FIFTY 50 YEARS
1969-2019

APSA
American Pediatric Surgical Association
Saving Lifetimes™

2019 Annual Meeting

May 19-22 | Boston, Massachusetts USA

Boston Marriott Copley Place | **#APSA50**

PROGRAM

eapsa.org

The City of Boston

PROCLAMATION

Whereas: *The City of Boston has a proud history of innovation and discovery in the medical field through research, education, teaching hospitals and partnering with our life sciences and medical devices companies; AND*

Whereas: *Boston is home to world-renowned hospitals such as Boston Children's Hospital, Floating Hospital for Children at Tufts, Massachusetts General Hospital staffed by some of the top pediatric surgeons in the world; AND*

Whereas: *The 50th Anniversary of the American Pediatric Surgical Association celebrates a nationwide commitment and the boundless efforts of all disciplines of pediatric surgery; AND*

Whereas: *The American Pediatric Surgical Association will meet and celebrate this milestone in Boston, Massachusetts, and carry forth their mission to ensure the optimal pediatric surgical care of patients and their families, to promote excellence in the field, and to foster a vibrant and viable community of pediatric surgeons; NOW*

Therefore: *I, Martin J. Walsh, Mayor of Boston, hereby proclaim May 19th, 2019 to be:*

American Pediatric Surgical Association Day

In the City of Boston

I encourage all my fellow Bostonians to show their support of APSA and their theme of "Saving Lifetimes" which highlights the immense impact of their profession.

Mayor of Boston
May 19, 2019

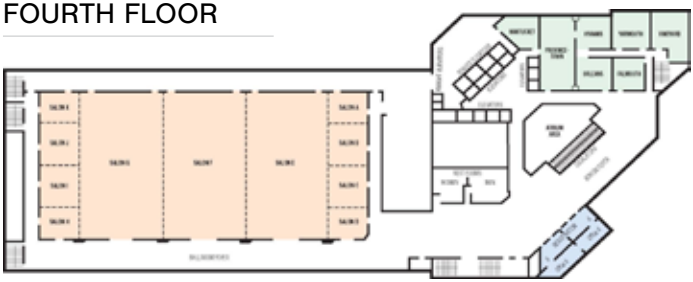
Boston Marriott Copley Place Floorplan

FIRST FLOOR

SECOND FLOOR

THIRD FLOOR

FOURTH FLOOR



FIFTH FLOOR

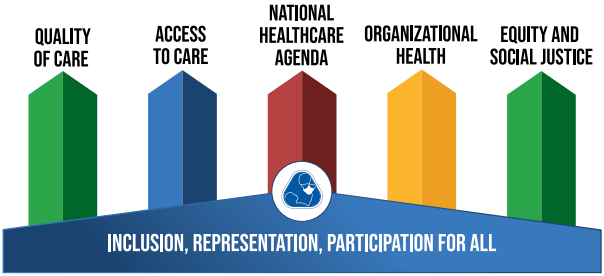
FIFTY 50 YEARS
1969-2019
APSA
American Pediatric Surgical Association
Saving Lifetimes™

American Pediatric Surgical Association Mission

To ensure optimal pediatric surgical care of patients and their families, to promote excellence in the field, and to foster a vibrant and viable community of pediatric surgeons.

We do this by:

- Developing and advocating for standards of care for infants and children and influencing public policy around the surgical care of children
- Encouraging discovery, innovation and improvement of care
- Providing rich venues for the dissemination of up-to-date knowledge
- Offering high quality continuing education to members
- Creating identity and community among pediatric surgeons
- Promoting a supportive health care environment for patients, staff and surgeons and making certain that it is sustained by economic health



APSA PILLARS

American Pediatric Surgical Association
Administrative Offices
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Fax: +1-847-686-2253
eapsa@eapsa.org | eapsa.org

Table of Contents

APSA Staff

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lclark@eapsa.org

Marina Petrulla
Administrative Director
mpetrulla@eapsa.org

Annie Cox
Administrator
acox@eapsa.org

Katherine Segreti
Administrator
ksegreti@eapsa.org

Liz Freyn
Conference Director
lfreyn@eapsa.org

Christine Meehan
Conference & Exhibits Manager
cmeehan@eapsa.org

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award@eapsa.org

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mgiliberto@eapsa.org

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rhardin@eapsa.org

Kyle Vermillion
Accountant
kvermillion@kellencompany.com

Marti Buckely
Order Processing Specialist
mbuckely@kellencompany.com

Governance

Board of Governors 2018 – 2019

Ronald B. Hirschl
President
2018-2019
734-764-6482
rhirschl@med.umich.edu

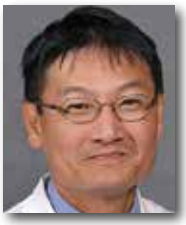
Gail E. Besner
Governor
2016-2019
614-722-3900
gail.besner@
nationwidechildrens.org

Joseph P. Vacanti
President-Elect
2018-2019
617-724-1725
jvacanti@partners.org

Jessica J. Kandel
Governor
2017-2020
773-702-6175
jkandel@surgery.bsd.
uchicago.edu

Henri R. Ford
Immediate Past President
2018-2019
305-243-9678
hford@med.miami.edu

Peter W. Dillon
Governor
2018-2021
717-531-8939
pdillon1@hmc.psu.edu



Mike K. Chen
Treasurer
2017-2020
205-638-9688
mike.chen@childrensal.org

David M. Powell
Strategic Project Officer
2018-2021
dmpowellmd@gmail.com

Max R. Langham, Jr.
Secretary
2018-2021
901-287-6300
mlangham@uthsc.edu

APSA Congratulates Incoming Board Members

John H.T. Waldhausen
Incoming President-Elect
2019-2020
206-987-1177
john.waldhausen@
seattlechildrens.org

Edward M. Barksdale, Jr.
Incoming Governor
2019-2022
216-844-3015
edward.barksdale@
UHhospitals.org

Past Presidents

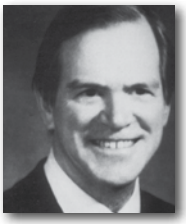
Robert E. Gross
1970-1971

Thomas M. Holder
1975-1976

C. Everett Koop
1971-1972

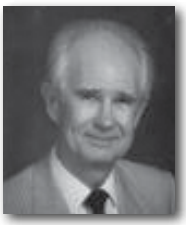
Alexander H. Bill
1976-1977

H. William Clatworthy, Jr.
1972-1973

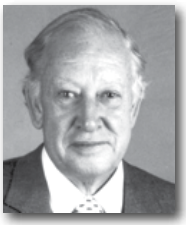


E. Thomas Boles, Jr.
1977-1978

Orvar Swenson
1973-1974



Morton M. Woolley
1978-1979



Harvey E. Beardmore
1974-1975

Robert G. Allen
1979-1980

Past Presidents (cont.)

Thomas V. Santulli
1980-1981

Dale G. Johnson
1985-1986

William B. Kiesewetter
1981

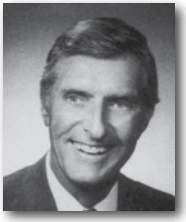
J. Alex Haller, Jr.
1986-1987

W. Hardy Hendren
1981-1983

Robert J. Izant, Jr.
1987-1988

Lester W. Martin
1983-1984

James A. O'Neill, Jr.
1988-1989



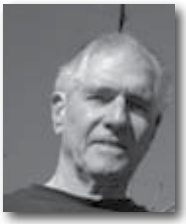
Judson G. Randolph
1984-1985

Eric W. Fonkalsrud
1989-1990

Past Presidents (cont.)

Robert M. Filler
1990-1991

Arvin I. Philippart
1995-1996



Alfred A. deLorimier
1991-1992

Keith W. Ashcraft
1996-1997

Dick G. Ellis
1992-1993

H. Biemann Othersen, Jr.
1997-1998

Raymond A. Amoury
1993-1994

Marc I. Rowe
1998-1999

Jay L. Grosfeld
1994-1995

Kathryn D. Anderson
1999-2000

Past Presidents (cont.)

David Tapper
2000-2001

M. Judah Folkman
2005-2006

Arnold G. Coran
2001-2002

Patricia K. Donahoe
2006-2007

R. Peter Altman
2002-2003

Moritz M. Ziegler
2007-2008

Bradley M. Rodgers
2003-2004

Michael R. Harrison
2008-2009

Robert J. Touloukian
2004-2005

Keith E. Georgeson
2009-2010

Past Presidents (cont.)

Marshall Z. Schwartz
2010-2011

Michael D. Klein
2014-2015

Robert C. Shamberger
2011-2012

Mary E. Fallat
2015-2016

Keith T. Oldham
2012-2013

Diana L. Farmer
2016-2017

Thomas M. Krummel
2013-2014

Henri R. Ford
2017-2018

Past Officers

Secretary

Thomas M. Holder 1970–1973
Dale G. Johnson 1973–1976
James A. O'Neill, Jr. 1976–1979
Robert J. Touloukian 1979–1982
Anthony Shaw 1982–1985
Raymond A. Amoury 1985–1988
Kathryn D. Anderson 1988–1991
Keith W. Ashcraft 1991–1994
Howard C. Filston 1994–1997
Keith T. Oldham 1997–2000
Robert M. Arensman 2000–2003
Donna A. Caniano 2003–2006
Ronald B. Hirschl 2006–2009
Diana L. Farmer 2009–2012
Mary L. Brandt 2012–2015
John H.T. Waldhausen 2015–2018

Treasurer

Alfred A. deLorimier 1970–1972
Lucian L. Leape 1972–1975
Robert G. Allen 1975–1978
Dick G. Ellis 1978–1981
J. Alex Haller, Jr. 1981–1984
Dick G. Ellis 1984–1987
William P. Tunell 1987–1990
Bradley M. Rodgers 1990–1993
Donald R. Cooney 1993–1996
Robert M. Arensman 1996–1999
Moritz M. Ziegler 1999–2002
Michael D. Klein 2002–2005
Neil J. Sherman 2005–2008
Dennis P. Lund 2008–2011
Charles J. Stolar 2011–2014
Daniel von Allmen 2014–2017

Governor

Federico A. Arcari 1970–1971
Robert J. Izant 1970–1972
Tague C. Chisholm 1971–1973
Robert G. Allen 1972–1974
Morton M. Woolley 1973–1975
Marc I. Rowe 1974–1976
George W. Holcomb, Jr 1975–1977
Eric W. Fonkalsrud 1976–1978
Dale G. Johnson 1977–1979
Lester W. Martin 1978–1980
Bernard J. Spencer 1979–1981
Harry C. Bishop 1980–1982
Judson G. Randolph 1981–1983
Robert M. Filler 1981–1984
Keith W. Ashcraft 1982–1985

Past Officers (cont.)

Alfred A. deLorimier 1983–1986
Jay L. Grosfeld 1984–1987
Robert T. Soper 1985–1988
H. Biemann Othersen, Jr 1986–1989
Robert J. Touloukian. 1987–1990
Arvin I. Philippart 1988–1991
Albert W. Dibbins 1989–1992
Patricia K. Donahoe 1990–1993
Arnold G. Coran 1991–1994
Moritz M. Ziegler 1992–1995
David Tapper 1993–1996
Eugene S. Wiener. 1994–1997
Samuel H. Kim 1995–1998
R. Peter Altman. 1996–1999
Michael D. Klein 1997–2000
Richard G. Azizkhan. 1998–2001
Thomas M. Krummel. 1999–2002
Keith E. Georgeson 2000–2003
Marshall Z. Schwartz 2001–2004
John Noseworthy 2002–2005
George W. Holcomb, III 2003–2006
Kurt D. Newman 2004–2007
Thomas F. Tracy 2005–2008
Robert C. Shamberger 2006–2009
Mary E. Fallat 2007–2010
Henri R. Ford 2008–2011
Fredrick J. Rescorla 2009–2012
Brad W. Warner 2010–2013
Kevin P. Lally. 2011–2014
Erik D. Skarsgard 2012–2015
Marleta Reynolds 2013–2016
David J. Schmeling. 2014–2017
Rebecka L. Meyers. 2015–2018

APSA Representatives

APSA members volunteer and hold positions within many professional organizations worldwide, and we commend their dedication to advancing the field of pediatric surgery. The list below consists of those representatives who have been elected, nominated or otherwise appointed by the APSA Board of Governors. We appreciate their time serving as official APSA representatives.

American Academy of Orthopaedic Surgeons

Writing panel of the Appropriate Use Criteria for Pediatric Supracondylar Humerus Fractures
Fizan Abdullah

Review panel of the Appropriate Use Criteria for Pediatric Supracondylar Humerus Fractures
Sara K. Rasmussen

American Academy of Pediatrics

SoSu Smart Tots Operations
Brian Kenney

American Board of Surgery

Pediatric Surgery Board
Marjorie J. Arca
John H.T. Waldhausen

American College of Radiology

Appropriateness Criteria Panel
Richard A. Falcone, Jr.

American College of Surgeons

Quality Assurance – Trauma
Joseph J. Tepas, III

Advisory Council for Pediatric Surgery

Specialty Society Representative
Robert Sawin

Young Surgeon Representative
Robert T. Russell

Board of Governors
Brad W. Warner

Central Line Task Force
Gary E. Hartman

Commission on Cancer
Kenneth W. Gow

American Medical Association

RUC Advisor
Richard G. Weiss

RUC Advisor Alternate
Samuel D. Smith

National Institute of Child Health and Human Development

National Advisory Committee
Charles S. Cox, Jr.

Trauma Center Association of America

Pediatric Committee
Michael L. Nance

Venous Access: National Guideline and Registry Development
Patrick J. Javid

APSA Committees 2018–2019

Anniversary/History ad hoc Committee

Louis M. Marmon, *Co-Chair*
lmarmon@childrensnational.org
Moritz M. Ziegler, *Co-Chair*
mmzieglermd@aol.com
William T. Adamson
Dean M. Anselmo
Marjorie J. Arca
Edward M. Barksdale, Jr.
Casey M. Calkins
Mike K. Chen
Henri R. Ford
Philip L. Glick
Ronald B. Hirsch
Dale G. Johnson
Michael D. Klein
Thomas M. Krummel
Steven L. Lee
Rebecka L. Meyers
Don K. Nakayama
David M. Powell
Robert C. Shamberger
Diana L. Farmer, *Ex Officio*

Women in Pediatric Surgery Subcommittee (Anniversary/History ad hoc Committee)
Mary E. Fallat, *Chair*
mefall01@louisville.edu
Kathryn D. Bass
Danielle S. Walsh

Visual Arts Subcommittee
Brad W. Warner, *Chair*
brad.warner@wustl.edu

Musical Arts Subcommittee
Troy A. Markel, *Chair*
tmarkel@iupui.edu

Historical Artifacts Subcommittee
Edward M. Barksdale, Jr., *Chair*
edward.barksdale@UHhospitals.org

Institutional Posters Subcommittee
Benedict C. Nwomeh, *Co-chair*
benedict.nwomeh@nationwidechildrens.org
Barbara A. Gaines, *Co-chair*
barbara.gaines@chp.edu

Audit

Michael J. Allshouse, *Chair*, 2017-2019
mallshouse@valleychildrens.org
Steven Stylianos, *Vice Chair*, 2017-2019
Philip L. Glick, 2016-2019
Joseph A. Iocono, 2018-2021
Dominique M. Jan, 2018-2021
Dennis P. Lund, 2016-2019
William Middlesworth, 2016-2019
David W. Bliss, *Ex Officio*, 2017-2020
Mike K. Chen, *Board Liaison*, 2017-2020

Benjy Brooks Committee on Women in Pediatric Surgery

Marion C.W. Henry, *Chair*
mcwhenry@surgery.arizona.edu
Erin E. Perrone, *Vice Chair*
Claudia N. Emami
Rohini K. Olson
Barrie S. Rich
Kimberly A. Ruscher
Allison L. Speer
Ala Stanford
Jennifer A. Timmons
Megan Vu
Mary E. Fallat, *Ex Officio*
Patricia K. Donahoe, *Ex Officio*
Diana L. Farmer, *Ex Officio*
Kathryn D. Anderson, *Ex Officio*

Bylaws

Joseph P. Vacanti, *Chair*, 2018-2019
jvacanti@partners.org
Adam C. Alder, 2016-2019
C. Thomas Black, 2017-2020
Paul D. Danielson, 2016-2019
Bryan J. Dicken, 2017-2020
Vincent P. Duron, 2018-2021
Peter F. Ehrlich, 2016-2019
Walt L. Pipkin, 2017-2020
Faisal G. Qureshi, 2018-2021
Rebecca M. Rentea, 2017-2020

Cancer

Roshni A. Dasgupta, *Chair*, 2017-2019
roshni.dasgupta@cchmc.org
Peter F. Ehrlich, *Vice Chair*, 2017-2019
Shahab F. Abdessalam, 2016-2019
Jennifer H. Aldrink, 2017-2020
Mary T. Austin, 2016-2019
Reto M. Baertschiger, 2017-2020
Jennifer L. Bruny, 2017-2020
Emily R. Christison-Lagay, 2018-2021

APSA Committees 2018–2019 (cont.)

Christa N. Grant, 2018-2021
Timothy B. Lautz, 2017-2020
Marcus M. Malek, 2016-2019
Stephanie F. Polites, 2017-2020
Daniel S. Rhee, 2017-2020
David A. Rodeberg, 2018-2021
Rebecca Stark, 2016-2019
Elisabeth T. Tracy, 2018-2021
Alicia M. Waters, 2017-2019
Rebecka L. Meyers, *Ex Officio*, 2016-2019
Max R. Langham, *Board Liaison*, 2018-2019

Childhood Obesity

Joy Collins, *Chair*, 2018-2020
jlcollins@carilionclinic.org
Mark L. Wulkan, *Vice Chair*, 2018-2020
Jeremy T. Aidlen, 2016-2019
Aleksander Bernshteyn, 2017-2020
Kanika A. Bowen-Jallow, 2017-2020
Sathyaprasad C. Burjonrappa, 2018-2021
Sandra M. Farach, 2017-2019
Jason D. Fraser, 2017-2020
Robert C. Kanard, 2016-2019
Charlotte Kvasnovsky, 2018-2020
David A. Lanning, 2018-2021
Tamar L. Levene, 2017-2020
Margaret McGuire, 2018-2021
Meghna V. Misra, 2018-2021
Evan P. Nadler, 2016-2019
Mikael Petrosyan, 2017-2020
Beth Walford, 2016-2019
Jeffrey L. Zitsman, 2016-2019
Mike K. Chen, *Board Liaison*, 2018-2019

Diversity, Equity and Inclusion Committee

Erika A. Newman, *Chair*, 2018-2020
eanewman@med.umich.edu
Cynthia Reyes, *Vice Chair*, 2018-2020
Hanna Alemayehu, 2018-2020
Kanika A. Bowen-Jallow, 2018-2019
Monica E. Lopez, 2018-2019
Sara A. Mansfield, 2018-2020
Colin A. Martin, 2018-2021
Kathryn L. Martin, 2018-2021
Paul K. Minifee, 2018-2020
Medo Mirza, 2018-2019
Zachary Morrison, 2018-2021
Robert J. Obermeyer, 2018-2019
Mary Catherine Santos, 2018-2021
Ala Stanford, 2018-2019
Sifrance Tran, 2018-2020
Jessica J. Kandel, *Board Liaison*, 2018-2019

Education Committee

Steven L. Lee, *Chair*, 2018-2021
StevenLee@mednet.ucla.edu
Eunice Y. Huang, *Vice Chair*, 2018-2021
Matias Bruzoni, 2016-2019
Brian A. Coakley, 2018-2021
Paul D. Danielson, 2018-2021
Diana L. Diesen, 2016-2019
Sherif G. S. Emil, 2017-2020
Erica M. Fallon, 2018-2021
Shinjiro Hirose, 2016-2019
Laura E. Hollinger, 2018-2021
Romeo C. Ignacio, 2013-2019
Brian A. Jones, 2017-2020
AndreaYan-Sin Lo, 2016-2019
Harold N. Lovvorn, 2016-2019
Grace Z Mak, 2016-2019
Jonathan A. Meisel, 2017-2020
Demetri J. Merianos, 2017-2020
Holly L. Neville, 2017-2020
Hannah G. Piper, 2015-2021
Pramod S. Puligandla, 2017-2020
Daniel M. Relles, 2018-2021
Julia S. Shelton, 2018-2021
Cathy E. Shin, 2017-2020
Eveline Shue, 2017-2020
Janice A. Taylor, 2017-2020
Christopher G. Turner, 2018-2021
Robert L. Weinsheimer, 2018-2021
Jill S. Whitehouse, 2015-2021
Benjamin Zendejas-Mummert, 2018-2021
Joseph P. Vacanti, *Board Liaison*, 2018-2019

Practicing Pediatric Surgeons Subcommittee

Pramod S. Puligandla, *Chair* 2019-2020
pramod.puligandla@mcgill.ca
Matias Bruzoni, 2019-2019
Brian A. Coakley, 2019-2021
Brian A. Jones, 2019-2020
Jonathan A. Meisel, 2019-2020
Julia S. Shelton, 2019-2021
Janice A. Taylor, 2019-2020

Patient and Family Subcommittee

Romeo C. Ignacio, *Chair*, 2015-2019
rcignacio@yahoo.com
Sherif G. S. Emil, 2018-2020
Laura Hollinger, 2018-2021
Andrea Yan-Sin Lo, 2018-2019
Hannah G. Piper, 2015-2021
Eveline Shue, 2018-2020
Janice A. Taylor, 2018-2020

APSA Committees 2018–2019 (cont.)

Simulation Subcommittee
Diana L. Diesen, 2018-2019
dld5b@hotmail.com

Student and Resident Education Subcommittee
Grace Z Mak, *Chair*, 2018-2019
gmak@surgery.bsd.uchicago.edu
Andrea Yan-Sin Lo, 2018-2019
Jonathan A. Meisel, 2018-2020
Demetri J. Merianos, 2018-2020
Holly L. Neville, 2018-2020
Janice A. Taylor, 2018-2020
Jill S. Whitehouse, 2015-2021

Ethics Committee

Deborah S. Loeff, *Chair*, 2018-2020
dsloeff@gmail.com
Patrick J. Javid, *Vice Chair*, 2018-2020
Begum Akay, 2018-2021
Carlos A. Angel, 2017-2020
Charles E. Bagwell, 2018-2021
Elizabeth A. Berdan, 2018-2021
Erica M. Carlisle, 2017-2020
Kaveer Chatoorgoon, 2018-2021
Kristine S. Corkum, 2018-2020
Eric Grossman, 2018-2021
Catherine J. Hunter, 2017-2020
Sidney Johnson, 2016-2019
Sarah A. Jones-Sapienza, 2015-2020
William Middlesworth, 2016-2019
Claudia M. Mueller, 2013-2019
Konstantinos Papadakis, 2016-2019
Elliot C. Pennington, 2018-2021
Mindy B. Statter, 2018-2021
Veronica F. Sullins, 2017-2020
Henri R. Ford, *Board Liaison*, 2017-2019

Fetal Diagnosis and Treatment Committee

Shinjiro Hirose, *Chair*, 2018-2020
shirose@ucdavis.edu
Rony Marwan, *Vice Chair*, 2018-2020
Fuad Alkhoury, 2018-2021
Brian W. Gray, 2018-2021
Eric B. Jelin, 2017-2020
Amanda Jensen, 2017-2019
Sundeep G. Keswani, 2018-2021
Mitchell R. Ladd, 2018-2020
Oluyinka O. Olutoye, 2018-2021
Erin E. Perrone, 2016-2019
David T. Schindel, 2017-2020
Avraham Schlager, 2016-2019
Charles J. Smithers, 2016-2019
Shaun A. Steigman, 2017-2020
David Stitelman, 2017-2020
Jesse Vrecenak, 2018-2021
Raphael Sun, 2018-2021
Friend of the Committee
Max R. Langham, *Board Liaison*, 2018-2019

Global Pediatric Surgery

J. Ted Gerstle, *Chair*, 2018-2020
gerstlej@mskcc.org
Tamara Fitzgerald, *Vice Chair*, 2018-2020
Marilyn W. Butler, 2016-2019
Muriel A. Cleary, 2018-2021
Michael R. Curci, 2018-2021
Daniel DeUgarte, 2015-2021
Philip K. Frykman, 2016-2019
Michael Ganey, 2015-2021
Sarah L. M. Greenberg, 2018-2021
Ivan M. Gutierrez, 2018-2021
Gerald M. Haase, 2018-2021
Erik N Hansen, 2016-2019
Sanjay Krishnaswami, 2016-2019
John P. Lawrence, 2017-2020
Donald E. Meier, 2014-2019
Zaria C. Murrell, 2016-2019
Bindi Naik-Mathuria, 2018-2021
Victor N. Ortiz-Justiniano, 2018-2021
Doruk E. Ozgediz, 2012-2019
Robin T. Petroze, 2017-2019
Henry E. Rice, 2017-2020
Shant Shekherdimian, 2018-2021
Jorge E. Uceda, 2017-2020
Francisca T. Velcek, 2018-2021
Megan Vu, 2018-2020
Ai-Xuan L. Holterman, *Ex Officio*, 2018-2019
Joseph P. Vacanti, 2018-2019
Board Liaison

Health Policy and Advocacy

Marion C. Henry, *Chair*, 2017-2019
mcwhenry@surgery.arizona.edu
Kathryn D. Bass, *Vice Chair*, 2017-2019
William T. Adamson, 2018-2021
Marybeth Browne, 2018-2021
Mike K. Chen, 2016-2019
Brian A. Coakley, 2017-2020
Cynthia D. Downard, 2017-2020
Audrey C. Durrant, 2017-2020
Loretto A. Glynn, 2018-2021
Kenneth W. Gow, 2018-2021
Mary L. Hilfiker, 2017-2020
Byron D. Hughes, 2018-2020

APSA Committees 2018–2019 (cont.)

J. Leslie Knod, 2017-2020
Julius Lister, 2017-2020
Thomas Pranikoff, 2018-2021
Kimberly A. Ruscher, 2017-2020
Patrick Bailey, *Ex Officio*
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Matthew S. Clifton, 2014-2019
Sanjeev Dutta, 2018-2021
Carroll M. Harmon, 2016-2019
Thomas H. Inge, 2016-2019
Marc A. Levitt, 2017-2019
Robert J. Obermeyer, 2018-2021
Richard H. Pearl, 2016-2019
Payam Saadai, 2017-2020
Sean C. Skinner, 2017-2020
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Celeste Hollands, 2017-2020
Eugene S. Kim, 2016-2019
Jonathan Kohler, 2017-2020
Aaron P. Lesher, 2016-2019
Francois I. Luks, 2016-2019
Barry M. Newman, 2017-2020
Samir R. Pandya, 2016-2019
Alexander Peters, 2018-2020
Jamie R. Robinson, 2018-2020
Steven S. Rothenberg, 2013-2019
Bethany J. Slater, 2016-2019
Allison L. Speer, 2017-2020
Benjamin D. Tabak, 2017-2020
Edward P. Tagge, 2016-2019
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Shaun M. Kunisaki, 2017-2020
Sean E. McLean, 2018-2021
Nathan M. Novotny, 2018-2021
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Bill Chiu, 2018-2021
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Anne C. Fischer, 2018-2021

APSA Committees 2018–2019 (cont.)

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Jamie Golden, 2017-2019
Tracy C. Grikscheit, 2017-2020
Scott S. Short, 2017-2020
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Laura A. Boomer, 2017-2020
Nikunj K. Chokshi, 2018-2021
Michael W. Dingeldein, 2016-2019
Natalie A. Drucker, 2017-2019
Michael M. Fuenfer, 2018-2021
Alejandro Garcia, 2017-2020
Michaela C. Kollisch-Singule, 2018-2020
Carrie Ann Laituri, 2017-2020
Christopher R. Newton, 2016-2019
Howard I. Pryor, 2018-2021
Samuel E. Rice-Townsend, 2017-2020
Jason O. Robertson, 2018-2021
Sabina M. Siddiqui, 2017-2020
Arunachalam Thenappan, 2018-2021
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Melissa Danko, 2018-2021
John M. Draus, 2018-2021
Annie H. Fecteau, 2016-2019
Colleen M. Fitzpatrick, 2017-2020
Grant H. Geissler, 2018-2021
Richard D. Glick, 2016-2019
Raquel Gonzalez, 2017-2020
Akemi L. Kawaguchi, 2017-2020
Matthew P. Landman, 2017-2020
Patricia Lange, 2018-2021
Monica E. Lopez, 2017-2020
Peter Mattei, 2018-2021
Erik G. Pearson, 2017-2020
Juan C. Pelayo, 2017-2020
Elizabeth J. Renaud, 2016-2019
Jose Ruben Rodriguez, 2018-2021
Jessica L. Roybal, 2016-2019
Jacqueline M. Saito, 2016-2019
Stephen B. Shew, 2018-2021
Derek S. Wakeman, 2018-2021
Ryan Walk, 2018-2021
Kristen A. Zeller, 2016-2019
Marybeth Browne, *Ex Officio*, 2017-2019
Adam B. Goldin, *Ex Officio*, 2017-2019
Kurt F. Heiss, *Ex Officio*, 2015-2019
Shawn J. Rangel, *Ex Officio*, 2016-2019
David E. Skarda, *Ex Officio*, 2017-2019
Shawn D. St. Peter, *Ex Officio*, 2017-2019
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Vincent P. Duron, 2016-2019
Mauricio A. Escobar, 2016-2019
David L. Gibbs, 2013-2019
Yosef J. Greenspon, 2018-2021
Harsh Grewal, 2016-2019
Brian Gulack, 2017-2019
Mubeen Jafri, 2018-2021
Aaron R. Jensen, 2017-2020
Stephanie A. Jones, 2018-2021
Alfred P. Kennedy, 2018-2021
Denise B. Klinkner, 2018-2021
Ann M. Kulungowski, 2018-2021
Shannon Wright Longshore, 2018-2021
Jessica A. Naiditch, 2017-2020
Mitchell R. Price, 2016-2019
Carmen T. Ramos, 2016-2019
Robert T. Russell, 2016-2019
Kennith Sartorelli, 2018-2021
Anthony Stallion, 2016-2019
Jacob T. Stephenson,2016-2019
Adam M. Vogel, 2016-2019
Kim Wallenstein, 2016-2019
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Brian W. Gray, 2017-2020
Patrick Healey, 2018-2021
Richard J. Hendrickson, 2016-2019
Sarah A. Jones-Sapienza, 2016-2019
Kimberly M. Lumpkins, 2017-2020
Abigail E. Martin, 2015-2021
Michael Phillips, 2018-2021
Faisal G. Qureshi, 2018-2021
Shawn D. Safford, 2017-2020
Stefan Scholz, 2018-2021
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APSA Foundation

APSA FOUNDATION

In 1991, a small group of APSA members led by Dr. Albert H. Wilkinson, Jr., of Jacksonville, Florida, discussed establishing a foundation for APSA to foster support for scientific investigation in the field of children's surgery by providing an Annual Grant to qualified applicants. Led by Dr. Jay Grosfeld, the APSA Foundation has provided funding to more than 30 young pediatric surgeon-scientists. The return on investment has been extraordinary! The grants were renamed the Jay Grosfeld, MD Scholar Grants in 2017 to honor Dr. Grosfeld's contributions.

With the election of Dr. Thomas Krummel as chair, the APSA Foundation continues to invest in the future of pediatric surgery through its grant programs — and not only in the United States and Canada, but throughout the world by supporting the Travel Fellow program. In 2016 the Foundation, together with APSA, extended its support to other international pursuits in an effort to identify and address children's surgical needs throughout the resource-poor countries in the world. Over its lifetime, the Foundation has raised more than $1,000,000 in donations and provided almost $700,000 in research grants. Fifty percent of APSA members have donated to the Foundation over the years.

Make plans to visit with the APSA Foundation board about the direction of the organization and future plans. Thank you for all you do for pediatric surgery and especially for what your next gift to the APSA Foundation can achieve in the future!

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Intestinal Ischemia Reperfusion Injury Contributes to the Initiation of the Systemic Inflammatory Response Syndrome
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Harmel, Richard P.
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Haynes, Jeffrey H.
Hearne, Linda
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Henderson, Bruce M.
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Morton, Duncan
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Rowell, Erin E.
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Saenz, Nicholas C.
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SanFilippo, J. Anthony
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Shaker, Issam J.
Sharp, Lana
Shilyansky, Joel
Shim, Walton K. T.
Shochat, Stephen J.
Shrock, Peter
Sieber, William K.
Sigalet, David L.
Signer, Richard D.
Skarsgard, Erik D.
Smith, E. Ide
Smith, Melvin D.
Smith, Samuel D.
Sneider, Erica
Snyder, Howard M.
Sola, Juan E.
Sonnino, Roberta E.
Spiegel, David A.
Stafford, Perry W.
Stallion, Anthony
Statter, Mindy B.
Stehr, Wolfgang
Steichen, Felicien M.
Stevenson, Richard J.
Stone, Marshall M.
Stovroff, Mark C.
Stringel, Gustavo L.
Swank, Ralph L.
Tagge, Edward P.
Tamura, Douglas Y.
Telander, Robert L.
Ternberg, Jessie L.
Thayer, Kristine J.
Thelen, Phyllis
Thompson, W. Raleigh
Towne, Barbara H.
Trump, David S.
Tsao, KuoJen
Tully, Nancy
Uceda, Jorge E.
Uffman, John K.
Uitvlugt, Neal D.
Upp, James Robert
Vacanti, Joseph P.
Valda, Victor
Wahoff, David C.
Walburgh, C. Eric
Walker, Andrew B.
Walsh, Danielle S.
Webb, Howard Warner
Weidner, Bryan C.
Weissberg, Alan
Weitzman, Jordan
White, John J.
Williams, Regan F.
Wilson, Jay Mark
Wolf, Stephen A.
Wong, Andrew L.
Woo, Russell K.
Wood, Gail
Woolley, Morton M.
Wosser, Ruth
Wrenn, Earle L.
Yamataka, Atsuyuki
Yedlin, Steven
Yokoi, Akiko
Zeller, Kristen A.
Zerella, Joseph

Membership

Award Recipients

APSA Distinguished Service Award

APSA's highest honor, the Distinguished Service Award is given in recognition of a lifetime commitment to, and wide-reaching impact on, the field of pediatric surgery. It has only been awarded a handful of times in the organization's history.

David M. Powell, MD – 2017
Patricia K. Donahoe, MD – 2016
Jay L. Grosfeld, MD – 2013
W. Hardy Hendren, MD – 2007
Harvey E. Beardmore, MD – 2004
Lucian L. Leape, MD
Thomas M. Holder, MD
Marc I. Rowe, MD
Stephen L. Gans, MD

Robert E. Gross Award for Excellence in Pediatric Research and Achievement

The award recognizes a seminal contribution by an individual who has made a major impact on pediatric surgery.

Alberto Peña, MD – 2018
Michael R. Harrison, MD – 2016
Robert Bartlett, MD – 2015
Bradley M. Rodgers, MD – 2014

ACS/APSA Executive Leadership Program in Health Policy and Management Scholarship Award

The American College of Surgeons and the American Pediatric Surgical Association offer an annual scholarship to subsidize attendance and participation in the Executive Leadership Program in Health Policy and Management at Brandeis University.

Marion C. W. Henry, MD, MPH – 2018
Shawn D. St. Peter, MD – 2017
David P. Bliss, Jr., MD – 2016
Mike K. Chen, MD – 2015
Max R. Langham, Jr., MD – 2014
Steven Teich, MD – 2013
Peter W. Dillon, MD – 2012
Patrick V. Bailey, MD – 2011
Aviva L. Katz, MD – 2010
Dennis P. Lund, MD – 2009
George W. Holcomb, III, MD – 2008

APSA/Association of Pediatric Surgery Training Program Directors M. Judah Folkman Memorial Award

Awarded to two outstanding research presentation given by residents. Judging is based on scientific merit and actual presentations.

2018

Basic Science
Caroline Maloney, MD
Surgery Accelerates the Development of Pulmonary Metastases in a Mouse Model of Osteosarcoma and is Attenuated by Perioperative Treatment with Gefitinib

Clinical Science
Amy E. Lawrence, MD
The Relationship Between Operative Volume And Outcomes in Esophageal Atresia

2017

Basic Science
Patrick E. McGovern, MD
Neuroprotection and Development in Extremely Premature Lambs Supported on the Extracorporeal Environment for Neonatal Development (Extend) Device

Clinical Science
Brenna Sullivan Fullerton, MD
Severe Neurodevelopmental Disability and Healthcare Needs Among Survivors of Medical and Surgical Necrotizing Enterocolitis - a Prospective Cohort Study

2016

Basic Science
Megan Berger, MD
Outcomes of Total Pancreatectomy and Islet Autotransplantation in Young Children

Clinical Science
Simone Langness, MD
Low D-Dimer Predicts the Absence of Intracranial Hemorrhage in Pediatric Blunt Head Trauma

Award Recipients (cont.)

2015
Basic Science
Baddr A. Shakhsheer, MD
Host and Bacterial Factors Cooperatively Disrupt Healing of Intestinal Anastomoses

Clinical Science
Barrett P. Cromeens, DO, PhD
Implementation of a Pediatric Surgical Quality Improvement (QI)-Directed M&M Conference

2014
Basic Science
Connie H. Keung, MD
Propranolol as a Novel Therapy for Lymphatic Malformations

Clinical Science
Blair A. Wormer, MD
Home Intravenous Versus Oral Antibiotics Following Appendectomy for Perforated Appendicitis, a Randomized Controlled Trial

Best Podium Presentation

2013
Basic Science
Eric D. Girard, MD
Amniotic Fluid Stem Cells in a Bioengineered Scaffold: a New Frontier in Patient Specific Therapy for Premature Lung Disease

Clinical Science
Ryan P. Cauley, MD
Higher Costs Charges and Resource Utilization do not Affect Survival in Congenital Diaphragmatic Hernia

2012
Amar Nijagal, MD
Fetal Intervention Triggers the Activation of Paternal Antigen-Specific Maternal T Cells

2011
Amar Nijagal, MD
The Maternal Adaptive Immune Response Against Paternal Antigens Incites Fetal Demise After Fetal Intervention

2010
Mehul V. Raval, MD
Pediatric ACS NSQIP: Feasibility of a Novel Prospective Assessment of Surgical Outcomes — a Phase I Report

2009
Eric Jelin, MD
Effects of Notch4 on Lung Vascular Remodeling

2008
Emily T. Durkin, MD
The Ontogeny of Human Fetal NK Cell Allorecognition: A Potential Barrier to *in Utero* Transplantation

Best Poster Presentation

2012
Eric J. Stanelle, MD
Pediatric Synovial Sarcoma: Prognostic Factors, Management of Pulmonary Metastasis, and Survival Outcomes

2011
Barrie S. Rich, MD
Predictors of Survival in Childhood and Adolescent Cutaneous Melanoma

2010
Allison L. Speer, MD
Tissue-Engineered Esophagus is a Versatile *in Vivo* Mouse Model with Intact Architecture

2009
Laura A. Boomer, MD
Cholangiocyte Apoptosis During Lamprey Metamorphosis

2008
Henry L. Chang, MD
In Vivo Metastatic/Invasion Assay to Identify Cancer Stem Cells and their Markers

Award Recipients (cont.)

Innovation Award
Recognizes one outstanding innovation abstract presented in the Innovation Session at the annual meeting. From 2011 to 2016 this award was generously funded by the Sheikh Zayed Institute for Pediatric Surgical Innovation.

2018
Robert Cina, MD
Expert Outpatient Burn Care in the Home Through Mobile Health Technology

2017
Nhan T. Huynh, MD
Three-Dimensionally Printed Surface Features to Anchor Endoluminal Spring for Distraction Enterogenesis

2016
Matthew A. Hornick, MD
Toward Physiologic Extracorporeal Support of the Premature Infant: Umbilical Cord Cannulation Provides Superior Oxygenator Flows, Oxygen Delivery and Hemodynamic Stability

Edward Hannon, MBChB, MRCS
Xenogeneic Decellularized Oesophageal Transplantation is Achievable in a Large Animal Model

2015
Maxime M. Mahe, PhD
Generation of Functional Intestine from Patient Derived Pluripotent Stem Cells

2014
Shahab Shaffiey, MD
Generation of an Artificial Intestine and Validation in Dogs: a Proof-of-Concept Study

2013
Veronica F. Sullins, MD
A Novel Biodegradable Device for Intestinal Lengthening

2012
Sabina Siddiqui, MD
Development of an Isolation Bed for Patients Undergoing MIBG Treatment for Neuroblastoma

2011
Maridelle B. Millendez, MD
Evaluation of Intestinal Viability Using 3-CCD (Charge Coupled Device) in Children Undergoing Appendectomy

APSA Quality, Safety and Value Award in Surgery
Awarded to the manuscript that best demonstrates quality improvement principles, patient safety initiatives and/or addresses the value proposition by demonstrating an improvement in outcomes while at the same time reducing cost or other measures of resource utilization.

2018
Beatrix Hyemin Choi, MD
Simple Preoperative Radiation Safety Interventions Significantly Lower Radiation Doses During Central Venous Line Placement in Children

2017
Andrew Nordin, MD
Effective Methods to Decrease Surgical Site Infections in Pediatric Gastrointestinal Surgery

2016
Jamie R. Robinson, MD
Measuring The Value Of A Clinical Practice Guideline For Children With Perforated Appendicitis

Award Recipients (cont.)

2015
No award was presented in 2015.

2014
Kathy Schall, MD
A Dynamic Discharge Protocol Provides Efficient Care for Uncomplicated Appendicitis

Jason W. Nielsen, MD
Nationwide Children's Hospital, Columbus, OH
Reducing CT Scans for Appendicitis by Increasing the Diagnostic Accuracy of Ultrasonography

APSA Posters of Distinction

Awarded to two outstanding poster presentations in Clinical and Basic Science.

Basic Science

2017
Christine Finck, MD
Esophageal Scaffolds Seeded with Epithelial Cells for Esophageal Replacement Therapy

2016
Julie Monteagudo, MD
Ex Vivo Comparison of Extracorporeal Membrane Oxygenation Circuits and Cannulae to Evaluate Sources of Hemolysis

2015
Elizabeth Clark, DVM
Characterization of Tissue Engineered Tracheal Grafts in an Ovine Model

2014
Catherine J. Hunter, MD
Defining the Role of Protein Kinase A and Apoptosis in Necrotizing Enterocolitis

2013
Leo Andrew O. Benedict, MD
Spinal Cord Expression of Virally Derived Mullerian Inhibiting Substance Extends Life and Promotes Survival of Motor Neurons in Transgenic SOD1 Mutant Mice

2012
Syamal D. Bhattacharya, MD
Temporal Relationships Between Positive Urine Culture and Onset of Necrotizing Enterocolitis

2011
R. Dawn Fevurly, MD
Novel Zebrafish Model Reveals Critical Role for MAPK in Lymphangiogenesis

2010
Hayden W. Stagg, MD
Matrix Metalloproteinase-9 Induces Hyperpermeability Following Traumatic Burn Injury

2009
Francois I. Luks, MD
Reflectance Spectrometry for Realtime Hemoglobin Determination of Placental Vessels During Endoscopic Laser Surgery for TTTS

Clinical Science

2017
Joseph Church, MD
Avalon Catheters in Pediatric Patients Requiring ECMO: Placement and Migration Issues

2016
Daniel L. Lodwick, MD, MS
Lymphocyte Depression and Postoperative Abscess after Appendectomy in Children

2015
Yinin Hu, MD
Cumulative Sum: an Individualized Proficiency Metric for Laparoscopic Fundamentals

2014
Cerine Jeanty, MD
Procedural Management of Cholelithiasis in Infants Under One Year of Age

Award Recipients (cont.)

2013
Deidre C. Kelleher, MD
Impact of a Checklist on ATLS Task Performance During Pediatric Trauma Resuscitation

2012
Alejandro Garcia, MD
The Role of Notch Inhibition in a Novel Hepatoblastoma Orthotopic Model

2011
Jesse R. Gutnick, MD
Circulating Thyrotropin Receptor MRNA for Evalution of Thyroid Nodules and Surveillance of Thyroid Cancer

2010
Diana L. Diesen, MD
Temporal Association Between Blood Transfusion and Necrotizing Enterocolitis in Premature Infants

2009
Henry L. Chang, MD
Mullerian Inhibiting Substance Inhibits Migration of Epithelial Cancer Cell Lines

Travel Fellowship

APSA and the APSA foundation support the Travel Fellow Scholarship. This program was previously funded with a generous grant from the Sidra Medical Research Center. It was designed to recognize pediatric surgeons from countries that do not enjoy the same quality of medical care, and to give young pediatric surgeons the opportunities to learn from their counterparts in APSA.

2019
Santosh Mahalik, MD
All India Institute of Medical Sciences, Bhubaneswar, India

Tunde Sholadoye, MD
Admadu Bello University Teaching Hospital, Kaduna, Nigeria

2018
Sohail Dogar, MD
Pediatric Surgery and the Healthcare System in Pakistan
The Indus Hospital, Karachi, Pakistan

Oluwaseun Ladipo-Ajayi, MD
Giving Respite from the Bite: Neonatal Care Challenges in a Developing Country
University of Lagos College of Medicine, Lagos, Nigeria

2017
Martin Situma, MD
Development of a Pediatric Surgical Unit in a Resource-Constrained Setting in Western Uganda
Mbarara University of Science & Technology, Mbarara, Uganda

Sushil Dhungel, MD
Pediatric Surgical Specialty in Nepal: Then and Now
Western Regional Hospital, Pokhara Nepal

2016
Christian País, MD
Military Hospital-Ecuador
Quito, Ecuador
Pediatric Surgery, My “Axis of Action”

Esther Saguil, MD
College of Medicine, University of the Philippines
Manila, Philippines
The Practice of Pediatric Surgery in the Philippines

2015
Opeoluwa Adesanya, MBBS
Federal Medical Centre, Abeokuta
Ogun State, Nigeria
Pediatric Surgery in Nigeria — Defying the Odds

Tiyamike Chilunjika, MBBS
COSECSA, Queen Elizabeth Central Hospital
Blantyre, Malawi
Pediatric Surgery in Malawi

Award Recipients (cont.)

2014

John K.M. Nyagetuba, MB, ChB
Bethany Kids at Kijabe Hospital
Nairobi, Kenya
Paediatric Surgery in Kenya: Challenges and Solutions

Tran Anh Quynh, MD, PhD
National Hospital of Pediatrics
Hanoi, Vietnam
The Development of Vietnam Pediatric Surgery

2013

Omolara Williams, MD
Lagos State University College of Medicine and Lagos State University
Teaching Hospital, Ikeja, Lagos, Nigeria
Practicing in a Resource Constrained Environment: Stumbling Blocks and Stepping Stones

New Members 2018-2019

The APSA Board of Governors and Membership Congratulates our Newest Members

April 2018 - April 2019

Regular Members
Laura A. Boomer
Andrew P. Bozeman
Ann-Christina Brady
Rebecca Brocks
Brian T. Bucher
Nikunj K. Chokshi
Brian A. Coakley
Katherine P. Davenport
Megan K. Fuller
Paul M. Jeziorczak
David A. Klima
Erol M. Knott
David A. Lazar
Hau D. Le
Louis D. Le
Franklin C. Margaron
Margaret McGuire
Anthony J. Munaco
Andrew J. Murphy
Adrianne L. Myers-Webb
Jessica A. Naiditch
Tate R. Nice
Grace A. Nicksa
Tolu Oyetunji
Eric G. Pearson
Juan C. Pelayo
Payam Saadai
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Eveline Shue
Mark Slidell
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Augusto Zani

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Candidate Members
Paulette Abbas
Mohammed Ageel
Marielena Bachier-Rodriguez
Erin G. Brown
Stewart R. Carter
Iijana M. Gaffar
Katherine Gonzalez
Sarah Greenberg
Cornelia Griggs
Candace Haddock
Afif N. Kulaylat
Linda Li
Allison Linden
Michael L. Megison
Julie Monteagudo
Baddr Shakhsheer
Yan Shi
Paul K. Waltz
Irving J. Zamora

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Alejandra M. Casar Berazaluce
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Michaela Gaffley
Colin Gause
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Xiao-Yue Han
Rachel Hanke
Calista M. Harbaugh
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Brian Hosfield
Jeremy D. Kauffman
Samantha W. E. Knight
Abby C. Larson
Adil J. Malek
Patrick E. McGovern
Zachary Morrison
Omar Nunez Lopez
Frances C. Okolo
Natalie A. O'Neill
Hector Osei
Richard Overman
Numa P. Perez
Ryan Phillips
Liese Pruitt
Kate B. Savoie
Ishna Sharma
Rita D. Shelby
Melissa Suh
Mark A. Taylor
Paul Truche
Sarah Ullrich
Alan F. Utria
Jonathan C. Vacek
Megan Vu
Maggie Westfal
Nicholas Yung

New Members 2018–2019

Pledge for New Members of the American Pediatric Surgical Association

This pledge will be read before the New Member Induction Ceremony.

As president of the American Pediatric Surgical Association, it is my pleasure to welcome you into regular membership and to stress the obligations that you assume by such membership.

The American Pediatric Surgical Association was founded on April 15, 1970, by 200 surgeons drawn together to encourage specialization in the field of pediatric surgery; to make available the benefits to be derived from the services of qualified pediatric surgeons; to promote and maintain the quality of education in pediatric surgery through meetings, lectures and the distribution of printed materials; to raise the standards of the specialty by fostering and encouraging research and scientific progress in pediatric surgery and by establishing standards of excellence in the surgical care of infants, children and teenagers; and to provide a forum for the dissemination of information with regard to pediatric surgery.

The association expects its new members to support the objectives and obligations of the association as set forth in the Articles of Incorporation and to reflect the values expressed in the Principles of Medical Ethics as stated in the Preamble to the Bylaws. The members are also expected to support the association through active participation in its meetings. We look forward to your contributions in advancing its proud traditions.

If you pledge to exemplify the high ethical and professional standards of the American Pediatric Surgical Association in your practice of surgery, and if you will participate actively in future meetings, please respond by stating "I will." Since you have indicated your intent to become an active and worthy member and since you have been duly elected, I now declare you to be a regular member of the American Pediatric Surgical Association.

I now call upon the current members and guests of the American Pediatric Surgical Association to rise and join me in welcoming our new colleagues.

In Memoriam 2018–2019

David Miller, 2019
Michael Irish, 2019
Daniel J. Ledbetter, 2019
William L. Donnellan, 2019
C. Peter Crowe, Jr., 2019
Cedric J. Priebe, Jr., 2019
Patrick F. Jewell, 2018
Richard C. Miller, 2018
J. Alex Haller, Jr., 2018
E. Thomas Boles, Jr., 2018
John R. Maddox, 2018

Founding Members

Fred Arcari, Royal Oak, MI
E. Thomas Boles, Columbus, OH
John L. Cahill, Indian Wells, CA
John R. Campbell, Portland, OR
Alfred A. de Lorimier, Geyserville, CA
Frank G. DeLuca, Barrington, RI
Robert M. Filler, Toronto, ON, Canada
Eric W. Fonkalsrud, Santa Monica, CA
Edward A. Free, Prescott, AZ
Dale G. Johnson, Salt Lake City, UT
Peter K. Kottmeier, Rutledge, TN
Lucian L. Leape, Boston, MA
Julius Lister, Framingham, MA
John Raffensperger, Sanibel, FL
Mark I. Rowe, Sanibel, FL
William K. Sieber, Yerona, PA
Robert T. Soper, Iowa City, IA
James A. Talbert, Gainesville, FL
Edward S. Tank, Portland, OR

Charter Members

Raymond A. Amoury, Kansas City, MO
H. Paulsen Armstrong, Baton Rouge, LA
A. Robert Beck, New York, NY
Jerrold M. Becker, New Hyde Park, NY
Clifford R. Boeckman, Salem, SC
Scott J. Boley, Bronx, NY
William E. Bomar, Gray Court, SC
Benjy Brooks, Houston, TX
John D. Burrington, Colorado Springs, CO
John L. Cahill, Indian Wells, CA
Walter S. Cain, Birmingham, AL
Gordon S. Cameron, Dunas, ON, Canada
Daniel T. Cloud, Phoenix, AZ
David L. Collins, San Diego, CA
Elizabeth Coryllos, Mineola, NY
C. Peter Crowe, Tucson, AZ
Joseph S. David, Eagle, ID
Jean G. DesJardins, Saint-Laurent, QC, Canada
Pieter A. deVries, Larkspur, CA
George W. Dorman, Prescott, AZ
Jacques C. Ducharme, Mont Royal, QC, Canada
Dick G. Ellis, Fort Worth, TX
John H. Fisher, Marshfield, MA
Eric W. Fonkalsrud, Santa Monica, CA
Eugene Garrow, Jersey City, NJ
Marvin Glicklich, Fox Point, WI
Leonard Graivier, Dallas, TX
J. Alex Haller, Jr., Glencoe, MD
Daniel M. Hays, Riverside, CA
Bruce M. Henderson, Corpus Christi, TX
W. Hardy Hendren, Duxbury, MA
Jack H. Hertzler, Franklin, MI
George W. Holcomb, Nashville, TX
Thomas M. Holder, Prairie Village, KS
James W. Hopkins, Windsor Heights, IA
George A. Hyde, Horare, Avondale, Zimbabwe
Patrick F. Jewell, Lincoln, CA
Frank R. Johnson, Frankfort, MI
Kenneth Kenigsberg, Glen Cove, NY
William N. Kincannon, Santa Barbara, CA
Murray R. Kliman, Vancouver, BC, Canada
Charles H. Klippel, Paxton, MA
Irwin H. Krasna, Forest Hills, NY
Dennis J. Lafer, Jacksonville, FL
J. Eugene Lewis, St. Louis, MO
Peter S. Liebert, White Plains, NY
Hugh B. Lynn, Winchester, VA
Enrique Marquez, San Juan, PR
Lester W. Martin, Bellbrook, OH

Charter Members (cont.)

R. W. Paul Mellish, Dhahran, Saudi Arabia
Ascher L. Mestel, Brooklyn, NY
Richard C. Miller, Jackson, MS
David R. Murphy, Kingston, ON, Canada
James A. O'Neill, Jr., Nashville, TN
H. Biemann Othersen, Charleston, SC
Cedric J. Priebe, Stony Brook, NY
Thomas C. Putnam, Rockland, ME
Judson Randolph, Nashville, TN
Lester R. Sauvage, Seattle, WA
Louise Schnaufer, Philadelphia, PA
John N. Schullinger, Woodstock, VT
Lloyd Schultz, Omaha, NE
Samuel R. Schuster, Westboro, MA
Alan D. Shafer, Dayton, OH
Barry Shandling, Toronto, ON, Canada
Anthony Shaw, Pasadena, CA
Walton K.T. Shim, Honolulu, HI
Laurence A. Somers, Lafayette Hill, PA
Bernard J. Spencer, Sanibel Island, FL
Rowena Spencer, New Orleans, LA
Nicholas M. Stahl, Charlestown, RI
Felicien M. Steichen, Mamaroneck, NY
H. Harlan Stone, Glenville, NC
Kamthorn Sukarochana, Pittsburgh, PA
Orvar Swenson, Charleston, SC
Jessie L. Ternberg, St. Louis, MO
Robert J. Touloukian, New Haven, CT
David S. Trump, Grants Pass, OR
Kenneth R. Tyson, Burnet, TX
Arie D. Verhagen, Hamilton, OH
Vollrad J. Von Berg, Hot Springs, AR
Theodore P. Votteler, Dallas, TX
H. Warner Webb, Jacksonville, FL
John J. White, Seattle, WA
Albert H. Wilkinson, Jacksonville, FL
Morton M. Woolley, Rancho Mirage, CA
Earle L. Wrenn, Greensboro, NC

Schedule & Program

Schedule-at-a-Glance

Saturday, May 18

7:00 a.m. – 5:00 p.m.	APSA Board Meeting	*Regis, 3rd FL*
2:00 p.m. – 6:00 p.m.	Registration Desk Open	*Registration Desk A&B, 4th FL*
2:00 p.m. – 6:00 p.m.	Speaker Ready Room Open	*Orleans, 4th FL*
2:30 p.m. – 6:30 p.m.	Program Directors Meeting	*Grand Ballroom Salons H-J, 4th FL*
6:30 p.m. – 10:00 p.m.	Publications Committee Meeting and Dinner	*Regis, 3rd FL*

Sunday, May 19

6:00 a.m. – 8:00 p.m.	Nursing Mothers Room	*Boston University, 3rd FL*
6:30 a.m. – 5:00 p.m.	Registration Desk Open	*Registration Desk A&B, 4th FL*
6:30 a.m. – 6:30 p.m.	Speaker Ready Room Open	*Orleans, 4th FL*
7:00 a.m. – 10:00 a.m.	Committee Meetings	*View the Ancillary Meetings List on page 63 for specific locations*
9:00 a.m. – 11:00 a.m.	Benjy Brooks Society Brunch and Meeting	*Salons H-J, 4th FL*
11:00 a.m. – 3:30 p.m.	Exhibitor Set-up	*Exhibit Hall, 3rd FL*
11:00 a.m. – 11:45 a.m.	New Member Rehearsal	*Salons A-F*
11:00 a.m. – 3:30 p.m.	Poster Set-up	*Exhibit Hall, 3rd FL*
Noon – 12:30 p.m.	President's Welcome	*Salons A-F*
12:30 p.m. – 2:00 p.m.	**Plenary Education Session:** Colorectal Malformations and Diseases – Anorectal Malformations (ARM); Hirschsprung Disease (HD)	*Salons A-F*
2:00 p.m. – 2:15 p.m.	Refreshment Break	*Grand Ballroom Foyer, 4th FL*
2:15 p.m. – 2:35 p.m.	**APSA's Past:** Key Factors in the Establishment of Pediatric Surgery and APSA - Who Did It and How	*Salons A-F*
2:35 p.m. – 3:05 p.m.	New Member Induction	*Salons A-F*
3:15 p.m. – 4:45 p.m.	**Scientific Session 1: Gastrointestinal Surgery**	*Salon G*
3:15 p.m. – 4:45 p.m.	**Scientific Session 2: Basic Science, Chest, IBD**	*Salons A-F*
3:15 p.m. – 4:45 p.m.	**Scientific Session 3: Oncology (basic science and clinical), Global, Anesthesia/Analgesia**	*Salons H-J*
4:00 p.m. – 9:00 p.m.	Exhibit Hall Open	*Exhibit Hall, 3rd FL*
4:00 p.m. – 9:00 p.m.	Poster Hall Open	*Exhibit Hall, 3rd FL*
4:30 p.m. – 5:30 p.m.	Wine and Cheese Reception	*Exhibit Hall*
5:15 p.m. – 6:15 p.m.	**Quick Shots 1: Gastrointestinal Surgery**	*Salon G*
5:15 p.m. – 6:15 p.m.	**Quick Shots 2: Thoracic and Colorectal Surgery**	*Salons A-F*
5:15 p.m. – 6:15 p.m.	**Quick Shots 3: Oncology (basic science and clinical)**	*Salon H-J*
6:15 p.m. – 7:00 p.m.	Free Time	
7:00 p.m. – 9:00 p.m.	Welcome Reception	*3rd and 4th Floors*

Schedule-at-a-Glance (cont.)

Monday, May 20

6:00 a.m. – 7:00 a.m.	Committee Meetings	*View the Ancillary Meetings List On page 63 for specific locations*
6:00 a.m. – 7:00 a.m.	Continental Breakfast	*Grand Ballroom Foyer, 4th FL*
6:00 a.m. – 8:00 p.m.	Nursing Mothers Room	*Boston University, 3rd FL*
6:00 a.m. – 5:30 p.m.	Speaker Ready Room Open	*Orleans, 4th FL*
6:30 a.m. – 5:00 p.m.	Registration Desk Open	*Registration Desk A&B, 4th FL*
7:00 a.m. – 8:15 a.m.	Business Meeting	*Salons A-F*
8:00 a.m. – 2:00 p.m.	Exhibit Hall Open	*Exhibit Hall, 3rd FL*
8:00 a.m. – 2:00 p.m.	Poster Hall Open	*Exhibit Hall, 3rd FL*
8:15 a.m. – 9:30 a.m.	***JPS* Top Educational Content (TEC) Talks**	*Salons A-F*
9:30 a.m. – 10:15 a.m.	Refreshment Break	*Exhibit Hall, 3rd FL*
10:15 a.m. – 11:30 a.m.	**Plenary Scientific Session 1; 2018 Foundation Scholar** Defining the Role of ROCK in Necrotizing Enterocolitis Catherine Hunter, MD	*Salons A-F*
11:30 a.m. – Noon	**PED Talk - Pediatric surgery, Education, Disruption #1: Artificial Intelligence** Michael C. Muelly, MD	*Salons A-F*
Noon – 12:30 p.m.	Box Lunch Pick-up	*Grand Ballroom Foyer A-F, 4th FL*
12:30 p.m. – 1:45 p.m.	**Roundtable Discussion: History of APSA and North American Pediatric Surgery**	*Salons A-F*
1:45 p.m. – 2:15 p.m.	Refreshment Break	*Exhibit Hall, 3rd FlL*
2:15 p.m. – 3:15 p.m.	**Case Debates and Controversies: Can't We Agree on ANYTHING?**	*Salons A-F*
3:15 p.m. – 3:45 p.m.	**PED Talk - Pediatric surgery, Education, Disruption #2: Building Dynamic Robots** Marc Raibert, PhD	*Salons A-F*
4:00 p.m. – 4:45 p.m.	**Advocacy**	*Salon G*
4:00 p.m. – 5:30 p.m.	**Publication: Academic Pediatric Surgery in the Era of Social Media and Electronic Publication**	*Salons H-J*
4:00 p.m. – 5:30 p.m.	**Quality: What's in Your Quality and Safety Toolkit? APSA Gives You the Tools!**	*Salons A-F*
4:45 p.m. – 5:30 p.m.	**Global Pediatric Surgery**	*Salon G*
5:30 p.m. – 6:30 p.m.	Residents Reception	*Regis, 3rd FL*
6:00 p.m. - 7:00 p.m.	**Global Pediatric Surgery Networking Event** Informal gathering for individuals interested in pediatric surgery efforts in low and middle-income countries	*Champions Bar, hotel lobby*

Schedule-at-a-Glance (cont.)

Tuesday, May 21

6:00 a.m. – 7:30 a.m.	Committee Meetings	*View the Ancillary Meetings List on page 63 for specific locations*
6:00 a.m. – 8:00 p.m.	Nursing Mothers Room	*Boston University, 3rd FL*
6:30 a.m. – 7:30 a.m.	Continental Breakfast	*Exhibit Hall, 3rd FL*
6:30 a.m. – 11:00 a.m.	Exhibit Hall Open	*Exhibit Hall, 3rd FL*
6:30 a.m. – 11:00 a.m.	Poster Hall Open	*Exhibit Hall, 3rd FL*
6:30 a.m. – 2:30 p.m.	Registration Desk Open	*Registration Desk A&B, 4th FL*
6:30 a.m. – 2:00 p.m.	Speaker Ready Room Open	*Orleans, 4th FL*
7:30 a.m. – 8:30 a.m.	**Outcomes and Systematic Reviews**	*Salons A-F*
8:45 a.m. – 9:45 a.m.	**Oncology**	*Salons A-F*
8:45 a.m. – 9:45 a.m.	**Practice: Getting Paid for Your Value – How to Get What You are Worth in Our Current Treacherous Environment**	*Salons H-J*
8:45 a.m. – 9:45 a.m.	**Trauma**	*Salon G*
9:45 a.m. – 10:15 a.m.	Refreshment Break	*Exhibit Hall, 3rd FL*
10:15 a.m. – 11:15 a.m.	**Critical Care**	*Salon G*
10:15 a.m. – 11:15 a.m.	**Fetal Diagnosis & Treatment**	*Salons A-F*
10:15 a.m. – 11:15 a.m.	**Opioid Reduction: Empowering Pediatric Surgeons to Combat the Opioid Epidemic Using Evidence-based Strategies**	*Salons H-J*
11:00 a.m.	Exhibit Dismantle	*Exhibit Hall, 3rd Fl*
11:00 a.m.	Poster Dismantle	*Exhibit Hall, 3rd FL*
11:30 a.m. – 1:30 p.m.	**Jay and Margie Grosfeld Presidential Symposium**	*Salons A-F*
2:00 p.m. – 5:30 p.m.	JFK Library Tour By separate registration, tickets required for entry	

Wednesday, May 22

6:00 a.m. – 7:00 a.m.	Committee Meetings	*View the Ancillary Meetings List on page 63 for specific locations*
6:00 a.m. – 7:00 a.m.	Continental Breakfast	*Grand Ballroom Foyer, 4th FL*
6:00 a.m. – 8:00 p.m.	Nursing Mothers Room	*Boston University, 3rd FL*
6:00 a.m. – 4:00 p.m.	Speaker Ready Room Open	*Orleans, 4th FL*
6:30 a.m. – 4:00 p.m.	Registration Desk Open	*Registration Desk A&B, 4th FL*
7:00 a.m. – 8:15 a.m.	**Plenary Scientific Session 2; 2018 Foundation Scholar** Fetal Mechanisms of Liver and Bile Duct Repair: A Link to the Prenatal Origins of Biliary Atresia Amar Nijagal, MD	*Salons A-F*
8:30 a.m. – 9:30 a.m.	**New Technology**	*Salons H-J*
8:30 a.m. – 9:30 a.m.	**Research: Necrotizing Enterocolitis**	*Salon G*
8:30 a.m. – 9:30 a.m.	**Scientific Session 4: Practice, Education, Trauma**	*Salons A-F*
9:30 a.m. – 10:30 a.m.	**Quick Shots 4: Basic Science and Trauma**	*Salon G*
9:30 a.m. – 10:30 a.m.	**Quick Shots 5: Fetal Basic Science, Neonatal, Fetal Clinical**	*Salons H-J*

Schedule-at-a-Glance (cont.)

9:30 a.m. – 10:30 a.m.	**Quick Shots 6: Clinical, Education and Innovation**	*Salons A-F*
10:30 a.m. – 10:45 a.m.	Refreshment Break	*Grand Ballroom Foyer, 4th FL*
10:45 a.m. – 11:30 a.m.	**Ethics**	*Salons A-F*
10:45 a.m. – 11:30 a.m.	**Industry Symposium** ***presented by Biostage***	*Salons H-J*
10:45 a.m. – 12:15 p.m.	**Social Determinants of Health Workshop**	*Salon G*
11:30 a.m. – 12:15 p.m.	**Childhood Obesity**	*Salons H-J*
11:30 a.m. – 12:15 p.m.	**Education: Understanding the ABCs on the MOCs and How the APSA Education Library Can Keep You in the Know**	*Salons A-F*
12:15 p.m. – 12:45 p.m.	Box Lunch Pick-up	*Grand Ballroom Foyer A-F, 4th FL*
12:45 p.m. – 2:00 p.m.	**Future of APSA: Future of Research, Education and Clinical Surgery**	*Salons A-F*
2:00 p.m. – 2:15 p.m.	Break	
2:15 p.m. – 3:20 p.m.	**Robert E. Gross Debate:** Topic: Be it resolved that I would not encourage my daughter or son to become a pediatric surgeon.	*Salons A-F*
3:20 p.m. - 3:30 p.m.	**Research Awards Presentations**	
3:30 p.m. – 4:00 p.m.	**PED Talk - Pediatric surgery, Education, Disruption: #3 Gun Violence as a Public Health Issue** Joseph V. Sakran, MD	*Salons A-F*
4:00 p.m. – 6:00 p.m.	Free Time	
6:00 p.m. – 7:00 p.m.	President's Reception	*Grand Ballroom Foyer, 4th FL*
7:00 p.m. – 11:00 p.m.	President's Banquet *Sponsored by Biostage*	*Salons A-F*
11:00 p.m.	Meeting Concludes	

Ancillary Meeting by Group

Committee	Date/Time	Room
AAP Delivery of Surgical Care Committee	Monday, May 20, 6:00 p.m.- 7:00 p.m.	Brandeis, 3rd FL
AAP Education Committee	Monday, May 20, 6:30 p.m. - 7:30 p.m.	Falmouth, 4th FL
AAP SoSu Publications Committee	Monday, May 20, 6:00 a.m. - 7:00 a.m.	Suffolk, 3rd FL
Anniversary/History AdHoc Committee	Sunday, May 19, 7:00 a.m. - 8:00 a.m.	Simmons, 3rd FL
APSA Opioid Guidelines Meeting	Friday, May 16, 11:00 a.m. - 5:00 p.m.	Nantucket, 4th FL
APSA Opioid Guidelines Meeting	Saturday, May 17, 8:00 a.m. - 5:00 p.m.	Nantucket, 4th FL
Benjy Brooks Committee	Sunday, May 19, 8:00 a.m. - 9:00 a.m.	Falmouth, 4th FL
Benjy Brooks Society Meeting and Brunch (registration required)	Sunday, May 19, 9:00 a.m. - 11:00 a.m.	Grand Ballroom H
Bethany Kids Reception	Tuesday, May 21, 5:00 p.m - 6:30 p.m.	Suffolk, 3rd FL
Board of Governors	Saturday, May 17, 7:00 a.m. - 5:00 p.m.	Regis, 3rd FL
Cancer Committee	Monday, May 20, 6:00 a.m. - 7:00 a.m.	Brandeis, 3rd FL
Childhood Obesity Committee	Wednesday, May 22, 6:00 a.m. - 7:00 a.m.	MIT, 3rd FL
COG PSORC	Tuesday, May 21, 5:00 p.m. - 6:00 p.m.	Northeastern, 3rd FL
Diversity, Equity and Inclusion Committee	Sunday, May 19, 7:00 a.m. - 8:00 a.m.	Provincetown, 4th FL
Education Committee	Sunday, May 19, 7:00 a.m. - 8:00 a.m.	Suffolk, 3rd FL
Ethics Committee	Tuesday, May 21, 6:00 a.m. - 7:30 a.m.	Northeastern, 3rd FL
Fetal Diagnosis and Treatment Committee	Monday, May 20, 6:00 a.m. - 7:00 a.m.	Regis, 3rd FL
Florida Association of Pediatric Surgeons	Tuesday, May 21, 2:00 p.m. - 3:00 p.m.	Regis, 3rd FL
Foundation Board Meeting	Tuesday, May 21, 6:00 a.m. - 7:30 a.m.	Regis, 3rd FL
Global Pediatric Surgery Committee	Monday, May 20, 6:00 a.m. - 7:00 a.m.	Simmons, 3rd FL
Global Pediatric Surgery Networking Event	6:00 p.m. - 7:00 p.m. *open to individuals interested in pediatric surgery efforts in low and middle-income countries*	Champions Bar, hotel lobby
Health Policy and Advocacy Committee	Monday, May 20, 6:00 a.m. - 7:00 a.m.	MIT, 3rd FL
Hirschsprung Disease Interest Group	Tuesday, May 21, 6:00 a.m. - 7:00 a.m.	Simmons, 3rd FL

Ancillary Meeting by Group (cont.)

Committee	Date/Time	Room
IBD Interest Group	Monday, May 20, 6:30 p.m. - 7:30 p.m.	Wellesley, 3rd FL
Industry and Institutional Advisory Committee	Tuesday, May 21, 6:30 a.m. -7:30 a.m.	Wellesley, 3rd FL
Informatics and Telemedicine Committee	Monday, May 20, 6:00 a.m. - 7:00 a.m.	Northeastern, 3rd FL
JPS Reception *(By invitation only)*	Tuesday, May 21, 5:45 p.m. -7:00 p.m.	Simmons, 3rd FL
Membership and Credentials Committee	Sunday, May 19, 8:00 a.m. - 9:00 a.m.	Wellesley, 3rd FL
New Technology Committee	Wednesday, May 22, 6:00 a.m. - 7:00 a.m.	Simmons, 3rd FL
Opiod SIG	Sunday, May 19, 8:00 a.m. - 9:00 a.m.	Provincetown, 4th FL
Outcomes and Evidence-Based Practice Committee	Sunday, May 19, 8:00 a.m. - 9:00 a.m.	Northeastern, 3rd FL
Pediatric Surgery Board (PSB)	Sunday, May 19, 7:00 a.m. - Noon	MIT, 3rd FL
Pediatric Surgery Research Collaborative (PedSRC)	Wednesday, May 22, 6:00 a.m. - 7:00 a.m.	Brandeis, 3rd FL
Practice Committee	Tuesday, May 21, 6:00 a.m. - 7:30 a.m.	Suffolk, 3rd FL
Professional Development Committee	Monday, May 20, 6:00 a.m. - 7:00 a.m.	Wellesley, 3rd FL
Program Committee	Sunday, May 19, 8:00 a.m. - 9:00 a.m.	Regis, 3rd FL
Program Directors Meeting	Saturday, May 17, 2:30 p.m. - 6:30 p.m.	Grand Ballroom H-J
Publications Committee	Saturday, May 17, 6:30 p.m. - 10:00 p.m.	Regis, 3rd FL
Surgical Critical Care Committee	Sunday, May 19, 8:00 a.m. - 9:00 a.m.	Brandeis, 3rd FL
Surgical Quality and Safety Committee	Tuesday, May 21, 6:30 a.m. - 7:30 a.m.	Brandeis, 3rd FL
Trauma Committee	Sunday, May 19, 8:00 a.m. - 9:00 a.m.	Tufts, 3rd FL
Wellness Task Force	Wednesday, May 22, 4:00 p.m. - 6:00 p.m.	Regis, 3rd FL
Workforce Committee	Sunday, May 19, 7:00 a.m. - 8:00 a.m.	Nantucket, 4th FL

Ancillary Meeting by Day

Committee	Time	Room
Friday, May 17		
APSA Opioid Guidelines Meeting	11:00 a.m. - 5:00 p.m.	Nantucket, 4th FL
Saturday, May 18		
Board of Governors	7:00 a.m. - 5:00 p.m.	Regis, 3rd FL
APSA Opioid Guidelines Meeting	8:00 a.m. - 5:00 p.m.	Nantucket, 4th FL
Program Directors Meeting	2:30 p.m. - 6:30 p.m.	Grand Ballroom H-J
Publications Committee Meeting	6:30 p.m. - 10:00 p.m.	Regis, 3rd FL
Sunday, May 19		
Anniversary/History AdHoc Committee	7:00 a.m. - 8:00 a.m.	Simmons, 3rd FL
Diversity, Equity and Inclusion Committee	7:00 a.m. - 8:00 a.m.	Provincetown, 4th FL
Education Committee	7:00 a.m. - 8:00 a.m.	Suffolk, 3rd FL
Workforce Committee	7:00 a.m. - 8:00 a.m.	Nantucket, 4th FL
Pediatric Surgery Board (PSB)	7:00 a.m. - Noon	MIT, 3rd FL
Benjy Brooks Committee	8:00 a.m. - 9:00 a.m.	Falmouth, 4th FL
Program Committee	8:00 a.m. - 9:00 a.m.	Regis, 3rd FL
Membership and Credentials Committee	8:00 a.m. - 9:00 a.m.	Wellesley, 3rd FL
Opioid SIG	8:00 a.m. – 9:00 a.m.	Provincetown, 4th FL
Outcomes and Evidence-Based Practice Committee	8:00 a.m. - 9:00 a.m.	Northeastern, 3rd FL
Surgical Critical Care Committee	8:00 a.m. - 9:00 a.m.	Brandeis, 3rd FL
Trauma Committee	8:00 a.m. - 9:00 a.m.	Tufts, 3rd FL
Benjy Brooks Society Meeting and Brunch (registration required)	9:00 a.m. - 11:00 a.m.	Grand Ballroom H

Ancillary Meeting by Day (cont.)

Committee	Time	Room
Monday, May 20		
Fetal Diagnosis and Treatment Committee	6:00 a.m. - 7:00 a.m.	Regis, 3rd FL
Professional Development Committee	6:00 a.m. - 7:00 a.m.	Wellesley, 3rd FL
AAP SoSu Publications Committee	6:00 a.m. - 7:00 a.m.	Suffolk, 3rd FL
Informatics and Telemedicine Committee	6:00 a.m. - 7:00 a.m.	Northeastern, 3rd FL
Cancer Committee	6:00 a.m. - 7:00 a.m.	Brandeis, 3rd FL
Health Policy and Advocacy Committee	6:00 a.m. - 7:00 a.m.	MIT, 3rd FL
Global Pediatric Surgery Committee	6:00 a.m. - 7:00 a.m.	Simmons, 3rd FL
Residents Reception	5:30 p.m. - 6:30 p.m.	Regis, 3rd FL
Global Pediatric Surgery Networking Event	6:00 p.m. - 7:00 p.m. *open to individuals interested in pediatric surgery efforts in low and middle-income countries*	Champions Bar, hotel lobby
AAP Delivery of Surgical Care Committee	6:00 p.m.- 7:00 p.m.	Brandeis, 3rd FL
AAP Education Committee	6:30 p.m. - 7:30 p.m.	Falmouth, 4th FL
IBD Interest Group	6:30 p.m. - 7:30 p.m.	Wellesley, 3rd FL

Ancillary Meeting by Day (cont.)

Committee	Time	Room
Tuesday, May 21		
Florida Association of Pediatric Surgeons	2:00 p.m. - 3:00 p.m.	Regis, 3rd FL
Foundation Board Meeting	6:00 a.m. - 7:30 a.m.	Regis, 3rd FL
Practice Committee	6:00 a.m. - 7:30 a.m.	Suffolk, 3rd FL
Ethics Committee	6:00 a.m. - 7:30 a.m.	Northeastern, 3rd FL
Hirschsprung Disease Interest Group	6:00 a.m. - 7:00 a.m.	Simmons, 3rd FL
Industry and Institutional Advisory Committee	6:30 a.m. - 7:30 a.m.	Wellesley, 3rd FL
Surgical Quality and Safety Committee	6:30 a.m. - 7:30 a.m.	Brandeis, 3rd FL
Bethany Kids	5:00 p.m. - 6:00 p.m.	Suffolk, 3rd FL
COG PSORC	5:00 p.m. - 6:00 p.m.	Northeastern, 3rd FL
JPS Reception *(by invitation only)*	5:45 p.m. - 7:00 p.m.	Simmons, 3rd FL
Wednesday, May 22		
Childhood Obesity Committee	6:00 a.m. - 7:00 a.m.	MIT, 3rd FL
New Technology Committee	6:00 a.m. - 7:00 a.m.	Simmons, 3rd FL
Pediatric Surgery Research Collaborative (PedSRC)	6:00 a.m. - 7:00 a.m.	Brandeis, 3rd FL
Wellness Task Force	4:00 p.m. - 6:00 p.m.	Regis, 3rd FL

Education Overview

The APSA Annual Meeting is designed to provide comprehensive continuing education in the field of pediatric surgery. APSA strives to bring together the world's leading pediatric surgery authorities to present and discuss the most recent clinical and basic science research efforts. This meeting covers the breadth of pediatric surgery and is intended to acquaint attendees with the latest research findings, clinical discoveries and trends that influence the day-to-day practice of pediatric surgery. The topics at these sessions have been selected by the Program and Education Committees and approved by the APSA Board of Governors. Topic selection is based on previous meeting attendee surveys, committee feedback regarding learning needs, and member requests from surveys and journal articles about what is relevant to their practices. The scientific sessions consist of basic science research and practical clinical presentations. "Quickshot" presentations are shorter and meant to provide snapshots of important basic science and clinical research endeavors. The poster sessions provide young investigators an opportunity to share preliminary research or to inform the membership about additional topics that may be of interest.

As a result of attending the sessions, attendees will be able to:

- Discuss the current level of evidence supporting current approaches to common pediatric surgical clinical problems.
- Explain the basic science foundations of pediatric surgical diseases.
- Describe the similarities and differences between practice in the United States and other countries in their approaches to the optimization and regionalization of pediatric surgical care.
- Identify and discuss the advantages and pitfalls of social media and medicine and make social media work in support of excellent patient care.

Accreditation Statement

The American Pediatric Surgical Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education (CME) for physicians. This live CME activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME).

APSA 2019 Annual Meeting

APSA designates this live activity for a maximum of 24.25 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The American Pediatric Surgical Association education credentials have been recognized and upgraded by the Accreditation Council for Continuing Medical Education from Accreditation to Accreditation with Commendation. The ACCME is the national accrediting board for all medical education organizations in the U.S. that administer courses and confer Continuing Medical Education credits to physicians and health care providers.

Disclosures

Disclaimer: These materials and all other materials provided in conjunction with CME activities are intended solely for purposes of supplementing CME programs for qualified health care professionals. Anyone using the materials assumes full responsibility and all risk for their appropriate use. APSA makes no warranties or representations whatsoever regarding the accuracy, completeness, currentness, noninfringement, merchantability or fitness for a particular purpose of the materials. In no event will APSA be liable to anyone for any decision made or action taken in reliance on the materials. In no event should the information in the materials be used as a substitute for professional care.

Policy on Faculty Disclosure

It is the policy of the ACCME and APSA that the planning committee and faculty disclose and resolve real or apparent conflicts of interest relating to the content of the educational activity, and also disclose discussions of unlabeled/unapproved uses of drugs or devices during their presentations.

Faculty Disclosures

In the case of faculty presentations the following faculty members have disclosed a financial relationship with an industry partner. The relationship was proven not to have an impact on the science presented at this annual meeting. All other faculty indicated that they have no financial relationships to disclose.

Q51 ASSOCIATION OF BLOOD COMPONENT RATIOS WITH 24-HOUR MORTALITY IN INJURED CHILDREN RECEIVING MASSIVE TRANSFUSION

John R. Hess - Gel-e Life Sciences: Intellectual Property/Patents, Stockholder/Ownership Interest (excluding diversified mutual funds); UpToDate: Royalties

P46 EFFECT OF PLASMA TREATMENT ON CELLULAR MIGRATION ON A POLYURETHANE SYNTHETIC SCAFFOLD

William Fodor - Biostage: Salary

S41 ENHANCED RECOVERY AFTER SURGERY PROTOCOL FOR PEDIATRIC LAPAROSCOPIC CHOLECYSTECTOMY PROMOTES SAFE AND EARLY DISCHARGE

Mihaela Visoiu - Hospira: Consultant

S61 IN UTERO AAV-BASED GENOME-EDITING TO CURE A MOUSE MODEL OF HUMAN HEREDITARY TYROSINEMIA TYPE 1

Raymond Hickey - Ambys Medicines: Salary, Stockholder/Ownership Interest (excluding diversified mutual funds)

S14 IN UTERO LIVER-DIRECTED LENTIVIRAL GENE THERAPY CURES A PIG MODEL OF HEREDITARY TYROSINEMIA TYPE 1

Raymond Hickey - Ambys Medicines: Salary, Stockholder/Ownership Interest (excluding diversified mutual funds)

Disclosures (cont.)

S74 IS IT ENDOMETRIOSIS?

Ceana Nezhat - Karl Storz: Grant/Research Support

Q28 LAPAROSCOPIC MORGAGNI HERNIA REPAIRS WITH AN INTUITIVELY-CONTROLLED ARTICULATING INSTRUMENT

James D. Geiger - FlexDex Surgical: Intellectual Property/Patents, Stockholder/Ownership Interest (excluding diversified mutual funds)

Q59 LOW POSTNATAL CRI VALUES ARE ASSOCIATED WITH THE NEED FOR ECMO IN NEWBORNS WITH CDH

Jane Mulligan - Flashback Technologies Inc.: Intellectual Property/Patents, Salary, Stockholder/Ownership Interest (excluding diversified mutual funds)

Steven L. Moulton - Flashback Technologies Inc.: Consultant, Intellectual Property/Patents, Royalties, Stockholder/Ownership Interest (excluding diversified mutual funds)

S21 SACRAL NERVE STIMULATOR PLACEMENT: A NOVEL SURGICAL NAVIGATION TOOL FOR COMPLEX ANATOMY

John M. Racadio - Philips Healthcare: Cincinnati Children's Hospital Department of Radiology has a Master Research Agreement with Philips Healthcare. No author on this manuscript receives any salary or financial benefits from Philips Healthcare.

S13 SYSTEMIC FETAL GENE EDITING AS A TREATMENT FOR CYSTIC FIBROSIS

Adele Ricciardi - Trucode Gene Repair, Inc.: Consultant, Intellectual Property/Patents, Stockholder/Ownership Interest (excluding diversified mutual funds)

Elias Quijano - Trucode Gene Repair, Inc.: Consultant, Intellectual Property/Patents

Mark Saltzman - Trucode Gene Repair, Inc.: Consultant, Grant/Research Support, Intellectual Property/Patents, Stockholder/Ownership Interest (excluding diversified mutual funds)

Peter Glazer - Trucode Gene Repair, Inc.: Consultant, Grant/Research Support, Intellectual Property/Patents, Stockholder/Ownership Interest (excluding diversified mutual funds)

Marie Egan - Trucode Gene Repair, Inc.: Grant/Research Support, Intellectual Property/Patents

S70 THE ETIOLOGY OF NECROTIZING ENTEROCOLITIS: INFECTIOUS OR INFLAMMATORY?

Michael Bailey - Scioto Biosciences: Stockholder/Ownership Interest (excluding diversified mutual funds)

Steven D. Goodman - Scioto Biosciences: Stockholder/Ownership Interest (excluding diversified mutual funds)

Gail E. Besner - Scioto Biosciences: Stockholder/Ownership Interest (excluding diversified mutual funds)

Disclosures (cont.)

S5 TISSUE ENGINEERING CAN RESTORE ESOPHAGEAL CONTINUITY IN LONG GAP ESOPHAGEAL DEFECTS BY USING A CELLSPAN ESOPHAGEAL IMPLANT

Christine Finck - Biostage: Grant/Research Support

Todd Jensen - Biostage: Grant/Research Support

Heather Wanczyk - Biostage: Grant/Research Support

William Fodor - Biostage: Stockholder/Ownership Interest (excluding diversified mutual funds)

Tina Roffidal - Biostage: Stockholder/Ownership Interest (excluding diversified mutual funds)

Sumati Sundaram - Biostage: Stockholder/Ownership Interest (excluding diversified mutual funds)

Karissa Paquin - Biostage: Stockholder/Ownership Interest (excluding diversified mutual funds)

Jeff Bouchard - Biostage: Stockholder/Ownership Interest (excluding diversified mutual funds)

Eyone Jones - Biostage: Grant/Research Support

Committee Disclosures

Disclosures were collected from all committee members with influence over the educational content of the annual meeting program. These committee members have reported the following financial relationships and it has been determined that no conflict of interest exists with any of these relationships. All other committee members indicated that they have no financial relationships to disclose.

James D. Geiger – Industry and Institutional Advisory Committee.

FlexDex Surgical: Intellectual Property/Patents, Stockholder/Ownership Interest (excluding diversified mutual funds)

Gail E. Besner – Benjy Brooks Committee on Women on Pediatric Surgery, Industry and Institutional Advisory Committee, Membership and Credentials Committee, Publications Committee, Research Committee.

Scioto Biosciences: Stockholder/Ownership Interest (excluding diversified mutual funds)

Christine M. Finck – Benjy Brooks Committee on Women on Pediatric Surgery.

Biostage: Grant/Research Support

Jay and Margie Grosfeld Presidential Symposium

Tuesday, May 21, 2019 | 11:30 a.m. – 1:30 p.m.
Adam J. Foss, Esq.
Founder and Executive Director, Prosecutor Impact, Boston, MA

Swords and Shields: A Discussion of Power, Privilege and Opportunity

Adam J. Foss is a former Assistant District Attorney in the Juvenile Division of the Suffolk County District Attorney's Office (SCDAO) in Boston, MA, and a fierce advocate for criminal justice reform and the importance of the role of the prosecutor in ending mass incarceration. Mr. Foss believes that the profession of prosecution is ripe for reinvention requiring better incentives and more measurable metrics for success beyond simply "cases won", leading him to found Prosecutor Impact — a non-profit developing training and curriculum for prosecutors to reframe their role in the criminal justice system.

PED TALK | Pediatric surgery, Education, Disruption #1: Artificial Intelligence

Monday, May 20, 2019 | 11:30 a.m. – Noon
Michael C. Muelly, MD
Product Manager, Google Cloud Healthcare & Lifesciences

Artificial Intelligence

Dr. Muelly leads provider productivity/telehealth on Google Cloud's Healthcare & Lifesciences team with the goal of enabling providers to deliver outstanding patient care efficiently. He works on real-world deployment strategies for AI tools in healthcare and solving challenges to unlock the power of data for patients. Prior to his current role at Google, he worked as a machine learning researcher in the Google AI (Healthcare) group. Prior to Google, Dr. Muelly was a full-time radiologist and researcher at Stanford University. He continues on the radiology faculty at Stanford University and practices diagnostic radiology specializing in body MRI. He co-founded companies to enable radiology in the cloud and a network security solutions provider in the past. Dr. Muelly completed a residency in diagnostic radiology and his subspecialty fellowship in body MRI at Stanford University. Prior to that he completed an internship in general surgery at Penn State Hershey Medical Center, obtained his MD and attended graduate school in engineering physics at the Pennsylvania State University, and completed his BS in mathematics and computer science at the University of Pittsburgh.

PED TALK | Pediatric surgery, Education, Disruption #2: Robotics

Monday, May 20, 2019 | 3:15 p.m. – 3:45 p.m.
Marc Raibert, PhD
Chief Executive Officer, Boston Dynamics, Waltham, MA

Building Dynamic Robots

Marc Raibert is founder and CEO of Boston Dynamics, a company that creates some of the world's most advanced dynamic robots, such as BigDog, Atlas, Spot and Handle. These robots are inspired by the remarkable ability of animals to move with agility, dexterity, perception and intelligence. A key ingredient of these robots is their dynamic behavior, which contributes to their effectiveness and versatility in the real world. Before starting Boston Dynamics, Raibert was Professor of Computer Science and Robotics at MIT and Carnegie Mellon. While at CMU and MIT Raibert founded the Leg Laboratory, a lab that helped establish the scientific basis for highly dynamic robots and that set the stage for the work done at Boston Dynamics. Raibert is a member of the National Academy of Engineering.

PED TALK | Pediatric surgery, Education, Disruption #3: Gun Violence as a Public Health Issue

Wednesday, May 22, 2019 | 3:30 p.m. - 4:00 p.m.
Joseph V. Sakran, MD
Associate Chief, the Johns Hopkins Hospital, Division of Acute Care Surgery and Director EGS, Baltimore, MD

Gun Violence as a Public Health Issue

Dr. Sakran is an assistant professor of surgery, director of emergency general surgery and associate Chief of the Division of Acute Care Surgery at the Johns Hopkins Hospital. As a former victim of gun violence, Joe spends a significant portion of his time as a clinician, researcher and advocate with a primary goal of reducing firearm death and disability in America. To this end, he recently founded the organization @ThisIsOurLane, a platform to help unite healthcare providers and deliver one strong voice in ending gun violence. Dr. Sakran completed a one-year educational sabbatical at the Harvard Kennedy School of Government where he developed a unique skill set within public policy, economics and leadership development. In 2017, Joe was selected by Becker's Hospital Review as one of Healthcare's Leaders under 40. He is a sought after national and international speaker and holds numerous national roles in surgical organizations. Beyond medicine, Joe serves as a Board Director for the Brady Campaign and recently was selected to join the Presidential Leadership Scholars program.

Future of APSA

Wednesday, May 22, 2019 | 12:45 p.m. – 2:00 p.m.
Jo Shapiro, MD
Associate Professor, Otolaryngology, Department of Surgery, Brigham and Women's Hospital Harvard Medical School, Boston, MA

Peer Support: Mitigating the Emotional Stresses of Adverse Events

Dr. Jo Shapiro is a surgeon in the Department of Surgery at the Brigham and Women's Hospital (BWH) in Boston and an Associate Professor of Otolaryngology at Harvard Medical School. She launched the BWH Center for Professionalism and Peer Support in 2008 and served as its director through 2018. During that time the Center supported and collaborated with multiple institutions, nationally and internationally, to enhance clinician wellness by supporting teamwork and respect and mitigating clinician burnout. She currently serves on the Ethics and Professionalism Committee of the American Board of Medical Specialties and recently completed her terms as that Committee's chairperson. Dr. Shapiro is committed to global health medical education and training. She was appointed Honorary Professor of Professional Behavior and Peer Support in Medicine through the academic track at Groningen University Medical Center in The Netherlands. She serves as Visiting Professor and Otolaryngology Residency Program Advisor for Mbarara University of Science and Technology in Uganda. She was also a member of the Israeli Commission for Higher Education International Committee for the Evaluation of Medical Schools in Israel.

APSA Past Meeting Lectures

Journal of Pediatric Surgery Lectures

2018
Steven Stylianos, MD
To Save a Child's Spleen: 50 Years from Toronto to ATOMAC

2017
Diana L. Farmer, MD
Audacious Goals 2.0: The Global Initiative in Children's Surgery

2016
Michael W. Collins, PhD
Sport-Related Concussion: Moving in the Right Direction

2015
Robert W. Block, MD
All Adults Were Once Children

2014
Eric A. Rose, MD
Understanding Translational Research

2013
David B. Hoyt, MD
The American College of Surgeons Model for Quality Improvement

2012
Brad W. Warner, MD
Adaptation: Paradigm for an Academic Career and the Gut

2011
Professor Lewis Spitz
The History of Paediatric Surgery in the United Kingdom and the National Health Service

2010
Robert H. Bartlett, MD
ECMO: Gross, Beethoven, Krummel and Georgeson

2008
Thomas M. Krummel, MD
Inventing Our Future: Training the Next Generation of Surgeon Innovators

2007
Alan W. Flake, MD
Stem Cell Biology and Pediatric Surgery – Deciphering the Venn Diagram

2006
Pedro Rosselló, MD
The Unfinished Business of American Healthcare

APSA Past Meeting Lectures (cont.)

2005
Alberto Peña, MD
Luck and Serendipity, the History of a Surgical Technique

2004
R. Scott Jones, MD
The American College of Surgeons Initiatives for Safety and Quality Improvement

2003
Patricia K. Donahoe, MD
Sustained Inquiry and Perseverance in the Clinic and at the Bench

2002
Michael R. Harrison, MD
Fetal Surgery: Trials, Tribulations and Territory

2001
Joseph P. Vacanti, MD
The History and Current Status of Tissue Engineering

Robert E. Gross Lectures

2018
Tracy C. Grikscheit, MD
Stem Cells for Babies and their Surgeons: the Future is Now

2017
Stephen W. Bickler, MD, DTM&H
Out of Africa: Insights from a Prospective Pediatric Surgery Database

2016
Mary E. Fallat, MD
Redefining Ladd's Path

2015
Robert S. Langer, ScD
Biomaterials and Biotechnology: from the Discovery of the First Angiogenesis Inhibitors to the Development of Controlled Drug Delivery Systems and the Foundation of Tissue Engineering

2014
Diana L. Farmer, MD
Standing on the Shoulders of Giants: From Singapore to Stem Cell Therapy

2013
Jorge D. Reyes, MD
Intestinal Transplantation: an Unexpected Journey

APSA Past Meeting Lectures (cont.)

2012
Daniel M. Green, MD
The Evolution of Treatment of Wilms' Tumor

2011
Judson G. Randolph, MD
Notes on the Early Development of Pediatric Surgery in the United States

2010
John D. Birkmeyer, MD
Measuring and Improvement the Quality of Pediatric Surgery

2009
Stanley B. Prusiner, MD
Designer Prions and a Quest for Therapy

2008
Michael W.L. Gauderer, MD
Creativity and the Surgeon

2007
Francisco G. Cigarroa, MD
Leading an Academic Health Center in the 21st Century: A Pediatric Surgeon's Perspective

2006
Diana Bianchi, MD
Fetomaternal Cell Trafficking: A Story that Begins with Prenatal Diagnosis and May End with Stem Cell Therapy

2005
W. Hardy Hendren, MD
Looking Back 50 Years

2004
Giulio (Dan) D'Angio, MD
The Role of the Surgeon in the Past, Present and Future of Pediatric Oncology

2003
Lucien Leape, MD
Safe Health Care — Are We Up to It?

2002
Harold Shapiro, PhD
The Ethical Dimensions of Scientific Progress

2001
M. Judah Folkman, MD
Angiogenesis-Dependent Diseases

APSA Past Meeting Lectures (cont.)

2000
J. Bruce Beckwith, MD
Pediatric Renal Tumors at the New Millennium: Myths, Misunderstandings, Controversies and Opportunities

1999
Samuel A. Wells, Jr., MD
(Title not available)

1998
Richard M. Satava, MD
Medicine in the 21st Century

1997
Douglas W. Wilmore, MD
Will Organ Growth Replace Transplantation? Lessons from Patients with Short Bowel Syndrome

1996
Robert H. Bartlett, MD
Surgery, Science and Respiratory Failure

1995
David A. Williams, MD
The Role of Interleukin-II on the Pathophysiology of the Small Intestine

1994
W. French Anderson, PhD
Human Gene Therapy

1993
M. Judah Folkman, MD
Clinical Applications of Angiogenesis Research

1992
Warren Zapol, MD
Inhaled Nitric Oxide: A Selective Vaso-Dilator

1991
Joel Cooper, MD
History and Current Status of Lung Transplantation

1990
Richard Simmons, MD
Role of the Gut Flora in Surgery

APSA Past Meeting Lectures (cont.)

Jay & Margie Grosfeld Lectures

2018
Paul E. Farmer, MD, PhD
Watering the Desert: Addressing Surgical Disparities in an Age of Austerity

2017
James A. O'Neill, Jr., MD
A Model for Humanitarian Outreach in Today's World

2016
Vinay Nadkarni, MD, MS
Resuscitating Resuscitation: Disruptive Innovations – Learning from the Past, Present and Toward a Brighter Future!

2015
Henri R. Ford, MD, MHA
Insights into the Pathogenesis of Necrotizing Enterocolitis: The Role of the Intestinal Microbiota

2014
Gail E. Besner, MD
A Pain in the NEC: Research Challenges and Opportunities

2013
Jessica J. Kandel, MD
Serendipity, Translational Research, High Quality Care, and the Children's Hospital

2012
M. James Kaufman, PhD
Heath Care Reform – The Impact on Children

2011
Anthony Atala, MD
Regenerative Medicine: New Approaches to Healthcare

2010
Christopher K. Breuer, MD
The Development and Translation of the Tissue Engineered Vascular Grafts

2009
Michael T. Longaker, MD, MBA
Regenerative Medicine: A Surgeon's Perspective

2008
Frederick J. Rescorla, MD
What's New in Pediatric Surgery

APSA Past Meeting Lectures (cont.)

International Guest Lectures

2018
Miliard Derbew, MD
Pediatric Surgery in Eastern Africa: Unmet Needs

2015
Paul K.H. Tam, MBBS, ChM
Hirschsprung's Disease: a Bridge for Science and Surgery

2014
Professor Jacques Marescaux
Next Step in Minimally Invasive Surgery: Hybrid Image-Guided Surgery

2013
Agostino Pierro, MD
Across the Ocean: Perspectives for Clinical Care, Training and Research

2012
Benno M. Ure, MD
Enthusiasm, Evidence and Ethics: the Triple E of Minimally Invasive Pediatric Surgery

2011
Professor Takeshi Miyano, MD
A Brief History of Pediatric Surgery and Healthcare Delivery Systems in Japan

2010
Jan Alice Marcel Deprest, MD
Prenatal Management of the Fetus with Isolated CDH

2009
Marcelo Martinez Ferro, MD
New Approaches to Pectus and Other MIS in Argentina

2008
Tadashi Iwanaka, MD
Technical Innovation, Standardization and Skill Qualification of Pediatric Minimally Invasive Surgery in Japan

2007
Claire Nihoul-Fékété, MD
Is Regionalism of Complex Pediatric Malformations Desirable and Feasible? The Example of Disorders of Sexual Development

2005
Prof. Frans W.J. Hazebroek, MD, PhD
Is Continuation of Life Support Always the Best Option for the Surgical Neonate?

APSA Past Meeting Lectures (cont.)

2004
David A. Lloyd, MD
Tomorrow's Surgeons: Who Cares for the Patient?

2003
Claire Nihoul-Fékété, MD
Modern Surgical Management of Congenital Hyperinsulinemic Hypoglycemia

2002
Takeshi Miyano, MD
Biliary Tree: A Gardener's 30-Year Experience

2001
Pedro Rosselló, MD
One Nation, with Liberty and Justice...and Healthcare for All

2000
Leela Kapila, MD
Are These the Children of a Lesser God?

1999
Bernardo Ochoa, MD
Pediatric Surgery in Latin America

1998
Sidney Cywes, MD
Some of the Little Things We Do — Something Old, Something New

1997
Justin Kelly, MD
Bladder Exstrophy — Problems and Solutions

1996
Prem Puri, MD
Variant Hirschsprug's Disease

1995
Sir Lewis Spitz, MD, PhD
Esophageal Atresia — Past, Present and Future

1994
Sean J. Corkery, MCh
In Pursuit of the Testis

1993
Edward M. Kiely, MD
The Surgical Challenge of Neuroblastoma

APSA Past Meeting Lectures (cont.)

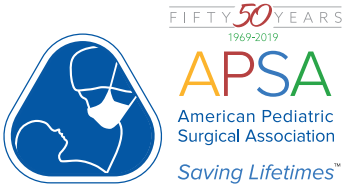
1992
Yann Revillon, MD
Intestinal Transplantation in France

1991
Shemuel Nissan, MD
The History of Surgery and Medicine in the Holy Land from the 19th Century

1990
Jan C. Molenaar, MD
Congenital Diaphragmatic Hernia — What Defect?

Plenary Lectures

2016
Mary L. Brandt, MD
Sustaining a Career



APSA 2019 Annual Meeting Program in Detail

Program in Detail

Saturday, May 18

7:00 a.m. – 5:00 p.m.	APSA Board Meeting	Regis, 3rd FL
7:00 a.m. – 10:00 p.m.	Committee and Affiliate Meetings	View the Ancillary Meetings List on page 63 for specific locations
2:00 p.m. – 6:00 p.m.	Registration Desk Open	Registration Desk A&B, 4th FL
2:00 p.m. – 6:00 p.m.	Speaker Ready Room Open	Orleans, 4th FL
2:30 p.m. – 6:30 p.m.	Program Directors Meeting	Grand Ballroom Salons H-J, 4th FL
6:30 p.m. – 10:00 p.m.	Publications Committee Meeting and Dinner	Regis, 3rd FL

Sunday, May 19

6:00 a.m. – 8:00 p.m.	Nursing Mothers Room	Boston University, 3rd FL
6:30 a.m. – 5:00 p.m.	Registration Desk Open	Registration Desk A&B, 4th FL
6:30 a.m. – 6:30 p.m.	Speaker Ready Room Open	Orleans, 4th FL
7:00 a.m. – 10:00 a.m.	Committee and Affiliate Meetings	View the Ancillary Meetings List on page 63 for specific locations

Benjy Brooks Society Brunch and Meeting

9:00 a.m. – 11:00 a.m. — Salons H-J, 4th FL

Ticket required for entry

Moderators: Jennifer A. Timmons, MD, Erin E. Perrone, MD

Discuss issues that women are currently facing in the pediatric surgery arena and talk about the society's future.

Panel: Patricia K. Donahoe, MD; Barbara Ann Barlow, MD; Kathryn D. Anderson, MD; Melanie I. Morris, MD

11:00 a.m. – 3:30 p.m.	Exhibitor Set-up	Exhibit Hall, 3rd FL
11:00 a.m. – 11:45 a.m.	New Member Rehearsal	Salons A-F
11:00 a.m. – 3:30 p.m.	Poster Set-up	Exhibit Hall, 3rd FL

President's Welcome

Noon – 12:30 p.m. — Salons A-F

Program in Detail (cont.)

Plenary Education Session:
Colorectal Malformations and Diseases - Anorectal Malformations (ARM); Hirschsprung Disease (HD)

12:30 p.m. – 2:00 p.m. Salons A-F

Moderator: Marc A. Levitt, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Describe the management of the newborn with an anorectal malformation and determine whether a newborn repair, delayed primary repair or diversion is appropriate
- Distinguish between a rectoperineal fistula and an ectopically located anus
- Accurately define the specific rectourethral anatomy (bladderneck, prostatic, or bulbar) as see on a distal colostogram
- Determine the best approach for repair of a male with an anorectal malformation - PSARP or laparoscopy
- Understand the treatment plan in a newborn with Hirschsprung disease, distension and enterocolitis in whom irrigations are not working
- Recognize the pitfalls involved with an intraoperative biopsy to determine the level of Hirschsprung disease during a primary pull-through
- Describe the different approaches to a Hirschsprung pull-through, transanal, umbilical or laparoscopic and understand the various techniques, Swenson, Soave and Duhamel
- Troubleshoot a postoperative Hirschsprung pull-through patient to determine whether there is an anatomic or pathologic cause to their obstructive symptoms
- Troubleshoot a postoperative Hirschsprung pull-through patient to determine whether there is an anatomic or pathologic cause to their soiling

Anorectal Malformations (ARM)

Belinda Dickie, MD, Michael D. Rollins, MD, Donald B. Shaul, MD, Richard J. Wood, MD, Caitlin A. Smith

Hirschsprung Disease (HD)

Jacob C. Langer, MD, Casey M. Calkins, MD, Megan K. Fuller, MD, Megan M. Durham, MD, Timothy C. Lee, MD

Tribute: Lester Martin and Orvar Swenson

Grace Z. Mak, MD

2:00 p.m. – 2:15 p.m. Refreshment Break Grand Ballroom Foyer, 4th FL

Program in Detail (cont.)

Sunday, May 19 (cont.)

APSA's Past: Key Factors in the Establishment of Pediatric Surgery and APSA - Who Did It and How

2:15 p.m. – 2:35 p.m. Salons A-F

Moderator: George W. Holcomb, III, MD

James A. O'Neill, Jr., MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Know who the pioneers were in the establishment of pediatric surgery
- Understand what the barriers were to establishing pediatric surgery as a specialty
- Understand the 4 essential factors for board certification in pediatric surgery
- Understand the vision and intentional strategy of Dr. H. William Clatworthy that resulted in the successful achievement of recognition of pediatric surgery as a specialty
- Know who the other pioneers were and what part they played

Tribute: H. William Clatworthy, Jr.

James A. O'Neill, Jr., MD

2:35 p.m. – 3:05 p.m. New Member Induction Salons A-F

Scientific Session 1 (Concurrent Session): Gastrointestinal Surgery

3:15 p.m. – 4:45 p.m. Salon G

Moderators: Samuel M. Alaish, MD; Christopher P. Gayer, MD, PhD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding the management of intestinal failure, the future of tissue engineering in the management of long gap esophageal atresia, operative techniques for patients with anorectal malformations, long term outcomes of patients born with gastroschisis and operative advancements in gastrostomy feeding access.

Program in Detail (cont.)

S1

SHORT-TERM OUTCOMES IN PEDIATRIC INTESTINAL FAILURE PATIENTS WITH CULTURE-PROVEN SMALL BOWEL BACTERIAL OVERGROWTH

Jamie Knell, MD[1], Christopher Duggan[2], Sam M. Han, MD[1], Charles R. Hong[1], Enju Liu[3], Heather Riley[4], Alexandra N. Carey[2], Biren P. Modi, MD[1], Tom Jaksic, MD[1]

[1]Center for Advanced Intestinal Rehabilitation and Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [2]Center for Advanced Intestinal Rehabilitation and Department of Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [3]Department of Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [4]Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA

S2

CHRONIC LYMPHATIC REMODELING IMPAIRS CHOLESTEROL HOMEOSTASIS AFTER SMALL BOWEL RESECTION

Emily J. Onufer, MD, MPH[1], Rafael Czepielewski[1], Li-hao Huang[1], Cathleen Courtney[1], Kristen M. Seiler[1], Gwendalyn Randolph[1], Brad W. Warner, MD[2]

[1]Washington University in St. Louis, St. Louis, MO, USA, [2]Division of Pediatric Surgery, Washington University School of Medicine, St. Louis, MO, USA

S3

A COMPARISON OF SMOFLIPID AND INTRALIPID IN THE EARLY MANAGEMENT OF INFANTS WITH INTESTINAL FAILURE

Cameron Casson, MD[1], Van Nguyen[2], Nandini Channabasappa[1], Pritha Nayak[1], Julia Panczuk[3], Kaitlin Berris[4], Hannah Piper, MD[3]

[1]University of Texas Southwestern, Dallas, TX, USA, [2]Children's Health Dallas, Dallas, TX, USA, [3]University of British Columbia, Vancouver, BC, Canada, [4]BC Children's Hospital, Vancouver, BC, Canada

Tribute: Morton Woolley
Michael Mallicote, MD

S4

ENDOLUMINAL FUNCTIONAL IMAGING AND DILATION: EARLY EXPERIENCE WITH ENDOSCOPIC IMPEDANCE-BASED MEASUREMENTS AND DILATIONS IN PEDIATRIC PATIENTS

Jordan S. Taylor, MD, James Wall, MD

Stanford University, Stanford, CA, USA

S5

TISSUE ENGINEERING CAN RESTORE ESOPHAGEAL CONTINUITY IN LONG GAP ESOPHAGEAL DEFECTS BY USING A CELLSPAN ESOPHAGEAL IMPLANT

Christine Finck, MD[1], Todd Jensen[2], Heather Wanczyk[2], William Fodor[3], Tina Roffidal[3], Sumati Sundaram[3], Karissa Paquin[3], Jeff Bouchard[3], Eyone Jones[1]

[1]Connecticut Children's Medical Center, Hartford, CT, USA, [2]University of Connecticut Health, Farmington, CT, USA, [3]Biostage, Holliston, MA, USA

Program in Detail (cont.)

Sunday, May 19 (cont.)

S6

ASSESSING THE BENEFIT OF REOPERATIONS IN PATIENTS WHO SUFFER FROM FECAL INCONTINENCE AFTER REPAIR OF THEIR ANORECTAL MALFORMATION

Devin R. Halleran[1], Hira Ahmad[1], Alejandra Vilanova-Sánchez[2], Patrick Stallings[1], Nisha Ganesh[1], Alessandra Gasior[1], Richard J. Wood[1], **Marc A. Levitt**[1]

[1]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA, [2]University Hospital La Paz, Madrid, Spain

S7

INTRAOPERATIVE INDOCYANINE GREEN LASER ANGIOGRAPHY (SPY™) AND ITS VALUE IN PREDICTING THE VASCULAR SUPPLY OF TISSUES NEEDED TO PERFORM CLOACAL, ANORECTAL MALFORMATION AND HIRSCHSPRUNG RECONSTRUCTIONS

Rebecca M. Rentea, MD[1,2], Devin R. Halleran, MD[1], Alejandra Vilanova-Sanchez[1], Hira Ahmad, MD[1], Kate McCracken[1], Geri Hewitt, MD[1], Victoria Alexander[1], Laura Weaver[1], Caitlin A. Smith[1,3], Richard J. Wood, MD[1], Marc A. Levitt, MD[1]

[1]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital,Columbus, OH, USA [2]Children's Mercy Hospital-Kansas City, Kansas City, MO, USA, [3]Seattle Children's Hospital, Seattle, WA, USA

S8

GASTROINTESTINAL MORBIDITY IN ADULTS FOLLOWING REPAIR OF SIMPLE NEONATAL GASTROSCHISIS

Gillian R. Goddard, MD[1], Justine Marchix, PhD[1], Meghan Hall Rauen, MA[2], Mary L. Brandt, MD[3], Michael A. Helmrath, MD[1]

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]Avery's Angel's Gastroschisis Foundation, Raleigh, NC, USA, [3]Baylor College of Medicine, Houston, TX, USA

S9

DESIGNING A SAFER GASTROSTOMY DEVICE, THE QUEST TO PREVENT G TUBE DISLODGEMENT

Luis I. Ruffolo, MD[1], Theresa Foito[2], Marsha Pulhamus[2], Anna McGuire, MD[1], Derek Wakeman, MD[3]

[1]University of Rochester Medical Center, Rochester, NY, USA, [2]Golisano Children's Hospital, Rochester, NY, USA, [3]University of Rochester Department of Surgery, Rochester, NY, USA

S10

ENDOSCOPIC CLOSURE OF GASTROCUTANEOUS FISTULA: MODIFIED TECHNIQUE WITH OVER-SCOPE CLIP

Jordan S. Taylor, MD, Julia M. Chandler, MD, MS, Katherine I. Portelli, James Wall, MD

Stanford University, Stanford, CA, USA

Program in Detail (cont.)

Scientific Session 2 (Concurrent Session): Basic Science, Chest, IBD

3:15 p.m. – 4:45 p.m. Salons A-F

Moderators: Samir Pandya, MD; Kasper Wang, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding fetal transplantation and gene editing, the long-term outcomes of patients with congenital diaphragmatic hernia, cryoablation during repair of pectus excavatum and the modern surgical management of pediatric inflammatory bowel disease.

S11

ACCESS TO AN ONLINE VIDEO ENHANCES THE CONSENT PROCESS, INCREASES KNOWLEDGE AND DECREASES ANXIETY OF CAREGIVERS WITH CHILDREN SCHEDULED FOR INGUINAL HERNIA REPAIR - A RANDOMIZED CONTROLLED TRIAL

Friederike Book[1], Jan Gödeke[1], Alicia Poplawski[2], Oliver J. Muensterer, MD, PhD[1]

[1]Pediatric Surgery, University Medicine of the Johannes Gutenberg University Mainz, Mainz, Rheinland-Pfalz, Germany, [2]Institute of Medical Biostatistics, Epidemiology and Informatics (IMBEI), University Medicine of the Johannes Gutenberg University Mainz, Mainz, Rheinland-Pfalz, Germany

S12

CELLULAR TRAFFICKING ACROSS THE BLOOD-BRAIN BARRIER FOLLOWING IN UTERO HEMATOPOIETIC CELLULAR TRANSPLANTATION

Matthew T. Grant, MD, MPhil, Jesse D. Vrecenak, MD

Washington University in St. Louis, St. Louis, MO, USA

S13

SYSTEMIC FETAL GENE EDITING AS A TREATMENT FOR CYSTIC FIBROSIS

Adele Ricciardi, PhD[1], Christina Barone[1], Rachael Putman[1], Elias Quijano[1], Anisha Gupta[1], James Farrelly[1], Valerie Luks[2], Richard Nguyen[1], Mark Saltzman[1], Peter Glazer[1], Marie Egan[1], David H. Stitelman, MD[3]

[1]Yale University, New Haven, CT, USA, [2]Pearlman School of Medicine, Philadelphia, PA, USA, [3]Yale School of Medicine/Yale University, New Haven, CT, USA

S14

IN UTERO LIVER-DIRECTED LENTIVIRAL GENE THERAPY CURES A PIG MODEL OF HEREDITARY TYROSINEMIA TYPE 1

Clara Nicolas, MD, MS, Kari Allen, Lori Hillin, Caitlin VanLith, Zeji Du, Robert Kaiser, Raymond Hickey, Joseph Lillegard, MD

Mayo Clinic, Rochester, MN, USA

Program in Detail (cont.)

Sunday, May 19 (cont.)

S15

COMPARATIVE OUTCOMES OF RIGHT VERSUS LEFT CONGENITAL DIAPHRAGMATIC HERNIA: A MULTICENTER ANALYSIS

Alexey Abramov, MD[1], Weijia Fan, MS[2], Rebecca Hernan, MS[3], Julia Wynn, MS[3], Gudrun Aspelund, MD[4], Foong-Yen Lim, MD[5], George B. Mychaliska, MD[6], Brad W. Warner, MD[7], Robert Cusick, MD[8], Timothy Crombleholme, MD[9], Chung Dai, MD[10], Melissa Danko, MD[11], Amy J. Wagner, MD[12], Kenneth S. Azarow, MD[13], David T. Schindel, MD[14], Douglas Potoka, MD[15], Samuel Soffer, MD[16], Jason Fisher, MD[17], Christiana Farkouh-Karoleski, MD[18], Wendy Chung, MD[19], Vincent P. Duron, MD[20]

[1]Department of Surgery, Columbia University Medical Center, New York, NY, USA, [2]Department of Biostatistics, Mailman School of Public Health, New York, NY, USA, [3]Department of Pediatrics, Columbia University Medical Center, New York, NY, USA, [4]Department of Surgery, Columbia University Medical Center, Valhalla, NY, USA, [5]Division of Pediatric General, Thoracic, and Fetal Surgery, Center for Molecular Fetal Therapy, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [6]Section of Pediatric Surgery, Fetal Diagnosis and Treatment Center, University of Michigan Health System, Ann Arbor, MI, USA, [7]Division of Pediatric Surgery, Washington University School of Medicine, St. Louis, MO, USA, [8]Division of Pediatric Surgery, University of Nebraska Medical Center College of Medicine, Omaha, NE, USA, [9]Division of Pediatric General, Thoracic, and Fetal Surgery, Center for Molecular Fetal Therapy, Cincinnati Children's Hospital Medical Center, Dallas, TX, USA, [10]Department of Pediatric Surgery, Monroe Carell Jr. Children's Hospital at Vanderbilt, [11]Department of Pediatric Surgery, Monroe Carell Jr. Children's Hospital at Vanderbilt, Nashville, TN, USA, [12]Division of Pediatric Surgery, Children's Hospital of Wisconsin, Medical College of Wisconsin, Madison, WI, USA, [13]Pediatric Surgery Division, Department of Surgery, Oregon Health & Science University, Portland, OR, USA, [14]Division of Pediatric Surgery, UT Southwestern Medical Center, Dallas, TX, USA, [15]Division of Pediatric Surgery, Children's Hospital of Pittsburgh, Pittsburgh, OH, USA, [16]Northwell Health, Division of Pediatric Surgery, Steven and Alexandra Cohen Children's Hospital, New Hyde Park, NY, USA, [17]Division of Pediatric Surgery, New York University Langone Medical Center, [18]Department of Pediatrics, Columbia University Medical Center, [19]Department of Pediatrics, Columbia University Medical Center Department of Medicine, Columbia University Medical Center, [20]Division of Pediatric Surgery, Columbia University Medical Center, New York, NY, USA

S16

THE INCIDENCE OF NEUROPATHIC PAIN AFTER INTERCOSTAL CRYOABLATION DURING THE NUSS PROCEDURE

Michael J. Zobel, MD[1], Clifton Ewbank[2], Roberto Mora[1], Olajire Idowu, MD[3], Sunghoon Kim, MD[4], Benjamin E. Padilla, MD[1]

[1]University of California, San Francisco, San Francisco, CA, USA, [2]University of California, San Francisco Benioff Children's Hospital Oakland, San Francisco, CA, USA, [3]UCSF Benioff Children's Hospital Oakland, San Francisco, CA, USA, [4]UCSF Benioff Children's Hospital Oakland, Oakland, CA, USA

S17

AVOIDANCE OF UNNECESSARY BRONCHOSCOPY IN CHILDREN WITH SUSPECTED FOREIGN BODY ASPIRATION THROUGH THE USE OF COMPUTED TOMOGRAPHY

Alexander T. Gibbons, MD, MS[1], Alejandra M. Casar Berazaluce, MD[2], Rachel Hanke, MD[2], Tracey Mehlman, Allison Person, Michael Rubin, Todd A. Ponsky, MD[2]

[1]Akron Children's Hospital, University Heights, OH, USA, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Tribute: Eric W. Fonkalsrud
Howard C. Jen, MD

Program in Detail (cont.)

S18

POUCHOGRAM PRIOR TO ILEOSTOMY REVERSAL AFTER ILEAL POUCH ANAL ANASTOMOSIS IN PEDIATRIC PATIENTS: IS IT USEFUL IN THE SETTING OF ROUTINE EUA?

Michael D. Traynor, MD, Nicholas P. McKenna, Elizabeth B. Habermann, Ryan M. Antiel, MD, MS, Christopher R. Moir, MD, Denise B. Klinkner, MD, Michael B. Ishitani, MD, D. Dean Potter, MD

Mayo Clinic, Rochester, MN, USA

S19

FERTILITY AND SEXUAL FUNCTION IN WOMEN FOLLOWING PEDIATRIC ILEAL POUCH ANAL ANASTOMOSIS

D. Dean Potter, MD, Christopher R. Moir, MD, Courtney Day, W. Scott Harmsen, John Pemberton

Mayo Clinic, Rochester, MN, USA

S20

TRANSANAL MINIMALLY INVASIVE COMPLETION PROCTECTOMY WITH ILEAL POUCH ANAL ANASTOMOSIS IN ULCERATIVE COLIITIS

Scott S. Short, MD[1], Katie Russell, MD[2], Zachary Kastenberg, MD[2]

[1]Primary Children's Hospital, The University of Utah, Salt Lake City, UT, USA, [2]Primary Children's Hospital/ University of Utah School of Medicine, Salt Lake City, UT USA

Scientific Session 3:
Oncology (basic science and clinical), Global, Anesthesia/analgesia

3:15 p.m. – 4:45 p.m. Salons H-J

Moderators: Barrie S. Rich, MD; David H. Rothstein, MD, MS

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding tissue repair using stem cells, the placement of sacral nerve stimulators, oncogenesis of common pediatric solid tumors, long term outcomes of patients following hyperthermic intraperitoneal chemotherapy, the global initiative for children's surgery and pediatric anesthesia and perioperative analgesia.

Program in Detail (cont.)

Sunday, May 19 (cont.)

S21

SACRAL NERVE STIMULATOR PLACEMENT: A NOVEL SURGICAL NAVIGATION TOOL FOR COMPLEX ANATOMY

Alejandra M. Casar Berazaluce, MD, Irene Isabel P. Lim-Beutel, MD, John M. Racadio, MD, Jason S. Frischer, MD

Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Tribute: Raymond A. Amoury

Robert M. Dorman, MD

S22

NERVE-DERIVED SIGNAL ASSIST TISSUE REPAIR BY MANDIBULAR SKELETAL STEM CELLS

R. Ellen Jones, MD[1], Ankit Salhotra[2], Ryan Ransom[2], Ava Carter[3], Kiana Robertson[2], Derrick Wan[2], Michael Longaker[2]

[1]UTSW, Stanford, Palo Alto, CA, USA, [2]Hagey Laboratory for Pediatric Regenerative Medicine, Stanford University School of Medicine, Stanford, CA, USA, [3]Stanford University School of Medicine, Stanford, CA, USA

S23

TRIPTOLIDE INHIBITS DVL2 EXPRESSION AND DOWN-REGULATES β-CATENIN AND MYC TARGET GENES IN HUMAN NEUROBLASTOMA

Min Huang, MD[1], **Jordan S. Taylor, MD**[2], Jasmine Zeki[2], Nathan Sumarsono[1], Bill Chiu, MD[2]

[1]Department of Pediatrics, Stanford University School of Medicine, Stanford, CA, USA, [2]Stanford University, Stanford, CA, USA

S24

PIM KINASES MEDIATE CISPLATIN RESISTANCE IN HEPATOBLASTOMA

Raoud Marayati, MD, Laura L. Stafman, MD, PhD, Adele P. Williams, MD, Jerry E. Stewart, BS, Karina J. Yoon, PhD, Jamie M. Aye, MD, Elizabeth A. Beierle, MD

University of Alabama at Birmingham, Birmingham, AL, USA

S25

DIFFERENTIAL EXPRESSION OF HUMAN ENDOGENOUS RETROVIRUS- K IN HEPATOBLASTOMA

David F. Grabski, MD[1], Monika Sharma[2], Laurie Gray[2], Sara French[2], David Rekosh[2], Marie-Louise Hammarskjold[2], Sara K. Rasmussen, MD[2]

[1]University of Virginia School of Medicine, Charlottesville, VA, USA, [2]University of Virginia, Charlottesville, VA, USA

Program in Detail (cont.)

S26

CYTOREDUCTIVE SURGERY (CRS) AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY (HIPEC) IN PEDIATRIC-TYPE MALIGNANCIES: CLINICAL CHARACTERISTICS OF LONG-TERM SURVIVORS

Brian Arrinza Coakley, MD[1], Gideon Sandler, MD[2], Lianchun Xiao[3], Peter Anderson[4], Winston Huh[3], Cynthia Herzog[3], Andrea A. Hayes-Jordan, MD[5]

[1]The Mount Sinai Health System, New York, NY, USA, [2]Westmead Hospital & The Children's Hospital at Westmead, Sydney, Australian Capital Territory, Australia, [3]MD Anderson Cancer Center, Houston, TX, USA, [4]The Cleveland Clinic, Cleveland, OH, USA, [5]The University of North Carolina School of Medicine, Chapel Hill, NC, USA

S27

ESSENTIAL SURGERY AND ANESTHESIA PACKAGE FOR CHILDREN AT THE FIRST-LEVEL LEVEL HOSPITAL: GUIDELINES FROM THE GLOBAL INITIATIVE FOR CHILDREN'S SURGERY

David F. Grabski, MD[1], Emmanuel Ameh[2], Doruk E. Ozgediz, MD[3], Stephen W. Bickler, MD[4]

[1]University of Virginia School of Medicine, Charlottesville, VA, USA, [2]Division of Pediatric Surgery, Department of Surgery, National Hospital, Abuja, Federal Capital Territory, Nigeria, [3]Yale School of Medicine, New Haven, CT, USA, [4]Division of Pediatric Surgery, Department of Surgery, University of California, San Diego, San Diego, CA, USA

S28

COMPARISON OF UGANDAN AND NORTH AMERICAN PEDIATRIC SURGERY FELLOWS' OPERATIVE EXPERIENCE: OPPORTUNITIES FOR GLOBAL TRAINING EXCHANGE

Christopher R. Reed, MD[1], Nasser Kakembo[2], Phyllis Kisa[2], Monica Langer, MD[3], Gustavo Villalona[4], Doruk E. Ozgediz, MD[5], Tamara N. Fitzgerald, MD[6]

[1]Duke University Medical Center, Durham, NC, USA, [2]Makerere University, Durham, NC, USA, [3]Northwestern University, Chicago, IL, USA, [4]Saint Louis University, St. Louis, MO, USA, [5]Yale School of Medicine, New Haven, CT, USA, [6]Department of Surgery, Duke University Medical Center, Durham, NC, USA

S29

RANDOMIZED TRIAL INVESTIGATING THE IMPACT OF DRUG DISPOSAL BAG PROVISION ON THE RATE OF POSTOPERATIVE OPIOID DISPOSAL IN PEDIATRIC SURGICAL PATIENTS

Amy E. Lawrence, MD[1], Alex Carsel[2], Karen Leonhart[2], Calista M. Harbaugh, MD[3], Jennifer F. Waljee, MD, MPH[3], Daryl McLeod, MD, MPH[1], Patrick Walz, MD[1], Peter C. Minneci, MD, MHSc[1], Katherine J. Deans, MD, MHSc[1], **Jennifer N. Cooper, MS, PhD**[2]

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]The Research Institute at Nationwide Children's Hospital, Columbus, OH, USA, [3]University of Michigan, Ann Arbor, MI, USA

Program in Detail (cont.)

Sunday, May 19 (cont.)

S30

FEASIBILITY OF SPINAL ANESTHESIA IN INFANTS UNDERGOING ADVANCED LAPAROSCOPIC AND THORACIC SURGERY

Elizabeth S. Soukup, MD, MMSc, Amanda DuBois, Jessica Bland, MD, Charles Eastwood, MD
Elliot Hospital, Manchester, NH, USA

4:00 p.m. – 9:00 p.m.	Exhibit Hall Open	Exhibit Hall, 3rd FL
4:00 p.m. – 9:00 p.m.	Poster Hall Open	Exhibit Hall, 3rd FL
4:30 p.m. – 5:30 p.m.	Wine and Cheese Reception	Exhibit Hall

Quick Shots 1: Gastrointestinal Surgery (Concurrent Session)

5:15 p.m. – 6:15 p.m. Salon G

Moderators: Biren P. Modi, MD; Andreas H. Meier, MD, MEd Dr med

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding health care disparities and the management of pediatric inflammatory bowel disease, intestinal failure, pancreaticobiliary tract and feeding disorders.

Q1

SURGERY IN CHILDREN WITH VERY EARLY ONSET INFLAMMATORY BOWEL DISEASE

Aimee G. Kim, MD, Jeremy Adler, Ronald B. Hirschl, MD, Samir K. Gadepalli, MSc, MD, MBA
University of Michigan, Ann Arbor, MI, USA

Tribute: E. Ide Smith
Jamie Knell, MD, Sam M. Han, MD

Q2

EFFECTS OF PARENTAL ACTIVATION IN CHILDREN WITH INTESTINAL FAILURE

Chinwendu Onwubiko, MD, PhD[1], Michelle C. Shroyer, MPH[1], J. Skyler Graham, BS[1], Linda Wilkinson, MSN, CRNP[1], David P. Galloway, MD[1], Gretchen P. Jackson, MD, PhD[2], Colin A. Martin, MD[1]
[1]Children's of Alabama, University of Alabama at Birmingham, Birmingham, AL, USA, [2]Vanderbilt University Medical Center, Nashville, TN, USA

Program in Detail (cont.)

Q3

OUTCOMES AND BURDEN OF DISEASE IN ADOLESCENTS WITH NEONATAL ONSET SHORT BOWEL SYNDROME

Sam M. Han, MD[1], Jamie Knell, MD[1], Owen Henry, BS[2], Charles R. Hong[1], Grace Y. Han[1], Steven J. Staffa[2], Biren P. Modi, MD[1], Tom Jaksic, MD[1]

[1]Center for Advanced Intestinal Rehabilitation and Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [2]Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA

Q4

DOES FOLLOWING A MANAGEMENT ALGORITHM FOR ADHESIVE SMALL BOWEL OBSTRUCTION DECREASE THE INCIDENCE OF BOWEL LOSS?

Brittany L. Johnson, MD [1], Giovanni A. Campagna[2], Adam M. Vogel, MD[1], Bindi J. Naik-Mathuria, MD[1]

[1]Texas Children's Hospital, Houston, TX, USA, [2]Baylor College of Medicine, Houston, TX, USA

Q5

LIPOCALIN-2 INCREASES INTESTINAL PERMEABILITY AND REDUCES ADAPTATION THROUGH CHANGES IN THE GUT MICROBIOME IN SHORT BOWEL SYNDROME

Ailan Zhang, MD, PhD[1], Menghan Wang[1], Elizabeth O'Hare[1], Thomas Prindle[2], William Fulton[2], Chhinder Sodhi[2], David J. Hackam, MD[2], Cynthia Sears[1], Samuel M. Alaish, MD[1]

[1]Johns Hopkins University, Baltimore, MD, USA, [2]Johns Hopkins Children's Center, Baltimore, MD, USA

Q6

MORE IS LESS: THE ADVANTAGES OF PERFORMING COMBINED LAPAROSCOPIC CHOLECYSTECTOMY AND ERCP FOR PEDIATRIC CHOLEDOCHOLITHIASIS

Kristin Gee, MD[1], R. Ellen Jones, MD[2], Cameron Casson, MD[3], Lorrie S. Burkhalter[4], David Troendle[5], Bradley Barth[5], Alana Beres, MD[5]

[1]Children's Hospital Los Angeles, Los Angeles, CA, USA, [2]UTSW, Stanford, Palo Alto, CA, USA, [3]University of Texas Southwestern, Dallas, TX, USA, [4]Children's Medical Center, Dallas, TX, USA, [5]University of Texas Southwestern, Children's Medical Center, Dallas, TX, USA

Q7

NORMALIZATION OF SERUM LIPASE LEVELS VERSUS RESOLUTION OF ABDOMINAL PAIN: A COMPARISON OF PRE-OPERATIVE MANAGEMENT IN CHILDREN WITH BILIARY PANCREATITIS

Kristin Gee, MD[1], David Rosenberg[2], Eugene Kim, MD[1]

[1]Children's Hospital Los Angeles, Los Angeles, CA, USA, [2]University of Illinois College of Medicine, Chicago, IL, USA

Q8

IS BILIARY DYSKINESIA SUFFICIENT TO ACCEPT THE RISKS OF ELECTIVE CHOLECYSTECTOMY IN THE PEDIATRIC POPULATION?

Lilly Bayouth, MD[1], Laurie Driscoll[2], Kari Beasley[3], Danielle Walsh[2], David Rodeberg, MD[2], Shannon Longshore[2]

[1]Vidant Medical Center, East Carolina University, Greenville, NC, USA, [2]East Carolina University, Greenville, NC, USA, [3]Vidant Medical Center, Greenville, NC, USA

Program in Detail (cont.)

Sunday, May 19 (cont.)

Q9

PAIN RESOLUTION AND GLYCEMIC CONTROL IN PEDIATRIC PATIENTS AFTER TOTAL PANCREATECTOMY WITH ISLET CELL AUTOTRANSPLANTATION FOR CHRONIC PANCREATITIS

Natalie Fillman, MD[1], Mark Kijek[1], Justyna Golebiewska[1], Piotr Bachul[1], Monica Para[1], Lindsay Basto[1], Laurencia Perea[1], Karolina Golab[1], Ling-jia Wang[1], Martin Tibudan[1], John Fung[1], Jeffrey Matthews[1], Piotr Witkowski[1], **Mark B. Slidell, MD MPH**[2]

[1]University of Chicago, Chicago, IL, USA, [2]Comer Children's Hospital, The University of Chicago, Chicago, IL, USA

Q10

TEMPORARY GASTRIC ELECTRICAL STIMULATION IN CHILDREN WITH GASTROPARESIS PREDICTS LONG-TERM SUCCESS

Neha Malik, Christopher Jolley, Saleem Islam, MD

University of Florida College of Medicine, Gainesville, FL, USA

Q11

MANAGEMENT OF CHOLEDOCHAL CYST BY ISOPERISTALTIC HEPATICOJEJUNOSTOMY WITHOUT ROUX-EN-Y

Abdul Hanif, MBBS, MS, MMEd, Jaglul Gaffer Khan, MD, Kaniz Hasina, Nazmus Sakib, Mahbubul Alam, MD, Syed Abdull Adi, MD

Dhaka Medical College & Hospital, Dhaka, Dhaka, Bangladesh

Q12

IMPLEMENTATION OF A PEDIATRIC ENHANCED RECOVERY PATHWAY DECREASES NARCOTIC UTILIZATION AND SHORTENS TIME TO FULL FEEDING

Michael R. Phillips, MD[1], Gregory S. Maves, MD[2], M Concetta. Lupa[1], Sara L. Pittenger[1], Lyla Hance[1], Sean E. McLean, MD[1], Andrea A. Hayes-Jordan, MD[3], William T. Adamson, MD[4]

[1]The University of North Carolina, Chapel Hill, NC, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA, [3]The University of North Carolina School of Medicine, Chapel Hill, NC, USA, [4]Nemours Children's Hospital, Orlando, FL, USA

Q13

COST-EFFECTIVENESS ANALYSIS OF THE SURGICAL MANAGEMENT OF INFANTS UNDER 1 YEAR OF AGE WITH FEEDING DIFFICULTIES

Yangyang R. Yu, MD, MS[1], Megan E. Cunningham, MD[2], Annalyn S. Demello[2], Eric H. Chiou[2], Panagiotis Kougias[3], David E. Wesson[2], Mary L. Brandt, MD[3], Monica E. Lopez, MD[3]

[1]Baylor College of Medicine, Texas Children's Hospital, Houston, TX, USA, [2]Texas Children's Hospital, Houston, TX, USA, [3]Baylor College of Medicine, Houston, TX, USA

Program in Detail (cont.)

Q14

RACIAL AND ETHNIC DISPARITIES IN THE USE OF EPIDURAL ANALGESIA IN CHILDREN UNDERGOING MAJOR ABDOMINAL SURGERY

Dalya M. Ferguson, MD[1], Jonathan K. Chica, MD[1], Jonathan Rodean, MPP, BS[2], Marisa A. Bartz-Kurycki, MD, MS[1], Pascal Owusu-Agyemang, MD[3], KuoJen Tsao, MD[1], Mary T. Austin, MD, MPH[1]

[1]McGovern Medical School at The University of Texas Health Science Center at Houston, Houston, TX, USA, [2]Children's Hospital Association, Lenexa, KS, USA, [3]The University of Texas MD Anderson Cancer Center, Houston, TX, USA

Quick Shots 2: Thoracic and Colorectal Surgery (Concurrent Session)

5:15 p.m. – 6:15 p.m. Salons A-F

Moderators: Michael J. Goretsky, MD; Drew A. Rideout, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding the management of pediatric pneumothorax, orthotic utilization for treatment of pectus carinatum, oOutcomes of complex congenital esophageal malformations, novel treatment of pulmonary fibrosis, pediatric colorectal disorders, and innovative laparoscopic techniques.

Q15

USE OF AUTOLOGOUS BLOOD PATCH IN PEDIATRIC PATIENTS WITH A PERSISTENT AIR LEAK

Liese C. C Pruitt, MD, Zachary J. Kastenberg, MD, Stephen J. Fenton, MD, Scott S. Short, MD

University of Utah, Salt Lake City, UT, USA,

Tribute: William B. Kiesewetter

Marcus Malek, MD

Q16

MINIMIZING VARIANCE IN PEDIATRIC SURGICAL CARE THROUGH IMPLEMENTATION OF A SPONTANEOUS PNEUMOTHORAX MANAGEMENT PROTOCOL: A MULTI-INSTITUTION STUDY

Aaron J. Cunningham, MD[1], **Minna M. Wieck, MD**[2], Claire Ostertag-Hill[1], Mubeen A. Jafri, MD[3], Katrine M. Lofberg, MD[4], Kenneth S. Azarow, MD[1], Marilyn W. Butler, MD[3], Nicholas A. Hamilton, MD[1], Sanjay Krishnaswami, MD[1], Andrew Zigman, MD[5], Elizabeth A. Fialkowski[1]

[1]Oregon Health & Science University, Portland, OR, USA, [2]University of Chicago, Chicago, IL, USA, [3]Randall Children's Hospital at Legacy Emanuel, Portland, OR, USA, [4]Phoenix Children's Hospital, Phoenix, AZ, USA, 5Northwest Permanente Physicians, Portland, OR, USA

Program in Detail (cont.)

Sunday, May 19 (cont.)

Q17

EVALUATING PATIENT COMPLIANCE OF PECTUS CARINATUM ORTHOSES WITH TEMPERATURE SENSOR

Elissa Port, Catherine Hunter, MD, Bryan Malas, Katherine King, Marleta Reynolds, MD

[1]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

Q18

ANESTHETIC EXPOSURE AND NEURODEVELOPMENTAL OUTCOMES IN TERM INFANTS WITH ESOPHAGEAL ATRESIA AND TRACHEOESOPHAGEAL FISTULA

Nupur Gupta, Jason JT. Mayne, **Priscilla P.L. Chiu, MD, PhD**, Aideen Moore, MD

The Hospital for Sick Children, Toronto, ON, Canada

Q19

SUCCESSFUL TREATMENT OF FLOYD TYPE I TRACHEAL AGENESIS WITH TRACHEALIZATION AND ESOPHAGOTRACHEOPLASTY USING 3D-PRINTED EXTERNAL BIORESORBABLE SPLINT

Anthony Tsai[1], **Morgan K. Moroi**[1], Joseph B. Clark[2], Andrea Les[3], Barry Fell[1], Thomas Samson[4], Dino Ravnic[4], Scott J. Hollister[5], Glenn E. Green[3], Robert E. Cilley, MD[6], Peter Dillon, MD[1]

[1]Division of Pediatric Surgery, Penn State Children's Hospital, Hershey, PA, USA, [2]Division of Pediatric Cardiac Surgery, Penn State Children's Hospital, Hershey, PA, USA, [3]Division of Pediatric Otolaryngology, University of Michigan, Ann Arbor, MI, USA, [4]Division of Plastic Surgery, Penn State Children's Hospital, Hershey, PA, USA, [5]Wallace A. Coulter Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, USA, [6]Penn State Milton S. Hershey Medical Center, Hershey, PA, USA

Q20

CERIUM OXIDE NANOPARTICLE CONJUGATED WITH MICRORNA-146a TREATS LUNG INJURY BY DECREASING REACTIVE OXYGEN SPECIES IN BLEOMYCIN INDUCED MURINE MODEL OF PULMONARY FIBROSIS

Sarah A. Hilton, MD, MSHS[1], Carlos Zgheib[1], Hanan Elajaili[1], Lindel C. Dewberry, MD[1], Maggie Hodges[1], Junyi Hu[1], Junwang Xu[1], Sudipta Seal[2], Eva Nozik-Grayck[1], Kenneth W. Liechty, MD[3]

[1]University of Colorado, Aurora, CO, USA, [2]University of Central Florida, Aurora, CO, USA, [3]University of Colorado School of Medicine; Colorado Fetal Care Center, Children's Hospital Colorado, Aurora, CO, USA

Q21

NATURAL EXCRETION OF ENDOLUMINAL SPRINGS AFTER SPRING-MEDIATED INTESTINAL LENGTHENING

Genia Dubrovsky, MD[1], Anne-Laure Thomas, MS[2], Shant Shekherdimian[3], James C.Y. Dunn, MD[4], **Jordan S. Taylor, MD**[4]

[1]UCLA David Geffen School of Medicine, Los Angeles, CA, USA, [2]Stanford University School of Medicine, Stanford, CA, USA, [3]UCLA, Los Angeles, CA, USA, [4]Stanford University, Stanford, CA, USA

Program in Detail (cont.)

Q22

THE DUAL-STAGED PATHWAY FOR CLOSURE IN CLOACAL EXSTROPHY: SUCCESSFUL EVOLUTION IN COLLABORATIVE SURGICAL PRACTICE

John Jayman, BS[1], Jason Michaud[2], Mahir Maruf[1], Matthew Kasprenski[1], Rachel Davis[1], Bruce Trock[2], Paul Sponseller[2], John P. Gearhart[1]

[1]Johns Hopkins School of Medicine, Baltimore, MD, USA, [2]Johns Hopkins Medical Institutes, Baltimore, MD, USA

Q23

SUCTION RECTAL BIOPSY IS SAFE AND ACCURATE IN PREMATURE INFANTS

Devin R. Halleran, MD[1], Haley Lehmkuhl[2], Hira Ahmad, MD[1], Peter Baker[2], Richard J. Wood, MD[1], Marc A. Levitt, MD[1], Jeremy G. Fisher, MD[2]

[1]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA,

Q24

VARIABILITY OF THE TRANSITION ZONE LENGTH IN HIRSCHSPRUNG'S DISEASE

Hemanshoo Thakkar, MBBS, BSc, FRCS (Paeds)[1], Simon Blackburn[1], Joe Curry[1], Paolo De Coppi[1], Stefano Giuliani[1], Neil Sebire[2], Kate Cross[1]

[1]Specialist Neonatal and Paediatric Surgery, Great Ormond Street Hospital for Children, London, England, United Kingdom, [2]UCL Institute of Child Health, Great Ormond Street Hospital, London, England, United Kingdom

Q25

FACTORS PREDICTING THE NEED FOR VAGINAL REPLACEMENT AT THE TIME OF THE DEFINITIVE RECONSTRUCTION OF A CLOACAL MALFORMATION

Alejandra Vilanova-Sánchez, MD[1], Devin R. Halleran, MD[2], Carlos A. Reck-Burneo, MD[2], Kate McCracken[2], Geri Hewitt, MD[2], Alessandra Gasior[2], Laura Weaver[3], Hira Ahmad, MD[2], Allison Akers[2], Jordon Jaggers[2], Marc A. Levitt, MD[2], Richard J. Wood, MD[2]

[1]University Hospital La Paz, Madrid, Spain, [2]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA

Q26

LONG-TERM IMPACT OF A BOWEL MANAGEMENT PROGRAM IN TREATING FECAL INCONTINENCE IN PATIENTS WITH ANORECTAL MALFORMATIONS

Richard J. Wood, MD[1], Alejandra Vilanova-Sánchez, MD[2], Devin R. Halleran, MD[1], Carlos Reck-Burneo, MD[1], Yuri V. Sebastiao, PhD[3], Hira Ahmad, MD[1], Onnalisa Nash[1], Kristina Booth[1], Casey Trimble[1], Pooja Zahora[1], Cheryl Baxter[1], Sarah Driesbach[1], Andrea Wagner[1], Stacie Leeper[1], Alessandra Gasior[1], Marc A. Levitt, MD[1]

[1]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA, [2]University Hospital La Paz, Madrid, Spain, [3]Center for Surgical Outcomes Research, Nationwide Children's Hospital, Columbus, OH, USA

Program in Detail (cont.)

Sunday, May 19 (cont.)

Q27

REAL-TIME MAGNETIC RESONANCE IMAGING AND CYSTOSCOPY TO AVOID MISPLACEMENT AND ROOF IN ANORECTAL MALFORMATION CORRECTIVE SURGERY

Matthew W. Ralls, MD[1], Karen Speck[1], Maria Ladino-Torres[1], Peter Mackie, MD[2], Marcus D. Jarboe, MD[1]

[1]University of Michigan, Ann Arbor, MI, USA, [2]C.S. Mott Children's Hospital, Ann Arbor, MI, USA

Q28

LAPAROSCOPIC MORGAGNI HERNIA REPAIRS WITH AN INTUITIVELY-CONTROLLED ARTICULATING INSTRUMENT

Mercedes Pilkington, MD[1], **Christa N. Grant, MD**[2], James D. Geiger, MD[1]

[1]University of Michigan, Ann Arbor, MI, USA, [2]Penn State Hershey Children's Hospital, Hershey, PA, USA

Quick Shots 3: Oncology (basic science and clinical) (Concurrent Session)

5:15 p.m. – 6:15 p.m. Salon H-J

Moderators: Roshni Dasgupta, MD, MPH; Dave R. Lal, MD, MPH

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding rare pediatric renal tumors, the management of renovascular hypertension, and pediatric liver tumors.

Q29

PEDIATRIC CLEAR CELL SARCOMA OF THE KIDNEY: A REPORT FROM THE NATIONAL CANCER DATABASE

Vei Shaun Siow[1], Xilin Chen[2], Stephen Strotmeyer, Jr.[2], Marcus Malek, MD[1]

[1]UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA [2]University of Pittsburgh, Pittsburgh, PA, USA

Tribute: Willilam K. Sieber

Dave R. Lal, MD, MPH, Jerry Xiao, BA

Q30

COMPLICATIONS FOLLOWING NEPHRON-SPARING SURGERY FOR WILMS TUMOR

Hannah R. Spiegl, BS[1], Andrew J. Murphy[1], David Yanishevski, BS, Candidate for MD[1], Rachel Brennan[1], Chen Li, MD, Zhaohua Lu[1], Joseph M. Gleason[2], Andrew M. Davidoff, MD[1]

[1]St. Jude Children's Research Hospital, Memphis, TN, USA, [2]University of Tennessee Health Science Center, Memphis, TN, USA

Program in Detail (cont.)

Q31

3D PRINTING FOR THE SURGICAL PLANNING OF NEPHRON-SPARING SURGERY FOR BILATERAL WILMS TUMOR

Joshua N. Honeyman, MD[1], Darshit Thakrar, MD[2], Shawn Gottschalk[2], Michael Magnetta, MD[2], Rajeev Chaudhry, MD[2], Stefan Scholz, MD[2], James Cooper, MD[2], Marcus Malek, MD[2], Kelly Austin, MD[2]

[1]Hasbro Children's Hospital, Providence, RI, USA, [2]UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

Q32

OUTCOMES AFTER LOCAL THERAPY FOR LIVER METASTASES IN PATIENTS WITH FAVORABLE HISTOLOGY WILMS TUMOR: A SINGLE INSTITUTION STUDY

Todd E. Heaton, MD, MPH, Michael V. Ortiz, MD, James A. Saltsman, MD, Neerav Shukla, Michael P. LaQuaglia, MD, Rachel Kobos, MD, Peter G. Steinherz, Suzanne L. Wolden

Memorial Sloan Kettering Cancer Center, New York, NY, USA

Q33

RENOVASCULAR HYPERTENSION IN CHILDREN: SURGICAL MANAGEMENT AND OUTCOMES AT A SINGLE CENTER INTERDISCIPLINARY PROGRAM

Stephanie Kim, MD[1], Deborah R. Stein[2], Michael A. Ferguson[2], Diego Porras[2], Gulraiz Chaudry[2], Michael N. Singh[2], Leslie Smoot[2], Heung Bae Kim, MD[2], Khashayar Vakili[2]

[1]Boston Children's Hospital, Brighton, MA, USA, [2]Boston Children's Hospital, Boston, MA, USA

Q34

PERIOPERATIVE OUTCOMES AFTER HEPATECTOMY IN CHILDREN: A NSQIP ANALYSIS

Alan F. Utria, MD[1], Anthony Rauschenbach[1], Paolo Goffredo[2], Naina Bagrodia[1], Graeme Pitcher[1], Imran Hassan[1]

[1]University of Iowa, Iowa City, IA, USA, [2]UIHC, Iowa City, IA, USA

Q35

PROGRESSIVE ACCUMULATION OF MUTATIONS ASSOCIATED WITH HEPATOCELLULAR CARCINOMAS IN PATIENTS WITH CONGENITAL PORTOSYSTEMIC SHUNTS

Athanasios Tyraskis, MBBS[1], Claudio de Vito, MD[2], Alberto Quaglia[2], Nigel D. Heaton[3], Richard Thompson[3], Mark Davenport[1]

[1]Dept. Paediatric Surgery, King's College Hospital, London, England, United Kingdom, [2]Dept. Histopathology, King's College Hospital, London, England, United Kingdom, [3]Institute of Liver Studies, King's College Hospital, London, England, United Kingdom

Program in Detail (cont.)

Sunday, May 19 (cont.)

Q36

PRIMARY MESENCHYMAL TUMORS OF THE LIVER IN CHILDREN: A POPULATION-BASED ANALYSIS OF A RARE PEDIATRIC TUMOR

Thuy Tran[1], Bethany Slater[2]

[1]University of Illinois at Chicago- MGH, Chicago, IL, USA, [2]University of Chicago, Chicago, IL, USA

Q37

ZIKA VIRUS AS AN ONCOLYTIC TREATMENT FOR HEPATOBLASTOMA

Joseph Mazar, PhD, Peter Phelan, Jeanne Brooks, Kenneth Alexander, Tamarah Westmoreland

Nemours Children's Hospital, Orlando, FL, USA

Q38

CONSOLIDATED CANCER CARE DOES NOT PROVIDE BENEFITS FOR SURVIVAL OR READMISSION RATES IN CHILDREN WITH METASTATIC NEUROBLASTOMA

Harold J. Leraas, MD, MHS, MA[1], Brian Ezekian[2], Aaron M. Tarnasky[3], Christopher R. Reed, MD[1], Sarah Jane Commander[2], Tamara N. Fitzgerald, MD[4], Henry E. Rice, MD[1], Elisabeth T. Tracy[1]

[1]Duke University Medical Center, Durham, NC, USA, [2]Duke University Department of Surgery, Durham, NC, USA, [3]Duke University School of Medicine, Durham, NC, USA, [4]Department of Surgery, Duke University Medical Center, Durham, NC, USA

Q39

IMPACT OF MYCN STATUS ON RESPONSE OF HIGH-RISK NEUROBLASTOMA TO NEOADJUVANT CHEMOTHERAPY

David Yanishevski, BS, Candidate for MD, M. Beth McCarville, Mikhail Doubrovin, Xiwen Zhao, Zhaohua Lu, Sara Federico, Wayne L. Furman, Andrew J. Murphy, Andrew M. Davidoff, MD, Hannah R. Spiegl, BS

St. Jude Children's Research Hospital, Memphis, TN, USA

Q40

DEPLETION OF PULMONARY ALVEOLAR MACROPHAGES INHIBITS METASTATIC OUTGROWTH IN A MOUSE MODEL OF OSTEOSARCOMA

Caroline W. Maloney, MD, PhD[1], Michelle P. Kallis, MD[2], Morris Edelman[3], Marc Symons[4], Bettie Steinberg[4], Samuel Soffer, MD[5]

[1]Zucker School of Medicine at Hofstra/Northwell, Cohen Children's Medical Center at Northwell Health, New Hyde Park, NY, USA, [2]Zucker School of Medicine at Hofstra/Northwell, Cohen Children's Medical Center at Northwell Health, New York, NY, USA, [3]Hoftstra Northwell School of Medicine, New Hyde Park, NY, USA, [4]Northwell Health Feinstein Institute for Medical Research, New Hyde Park, NY, USA, [5]Northwell Health, Division of Pediatric Surgery, Steven and Alexandra Cohen Children's Hospital, New Hyde Park, NY, USA

Program in Detail (cont.)

Q41

RISK OF STRUCTURAL RECURRENCE IN PEDIATRIC PAPILLARY THYROID MICROCARCINOMA: DOES MICROCARCINOMA DEFINE A VERY LOW RISK GROUP?

David J. Worhunsky, MD[1], Kayleigh Herrick-Reynolds, MD[2], Glenda Callendar, MD[1], Catherine Dinauer, MD[1], Emily R. Christison-Lagay, MD[1]

[1]Yale School of Medicine, New Haven, CT, USA, [2]Walter Reed Medical Center, Bethesda, MD, USA

Q42

PROPHYLACTIC PREOPERATIVE PLATELET TRANSFUSION FOR THROMBOCYTOPENIC PEDIATRIC PATIENTS LEADS TO HIGHER POSTOPERATIVE PLATELET TRANSFUSION VOLUMES WITHOUT REDUCED RISK OF BLEEDING

Mackenzie Moore, Daniel A. Saltzman, MD, Robert D. Acton, MD, Bradley J. Segura, **Donavon J. Hess, MD, PhD**

University of Minnesota, Minneapolis, MN, USA

6:15 p.m. – 7:00 p.m.	Free Time	
7:00 p.m. – 9:00 p.m.	Welcome Reception	3rd and 4th Floors

Honoring Dr. Rowena Spencer and Dr. C. Everett Koop
Matthew Hornick, MD, Barbara Coons, MD

Monday, May 20

6:00 a.m. – 7:00 a.m.	Committee and Ancillary Meetings	View the Ancillary Meetings List on page 63 for specific locations
6:00 a.m. – 7:00 a.m.	Continental Breakfast	Grand Ballroom Foyer, 4th FL
6:00 a.m. – 8:00 p.m.	Nursing Mothers Room	Boston University, 3rd FL
6:00 a.m. – 5:30 p.m.	Speaker Ready Room Open	Orleans, 4th FL
6:30 a.m. – 5:00 p.m.	Registration Desk Open	Registration Desk A&B, 4th FL
7:00 a.m. – 8:15 a.m.	Business Meeting **Tribute: Dale G. Johnson** Katie W. Russell, MD	Salons A-F
8:00 a.m. – 2:00 p.m.	Exhibit Hall Open	Exhibit Hall, 3rd FL
8:00 a.m. – 2:00 p.m.	Poster Hall Open	Exhibit Hall, 3rd FL

Program in Detail (cont.)

JPS Top Educational Content (TEC) Talks

8:15 a.m. – 9:30 a.m. Salons A-F

Moderators: Craig W. Lillehei, MD; Charles L. Snyder, MD

Tribute: Judson Randolph
Mikael Petrosyan, MD, Philip C. Guzzetta, Jr., MD

2018 TEC Topic Review
David M. Powell, MD

Pediatric Cervical Spine Evaluation and Management: Current Guidelines and Emerging Pathways
Aaron R. Jensen, MD, Med, MS

Fertility Preservation for Children with Cancer: Why, When and How?
Erin E. Rowell, MD

Exploring the Gap Between Guidelines, Evidence and Practice for Antimicrobial Prophylaxis in Pediatric Surgery: What's the Data and Where Should We Go From Here?
Shawn J. Rangel, MD, MSCE

Surviving Sepsis
Samir K. Gadepalli, MSc, MD, MBA

9:30 a.m. – 10:15 a.m. Refreshment Break Exhibit Hall, 3rd FL

Plenary Scientific Session 1

10:15 a.m. – 11:30 a.m. Salons A-F

Moderators: Joseph P. Vacanti, MD; Erin E. Rowell, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding oligosaccharide treatment of necrotizing enterocolitis, sutureless closure of gastroschisis, treatment of spontaneous pneumothorax, pediatric osteosarcoma, ovarian neoplasms, and breast disease and implementation of competency based curriculum in pediatric surgical training.

2018 Foundation Scholar: Defining the Role of ROCK in Necrotizing Enterocolitis
Catherine J. Hunter, MD

Program in Detail (cont.)

S31

INDIVIDUAL HUMAN MILK OLIGOSACCHARIDES PREVENT EXPERIMENTAL NECROTIZING ENTEROCOLITIS VIA DIVERGENT TRANSCRIPTOMIC RESPONSES

Richard Y. Wu, MD(c), PhD, Bo Li, PhD, Hiromu Miyake, MD, Marissa Cadete, Shaiya Robinson, Kathene C. Johnson-Henry, Abdallah Ahmed, Agostino Pierro, MD, Philip M. Sherman

The Hospital for Sick Children, Toronto, ON, Canada

Tribute: Thomas V. Santulli

Brian T. Craig, MD

S32

SUTURELESS VS SUTURED ABDOMINAL WALL CLOSURE FOR GASTROSCHISIS: OPERATIVE CHARACTERISTICS AND EARLY OUTCOMES FROM A MULTI-INSTITUTIONAL CONSORTIUM

Jason D. Fraser, MD[1], Katherine J. Deans, MD, MHSc[2], Mary E. Fallat, MD[3], Michael A. Helmrath, MD[4], Rashmi Kabre[5], Charles M. Leys, MD, MSCI[6], Shawn D. St. Peter[1], on behalf of the Midwest Pediatric Surgery Consortium

[1]Children's Mercy Kansas City, Kansas City, MO, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA, [3]Norton Children's Hospital, Louisville, KY, USA, [4]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [5]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, [6]University of Wisconsin School of Medicine & Public Health, Division of Pediatric Surgery, Madison, WI, USA

S33

CHANGING THE PARADIGM FOR MANAGEMENT OF PEDIATRIC PRIMARY SPONTANEOUS PNEUMOTHORAX: A SIMPLE ASPIRATION TEST PREDICTS NEED FOR OPERATION

Charles M. Leys, MD, MSCI[1], Ronald B. Hirschl, MD[2], Jonathan Kohler[1], Linda Cherney-Stafford[1], Nicholas Marka[1], Mary E. Fallat, MD[3], Samir K. Gadepalli, MSc, MD, MBA[2], Jason D. Fraser, MD[4], Julia Grabowski, MD[5], Daniel J. Ostlie, MD[6], on behalf of the Midwest Pediatric Surgery Consortium

[1]University of Wisconsin School of Medicine & Public Health, Division of Pediatric Surgery, Madison, WI, USA, [2]University of Michigan, Ann Arbor, MI, USA, [3]Norton Children's Hospital, Louisville, KY, USA, [4]Children's Mercy Kansas City, Kansas City, MO, USA, [5]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, [6]Phoenix Children's Hospital, Phoenix, AZ, USA

Program in Detail (cont.)

Monday, May 20 (cont.)

S34

THORACOSCOPY OR THORACOTOMY FOR THE MANAGEMENT OF METASTATIC OSTEOSARCOMA - A PEDIATRIC SURGICAL ONCOLOGY RESEARCH STUDY

John Doski, MD[1], Zishaan Farooqui, MD, PhD[2], Andrew J. Murphy[3], Israel Fernandez-Pineda[3], Andrew M. Davidoff, MD[3], Sanjeev Vasudevan[4], **Todd E. Heaton, MD, MPH**[5], Michael P. LaQuaglia, MD[5], Nelson Piche[6], Jennifer H. Aldrink, MD[7], Marcus Malek, MD[8], Timothy B. Lautz, MD[9], Richard D. Glick, MD[10], Barrie S. Rich, MD[10], Rebecka Meyers, MD[11], Scott S. Short, MD[11], Andreana Bütter, MD[12], Reto Baertschiger, MD[13], Todd M. Jenkins[2], Roshni Dasgupta, MD MPH[2]

[1]San Antonio, San Antonio, TX, USA, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [3]St. Jude Children's Research Hospital, Memphis, TN, USA, [4]Texas Children's Hospital, Houston, TX, USA, [5]Memorial Sloan Kettering Cancer Center, New York, NY, USA, [6]St. Justine, Montreal, PQ, Canada, [7]Nationwide Children's Hospital, The Ohio State University College of Medicine, Columbus, OH, USA, [8]UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA, [9]Ann & Robert H. Lurie Children's Hospital of Chicago, Northwestern University, Chicago, IL, Chicago, IL, USA, [10]Cohen Children's Medical Center at Hofstra/Northwell, Manhasset, NY, USA, [11]Primary Children's Hospital, The University of Utah, Salt Lake City, UT, USA, [12]Children's Hospital, London Health Sciences Centre, Western University, London, ON, Canada, [13]Dartmouth, Dartmouth, NH, USA

S35

UNDERSTANDING THE VALUE OF TUMOR MARKERS IN PEDIATRIC OVARIAN NEOPLASMS

Amy E. Lawrence, MD[1], Mary E. Fallat, MD[2], Geri Hewitt, MD[3], Paige Hertweck, MD[2], Amanda Onwuka, PhD[1], Peter C. Minneci, MD, MHSc[1], Katherine J. Deans, MD, MHSc[1], Jennifer H. Aldrink, MD[4], Midwest Pediatric Surgery Consortium[1]

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]Norton Children's Hospital, Louisville, KY, USA, [3]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA, [4]Nationwide Children's Hospital, The Ohio State University College of Medicine, Columbus, OH, USA

S36

CLINICAL APPROPRIATENESS OF PEDIATRIC BENIGN BREAST DISEASE MANAGEMENT

Maggie L. Westfal, MD, MPH[1], Ya-Ching Hung, MD, MPH[2], David Chang, PhD, MPH, MBA[2], Numa Perez, MD[2], Cassandra M. Kelleher, MD[3]

[1]Massachusetts General Hospital, Charlestown, MA, USA, [2]Massachusetts General Hospital, Boston, MA, USA, [3]MassGeneral Hospital for Children, Boston, MA, USA

S37

DEVELOPMENT AND IMPLEMENTATION OF A COMPETENCY-BASED CURRICULUM IN PEDIATRIC SURGERY

Calista M. Harbaugh, MD[1], Meredith Barrett, MD[1], Gurjit Sandhu, MD[1], Christa Grant, MD[2], Jose Diaz-Miron, MD[1], Natasha Corbitt, MD, PhD[1], Peter F. Ehrlich, MD, MSC[1], Ronald B. Hirschl, MD[1]

[1]University of Michigan, Ann Arbor, MI, USA, [2]Penn State Children's Hospital

Program in Detail (cont.)

PED Talk - Pediatric surgery, Education, Disruption #1: Artificial Intelligence

11:30 a.m. – Noon — Salons A-F

Moderator: James D. Geiger, MD

Tribute: Robert J. Izant, Jr.
Cory N. Criss, MD

Artificial Intelligence
Michael C. Muelly, MD

Noon – 12:30 p.m. — Box Lunch Pick-up — Grand Ballroom Foyer A-F, 4th FL

Roundtable Discussion: History of APSA and North American Pediatric Surgery

12:30 p.m. – 1:45 p.m. — Salons A-F

Moderators: Diana L. Farmer, MD; Kristen A. Zeller, MD; Don K. Nakayama, MD

Tribute: M. Judah Folkman
Kristen A. Zeller, MD

Panel
Arnold G. Coran, MD; Dick G. Ellis, MD; Lucian L. Leape, MD; Alberto Pena, MD; Kathryn D. Anderson, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Appreciate the contributions of leaders in our field to the creation of the American Pediatric Surgical Association
- Recognize the diversity of experience among our organization's early leadership
- Describe accomplishments of pediatric surgeons within and beyond the realm of pediatric surgery
- Know about the great history of APSA

1:45 p.m. – 2:15 p.m. — Refreshment Break — Exhibit Hall, 3rd FL

Program in Detail (cont.)

Monday, May 20 (cont.)

Case Debates and Controversies
Can't We Agree on ANYTHING?

2:15 p.m. – 3:15 p.m. Salons A-F

Moderators: Mac Harmon, PhD, MD; Todd A. Ponsky, MD

Tribute: Marc I. Rowe
Rachel Hanke, MD

LEARNING OBJECTIVES
By the end of the presentation, attendees will be able to:

- Understand how their colleagues may approach common pediatric surgical problems differently
- Become familiar with changing trends in pediatric surgery
- Become familiar with recent data that may change their historical practice
- Understand common controversies facing general pediatric surgeons

PED Talk - Pediatric surgery, Education, Disruption #2: Building Dynamic Robots

3:15 p.m. – 3:45 p.m. Salons A-F

Moderator: Thomas M. Krummel, MD

LEARNING OBJECTIVES
By the end of this session, attendees will be able to:

- Know the application space for robots
- Tell the difference between hardware and software in robotics
- Discuss which Boston Dynamics robot is being developed for commercialization

Tribute: Arnold G. Coran
Marcus D. Jarboe, MD

Building Dynamic Robots
Marc Raibert, PhD

Program in Detail (cont.)

Advocacy

4:00 p.m. – 4:45 p.m. Salon G

Moderators: Marion C.W. Henry, MD, MPH; Kathryn D. Bass, MD, MBA

LEARNING OBJECTIVES

By the end of this session, attendees will be able to:

- Know contributions made to children's health advocacy by Dr. Barbara Barlow
- Understand the structure of the advocacy arm of the American College of Surgeons
- Explain the purpose of the Surgeons PAC (political action committee)
- Understand the structure of the Advocacy branch of the American Academy of Pediatrics
- Know how to get more involved in advocacy through the ACS, the AAP and APSA

A Tribute to Dr. Barbara A. Barlow
J. Leslie Knod, MD

S38

STOP THE BLEED: TEACHING THE NEXT GENERATION – ONE STUDENT AT A TIME

Adil J. Malek, MD[1], Emily Nes, MD[1], Hayden W. Stagg[2], Kayla R. Cehand[3], Danny Little, MD[2]

[1]Texas A&M - Baylor Scott & White Health, Temple, TX, USA, [2]Texas A&M - McLane Children's Medical Center, Temple, TX, USA, [3]McLane's Children's Hospital - Baylor Scott & White Health, Temple, TX, USA

S39

A MULTICENTER EVALUATION OF A FIREARM SAFETY INTERVENTION IN THE PEDIATRIC OUTPATIENT SETTING

Brendan T. Campbell, MD, MPH[1,2], Shefali Thaker[2], Mary E. Fallat, MD[3], David S. Foley, MD[3], Elizabeth McClure[4], Joseph V. Sakran, MD[5], Isam W. Nasr, MD[5], Susan Ziegfeld[5], Peter Mackie, MD[6], Marie Snodgrass[6], Marc Levy, MD[7], Bindi J. Naik-Mathuria, MD[8], Annalyn S. Demello[8], Stephanie Jones, MD[9], Jennifer M. Watters, MD[10], Peter Burke, MD[1], Lisa Allee[11], Robert W. Letton, MD[1], Deborah A. Kuhls, MD[1], Eileen M. Bulger, MD[1], Ronald M. Stewart, MD[1]

[1]American College of Surgeons, Committee on Trauma, Chicago, IL, USA, [2]Connecticut Children's Medical Center, Hartford, CT, USA, [3]Norton Children's Hospital, Louisville, KY, USA, [4]University of Louisville, Louisville, KY, USA, [5]Johns Hopkins, Baltimore, MD, USA, [6]C.S. Mott Children's Hospital, Ann Arbor, MI, USA, [7]Arnold Palmer Hospital, Orlando, FL, USA, [8]Texas Children's Hospital, Houston, TX, USA, [9]University of Nevada, Las Vegas, NV, USA, [10]St. Charles Medical Center, Bend, OR, USA, [11]Boston Medical Center, Boston, MA, USA

Program in Detail (cont.)

Monday, May 20 (cont.)

Publication: Academic Pediatric Surgery in the Era of Social Media and Electronic Publication

4:00 p.m. – 5:30 p.m. Salons H-J

Moderators: Todd A. Ponsky, MD; Mary J. Edwards, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Describe principles of effective authorship of pediatric surgical scientific articles in the digital age
- Describe effective tools, including the academic portfolio, to meet academic advancement goals
- Ilustrate the importance of a digital portfolio, and the effective use of technology in academic and clinical practice
- Illustrate the impact of social media in modern academic and clinical surgery practice

An Editor's Perspective on Authoring Manuscripts

George W. Holcomb, MD

Tribute: Edward A. Free

Alejandra M. Casar Berazaluce, MD

Developing an Academic Portfolio in 2019

Sundeep G. Keswani, MD

The Digital Disruption of Academic Medicine: Paddle or Perish

Todd A. Ponsky, MD

Tribute: Robert T. Soper

Numa Perez, MD, Maggie L. Westfal, MD, MPH

Social Media 3.0: What is Your Twimpact Factor?

Benedict C. Nwomeh, MD, MPH

Quality: What's in Your Quality and Safety Toolkit? APSA Gives You the Tools!

4:00 p.m. – 5:30 p.m. Salons A-F

Moderators: Loren Berman, MD; Mehul V. Raval, MD, MS

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Utilize the APSA QSC toolkit to jumpstart QI projects at their own institutions

Program in Detail (cont.)

- Identify discrete areas/topics for implementation of QI projects in their own institutions
- Connect with mentors at other institutions who have successfully implemented QI projects
- Navigate obstacles commonly encountered during QI efforts
- Identify and involve stakeholders to facilitate successful QI efforts

Tribute: Lucian L. Leape
Danielle B. Cameron, MD, MPH

Tribute: John R. Campbell
Sanjay Krishnaswami, MD

Welcome and Introduction
Loren Berman, MD

Intussusception Toolkit Topics
Colleen M. Fitzpatrick, MD, Akemi L. Kawaguchi, MD

Appy Toolkit Topic
Monica E. Lopez, MD

S40

DECREASING SURGICAL SITE INFECTIONS IN PEDIATRIC STOMA CLOSURES

Hira Ahmad, MD[1], Devin R. Halleran, MD[1], Andrew B. Nordin, MD[2], Preeti Jaggi, MD[3], Brian D. Kenney, MD[4], Laura Weaver[1], Julie Zipfel[1], Richard J. Wood, MD[1], Marc A. Levitt, MD[1]

[1]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA, [2]University at Buffalo, Buffalo, NY, USA, [3]Emory University, Children's Healthcare of Atlanta, Atlanta, GA, USA, [4]Department of Pediatric Surgery, Nationwide Children's Hospital, Columbus, OH, USA

S41

ENHANCED RECOVERY AFTER SURGERY PROTOCOL FOR PEDIATRIC LAPAROSCOPIC CHOLECYSTECTOMY PROMOTES SAFE AND EARLY DISCHARGE

Andrew Yeh, MD[1], Gabriella Butler[2], Kelly Austin, MD[2], Mihaela Visoiu[2], Marcus Malek, MD[2]

[1]University of Pittsburgh Medical Center, Pittsburgh, PA, USA, [2]UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

S42

AN EVIDENCE-BASED GUIDELINE FOR POST-APPENDECTOMY ANALGESIA: OPIOID-FREE FOR MOST

Mollie R. Freedman-Weiss, MD[1], Alexander S. Chiu[1], David J. Worhunsky, MD[1], Alefteria Manchisi[2], M. Isabel T. Maldonado[2], Lisa M. Sagnella[2], Michael G. Caty, MD[1], Robert A. Cowles, MD[3], Doruk E. Ozgediz, MD[1], Emily R. Christison-Lagay, MD[1], Daniel G. Solomon, MD[4], David H. Stitelman, MD[5]

[1]Yale School of Medicine, New Haven, CT, USA, [2]Yale New Haven Hospital, New Haven, CT, USA, [3]Yale University, New Haven, CT, USA, [4]Yale University School of Medicine, New Haven, CT, USA, [5]Yale School of Medicine/Yale University, New Haven, CT, USA

Program in Detail (cont.)

Monday, May 20 (cont.)

S43

Implementation of a Plan-Do-Study-Act Framework to Reduce Unindicated Surgical Antibiotic Prophylaxis

Mark Kashtan, MD, MPH, Michele Dawson, MPH, CPHQ, Seema Anandalwar, MD, MPH, Jonathan L. Hills-Dunlap, MD, MPH, Shawn J. Rangel, MD, MSCE

Boston Children's Hospital, Boston, MA, USA

S44

REDUCTION OF OPIATE USE IN INFANTS UNDERGOING GASTROINTESTINAL SURGERY

David F. Grabski, MD[1], Rick Vavolizza[2], Daniel Levin[2], Sara K. Rasmussen, MD[2], Jonathan Swanson[2], Eugene D. McGahren[2], Jeffrey W. Gander, MD[2]

[1]University of Virginia School of Medicine, Charlottesville, VA, USA, [2]University of Virginia, Charlottesville, VA, USA

Global Pediatric Surgery

4:45 p.m. – 5:30 p.m. Salon G

Moderators: Tamara N. Fitzgerald, MD; Sanjay Krishnaswami, MD; J. Ted Gerstle, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Recognize the need for pediatric surgery fellowship training in low- and middle-income countries in the context of the global disease burden
- Describe some of the strategies that NGO's take to address areas of inadequate infrastructure for pediatric surgery in low- and middle-income countries
- List some opportunities for APSA members to be involved in global health initiatives

Tribute: James A. O'Neill, Jr.
Erik N. Hansen, MD

Survey Results of the APSA International Travel Fellow Program
Tamara N. Fitzgerald, MD

First 12 Years of the Kijabe Pediatric Surgery Fellowship
Erik N. Hansen, MD

Kids OR
Tamara N. Fitzgerald, MD, David Cunningham, Doruk E. Ozgediz, MD

Question and Answer Panel
Erik N. Hansen, MD, David Cunningham, Doruk E. Ozgediz, MD, Tamara H. Fitzgerald, MD

Program in Detail (cont.)

5:30 p.m. – 6:30 p.m.	Residents Reception	Regis, 3rd FL

All trainees welcome

6:00 p.m. – 7:00 p.m.	Global Pediatric Surgery Networking Event *Informal gathering for individuals interested in pediatric surgery efforts in low and middle-income countries*	Champions Bar, hotel lobby

Tuesday, May 21

6:00 a.m. – 7:30 a.m.	Committee and Ancillary Meetings	View the Ancillary Meetings on page 63 List for specific locations
6:00 a.m. – 8:00 p.m.	Nursing Mothers Room	Boston University, 3rd FL
6:30 a.m. – 7:30 a.m.	Continental Breakfast	Exhibit Hall, 3rd Floor
6:30 a.m. – 11:00 a.m.	Exhibit Hall Hours	Exhibit Hall, 3rd Floor
6:30 a.m. – 11:00 a.m.	Poster Hall Hours	Exhibit Hall, 3rd Floor
6:30 a.m. – 2:30 p.m.	Registration Desk Open	Registration Desk A&B, 4th FL
6:30 a.m. – 2:00 p.m.	Speaker Ready Room Open	Orleans, 4th FL

Outcomes and Systematic Reviews

7:30 a.m. – 8:30 a.m. — Salons A-F

Moderator: Adam B. Goldin, MD, MPH

Tribute: W. Hardy Hendren
Brendan Lovasik, MD

A Systematic Review of the Effect of General Anesthesia on Brain Development
Roshni Dasgupta, MD MPH, Julia Grabowski, MD

LEARNING OBJECTIVES

By the end of this presentation, attendees will be able to:

- Understand the risks that general anesthetic exposure in infants and children pose to neurodevelopment
- Determine if there exists a critical window of neurodevelopment during which anesthesia exposure should be avoided
- Understand the difference between specific anesthetic agents in terms of risks of neurotoxicity, and if these risks can be decreased
- Understand what alternatives there are to general anesthesia in children and their safety profiles

Program in Detail (cont.)

Tuesday, May 21 (cont.)

Long Segment Hirschsprung Disease: A Systematic Review
Ankush Gosain, MD, PhD, Akemi L. Kawaguchi, MD

LEARNING OBJECTIVES

By the end of this presentation, attendees will be able to:

- Define Long-segment Hirschsprung disease
- Understand the preferred method(s) for surgical repair of Long-segment Hirschsprung disease
- Appreciate long-term outcomes for patients with Long-segment Hirschsprung disease
- Describe novel techniques and future strategies for treatment of Long-segment Hirschsprung disease

Oncology
(Concurrent Session)

8:45 a.m. – 9:45 a.m. Salons A-F

Moderators: Roshni Dasgupta, MD, MPH; Peter F. Ehrlich, MD, MSC

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Understand the mechanism of indocyanine green (ICG) as a method of detection of pulmonary metastatic disease in hepatoblastoma
- Discuss the accuracy of ICG as an adjuvant to axial imaging in the detection pulmonary hepatoblastoma
- Describe the utility of image-guided percutaneous biopsy for the initial diagnostic management of neuroblastoma
- Understand how technical aspects of image-guided percutaneous biopsy may impact diagnostic yield
- Recognize the imaging patterns seen with malignant ovarian germ cell tumors
- Know which ovarian masses need preoperative tumors markers and full pediatric tumor staging

Tribute: H. Biemann Othersen
Elisabeth T. Tracy, Christa N. Grant, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Describe the utility of image-guided percutaneous biopsy for the initial diagnostic management of neuroblastoma
- Understand how technical aspects of image-guided percutaneous biopsy may impact diagnostic yield

Program in Detail (cont.)

S48

OPTIMIZATION OF IMAGE-GUIDED PERCUTANEOUS CORE NEEDLE BIOPSY FOR INITIAL DIAGNOSTIC MANAGEMENT OF NEUROBLASTOMA: A PEDIATRIC SURGICAL ONCOLOGY RESEARCH COLLABORATIVE STUDY

Richard E. Overman, MD[1], Tanvi Kartal[1], Benjamin T. Many, MD[2], Rachel Jones[2], Timothy B. Lautz, MD[2], Jerry Xiao, BA[3], Dave R. Lal, MD, MPH[3], Roshni Dasgupta, MD, MPH[4], Misty Trout[4], Jana Lewis[4], Jennifer H. Aldrink, MD[5], Sara Mansfield, MD[5], Scott S. Short, MD[6], Rebecka Meyers, MD[7], Bindi J. Naik-Mathuria, MD[8], Sanjeev Vasudevan[8], Jacob Davidson[9], Andrew Williams[9], Andreana Bütter, MD[9], Erika A. Newman, MD[1]

[1]C. S Mott Children's Hospital, University of Michigan, Ann Arbor, MI, USA, [2]Ann & Robert H. Lurie Children's Hospital of Chicago, Northwestern University, Chicago, IL, Chicago, IL, USA, ,[3]Medical College of Wisconsin, Milwaukee, WI, USA, [4]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [5]Nationwide Children's Hospital, The Ohio State University College of Medicine, Columbus, OH, USA, [6]Primary Children's Hospital, The University of Utah, Salt Lake City, UT, USA, [8]Texas Children's Hospital, Houston, TX, USA, [19]Children's Hospital, London Health Sciences Centre, Western University, London, ON, Canada

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Recognize the imaging patterns seen with malignant ovarian germ cell tumors
- Know which ovarian masses need preoperative tumors markers and full pediatric tumor staging.

S49

IMAGING APPEARANCE OF NONGERMINOMA PEDIATRIC OVARIAN GERM CELL TUMORS DOES NOT DISCRIMINATE BENIGN FROM MALIGNANT HISTOLOGY

Deborah Billmire, MD[1], Bryan Dicken, MD[2], Frederick Rescorla, MD[1], Jonathan Ross[3], Jin Piao, MD[4], Li Huang[4], Mark Krailo[4], Furqan Shaikh[5], Farzana Pashankar, MD[6], Lindsay Frazier, MD[7]

[1]Indiana University, Indianapolis, IN, USA, [2]University of Alberta, Edmonton, AB, Canada, [3]Case Western Reserve University, Cleveland, OH, USA,[4]Children's Oncology Group, Monrovia, CA, USA, [5]University of Toronto, The Hospital for Sick Children, Toronto, ON, Canada, [6]Yale School of Medicine, New Haven, CT, USA, [7]Harvard University, Dana Farber Cancer Institute, Boston, MA, USA

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Understand the mechanism of indocyanine green (ICG) as a method of detection of pulmonary metastatic disease in hepatoblastoma.
- Discuss the accuracy of ICG as an adjuvant to axial imaging in the detection pulmonary hepatoblastoma.

Program in Detail (cont.)

Tuesday, May 21 (cont.)

S50

USE OF INDOCYANINE GREEN AS A DIAGNOSTIC ADJUNCT AT TIME OF PULMONARY METASTASECTOMY FOR HEPATOBLASTOMA

Alexander Bondoc, MD[1], Meera Kotagal[1], Roshni Dasgupta, MD, MPH[1], Maria Alonso[2], James Geller[1], Gregory Tiao, MD[1]

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]Cincinnati Children's Hospital Medical Center, Boston, OH, USA

APSA Surgeons and the Evolution of Therapy for Wilms Tumor
Marcus M. Malek, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Compare the modern day outcomes for Wilms tumor with outcomes from 50 years ago
- Understand the role that surgeons have played in the evolution of therapy for Wilms tumor
- Understand the role of tumor biology in both the prognosis and therapy of Wilms tumor

Rhabdomyosarcoma: 50 Years of Progress Through Cooperative Study
Timothy B. Lautz, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Develop an understanding of the progress made over the past fifty years in the care of children with rhabdomyosarcoma
- Understand the various approaches to improving local control in rhabdomyosarcoma which have been investigated by the Children's Oncology Group
- Appreciate the importance of cooperative study for advancing the care of children with cancer

Practice: Getting Paid for Your Value – How to Get What You are Worth in Our Current Treacherous Environment (Concurrent Session)

8:45 a.m. – 9:45 a.m. Salons H-J

Moderators: Barry M. Newman, MD, MBA MS(Inf), John C. Bleacher, MD

Program in Detail (cont.)

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Demonstrate an understanding of the current regulatory and practice environment, specifically regarding the transition "from volume to value"
- Describe general concepts of negotiations, as well as potentially demonstrate some practical skills underlying negotiating
- Describe the experiences and knowledge that other surgeons have developed, which will underpin their negotiating abilities, and better obtain value for their services

Tribute: Dick G. Ellis
Chip Uffman, MD, MPH

Overview of Current State of Physician Payment: How to Value Value?
Barry M. Newman, MD, MBA, MS(Inf)

Negotiating as if Your Livelihood Depends on It
J. Duncan Phillips, MD

Three Practicing Pediatric Surgeons - How They Made This Work in Differing Practice Situations

Marcene McVay Gillam, MD - Employed Pediatric Surgeon, Academic
Ravindra K. Vegunta, MD – Employed Pediatric Surgeon, Non-academic
Ala Stanford, MD – Employed Pediatric Surgeon, Private Practice

Open Discussion- Questions, Answers, What has worked for you?

Trauma
(Concurrent Session)

8:45 a.m. – 9:45 a.m. Salon G

Moderators: John K. Petty, MD Jeffrey S. Upperman, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Describe the operative exposure of the major blood vessels in the neck (internal carotid artery, jugular vein and vertebral artery)
- Describe the operative exposure to injuries to the trachea and esophagus.
- Apply an evidence-based care strategy for solid organ injury into daily pediatric surgical practice
- Identify and execute incisions and maneuvers to expose and treat intrathoracic traumatic vascular and nonvascular injuries
- Describe vascular exposure for different zones of the abdomen and pelvis
- Describe surgical approach to liver, spleen, pancreas and duodenal injuries

Program in Detail (cont.)

Tuesday, May 21 (cont.)

Tribute: Peter K. Kottmeier
Robert T. Russell, MD, MPH

Updated APSA Solid Organ Injury Management Guidelines
Regan F. Williams, MD

Head and Neck Operative Trauma
John K. Petty, MD

Thoracic Operative Trauma
Mitchell R. Price, MD

Abdomen and Pelvis Operative Trauma
Vincent P. Duron, MD

S51

UNINTENTIONAL PEDIATRIC FIREARM INJURIES: EXPANDING THE FOCUS FOR PREVENTION

Robert J. McLoughlin, MD, Clark Murray, MD, Shauna Rice, Michael P. Hirsh, MD, Muriel Cleary, MD, Jeremy T. Aidlen, MD

University of Massachusetts Medical School, Worcester, MA, USA

S52

TOY GUNS, REAL DANGER – AN UPDATE ON PEDIATRIC INJURY PATTERNS RELATED TO BB AND AIR GUNS

Robert J. McLoughlin, MD, Alyssa E. Stetson, Jonathan Green, MD, Michael P. Hirsh, MD, Muriel Cleary, MD, Jeremy T. Aidlen, MD

University of Massachusetts Medical School, Worcester, MA, USA

9:45 a.m. – 10:15 a.m. Refreshment Break Exhibit Hall, 3rd Floor

Critical Care (Concurrent Session)

10:15 a.m. – 11:15 a.m. Salon G

Moderators: Samir K. Gadepalli, MSc, MD, MBA; Alexander Feliz, MD

Program in Detail (cont.)

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Understand the role of thromboelastography for management of CDH patients on ECMO
- Identify factors that are important to consider in doing procedures on ECMO
- Determine the role for early CDH repair on children placed on ECMO
- Understand how to interpret values in thromboelastography to guide transfusion strategies

Tribute: Arvin I. Philippart
Mary K. Arbuthnot, MD, Natalie A. Drucker, MD

S46

OPERATIVE TIMING IN CONGENITAL DIAPHRAGMATIC HERNIA PATIENTS RECEIVING ECMO, PART I: REPAIR ON ECMO IMPROVES SURVIVAL

Duy T. Dao, MD[1,2], Carmen M. Burgos, MD, PhD[3], Matthew T. Harting, MD, MS[4], Kevin P. Lally, MD, MS[4], Pamela A. Lally, MD[4], Hong-An T. Nguyen, MD[5], Jay M. Wilson[4], Terry L. Buchmiller, MD[1]

[1]Department of Surgery, Boston Children's Hospital, Boston, MA, USA, [2]Vascular Biology Program, Boston Childen's Hospital, Boston, MA, USA, [3]Department of Women's and Children's Health, Karolinska Institute, Stockholm, Sweden, [4]Department of Pediatric Surgery, McGovern Medical School at UT Health and Children's Memorial Hermann Hospital, Houston, TX, USA, [5]Department of Pediatrics, Boston Medical Center, Boston, MA, USA

S47

OPERATIVE TIMING IN CONGENITAL DIAPHRAGMATIC HERNIA PATIENTS RECEIVING ECMO, PART II: REPAIR EARLY ON ECMO IMPROVES SURVIVAL

Duy T. Dao, MD[1,2], Carmen M. Burgos, MD, PhD[3], Matthew T. Harting, MD, MS[4], Kevin P. Lally, MD, MS[4], Pamela A. Lally, MD[4], Hong-An T. Nguyen, MD[5], Jay M. Wilson[4], Terry L. Buchmiller, MD[1]

[1]Department of Surgery, Boston Children's Hospital, Boston, MA, USA, [2]Vascular Biology Program, Boston Childen's Hospital, Boston, MA, USA, [3]Department of Women's and Children's Health, Karolinska Institute, Stockholm, Sweden, [4]Department of Pediatric Surgery, McGovern Medical School at UT Health and Children's Memorial Hermann Hospital, Houston, TX, USA, [5]Department of Pediatrics, Boston Medical Center, Boston, MA, USA

Procedures on ECMO
Sabina M. Siddiqui, MD

Thromboelastography
Adam M. Vogel, MD

Program in Detail (cont.)

Tuesday, May 21 (cont.)

History of Fetal Surgery
Diana L. Farmer, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Learn the unique perspectives that were brought to bear on the fetal patient.
- Understand what scientific questions needed to be answered before fetal surgery could become a reality
- Learn what other surgical procedures carry similar ethical considerations as fetal surgery.

S45

THE USE OF THROMBOELASTOGRAMS IN CONGENITAL DIAPHRAGMATIC HERNIA NEONATES ON EXTRACORPOREAL MEMBRANE OXYGENATION

Ryan C. Phillips, MD[1], Niti Shahi, MD[2], Sarah A. Hilton, MD, MSHS[3], David Leopold[1], Claire Levek[1], Jason Gien, MD[1], John P. Kinsella, MD[1], Steven L. Moulton, MD[1], Kenneth W. Liechty, MD[4], Ahmed I. Marwan, MD[4]

[1]University of Colorado School of Medicine, Aurora, CO, USA, [2]Childrens, Aurora, CO, USA, [3]University of Colorado, Aurora, CO, USA, [4]University of Colorado School of Medicine; Colorado Fetal Care Center, Children's Hospital Colorado, Aurora, CO, USA

Fetal Diagnosis and Treatment (Concurrent Session)

10:15 a.m. – 11:15 a.m. Salons A-F

Moderators: Shinjiro Hirose, MD; Rony Marwan, MD

Tribute: Alfred A. de Lorimier
Niti Shahi, MD, Laura Galganski, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- understand ethical complexity and background of the dual patient nature of fetal surgery
- Learn comprehensive background regarding fetal intervention for in utero renal failure
- Understand the interplay between prenatal and postnatal diagnosis of choledochal cysts

History of Fetal Surgery
Diana L. Farmer, MD

Program in Detail (cont.)

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Learn the unique perspectives that were brought to bear on the fetal patient.
- Understand what scientific questions needed to be answered before fetal surgery could become a reality
- Learn what other surgical procedures carry similar ethical considerations as fetal surgery.

S53

DISCORDANT PRENATAL ULTRASOUND AND FETAL MRI IN CDH: WHEREIN LIES THE TRUTH?

Aimee G. Kim, MD[1], Gabriella A. Norwitz[1], Monita Karmakar[1], Maria Ladino-Torres[1], Deborah R. Berman[1], Jeannie Kreutzman[1], Marjorie C. Treadwell[1], George B. Mychaliska, MD[2], Erin E. Perrone, MD[1]

[1]University of Michigan, Ann Arbor, MI, USA, [2]Section of Pediatric Surgery, Fetal Diagnosis and Treatment Center, University of Michigan Health System, Ann Arbor, MI, USA

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Discuss background regarding fetal intervention for fetal renal failure
- Discuss rationale, hypothesis, and study design
- Present maternal information, intervention types and complications
- Review neonatal outcomes specifically survival, respiratory morbidity, neonatal complications
- Discuss conclusions and immediate future directions

S54

SURVIVAL FOLLOWING FETAL INTERVENTION FOR IN UTERO RENAL FAILURE

Stefanie Riddle, MD[1], William Polzin, MD[2], Foong-Yen Lim, MD[3], Alexander Bondoc, MD[1], Donna Claes, MD[1], Pramod Reddy, MD[1], Gregory Tiao, MD[1], Brian Vanderbrink, MD[1], Paul Kingma, MD PhD[1]

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]Cincinnati Fetal Center, Cincinnati, OH, USA, [3]Division of Pediatric General, Thoracic, and Fetal Surgery, Center for Molecular Fetal Therapy, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

LEARNING OBJECTIVES

During this presentation, the audience will learn:

- In those newborns identified prenatally as having a choledochal cyst, what postnatal ultrasound findings are associated with the early development of related symptoms.
- The frequency of symptom development during the first month of life in infants with prenatally diagnosed choledochal cysts
- The recommended postnatal evaluation and management of infants with prenatally diagnosed choledochal cysts

Program in Detail (cont.)

Tuesday, May 21 (cont.)

S55

THE IN-UTERO DIAGNOSIS OF CHOLEDOCHAL CYST: CAN POSTNATAL IMAGING PREDICT WHO MIGHT BENEFIT FROM EARLY INTERVENTION?

Elizabeth D. Cochran, MD[1], Stefanie P. Lazow, MD[2], Natalie Frost, MD[3], Patricia Santiago-Munoz, MD[4], Lorrie S. Burkhalter[5], James Davis, MD[6], Kim Aimee[7], Erin E. Perrone, MD[7], Terry L. Buchmiller, MD[2], David H. Stitelman, MD[8], David T. Schindel, MD[9]

[1]University of Texas Southwestern Medical School, Dallas, TX, USA, [2]Boston Children's Hospital, Boston, MA, USA, [3]Dell Children's Austin, Austin, TX, USA, [4]University of Texas Southwestern Medical Center, Dallas, TX, USA, [5]Children's Medical Center, Dallas, TX, USA, [6]Pediatric Surgical Group, Dallas, TX, USA, [7]University of Michigan, Ann Arbor, MI, USA, [8]Yale School of Medicine/Yale University, New Haven, CT, USA, [9]Division of Pediatric Surgery, UT Southwestern Medical Center, Dallas, TX, USA

Opioid Reduction: Empowering Pediatric Surgeons to Combat the Opioid Epidemic Using Evidence-based Strategies (Concurrent Session)

10:15 a.m. – 11:15 a.m. Salons H-J

Moderators: Mehul V. Raval, MD, MS; Kurt F. Heiss, MD; Lorraine Kelley-Quon, MD, MSHS

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Describe the history and scope of the current opioid epidemic as it applies to children undergoing surgery
- Understand the current evidence regarding opioid prescribing for children after surgery
- Identify resources to educate patients, care providers, and health care providers on best practices related to opioid use
- Select local interventions to implement best practices related to opioid stewardship such as improved prescribing and proper disposal practices

Tribute: Robert G. Allen
Erica Hodgman, MD, Eunice Y. Huang, MD

Introduction to the Session and Brief Background/Timeline of the Opioid Epidemic
Kurt F. Heiss, MD

Efforts of the APSA Outcomes Committee – Evidence-based Reviews
Lorraine Kelley-Quon, MD, MSHS

Program in Detail (cont.)

S58

OPIOIDS ARE OVERPRESCRIBED AND CAN BE ELIMINATED FOR A NUMBER OF CHILDREN'S OPERATIONS

Calista M. Harbaugh, MD, Gracia Vargas, Courtney L. Streur, G. Ying Li, Aaron L. Thatcher, David A. Zopf, Lauren A. Bohm, Ronald B. Hirschl, MD, Jennifer F. Waljee, MD, MPH, Samir K. Gadepalli, MSc, MD, MBA

University of Michigan, Ann Arbor, MI, USA

S59

FACTORS AFFECTING NARCOTIC MANAGEMENT FOR INJURED CHILDREN AFTER HOSPITAL DISCHARGE: A PROSPECTIVE SURVEY OF PARENTS

Anna Delamerced[1], **Hale Wills**[2]

[1]Warren Alpert Medical School of Brown University, Providence, RI, USA, [2]Hasbro Children's Hospital / Brown University, Providence, RI, USA

Efforts of the APSA Quality & Safety Committee - QI Toolbox

Mehul V. Raval, MD, MS

S56

A FOCUSED EDUCATIONAL INTERVENTION FOR HIGH-RISK OPIOID PRESCRIBING PATTERNS

Katherine Barsness, MD, MS, Hehui Quan, MS, Renee Manworren, PhD, MS, Christine State, DHA, Leah Harris, MD

Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

S57

A SINGLE EDUCATIONAL INTERVENTION MAY NOT BE SUFFICIENT TO CHANGE OPIOID PRESCRIBING PRACTICES FOR SOME SURGEONS

Megan E. Cunningham, MD[1], Celia D. Flores, PA-C[1], Huirong Zhu, PhD[1], Monica E. Lopez, MD[2], Adam M. Vogel, MD[1], Mehul V. Raval, MD, MS[3], Sohail R. Shah, MD, MSHA[2]

[1]Texas Children's Hospital, Houston, TX, USA, [2]Baylor College of Medicine, Houston, TX, USA, [3]Ann & Robert H. Lurie Children's Hospital of Chicago; Surgical Outcomes and Quality Improvement Center, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Abstract Discussions, Next Steps

Kurt F. Heiss, MD, Mehul V. Raval, MD, MS, Lorraine Kelley-Quon, MD, MSHS

11:00 a.m.	Exhibit Dismantle	Exhibit Hall, 3rd Floor
11:00 a.m.	Poster Dismantle	Exhibit Hall, 3rd Floor

Program in Detail (cont.)

Tuesday, May 21 (cont.)

Jay and Margie Grosfeld Presidential Symposium

11:30 a.m. – 1:30 p.m. Salons A-F

Moderator: Ronald B. Hirschl, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Realize the changes in APSA which are required for the organization to be successful as it enters its next 50 years
- Understand the advantage of diversity and inclusiveness in enhancing the capabilities and success in organizations by allowing incorporation of all views and perspectives
- Appreciate the effect that Societal Determinants of Health (SDOH) and child poverty have on the welfare of our pediatric surgery patients

Tribute: Jay L. Grosfeld
Alan P. Ladd, MD

Tribute: Louise Schnaufer
Ronald B. Hirschl, MD

APSA 5.0: Saving Even More Lifetimes
Ronald B. Hirschl, MD

Advancing Organizational Excellence: Leveraging Differences as Our Strength
Erika A. Newman, MD

Why I Became an Upstream Surgeon
Victor F. Garcia, MD

Swords and Shields: A Discussion of Power, Privilege and Opportunity
Adam J. Foss, Esq

Wednesday, May 22

6:00 a.m. – 7:00 a.m.	Committee and Ancillary Meetings	View the Ancillary Meetings List on page 63 for specific locations
6:00 a.m. – 7:00 a.m.	Continental Breakfast	Grand Ballroom Foyer, 4th Floor
6:00 a.m. – 8:00 p.m.	Nursing Mothers Room	Boston University, 3rd FL
6:00 a.m. – 4:00 p.m.	Speaker Ready Room Open	Orleans, 4th FL
6:30 a.m. – 4:00 p.m.	Registration Desk Open	Registration Desk A&B, 4th FL

Program in Detail (cont.)

Plenary Scientific Session 2

7:00 a.m. – 8:15 a.m. Salons A-F

Moderators: Kathleen van Leeuwen, MD; Ronald B. Hirschl, MD

LEARNING OBJECTIVES

At the conclusion of this session, attendees will have been explosed to:

- New and up to date information regarding novel in-utero treatments, quality improvement initiatives in colorectal disorders, feeding access, and thromboembolism prophylaxis, long term sexual function in patients with Hirschsprung disease and a novel method by which to repair epigastric hernia.

S60

EXTENDING THE 'WINDOW OF TOLERANCE': REGULATORY T CELLS PERMIT LATE GESTATION IN UTERO HEMATOPOIETIC CELL TRANSPLANTATION

John S. Riley, MD, MS[1], Lauren McClain[2], John Stratigis[2], Barbara Coons[2], Nicholas Ahn[2], Haiying Li[2], Alan W. Flake, MD[2], William H. Peranteau, MD[2]

[1]Hospital of the University of Pennsylvania, Philadelphia, PA, USA, [2]Children's Hospital of Philadelphia, Philadelphia, PA, USA

Tribute: J. Alex Haller, Jr.
Seth D. Goldstein, MD, MPhil

Tribute: James A. Talbert
Kevin Johnson, MD

S61

IN UTERO AAV-BASED GENOME-EDITING TO CURE A MOUSE MODEL OF HUMAN HEREDITARY TYROSINEMIA TYPE 1

Clara Nicolas, MD, MS, **Caitlin VanLith**, Kari Allen, Zeji Du, Rebekah Guthman, Robert Kaiser, Raymond Hickey, Joseph Lillegard, MD

Mayo Clinic, Rochester, MN, USA

S62

MINIMIZING VARIANCE IN PEDIATRIC SURGICAL CARE THROUGH IMPLEMENTATION OF A COLON BUNDLE: A MULTI-INSTITUTION STUDY

Aaron J. Cunningham, MD[1], Pavithra Rao[1], Arjun Ashok[1], Sanjay Krishnaswami, MD[1], Nicholas A. Hamilton, MD[1], Mubeen A. Jafri, MD[2], Kenneth S. Azarow, MD[3], Marilyn W. Butler, MD[2], Andrew Zigman, MD[4], Elizabeth A. Fialkowski[1]

[1]Oregon Health & Science University, Portland, OR, USA, [2]Randall Children's Hospital at Legacy Emanuel, Portland, OR, USA, [3]Pediatric Surgery Division, Department of Surgery, Oregon Health & Science University, Portland, OR, USA, [4]Northwest Permanente Physicians, Oregon Health & Science University

Program in Detail (cont.)

Wednesday, May 22 (cont.)

S63

DECREASING POST-OPERATIVE COMPLICATIONS IN SURGICALLY PLACED GASTROSTOMY TUBES: A QUALITY IMPROVEMENT INITIATIVE

Kate B. Savoie, MD, MS[1], Sarah Hastie[2], Margaret Holston[2], Brenda Ruth[2], Luke Vohsing[2], Ruth Seabrook[2], Tria Shadeed[2], Maria Haghnazari[2], Elizabeth Theado[2], Mary Gossard[2], Karen A. Diefenbach, MD[2]

[1]Department of Pediatric Surgery, Nationwide Children's Hospital, Columbus, OH, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA

S64

PEDIATRIC TRAUMA VENOUS THROMBOEMBOLISM PREDICTION ALGORITHM OUTPERFORMS CURRENT ANTICOAGULATION PROPHYLAXIS GUIDELINES: A MULTICENTER PILOT STUDY

Aaron J. Cunningham, MD[1], Nicholas A. Hamilton, MD[1], Sanjay Krishnaswami, MD[1], Martin A. Schreiber, MD[1], Mubeen A. Jafri, MD[2]

[1]Oregon Health & Science University, Portland, OR, USA, [2]Randall Children's Hospital at Legacy Emanuel, Portland, OR, USA

2018 Foundation Scholar: Fetal Mechanisms of Liver and Bile Duct Repair: A Link to the Prenatal Origins of Biliary Atresia

Amar Nijagal, MD

S65

SEXUAL FUNCTION AND FERTILITY IN FEMALES AFTER SURGERY FOR HIRSCHSPRUNG DISEASE

Joseph R. Davidson, MBBS, MA, MRCS[1], Kristiina Kyrklund, MD[2], Mikko Pakarinen[2], Simon Eaton, PhD[3], Paolo De Coppi[1], Joe Curry[1]

[1]Specialist Neonatal and Paediatric Surgery, Great Ormond Street Hospital for Children, London, England, United Kingdom, [2]Department of Paediatric Surgery, New Children's Hospital, University of Helsinki and Helsinki University Hospital, Helsinki, Uusimaa, Finland, [3]Department of Paediatric Surgery, UCL-Great Ormond Street Institute of Child Health, London, England, United Kingdom

S66

ULTRASOUND-GUIDED EPIGASTRIC HERNIA REPAIR

Mercedes Pilkington, MD, Matthew W. Ralls, MD, Ronald B. Hirschl, MD, Marcus D. Jarboe, MD

University of Michigan, Ann Arbor, MI, USA

New Technology

8:30 a.m. – 9:30 a.m. Salons H-J

Moderators: Nam X. Nguyen, MD; Sean J. Barnett, MD, MS

Program in Detail (cont.)

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Gain enhanced knowledge of different uses of ultrasound guidance for various procedures
- Introduce new technologies and techniques into your hospital and surgical practice
- Use new technology to reduce sedation for simple procedures in the pediatric population

Tribute: David Tapper
Robert S. Sawin, MD

CHARIOT Program: Program and Technology Development, Future Uses
Julia M. Chandler, MD, MS, Jordan S. Taylor, MD

Innovative Uses for Ultrasound in Pediatric Surgery
Marcus D. Jarboe, MD

Introducing New Devices into the Operating Room
Bethany Slater, MD

Introducing New Techniques and Procedures into Practice
Nam X. Nguyen, MD

Developing a Robust Equipment and Standards Committee
Sean J. Barnett, MD, MS

Panel Discussion
Bethany Slater, MD, Marcus D. Jarboe, MD, Nam X. Nguyen, MD, Sean J. Barnett, MD, MS, Russell K. Woo, MD

S67

ULTRASOUND-GUIDED INGUINAL HERNIA REPAIR

Marcus D. Jarboe, MD, Maria Ladino-Torres, Ronald B. Hirschl, MD
University of Michigan, Ann Arbor, MI, USA

S68

SMALL SURGERIES, BIG SMILES: REDUCING SEDATION THROUGH VIRTUAL REALITY

Julia M. Chandler, MD, MS, Jordan S. Taylor, MD, Katherine I. Portelli, John R. Austin, Thomas J. Caruso, MD, Samuel T. Rodriguez, MD, Gary E. Hartman, Stephanie D. Chao, MD
Stanford University, Stanford, CA, USA

Program in Detail (cont.)

Wednesday, May 22 (cont.)

Research: Necrotizing Enterocolitis

8:30 a.m. – 9:30 a.m. Salon G

Moderators: Agostino Pierro, MD; David J. Hackam, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Understand the mechanisms leading to the development of NEC
- Understand how the premature infant is at risk for NEC
- Understand new objectives in NEC research
- Discuss the roles of novel molecular mediators in NEC pathogenesis
- Design studies to test novel hypotheses in NEC research

Tribute: Julius Lister
David J. Hackam, MD

S69

HUMAN BREAST MILK-DERIVED EXOSOMES IN THE PROTECTION AGAINST EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Courtney Pisano, DO, MS, Jeffrey Galley, PhD, Mostafa Elbahrawy, MD, PhD, Yijie Wang, MS, Aidan Farrell, BA, David Brigstock, PhD, Gail E. Besner, MD

Nationwide Children's Hospital, Columbus, OH, USA

S70

THE ETIOLOGY OF NECROTIZING ENTEROCOLITIS: INFECTIOUS OR INFLAMMATORY?

Rita D. Shelby, MD, MS[1], Lauren Mashburn-Warren[2], Jason Navarro[2], Natalie Tengberg[2], Michael Bailey[2], Steven D. Goodman[2], Gail E. Besner, MD[2]

[1]Nationwide Children's Hospital, Ohio State University, Columbus, OH, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA

S71

IS ILEUS A CAUSE AS OPPOSED TO A CONSEQUENCE OF NEC? REVERSAL OF INTESTINAL DYSMOTILITY REDUCES THE SEVERITY OF EXPERIMENTAL NEC THROUGH INCREASED NEURON SIGNALING

Mark L. Kovler, MD, Mitchell R. Ladd, William Fulton, Yukihiro Yamaguchi, Thomas Prindle, Sanxia Wang, Chhinder Sodhi, David J. Hackam, MD

Johns Hopkins Children's Center, Baltimore, MD, USA

Program in Detail (cont.)

S72

TETRAHYDROBIOPTERIN AMELIORATES EXPERIMENTAL NECROTIZING ENTEROCOLITIS BY REDUCING THE OXIDATIVE STRESS

Shogo Seo, MD,PhD, Hiromu Miyake, MD, Mashriq Alganabi, MD, Maarten Janssen Lok, MD, Joshua S. O'Connell, MD, Carol Lee, Bo Li, PhD, Agostino Pierro, MD

The Hospital for Sick Children, Toronto, ON, Canada

S73

MITOCHONDRIAL DNA IS ELEVATED IN PLASMA OF INFANTS WITH NECROTIZING ENTEROCOLITIS AND ACUTE ABDOMEN

Georgina Navoly[1], Claire Deakin[1], Haris Achilleos[1], Tim Scorrer[2], Mark Peters[1], Nigel J. Hall, MD[3], **Simon Eaton, PhD**[4]

[1]UCL Great Ormond Street Institute of Child Health, London, England, United Kingdom, [2]Queen Alexandra Hospital, Portsmouth, England, United Kingdom, [3]Southampton Children's Hospital, Southampton, England, United Kingdom, [4]Department of Paediatric Surgery, UCL-Great Ormond Street Institute of Child Health, London, England, United Kingdom

Scientific Session 4: Practice, Education, Trauma

8:30 a.m. – 9:30 a.m. Salons A-F

Moderators: David M. Notrica, MD; Erin M. Garvey, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding the diagnosis of endometriosis, the pediatric surgery match process, assessment of trainee readiness for independent pediatric surgical practice, health care disparities in pediatric trauma management and the use of artificial intelligence in pediatric trauma care.

S74

IS IT ENDOMETRIOSIS?

Rachel Hanke, MD[1], Andrew de Fazio, MD[2], Todd A. Ponsky, MD[1], Ceana Nezhat, MD[3]

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]New York Presbyterian Brooklyn Methodist Hospital, Brooklyn, NY, USA, [3]Nezhat Medical Center, Atlanta, Georgia, Atlanta, GA, USA

S75

EXPLORING THE GENDER GAP: LETTERS OF RECOMMENDATION TO PEDIATRIC SURGERY FELLOWSHIP

Arika L. Hoffman, MD[1], Rachel Ghoubrial[1], Melanie McCormick[2], Praise Matemavi[1], Robert Cusick, MD[3]

[1]University of Nebraska Medical Center, Omaha, NE, USA, [2]University of Minnesota Medical Center, Minneapolis, MN, USA, [3]Division of Pediatric Surgery, University of Nebraska Medical Center College of Medicine, Omaha, NE, USA

Program in Detail (cont.)

Wednesday, May 22 (cont.)

S76

ASSESSMENT OF OPERATIVE AUTONOMY AND READINESS FOR INDEPENDENT PRACTICE AMONG PEDIATRIC SURGERY FELLOWS

Benjamin Zendejas, MD, MSc[1], Craig W. Lillehei, MD[1], Brian C. George, MD[2], Biren P. Modi, MD[3]

[1]Boston Children's Hospital, Boston, MA, USA, [2]University of Michigan, Ann Arbor, MI, USA, [3]Center for Advanced Intestinal Rehabilitation and Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA

Tribute: Keith W. Ashcraft
Charlene Dekonenko, MD, Robert M. Dorman, MD

Tribute: Thomas M. Holder
Robert M. Dorman, MD

S77

ARTIFICIAL INTELLIGENCE AND VISUAL RECOGNITION IN COMPUTER-AIDED DIAGNOSIS: A PROOF OF CONCEPT FEMUR FRACTURE MODEL

Alejandra M. Casar Berazaluce, MD[1], Alexander T. Gibbons, MD, MS[2], Rachel Hanke, MD[1], Todd A. Ponsky, MD[1]

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]Akron Children's Hospital, University Heights, OH, USA

S78

PREDICTORS OF DISPARITIES IN PEDIATRIC MORTALITY FROM MOTOR VEHICLE CRASHES AMONG US COUNTIES

Ali A. Mokdad, MD, MS[1], Samir Pandya, MD[2], Lindsey Wolf[3], Mark Ryan[1], Faisal Qureshi, MD[4]

[1]University of Texas Southwestern, Dallas, TX, USA, [2]University of Texas Southwestern Medical Center, Dallas, TX, USA, [3]Brigham and Women's Hospital, Boston, MA, USA, [4]UT Southwestern Medical Center, Dallas, TX, USA

S79

TIMING OF NUTRITIONAL ASSISTANCE BENEFIT DISTRIBUTION IS ASSOCIATED WITH RATES OF ADMISSION FOR CHILD ABUSE AND NEGLECT: AN INTERSTATE ANALYSIS OF 3574 ADMISSIONS

Emily R. Christison-Lagay, MD[1], Andrea Asnes, MD[2], **Daniel G. Solomon, MD**[2]

[1]Yale School of Medicine, New Haven, CT, USA, [2]Yale University School of Medicine, New Haven, CT, USA

Quick Shots 4: Basic Science and Trauma

9:30 a.m. – 10:30 a.m. Salon G

Moderators: Peter T. Yu, MD, MPH; Richard A. Falcone, MD, MPH

Program in Detail (cont.)

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding the pathogenesis of neonatal intestinal disorders, the pharmacologic manipulation of traumatic brain injury, the cellular mechanisms of tissue engineering, applicability of autologous epithelial transplantation and fetal enzyme replacement and controversies in pediatric trauma care.

Q43

INTESTINAL STEM CELLS AND EZH2 ARE INVOLVED IN THE PATHOGENESIS OF NEONATAL INTESTINAL INJURY

Adam E. Minich[1], **Bo Li, PhD**[2], Carol Lee[2], Hiromu Miyake, MD[2], Marissa Cadete[2], Agostino Pierro, MD[2]

[1]The Hospital for Sick Children, Concord, ON, Canada, [2]The Hospital for Sick Children, Toronto, ON, Canada

Q44

SHORT-CHAIN FRUCTO-OLIGOSACCHARIDES PROVIDE INTESTINAL PROTECTION AGAINST EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Haitao Zhu, MD, Richard Y. Wu, MD(c), PhD, Bo Li, PhD, Mashriq Alganabi, MD, Maarten Janssen Lok, MD, Carol Lee, Jia Liu, Kathene C. Johnson-Henry, Philip M. Sherman, Agostino Pierro, MD

The Hospital for Sick Children, Toronto, ON, Canada

Q45

REMOTE ISCHEMIC CONDITIONING REDUCES THE INJURY ASSOCIATED WITH EXPERIMENTAL INTESTINAL ISCHEMIA/REPERFUSION

Hiromu Miyake, MD, Shogo Seo, MD,PhD, Carol Lee, Bo Li, PhD, Agostino Pierro, MD

The Hospital for Sick Children, Toronto, ON, Canada

Q46

PHARMACOLOGIC TOLL-LIKE RECEPTOR (TLR4) INHIBITION IN TRAUMATIC BRAIN INJURY ATTENUATES NEUROINFLAMMATION AND IMPROVES COGNITIVE OUTCOMES BY PROMOTING MONOCYTE INFILTRATION

Young Chun, MD[1], Jose Alonso-Escalante[2], Bruno Soares[1], William Fulton[3], Chhinder Sodhi[3], David J. Hackam, MD[3], Isam W. Nasr, MD[4]

[1]Johns Hopkins University, Baltimore, MD, USA, [2]Allegheny General Hospital, Pittsburgh, PA, USA, [3]Johns Hopkins Children's Center, Baltimore, MD, USA, [4]Johns Hopkins, Baltimore, MD, USA

Q47

HUMAN HEPATIC PROGENITOR CELLS GENERATE TISSUE ENGINEERED LIVER COMPRISED OF MAJOR HEPATIC CELL TYPES IN A 3-MONTH MURINE MODEL

Anthony I. Squillaro, MD, MPH, Alexa M. Fode, Laura-Marie A. Nucho, Samuel M. Zuber, David F. Chang, Christopher R. Schlieve, Tracy C. Grikscheit, MD

Children's Hospital Los Angeles, Los Angeles, CA, USA

Program in Detail (cont.)

Wednesday, May 22 (cont.)

Q48

AUTOLOGOUS TRANSPLANTATION OF SKIN-DERIVED PRECURSOR CELLS IN A PORCINE MODEL

Anne-Laure Thomas, MS[1], **Jordan S. Taylor, MD**[2], Nhan Huynh[3], Genia Dubrovsky, MD[4], Jean Paul Chadarevian[5], Angela Chen[5], Samuel Baker[6], James C.Y. Dunn, MD[2]

[1]Stanford University School of Medicine, Stanford, CA, USA, [2]Stanford University, Stanford, CA, USA, [3]UCLA, Palo Alto, CA, USA, [4]UCLA David Geffen School of Medicine, Los Angeles, CA, USA, [5]UCLA, Los Angeles, CA, USA, [6]Stanford University, Palo Alto, CA, USA

Q49

IDENTIFICATION OF A NOVEL CIRP RECEPTOR AND ITS ROLE IN SEPSIS

Naomi-Liza Denning, MD[1], Monowar Aziz[2], Jose Prince, MD[3], Ping Wang[2]

[1]Cohen Children's Medical Center at Hofstra/Northwell, New Hyde Park, NY, USA, [2]Center for Inflammation and Immunology, Feinstein Institute for Medical Research, Manhasset, NY, USA, [3]Cohen Children's Medical Center at Hofstra/Northwell, Manhasset, NY, USA

Q50

FETAL ENZYME REPLACEMENT AND STEM CELL TRANSPLANTATION RESCUE BRAIN MICROGLIA IN MURINE MUCOPOLYSACCHARIDOSIS TYPE 7

Quoc-Hung Nguyen, MD, Bowen Wang, Carlo Eikani, Lucas Smith, Jeremy Shea, Russell Witt, Saul Villeda, Tippi Mackenzie

UCSF, San Francisco, CA, USA

Tribute: Jens G. Rosenkrantz
Christina Feng, MD

Q51

ASSOCIATION OF BLOOD COMPONENT RATIOS WITH 24-HOUR MORTALITY IN INJURED CHILDREN RECEIVING MASSIVE TRANSFUSION

Jonathan I. Groner, MD[1], Brianna M. Mills[2], Saman Arbabi, MD[2], Eileen M. Bulger, MD[3], Monica S. Vavilala[2], Jonathan I. Groner, MD[1], Lynn G. Stansbury[2], John R. Hess[4], Frederick P. Rivara[2], Elissa K. Butler, MD[5]

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]University of Washington, Harborview Injury Prevention and Research Center, Seattle, WA, USA, [3]American College of Surgeons, Committee on Trauma, Chicago, IL, USA, [4]University of Washington, Department of Laboratory Medicine, Seattle, WA, USA, [5]University of Washington, WA, USA

Q52

SECONDARY OVERTRIAGE IN A PEDIATRIC LEVEL ONE TRAUMA CENTER

Andrew B. Nordin, MD[1], Aleksander D. Nordin[2], Brian D. Kenney, MD[3], Rajan K. Thakkar[4], Karen A. Diefenbach, MD[4]

[1]University at Buffalo, Buffalo, NY, USA, [2]Baylor University, Waco, TX, USA, [3]Department of Pediatric Surgery, Nationwide Children's Hospital, Columbus, OH, USA, [4]Nationwide Children's Hospital, Columbus, OH, USA

Program in Detail (cont.)

Q53

DOWNWARD TRENDS IN PANCREATECTOMY OF MODERATE AND SEVERE BLUNT PANCREATIC TRAUMA IN CHILDREN

David M. Notrica, MD[1], Bethany L. Sussman[1], Lois W. Sayrs, MD[1], Brenna McElenney[2], Tanner Ellsworth[2], Justin Lee[1], Kate Davenport[1]

[1]Phoenix Children's Hospital, Phoenix, AZ, USA, [2]University of Arizona College of Medicine, Phoenix, AZ, USA

Q54

POST-DISCHARGE OUTCOMES IN PEDIATRIC TRAUMA: AN EXAMINATION OF SURGICAL PEDIATRIC PATIENTS AT AN URBAN TRAUMA CENTER AFTER A PENETRATING INJURY

Gabriel Siegel, BS, Aaron Katrikh, Timothy C. Lee, MD, Daniel Webster, Connor Wakefield, Justin Mis, Jennifer Poirier, Matthew Kaminsky, MD, Ami Shah

Rush Medical College, Chicago, IL, USA

Q55

IDENTIFYING POPULATIONS AT RISK FOR CHILD ABUSE: A NATIONWIDE ANALYSIS

Hallie J. Quiroz, MD[1], Joshua P. Parreco, MD[2], Brent A. Willobee, MD[1], Anthony Ferrantella, MD[1], Chad M. Thorson, MD[1], Rishi Rattan, MD[1], Juan E. Sola, MD[1], Eduardo A. Perez, MD[1]

[1]University of Miami Miller School of Medicine, Miami, FL, USA, [2]University of Miami Miller School of Medicine - Department of Surgery, Miami, FL, USA

Q56

THE EFFECT OF A TEDDYBEAR HOSPITAL PROJECT ON CHILDRENS' ANATOMICAL KNOWLEDGE, ANXIETY, AND MEDICAL STUDENT PROFESSIONALISM

Julia E. Mildenberger[1], Rafael Cámara[2], Oliver J. Muensterer, MD, PhD[3]

[1]University Medicine of the Johannes Gutenberg University Mainz, Mainz, Rheinland-Pfalz, Germany, [2]Institute of Medical Biostatistics, Epidemiology and Informatics (IMBEI), University Medicine of the Johannes Gutenberg University Mainz, Mainz, Rheinland-Pfalz, Germany, [3]Pediatric Surgery, University Medicine of the Johannes Gutenberg University Mainz, Mainz, Rheinland-Pfalz, Germany

Quick Shots 5: Fetal Basic Science, Neonatal, Fetal Clinical

9:30 a.m. – 10:30 a.m. Salons H-J

Moderators: KuoJen Tsao, MD; Pablo Laje, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding the pre and postnatal management of congenital diaphragmatic hernia and its associated comorbidities, treatment of tracheobronchomalacia, intraoperative temperature management, the in-utero treatment of spina bifida, monitoring during fetal surgery, a gastroschisis management pathway, minimally invasive surgery in neonates and management of neonatal aortoiliac thrombosis.

Program in Detail (cont.)

Wednesday, May 22 (cont.)

Q57

CORD BLOOD MICRORNAS AS NOVEL PREDICTORS OF SEVERITY IN CONGENITAL DIAPHRAGMATIC HERNIA

Quoc-Hung Nguyen, MD, Idit Kosti, Ishan Paranjpe, Carlo Eikani, Marina Sirota, Tippi Mackenzie

University of California San Francisco, San Francisco, CA, USA

Q58

DELAYED ECMO DECANNULATION IN PATIENTS WITH CONGENITAL DIAPHRAGMATIC HERNIA: IS IT SAFE TO LEAVE CANNULAS IN PLACE?

Mercedes Pilkington, MD[1], George B. Mychaliska, MD[2], Marcus D. Jarboe, MD[1], Meghan A. Arnold, MD[1], Ronald B. Hirschl, MD[1], Samir K. Gadepalli, MSc, MD, MBA[1]

[1]University of Michigan, Ann Arbor, MI, USA, [2]Section of Pediatric Surgery, Fetal Diagnosis and Treatment Center, University of Michigan Health System, Ann Arbor, MI, USA

Q59

LOW POSTNATAL CRI VALUES ARE ASSOCIATED WITH THE NEED FOR ECMO IN NEWBORNS WITH CDH

Ryan C. Phillips, MD[1], Niti Shahi, MD[2], Jason Gien, MD[1], Kenneth W. Liechty, MD[3], Ahmed I. Marwan, MD[3], John P. Kinsella, MD[1], Jane Mulligan[4], Steven L. Moulton, MD[1], David Leopold[1]

[1]University of Colorado School of Medicine, Aurora, CO, USA, [2]Childrens, Aurora, CO, USA, [3]University of Colorado School of Medicine; Colorado Fetal Care Center, Children's Hospital Colorado, Aurora, CO, USA, [4]Flashback Technologies Inc., Louisville, CO, USA

Q60

SURGICAL MANAGEMENT OF GASTROESOPHAGEAL REFLUX DISEASE IN PATIENTS WITH CONGENITAL DIAPHRAGMATIC HERNIA: SYNCHRONOUS LADD'S SURGERY MAY BE PROTECTIVE

Heron D. Baumgarten, MD, MPH[1], Zoya Butt[2], Robin C. Cook[2], Audrey A. Foster[2], Dana L. Bartholomew[2], Lisa M. Herkert[2], Samantha E. Adams[2], Natalie E. Rintoul[2], William H. Peranteau, MD[2], Holly L. Hedrick, MD[2], Thane A. Blinman, MD[2]

[1]University of Virginia, Children's Hospital of Philadelphia, Charlottesville, VA, USA, [2]Children's Hospital of Philadelphia, Philadelphia, PA, USA

Q61

AMNIOTIC FLUID STEM CELL EXOSOMES PROMOTE FETAL LUNG MATURATION IN AN IN VIVO MODEL OF CONGENITAL DIAPHRAGMATIC HERNIA

Louise Montalva, MD[1], Rebeca Lopes Figueira[2], Lina Antounians[1], Karina Miura[1], Lourenço Sbragia Neto, MD[2], Augusto Zani[1]

[1]The Hospital for Sick Children, Toronto, ON, Canada, [2]Ribeirão Preto Medical School, University of Sao Paulo - USP, Ribeirão Preto, Sao Paulo, Brazil

Tribute: Fred Arcari

KuoJen Tsao, MD, Pablo Laje, MD

Program in Detail (cont.)

Q62

PREDICTING THE NEED AND BENEFIT OF DESCENDING AORTOPEXY IN ADDITION TO POSTERIOR TRACHEOPEXY FOR THE SURGICAL TREATMENT OF TRACHEOBRONCHOMALACIA

Wendy Jo Svetanoff, MD[1], Benjamin Zendejas, MD, MSc[2], C. Jason. Smithers[2], Leah Frain[2], Gary Visner[2], Christopher W. Baird[2], Sanjay P. Prabhu[2], Russell Jennings, MD[2], Thomas E. Hamilton, MD[2]

[1]Boston Children's Hospital, Brookline, MA, USA, [2]Boston Children's Hospital, Boston, MA, USA

Q63

EFFECTS OF INTRAOPERATIVE TEMPERATURES ON POSTOPERATIVE INFECTIONS IN INFANTS

Ruchi Amin, MD, Sarah Walker, MD, Marjorie J. Arca, MD, Ankur Datta, MD

Medical College of Wisconsin, Milwaukee, WI, USA

Q64

IN UTERO TREATMENT OF MYELOMENINGOCELE WITH PLACENTAL MESENCHYMAL STROMAL CELLS RESCUES AMBULATION IN THE OVINE MODEL – SELECTION OF AN OPTIMAL CELL LINE

Laura Galganski, MD[1], Priyadarsini Kumar[1], Melissa Vanover[1], Christopher Pivetti[1], Jamie Anderson[1], Lee Lankford[1], Zachary Paxton[1], Karen Chung[1], Mennatalla Hegazi[1], Kaeli Yamashiro[1], Aijun Wang[1], Diana L. Farmer, MD[2]

[1]University of California, Davis, Sacramento, CA, USA, [2]University of California, Davis: UC Davis Children's Hospital, Carmichael, CA, USA

Q65

REPEAT DOSING IN THE RETINOIC ACID MODEL OF TRANSAMNIOTIC STEM CELL THERAPY FOR SPINA BIFIDA

Sarah A. Tracy, MD, Alexander V. Chalphin, MD, Stefanie P. Lazow, MD, Ina Kycia, MD, Christopher Chan, Adam Finkelstein, David Zurakowski, Dario O. Fauza, MD

Boston Children's Hospital, Boston, MA, USA

Q66

A COMPARISON BETWEEN PLACENTAL AND AMNIOTIC MESENCHYMAL STEM CELLS IN TRANSAMNIOTIC STEM CELL THERAPY FOR EXPERIMENTAL GASTROSCHISIS

Alexander V. Chalphin, MD, Sarah A. Tracy, MD, Stefanie P. Lazow, MD, Ina Kycia, MD, David Zurakowski, Dario O. Fauza, MD

Boston Children's Hospital, Boston, MA, USA

Q67

DEVELOPMENT OF A UTERINE TONE MONITORING DEVICE FOR FETAL SURGERY

Saif I. Al-Juboori, PhD[1], Irina Marii[2], Ahmed I. Marwan, MD[3]

[1]University of Colorado Denver- Anschutz Medical Campus, Aurora, CO, USA, [2]University of Colorado Denver- Anschutz Medical Campus, Golden, CO, USA, [3]University of Colorado School of Medicine; Colorado Fetal Care Center, Children's Hospital Colorado, Aurora, CO, USA

Program in Detail (cont.)

Wednesday, May 22 (cont.)

Q68

ADHERENCE TO AND OUTCOMES OF A UNIVERSITY-CONSORTIUM GASTROSCHISIS PATHWAY

Daniel A. DeUgarte, MD, MS[1], Hanmin Lee, MD[2], Yigit S. Guner, MD[3], Karen M. Kling, MD[4], Payam Saadai[5], Cherry Uy[6], Kara L. Calkins[1], Jae Kim[7], Katelin Kramer[2], Leslie Lusk[2], Catherine Rottkamp[5], University of California Fetal Consortium[8]

[1]University of California, Los Angeles, Los Angeles, CA, USA, [2]University of California, San Francisco, San Francisco, CA, USA, [3]Department of Surgery, Division of Pediatric Surgery, University of California, Irvine Medical Center, Orange, CA, USA, [4]Division of Pediatric Surgery, Department of Surgery, University of California, San Diego, San Diego, CA, USA, [5]University of California, Davis, Sacramento, CA, USA, [6]University of California, Irvine, Irvine, CA, USA, [7]University of California, San Diego, San Diego, CA, USA, [8](UCFC), San Francisco, CA, USA

Q69

UMBILICAL ACCESS IN LAPAROSCOPIC SURGERY IN INFANTS LESS THAN 3 MONTHS OF AGE: A SURVEY OF THE AMERICAN PEDIATRIC SURGICAL ASSOCIATION

Matthew P. Landman, MD, MPH, Deborah Billmire, MD

Indiana University, Indianapolis, IN, USA

Q70

SURGICAL MANAGEMENT OF ACUTE AORTOILIAC THROMBOSIS IN A NEONATE

Bryan V. Dieffenbach, MD, Bharath Nath, Heung Bae Kim, MD

Boston Children's Hospital, Boston, MA, USA

Quick Shots 6: Clinical, Education and Innovation

9:30 a.m. – 10:30 a.m. Salons A-F

Moderators: Aaron M. Lipskar, MD; Kenneth C. Walters, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to acknowledge and discuss:

- New and up to date information regarding antibiotic stewardship, controversies in pediatric appendicitis, the current state of the children's verification process, the timing of neonatal inguinal hernia repair, laparoscopic assistance in placement of ventriculoperitoneal shunt, pit picking for pilonidal disease, pediatric surgical device innovation, ethical issues at a pediatric surgical teaching institution, and modern educational methods for the practicing pediatric surgeon.

Program in Detail (cont.)

Q71

TRENDS IN THE USE OF SURGICAL ANTIBIOTIC PROPHYLAXIS IN GENERAL PEDIATRIC SURGERY: ARE WE MISSING THE MARK FOR BOTH STEWARDSHIP AND INFECTION PREVENTION?

Seema Anandalwar, MD, MPH, Carly Milliren, Dionne Graham, PhD, Mark Kashtan, MD, MPH, Jonathan L. Hills-Dunlap, MD, MPH, Shawn J. Rangel, MD, MSCE

Boston Children's Hospital, Boston, MA, USA

Q72

COST-EFFECTIVE METHODS OF OPTIMIZING ANTIBIOTIC STEWARDSHIP IN PEDIATRIC NON-COMPLICATED APPENDICITIS

Angie M. Kao, MD[1], Sean R. Maloney[1], Tanushree Prasad[1], Thomas Schmelzer, MD[2], Daniel A. Bambini, MD[2], Andrew M. Schulman[2], Graham H. Cosper, MD[2]

[1]Carolinas Medical Center, Charlotte, NC, USA, [2]Levine Children's Hospital, Charlotte, NC, USA

Q73

OBESITY-RELATED DIFFERENCES IN MANAGEMENT AND OUTCOMES OF CHILDREN WITH APPENDICITIS: IMPLICATIONS FOR TREATMENT DELAY, RADIATION STEWARDSHIP, AND INFECTION PREVENTION

Jonathan L. Hills-Dunlap, MD, MPH, Carly Milliren, Dionne Graham, PhD, Seema Anandalwar, MD, MPH, Mark Kashtan, MD, MPH, Shawn J. Rangel, MD, MSCE

Boston Children's Hospital, Boston, MA, USA

Q74

QUANTIFYING THE EFFECT OF RESIDENT EDUCATION ON PATIENT COSTS AND OUTCOMES IN PEDIATRIC APPENDICITIS

Mark V. Mazziotti, MD, MEd[1], **Brittany L. Johnson, MD** [2], Megan E. Cunningham, MD[2], Sara C. Fallon, MD[1], Sohail R. Shah, MD, MSHA[1], Monica E. Lopez, MD[1]

[1]Baylor College of Medicine, Houston, TX, USA, [2]Texas Children's Hospital, Houston, TX, USA

Q75

CHILDREN'S SURGICAL VERIFICATION: DEVELOPMENT OF A QUALITY AND SAFETY TOOL TO EVALUATE PEDIATRIC SURGICAL CARE AND TEACH THE SURGICAL QUALITY PROCESS

Erik G. Pearson, MD, Emily Weinschreider, Heather Shininger, RN, Kelly Kogut, MD

Sunrise Children's Hospital, Las Vegas, NV, USA

Q76

COMPLICATIONS WHILE AWAITING ELECTIVE INGUINAL HERNIA REPAIR IN INFANTS: NOT AS COMMON AS YOU THOUGHT

Anthony Ferrantella, MD[1], Juan E. Sola, MD[1], Joshua P. Parreco, MD[2], Brent A. Willobee, MD[1], Hallie J. Quiroz, MD[1], Emily L. Ryon, MD[1], Clara Reyes-Miranda, ARNP[3], Rishi Rattan, MD[1], Chad M. Thorson, MD[1], Eduardo A. Perez, MD[1]

[1]University of Miami Miller School of Medicine, Miami, FL, USA, [2]University of Miami Miller School of Medicine - Department of Surgery, Miami, FL, USA, [3]Department of Pediatric Hospital Medicine, Nicklaus Children's Hospital, Miami, FL, USA

Program in Detail (cont.)

Wednesday, May 22 (cont.)

Q77

LAPAROSCOPIC ASSISTED VERSUS OPEN VP SHUNT PLACEMENT IN CHILDREN - AN OUTCOMES STUDY USING THE ACS-NSQIP PEDIATRIC DATABASE

Michael R. Arnold, MD[1], Mark Van Poppel[2], Scott Wait[2], Caroline Reinke[1], Sarah Jernigan, MD[2], Andrew M. Schulman[3]

[1]Carolinas Medical Center, Charlotte, NC, USA, [2]Carolinas Neurosurgery and Spine Associates, Charlotte, NC, USA, [3]Levine Children's Hospital, Charlotte, NC, USA

Q78

IMPROVING RESOURCE UTILIZATION AND OUTCOMES USING A MINIMALLY INVASIVE PILONIDAL PROTOCOL

Hajar R. Delshad, MS, PA-C[1], Owen Henry, BS[2], David P. Mooney, MD, MPH[1]

[1]Boston Children's Hospital, Harvard Medical School, Boston, MA, USA, [2]Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA

Q79

PILONIDAL PIT AND SINUS EXCISION WITH TREPHINATION AND CURETTAGE IN ADOLESCENTS AND YOUNG ADULTS

Michelle P. Kallis, MD[1], Charlotte Kvasnovsky, MD[1], Barrie S. Rich, MD[2], Aaron M. Lipskar, MD[3]

[1]Zucker School of Medicine at Hofstra/Northwell, Cohen Children's Medical Center at Northwell Health, New York, NY, USA, [2]Cohen Children's Medical Center at Hofstra/Northwell, Manhasset, NY, USA, [3]Zucker School of Medicine at Hofstra/Northwell, Cohen Children's Medical Center at Northwell Health, New Hyde Park, NY, USA

Tribute: Alexander H. Bill
Yan Shi, MD

Q80

TRAINEE AUTONOMY IN THE OPERATING ROOM: WHAT DO PARENTS KNOW AND WANT TO KNOW?

Calista M. Harbaugh, MD[1], Beth A. Fischer, MD[2], Amy E. Lawrence, MD[2], Devin R. Halleran, MD[3], Loren N. Thomas[1], Rylee Kim[1], Katherine J. Deans, MD, MHSc[2], Peter C. Minneci, MD, MHSc[2], Gurjit Sandhu, MD[1], Ronald B. Hirschl, MD[1]

[1]University of Michigan, Ann Arbor, MI, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA, [3]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA

Q81

A NOVEL COMBINED CAUTERY-SUCTION DEVICE: THE FIRST PRODUCT OF A SURGICAL DEVICE INNOVATION FELLOWSHIP

Gabriel Jose Ramos-Gonzalez, MD[1], Alexander Yang, BE[2], Kyle Wu, MD[1], Robert Crum, MD[1], Heung Bae Kim, MD[1]

[1]Boston Children's Hospital, Boston, MA, USA, [2]Harvard Medical School, Boston, MA, USA

Program in Detail (cont.)

Q82

SPRAYABLE, BIODEGRADABLE, INTRINSICALLY ADHESIVE, AND ANTIMICROBIAL WOUND DRESSING

Lung Lau, MD[1], Omar Ayyub, PhD[2], John Daristotle[2], Priya Srinivasan, PhD[1], Xiaofang Wu, PhD[1], Mousumi Basu[1], Peter Kofinas, PhD[2], Anthony Sandler, MD[1]

[1]Sheikh Zayed Institute for Pediatric Surgical Innovation, Children's National Medical Center, Washington, DC, USA, [2]University of Maryland, [3]University of Maryland, College Park, MD, USA

Q83

ANSWERING THE QUESTIONS: EARLY RESULTS FROM APSA'S ExPERT ROGRAM

Charles L. Snyder, MD[1], Steven Lee, MD[5], Marjorie J. Arca, MD[6], Elizabeth A. Beierle, MD[7], Erik Skarsgard, MD[10], Saleem Islam, MD[8], Robert Cusick, MD[9], Janice Taylor, MD, MEd[2], Craig W. Lillehei, MD[3], David Powell, MD[4]

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]University of Florida, Gainesville, FL, USA, [3]Boston Children's Hospital, Boston, MA, USA, [4]Stanford University, Palo Alto, CA, USA, [5]UCLA, Los Angeles, CA, USA [6]Medical College of Wisconsin, Milwaukee, WI, USA, [7]University of Alabama at Birmingham, Birmingham, AL, USA, [8]University of Florida College of Medicine, Gainesville, FL, USA, [9]Division of Pediatric Surgery, University of Nebraska Medical Center College of Medicine, Omaha, NE, USA, [10]British Columbia Children's Hospital, Vancouver, British Columbia, Canada

Q84

INCREASING ACCEPTANCE OF INTERNET-BASED EDUCATIONAL PROGRAMS BY PEDIATRIC SURGEONS

Janice Taylor, MD, MEd[1], Charles L. Snyder, MD[2], David Powell, MD[3]

[1]University of Florida, Gainesville, FL, USA, [2]Children's Mercy Hospital, Kansas City, MO, USA, [3]Stanford University, Palo Alto, CA, USA

10:30 a.m. – 10:45 a.m. Refreshment Break Grand Ballroom Foyer, 4th Floor

Ethics

10:45 a.m. – 11:30 a.m. Salons A-F

Moderators: Deborah S. Loeff, MD; Patrick J. Javid, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Define ethical dilemmas in determining timing of surgery in patients with disorders of sexual differentiation (DSD)
- Discuss the ethical considerations of surgery in children at the end of life and the impact of pediatric surgeons in this role
- Identify ethical considerations in the procurement of organs from children with anencephaly

Program in Detail (cont.)

Wednesday, May 22 (cont.)

Tribute: Aviva L. Katz, MD, MA 1959-2018
Mindy B. Statter, MD, MBE

Tribute: John Raffensperger
Marko Rojnica, MD, MBA, Elliot C. Pennington, MD

S80

SURGERY AT THE END OF LIFE: A NATIONAL MULTICENTER CASE SERIES FROM CHILDREN'S HOSPITALS

Ryan M. Antiel, MD, MS[1], Michael D. Traynor, MD[1], Matt Hall[2], Thane A. Blinman, MD[3], Michael L. Nance, MD[3], Pirooz Eghtesady[4], Sandi Lam[5], Chris Feudtner[3]

[1]Mayo Clinic, Rochester, MN, USA, [2]Children's Hospital Association, Lenexa, KS, USA, [3]Children's Hospital of Philadelphia, Philadelphia, PA, USA, [4]Washington University in St. Louis, St. Louis, MO, USA, [5]Texas Children's Hospital, Houston, TX, USA

S81

TIMING OF RECONSTRUCTIVE SURGERY FOR PATIENTS WITH DISORDERS/ DIFFERENCES OF SEX DEVELOPMENT (DSD): PRELIMINARY ANALYSIS OF STAKEHOLDER VIEWS ON SUCCESSFUL OUTCOMES

Kathleen van Leeuwen, MD[1], Erica M. Weidler[1], Melissa Gardner[2], Tara Schafer-Kalkhoff[3], Alison S. Baskin[2], Kristina I. Suorsa[2], Meilan M. Rutter[3], David E. Sandberg[2]

[1]Phoenix Children's Hospital, Phoenix, AZ, USA, [2]Department of Pediatrics and Communicable Diseases, University of Michigan Medical School, Ann Arbor, MI, USA, [3]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

S82

ETHICAL ASPECTS ON ORGAN PROCUREMENT FROM CHILDREN BORN WITH ANENCEPHALY

Julia E. Mildenberger, Oliver J. Muensterer, MD PhD

Pediatric Surgery, University Medicine of the Johannes Gutenberg University Mainz, Mainz, Rheinland-Pfalz, Germany

Industry Symposium

10:45 a.m. – 11:30 a.m. Salons H-J

Moderator: Karen A. Diefenbach, MD

Innovations for Hope – Emerging Technologies in Tissue Engineering & Regenerative Medicine (TERM)

Presented by Biostage

In the advent of combining biology with technology, scientific breakthroughs can be accelerated into clinical applications and products. Join us for the Industry Symposium featuring renown speakers in the field of TERM.

Program in Detail (cont.)

Tissue Engineering: Regenerating Hope for the Future
Joseph P. Vacanti, MD, Surgeon in Chief and Deputy Director, Center for Regenerative Medicine, Massachusetts General Hospital for Children, Boston, MA

Cellspan Esophageal Implant & First-In-Man Experience
William Fodor, PhD, Chief Scientific Officer, Biostage, Holliston, MA

Tissue Engineered Vascular Graft
Christopher K. Breuer, MD, Professor of Surgery and Director of the Center for Regenerative Medicine, Nationwide Children's Hospital, Columbus, OH

FDA Pathway and Clinical Transition
Lauren Baker, PhD, President, Boston Biomedical Associates, Marlborough, MA
Christine M. Finck, MD, Surgeon in Chief, Connecticut Children's Medical Center, Hartford, CT

Q&A Session

Social Determinants of Health Workshop
APSA Can Do More - Broadening Our Approaches to Bringing Health and Prosperity to All Children

10:45 a.m. – 12:15 p.m. Salons G

Moderator: C. Sherry Immediato

This 90 minute facilitated workshop will allow the attendees to devise a means for creating a positive impact on Social Determinants of Health (SDOH) in our country as individuals, as clinicians in children's hospitals, and through APSA as an organization. The session is designed for all levels—from those who have no prior experience, but want to learn how to make a difference, to those already deeply involved in such social change. Attendance is limited to the first 200 attendees who signed up or first come/first serve at the meeting if space remains.

LEARNING OBJECTIVES

By the end of the presentation, the attendees will be able to:

- Better understand some of the social of health outcomes
- Better understand the role of systems thinking in identifying leverage points for impact
- Exercise leadership to enhance health and well-being in their communities
- Articulate an increased interest and commitment to forming/expanding a health equity and/or wellness task force

Tribute: Harvey E. Beardmore
Emil G.S. Sherif, MD

Panel
Adam J. Foss, Esq; Victor Garcia, MD; Marion C.W. Henry, MD, MPH; John K. Petty, MD

Wednesday, May 22 (cont.)

Childhood Obesity

11:30 a.m. – 12:15 p.m. Salon H-J

Moderators: Joy Collins, MD; Mark L. Wulkan, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Describe recommended technical points of gaining access to the obese abdomen for a laparoscopic procedures, including port selection, port placement and pitfalls
- Discuss relevant aspects of peri-operative care of the obese non-bariatric patient, including VTE prophylaxis and pneumonia/atelectasis prevention
- Have a greater awareness of weight bias, its effects on patients and their families, and how to minimize this in the clinical setting
- Better understand the importance of motivational interviewing and recommended ways to interact with obese patients and their families

Tribute: Frank G. DeLuca
Charlotte Kvasnovsky, MD

Motivational Interviewing in the Care of the Obese Patient
Kanika A. Bowen-Jallow, MD, MMS

Overall Perioperative Care of the Obese Pediatric Patient
David A. Lanning, MD, PhD

Access to the Obese Abdomen - Tips and Tricks for Laparoscopic Procedures
Jason D. Fraser, MD

Weight Bias
Stephanie Walsh, MD

Education: Understanding the ABCs on the MOCs and How the APSA Education Library Can Keep You in the Know

11:30 a.m. – 12:15 p.m. Salons A-F

Moderators: Grace Z. Mak, MD; Romeo C. Ignacio, MD

LEARNING OBJECTIVES

By the end of the presentation, attendees will be able to:

- Describe the recent changes of the American Board of Surgery for Maintenance of Certification in pediatric surgery.
- List the requirements for Maintenance of Certification for their Pediatric Surgery Board

Wednesday, May 22 (cont.)

- Demonstrate how to utilize the online Education Library to obtain information in pediatric surgery

Tribute: Edward S. Tank
Julia S. Shelton, MD, MPH; Laura Hollinger, MD; Brian A. Jones, MD; Romeo C. Ignacio, Jr., MD

Update on the American Board of Surgery and the Pediatric Surgery Board
John H.T Waldhausen, MD

Updates on the Pediatric Surgery Library and NaT
Pramod S. Puligandla, MD, MSc, David M. Powell, MD, Janice A. Taylor, MD, MEd

12:15 p.m. – 12:45 p.m. Box Lunch Pick-up Grand Ballroom Foyer A-F, 4th FL

Future of APSA: Future of Research, Education and Clinical Surgery

12:45 p.m. – 2:00 p.m. Salons A-F

Moderators: Roshni A. Dasgupta, MD, MPH

Tribute: R. Peter Altman
Steven Stylianos, MD

Peer Support: Mitigating the Emotional Stresses of Adverse Events
Jo Shapiro, MD

LEARNING OBJECTIVES

By the end of this presentation, attendees will be able to:

- Identify the emotional impact of adverse events on clinicians
- Recognize the effect this impact has on disclosure and reporting, patient safety, quality of care, and provider well-being
- Identify the rationale for having a peer support program

The Future of Clinical Research in Pediatric Surgery: "Are We Poised to Lead?"
Katherine J. Deans, MD, MHSc

LEARNING OBJECTIVES

By the end of this presentation, attendees will be able to:

- Appreciate the track record of clinical research in pediatric surgery within the broader context of medical research
- Identify current methodologic and content areas for innovation within clinical research: Learning Healthcare Systems, Data Transparency, Implementation Science, and Patient-Centeredness

Wednesday, May 22 (cont.)

- Understand the potential for clinical researchers in pediatric surgery to lead within both pediatric healthcare and adult surgical care more broadly

The Digital Surgeon: How Data and Intelligence Will Change How We Practice
James K. Wall, MD

LEARNING OBJECTIVES
By the end of the presentation, the attendees will be able to:

- Understand the scale of big data outside of medicine.
- Understand the role of data and artificial intelligence in the operating room of the future.
- Understand the role of automation in the operating room of the future.

Realizing New Frontiers; iPSC's Driving Therapeutics and Discovery
Michael A. Helmrath, MD

LEARNING OBJECTIVES
By the end of the presentation, the attendees will be able to:

- Understand the role of research driving clinical pediatric surgical practice
- Understand the role of pediatric surgeons advocating for discovery in our orphan diseases
- Understand that human development is the insight to most adult diseases

Robert E. Gross Debate

2:15 p.m. – 3:20 p.m. Salons A-F

Moderator: Jacob C. Langer, MD

Tributes: Robert E. Gross and Robert M. Filler
Priscilla P.L. Chiu, MD, PhD

Topic: Be it resolved that I would not encourage my daughter or son to become a pediatric surgeon

Panel: Cathy A. Burnweit, MD; Andrea A. Hayes-Jordan, MD; Daniel J. Ostlie, MD; Douglas C. Barnhart, MD

PED Talk - Pediatric surgery, Education, Disruption #3: Gun Violence as a Public Health Issue

3:30 p.m. – 4:00 p.m. Salons A-F

Moderator: Marion C.W. Henry, MD, MPH

Wednesday, May 22 (cont.)

LEARNING OBJECTIVES

By the end of the presentation, the attendees will be able to:

- Outline scope of problem
- Assess the current situation
- Discuss challenges moving forward
- Highlight public policy approach

Tribute: Jessie L. Ternberg
Emily J. Onufer, MD, MPH

Joseph V. Sakran, MD

4:00 p.m. – 6:00 p.m.		Free Time
6:00 p.m. – 7:00 p.m.	**President's Reception**	Grand Ballroom Foyer - 4th Floor

Tribute: E. Thomas Boles
Rita D. Shelby, MD, MS, Pamela Mar, MD, Courtney Pisano, DO, MS

7:00 p.m. – 11:00 p.m.	**President's Banquet**	Salons A-F
	Sponsored by Biostage	

Tribute: Benjy Brooks
Mary L. Brandt, MD

Tribute: William E. Ladd
Don K. Nakayama, MD

11:00 p.m.	Meeting Concludes

Scientific Session I

Scientific Session 1: Gastrointestinal Surgery
Sunday, May 19 | 3:15 p.m. – 4:45 p.m.
Salon G

S1

SHORT-TERM OUTCOMES IN PEDIATRIC INTESTINAL FAILURE PATIENTS WITH CULTURE-PROVEN SMALL BOWEL BACTERIAL OVERGROWTH

Jamie Knell, MD[1], Christopher Duggan[2], Sam M. Han, MD[1], Charles R. Hong[1], Enju Liu[3], Heather Riley[4], Alexandra N. Carey[2], Biren P. Modi, MD[1], Tom Jaksic, MD[1]

[1]Center for Advanced Intestinal Rehabilitation and Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [2]Center for Advanced Intestinal Rehabilitation and Department of Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [3]Department of Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [4]Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA

Purpose
To evaluate symptoms, growth and enteral nutrition tolerance in pediatric intestinal failure patients with duodenal culture-positive small bowel bacterial overgrowth (SBBO).

Methods
We retrospectively reviewed data from children 0-18 years with intestinal failure (parenteral nutrition dependence ≥90 days) from a single, multidisciplinary intestinal rehabilitation center. Patients with endoscopic duodenal cultures demonstrating >10^5 organisms per colony-forming unit from January 2010 through December 2017 were included. Symptoms, growth, enteral tolerance and antibiotic regimens were evaluated six months prior to and after endoscopy. Paired t, Fisher's exact and Mann Whitney-U tests were applied as appropriate.

Results
57 patients with positive duodenal cultures were evaluated. Intestinal failure diagnoses included 17(39.8%) patients with gastroschisis, 18(31.6%) with atresia, 15(26.3%) with volvulus, 13(22.8%) with NEC and 9(16.4%) with chronic intestinal pseudo-obstruction. The most common bacteria identified were S viridans (n=21), E coli (n=21) and Klebsiella (n=19). Compared to before endoscopy, patients who underwent endoscopic culture and therapy for SBBO showed significant improvement in emesis or feed intolerance (59.6 vs. 24.6%,p< .0001), high stool output (43.9 vs. 19.3%,p<.01) and GI bleeding (19.3 vs. 3.5%,p<.01) (Table). Growth parameters were not statistically different pre- vs post-endoscopy, nor was enteral intake, episodes of blood stream infections or d-lactic acidosis. The number of agents, antibiotic regimen and weeks per month on treatment remained highly variable; the mean weeks per month that antibiotics were prescribed was 1.46 +/- 1.41 in the 6 months before and 1.67 +/- 1.57 in the 6 months after endoscopy (p=.25).

Conclusions
Children with intestinal failure and culture-positive SBBO showed significant improvement in symptoms of emesis or feeding intolerance, high stool output and GI bleeding after endoscopic culture and antibiotic therapy. There was no significant improvement in growth parameters or enteral tolerance post-culture. Further investigation into outcomes and management of SBBO in intestinal failure patients is warranted.

Scientific Session I (cont.)

S2

CHRONIC LYMPHATIC REMODELING IMPAIRS CHOLESTEROL HOMEOSTASIS AFTER SMALL BOWEL RESECTION

Emily J. Onufer, MD, MPH[1], Rafael Czepielewski[1], Li-hao Huang[1], Cathleen Courtney[1], Kristen M. Seiler[1], Gwendalyn Randolph[1], Brad W. Warner, MD[2]

[1]Washington University in St. Louis, St. Louis, MO, USA, [2]Division of Pediatric Surgery, Washington University School of Medicine, St. Louis, MO, USA

Tweet it! Come learn about chronic lymphatic remodeling in the setting of short bowel syndrome and its implications!

Purpose

Short bowel syndrome is associated with diminished levels of serum cholesterol by unknown mechanisms. Cholesterol is primarily absorbed in the proximal bowel via chylomicron secretion. There may also be a role for HDL in intestinal cholesterol transport, given that the small bowel highly expresses apoA1 and ABCA1 involved in the genesis of HDL. We have shown that mesenteric lymphatics remodel to a more primitive state one week after small bowel resection (SBR); therefore, this study focuses on the effect of chronic lymphatic remodeling and magnitude of resection on intestinal fatty acid uptake and transport.

Methods

C57BL6 and Prox1 creER-Rosa26LSLTdTomato (lymphatic reporter) mice underwent 50% or 75% proximal SBR or sham operations and were studied after 10-13 weeks. Serum cholesterol levels were measured and matched to non-operated littermates. Epithelial cell Abca1 mRNA expression from the immediate proximal bowel was determined. Imaging was performed on the ileal mesentery.

Results

There was no difference in serum cholesterol levels between sham and nonoperative controls. Serum cholesterol levels decreased by 54.5% and 69.3% in mice undergoing 50% and 75% SBR, respectively ($p<0.0001$, Figure 1A). Proximal epithelial expression of Abca1 demonstrated 1.82-fold and 10.54-fold reductions after 50% and 75% SBR, respectively ($p<0.007$, Figure 1B), whereas genes associated with chylomicron production were unaltered. In the distal ileal remnant, diverticular budding structures developed along the lymphatic network in 50% SBR versus sham mice (Figure 1C).

Conclusion

Serum cholesterol levels decrease with increasing loss of bowel length. The remaining proximal bowel fails to increase expression of the major cholesterol transporter for HDL, ABCA1. The mesenteric lymphatic network draining the adapting bowel dramatically remodels, suggesting loss of flow and impaired intestinal transport of fat. Future directions call for a direct assessment of the role of HDL versus chylomicrons in the transport of cholesterol from the intestine.

Scientific Session I (cont.)

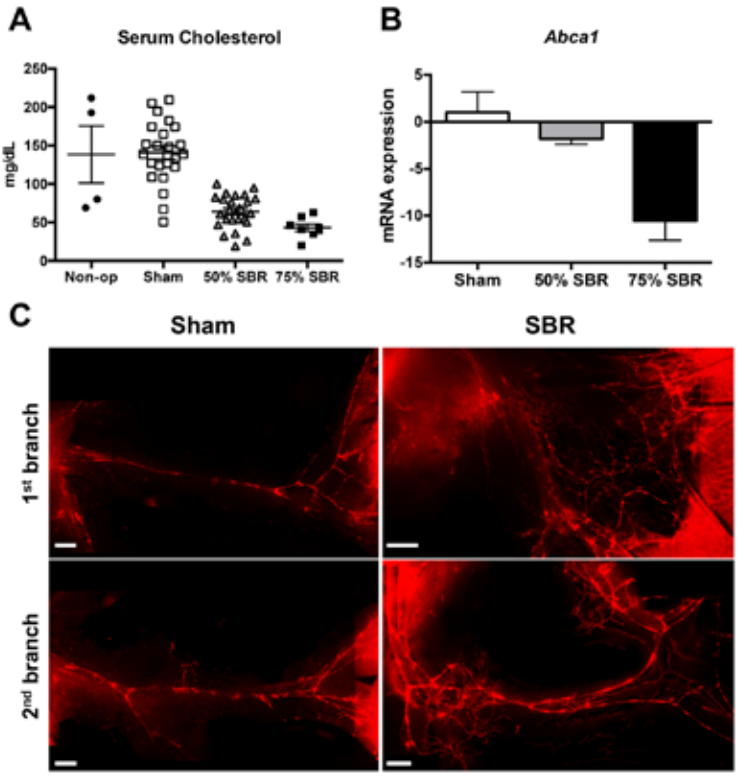


Figure 1. *Long-term impacts of SBR on lymphatic remodeling and cholesterol uptake.* **(A)** Serum cholesterol levels in non-operated (n=4), sham (n=23), 50% SBR (n=25), and 75% SBR (n=8) mice 10-13 weeks after surgery (ANOVA, p<0.0001). **(B)** Proximal epithelial expression of *Abca1* in sham (n=5), 50% SBR (n=2), and 75% SBR (n=9) mice 13 weeks after surgery (ANOVA, p<0.007). **(C)** Tomato fluorescence (in red) in induced Prox1creER-Rosa26^{LSL}TdTomato sham and 50% SBR mesenteric imaging of the first and second branches distal to the anastomosis with orientation of gut to the right. Scale bar 1mm.

Scientific Session I (cont.)

S3

A COMPARISON OF SMOFLIPID AND INTRALIPID IN THE EARLY MANAGEMENT OF INFANTS WITH INTESTINAL FAILURE

Cameron Casson, MD[1], Van Nguyen[2], Nandini Channabasappa[1], Pritha Nayak[1], Julia Panczuk[3], Kaitlin Berris[4], Hannah Piper, MD[3]

[1]University of Texas Southwestern, Dallas, TX, USA, [2]Children's Health Dallas, Dallas, TX, USA, [3]University of British Columbia, Vancouver, BC, Canada, [4]BC Children's Hospital, Vancouver, BC, Canada

Purpose

Hepatic cholestasis is problematic for infants with intestinal failure (IF). Intralipid, a soy-based lipid has been implicated, often requiring dose reduction. Smoflipid (SMOF) an alternative lipid with anti-inflammatory properties is increasingly used, however its role in prevention of cholestasis is unclear. This study compares the incidence and degree of cholestasis between infants with IF receiving either SMOF or IL.

Methods

A retrospective review of infants with IF in two intestinal rehabilitation programs, receiving SMOF or IL during the first 8 weeks of parenteral nutrition (PN) support (2014-2017) were reviewed. Clinical characteristics, incidence of cholestasis (conjugated bilirubin (Cbili) > 2 mg/dL for >2 weeks) and nutritional parameters were compared. Welch's t-test was used to compare variables with P values <0.05 considered significant.

Results

44 infants were reviewed (23 IL, 21 SMOF). Groups were similar in age and diagnoses. 91% of IL babies and 76% of SMOF babies became cholestatic (p=0.18). There was no significant difference in median peak Cbili (5.4 mg/dL vs. 4.8 mg/dL, p=0.64) between SMOF and IL groups, but babies receiving SMOF normalized their Cbili more quickly (83 vs. 120 days, p=0.04). Median z-scores for weight were similar at study start (-0.59 vs. -0.71, p=0.51) and end (-1.09 vs. -0.94, p=0.70), but IL patients were getting less parenteral fat by study end (1.5 g/kg/d vs. 2 g/kg/d, p=0.05). SMOF patients getting no enteral nutrition (n=9) had a lower incidence of cholestasis than IL patients (n=13) (78% vs. 92%, p=0.057), but those with cholestasis had similar median peak Cbili, time to resolution and overall growth.

Conclusion

Early use of Smoflipid did not reduce the incidence or degree of cholestasis compared to Intralipid in PN dependent infants with IF, but did result in more rapid resolution. Smoflipid may decrease the incidence of cholestasis in infants not tolerating any enteral nutrition.

Scientific Session I (cont.)

S4

ENDOLUMINAL FUNCTIONAL IMAGING AND DILATION: EARLY EXPERIENCE WITH ENDOSCOPIC IMPEDANCE-BASED MEASUREMENTS AND DILATIONS IN PEDIATRIC PATIENTS

Jordan S. Taylor, MD, James Wall, MD

Stanford University, Stanford, CA, USA

Tweet it! Endoluminal functional imaging and dilating probe: safe use in pediatric patients with esophageal pathology

Introduction

Endoluminal functional imaging probes have been used to endoscopically evaluate and treat esophageal and colonic strictures in adults. These catheters derive precise cross sectional areas (CSA) and diameters based on impedance values along the catheter, obviating the need for fluoroscopically-guided measurements or dilations. This methodology has only recently been adapted for pediatric patients and is not been well studied. The aim of this study is to describe the early uses and outcomes associated with endoluminal functional imaging probes in pediatrics.

Methods

Records of pediatric patients who underwent endoscopic procedures involving endoluminal functional imaging or dilations between Jan-2015 and Oct-2018 were systematically reviewed. Patient demographics and characteristics, including procedures performed, operative times, postoperative complications, and change in esophageal diameter were analyzed with descriptive statistics(mean±SD; median, IQR).

Results

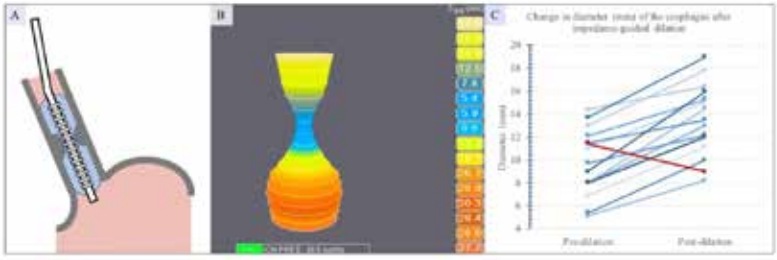
Forty-seven patients (21F:26M) underwent 75 procedures involving endoluminal imaging diagnostics or dilations during the study period. In 20 cases (26.7%, n=16 patients) cases, the endoluminal probe was used to dilate esophageal strictures, with the most common indications being achalasia (n=9) or previous TEF repair (n=4). The average age was 12.2±5.6yr, and patients had 2.3±1.9 previous dilations. Procedures lasted a median of 28min (17–46min) and resulted in an average 3.7±2.2mm increase in esophageal diameter. There were no intraoperative or early postoperative complications (average follow up of 190days), though one patient's stricture was too narrow for the probe to pass.

Conclusions

Endoluminal functional imaging probes are safe and feasible for quantifying and treating esophageal strictures in pediatrics. The technology offers several advantages, including precision measurements of diameter, CSA, and distensibility, as well as dilations without radiation exposure.

Scientific Session I (cont.)

Figure 1.A)Schematic of endoluminal functional imaging/dilating probe. B)Pre-dilation measurements showing esophageal diameter and stricture length. C)Changes in esophageal diameter after dilation with endoluminal functional probe. One patient (red) had spasm following dilation that affected the post-dilation measurement.



Scientific Session I (cont.)

S5

TISSUE ENGINEERING CAN RESTORE ESOPHAGEAL CONTINUITY IN LONG GAP ESOPHAGEAL DEFECTS BY USING A CELLSPAN ESOPHAGEAL IMPLANT

Christine Finck, MD[1], Todd Jensen[2], Heather Wanczyk[2], William Fodor[3], Tina Roffidal[3], Sumati Sundaram[3], Karissa Paquin[3], Jeff Bouchard[3], Eyone Jones[4]

[1]Connecticut Children's Medical Center, Hartford, CT, USA, [2]University of Connecticut Health, Farmington, CT, USA, [3]Biostage, Holliston, MA, USA, [4]Connecticut Children's Medical Center, Hartford, CT, USA

Purpose

Esophageal-atresia occurs 1 in every 4-5000 live births with long-gap atresia being most relevant to tissue engineering. The ability to utilize a personalized scaffold to bridge the gap would mitigate some of the morbidity seen with current treatments. This study demonstrates feasibility of utilizing CellspanTM Esophageal-Implant (CEI), an electrospan polyurethane scaffold seeded with autologous adipose-derived mesenchymal-stem-cells (ad-MSC), to regenerate a functional esophageal conduit for long gap defects.

Methods

Ad-MSCs were isolated from 3 Yucatan mini-pigs and seeded onto Cellspan and cultured in a bioreactor for 6 days. The pigs underwent a 5cm circumferential esophageal resection, with a primary repair under tension in the control animal and a 6 cm CEI implanted in 3 pigs. All animals had stents deployed maintaining patency during healing and gastrostomy tubes for enteral feedings. Scaffolds were removed after 21 days with reinsertion of stents and animals began PO intake. Animals were monitored biochemically for markers of inflammation and functionally with fluoroscopy and endoscopy for 90-days.

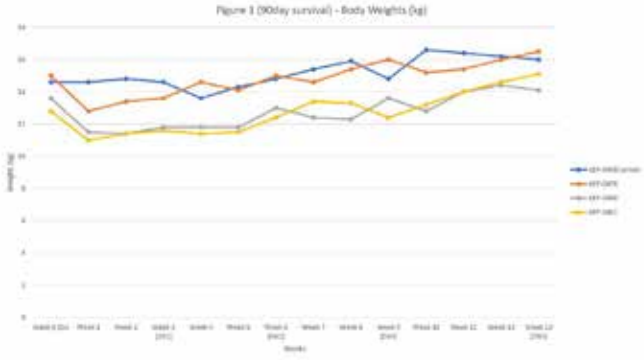
Results

All animals initially experienced mild weight loss and exhibited elevation in inflammatory markers. At day 21, scaffolds and stents were easily retrieved, and endoscopy demonstrated that pigs which received CEIs had regeneration of a patent esophagus without leak or stricture. Over 90 days, the control animal experienced more strictures requiring intervention than the ad-MSC-CEI cohort. Esophageal patency, weight gain (Fig.1) and functional status was maintained for 90 days for all treated animals.

Conclusion

In a model simulating a long-gap esophageal defect, we demonstrated tissue regeneration utilizing CellspanTM-Implants. Scaffolds were extruded by day 21 leaving behind regenerating tissue. Treated animals had progressive weight gain via oral intake with robust activity levels. None suffered debilitating strictures, perforations, scaffold rejection or anastomotic leaks. These promising results may have the potential of translating bench to bedside clinical application in the near future.

Scientific Session I (cont.)



Scientific Session I (cont.)

S6

ASSESSING THE BENEFIT OF REOPERATIONS IN PATIENTS WHO SUFFER FROM FECAL INCONTINENCE AFTER REPAIR OF THEIR ANORECTAL MALFORMATION

Devin R. Halleran[1], Hira Ahmad[1], Alejandra Vilanova-Sánchez[2], Patrick Stallings[1], Nisha Ganesh[1], Alessandra Gasior[1], Richard J. Wood[1], **Marc A. Levitt**[1]

[1]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA, [2]University Hospital La Paz, Madrid, Spain

Tweet it! Redo PSARP can improve the anatomic result in patients with fecal continence as a result of anal mislocation or stricture after ARM repair, but does it improve functional outcomes? @devinrhalleran

Background

Patients with a previously repaired anorectal malformation (ARM) can suffer from complications that are only discovered years later with many suffering from fecal incontinence. Reoperation has been shown to improve the anatomic result, but the impact of this intervention on functional outcomes is unclear.

Methods

We performed a retrospective cohort study of all patients (excluding cloacas) with a previously repaired ARM who were referred to us for evaluation of fecal incontinence between 2014 and 2017. Validated scores were used to compare patients at their initial assessment and 1 year postoperatively.

Result

Of 682 patients referred, 153 (22%) underwent a redo PSARP to correct their anatomy in an attempt to improve their continence potential. The majority of indications for reoperation included anoplasty mislocation (n=93, 61%) and stricture (n=55, 36%). After the redo, strictures (n=33, 22%) were managed with a Heineke-Mikulicz anoplasty (25/33, 76%), dilation under anesthesia (4/33, 12%), or redo PSARP (3/33, 9%). Dehiscence of the posterior sagittal incision occurred in 5 patients (3%). At 1 year post-redo, 40 of 96 (42%) patients 4 years or older are on a laxative regimen, of whom 30 (75%) have voluntary bowel movements and 10 have occasional accidents. The remaining 56 (58%) are clean on antegrade (n=50, 89%) or retrograde (n=6, 11%) enemas, and a future attempt at bowel control is planned. Overall, 116 (76%) of patients are clean for stool after their redo with 100% of these initially presenting with incontinence. Pediatric quality of life (76.7 vs. 83.8, p=0.05) and Baylor continence (29.2 vs. 17.7, p=<0.0001) scores improved.

Conclusion

Patients with fecal incontinence after an ARM repair can have an anal mislocation or stricture surgically corrected which can restore continence and improve quality of life in a majority of patients, with acceptable surgical morbidity.

Scientific Session I (cont.)

S7

INTRAOPERATIVE INDOCYANINE GREEN LASER ANGIOGRAPHY (SPY™) AND ITS VALUE IN PREDICTING THE VASCULAR SUPPLY OF TISSUES NEEDED TO PERFORM CLOACAL, ANORECTAL MALFORMATION AND HIRSCHSPRUNG RECONSTRUCTIONS

Rebecca M. Rentea, MD[1,2], Devin R. Halleran, MD[1], Alejandra Vilanova-Sanchez[1], Hira Ahmad, MD[1], Kate McCracken[1], Geri Hewitt, MD[1], Victoria Alexander[1], Laura Weaver[1], Caitlin A. Smith[1,3], Richard J. Wood, MD[1], Marc A. Levitt, MD[1]

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Purpose

Reconstruction techniques for cloaca, anorectal malformations (ARM), and Hirschsprung disease (HD) may require intestinal flaps on vascular pedicles for vaginal reconstruction and/or colonic pullthroughs. Visual intraoperative assessment of tissue perfusion is typically the only modality used to evaluate these structures. With this in mind, we investigated the utility of intraoperative indocyanine green laser angiography (SPY™) for this purpose and hypothesized that it would be more accurate than the surgeon's eye.

Methods

12 consecutive patients undergoing cloacal reconstruction (8), ARM repair (1), or a pull through for HD (3) underwent SPY™ imaging to assess colonic, rectal, and neo-vaginal tissue perfusion following intra-operative visual clinical assessment. Operative findings were correlated with healing at 6 weeks, 3 months, and 1 year postoperatively.

Results

SPY™ imaging resulted in a change in the operative plan in 3 of the 12 (25%) cases. In these 3 cases the pedicled tissue were incorrectly thought to be well perfused on visual inspection. In 2 cases, inadequate perfusion as determined by SPY™ resulted in the distal bowel being transected at a level (>10 cm) higher than originally planned, and in 1 case the decision was made to discard the distal bowel altogether and pull through the colostomy. All vaginal assessments correlated with SPY™ findings. If viability of the native vagina or rectal pull through was predicted to be adequate by SPY™, good healing without stenosis, fistula, or acquired atresia occured.

Conclusion

In this initial series, intraoperative SPY™ correctly identified patients who might have developed a complication from poor tissue perfusion if the operative decision had been based only on the surgeon's clinical assessment. Employing this technology to assess rectal or neovaginal pull-throughs on a vascular pedicle in cloacal reconstructions and complex HD and ARM cases may be a valuable addition to the surgeon's armamentarium.

Scientific Session I (cont.)

S8

GASTROINTESTINAL MORBIDITY IN ADULTS FOLLOWING REPAIR OF SIMPLE NEONATAL GASTROSCHISIS

Gillian R. Goddard, MD[1], Justine Marchix, PhD[1], Meghan Hall Rauen, MA[2], Mary L. Brandt, MD[3], Michael A. Helmrath, MD[1]

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]Avery's Angel's Gastroschisis Foundation, Raleigh, NC, USA, [3]Baylor College of Medicine, Houston, TX, USA

Purpose

Infants born with simple gastroschisis have not been previously reported to have long term gastrointestinal morbidity. The purpose of this study is to evaluate gastrointestinal morbidity in patients at least 12 years s/p repair of simple gastroschisis.

Method

An electronic survey was created to collect demographic information, neonatal medical and surgical history, and current health status. Subjects were recruited from July 2018 – September 2018 through a national gastroschisis network. Subjects age 12 or older were included. Respondents with complex gastroschisis (any gastrointestinal surgery before one year of age) or with unknown surgical history were excluded. QoL was assessed with the 12-item Short Form Health Survey (SF-12). Univariate analysis was done using Kruskal-Wallis test. A p-value <0.05 was considered statistically significant.

Results

A total of 77 respondents with simple gastroschisis were enrolled. 75.3% were female. The mean age was 27.7±10.7 years. 42/77 (54%) required additional surgery following their neonatal repair, with 7/42 (17%) undergoing bowel resection. 50/77 (65%) experienced at least one gastrointestinal symptom during the previous month. Abdominal pain was the most common (45%), followed by constipation (43%) and abdominal bloating (35%). 17/50 (35%) of these individuals were symptom free until 6 years of age when they experienced their first gastrointestinal symptom(s). 58 participants completed the SF-12 survey. Physical scores were within normal range, but mental scores were significantly lower in subjects who experienced gastrointestinal symptoms when compared to the general population (43.1±13.6, $p<0.01$) (Table 1).

Conclusion

Over half of patients with simple gastroschisis will require additional surgery after their initial repair, with one-sixth of these patients requiring bowel resection. Almost two-thirds of patients report gastrointestinal symptoms which negatively impacts their quality of life. These data support developing prospective registries to more accurately determine long term outcome, and strategies to decrease morbidity in children with gastroschisis.

Scientific Session I (cont.)

S9

DESIGNING A SAFER GASTROSTOMY DEVICE, THE QUEST TO PREVENT G TUBE DISLODGEMENT

Luis I. Ruffolo, MD[1], Theresa Foito[2], Marsha Pulhamus[2], Anna McGuire, MD[1], Derek Wakeman, MD[3]

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Purpose

Gastrostomy tubes (G tubes) for pediatric patients can serve as lifelines for nutrition and hydration, but have long been associated with frequent dysfunction resulting in overutilization of healthcare resources. In fact, the largest review of patients with G tubes found that nearly 10% will present to the emergency department (ED) within 30 days of discharge with a G tube related complaint. At our institution, data suggest that approximately 70% of ED visits result from dislodgement of G tubes. Early dislodgement, before the formation of a mature gastrocutaneous tract, can result in peritoneal contamination, abdominal sepsis, and even death. Thus, in an effort to prevent unwanted G tube dislodgement, we endeavored to create a device which would prevent removal of the intragastric retention bumper via a magnetic failsafe.

Methods

We designed a magnetically coupled G tube, constructed such that a force applied to connection tubing would result in safe disconnection from the button. This device works similarly to a conventional low profile button with a nozzle tipped connection tubing and anti-reflux valve (Figure). Neodymium alloy magnets are employed to maximize connection strength while minimizing size. Connection strengths were measured with a force gauge.

Results

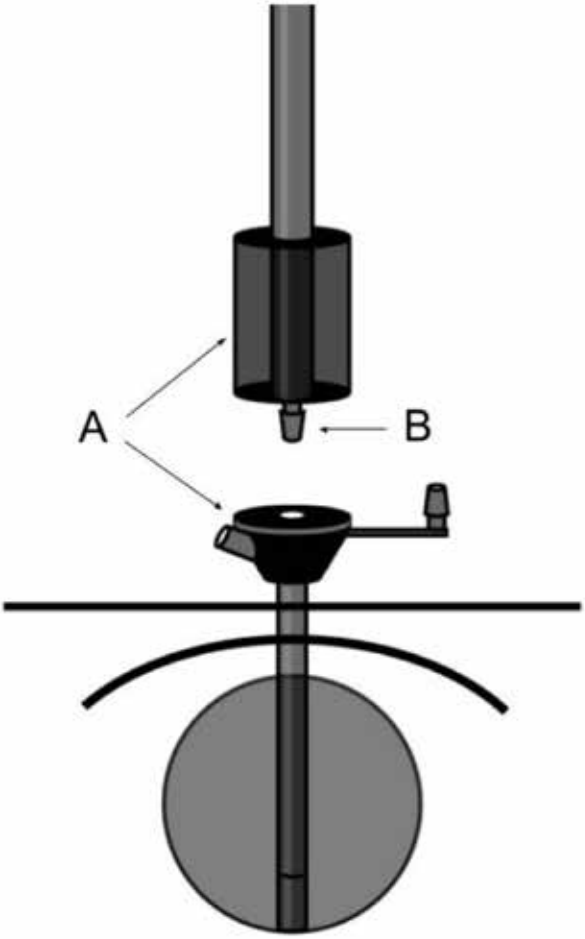
Prototypes demonstrated connection strengths which were modifiable between 1.0 and 16.9 lbs. These prototypes also continued to function with the infusion of tube feedings or water without leakage.

Conclusions

Devices and techniques for preventing accidental G tube dislodgement carry the promise of preventing ED visits, readmissions, and potential sepsis. While educational strategies can potentially prevent unnecessary ED visits for problems such as mechanical clogs or excessive granulation tissue, dislodgement remain a major burden for families. Strategies which dissipate the force of accidental traction on the G tube device may prevent dislodgement. Other strategies or devices for creating a safe breakaway should be explored.

Scientific Session I (cont.)

Figure: Schematic demonstrating (A) magnetic coupling of G tube with connection tubing and (B) nozzle tip for engaging internal one-way valve.



Scientific Session I (cont.)

S10

ENDOSCOPIC CLOSURE OF GASTROCUTANEOUS FISTULA: MODIFIED TECHNIQUE WITH OVER-SCOPE CLIP

Jordan S. Taylor, MD, Julia M. Chandler, MD, MS, Katherine I. Portelli, James Wall, MD
Stanford University, Stanford, CA, USA

Tweet it! Simple modification to assist gastrocutaneous fistula closure with an endoscopic over the scope clip and transabdominal suture

Introduction
This video presents a modified technique for endoscopic closure of gastrocutaneous fistulas using a transabdominal suture to improve the accuracy of the over-scope nitinol clip. The technique addresses the issue of misfiring clips, which can lead to an incomplete closure of a gastrocutaneous fistula.

Methods
An endoscopic grasper is advanced through the fistula and used to pass a suture through the fistula. The suture is then used to direct the scope perpendicular to the stomach wall, centering the scope over the fistula. The clip can then be deployed to fully close the fistula, enhancing the precision of the over the scope clip system.

Results
The trans-fistula suture centers the scope and ensures complete closure of the fistula, allowing the patient's skin to heal.

Conclusions
Utilization of a transabdominal suture for endoscopic centering prior to over-scope clip deployment can reduce the number of misplaced clips. While this technique is especially useful for large or irregularly shaped fistulas, the application of the trans-fistula suture improves accuracy for all endoscopic over-scope clip procedures and should be routinely utilized in pediatric patients.

Scientific Session 2

Scientific Session 2: Basic Science, Chest, IBD

Sunday, May 19 | 3:15 p.m. – 4:45 p.m.

Salons A-F

S11

ACCESS TO AN ONLINE VIDEO ENHANCES THE CONSENT PROCESS, INCREASES KNOWLEDGE, AND DECREASES ANXIETY OF CAREGIVERS WITH CHILDREN SCHEDULED FOR INGUINAL HERNIA REPAIR - A RANDOMIZED CONTROLLED TRIAL

Friederike Book[1], Jan Gödeke[1], Alicia Poplawski[2], Oliver J. Muensterer, MD, PhD[1]

[1]Pediatric Surgery, University Medicine of the Johannes Gutenberg University Mainz, Mainz, Rheinland-Pfalz, Germany, [2]Institute of Medical Biostatistics, Epidemiology and Informatics (IMBEI), University Medicine of the Johannes Gutenberg University Mainz, Mainz, Rheinland-Pfalz, Germany

Tweet it! Ad-lib access to an online YouTube(TM) video enhances the consent process by increases knowledge and decreases anxiety of families with children who are scheduled for inguinal hernia repair without compromizing satisfaction with care.

Background

Obtaining well-informed consent is an essential part of pediatric surgery. Often however, there is limited time in clinic, and the families may be overwhelmed by information given to them during the visit. This study evaluates whether ad-lib access to an online video of the consent dialogue enhances the consent process for inguinal hernia repair in children.

Methods

A 6-minute video of a consent dialogue on inguinal hernia repair was produced and uploaded to a nonpublic YouTube(TM) channel, explaining the condition, procedure, possible complications and postoperative expectations. Families of children scheduled for inguinal hernia repair were offered to participate in the study. After obtaining study participation consent, they were randomized to conventional, face-to-face consenting in clinic either with (intervention) or without (control) ad-lib access to the YouTube(TM) video anytime after the clinic visit. On the day of surgery, while waiting for their child, the caregivers were asked to complete out a standardized State-Trait-Anxiety-Inventory (STAI-X1, Consulting Psychologists Press. 1970), a modified Friedlander questionnaire on assessing knowledge sufficient to provide informed consent (J Med Ethics. 2011), and a satisfaction questionnaire based on Spencer et al. (Pediatr Emerg Care 2015). Scores of the intervention and control group were statistically compared.

Results

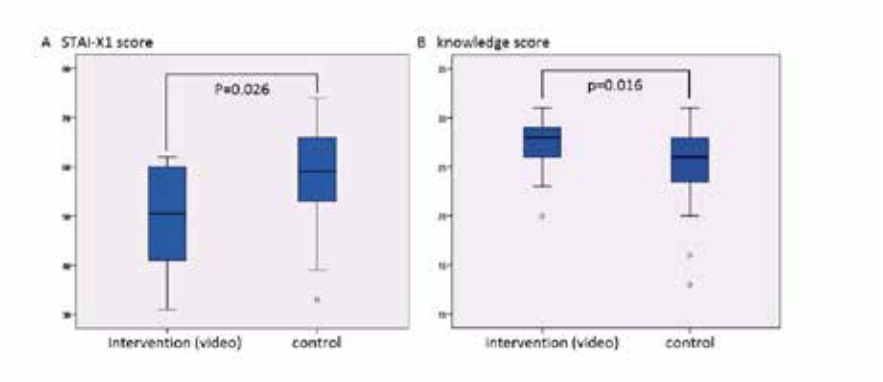
A total of 50 families were randomized. There was a significant decrease in anxiety measured with the STAI ($p=0.026$, fig. A) and increased knowledge ($p=0.016$, fig. B) demonstrated in the intervention compared to the control group. There was no difference in satisfaction between the groups ($p=0.557$).

Conclusion

Preoperatively providing caregivers access to an online consent video regarding pediatric inguinal hernia repair reduces anxiety and enhances knowledge, without altering their

Scientific Session 2 (cont.)

satisfaction level with overall care. Adjunct online videos are a useful tool to enhance the consent process. We plan to produce videos for other procedures in different languages in the future.



Scientific Session 2 (cont.)

S12

CELLULAR TRAFFICKING ACROSS THE BLOOD-BRAIN BARRIER FOLLOWING IN UTERO HEMATOPOIETIC CELLULAR TRANSPLANTATION

Matthew T. Grant, MD, MPhil, Jesse D. Vrecenak, MD

Washington University in St. Louis, St. Louis, MO, USA

Tweet it! Donor stem cells engraft within the CNS and adopt a neuronal phenotype following in utero hematopoietic cell transplantation (IUHCT), which utilizes a unique window in immune development that enables transplanted cells to engraft without need for immunosuppression. @matthewtgrant

Purpose

Inborn errors of metabolism (IEM) are recognized to cause irreversible neuronal damage before birth, and the intact blood-brain barrier (BBB) complicates postnatal treatment. We hypothesize that in utero hematopoietic cell transplantation (IUHCT) would allow engraftment of healthy donor cells before irreversible central nervous system (CNS) damage occurs at a time when the BBB would be highly dynamic. We aim to characterize cellular trafficking across the BBB throughout gestation following IUHCT in order to understand its potential to treat these devastating diseases.

Methods

Gestational day 13-15 (E13-15) BALBc fetuses underwent intravascular injection of whole bone marrow harvested from B6GFP mice. Engraftment within the brain was assessed via fluorescent stereomicroscopy and immunohistochemistry at terminal analysis. Furthermore, peripheral blood chimerism was assessed using flow cytometry. CNS engraftment was quantified via stereologic analysis.

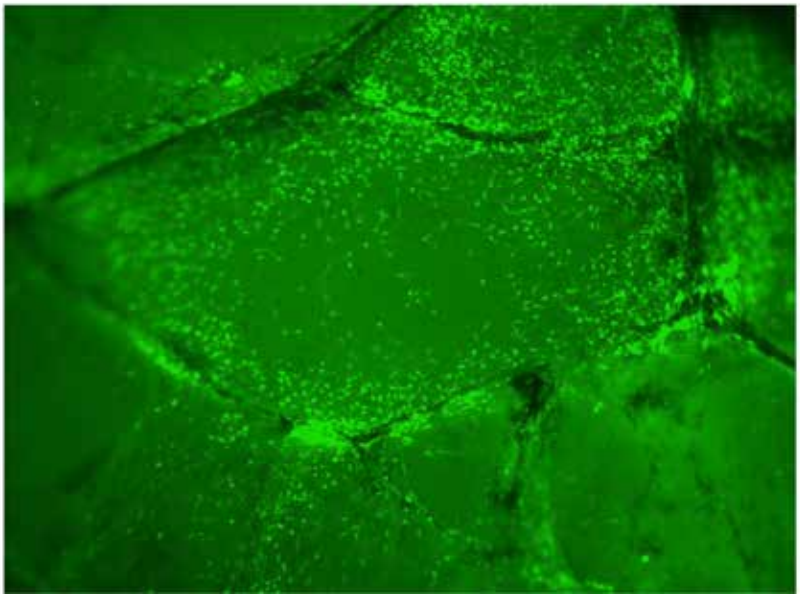
Results

Donor-derived GFP+ cells are observed within the brain at each timepoint assessed, and are especially concentrated within the cerebellum, corresponding to its delayed development as compared with other areas of the brain. Higher concentrations of donor cells are observed within brains analyzed at later timepoints (Figure 1). Microscopy confirms that the injected bone marrow-derived cells take on neuronal morphology following engraftment within the CNS.

Conclusion

IUHCT can effectively deliver stem cells within the CNS, demonstrating that the BBB is immature at gestational timepoints when in utero transplantation could be performed. The long-term engraftment of donor-derived cells within the brain could allow enzyme production and rescue of neighboring cells, suggesting the potential for a novel approach to treatment of IEM. Using early detection techniques paired with IUHCT, physicians could detect and intervene upon this family of diseases in utero, preventing irreversible neurologic damage.

Scientific Session 2 (cont.)



Scientific Session 2 (cont.)

S13

SYSTEMIC FETAL GENE EDITING AS A TREATMENT FOR CYSTIC FIBROSIS

Adele Ricciardi, PhD[1], Christina Barone[1], Rachael Putman[1], Elias Quijano[1], Anisha Gupta[1], James Farrelly[1], Valerie Luks[2], Richard Nguyen[1], Mark Saltzman[1], Peter Glazer[1], Marie Egan[1], David H. Stitelman, MD[3]

[1]Yale University, New Haven, CT, USA, [2]Pearlman School of Medicine, Philadelphia, PA, USA, [3]Yale School of Medicine/Yale University, New Haven, CT, USA

Tweet it! Fetal gene editing results in phenotypic improvement in a mouse model of cystic fibrosis.

Purpose
Although recent advances in genetic testing allow for prenatal disease detection, many neonates and children with cystic fibrosis (CF) continue to suffer substantial morbidity and mortality, as currently available therapies do not correct the underlying gene defect. We hypothesize that early intervention through in utero gene editing can correct disease-causing mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene during the initial stages of pathogenesis, which could potentially allow for normal organ development, disease improvement, and possibly cure. The aim of this study was to demonstrate that administration of biodegradable nanoparticles (NPs) loaded with peptide nucleic acids (PNAs) and donor DNA editing reagents could correct a CFTR mutation in the fetus.

Methods
We used a GFP reporter mouse model to assess the safety and activity of PNA/DNA NPs to edit lung tissue after intravenous (IV) fetal administration. We then determined if fetal treatment with PNA/DNA NPs targeting a disease causing CFTR mutation can be used to correct the mutation and lead to sustained postnatal functional CFTR activity by measuring the nasal and rectal potential differences in a mouse model of CF.

Results
In the reporter model, fetal editing resulted in significant gene correction in the lung. Fetal delivery of editing reagents in a CF mouse model resulted in significant correction of mutated CFTR and sustained functional CFTR activity in multiple tissues after systemic treatment, at a level similar to that of wild-type mice.

Conclusions
PNA/DNA NPs can be safely administered to fetal mice and can effectively correct a disease-causing CFTR mutation in a preclinical mouse model, resulting in sustained postnatal functional disease improvement. Our findings represent the first systemic fetal correction of a CFTR mutation and additionally establish the feasibility of a fetal gene editing approach that could be translated to other genetic diseases before birth.

Scientific Session 2 (cont.)

S14

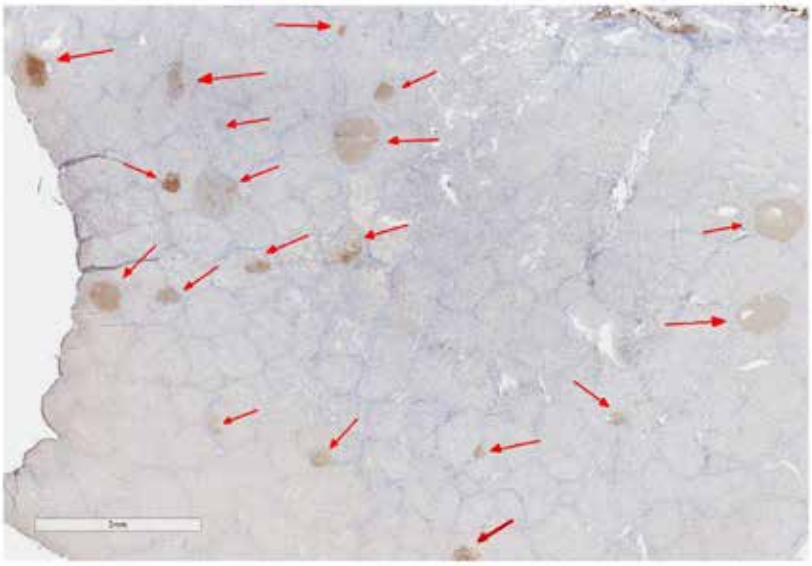
IN UTERO LIVER-DIRECTED LENTIVIRAL GENE THERAPY CURES A PIG MODEL OF HEREDITARY TYROSINEMIA TYPE 1

Clara Nicolas, MD, MS, Kari Allen, Lori Hillin, Caitlin VanLith, Zeji Du, Robert Kaiser, Raymond Hickey, Joseph Lillegard, MD

Mayo Clinic, Rochester, MN, USA

In utero gene therapy is an advanced approach that offers significant advantages over postnatal therapy. In liver disease, it can be curative while also addressing disease before any clinical consequences occur. We show here for the first time that in utero gene therapy can cure a large animal model of liver disease, in this case hereditary tyrosinemia type I. We performed ultrasound-guided intrahepatic injections of a lentiviral vector carrying the human fumarylacetoacetate hydrolase (Fah) gene under the alpha-1 antitrypsin promoter in 16 Fah-/- pig fetuses at E70±5. Doses ranged from 2.4x10E8 to 1.6x10E9 transducing units/fetus. Sows were maintained on the protective drug, 2-(2-nitro-4-trifluoromethylbenzoyl)-1,3-cyclohexanedione (NTBC), throughout gestation, and piglets were maintained on NTBC until weaning. Sixteen treated and seventeen control Fah-/- piglets were born from four pregnancies. Six treated piglets were euthanized for early data collection, and five died from complications due to surrogate sows. Positive FAH immunohistochemistry was seen at birth. Remaining treated piglets and control littermates are being followed long-term, and many treated piglets have already demonstrated NTBC-independent growth. Liver biopsies at 50 days of life show expansion of FAH+ hepatocytes with no evidence of fibrosis, cirrhosis, or HCC, and plasma tyrosine levels have begun to normalize. Lentiviral integration was present in the liver of treated piglets, as well as a few other organs, but was only detected in one of 4 sows and demonstrated a benign integration profile. In conclusion, lentiviral gene delivery is an effective treatment of hereditary tyrosinemia type I in a pig model of the disease, suggesting possible implications for human treatment. This report is the first ever to use in utero gene therapy to cure a large animal model of a human liver disease.

Scientific Session 2 (cont.)



Scientific Session 2 (cont.)

S15

COMPARATIVE OUTCOMES OF RIGHT VERSUS LEFT CONGENITAL DIAPHRAGMATIC HERNIA: A MULTICENTER ANALYSIS

Alexey Abramov, MD[1], Weijia Fan, MS[2], Rebecca Hernan, MS[3], Julia Wynn, MS[3], Gudrun Aspelund, MD[4], Foong-Yen Lim, MD[5], George B. Mychaliska, MD[6], Brad W. Warner, MD[7], Robert Cusick, MD[8], Timothy Crombleholme, MD[9], Chung Dai, MD[10], Melissa Danko, MD[11], Amy J. Wagner, MD[12], Kenneth S. Azarow, MD[13], David T. Schindel, MD[14], Douglas Potoka, MD[15], Samuel Soffer, MD[16], Jason Fisher, MD[17], Christiana Farkouh-Karoleski, MD[18], Wendy Chung, MD[19], Vincent P. Duron, MD[20]

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Purpose

Congenital diaphragmatic hernia (CDH) occurs in 1 out of 2500-3000 live births. Right-sided CDH (R-CDH) are reported in up to 25% cases; however, data are conflicting on outcomes of these patients. The aim of our study was to compare short and long-term outcomes in patients with right versus left CDH (L-CDH).

Methods

We analyzed the multicenter Diaphragmatic Hernia Research and Exploration Advancing Molecular Science (DHREAMS) database to compare baseline characteristics and outcomes of neonates enrolled from 2005 to 2018 with right versus left-sided CDH. Categorical variables were analyzed by Chi-squared test or Fisher's exact test, continuous variables by t-test, and time-to-event outcomes were assessed using Cox model.

Scientific Session 2 (cont.)

Results

A total of 585 patients with CDH were analyzed. 494 patients had L-CDH and 91 had R-CDH. Lung-to-head ratio was similar in both cohorts (1.58 L-CDH, 1.35 R-CDH, p=0.21). Gestational age and weight at birth were also similar. L-CDH were more frequently diagnosed prenatally (p=0.009). R-CDH had a lower frequency of primary repair (p=0.03) and a higher frequency of need for oxygen at discharge (p=0.016). There was no difference in death at discharge, need for extracorporeal membrane oxygenation, need for pulmonary hypertension medications at discharge, or hernia recurrence. After adjusting for size of defect, need for oxygen at discharge was no longer significantly different between R and L-CDH. Furthermore, there were no differences in long term neurodevelopmental outcomes, assessed at two and five years with validated scoring metrics.

Conclusion

In this large series comparing R to L-CDH patients, we found no significant difference in mortality, pulmonary outcomes, use of ECMO, or long term neurocognitive outcomes. Our study supports prior data that R-CDH defects are relatively larger and more often require a patch or muscle flap for repair.

Scientific Session 2 (cont.)

S16

THE INCIDENCE OF NEUROPATHIC PAIN AFTER INTERCOSTAL CRYOABLATION DURING THE NUSS PROCEDURE

Michael J. Zobel, MD[1], Clifton Ewbank[2], Roberto Mora[1], Olajire Idowu, MD[3], Sunghoon Kim, MD[4], Benjamin E. Padilla, MD[1]

[1]University of California, San Francisco, San Francisco, CA, USA, [2]University of California, San Francisco Benioff Children's Hospital Oakland, San Francisco, CA, USA, [3]UCSF Benioff Children's Hospital Oakland, San Francisco, CA, USA, [4]UCSF Benioff Children's Hospital Oakland, Oakland, CA, USA

Tweet it! "The Incidence of Neuropathic Pain after Intercostal Cryoablation during the Nuss Procedure": Cryoablation effectively numbs pediatric pts for the Nuss without incr. risk of neuropathy, but there is risk of neuropathic pain, delayed sensation recovery for older pts. @michaelzobel

Purpose

Intercostal cryoablation during the Nuss procedure for pectus excavatum decreases post-operative pain, hospital length of stay, and opiate requirement versus thoracic epidural analgesia, though long-term complications are not well studied. We hypothesize cryoablation is not associated with neuropathic pain.

Methods

After IRB approval, we conducted a multi-institutional retrospective review of 43 patients who underwent intercostal cryoablation with Nuss bar placement (November 2015-July 2018). Patients completed a validated self-reportable Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS), with scores>12 indicating pain of predominantly neuropathic origin. Primary outcome was neuropathic pain development. Secondary outcomes included time to chest numbness resolution and length of stay. Statistical analysis was performed using a two-tailed T-test, with alpha=0.05 for significance.

Results

43 patients underwent intercostal cryoablation during the Nuss procedure. Ages ranged from 11 to 47 years (mean 14.7 years). Patients were grouped based on age at repair: 21 years and younger (29 patients) or older (14 patients). Mean pre-operative Haller index was 4.2 in the younger group and 3.8 in the older group ($p=0.19$). All younger patients and 86% of older patients reported chest numbness post-operatively. Mean hospital length of stay post-operatively was 2.1 days and 3.9 days for the younger and older groups, respectively ($p=0.002$). Zero patients in the younger group, and 3 in the older, experienced neuropathic pain by S-LANSS. Mean S-LANSS score was significantly lower in the younger group, 0.8 versus 3.9($p<0.05$). Mean time to numbness resolution was 2.3 months and 10.9 months in the younger and older groups, respectively ($p<0.001$). One younger (3.4%) and two older (16.7%) patients reported numbness persisting beyond 1 year.

Conclusion

In pediatric patients, intercostal cryoablation safely provides effective analgesia following the Nuss procedure, without increased risk of long-term post-operative neuropathic pain. Older patients are at greater risk of developing neuropathic pain and delayed sensation recovery.

Scientific Session 2 (cont.)

S17

AVOIDANCE OF UNNECESSARY BRONCHOSCOPY IN CHILDREN WITH SUSPECTED FOREIGN BODY ASPIRATION THROUGH THE USE OF COMPUTED TOMOGRAPHY

Alexander T. Gibbons, MD, MS[1], Alejandra M. Casar Berazaluce, MD[2], Rachel Hanke, MD[2], Tracey Mehlman, Allison Person, Michael Rubin, Todd A. Ponsky, MD[2]

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Background

Patients with upper respiratory symptoms can have a multitude of etiologies, with foreign body aspiration (FBA) and reactive airway disease being two of the most common. Although rigid bronchoscopy is both the gold standard for diagnosis and the definitive therapeutic intervention for FBA, it remains an invasive procedure that can worsen symptoms in patients with reactive airway disease. The rate of negative bronchoscopy ranges from 10-70%, meaning that many patients could avoid unnecessary intervention with proper evaluation. We propose that the use of computed tomography (CT) can improve diagnostic accuracy, thereby lowering the negative bronchoscopy rate.

Methods

A retrospective chart review was performed on all patients who underwent a CT and/or a bronchoscopy for suspected FBA from June 2012 to September 2018. Patients who required intubation in the Emergency Department (ED) prior to bronchoscopy were excluded. Variables analyzed included patient demographics, clinical history, exam findings, radiographic findings, and operative findings. Fisher's exact test was performed on categorical data.

Results

A total of 125 patients were evaluated for FBA during the study period, with an average age of 3.3 years; 62% were male. Seventy-five patients were treated with bronchoscopy. For the patients who had a pre-bronchoscopy CT showing a foreign body, findings were confirmed at the time of bronchoscopy for 16/17 (93%); for the patients without a CT, 34/56 (61%) were found to have a foreign body (P=0.008). Two patients had equivocal reads on CT; both underwent bronchoscopy without evidence of a foreign body. Additionally, 50 patients with a suspicion of FBA had this diagnosis excluded with CT. Only one of these patients returned for an outpatient bronchoscopy, and no foreign body was detected.

Conclusion

CT is a valuable diagnostic tool that should be more widely used in the evaluation of possible FBA, as it reduces the negative bronchoscopy rate.

Scientific Session 2 (cont.)

S18

POUCHOGRAM PRIOR TO ILEOSTOMY REVERSAL AFTER ILEAL POUCH ANAL ANASTOMOSIS IN PEDIATRIC PATIENTS: IS IT USEFUL IN THE SETTING OF ROUTINE EUA?

Michael D. Traynor, MD, Nicholas P. McKenna, Elizabeth B. Habermann, Ryan M. Antiel, MD, MS, Christopher R. Moir, MD, Denise B. Klinkner, MD, Michael B. Ishitani, MD, D. Dean Potter, MD

Mayo Clinic, Rochester, MN, USA

Purpose

Routine pouchogram prior to ileostomy closure to assess for ileal pouch-anal anastomosis (IPAA) complications is uncomfortable and exposes children to radiation. Its impact on clinical decision-making remains unclear.

Methods

We reviewed pediatric patients (age < 18 years) who underwent routine pouchogram between 2007-2017 prior to ileostomy reversal after IPAA at two affiliated hospitals, where an exam under anesthesia (EUA) is also routinely performed at the time of planned ileostomy reversal.

Results

Sixty patients (57% female) with median age of 17 years (interquartile range [IQR], 14-17) underwent pouchogram before planned ileostomy reversal (n=56 for hospital A, n=4 for hospital B). The median time from IPAA formation to pouchogram was 60.5 days (IQR: 46-77) and median follow-up was 4 years (IQR: 1-6). Fifty-seven patients were asymptomatic prior to reversal (TABLE). Of the 40 asymptomatic patients with a normal EUA, pouchogram detected one stricture, but reversal proceeded as planned. In the 16 patients with strictures on EUA, pouchogram only detected six. One anastomotic dehiscence was found on EUA and missed on pouchogram. Despite normal pouchogram and EUA, four asymptomatic patients required subsequent diversion for pouch-related complications between 13-60 months after ileostomy reversal. Three patients had pelvic pain prior to pouchogram; associated symptoms included perineal pain (n=1) hematochezia (n=1), and tenesmus (n=1). EUA and pouchogram were concordant in two patients (n=1 anastomotic complication, n=1 pouch septum) and ileostomy reversal was delayed. In the remaining symptomatic patient, pouchogram detected an anastomotic leak where EUA detected only a stricture, and this prompted a delay in reversal. Long term, none of these patients required diversion or excision of their pouch.

Conclusion

Routine pouchogram in asymptomatic pediatric patients does not change management, and should be omitted, sparing patients discomfort and unnecessary radiation exposure. Pouchogram may aid in the diagnosis of symptomatic patients.

Scientific Session 2 (cont.)

S19

FERTILITY AND SEXUAL FUNCTION IN WOMEN FOLLOWING PEDIATRIC ILEAL POUCH ANAL ANASTOMOSIS

D. Dean Potter, MD, Christopher R. Moir, MD, Courtney Day, W. Scott Harmsen, John Pemberton

Mayo Clinic, Rochester, MN, USA

Tweet it! Pediatric IPAA resulted in 73% of women who desired children to become pregnant and an 88% successful delivery rate. Only 5% reported severely restricted sexual function. Minimally invasive techniques may improve fertility rates and require continued follow-up. @KidDoc_dpotter

Purpose
Ileal Pouch Anal Anastomosis (IPAA) is the standard of care for children with severe colitis or polyposis syndromes. This study aims is to investigate the sexual function and fertility in women after undergoing childhood IPAA.

Methods
A prospectively maintained colorectal database of consenting patients was queried from January 1980 to October 2015. We included all females that replied to at least 1 survey between the ages of 20-45 years that had undergone IPAA younger than 20 years of age.

Results
Two hundred females met inclusion criteria whereas 149 women replied to the sexual function questions. Ulcerative colitis was diagnosed in 122 (83%) patients, with the remainder having polyposis. Seven patients had laparoscopic proctectomy. Only 2 patients had a pelvic infection, whereas 14 had intestinal obstruction postoperatively. A severely restricted sex life was reported in 6 (5%) patients. Of the 93 (62%) women who attempted pregnancy, 68 (73%) became pregnant. Median age of pregnancy and IPAA was 34 (range 22-45) and 17 years (range 5-20), respectively. Medical intervention to assist fertilization was required in 14/68. A total of 29 women reported problems during pregnancy with 58/68 (88%) giving birth to a live baby. Elective termination was reported in 2/68 surveys. Vaginal delivery occurred in 26/58 mothers with 27/58 planned and 9/58 unplanned cesarean sections. Diagnosis, procedure type, pelvic infection and obstruction were not associated with decreased fertility. All 7 patients operated laparoscopically have become pregnant. Change in pouch function after delivery was reported in 20/68 (32%, 5 missing) surveys.

Conclusions
Pediatric IPAA resulted in 73% of women who desired children to become pregnant and an 88% successful delivery rate. Only 5% reported severely restricted sexual function. Changes in pouch function occurred with pregnancy and persisted in 1/3 after delivery. Minimally invasive techniques may improve fertility rates and require continued follow-up.

Scientific Session 2 (cont.)

S20

TRANSANAL MINIMALLY INVASIVE COMPLETION PROCTECTOMY WITH ILEAL POUCH ANAL ANASTOMOSIS IN ULCERATIVE COLIITIS

Scott S. Short, MD, Katie Russell, MD, Zachary Kastenberg, MD

Primary Children's Hospital, The University of Utah, Salt Lake City, UT, USA

Tweet it! Transanal Minimally Invasive Completion Proctectomy with Ileal Pouch Anal Anastomosis in Ulcerative Colitis

Recent data demonstrate that the transanal ileal pouch-anal anastomosis (TA-IPAA) is safe and may offer lower morbidity compared to other minimally invasive techniques. We report the first (TA-IPAA) in a pediatric patient (13 y.o. girl) with medical refractory ulcerative colitis and detail the technical aspects in our video submission. We conclude that this technical modification is feasible and can be accomplished without difficulty.

Scientific Session 3

Scientific Session 3: Oncology (basic science and clinical), Global, Anesthesia/Analgesia

Sunday, May 19 | 3:15 p.m. – 4:45 p.m.

Salons H-J

S21

SACRAL NERVE STIMULATOR PLACEMENT: A NOVEL SURGICAL NAVIGATION TOOL FOR COMPLEX ANATOMY

Alejandra M. Casar Berazaluce, MD, Irene Isabel P. Lim-Beutel, MD, John M. Racadio, MD, Jason S. Frischer, MD

Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Sacral neuromodulation is a therapy aimed at improving the quality of life of patients with constipation and fecal incontinence. By delivering electrical impulses through a probe placed at the S3 foramen, this technology acts like a pacemaker to stimulate bowel and sphincter function.

This video describes a novel surgical navigation technique for sacral nerve stimulator insertion in patients with complex anatomy. Placement at our institution takes place in a hybrid operating room equipped with c-arm cone beam computed tomography (CBCT) and a surgical navigation system. Using this technique enables us to offer this therapy to patients with dysplastic or malformed sacra whose anatomy would be otherwise prohibitive for traditional or purely fluoroscopic interventions.

A CBCT run is acquired intraoperatively, and a three-dimensional model is constructed for procedural guidance. The target anatomy is identified using the surgical navigation system, and a virtual path is created from the skin surface to the desired electrode location and evaluated in multiple views. A needle is inserted under live fluoroscopy to maintain proper alignment to the virtual guides. The needle tip location is then confirmed with multiplanar navigation with an intraoperative CT overlay. Insertion of the neuromodulation lead is accomplished using standard Seldinger technique after needle placement is confirmed with electrode testing for a bellows contraction and toe flexion.

Over the next two to four weeks, the patient's bowel function is carefully recorded and compared to previous records. If a positive effect is demonstrated with neuromodulation, a permanent generator is implanted in a second stage. If unsuccessful, the lead can be removed without permanent damage to the nerve.

Scientific Session 3 (cont.)

S22

NERVE-DERIVED SIGNAL ASSIST TISSUE REPAIR BY MANDIBULAR SKELETAL STEM CELLS

R. Ellen Jones, MD[1], Ankit Salhotra[2], Ryan Ransom[2], Ava Carter[3], Kiana Robertson[2], Derrick Wan[2], Michael Longaker[2]

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Tweet it! Are stem cells nerve-dependent? Skeletal stem cells generate bone after craniofacial injury, and we show they exhibit nerve-dependency in a mouse fracture model. @apsasurgeons @stanfordplastics @stanfordpedsurg @ stanfordsurgery

Purpose

We previously described a novel mouse mandibular denervation model by inferior alveolar nerve (IAN) disruption. Skeletal stem cells (SSCs) repair bone after injury, and we have demonstrated impaired SSC function after fracture in denervated mandibles. We now present corresponding evidence of aberrant bone healing, and propose paracrine signaling between IAN Schwann cells and SSCs as the underlying mechanism.

Methods

C57BL/6J mice underwent IAN denervation with 2 weeks of latency for Wallerian degeneration. Fracture osteotomy was performed on innervated (IN) and denervated (DN) mandibles with harvests at POD5, 10, 15, and 20. At POD10, histologic and micro-CT analyses were performed (Fig1A). SSCs were isolated with fluorescent activated cell sorting from IN and DN fractures to assess cell frequencies and colony formation units (CFUs) were compared (Fig 1B,C). Bulk RNA sequencing measured SSC gene expression of signaling receptors with established roles nerve-dependency, including platelet-derived growth factor (PDGF) receptor-α(Fig1D). Reverse transcription quantitative polymerase chain reaction (RT-qPCR) measured growth factor gene expression by IAN Schwann cells. DN-SSC CFUs were measured after addition of PDGF-AA ligand to standard media (Fig1E).

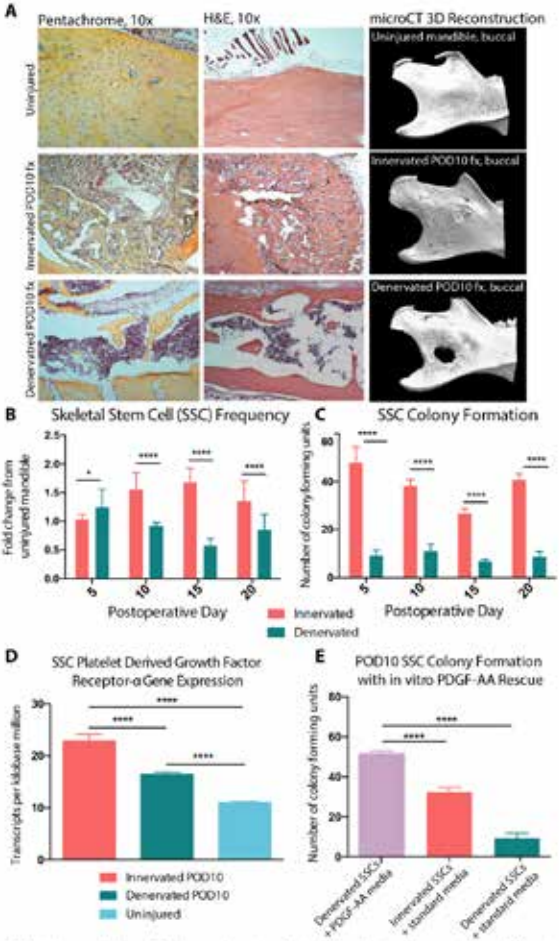
Result

DN mandibles exhibited gross deficiencies in healing (Fig1A). SSC frequency was significantly decreased in DN fractures POD10, 15, and 20 (Fig1B). Concordantly, significantly decreased CFUs reflected poor self-renewal capability of DN-SSCs at all time points (*$p<0.05$ for all comparisons, Fig1C). RNA sequencing revealed upregulation of PDGF receptor-αin DN and especially IN-SSCs when compared to uninjured SSCs (****$p<0.0001$, Fig1D). RT-qPCR confirmed that Schwann cells express PDGF-AA growth factor gene. PDGF-AA media significantly rescued SSC CFU capacity versus untreated controls (****$p<0.0001$, Fig1E).

Conclusions

We show that SSC-enacted mandibular healing is nerve dependent. Paracrine signaling between IAN Schwann cells and SSCs is proposed as the underlying mechanism. In vitro and in vivo testing of additional targets continues in order to strengthen this finding.

Scientific Session 3 (cont.)



A. Histology and micro-CT images showing defective healing in denervated mandibles at POD10. **B.** SSC numbers were significantly depressed for denervated fractures for POD 10, 15, 20. **C.** Colony formation units (CFUs) were also significantly decreased in denervated SSCs at POD 5, 10, 15 and 20. **C.** PDGF receptor-α receptor was significantly upregulated in innervated and denervated SSCs at POD10 after fracture, with a larger effect in innervated SSCs. **D.** CFUs were measured from denervated POD10 SSCs after PDGF-AA was added to standard SSC media. This treatment rescued CFUs in denervated SSCs. (*$p<0.05$, **$p<0.01$, ***$p<0.001$, ****$p<0.0001$).

Scientific Session 3 (cont.)

S23

TRIPTOLIDE INHIBITS DVL2 EXPRESSION AND DOWN-REGULATES ΒCATENIN AND MYC TARGET GENES IN HUMAN NEUROBLASTOMA

Min Huang, MD[1], **Jordan S. Taylor, MD**[2], Jasmine Zeki[2], Nathan Sumarsono[1], Bill Chiu, MD[2]

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Introduction

Triptolide is the active ingredient isolated from a traditional Chinese herb that has widespread antitumor activity in several solid malignancies. Myc and αcatenin pathways are frequently deregulated in MYCN non-amplified high-risk human neuroblastoma (NB) with poor prognosis and resistance to therapy. We hypothesize that triptolide can inhibit neuroblastoma cell growth through downregulation of Myc and αcatenin pathways.

Methods

Human neuroblastoma cell lines (SK-N-AS and CLB-GA) and vincristine (VCR)- or cisplatin-resistant SK-N-AS derived xenograft tumor cells were treated with 0.01-1μM triptolide for 24 or 72 h. Western blot analysis and qPCR were used to determine the effects of triptolide on the protein or mRNA expression, respectively. MTS assays were used to determine cytotoxicity.

Results

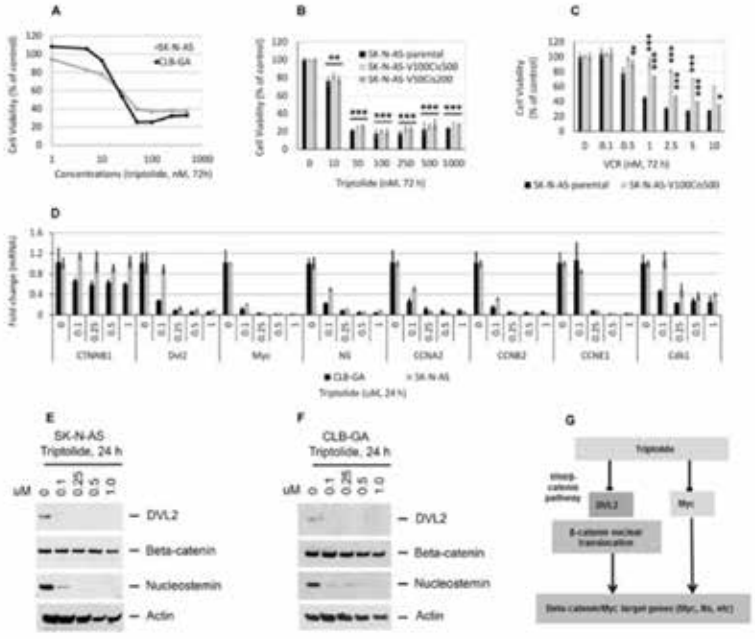
Triptolide induced a dose dependent cytotoxicity for both parental NB cell lines. VCR/cisplatin-resistant SK-N-AS tumor cells also showed similar sensitivity to triptolide in comparison to the parental cells but showed significant resistance to VCR, etoposide, and doxorubicin. Triptolide decreased the mRNA and protein expression of Dishevelled (Dvl2), Myc, αcatenin, as well as Myc/αcatenin regulated genes such as nucleostemin (NS), CCNA2, CCNB2, CCNE1, and Cdk1.

Conclusions

The present study has identified Dvl2, a Wnt signaling component and activator of αcatenin pathway, as a novel drug target of triptolide. Triptolide may mediate cytotoxic effect on parental and chemo-resistant NB cells through transcriptional inhibition of Dvl2 and Myc/αcatenin target genes. This effect may improve treatment outcomes for advanced staged neuroblastoma, though more pre-clinical and clinical testing is needed.

Figure 1. A, B, C): Dose dependent cytotoxicity of triptolide in parental (SK-N-AS, CLB-GA) and VCR/cisplatin resistant (SK-N-AS-V100Cis500, SK-N-AS-V50Cis200) NB cells; D) Effects of triptolide on mRNA expression of Dvl2, and Myc/αcatenin target genes and E, F) Western blot protein expression of Dvl2 and NS; G) Schematic diagram of proposed mechanisms for triptolide anti-NB activity.

Scientific Session 3 (cont.)



Scientific Session 3 (cont.)

S24

PIM KINASES MEDIATE CISPLATIN RESISTANCE IN HEPATOBLASTOMA

Raoud Marayati, MD, Laura L. Stafman, MD, PhD, Adele P. Williams, MD, Jerry E. Stewart, BS, Karina J. Yoon, PhD, Jamie M. Aye, MD, Elizabeth A. Beierle, MD

University of Alabama at Birmingham, Birmingham, AL, USA

Tweet it! @RMarayati presenting her research at #APSA50 on cisplatin resistance in hepatoblastoma and the effect of adding PIM3 inhibition in a xenograft model. @BeierleLab @UABSurgery

Purpose

Chemoresistance remains a significant challenge in the treatment of hepatoblastoma (HB). Proviral Integration site for Moloney murine leukemia (PIM) kinases are overexpressed in HB and function to promote tumorigenesis and maintain a stem cell-like (SCL) phenotype. We found that PIM inhibition in combination with the standard chemotherapeutic cisplatin functioned synergistically to decrease tumor growth, leading us to hypothesize that PIM kinases mediate cisplatin resistance in HB. We sought to evaluate the effects of PIM inhibition on cisplatin-resistant cells.

Methods

Cisplatin-resistant cells were developed through serial passage of the HB patient-derived xenograft, COA67, in athymic nude and treatment with 2 mg/kg intraperitoneal cisplatin twice weekly. Cells from untreated mice were referred to as “naɶve”. PIM inhibition was achieved using the small molecule AZD1208. Proliferation and viability were assessed using CellTiter 96® and alamarBlue® assays. Combination indices (CI) were calculated using the method of Chou and Talalay, with CI<1 indicating synergism. Tumorsphere formation was assessed using extreme limiting dilution analysis.

Results

In the presence of cisplatin, proliferation and viability were significantly decreased in naïve but not in resistant cells. Resistant cells required a higher half maximal inhibitory concentration (IC50) of cisplatin (84 vs 59 μM in naïve cells), confirming the cisplatin resistance model. PIM inhibition with AZD1208 in combination with cisplatin resulted in decreased proliferation and re-sensitized cisplatin-resistant cells to cisplatin (figure 1A). CIs were 0.27 and 0.28, indicating synergy between the two drugs (figure 1B). Similar trends were seen with viability. Finally, resistant cells formed tumorspheres more readily than naïve cells ($p<0.001$), indicating an increase in the SCL phenotype, and PIM inhibition significantly decreased the SCL phenotype (tumorsphere formation) in cisplatin-resistant cells ($p<0.001$).

Conclusion

These findings provide evidence that PIM inhibition re-sensitizes cisplatin-resistant cells to cisplatin which may be promising in the treatment of refractory or relapsed hepatoblastoma.

Scientific Session 3 (cont.)

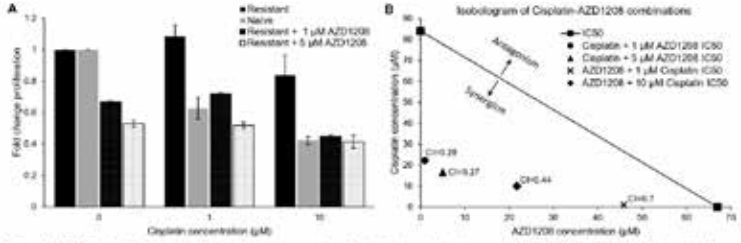


Figure 1. (A) Cell proliferation was greater at the same dose of cisplatin in resistant compared to naïve cells. PIM inhibition with 1 μm and 5 μM of AZD1208 resulted in decreased proliferation and re-sensitized resistant cells to cisplatin. **(B)** COA67 cisplatin-resistant cells were treated with AZD1208 and cisplatin alone or in combination for 72 hours. The half maximal inhibitory concentration (IC_{50}) of each drug and their combinations was determined and an isobologram was constructed. Combination Indices (CIs) were 0.27 and 0.28 with the addition of 1 μm and 5 μM of AZD1208, indicating synergy between the two drugs.

Scientific Session 3 (cont.)

S25

DIFFERENTIAL EXPRESSION OF HUMAN ENDOGENOUS RETROVIRUS- K IN HEPATOBLASTOMA

David F. Grabski, MD[1], Monika Sharma[2], Laurie Gray[2], Sara French[2], David Rekosh[2], Marie-Louise Hammarskjold[2], Sara K. Rasmussen, MD[2]

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Purpose

Hepatoblastoma is the most common liver malignancy in children. Human endogenous retroviruses (HERVs) are genomic elements which resulted from ancient retroviral infection and occupy 8% of the human genome. HERV-K transcription is upregulated in cancers and during embryogenesis. This activity of HERVs during fetal development could impact the development of certain pediatric malignancies or represent a target for immunologic therapy. The purpose of this study is to utilize RNA-Seq data to determine the differential expression of HERV-K in hepatoblastoma.

Methods

We developed a HERV-K genome of 92 previously described proviruses. Utilizing the Bioinformatics platform Geneious, we annotated these 92 proviruses for all protein coding regions. We then evaluated publicly available RNA-seq libraries from 10 hepatoblastoma tumors and 3 normal liver controls (GSE89775). Differential provirus expression between hepatoblastoma and normal liver controls was performed utilizing the HISAT2, Stringtie, Ballgown package.

Results

Absolute read counts that uniquely aligned to the HERV-K genome were 6,128.6 (SD +/- 3,721.5) reads in hepatoblastoma samples and 1,475.0 (SD +/- 383.1) reads in liver controls. Numerous HERV-K loci were transcribed in both conditions. 27.5 (SD 8.7) locations were transcribed in hepatoblastoma while 16.7 (SD 1.5) locations were transcribed in normal liver ($p = 0.009$). The provirus at location 20q11.22 was transcribed in all hepatoblastoma samples and none of the normal liver controls (fold change = 1519.8, q-value = 0.0001). Similarly, the provirus at 3q12.3 appeared to be differentially expressed (fold change = 2.59, q-value 0.56) between conditions.

Conclusions

This data demonstrates that HERV-K is expressed in hepatoblastoma. Additionally, this data confirms that HERV-K is transcribed from multiple locations. One locus, 20q11.22, is solely activated in hepatoblastoma and not normal liver tissue, representing a potential biomarker or immunotherapeutic target. Future studies are needed to determine the biologic significance HERV-K on the basic mechanisms of pathogenesis in hepatoblastoma.

Scientific Session 3 (cont.)

S26

CYTOREDUCTIVE SURGERY (CRS) AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY (HIPEC) IN PEDIATRIC-TYPE MALIGNANCIES: CLINICAL CHARACTERISTICS OF LONG-TERM SURVIVORS

Brian Arrinza Coakley, MD[1], Gideon Sandler, MD[2], Lianchun Xiao[3], Peter Anderson[4], Winston Huh[3], Cynthia Herzog[3], Andrea A. Hayes-Jordan, MD[5]

[1]The Mount Sinai Health System, New York, NY, USA, [2]Westmead Hospital & The Children's Hospital at Westmead, Sydney, Australian Capital Territory, Australia, [3]MD Anderson Cancer Center, Houston, TX, USA, [4]The Cleveland Clinic, Cleveland, OH, USA, [5]The University of North Carolina School of Medicine , Chapel Hill, NC, USA

Background
Cytoreductive Surgery, (CRS) and Hyperthermic Intraperitoneal Chemotherapy, (HIPEC) is a relatively new operative approach for children and adolescents with sarcomatosis or extensive abdominal disease. Patient selection guidelines are lacking. Here we outline the outcomes of 153 CRS and HIPEC operations in pediatric, adolescent and young adults.

Methods
In a retrospective review of a prospectively collected database, 153 of 189 consecutive CRS-HIPEC operations completed at a quaternary referral center had long term follow-up. Median age was 15.3 years. HIPEC chemotherapy varied by histologic diagnosis. Long term survivors greater than 4 years were compared to patients who succumbed to disease before 4 years.

Results
The most common diagnosis was Desmoplastic Small Round Cell Tumor (DSRCT) (n=101), followed by ovarian based disease (n=11), other sarcomas (n=22) and other non-sarcoma histology's (n=19). In the DSRCT patients, metastasis outside of the peritoneum was correlated with worse outcomes. Patients with disease limited to one, or multiple portions of the peritoneum, without liver metastasis, had a similar overall survival compared to those with liver metastasis or disease outside of the abdominal cavity (25.0 months vs. 30.5 months, P = 0.52). Completeness of cytoreduction resulted in improved, but not statistically significant, recurrence-free survival (22.0 months vs. 16.8 months) and overall survival (32.0 months vs. 20.2 months), across histologies (P = 0.30 and P = 0.10, respectively).

Conclusion
In selective pediatric and adolescent patients, with sarcoma histology's, CRS and HIPEC can be effective, particularly if complete (CCR0) cytoreduction can be achieved.

Scientific Session 3 (cont.)

S27

ESSENTIAL SURGERY AND ANESTHESIA PACKAGE FOR CHILDREN AT THE FIRST-LEVEL LEVEL HOSPITAL: GUIDELINES FROM THE GLOBAL INITIATIVE FOR CHILDREN'S SURGERY

David F. Grabski, MD[1], Emmanuel Ameh[2], Doruk E. Ozgediz, MD[3], Stephen W. Bickler, MD[4]

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Purpose

Despite increased focus on surgical disparities in low and middle-income countries (LMICs), children's surgery has been relatively neglected. The World Health Organization (WHO) has identified the first-level hospital as the priority site for improving emergency and essential surgical care in LMICs. The role of first-level hospitals in treating children surgical conditions remains poorly defined.

Methods

Members from the Global Initiative for Children's Surgery (GICS) were asked to make recommendations on the types of childhood surgical procedures that could be done safely at first-level hospital in LMICs. GICS is a consortium of low and high-income country providers representing 12 children's specialties—half of members live and work in LMICs. Recommendations were discussed at three international meetings (2016-2018) and refined though ongoing communication with experts in the field. The process was part of GICS's Optimal Resources for Children's Surgery project.

Results

Surgical care for children at first-level hospitals in LMICs should include (Table 1) pediatric trauma care (e.g., emergency laparotomy, tube thoracostomy, basic fracture and burn management), acute abdominal emergencies, and management of soft tissue infections and osteomyelitis. Stabilization and transfer of newborn emergencies and elective repair of inguinal hernia in children over one year of age is recommended. Children < 1 year old should be transferred to a higher-level hospital due to increased anesthesia risk, if possible. Safe anesthesia and perioperative care, such as vascular access, resuscitation, and monitoring are critical elements at this level of the system.

Conclusions

GICS proposes a basic children's surgical package for first-level hospitals in LMICs. This package includes treatment of injuries, surgical infections, abdominal emergencies, as well as stabilization and referral of newborn and infant emergencies when possible. Safe anesthesia and perioperative care are critical elements of the package. These recommendations may guide the development of a training and implementation programs for first-level hospitals.

Scientific Session 3 (cont.)

S28

COMPARISON OF UGANDAN AND NORTH AMERICAN PEDIATRIC SURGERY FELLOWS' OPERATIVE EXPERIENCE: OPPORTUNITIES FOR GLOBAL TRAINING EXCHANGE

Christopher R. Reed, MD[1], Nasser Kakembo[2], Phyllis Kisa[2], Monica Langer, MD[3], Gustavo Villalona[4], Doruk E. Ozgediz, MD[5], Tamara N. Fitzgerald, MD[6]

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Purpose

North American pediatric surgery training programs vary in exposure to index cases, while controversy exists regarding fellow participation in global surgery rotations. Using case logs, we compared the operative experience of pediatric surgical fellows in Uganda and North America.

Methods

The pediatric surgery training program at Mulago Hospital in Kampala, Uganda hosts a collaboration between Ugandan and North American pediatric surgeons. Fellow case logs from this program, as reported to the accrediting College of Surgeons of East, Central and Southern Africa (COSECSA), were compared to the ACGME Pediatric Surgery Case Log 2016 National Data Report.

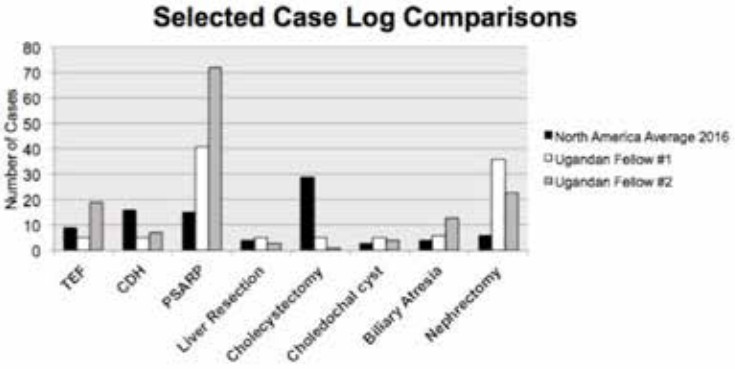
Results

Two Ugandan fellows completed training between 2011-2016 and reported case numbers of 1,124 and 726, compared to an average of 798 cases for North American fellows. The Ugandan fellows performed more procedures than the average North American fellow for biliary atresia (6 and 13 versus 4), Wilm's tumor (36 and 23 versus 6), anorectal malformation (41 and 72 versus 15), and inguinal hernia (247 and 120 versus 88). North American fellows performed more central lines (96 versus 38 and 2), cholecystectomies (29 versus 5 and 1), ECMO cannulations (16 versus 3 and 0), and congenital diaphragmatic hernia repairs (16 versus 5 and 7). All cases in Uganda were performed without laparoscopy. The Ugandan fellows completed pediatric critical care rotations and operative rotations in North America, for training opportunities that do not currently exist in Uganda.

Conclusion

There is limited access to pediatric surgery in sub-Saharan Africa, leading to a backlog of children requiring surgical care. Consequently, Ugandan fellows have access to large numbers of index cases. In contrast, North American trainees have more training in critical care and cases requiring post-operative critical care. Properly orchestrated global exchange rotations may improve education for both Ugandan and North American trainees, and subsequently improve patient care.

Scientific Session 3 (cont.)



Scientific Session 3 (cont.)

S29

RANDOMIZED TRIAL INVESTIGATING THE IMPACT OF DRUG DISPOSAL BAG PROVISION ON THE RATE OF POSTOPERATIVE OPIOID DISPOSAL IN PEDIATRIC SURGICAL PATIENTS

Amy E. Lawrence, MD[1], Alex Carsel[2], Karen Leonhart[2], Calista M. Harbaugh, MD[3], Jennifer F. Waljee, MD, MPH[3], Daryl McLeod, MD, MPH[1], Patrick Walz, MD[1], Peter C. Minneci, MD, MHSc[1], Katherine J. Deans, MD, MHSc[1], **Jennifer N. Cooper, MS, PhD**[2]

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]The Research Institute at Nationwide Children's Hospital, Columbus, OH, USA, [3]University of Michigan, Ann Arbor, MI, USA

Purpose

Postoperative opioids are often prescribed in excess and rarely disposed of appropriately. The lack of prompt opioid disposal after recovery from surgery places children at risk of accidental ingestion of opioids and increases the potential for non-medical diversion. We aimed to assess whether providing an activated charcoal containing drug disposal pouch (Deterra® drug disposal pouch) to the families of children undergoing outpatient surgery increases their rate of postoperative opioid disposal.

Methods

We performed a randomized controlled trial in which parents/guardians given an opioid prescription after their child's outpatient surgery in June-August 2018 received a drug disposal pouch along with standard counseling regarding opioid disposal or standard counseling only. Assessment of opioid use and disposal was accomplished by means of a phone or web-based survey 2-4 weeks after surgery. One hundred and twenty-seven families have been enrolled in the trial, 64 received a disposal pouch and 63 did not.

Results

Of the 127 parents/guardians enrolled, 120 completed follow-up. At follow-up, 101 (84%) reported having leftover opioid medication after resolution of their child's pain. This did not vary by group. Among the 101 parents/guardians, 88% of those randomized to receive a disposal pouch reported disposing of their child's opioids, whereas 67% of parents who did not receive a pouch reported opioid disposal (p=0.01). Among parents reporting disposal, the majority not receiving a pouch disposed of their child's opioids by pouring them in the toilet or sink (60%) whereas the majority of those receiving a pouch used it for opioid disposal (86%).

Conclusion

Providing drug disposal pouches to parents of children receiving postoperative opioids increases the likelihood of opioid disposal. Widespread availability of disposal products, such as these bags, can complement prescribing reduction efforts in the fight to end the opioid epidemic.

Scientific Session 3 (cont.)

S30

FEASIBILITY OF SPINAL ANESTHESIA IN INFANTS UNDERGOING ADVANCED LAPAROSCOPIC AND THORACIC SURGERY

Elizabeth S. Soukup, MD MMSc, Amanda DuBois, Jessica Bland, MD, Charles Eastwood, MD
Elliot Hospital, Manchester, NH, USA

Tweet it! SPINAL ANESTHETIC IS FEASIBLE AND SAFE IN INFANTS UNDERGOING MAJOR SURGERY

Purpose
As awareness grows for neurodevelopmental side effects of general anesthesia, we have expanded our use of spinal anesthesia throughout infancy. We aim to demonstrate the feasibility and safety of using spinal anesthetic for increasingly complex pediatric surgical procedures.

Methods
IRB approval was obtained and we reviewed our most recent pediatric surgical procedures performed under spinal anesthetic between 2016 and 2018.

Results
In a single-surgeon solo pediatric surgical practice, 53 spinal anesthetics were performed by three pediatric anesthesiologists. Mean age was 10.5 weeks (ranging from preterm 31 weeks corrected age to 12 months), and weight ranging from 1.5 to 9 kg. Procedures included laparoscopic pyloromyotomy (12), laparoscopic gastrostomy tube (5), closure of gastroschisis (1), closure of gastrostomy (1), ileostomy closure (1), perianal mass excision (1), perianal abscess/fistulotomy (2), excision of chest wall mass (1), cutdown tunneled central line placement (4), inguinal hernia repair with/without diagnostic laparoscopy (21), orchiopexy (1), and circumcision/revision (8). Mean time for induction of spinal anesthesia was 6 minutes (ranging 4-8 minutes), which included timeout and intravenous line placement. Surgical time ranged from 8 - 113 minutes. Patients exited the operating room 7.7 minutes (+/- 4.2) after the completion of procedure. There were no conversions to general anesthesia in any patient, and a single dose of fentanyl was used in only 2 patients. There were no respiratory or spinal complications in any patient. The success rate of adequate spinal anesthesia was 98.1%.

Conclusions
Spinal anesthesia is a safe and effective method for anesthesia in infants undergoing complex open and laparoscopic procedures of the abdomen, chest wall, perineum and lower extremities. Not only do these infants avoid a general anesthetic for major surgery, but utilization of costly resources is minimized. The use of this technique can be expanded to larger infants undergoing increasingly complex surgical procedures.

Plenary Scientific Session 1
Monday, May 20, 2019

Plenary Scientific Session 1
10:15 a.m. – 11:30 p.m.
Salons A-F

S31
INDIVIDUAL HUMAN MILK OLIGOSACCHARIDES PREVENT EXPERIMENTAL NECROTIZING ENTEROCOLITIS VIA DIVERGENT TRANSCRIPTOMIC RESPONSES

Richard Y. Wu, MD(c), PhD, Bo Li, PhD, Hiromu Miyake, MD, Marissa Cadete, Shaiya Robinson, Kathene C. Johnson-Henry, Abdallah Ahmed, Agostino Pierro, MD, Philip M. Sherman

The Hospital for Sick Children, Toronto, ON, Canada

Background
Breastmilk reduces the risk of necrotizing enterocolitis (NEC) in preterm infants, but the bioactive components mediating this effect are not well-understood. Human milk oligosaccharides (HMOs) reduce NEC injury in humans and in relevant animal models, but it is unclear if there are functional differences between individual oligosaccharides.

Purpose
The objective of this study was to compare intestinal signaling effects of individual HMOs on in vitro and in vivo models of NEC.

Methods
RNA sequencing was performed on Caco-2Bbe1 gut epithelial cells after exposure to commercially-purified 2'-fucosyllactose (2'FL), 3-fucosyllactose, 6'-siallyllactose, lacto-N-tetraose (LNT) or lacto-N-neotetraose for 24hr at 37°C. Signaling pathways were analyzed in murine- and human-derived NEC enteroids by qPCR. In addition, five-day-old mouse pups were orally gavaged formula with or without individual HMOs, followed by NEC induction with hypoxia (5% O2, 95% N2) and lipopolysaccharide (4 mg/kg/day). Coded ileal sections were analyzed for mucosal injury, immunofluorescence, immunohistochemistry, and gene expression.

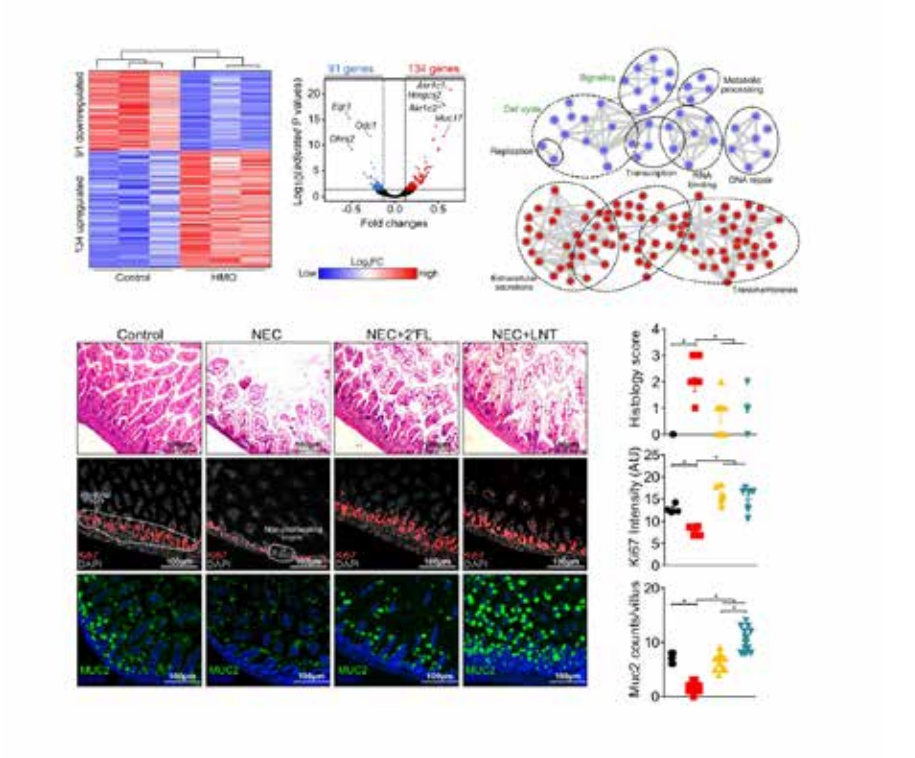
Results
The HMO-transcriptome clustered into multiple functional categories including: cell cycle, proliferation, and glycoproteins. LNT and 2FL induced unique transcriptomes and exhibited varying effects on intestinal immune responses, including: Muc2, Il-8, Il-6, and Il-18. In the murine model of NEC, both LNT and 2FL mitigated NEC injury with comparable recovery in intestinal cell proliferation (Ki67) and stem cell function. However, qPCR and immunofluorescence staining showed significant differences between 2FL- and LNT-fed pups in host inflammatory responses and intestinal cell types.

Plenary Scientific Session 1 (cont.)

Conclusions

Our study demonstrates that while single HMOs can independently rescue experimental NEC, the molecular mechanisms by which individual oligosaccharides act on the intestine are different. This suggests that single HMOs may not recapitulate the benefits of pooled HMOs on the intestine. Future studies will further delineate structure-function relationships of HMOs on the host immune responses.

Acknowledgement: Synthetic HMO's were kindly provided to the investigators by Glycom (Hørsholm, Denmark).



Plenary Scientific Session 1 (cont.)

S32

SUTURELESS VS SUTURED ABDOMINAL WALL CLOSURE FOR GASTROSCHISIS: OPERATIVE CHARACTERISTICS AND EARLY OUTCOMES FROM A MULTI-INSTITUTIONAL CONSORTIUM

Jason D. Fraser, MD[1], Katherine J. Deans, MD, MHSc[2], Mary E. Fallat, MD[3], Michael A. Helmrath, MD[4], Rashmi Kabre[5], Charles M. Leys, MD, MSCI[6], Shawn D. St. Peter[1], on behalf of the Midwest Pediatric Surgery Consortium

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Tweet it! Sutureless vs sutured abdominal wall closure for gastroschisis

Purpose

Sutureless abdominal wall closure for gastroschisis has gained popularity. This study reports outcomes of sutured and sutureless abdominal wall closure for gastroschisis across a large regional cohort.

Methods

An IRB approved, retrospective cohort study of infants with gastroschisis at 11 children's hospitals in the United States over a 3-year period (2013 - 2016) was performed. Outcomes of sutured and sutureless abdominal wall closure were compared overall and in subgroups based on primary vs. delayed closure. Patients who had complex gastroschisis (perforation, ischemia, atresia, or death) were excluded.

Results

Among 315 neonates with uncomplicated gastroschisis, sutured abdominal wall closure was performed in 248 (79%): 212 undergoing sutured closure after silo and 36 undergoing primary sutured closure. Sutureless closure was performed in 67 (21%): 41 undergoing primary sutureless closure and 30 sutureless closure after silo. Four patients failed sutureless closure. There were no significant differences in gestational age, gender, birth weight, time from closure to initial enteral intake or goal feeds, total TPN days, or length of stay. Patients that had sutureless closure had less general anesthetics, ventilator use/time, time from birth to final closure, antibiotic use after closure, and surgical site/deep space infections (Table). Primary sutureless closure had less ventilator use (47% vs. 83%, P=0.001) and median anesthetics (0 vs. 1, p<0.001) than primary sutured closure. Silo then sutureless closure had less ventilator use (50% vs. 77%, P=0.001), median ventilator days (0.5d vs. 4d, P=0.007), median anesthetics (0 vs. 2, P<0.001), and antibiotics after closure (60% vs. 84%, P=0.001) as compared to silo then sutured closure.

Conclusion

Sutureless abdominal wall closure in neonates with gastroschisis resulted in fewer general anesthetics, less antibiotic use, less surgical site/deep space infections, and decreased ventilator time with a similar time to initial feeds, goal feeds, and hospital stay.

Plenary Scientific Session 1 (cont.)

S33

CHANGING THE PARADIGM FOR MANAGEMENT OF PEDIATRIC PRIMARY SPONTANEOUS PNEUMOTHORAX: A SIMPLE ASPIRATION TEST PREDICTS NEED FOR OPERATION

Charles M. Leys, MD, MSCI[1], Ronald B. Hirschl, MD[2], Jonathan Kohler[1], Linda Cherney-Stafford[1], Nicholas Marka[1], Mary E. Fallat, MD[3], Samir K. Gadepalli, MSc, MD, MBA[2], Jason D. Fraser, MD[4], Julia Grabowski, MD[5], Daniel J. Ostlie, MD[6], on behalf of the Midwest Pediatric Surgery Consortium

[1]University of Wisconsin School of Medicine & Public Health, Division of Pediatric Surgery, Madison, WI, USA, [2]University of Michigan, Ann Arbor, MI, USA, [3]Norton Children's Hospital, Louisville, KY, USA, [4]Children's Mercy Kansas City, Kansas City, MO, USA, [5]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, [6]Phoenix Children's Hospital, Phoenix, AZ, USA

Purpose

Chest tube (CT) management for initial pediatric primary spontaneous pneumothorax (PSP) is associated with long hospital stays and high recurrence rates. In an effort to define a streamlined treatment algorithm, we explored whether initial simple aspiration might serve as a test to predict which patients are likely to require surgery.

Methods

Multi-institution, prospective, IRB-approved study of patients with first presentation PSP at 9 children's hospitals from 2016-2018. Simple aspiration was performed with a pigtail catheter, which was then clamped during 6 hours of observation and removed if the pneumothorax sufficiently resolved. If the pneumothorax recurred during observation, the aspiration test was considered to have failed, the catheter maintained, and the patient admitted for further management.

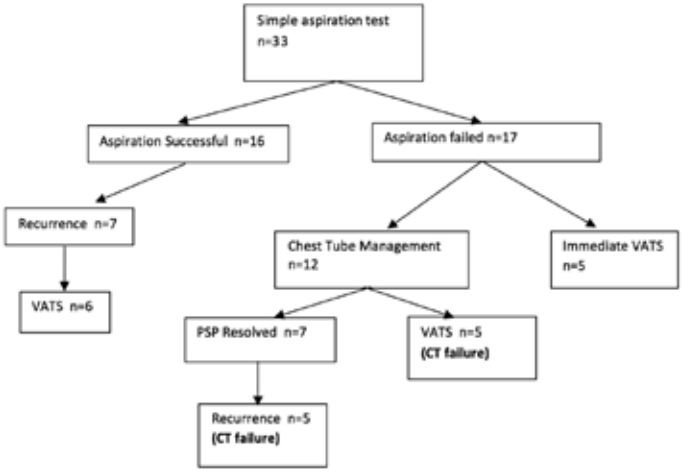
Results

Thirty-three patients were managed with initial simple aspiration, mean age 16 years (range 13-18). The aspiration test was successful in 16 of 33 (48%), while 17 (52%) failed the aspiration test and required hospitalization. Twelve who failed the aspiration test underwent CT management, of which 10 (83%) failed CT management due to either persistent air leak requiring VATS or subsequent PSP recurrence. In contrast, recurrence rate was significantly lower in the group that passed the aspiration test (Passed =7/16 (44%) vs Failed=10/12 (83%), P=0.034). The aspiration test thus had positive predictive value=83% and negative predictive value=56%. A cohort of five patients who failed the aspiration test opted for immediate VATS. While limited by small sample size, this group suggests that immediate VATS after failed aspiration could yield shorter length of stay and fewer CXR tests compared to CT management (Table 1).

Conclusion

A simple aspiration test upon presentation with PSP predicts chest tube failure with 83% positive predictive value. Therefore, we recommend changing the standard algorithm to include an initial simple aspiration test and, if that fails, then proceed directly to VATS.

Plenary Scientific Session 1 (cont.)



Plenary Scientific Session 1 (cont.)

S34

THORACOSCOPY OR THORACOTOMY FOR THE MANAGEMENT OF METASTATIC OSTEOSARCOMA - A PEDIATRIC SURGICAL ONCOLOGY RESEARCH STUDY

John Doski, MD[1], Zishaan Farooqui, MD, PhD[2], Andrew J. Murphy[3], Israel Fernandez-Pineda[3], Andrew M. Davidoff, MD[3], Sanjeev Vasudevan[4], **Todd E. Heaton, MD, MPH**[5], Michael P. LaQuaglia, MD[5], Nelson Piche[6], Jennifer H. Aldrink, MD[7], Marcus Malek, MD[8], Timothy B. Lautz, MD[9], Richard D. Glick, MD[10], Barrie S. Rich, MD[10], Rebecka Meyers, MD[11], Scott S. Short, MD[11], Andreana Bütter, MD[12], Reto Baertschiger, MD[13], Todd M. Jenkins[2], Roshni Dasgupta, MD MPH[2]

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Tweet it! Thoracotomy or Thoracoscopy for pulmonary metastases in osteosarcoma - Which is better?

Purpose

Complete surgical resection of pulmonary metastatic disease in patients with osteosarcoma is known to be crucial to long-term survival. Current recommendation for resection is open thoracotomy to palpate nodules not identified on imaging. The clinical significance of resecting non-imaged nodules is unknown. The primary aim of this study was to compare the overall survival (OS) and disease-free survival (DFS) in children who underwent open versus thoracoscopic surgery for removal of pulmonary metastases.

Methods

A multi-institutional collaborative retrospectively reviewed data on 206 patients with osteosarcoma who underwent pulmonary metastasectomy (n=155) or thoracoscopy (n=52). Kaplan-Meier survival estimates between different surgical approaches using log-rank tests were compared . Multivariate Cox proportional hazard regression models were used to evaluate the association between surgical approach and OS and DFS.

Results

The majority of participants were male and Caucasian. No significant differences were found in demographics or tumor characteristics between patients who underwent thoracotomy or thoracoscopy, Bilateral disease was present on imaging in 17.6% of thoracoscopies, and 43.2% of thoracotomies ($p<0.01$). OS and DFS was 48.3% and 28.8% in the thoracotomy group, and 56.9% and 33.3% in the thoracoscopy group ($p=0.29$, 0.54). Recurrence was seen in 66% of thoracoscopy patients and 75% of thoracotomy

Plenary Scientific Session 1 (cont.)

patients (p=.44). After adjusting for covariates, there was no significant difference between surgical approaches in OS (HR=1.01; 95% CI=0.60,1.72; p=0.96) or DFS (HR=1.01; 95% CI=0.63,1.60; p=0.98).

Conclusion

No difference in survival was identified comparing patients who underwent thoracotomy vs thoracoscopy for the surgical management of pulmonary metastases. This retrospective review supports the need for further prospective evaluation to determine the optimal surgical approach for patients with metastatic osteosarcoma.

Plenary Scientific Session 1 (cont.)

S35

UNDERSTANDING THE VALUE OF TUMOR MARKERS IN PEDIATRIC OVARIAN NEOPLASMS

Amy E. Lawrence, MD[1], Mary E. Fallat, MD[2], Geri Hewitt, MD[3], Paige Hertweck, MD[2], Amanda Onwuka, PhD[1], Peter C. Minneci, MD, MHSc[1], Katherine J. Deans, MD, MHSc[1], Jennifer H. Aldrink, MD[4], Midwest Pediatric Surgery Consortium[1]

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Purpose

Preoperative risk assessment of pediatric ovarian neoplasms as potentially benign or malignant is critical to surgical planning. The goal of this study was to determine the sensitivity and specificity of tumor markers for malignancy in girls with ovarian neoplasms.

Methods

A retrospective review of girls between ages 2-18 who presented for surgical management of an ovarian neoplasm across 10 children's hospitals between 2010-2016 was performed. Patients who had at least one concerning feature on imaging (size > 8 cm, solid components, septations, or extension into surrounding structures) and had tumor marker testing were included in the study. We conducted Chi-square, and sensitivity and specificity testing, to better understand the association between tumor markers and malignant pathologies.

Results

Our cohort included 401 patients of which 22.4% had a malignancy. Testing for tumor markers was inconsistent with the most frequently tested tumor markers being AFP (94%), beta HCG (78%), CA 125 (54%), and LDH (39%); less than 30% of patients underwent CA 19-9, Inhibin A, Inhibin B, and CEA testing. AFP had remarkably high specificity (98%), suggesting that individuals with normal AFP values likely have benign disease. However, AFP also has a low sensitivity (42%) indicating an elevated level is a poor predictor of malignant disease. Reliable conclusions regarding other tumor markers are limited due to variable testing (Table); however, LDH had high sensitivity (95%) and Inhibin A and Inhibin B had high specificity (97% and 92%, respectively).

Conclusions

Tumor marker testing is helpful in preoperative risk stratification of ovarian neoplasms for malignancy. Uncommonly obtained novel markers, such as Inhibin A and B, may be valuable in differentiating benign and malignant neoplasms. Prospective studies that standardize laboratory testing will further elucidate the predictive value of tumor markers in a pediatric ovarian neoplasm population.

Plenary Scientific Session 1 (cont.)

S36

CLINICAL APPROPRIATENESS OF PEDIATRIC BENIGN BREAST DISEASE MANAGEMENT

Maggie L. Westfal, MD, MPH[1], Ya-Ching Hung, MD, MPH[2], David Chang, PhD, MPH, MBA[2], Numa Perez, MD[2], Cassandra M. Kelleher, MD[3]

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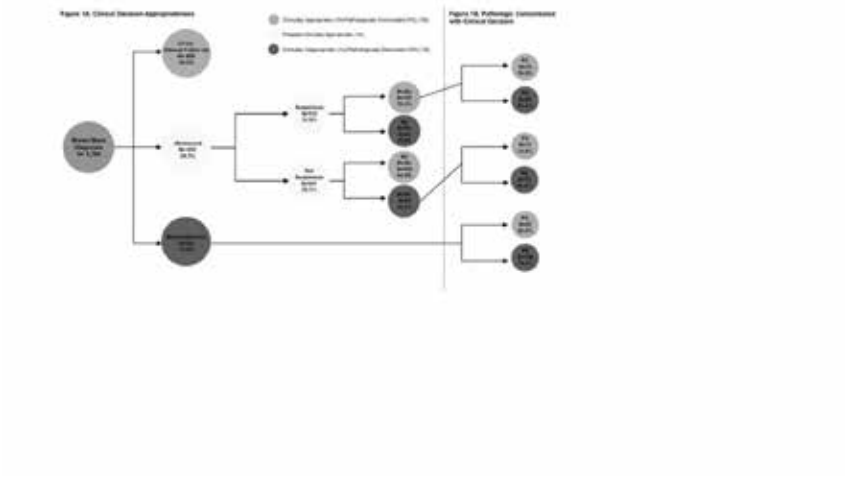
Breast masses affect approximately 3% of pediatric patients and 10-40% of clinically detected masses will resolve completely without intervention. The available literature suggests that a period of observation is safe and minimization of interventions appropriate. Despite this, the management of these lesions varies widely by provide and patients often undergo inappropriate interventions in lieu of observation. This study investigated a large cohort of pediatric patients with benign breast disease to quantify the appropriateness of management.

Pediatric patients were identified from electronic medical records of five large academic hospitals. A timeline of all interventions (ultrasound, biopsy, excision) was generated to quantify the number of patients who were appropriately observed for at least 90 days. To quantify care that was deemed inappropriate, the number of interventions performed within 90 days, and the pathologic concordance to clinical decisions was determined by reviewing the radiology reports of all ultrasounds and pathology reports of all biopsies/ excisions (Figure 1A/1B).

1,764 adolescent females with breast masses were identified. The majority of the masses were fibroadenomas (61.2%), followed by juvenile/cellular fibroadenomas (10.6%), hamartomas (9.9%), and phyllodes (5.4%). Malignant disease was found in 0.28% of patients. Only half (49.2%) of the patients were observed for 90 or more days. Based on the final pathology of biopsied/excised masses, 82.2% of interventions were unnecessary. The positive predictive value of clinical decisions made based on suspicious ultrasound findings was 70.4% compared to a PPV of 20.8% ($p<0.01$) for decisions made on clinical suspicion alone.

Despite literature supporting an observation period for pediatric breast masses, nearly half of patients had an intervention within three months. Additionally, 82% of invasive interventions were unnecessary based on final pathology. Formal consensus guidelines for the management of pediatric benign breast disease, including a standardized clinical observation period, is needed to decrease unnecessary procedures in this population.

Plenary Scientific Session 1 (cont.)



Plenary Scientific Session 1 (cont.)

S37

DEVELOPMENT AND IMPLEMENTATION OF A COMPETENCY-BASED CURRICULUM IN PEDIATRIC SURGERY

Calista M. Harbaugh, MD[1], Meredith Barrett, MD[1], Gurjit Sandhu, MD[1], Christa Grant, MD[2], Jose Diaz-Miron, MD[3], Natasha Corbitt, MD, PhD[3], Peter F. Ehrlich, MD, MSC[1], Ronald B. Hirschl, MD[1]

[1]University of Michigan, Ann Arbor, MI, USA, [2]Penn State Hershey Children's Hospital, Hershey, PA, USA

Purpose

Competency-based training paradigms have potential to ensure preparation of graduating trainees for independent practice. We developed and implemented the first pediatric surgery competency-based curriculum for three common procedures.

Methods

The competency-based curriculum was built on a framework of Entrustable Professional Activities (EPAs), or key tasks that a competent individual can be trusted to perform. Through critical review of the Pediatric Surgery Milestones, Non-Technical Skills for Surgeons, and Operative Performance Rating System (OPRS), we defined EPAs for appendicitis, inguinal hernia, and hypertrophic pyloric stenosis. To assess each EPA, 3 assessments were created: (1) modified OPRS, (2) Communication Assessment Tool, and (3) Oral Exam. The curriculum was implemented through fellow and faculty engagement in 3 phases (Figure). The first phase was fellow-driven: Fellows solicited evaluations and reviewed their own progress through EPAs. The second phase was faculty-driven with iterative progress review by the Clinical Competency Committee (CCC). The third phase was an external faculty review of operative videos to ensure technical competence. When the CCC determined that all EPAs had been met, the fellow was deemed competent for the surgical care of a disease process.

Results

This competency-based curriculum was initiated for the pediatric surgery fellowship at a single academic tertiary children's hospital. During implementation, challenges included faculty buy-in and administrative burden. Faculty buy-in improved as structured progression allowed enhanced identification of skill and knowledge gaps. Administrative burden was addressed through process delineation and organization with an online platform. After achieving competency, the first fellow performed 5 appendectomies, 6 inguinal hernia repairs, and 6 pyloromyotomies with perceived increase in autonomy.

Conclusion

In our experience, competency-based training may allow identification of specific gaps in expertise and a greater sense of trainee autonomy prior to graduation. We are expanding this program to additional institutions and performing a qualitative program evaluation to refine implementation.

Plenary Scientific Session 1 (cont.)

Advocacy

Monday, May 20 | 4:00 p.m. – 4:45 p.m.
Salon G

S38

STOP THE BLEED: TEACHING THE NEXT GENERATION – ONE STUDENT AT A TIME

Adil J. Malek, MD[1], Emily Nes, MD[1], Hayden W. Stagg[2], Kayla R. Cehand[3], Danny Little, MD[2]
[1]Texas A&M - Baylor Scott & White Health, Temple, TX, USA, [2]Texas A&M - McLane Children's Medical Center, Temple, TX, USA, [3]McLane's Children's Hospital - Baylor Scott & White Health, Temple, TX, USA

Purpose
Uncontrolled hemorrhage is the most preventable cause of death following trauma. Following the Sandy Hook tragedy in 2012, Stop the Bleed was developed as a national campaign to educate bystanders to act as immediate responders. Trainees learn appropriate use of tourniquets, wound packing, and direct wound pressure. Prior studies validated that hands-on practice with tourniquets and wound packing are most effective at ensuring both mastery and retention of skill. 7111 individuals in Texas have currently received this training. Our level II pediatric trauma center was the first in Texas to use Stop the Bleed as a platform to train an entire high school faculty and student body.

Methods
Over three months, school and hospital leadership met to establish training dates, discuss public relations concerns, determine appropriate presentation content, anticipate student or parental anxiety, and provide opt-out documentation for students. School faculty were trained two weeks prior to the start of the school year. Forty class officers, athletic training students, and emergency medical technician (EMT) students were subsequently trained and tasked with informing the student body about our presentation. There were twenty-three classrooms staffed with 56 hospital-based volunteers and several trained EMT students.

Results
1909 students and over 300 teachers were successfully trained over two days. One student opted out. Daily faculty debriefing was helpful to anticipate problems and unexpected questions. Feedback was overwhelmingly favorable from teachers, students, volunteers, and parents. Four additional school districts are now requesting similar training.

Conclusions
Stop the Bleed training is feasible on a large scale when hospitals partner with community leaders. We plan to continue annual training efforts for underclassmen while reassessing competence in skill retention. Additional fundraising efforts are ongoing to supply the school with emergency hemorrhage control kits. Further collaboration with Regional Advisory Council may optimize the rollout of this important initiative.

Advocacy (cont.)

S39

A MULTICENTER EVALUATION OF A FIREARM SAFETY INTERVENTION IN THE PEDIATRIC OUTPATIENT SETTING

Brendan T. Campbell, MD, MPH[1,2], Shefali Thaker[2], Mary E. Fallat, MD[3], David S. Foley, MD[3], Elizabeth McClure[4], Joseph V. Sakran, MD[5], Isam W. Nasr, MD[5], Susan Ziegfeld[5], Peter Mackie, MD[6], Marie Snodgrass[6], Marc Levy, MD[7], Bindi J. Naik-Mathuria, MD[8], Annalyn S. Demello[8], Stephanie Jones, MD[9], Jennifer M. Watters, MD[10], Peter Burke, MD[1], Lisa Allee[11], Robert W. Letton, MD[1], Deborah A. Kuhls, MD[1], Eileen M. Bulger, MD[1], Ronald M. Stewart, MD[1]

[1]American College of Surgeons, Committee on Trauma, Chicago, IL, USA, [2]Connecticut Children's Medical Center, Hartford, CT, USA, [3]Norton Children's Hospital, Louisville, KY, USA, [4]University of Louisville, Louisville, KY, USA, [5]Johns Hopkins, Baltimore, MD, USA, [6]C.S. Mott Children's Hospital, Ann Arbor, MI, USA, [7]Arnold Palmer Hospital, Orlando, FL, USA, [8]Texas Children's Hospital, Houston, TX, USA, [9]University of Nevada, Las Vegas, NV, USA, [10]St. Charles Medical Center, Bend, OR, USA, [11]Boston Medical Center, Boston, MA, USA

Tweet it! The majority of parents of pediatric surgical patients are open to using a tablet based firearm safety module in the outpatient surgical setting, and believe it is appropriate for physicians to be providing them with information on firearm safety. @4BCampbell

Purpose

Firearm injuries continue to be a common cause of morbidity and mortality for American children. Implementation of a public health approach through primary prevention methods have yet to be developed. This pilot study was developed by the American College of Surgeons Committee on Trauma to evaluate the feasibility of providing guidance about firearm safety to the parents of pediatric patients using a tablet based module in the outpatient surgery setting.

Methods

A tablet-based questionnaire that included a firearm safety message based on current best practice was administered to parents of pediatric patients at nine outpatient surgery centers from July to September 2018. Parents were shown a three minute firearm safety video, and then asked a series of questions related to pediatric firearm safety. Data was collected using Qualtrics Survey Software.

Results

The tablet based firearm safety module was completed by 542 parents from 15 states. Families were Caucasian (65%), black (16%), Hispanic (10%), Asian (2%), and other (7%). More than one-third (37%) of families kept guns in their home. The majority of parents (81%, n=438) thought it was appropriate for physicians to provide anticipatory guidance on firearm safety. Two-thirds (67%) of gun owning parents who do not keep their guns locked said that the information provided in the module would change the way they stored firearms in their home. Parents held widely varying views on what age children could distinguish between a real and a fake gun, and at what age a child could distinguish between a loaded and an unloaded firearm.

Advocacy (cont.)

Conclusion

Use of a tablet based firearm safety module in the outpatient surgery setting is feasible, and the majority of parents are receptive to receiving anticipatory guidance on firearm safety. Further data is needed to evaluate whether the intervention will improve firearm safety practices in the home.

Quality: What's in Your Quality and Safety Toolkit? APSA Gives You the Tools!

Monday, May 20 | 4:00 p.m. – 5:30 p.m.
Salons A-F

S40

DECREASING SURGICAL SITE INFECTIONS IN PEDIATRIC STOMA CLOSURES

Hira Ahmad, MD[1], Devin R. Halleran, MD[1], Andrew B. Nordin, MD[2], Preeti Jaggi, MD[3], Brian D. Kenney, MD[4], Laura Weaver[1], Julie Zipfel[1], Richard J. Wood, MD[1], Marc A. Levitt, MD[1]

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Introduction
Gastrointestinal (GI) surgeries represent a significant proportion of the surgical site infection (SSI) burden in pediatric patients, resulting in significant morbidity. We have previously demonstrated that a GI bundle (including bowel prep, preoperative warming, preoperative cleansing, skin prep, and a closing protocol) decreases SSI rates, length of stay (LOS), and hospital charges. Following this success, we hypothesized that by targeting the preoperative antibiotics for stoma closures based on organisms found in infected wounds we could further decrease surgical site infection rates.

Methods
As part of a broad quality improvement effort to reduce SSI rates for GI surgery we noted high infection rates for stoma closure patients. We reviewed the responsible pathogens and their sensitivities as well as the preoperative antibiotic used. 29% of wound infections were caused by enterococcus which is not covered by cefoxitin. Based on this information, starting in May 2017, we changed the preoperative antibiotic from cefoxitin to ampicillin-sulbactam which more accurately targeted the prevalent pathogens, thus augmenting the bundle by only one variable, and reanalyzed our SSI rates.

Results
The baseline SSI for all stoma takedown patients was 21.4% (n=119) and, after bundle implementation, decreased to 7.9% (n=221; p=0.03). After changing the preoperative antibiotics in May 2017 in the same patient group, our rate of SSI decreased further to 2.2% (n=44; p=0.039).

Conclusion
Reduction of SSI in GI surgery is best accomplished with a bundle of prevention strategies. After establishment of good compliance with a GI bundle, our preoperative antibiotic change decreased SSI rates among stoma closure patients. We recommend an institution specific analysis of wound infections, and modification of preoperative antibiotics if the responsible organisms are resistant to the original antibiotic choice.

Quality: What's in Your Quality and Safety Toolkit? APSA Gives You the Tools! (cont.)

S41

ENHANCED RECOVERY AFTER SURGERY PROTOCOL FOR PEDIATRIC LAPAROSCOPIC CHOLECYSTECTOMY PROMOTES SAFE AND EARLY DISCHARGE

Andrew Yeh, MD[1], Gabriella Butler[2], Kelly Austin, MD[2], Mihaela Visoiu[2], Marcus Malek, MD[2]

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Introduction

Pediatric laparoscopic cholecystectomy (LC) has historically involved an overnight hospital stay (ON), despite evidence supporting same-day discharge (SDD) in adults. Furthermore, Enhanced Recovery After Surgery (ERAS) protocols are effective in adults but have not been extensively used in pediatric surgery. Our institution implemented an ERAS protocol for pediatric LC aiming to promote SDD while identifying patients that may benefit from ON. We hypothesize that the ERAS protocol will increase SDD without increased complications.

Methods

A retrospective study of prospectively collected data of patients after elective LC was conducted between 2014 and 2018 including patients before (BI) and after (AI) implementation of the ERAS protocol. The protocol was collaboratively developed by surgeons, anesthesiologists, and nursing staff. The protocol included pre-operative education, electronic medical record (EMR) integration, standardized anesthesia management, and early mobilization and diet advancement (Figure). Endpoints were length of stay (LOS), SDD versus ON, 30-day re-admissions, emergency department (ED) visits, and complications. Wilcoxon's rank sum, Chi-square test, and multivariate logistic regression were used.

Results

A total of 250 patients (105 BI, 145 AI) were included. Demographics, indications, and ASA were similar across groups. Mean LOS (hours) decreased from BI (27.5) to AI (13.6; $p<0.01$). SDD rate increased from 1.9% (BI) to 77.2% (AI; $p<<0.01$; Table). There were no differences in the rate of ED visits, re-admissions, or complications. Multivariate logistic regression of SDD versus ON in the AI group found that higher ASAs, later surgery start times, and longer operative times predicted ON ($p<0.05$).

Conclusion

This ERAS protocol increased the rate of SDD after LC without increased complications. Multi-disciplinary participation, patient education, and EMR integration were keys to its success. Factors associated with ON will allow for early identification of patients needing ON. The success of this protocol underscores the potential for further ERAS protocols in pediatric surgery.

Quality: What's in Your Quality and Safety Toolkit? APSA Gives You the Tools! (cont.)

Quality: What's in Your Quality and Safety Toolkit? APSA Gives You the Tools! (cont.)

S42

AN EVIDENCE-BASED GUIDELINE FOR POST-APPENDECTOMY ANALGESIA: OPIOID-FREE FOR MOST

Mollie R. Freedman-Weiss, MD[1], Alexander S. Chiu[1], David J. Worhunsky, MD[1], Alefteria Manchisi[2], M. Isabel T. Maldonado[2], Lisa M. Sagnella[2], Michael G. Caty, MD[1], Robert A. Cowles, MD[3], Doruk E. Ozgediz, MD[1], Emily R. Christison-Lagay, MD[1], Daniel G. Solomon, MD[4], David H. Stitelman, MD[5]

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Purpose

Surgeon over-prescription of opioids is an important and modifiable contributor to the opioid epidemic. To mitigate this, studies have assessed postoperative opioid use in adults after common operations to inform evidence-based prescribing guidelines. However, no clear guidelines exist for prescribing opioids to younger patients after surgery, despite this population's high-risk for addiction. We sought to determine postoperative opioid need in pediatric/young adult patients after laparoscopic appendectomy—a common pediatric operation.

Methods

This is a single-institution prospective cohort study. Patients 5-20 years old who underwent laparoscopic appendectomy were recruited. Telephone interviews were attempted between postoperative days 6-21 and caregivers were queried on analgesic use (opioid and non-opioid) and adequacy of pain relief based on the Michigan Pain Measurement Scale. The main outcome measures were: quantity of opioid used, presence of pain >4/10, and need for follow-up/call due to pain. All opioids were converted into morphine milligram equivalents (MME).

Results

Fifty-five patients qualified for the study and 41 (75%) caregivers completed a postoperative interview. Study participants had a mean age of 11.2 years and postoperative stay of 0.8 days. After hospital discharge, 90% (37/41) used acetaminophen and/or ibuprofen. Twelve percent (5/41) received a prescription for an opioid—though only two of these were filled. Opioid use ranged from 7.5-25 MME/patient. Eight experienced pain >4/10 after hospital discharge—6 of these (62.5%) required a postoperative opioid while inpatient. Only 2 patients not prescribed an opioid (5.7%) would have preferred one for improved analgesia. No patients had unanticipated follow-up for pain concerns.

Conclusion

After hospital discharge following laparoscopic appendectomy the majority of patients have adequate analgesia without opioids. Opioid prescriptions should only be discussed when discharging patients within 24 hours of surgery or when an opioid is used preceding discharge; when offered, no more than 25 MME of opioid (three 5mg oxycodone) should be prescribed.

Quality: What's in Your Quality and Safety Toolkit? APSA Gives You the Tools! (cont.)

S43

IMPLEMENTATION OF A PLAN-DO-STUDY-ACT FRAMEWORK TO REDUCE UNINDICATED SURGICAL ANTIBIOTIC PROPHYLAXIS

Mark Kashtan, MD, MPH, Michele Dawson, MPH, CPHQ, Seema Anandalwar, MD, MPH, Jonathan L. Hills-Dunlap, MD, MPH, Shawn J. Rangel, MD, MSCE

Boston Children's Hospital, Boston, MA, USA

Tweet it! A simple intervention to improve antibiotic stewardship for clean cases at your institution @MarkKashtanMD

Purpose

Recently published data has shown that nearly 50% of children receive unindicated antibiotic prophylaxis for clean surgical cases without foreign body implantation. The goal of this project was to use a Plan-Do-Study-Act (PDSA) framework to improve antibiotic stewardship by reducing utilization of unindicated antibiotic prophylaxis. Here we report details of the intervention and lessons learned that might be leveraged to support similar efforts elsewhere.

Methods

We conducted a process improvement project designed to reduce unindicated antibiotic prophylaxis at a single children's hospital from 11/2017-9/2018. Initial interventions included dedicated faculty meetings to educate staff on current published guidelines, establishing departmental consensus around guideline adoption and exclusion criteria, and regular compliance audits. Standardized email templates were used for guideline reminders and facilitating root-cause analysis of non-compliant cases. A second PDSA cycle was initiated to address compliance failures identified during the first; primarily trainees ordering antibiotics for all cases without attending knowledge. Additional interventions included targeted education of antibiotic prophylaxis guidelines via standardized email templates with closed-loop communication at the beginning of trainee rotations. Pre-intervention rates of unindicated antibiotic prophylaxis were established through retrospective chart review and post-intervention rates by prospective audit.

Results

In the 6 months pre-intervention, 42% (114/273) of patients undergoing clean cases without foreign body implantation received unindicated antibiotic prophylaxis. Following implementation of the first PDSA cycle, rates of unindicated antibiotic prophylaxis decreased to 18% (6/34). Following the second PDSA cycle, unindicated antibiotic prophylaxis decreased further to 7% (12/165), which was sustained after an additional 5-month post-intervention audit period.

Conclusion

Unindicated antibiotic prophylaxis was significantly reduced by implementing a Plan-Do-Study-Act-based project targeting both faculty and trainees. Resources to carry out the project at other hospitals (relevant literature, Powerpoint presentations, email templates, and a "how to roll-out" guide) are available from the APSA Quality and Safety Toolkit Website (https://sites.google.com/view/apsaqsc/home/antibiotic-stewardship).

Quality: What's in Your Quality and Safety Toolkit? APSA Gives You the Tools! (cont.)

S44

REDUCTION OF OPIATE USE IN INFANTS UNDERGOING GASTROINTESTINAL SURGERY

David F. Grabski, MD[1], Rick Vavolizza[2], Daniel Levin[2], Sara K. Rasmussen, MD[2], Jonathan Swanson[2], Eugene D. McGahren[2], Jeffrey W. Gander, MD[2]

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Purpose

Addiction to opiates is a public health emergency that affects children. There is growing evidence that heavy opioid use during the neonatal period may have neurodevelopmental sequela in childhood. We implemented an opioid reduction strategy in our neonatal intensive care unit (NICU) and surgical ward for infants undergoing gastrointestinal surgery.

Methods

Infants were given standing intravenous acetaminophen post-operatively. Opioid reduction education seminars were given to NICU practitioners and nursing staff. Additionally, pain-control was directly addressed at post-surgical sign-out.

We conducted a before and after retrospective investigation of all infants < 5.5 kilograms who underwent non-emergent gastrointestinal surgery at our institution from July 2014-July 2018. The opioid reduction strategy was implemented in May 2016. Patient factors, pre- and post-operative clinical parameters, morphine equivalents/kilogram and clinical pain scores were collected. Student t-test, Chi-Squared or Wilcoxon Rank Sum Test was used as appropriate. A p-value of 0.05 was considered significant.

Results

A total of 69 infants were included in the study (30 in opioid reduction group (OR) and 39 in historic control). Patient characteristics were equivalent. The intervention significantly reduced post-operative opioid use: OR 0.09 morphine equivalents/kilogram (IQR 0, 0.22) vs. control 6.57 morphine equivalents/kilogram (IQR 2.56, 15.67), $p < 0.0001$ (Table 1). Post-operative acetaminophen was increased in the OR group compared to control (193.1 mg/kg vs. 74.1 mg/kg, $p = 0.0002$). NPASS and FLACC pain scores were equivalent. Post-operative intubation was reduced in the OR group: 1.5 hours (0, 14) vs. 22 hours (5, 21) in control, $p = 0.016$.

Conclusions

Intravenous acetaminophen coupled with provider education can successfully reduce opioid use in post-surgical infants, including those in the NICU. Given the concern for opioid exposure in neonatal neurodevelopment as well as clinical benefits, similar strategies for opioid reduction may prove useful at other institutions

Critical Care

Tuesday, May 21 | 10:15 a.m. – 11:15 a.m.
Salon G

S45

THE USE OF THROMBOELASTOGRAMS IN CONGENITAL DIAPHRAGMATIC HERNIA NEONATES ON EXTRACORPOREAL MEMBRANE OXYGENATION

Ryan C. Phillips, MD[1], Niti Shahi, MD[2], Sarah A. Hilton, MD, MSHS[3], David Leopold[1], Claire Levek[1], Jason Gien, MD[1], John P. Kinsella, MD[1], Steven L. Moulton, MD[1], Kenneth W. Liechty, MD[4], Ahmed I. Marwan, MD[4]

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Tweet it! The Use of Thromboelastograms in Congenital Diaphragmatic Hernia Neonates on Extracorporel Membrane Oxygenation @RyanPhillipsMD

Purpose
Congenital diaphragmatic hernia (CDH) can be associated with severe hemodynamic deterioration in newborns leading to the emergent need for extracorporeal membrane oxygenation (ECMO). ECMO is associated with thromboembolic and hemorrhagic complications that are the most common sources of morbidity in these patients. In 2015 our multidisciplinary CDH team implemented a standardized protocol to optimize utilization of thromboelastograms (TEG) to manage coagulation status of CDH patients requiring ECMO. The purpose of this study is to perform an initial evaluation whether our blood product usage changed in normal versus abnormal TEGs.

Methods
A retrospective review of neonates with CDH on ECMO at Children's Hospital Colorado was conducted from 2010 to 2018. TEG values and appropriate blood product choices were examined in normal versus abnormal TEGs using a Wilcoxon rank-sum test for significance.

Results
Thirty-eight neonates required ECMO of which 35 had 655 time points considered. R was measured 365 times while alpha angle and max amplitude (MA) 371 times. Regarding R-time, 254 had normal versus 111 abnormal values with no significant difference in FFP transfusion between the 2 groups. For alpha-angle, 137 had normal and 234 abnormal values with a significant increase in cryoprecipitate appropriately given with abnormal alpha-angles ($p=0.0351$). For MA, 154 had normal and 217 abnormal values with a significant increase in appropriate platelet transfusion for abnormal MA values ($p=<0.001$) (Table 1).

Conclusion
To our knowledge this is the first study of CDH patients on ECMO with the utilization of TEG to examine choice of blood product transfusion. Abnormal alpha angle and MA values were associated with more appropriate blood product utilization. We also identified an area for quality improvement due to under utilization of R-time to guide FFP transfusion. Goal directed TEG protocols may lead to better resource utilization in neonates on ECMO.

Critical Care (cont.)

S46

OPERATIVE TIMING IN CONGENITAL DIAPHRAGMATIC HERNIA PATIENTS RECEIVING ECMO, PART I: REPAIR ON ECMO IMPROVES SURVIVAL

Duy T. Dao, MD[1,2], Carmen M. Burgos, MD, PhD[3], Matthew T. Harting, MD, MS[4], Kevin P. Lally, MD, MS[4], Pamela A. Lally, MD[4], Hong-An T. Nguyen, MD[5], Jay M. Wilson[4], Terry L. Buchmiller, MD[1]

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Purpose

For infants with congenital diaphragmatic hernia (CDH) who receive extracorporeal membrane oxygenation (ECMO), optimal timing of surgical repair remains uncertain. We compared the outcome of surgical repair on versus after ECMO using the CDH Study Group Registry.

Methods

All patients cannulated to ECMO from 2007-2017 were included. Patients undergoing repair before or during a second run of ECMO were excluded. Subjects were stratified based on their center's proportion of on-ECMO repair over the study period, a reflection of the center's policy with respect to on-ECMO repair. Patients in the bottom quartile were classified into the "Low" group, middle two quartiles "Medium," and top quartile "High." Multivariable logistic and linear regression models were fit to determine associations between center's frequency of on-ECMO repair with rate of non-repair and ECMO duration, respectively. Survival analysis was performed with Kaplan-Meier curves and multivariable Cox regression. Propensity score (PS) matching was performed between the Low and High groups and survival analysis was repeated on the matched cohort.

Results

The study sample consisted of 1423 patients. Compared to those treated at centers with Low on-ECMO repair (n=342), patients in the High group (n=347) were on ECMO 2.5 (1.2-3.8) days longer (P=0.0001), had a lower rate of non-repair, odds ratio 0.16 (0.09-0.27) (P<0.0001), and a better survival rate, hazard ratio (HR) 0.65 (0.50-0.84) (P=0.0016). After PS matching (n=121 in each group), patients treated at centers with High on-ECMO repair still had better survival, HR 0.46 (0.31-0.68) (P<0.0001). The median survival time for the High and Low group was 192 (146-238) and 47 (26-109) days (P<0.0001), respectively (Figure 1).

Conclusion

A strategy of CDH repair on ECMO is associated with improved survival. Previously reported survival advantage of off-ECMO repair likely reflects a strong selection bias. These data support an aggressive approach of on-ECMO repair of CDH patients.

Critical Care (cont.)

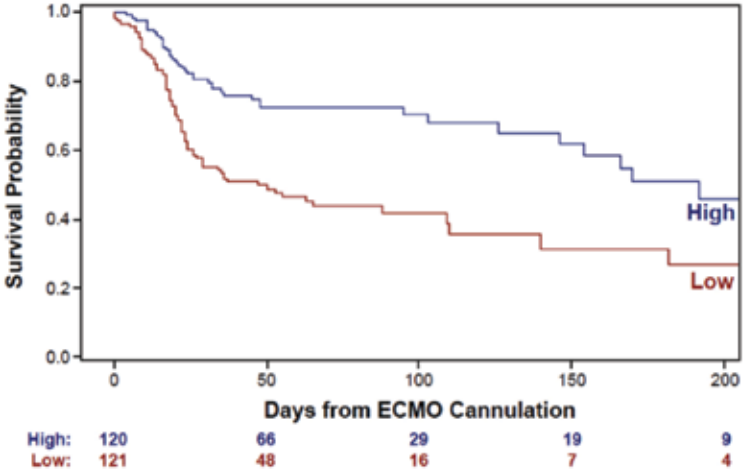

Figure 1: Kaplan-Meier analysis comparing patients treated at centers with High on-ECMO repair vs centers with Low on-ECMO repair after propensity score matching

Critical Care (cont.)

S47

OPERATIVE TIMING IN CONGENITAL DIAPHRAGMATIC HERNIA PATIENTS RECEIVING ECMO, PART II: REPAIR EARLY ON ECMO IMPROVES SURVIVAL

Duy T. Dao, MD[1,2], Carmen M. Burgos, MD, PhD[3], Matthew T. Harting, MD, MS[4], Kevin P. Lally, MD, MS[4], Pamela A. Lally, MD[4], Hong-An T. Nguyen, MD[5], Jay M. Wilson[4], Terry L. Buchmiller, MD[1]

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Purpose

For children with congenital diaphragmatic hernia (CDH) who receive extracorporeal membrane oxygenation (ECMO), the timing of surgical repair on ECMO remains controversial. We compared the outcome of early versus late surgical repair on ECMO using the CDH Study Group Registry.

Methods

The primary analysis included patients undergoing CDH repair during a first run of ECMO and those cannulated to ECMO without undergoing repair between 2007-2017. Subjects were stratified into two quantiles based on their center's average duration to repair, in order to reflect each center's general approach to CDH repair timing. Subjects in the bottom quantile belonged to the "Early" group, and the remaining in the "Late" group. ECMO duration, rate of non-repair, and survival were compared between the two groups using multivariable linear, logistic, and Cox regressions, respectively. In the secondary analysis, only patients undergoing CDH repair during a first run of ECMO were assessed. Patients repaired within the first three days after ECMO cannulation were categorized into the "Early" group, and the remaining in the "Late" group. The two groups were matched on propensity score (PS), and survival was compared between the two matched cohorts with Cox regression.

Results

There were 912 subjects in the primary analysis. Compared to those in the Early group (n=402), patients in the Late group (n=510) had a longer ECMO duration, 1.39 (0.18-2.60) days (P=0.02), a higher rate of non-repair, odds ratio 2.80 (1.87-4.21) (P<0.0001), and a higher mortality rate, hazard ratio (HR) 1.26 (1.04-1.53) (P=0.02).

In the secondary analysis, 209 patients remained in each group after PS matching. Patients in the Late group had a higher mortality rate, HR 1.47 (1.11-1.94) (P=0.008), compared to those in the Early group.

Conclusion

The approach of early repair on ECMO is associated with improved survival. These results support early repair of CDH on ECMO.

Oncology

Tuesday, May 21 | 8:45 a.m. – 9:45 a.m.
Salons A-F

S48

OPTIMIZATION OF IMAGE-GUIDED PERCUTANEOUS CORE NEEDLE BIOPSY FOR INITIAL DIAGNOSTIC MANAGEMENT OF NEUROBLASTOMA: A PEDIATRIC SURGICAL ONCOLOGY RESEARCH COLLABORATIVE STUDY

Richard E. Overman, MD[1], Tanvi Kartal[1], Benjamin T. Many, MD[2], Rachel Jones[2], Timothy B. Lautz, MD[2], Jerry Xiao, BA[3], Dave R. Lal, MD, MPH[3], Roshni Dasgupta, MD MPH[4], Misty Trout[4], Jana Lewis[4], Jennifer H. Aldrink, MD[5], Sara Mansfield, MD[5], Scott S. Short, MD[6], Rebecka Meyers, MD[6], Bindi J. Naik-Mathuria, MD[7] Sanjeev Vasudevan[7], Jacob Davidson[10], Andrew Williams[10], Andreana Bütter, MD[8], Erika A. Newman, MD[1]

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Purpose
Image-guided percutaneous core needle biopsy (PCNB) is increasingly utilized to diagnose neuroblastoma. Our objective is to determine whether PCNB is adequate for modern biologic characterization of neuroblastoma.

Methods
A multi-institutional, IRB approved, retrospective study was performed on pediatric patients aged 0-18 years with neuroblastoma at 8 children's hospitals over a 3-year period (2014-2017). Data collected included demographics, clinical details, biopsy technique, complications, and adequacy of biopsies for cytogenetic markers utilized by the Children's Oncology Group for pretreatment risk stratification. The results were de-identified and underwent analysis using STATA v15.1 (p-value less than 0.05 considered significant).

Results
We reviewed 172 patients diagnosed with neuroblastoma at participating institutions meeting inclusion criteria. Biopsy type was as follows: 52 (30.4%) PCNB, 56 (32.8%) excisional biopsy, and 63 (36.8%) incisional biopsy. Compared to incisional biopsy, there was no significant difference in ability to accurately obtain a primary diagnosis by PCNB (96.2% vs 98.4%, p = 0.589) or determine MYCN copy number (93.9% vs 96.7%, p=0.489). The yield for cytogenetic studies was lower with PCNB versus incisional biopsy (56.1% vs 90.9%, p<0.05), but significantly improved when a higher number of cores was obtained (p = 0.0198) and when a larger gauge needle was utilized (p= 0.0071)(Table 1). Procedural complications did not differ between groups (1.9 % vs 4.8%, p = 0.625). There was no difference in the need for repeat biopsy at a later date (5.8% vs 1.6%, p=0.327).

Conclusions

Oncology (cont.)

Percutaneous core needle biopsy is a potential method for diagnosing and determining MYCN status in pediatric patients with neuroblastoma. While incisional biopsy demonstrated superior results for genetic characterization, success of PCNB was significantly increased with large gauge needles and multiple cores. A prospective study to standardize best practices and determine optimal needle size and number of cores that allow for complete cytogenetic characterization is warranted.

	Incisional Biopsy n = 59	Core Needle Biopsy n = 47	p values
Average Age (years)	2.42	2.65	0.652
Gender (M/F)	35/24	23/24	0.145
Race — *Caucasian*	72.9 %	70.2 %	0.581
Race — *African American*	8.5%	6.4%	
Race — *Hispanic*	15.3%	12.8%	
Race — *Other*	3.4 %	10.6%	
Adequate for primary Diagnosis	98.3%	95.7%	0.583
Adequate for DNA analysis/Ploidy	89.5%	57.8%	< 0.05
Adequate for MYCN	96.4%	93.2%	0.460
Adequate for cytogenetics/LOH	92.5%	59.0%	< 0.05
		**Logistic regression: Increasing number of cores	p=0.0198
		Larger Needle size	p=0.0071
Need for re-biopsy	1.7%	6.4%	0.320
Procedural complications	5.1%	2.1%	0.628

Oncology (cont.)

S49

IMAGING APPEARANCE OF NONGERMINOMA PEDIATRIC OVARIAN GERM CELL TUMORS DOES NOT DISCRIMINATE BENIGN FROM MALIGNANT HISTOLOGY

Deborah Billmire, MD[1], Bryan Dicken, MD[2], Frederick Rescorla, MD[1], Jonathan Ross[3], Jin Piao, MD[4], Li Huang[4], Mark Krailo[4], Furqan Shaikh[5], Farzana Pashankar, MD[6], Lindsay Frazier, MD[7]

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Purpose

Pediatric ovarian neoplasms with mixed cystic and solid components are often presumed to have low risk of malignancy. In this study we assessed the pre-operative imaging appearance in pediatric malignant ovarian germ cell tumors.

Methods

The Children's Oncology Group (COG) study AGCT0132 was undertaken for treatment of extra-cranial malignant germ cell tumors in children with gonadal and extra-gonadal anatomic primary sites. Included malignant histologies were yolk sac tumor, embryonal carcinoma and choriocarcinoma. A surgical checklist was required at enrollment for all patients that included a request for imaging description of the tumor with documentation of solid, cystic and calcified areas. For this review, the surgical checklists and pathology reports of girls with ovarian primary tumor were analyzed.

Results

138 girls (11 months to 20 years at enrollment) had primary ovarian tumors COG stage I-III. Imaging appearance and pathology information were available for 133 patients. Among the 133 patients, tumor appearance was solid (10.5%), solid with calcification (3.0%), mixed cystic and solid (58.7%), mixed cystic and solid with calcification (24.8%) and unknown (3.0%). Fifty four per cent had elements of teratoma in addition to malignant histology.

Conclusions

Less than 15% of nongerminoma pediatric ovarian malignant ovarian germ cell tumors were entirely solid in appearance. A mixed cystic and solid appearance was seen in 83.4%. Histologic elements of associated benign teratoma were common. The presence of a mixed cystic and solid appearance on pre-operative imaging of ovarian neoplasms should not dissuade the surgeon from obtaining preoperative serum markers and undertaking complete surgical staging with care to avoid disruption of the tumor capsule in situ.

Oncology (cont.)

S50

USE OF INDOCYANINE GREEN AS A DIAGNOSTIC ADJUNCT AT TIME OF PULMONARY METASTASECTOMY FOR HEPATOBLASTOMA

Alexander Bondoc, MD[1], Meera Kotagal[1], Roshni Dasgupta, MD, MPH[1], Maria Alonso[2], James Geller[1], Gregory Tiao, MD[1]

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]Cincinnati Children's Hospital Medical Center, Boston, OH, USA

Purpose

Hepatoblastoma (HB) is most common primary malignancy of childhood, and approximately 20% of patients present with pulmonary metastases. Localization and extirpation of metastatic lung disease unresponsive to neoadjuvant chemotherapy are requisite prior to liver transplantation. Metastasectomy is also utilized in patients with recurrent disease with long term benefit in some patients. Indocyanine green (ICG) is fluorescent dye retained by liver tumors due to abnormal biliary excretion. We reviewed our institution's recent experience using ICG in pulmonary metastasectomy for HB.

Methods

From June 2017 to August 2018, 8 patients underwent 9 chest explorations (8 thoracotomies, 1 thoracoscopic) by the same surgeon to resect lesions identified on computed tomography (CT) as suspicious for pulmonary HB. Six patients were explored because of suspicion of relapse. Twenty-four hours prior to chest exploration, patients received a one-time dose of intravenous ICG (0.5 mg/kg). At the time of surgery, all fluorescence-positive and palpable lesions were resected.

Results

Average age at surgery was 5.16 years. Sixteen lesions were identified by pre-operative CT. A total of 31 lesions were resected. 29% of lesions resected were identified by ICG and not by CT. The overall sensitivity and specificity of ICG in this series was 87% [95% CI, 60-98%] and 75% [95% CI 48-93%], respectively (p=0.001). The positive predictive value of ICG was 76% [95% CI 58-89%] while negative predictive value was 86% [95% CI, 62-96%], respectively (p=0.001). Average duration of post-operative chest tube was 1.75 days. There were no surgical site infections or episodes of post-operative pneumonia.

Conclusions

ICG is a useful adjunct to diagnostic imaging in the setting of pulmonary HB disease. Further study is required to understand how it can be optimally utilized in these patients.

Trauma

Tuesday, May 21 | 8:45 a.m. – 9:45 a.m.
Salon G

S51

UNINTENTIONAL PEDIATRIC FIREARM INJURIES: EXPANDING THE FOCUS FOR PREVENTION

Robert J. McLoughlin, MD, Clark Murray, MD, Shauna Rice, Michael P. Hirsh, MD, Muriel Cleary, MD, Jeremy T. Aidlen, MD

University of Massachusetts Medical School, Worcester, MA, USA

Obective
To define the population of children and adolescents suffering accidental firearm-related injuries in the U.S.

Methods
A cross-sectional analysis was performed by combining the Kids' Inpatient Database for study years of 2006, 2009, and 2012. We identified cases (age <21 years) of accidental firearm-related injury (AFI) using external cause of injury codes. Patient characteristics were analyzed using ICD-9 codes, and national estimates were obtained using case weighting. Multiple multivariable logistic regressions were performed adjusting for gender, race, age, payer, income quartile, and setting. P-values <0.05 indicated significance.

Results
There were 4,696 admissions for AFI averaging over four daily. Victims were mostly high-school aged or older (85.2%), male (87.8%), black (48.4%), urban (59.5%) and resided in the South (46.8%). The lowest income quartile represented over half the injured. Almost two-thirds underwent a major surgical procedure. Overall mortality was 5%. Elementary (aOR 4.91, 95% CI: 3.74-6.44) and middle-school aged children (aOR 3.45, 95% CI: 2.68-4.42) were significantly more likely to be admitted for AFI than older children. Additionally, those residing in rural settings (aOR 2.97, 95% CI: 2.38-3.70) were more likely to have an AFI compared to urban settings. When analyzed by gender, elementary school-aged victims were usually boys (aOR 6.1, 95% CI: 4.39-8.47) and girls were more often injured in a rural setting (aOR 4.21, 95% CI: 2.48-7.14).

Conclusion
Accidental firearm injuries represent a serious risk for pediatric patients. Children and adolescents in urban environments, and older children (>14 years) are most affected by AFI. However, after adjusting for confounders, elementary and middle-school aged children and those who live in rural communities are most at risk for an AFI. Gun safety and education should be aimed at pediatric patients of all ages in both urban and rural environments.

Trauma (cont.)

S52

TOY GUNS, REAL DANGER – AN UPDATE ON PEDIATRIC INJURY PATTERNS RELATED TO BB AND AIR GUNS

Robert J. McLoughlin, MD, Alyssa E. Stetson, Jonathan Green, MD, Michael P. Hirsh, MD, Muriel Cleary, MD, Jeremy T. Aidlen, MD

University of Massachusetts Medical School, Worcester, MA, USA

Purpose

Changes in the design of non-powder guns, including BB guns and air guns, have significantly increased their potential to injure compared to those from the 1940s and 1950s. We sought to characterize the demographics of children injured with non-powder guns, and to characterize the specific injuries suffered.

Methods

A cross-sectional analysis of the study years 2006, 2009, and 2012 was performed by combining the Kids' Inpatient Database into a single dataset. We identified cases (age <21 years) of air gun injuries using external cause of injury codes. Patient characteristics and injuries were analyzed using ICD-9 codes, and national estimates were obtained using case weighting.

Results

There were 1,129 pediatric admissions for injuries related to air guns. The victims were predominately male (87.3%), non-Hispanic white (52.4%), resided in the South (47.8%), and were in the lowest income quartile (39.1%). Almost one-third occurred on a weekend (31.7%), and over half occurred during the spring and summer (57.6%). Mortality was low (0.3%), but almost half required a major surgical procedure (49.4%). The predominant injuries were open wounds to the head, neck, or trunk (39.4%), contusion (22.2%), and open wounds of the extremities (19.2%). Notable other injuries were open injuries to the eye (15.4%), intracranial injury (8.6%) and blindness or vision defects (3.3%).

Conclusions

The non-powder guns available to this generation have the ability to cause significant harm with muzzle velocities far exceeding those needed to penetrate the skin and soft tissue. Currently, less than half of U.S. states have any form of restrictions regarding the sale or use of non-powder guns. These weapons are no longer toys, and so further research and legislation should be aimed at limiting children's access to these weapons.

Fetal Diagnosis and Treatment

Tuesday, May 21 | 10:15 a.m. – 11:15 a.m.
Salons A-F

S53

DISCORDANT PRENATAL ULTRASOUND AND FETAL MRI IN CDH: WHEREIN LIES THE TRUTH?

Aimee G. Kim, MD[1], Gabriella A. Norwitz[1], Monita Karmakar[1], Maria Ladino-Torres[1], Deborah R. Berman[1], Jeannie Kreutzman[1], Marjorie C. Treadwell[1], George B. Mychaliska, MD[2], Erin E. Perrone, MD[1]

[1]University of Michigan, Ann Arbor, MI, USA, [2]Section of Pediatric Surgery, Fetal Diagnosis and Treatment Center, University of Michigan Health System, Ann Arbor, MI, USA

Purpose
Ultrasound (US)-based observed-to-expected lung-to-head ratio (o/e LHR) is well-validated in the evaluation of prenatally diagnosed congenital diaphragmatic hernia (CDH). Fetal magnetic resonance imaging (fMRI)-based observed-to-expected total lung volume (o/e TLV) is an important adjunct. When the two modalities differ in their prognosis, however, it is unclear which is more reliable for clinical decision-making and prenatal counseling.

Methods
Retrospective chart review identified cases of prenatally diagnosed CDH with both MRI-based lung volumetric data and sonographic measurements between April 2010 and June 2018. Patients were classified into mild, moderate, and severe categories based on o/e LHR and o/e TLV and previous literature. Cases with right-sided defects, chromosomal abnormalities, and major cardiac anomalies were excluded. Demographic, radiologic, and postnatal clinical outcomes data were collected. Descriptive statistical analysis was applied.

Results
Forty-four patients met criteria and had fMRI (mean 30.5 ± 3.1 weeks' gestation) within a week of the comparable ultrasound. Of these, 19 patients (43.2%) had a change in their prognostic classification based on fMRI. In 15/19 (78.9%) patients, fMRI o/e TLV predicted a worse outcome compared to US-based o/e LHR (4 changed from mild to moderate, 4 changed from mild to severe, 7 changed from moderate to severe). Clinical outcomes such as survival to discharge and utilization of ECMO seem to favor the fMRI-based prognosis.

Conclusion
Accurately assessing prognosis is critical to prenatal counseling of families with fetuses diagnosed with CDH. We found 43% of patients who underwent both US and fMRI demonstrated discordant prognoses. Clinical outcomes suggest fMRI may more accurately predict severity of pulmonary hypoplasia in these discordant cases. Our analysis confirms fMRI-based volumetric analysis is a necessary adjunct in the prenatal evaluation and counseling of CDH, and should be standard of care.

Fetal Diagnosis and Treatment (cont.)

S54

SURVIVAL FOLLOWING FETAL INTERVENTION FOR IN UTERO RENAL FAILURE

Stefanie Riddle, MD[1], William Polzin, MD[2], Foong-Yen Lim, MD[3], Alexander Bondoc, MD[1], Donna Claes, MD[1], Pramod Reddy, MD[1], Gregory Tiao, MD[1], Brian Vanderbrink, MD[1], Paul Kingma, MD, PhD[1]

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]Cincinnati Fetal Center, Cincinnati, OH, USA, [3]Division of Pediatric General, Thoracic, and Fetal Surgery, Center for Molecular Fetal Therapy, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Purpose

Limited data exists regarding fetal intervention for in utero renal failure (IURF), specifically the impact of amniotic fluid volume restoration in relation to pulmonary hypoplasia and neonatal survival.

Methods

An IRB approved, retrospective review of 56 cases referred to a fetal center for evaluation of IURF from 1/2010-1/2017 was conducted. Therapy was offered in select cases vs. expectant management or termination. Reviewed data included patient demographics, medical, surgical, obstetrical, & social histories for each mother/infant dyad.

Results

Of the 56 fetuses, 21 were diagnosed with bilateral renal agenesis (BRA), 20 with obstructive genitourinary anomalies, and 15 with renal dysplasia. Oligohydramnios developed at mean GA of 20.2 weeks & were evaluated at 21.2 weeks gestation. 36 families (63%) opted for a fetal intervention, including fetal vesicoamniotic shunt, laser valve ablation, and/or restoration of amniotic fluid volume via amnioinfusion. 24 mothers (43%) underwent serial amnioinfusion, receiving 9.7 infusions (mean, range 2-32). 33 families chose aggressive post-natal intervention. 17 neonates (51.5%) survived > 7 days, 14 survived > 30 days (42.4%), and 9 (27.3%) survived to NICU transfer/discharge. Of the 14 pts who survived > 30 days [BRA (n=1,7%); obstructive uropathy (n=8, 57%), and dysplasia (n=5, 36%)], ten (71.4%) had received serial amnioinfusions. Seven survivors >30 days (50%) required initiation of dialysis prior to NICU discharge/transfer, and 11 (78.6%) required initial mechanical ventilation. 8 of the 9 patients that survived to NICU discharge were weaned to room air or low flow oxygen.

Conclusion

Recently our center and others have challenged the traditional paradigm of no intervention for in utero renal failure due to benefits of serial amnioinfusion on lung development. We report that select neonates can survive with aggressive postnatal care. The IURF cohort requires further investigation to delineate maternal and neonatal factors associated with postnatal survival.

Fetal Diagnosis and Treatment (cont.)

S55

THE IN-UTERO DIAGNOSIS OF CHOLEDOCHAL CYST: CAN POSTNATAL IMAGING PREDICT WHO MIGHT BENEFIT FROM EARLY INTERVENTION?

Elizabeth D. Cochran, MD[1], Stefanie P. Lazow, MD[2], Natalie Frost, MD[3], Patricia Santiago-Munoz, MD[4], Lorrie S. Burkhalter[5], James Davis, MD[6], Kim Aimee[7], Erin E. Perrone, MD[7], Terry L. Buchmiller, MD[2], David H. Stitelman, MD[8], David T. Schindel, MD[9]

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Tweet it! The In-Utero Diagnosis Of Choledochal Cyst: Can Postnatal Imaging Predict Who Might Benefit From Early Intervention?

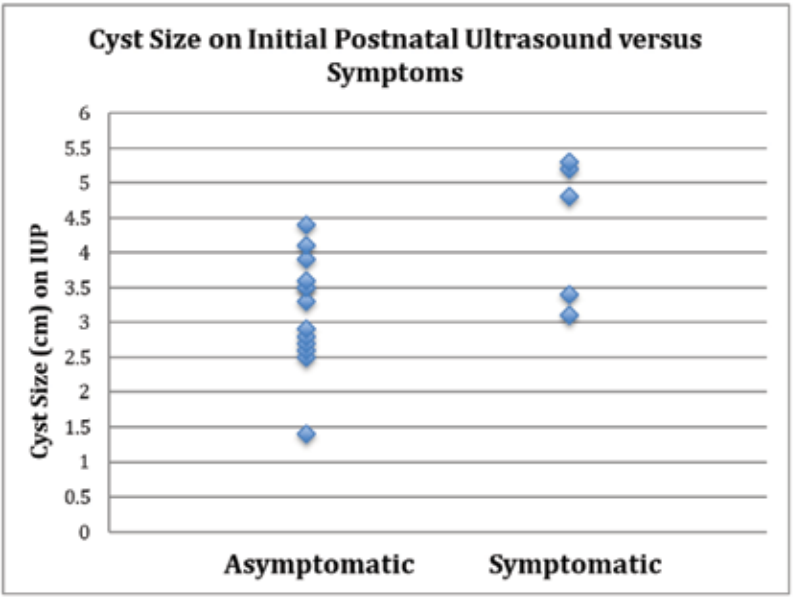
Purpose
Infants diagnosed prenatally with choledochal cyst (CDC) require additional imaging after birth to further characterize the lesion. As cyst excision is commonly deferred until 6-8 months of age, this study seeks to determine whether findings on initial postnatal ultrasound (IPU) might aid in identifying newborns who would benefit from earlier surgical intervention.

Methods
Following IRB approval, patients diagnosed prenatally with CDC at three large fetal centers from 2000-2017 were reviewed. Imaging, clinical courses, and operative outcomes were compared.

Results
Thirty-nine patients were diagnosed prenatally with CDC. 18 patients (46%) were excluded due to postnatal diagnosis revision (n=9), cyst resolution on IPU (n=5), lack of IPU cyst measurements (n=3), or lack of follow-up (n=1). Of the 21 included patients, five (23.8%) developed symptoms, including jaundice, pale stools, abdominal distension, and cholangitis, at a median age of 16.5 days (range 16-19) and underwent cyst excision at a median age of 40.0 days (range 17-158). Sixteen patients (76.2%) remained asymptomatic and underwent cyst excision at a median age of 247 days (range 15-3422). On IPU, 4 patients (19.0%) had cysts > 4.5cm, of whom 3 became symptomatic during the neonatal period. Seventeen patients (81.0%) had cysts < 4.5cm on IPU and, of those, 15 (88.2%) remained asymptomatic throughout infancy. This association between early symptom development and the presence of a cyst > 4.5cm in size on IPU was statistically significant ($p=0.028$). A cyst > 4.5cm on IPU is 93.8% specific (95% CI 69.8-99.8%) and 60% sensitive (95% CI 14.7-94.7%) for the development of cyst-related symptoms during the neonatal period.

Conclusions
In newborns with prenatally diagnosed CDC, presence of a cyst > 4.5cm in size on initial postnatal ultrasound is predictive of symptom development during the first month of life and may serve as an indication for early elective cyst excision.

Fetal Diagnosis and Treatment (cont.)



Opioid Reduction: Empowering Pediatric Surgeons to Combat the Opioid Epidemic Using Evidence-based Strategies

Tuesday, May 21 | 10:15 a.m. – 11:15 a.m.
Salons H-J

S56

A FOCUSED EDUCATIONAL INTERVENTION FOR HIGH-RISK OPIOID PRESCRIBING PATTERNS

Katherine Barsness, MD, MS, Hehui Quan, MS, Renee Manworren, PhD, MS, Christine State, DHA, Leah Harris, MD

Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

Purpose
FDA drug safety communications for pediatric codeine and tramadol use have culminated in "contraindication" and "warning" statements relative to the use of these medications for postoperative pain control. With pediatric surgeons prescribing the majority of discharge opioids, we previously identified a concerning lack of adherence to FDA safety communications for postoperative pain control. We sought to 1) evaluate baseline opioid prescribing knowledge and 2) determine change in opioid prescribing patterns after a focused educational intervention.

Methods
After IRB exempt determination, the electronic health record (EHR) was queried for discharge opioid prescriptions at a single, tertiary care pediatric hospital. During a focused educational intervention, pediatric surgery healthcare providers completed a 3-question survey of baseline opioid knowledge, followed by presentation of 2-year historical opioid prescribing data. Finally, FDA safety communications were discussed in detail. EHR data were collected for the 6 months period prior to and after the educational intervention. Opioid prescribing data are reported as proportions of opioids prescribed pre and post, and were evaluated by chi-squared test, $p<0.05$ significant.

Results
Pre-education, 2034 patients were prescribed discharge opioid medications, with hydrocodone accounting for 89% of the prescriptions. Sixty seven prescriptions were FDA-contraindicated for use in these patients. During the educational intervention, 53 clinicians completed the questionnaire (62% faculty surgeons). Poor baseline knowledge was confirmed with 45-72% of participants being unable to correctly identify FDA-contraindicated opioid medications. Following the educational intervention, there was an 18% decrease in total number of discharge opioid prescriptions ($p<0.05$). There were also only five prescriptions belonging to the FDA-contraindicated groups.

Conclusion
High-risk opioid prescribing behavior was identified among pediatric surgical providers. A focused educational intervention confirmed a lack of opioid prescribing knowledge, particularly relative to FDA-contraindicated opioid medications. Post-education prescribing patterns are consistent with safer provider prescribing behaviors.

Opioid Reduction: Empowering Pediatric Surgeons to Combat the Opioid Epidemic Using Evidence-based Strategies (cont.)

A SINGLE EDUCATIONAL INTERVENTION MAY NOT BE SUFFICIENT TO CHANGE OPIOID PRESCRIBING PRACTICES FOR SOME SURGEONS

Megan E. Cunningham, MD[1], Celia D. Flores, PA-C[1], Huirong Zhu, PhD[1], Monica E. Lopez, MD[2], Adam M. Vogel, MD[1], Mehul V. Raval, MD, MS[3], Sohail R. Shah, MD, MSHA[2]

[1]Texas Children's Hospital, Houston, TX, USA, [2]Baylor College of Medicine, Houston, TX, USA, [3]Ann & Robert H. Lurie Children's Hospital of Chicago; Surgical Outcomes and Quality Improvement Center, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Purpose

Prescribing practices of providers may contribute to the multifactorial opioid epidemic. The aim of this study was to reduce the rate and quantity of opioids prescribed after routine pediatric surgical procedures by educating prescribing surgeons on current literature concerning opioid stewardship.

Methods

An educational intervention was performed at a tertiary-care academic children's hospital with 18 pediatric surgical faculty. Education involved a presentation that described current literature on opioid addiction, variation in the faculty's opioid prescribing practices, and alternative non-opioid analgesic dosing regimens. Additionally, all surgeons were emailed the presentation with follow-up questions answered as needed. Three months pre- and post-intervention prescribing practices for all surgeons were compared for eight routine surgical procedures. Patients with multiple procedures, hospital length of stay (LOS) >7 days, or postoperative LOS >3 days were excluded. Data collected included demographics, operating surgeon, opioid prescription and dosages, and LOS. Statistical analysis was performed using Chi-square, Fischer's Exact, and Mann-Whitney test.

Results

We identified 1,087 patients during the study period with a median age of 9 years [IQR 4-13] and 58% males. The pre- and post-intervention cohorts were similar in patient characteristics and procedures performed. There was no difference in rate of opioid prescription at discharge for all patients before and after the intervention (46% vs 44%, p=0.59), although fewer doses of opioid and lower MME/Kg were prescribed at discharge post-intervention (Figure 1). There was no significant change in rate or opioid prescription at discharge when analyzed by individual procedure type (all p>0.05) and only one surgeon demonstrated a significant decrease in opioid prescriptions after the intervention.

Conclusion

A single group educational session concerning opioid prescribing practices may not lead to clinically significant changes in opioid prescribing practices for some pediatric surgeons. More personalized educational interventions may be needed to bring about institutional change.

Opioid Reduction: Empowering Pediatric Surgeons to Combat the Opioid Epidemic Using Evidence-based Strategies (cont.)

Description of Patients for all Procedures			
	Pre-intervention (n=528)	**Post-intervention (n=559)**	***p*-value**
Age (Years)	10 [4-13]	9 [3-13]	0.19
Weight (Kg)	37.8 [17.2-59.2]	35 [17-54]	0.20
Hospital LOS	0 [0-1]	0 [0-1]	0.13
Postoperative LOS	0 [0-0]	0 [0-1]	0.11
Gender (Male)	56%	60%	0.12
White Hispanic White Non-Hispanic Black/African American Asian Other Race	49% 28% 20% 3% 1%	48% 28% 21% 3% 0%	0.88
Laparoscopic appendectomy Abscess I&D Umbilical hernia repair Inguinal hernia repair Circumcision Lesion excision Laparoscopic cholecystectomy Pilonidal I&D	49% 14% 7% 9% 6% 6% 6% 3%	45% 13% 10% 8% 9% 8% 5% 2%	0.16
Surgeon experience (> 10 years)	33%	34%	0.82
Prescription at discharge	46%	44%	0.59
Prescription after discharge	0.7%	0.8%	1.00
Description of Opioid Prescription at Discharge			
	Pre-intervention (n=240)	**Post-intervention (n=245)**	***p*-value**
Hydrocodone Oxycodone Tramadol	100% 0% 0%	99.2% 0.4% 0.4%	1.00
Dispense type (tablet)	44%	44%	0.75
Dose	10 [6-15]	8 [5-12]	0.01
MME/KG	1.5 [1.1-1.8]	1.3 [1.0-1.7]	<0.01
MME/KG/dose	0.15 [0.10-0.26]	0.15 [0.10-0.28]	0.47

Kg- Kilogram, LOS-Length of stay, I&D- incision and drainage, MME- Morphine milligram equivalent

Opioid Reduction: Empowering Pediatric Surgeons to Combat the Opioid Epidemic Using Evidence-based Strategies (cont.)

S58

OPIOIDS ARE OVERPRESCRIBED AND CAN BE ELIMINATED FOR A NUMBER OF CHILDREN'S OPERATIONS

Calista M. Harbaugh, MD, Gracia Vargas, Courtney L. Streur, G. Ying Li, Aaron L. Thatcher, David A. Zopf, Lauren A. Bohm, Ronald B. Hirschl, MD, Jennifer F. Waljee, MD, MPH, Samir K. Gadepalli, MSc, MD, MBA

University of Michigan, Ann Arbor, MI, USA

Tweet it! Opioids can be safely eliminated after umbilical and inguinal hernia repairs, appendectomy, and adenoidectomy @harbauc @SamirGadepalli

Purpose

Though surgery is a leading source of opioids among children, procedure-specific patterns of postoperative use, storage, and disposal are unknown. We sought to evaluate these outcomes after eight pediatric procedures.

Methods

We prospectively surveyed parents of children age 0-17 years who underwent appendectomy, umbilical or inguinal hernia repair, orchiopexy, circumcision, tonsillectomy, adenoidectomy, and upper extremity fracture fixation at a tertiary children's hospital (N=634, 3/26/18-7/31/18). Patients received a pain journal at discharge. Parents were contacted by phone, email, or follow-up clinic at 7-21 days postoperatively to assess pain control, medication use, postoperative education, and opioid storage and disposal. Opioid prescription quantity (number of doses to account for weight-based dosing) was obtained by chart review. Descriptive statistics were performed. This project was deemed exempt by the IRB.

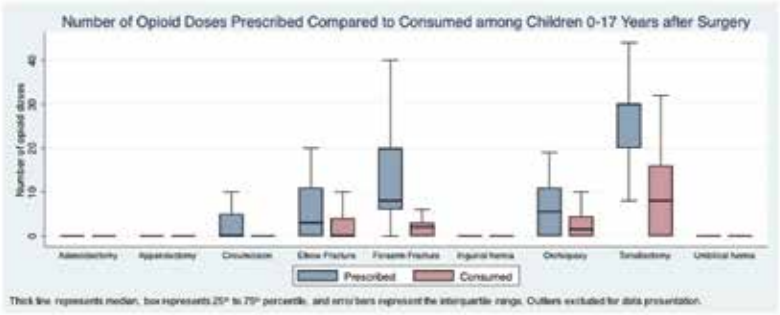
Results

Among 412 respondents (65% response rate), 217 received an opioid prescription (53%). Patients reported good (71%) or adequate (24%) pain control and frequent use of acetaminophen (81%) and/or ibuprofen (92%). Excess medication was prescribed to 73% of patients (158/217). Prescriptions exceeded use for all procedures (Figure). For 4 procedures, most patients took no opioid: adenoidectomy (45/48, 94%), inguinal hernia (47/51, 92%), appendectomy (21/23, 91%), and umbilical hernia (18/20, 90%). Among these, 1 parent requested a refill after adenoidectomy. Only 37% and 48% of all parents reported receiving education on opioid storage and disposal, respectively. Opioids were stored in a locked location (23%, 45/200), unlocked location (66%, 132/200), or in the open (11%, 23/200). Only 27% of parents disposed of extra medication (43/159).

Conclusion

Excess opioids are frequently prescribed after children's surgery. This study offers evidence for procedure-specific opioid prescribing recommendations, specifically suggesting elimination of opioids for umbilical hernia, inguinal hernia, appendectomy, and adenoidectomy. To address unsafe opioid management in the home, a multidisciplinary approach to standardize both education content and delivery is necessary.

Opioid Reduction: Empowering Pediatric Surgeons to Combat the Opioid Epidemic Using Evidence-based Strategies (cont.)



Opioid Reduction: Empowering Pediatric Surgeons to Combat the Opioid Epidemic Using Evidence-based Strategies (cont.)

S59

FACTORS AFFECTING NARCOTIC MANAGEMENT FOR INJURED CHILDREN AFTER HOSPITAL DISCHARGE: A PROSPECTIVE SURVEY OF PARENTS

Anna Delamerced[1], **Hale Wills**[2]

[1]Warren Alpert Medical School of Brown University, Providence, RI, USA, [2]Hasbro Children's Hospital / Brown University, Providence, RI, USA

Purpose

Prescription narcotic misuse is a national crisis. Injured children often receive narcotics at hospital discharge, but the role these narcotics play in the crisis has not been fully elucidated. It remains unknown whether medications from filled prescriptions are administered, duration of pain requiring narcotics, and what happens with unused narcotics in this population.

Methods

English-speaking parents of injured children admitted to an ACS Level 1 Pediatric Trauma Center were prospectively enrolled May 2017-May 2018. A survey of demographic information was collected pre-discharge. Another survey administered 7-10 days post-discharge assessed parents' perceptions of child's pain, narcotics administered, narcotic storage and disposal, and perceptions of narcotic education.

Results

Seventy of 114 (61.4%) enrolled parents completed follow-up survey. 79.1% reported a narcotic prescription for their child, with 92.5% filling it. Reason to fill included healthcare provider's advice (69.4%), belief narcotic would relieve pain (95.9%), patient request for narcotic (4.1%). No financial barriers were reported. Reasons for not filling included belief of negative narcotic side effects (50%), addiction potential (50%). Of 48 reporting on narcotic usage, 75% used narcotics < 3 days, 12.5% 4-7 days, 2% > 7 days, 10.4% never used the narcotic. Reasons for discontinuing narcotics included child no longer has pain (87.2%), ran out (5.1%), other (7.7%). Regarding storage, 53.3% reported unlocked bathroom cabinet, and 81.3% unlocked kitchen space. Of those reporting unused narcotics, 83.3% reported not disposing them, and 38.2% reported no plan for disposal.

Conclusion

While a small fraction of patients continued to take narcotics beyond 7 days, the majority appear to have been prescribed a greater number of doses than they needed. Further investigation is warranted to quantify and address the gap between pain control needs and prescribing practices. The rate of unsecure storage and plan to retain unused narcotics are potential targets for discharge narcotic education.

Plenary Scientific Session 2

Wednesday, May 22 | 7:00 a.m. – 8:15 a.m.
Salons A-F

S60

EXTENDING THE 'WINDOW OF TOLERANCE': REGULATORY T CELLS PERMIT LATE GESTATION IN UTERO HEMATOPOIETIC CELL TRANSPLANTATION

John S. Riley, MD, MS[1], Lauren McClain[2], John Stratigis[2], Barbara Coons[2], Nicholas Ahn[2], Haiying Li[2], Alan W. Flake, MD[2], William H. Peranteau, MD[2]

[1]Hospital of the University of Pennsylvania, Philadelphia, PA, USA, [2]Children's Hospital of Philadelphia, Philadelphia, PA, USA

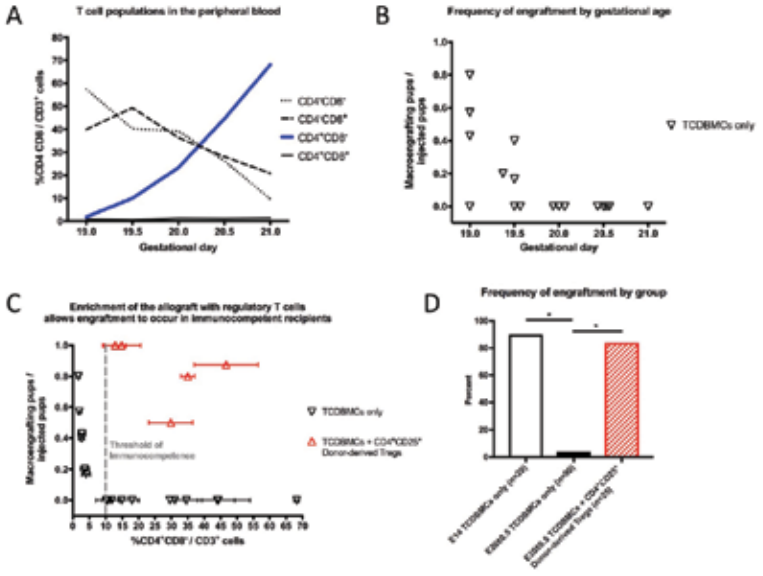
Purpose
In utero hematopoietic cell transplantation (IUHCT) has the potential to cure congenital hematologic diseases. IUHCT must be performed early in gestation prior to immunologic maturity; this is technically challenging, however, and mandates that the target disease be diagnosed during the first trimester. Regulatory T cells (Tregs) are a population of T cells that can promote a tolerogenic immune state. The purpose of this study is to define the threshold of immunocompetence in murine gestation and determine if enrichment of the allograft with Tregs can promote tolerance thereafter.

Methods
9.7x10^6 T cell-depleted bone marrow cells (TCDBMCs) from B6GFP (H2kb) donors were injected into cohorts of Balb/c (H2kd) fetuses shortly after birth (gestational day 19-21). The frequency of macrochimeric engraftment (donor cell chimerism >1% at 4 weeks of age) was correlated with gestational age and the prevalence of T cell subtypes in the blood of uninjected littermates. The ability of Tregs to promote tolerance late in gestation (E20±0.5) was assessed by enriching the allograft with 0.5x10^6 CD4+CD25+ donor-derived Tregs. Fetuses injected with 9.7x10^6 TCDBMCs early in gestation (E14) served as positive controls.

Results
CD4+CD8- T cells, absent at E19, increase steadily through E21 (Figure 1A). The frequency of engraftment, by contrast, decreases (Figure 1B). CD4+CD8- / CD3+ >10% was found to be an excellent predictor of immunocompetence with respect to donor rejection. Enrichment of the allograft with Tregs successfully restored engraftment beyond the threshold of immunocompetence (Figure 1C), achieving an overall frequency of engraftment (84%) equivalent to IUHCT performed at E14 (90%) (P=0.68) (Figure 1D). There was no evidence of graft-versus-host-disease, and all animals demonstrated multilineage engraftment.

Conclusion
Enrichment of the allograft with CD4+CD25+ Tregs allows engraftment to occur in immunocompetent murine fetuses. A similar strategy may be useful to overcome technical and practical challenges to the clinical application of IUHCT.

Plenary Scientific Session 2 (cont.)



Plenary Scientific Session 2 (cont.)

S61

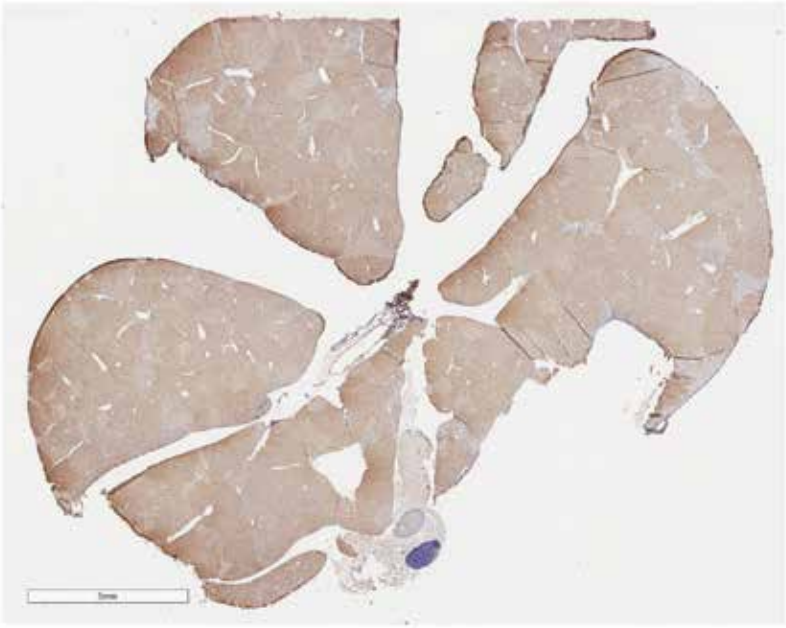
IN UTERO AAV-BASED GENOME-EDITING TO CURE A MOUSE MODEL OF HUMAN HEREDITARY TYROSINEMIA TYPE 1

Clara Nicolas, MD, MS, **Caitlin VanLith**, Kari Allen, Zeji Du, Rebekah Guthman, Robert Kaiser, Raymond Hickey, Joseph Lillegard, MD

Mayo Clinic, Rochester, MN, USA

In utero gene therapy is an advanced approach that offers significant advantages over postnatal therapy. In utero gene therapy for liver disease can be curative while also addressing liver disease before any clinical consequences occur. In addition, the liver is an ideal organ for gene therapy in utero due to its easy access, rapid growth, and immune privilege. We show here for the first time that in utero gene editing can cure a mouse model of liver disease—in this case, hereditary tyrosinemia type I. Two AAV vectors expressing S. aureus Cas9 with gRNAs and a 1.2kb homology repair template were developed to correct the point mutation in fumarylacetoacetate hydrolase (FAH)-deficient mice. We performed fetal intrahepatic injections of both vectors in Fah-/- mice at E15±1 (n=5). Pups were withdrawn from 2-(2-nitro-4-trifluoromethylbenzoyl)-1,3-cyclohexanedione (NTBC) at the time of weaning (21 days) and were weighed daily for NTBC-independent growth. Dosed mice demonstrated the presence of FAH positive cells in the liver at birth (3.99%) and showed healthy NTBC-independent growth after weaning, with many animals requiring no NTBC therapy. By 70 days of life all animals were phenotypically cured, with complete liver repopulation by FAH-positive hepatocytes and normal plasma tyrosine and liver enzyme levels. In conclusion, AAV-based gene editing is a viable treatment for hereditary tyrosinemia type I as demonstrated in mice, leading to phenotypic, histological, biochemical, and genomic correction of the disease. This report is the first ever to use in utero AAV-based genome editing to cure a mouse model of a human disease and acts as a proof-of-concept for this approach to prevent liver damage, neurological crises, and noncompliance issues currently prevalent in hereditary tyrosinemia type I human patients.

Plenary Scientific Session 2 (cont.)



Plenary Scientific Session 2 (cont.)

S62

MINIMIZING VARIANCE IN PEDIATRIC SURGICAL CARE THROUGH IMPLEMENTATION OF A COLON BUNDLE: A MULTI-INSTITUTION STUDY

Aaron J. Cunningham, MD[1], Pavithra Rao[1], Arjun Ashok[1], Sanjay Krishnaswami, MD[1], Nicholas A. Hamilton, MD[1], Mubeen A. Jafri, MD[2], Kenneth S. Azarow, MD[3], Marilyn W. Butler, MD[2], Andrew Zigman, MD[4], Elizabeth A. Fialkowski[1]

[1]Oregon Health & Science University, Portland, OR, USA, [2]Randall Children's Hospital at Legacy Emanuel, Portland, OR, USA, [3]Pediatric Surgery Division, Department of Surgery, Oregon Health & Science University, Portland, OR, USA, [4]Northwest Permanente Physicians, Oregon Health & Science University

Tweet it! Use of a standardized colon bundle in pediatric colorectal cases can reduce surgical site infections greater than 10%. Work performed @ OHSUDoernbecher, @OHSUsurgery, @unningham

Purpose

As part of a larger institutional initiative to minimize variance in pediatric surgical care, we implemented a colon bundle for all colorectal procedures to streamline care and study the effect on surgical site infections (SSI).

Methods

Implementation of a standardized colon bundle at two children's hospitals was initiated in December 2014. Data were collected for one year before and after implementation, excluding a 6-month transition period. All subjects (0-23 years) who underwent a colorectal procedure during the study period were included. Creation of isolated loop colostomies or procedures where the abdominal fascia was not closed were excluded. Patients undergoing elective colorectal procedures underwent a preoperative bowel prep or enema as appropriate. Pre- and intra-operative skin preparation was standardized along with antibiotics. Prior to closure, gloves and surgical instruments were exchanged. Superficial wicks were left in the subcutaneous tissue until first the dressing change. Age, length of stay, hospital days, cost and National Surgical Quality Improvement Program (NSQIP)-defined complications were compared. Wilcoxon Rank-Sum and χ^2 tests were performed. Statistical significance was defined as $p<0.05$.

Results

Ninety-five patients were included in the study (control = 42, protocol = 53). Median age (6.2 vs. 8.8 years, p=0.776) was similar between groups. Comparing pre- and post-implementation, median hospital days (6.1 vs. 8.2 days), cost ($24,998 vs. $35,531), re-admission (17% vs. 8%), re-operation (14% vs. 8%), intra-abdominal abscess (12% vs. 6%), anastomotic leak (5% vs. 4%) and mortality (5% vs. 2%) were unchanged (all $p>0.05$). Superficial SSI was significantly decreased following implementation of a colon bundle (19% vs. 6%, p=0.04).

Conclusion

Minimizing variance in pediatric colorectal surgical care through implementation of a colon bundle can reduce superficial SSI. Large studies, perhaps through regional research consortiums, are needed to further evaluate incorporation of pediatric colon bundles into clinical practice.

Plenary Scientific Session 2 (cont.)

S63

DECREASING POST-OPERATIVE COMPLICATIONS IN SURGICALLY PLACED GASTROSTOMY TUBES: A QUALITY IMPROVEMENT INITIATIVE

Kate B. Savoie, MD, MS[1], Sarah Hastie[2], Margaret Holston[2], Brenda Ruth[2], Luke Vohsing[2], Ruth Seabrook[2], Tria Shadeed[2], Maria Haghnazari[2], Elizabeth Theado[2], Mary Gossard[2], Karen A. Diefenbach, MD[2]

[1]Department of Pediatric Surgery, Nationwide Children's Hospital, Columbus, OH, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA

Tweet it! A quality improvement initiative with implementation of standardized post-operative gastrostomy tube care and feeding guidelines leads to a significant reduction in complications rates. #gastrostomytubequalityimprovement @NCHPedSurg

Background

Gastrostomy tubes (GT) are a common pediatric surgical procedure and can have high rates of complications. Site complications including leakage, traction injuries, and dilation of the tract, can lead to an increased cost and length of stay. Our aim was to decrease 60-day complication rate by >10% within our neonatal intensive care (NICU) patients within 1 year and maintain the change for 1 year.

Methods

All NICU patients who had a surgically placed GT were included in the analysis. A baseline rate of GT complications was established using wound care consults and chart documentation. A key drivers diagram was developed with focus on two main areas: early site care and post-operative feeding practices to reduce over-pressurization of the stomach. A quality improvement initiative (QII) was implemented with a standardized dressing and post-operative wound care protocol managed by a wound care nurse and dedicated NICU NNPs, and standardized feeding strategy based on preoperative feeding regimen and anatomic considerations. Data was prospectively collected on all surgically placed GTs for NICU patients and the rate of complications determined.

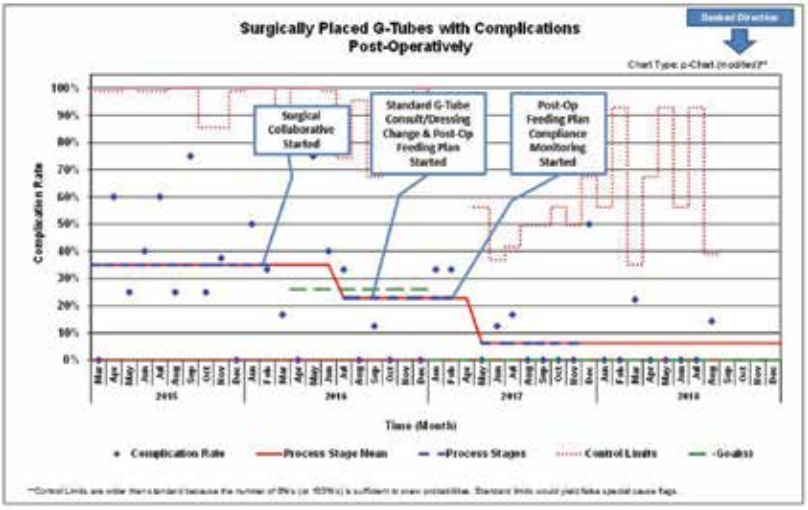
Results

A total of 78 GTs were placed during the 16 months prior to implementation of the QII. Of these, 27 had complications, for a baseline complication rate of 35%. We achieved our initial goal within 8 months after initiating the QII, with a decrease in the rate of complications to 22% (8/36 patients). This rate continued to decrease to a sustained rate of 6% since November 2017, for a total decrease in complication rate of 29% (p=0.003).

Conclusions

Implementation of a standardized GT wound care protocol and a postoperative feeding protocol significantly decrease the complication rate of surgically placed GTs.

Plenary Scientific Session 2 (cont.)



Plenary Scientific Session 2 (cont.)

S64

PEDIATRIC TRAUMA VENOUS THROMBOEMBOLISM PREDICTION ALGORITHM OUTPERFORMS CURRENT ANTICOAGULATION PROPHYLAXIS GUIDELINES: A MULTICENTER PILOT STUDY

Aaron J. Cunningham, MD[1], Nicholas A. Hamilton, MD[1], Sanjay Krishnaswami, MD[1], Martin A. Schreiber, MD[1], Mubeen A. Jafri, MD[2]

[1]Oregon Health & Science University, Portland, OR, USA, [2]Randall Children's Hospital at Legacy Emanuel, Portland, OR, USA

Tweet it! A venous thromboembolism prediction algorithm for injured children outperforms current anticoagulation prophylaxis guidelines while also reducing the number of children receiving thromboprophylaxis. Work performed @ OHSUDoernbecher, @OHSUsurgery, @unningham

Purpose

Venous thromboembolism (VTE) in injured children is rare, and the variability of its incidence across age and injury severity make prophylactic anticoagulation decisions challenging. Recent guidelines from the Pediatric Trauma Society and the Eastern Association for the Surgery of Trauma (PTS/EAST) suggest that all children over the age of 15 years should receive thromboprophylaxis. These guidelines may over-treat children who are high-risk for bleeding complications. We sought to validate our previously published VTE prediction algorithm (derived from the National Trauma Data Bank) and compare it to current recommendations.

Methods

Local trauma registries at two institutions were queried for all pediatric (age < 18 years) patients evaluated from 2007 to 2018. Demographic and clinical data for each patient were collected. These variables were applied to the prediction algorithm (Figure 1A) and VTE risk was calculated. The area under a receiver operator characteristic (AUROC) curve was calculated to test algorithm validity. Number-needed-to-treat analysis was performed based on presumed prophylaxis to compare the algorithm to current recommendations.

Results

Retrospective review identified 8,271 subjects with 29 episodes of VTE (0.35%). The VTE prediction algorithm classified 16 (0.2%) as high-risk (>5% risk), 251 (3%) as moderate-risk (1-5% risk) and 8004 (97%) as low-risk (<1% risk). AUROC was 0.917 (0.867-0.966, 95%CI), as demonstrated in Figure 1B. In our population, prophylaxis of the 'moderate-' and 'high-risk' cohorts would out perform the sensitivity (58% vs. 55%) and specificity (97% vs. 73%) of current guidelines while anticoagulating substantially less patients (267 vs. 2267, p<0.001). Number-needed-to-treat using the VTE prediction algorithm was 16 as compared to 200 for PTS/EAST guidelines.

Conclusion

A VTE prediction algorithm using limited, easily collected, clinical variables can identify injured children at risk for venous thromboembolic disease with more discrimination than current society guidelines. Prospective studies should investigate the validity of this model.

Plenary Scientific Session 2 (cont.)

A

Characteristic	Points
GCS	
Mild, 13–15	0
Moderate, 9–12	40
Severe, 3–8	34
Age category, y	
0	94
1-9	0
10-12	78
13-15	120
16-17	147
Female sex	4
Male sex	0
Intubation	97
Admission to ICU	171
Transfusion of blood products	58
Central venous catheter placement	61
Pelvic fracture	33
Lower-extremity fracture	36
Major surgery	150

B

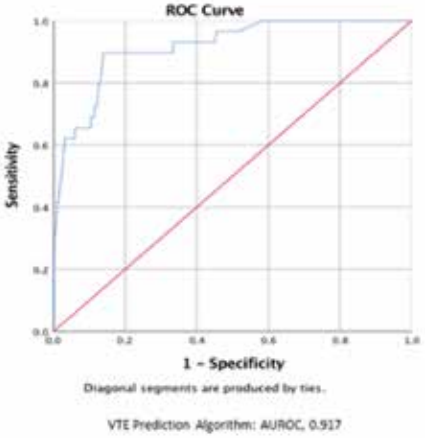


Figure 1. *Pediatric trauma venous thromboembolism (VTE) prediction algorithm.* **A:** VTE risk prediction model with ten variables and point assignment. Scores of 0-523 correspond with low-risk (<1%), 524-688 correspond with moderate-risk (1-5%) and 689-797 correspond with high-risk (>5%) of VTE. Model development and internal validation previously described by Connelly et al. JAMA Surg. 2016;151(1):50-57. **B:** External validation in a retrospective population performed and the area under the receiver operator characteristic curve (AUROC) plotted and calculated. AUROC = 0.917. VTE: venous thromboembolism. GCS: Glasgow Coma Score. ICU: intensive care unit. NA: not applicable

Plenary Scientific Session 2 (cont.)

S65

SEXUAL FUNCTION AND FERTILITY IN FEMALES AFTER SURGERY FOR HIRSCHSPRUNG DISEASE

Joseph R. Davidson, MBBS, MA, MRCS[1], Kristiina Kyrklund, MD[2], Mikko Pakarinen[2], Simon Eaton, PhD[3], Paolo De Coppi[1], Joe Curry[1]

[1]Specialist Neonatal and Paediatric Surgery, Great Ormond Street Hospital for Children, London, England, United Kingdom, [2]Department of Paediatric Surgery, New Children's Hospital, University of Helsinki and Helsinki University Hospital, Helsinki, Uusimaa, Finland, [3]Department of Paediatric Surgery, UCL-Great Ormond Street Institute of Child Health, London, England, United Kingdom

Purpose

There is little information regarding the long-term outcomes for female sexual function and fertility after treatment of Hirschsprung's disease (HSCR), however large cohort data for patients treated with ileoanal pullthrough for ulcerative colitis demonstrates reduced fertility (36% compared to 88% of 'normal' population.) Our aim was to determine sexual function and fertility outcomes across a cohort of women treated for HSCR.

Methods

Following ethical approval (17/LO/1692), women who had undergone surgery for HSCR at a single tertiary centre between 1978-2000 were invited to complete a multi-domain questionnaire on sexual function and fertility, along with a validated sexual quality of life survey (SQoL-F).

Results

Of 58 females, 51 could be contacted and 29 (57%); median age 29.7y (range 19.5-41.0) returned completed questionnaires. There was no difference in baseline characteristics compared to non-responders. 27/29 patients had undergone open primary procedures (20 Duhamel). Further abdominal surgery, including 7 re-do procedures, had been performed in 11 patients (38%). 27/29 women (93%) were sexually active, but 12/27 (44%) described frequent dyspareunia. The SQoL-F score (out of 108) was subnormal; mean(SD) = 81.6 (19.2), but demonstrated significant variability. 12 women had attempted to conceive, 6 (50%) were able to fall pregnant, 4 achieving spontaneous pregnancies, and 2 with assisted fertility. Six patients (50%) have not yet conceived despite investigation and fertility treatment.

Conclusion

This is the largest prospective collection of outcome data performed in a cohort of adult patients with HSCR, and the only study to provide detailed data regarding fertility and sexual quality of life in women. There may be a significant, previously unrecognized, burden of subfertility secondary to surgery for HSCR. Sexual quality of life also appears to be reduced in these women.

Plenary Scientific Session 2 (cont.)

S66

ULTRASOUND-GUIDED EPIGASTRIC HERNIA REPAIR

Mercedes Pilkington, MD, Matthew W. Ralls, MD, Ronald B. Hirschl, MD, Marcus D. Jarboe, MD

University of Michigan, Ann Arbor, MI, USA

An ultrasound-guided incision-free epigastric hernia repair is demonstrated. Surgeon-performed ultrasound demonstrates the hernia. A meniscus needle is then passed under ultrasound guidance to facilitate placement of a transfascial suture across the defect to eliminate the hernia. Both ultrasound images and surgical technique are shown to describe this minimally invasive procedure.

New Technology

Wednesday, May 22 | 8:30 a.m. – 9:30 a.m.
Salons H-J

S67

ULTRASOUND-GUIDED INGUINAL HERNIA REPAIR

Marcus D. Jarboe, MD, Maria Ladino-Torres, Ronald B. Hirschl, MD
University of Michigan, Ann Arbor, MI, USA

Tweet it! Twitter title: Incisionless surgery to correct hernia defects. #noscars

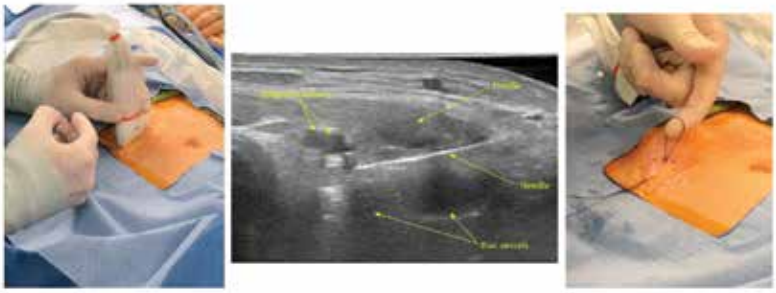
Purpose
Inguinal Hernias are repaired using a number of techniques. Here we report a case series of a novel method, inguinal Herniorraphy Using Ultrasound Guidance (iHUUG).

Methods
With IRB approval, all cases of iHUUG at our institution from November 2017-October 2018 were retrospectively reviewed. Data collected included demographics, operative time and complications. All patients were females. The steps of the procedure are as follows: A meniscus repair needle (Smith&Nephew) was passed with ultrasound guidance (L20-5 Linear transducer Zonare) through the skin, laterally, and then, under the hernia, and then medially out through the skin. A silk suture was passed through the needle and the needle was removed. The needle was passed through same sites, only over the hernia and out. The same suture was passed through the needle so that both ends of the suture were exiting the original entry skin site. A needle laparoscope was placed to confirm appropriate placement of suture.¬¬

Results
Fifteen patients underwent iHUUG for a total of 21 hernia repairs (5 bilaterals). Median age was 4.6years (IQR 0.4-6.3) and median weight was 15.1kg (IQR 6.2-23.7). Mean operative time was 39.0min (IQR 31-44.3). There were 5 patients (5/15) who had undiagnosed contralateral hernias that were identified at the time of surgery with ultrasound. There was one attempt that, initially, did not close the hernia defect (1/21 repairs), but instilled saline distension of the sac allowed ultrasound-guided closure. There were 3 (3/15) converted to laparoscopic repair secondary to sliding components that were seen on ultrasound. There were 2 post-operative fluid collections but neither required intervention. There were no recurrences.

Conclusion
Inguinal herniorrhaphy using ultrasound guidance in females is safe and effective. A true recurrence rate will need longer follow-up. In the future this technique could be performed without laparoscopic confirmation and under sedation to avoid general anesthesia.

New Technology (cont.)



New Technology (cont.)

S68

SMALL SURGERIES, BIG SMILES: REDUCING SEDATION THROUGH VIRTUAL REALITY

Julia M. Chandler, MD, MS, Jordan S. Taylor, MD, Katherine I. Portelli, John R. Austin, Thomas J. Caruso, MD, Samuel T. Rodriguez, MD, Gary E. Hartman, Stephanie D. Chao, MD
Stanford University, Stanford, CA, USA

Tweet it! Virtual reality reduces the need for sedation for minor surgical procedures in children.

Purpose
Children often require anesthesia for simple diagnostic and therapeutic procedures. This video presents the novel use of virtual reality (VR) to reduce the need for procedural sedation in children undergoing minor surgical procedures.

Methods
Patients were offered the opportunity to use VR during their procedure instead of procedural sedation or
general anesthesia. Patients and caregivers received a brief tutorial on VR prior to the procedure. All patients received local anesthesia at the start of the procedure. Outcome measures included the Pain Catastrophizing Scale for Parents, the Child Fear Scale, the Childhood Anxiety Meter, and child, caregiver, and clinician satisfaction surveys.

Results
This pilot study enrolled 7 patients with a median age of 9.6 years. Procedures included hormone implant placement (57%), hormone implant removal (29%), and cecostomy tube exchange (14%), with a mean procedure duration of 17 minutes. No sedating medications were needed. Post-procedure, parents' concerns about their child's pain decreased, as did children's self-reported anxiety, pain, and fear scores. Overall satisfaction was very high, and all patients would want VR again for a similar procedure.

Conclusion
It is feasible to use VR to reduce the need for procedural sedation during minor surgical procedures in children.

Research: Necrotizing Enterocolitis

Wednesday, May 22 | 8:30 a.m. – 9:30 a.m.
Salon G

S69

HUMAN BREAST MILK-DERIVED EXOSOMES IN THE PROTECTION AGAINST EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Courtney Pisano, DO, MS, Jeffrey Galley, PhD, Mostafa Elbahrawy, MD, PhD, Yijie Wang, MS, Aidan Farrell, BA, David Brigstock, PhD, Gail E. Besner, MD
Nationwide Children's Hospital, Columbus, OH, USA

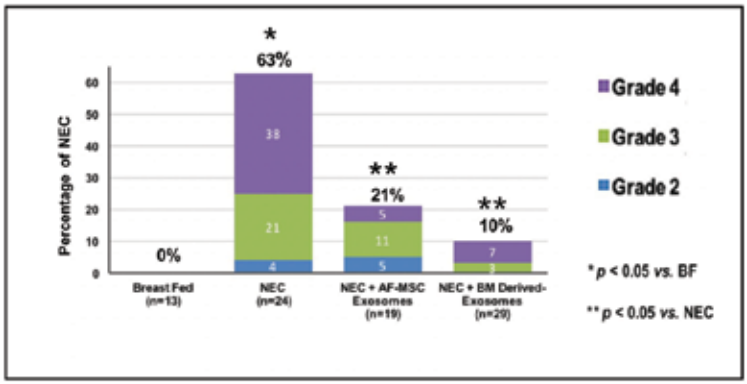
Purpose
Necrotizing enterocolitis (NEC) remains the leading cause of death in premature infants despite decades of research. It is well known that breast feeding decreases the incidence of NEC, but even with aggressive promotion of nursing in Neonatal Intensive Care Units, morbidity and mortality remain unacceptably high. Exosomes are bi-lipid membrane nanovesicles (~100 nanometers in diameter) that contain DNA, RNA and proteins, and are present in bodily fluids including breast milk. We have previously shown that exosomes purified from mesenchymal stem cells and delivered intraperitoneally (IP) can protect the intestines from NEC. The aim of the current study was to determine whether breast milk-derived exosomes administered enterally could protect the intestines from NEC.

Methods
Human donor breast milk was obtained from a donor milk bank. Exosomes were purified from milk by ultracentrifugation. Rat pups were delivered prematurely by C-section and exposed to repetitive episodes of asphyxia/hypothermia/hypercaloric feeds to induce NEC. Pups were randomized to the following groups: (1) breast fed uninjured pups (negative control), (2) NEC, (3) NEC + exosomes (4x10^8) isolated from amniotic fluid-derived mesenchymal stem cells (AF-MSC) administered once IP (positive control), or (4) NEC + breast milk (BM)-derived exosomes (1x10^8) administered orally with each feed. Pups were sacrificed upon signs of clinical NEC or after 96 hours of life, and intestines harvested and graded blindly using an established histological injury scoring system.

Results
The incidence of NEC was 0% in uninjured pups and 63% in untreated stressed pups. Compared to untreated pups, the incidence of NEC was decreased to 21% with administration of AF-MSC-derived exosomes administered IP and to 10% with breast milk-derived exosomes administered enterally ($p<0.05$) (Figure).

Conclusion
Breast milk-derived exosomes delivered enterally substantially decrease the incidence and severity of experimental NEC, and may represent a novel cell-free clinical therapy for the disease in the future.

Research: Necrotizing Enterocolitis (cont.)



Research: Necrotizing Enterocolitis (cont.)

S70

THE ETIOLOGY OF NECROTIZING ENTEROCOLITIS: INFECTIOUS OR INFLAMMATORY?

Rita D. Shelby, MD, MS[1], Lauren Mashburn-Warren[2], Jason Navarro[2], Natalie Tengberg[2], Michael Bailey[2], Steven D. Goodman[2], Gail E. Besner, MD[2]

[1]Nationwide Children's Hospital, Ohio State University, Columbus, OH, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA

Introduction

Although the precise etiology of necrotizing enterocolitis (NEC) is unknown, alterations in the microbiome and in the intestinal inflammatory response are hypothesized mechanisms. We have demonstrated the efficacy of a single dose of wild type Lactobacillus reuteri (Lr-WT) administered in its biofilm state by incubation on maltose-loaded microspheres (Lr-WT + DM-maltose) in protection from experimental NEC. Lr possesses antimicrobial and anti-inflammatory properties. We previously showed that elimination of the major antimicrobial attribute of Lr only partially attenuated its protective effects. We hypothesized that elimination of its major anti-inflammatory attribute via deletion of the hdcA gene (Lr-ΔhdcA), which is required for the production of histamine, would also attenuate its protective effects.

Methods

Premature rat pups delivered via C-section were subjected to experimental NEC via repeated exposure to hypoxia/hypothermia/hypertonic feeds. Prior to exposure to experimental NEC, pups were randomized to receive a single dose of: 1) sterile water (vehicle control); 2) planktonic (free-living) Lr-WT; 3) Lr- ΔhdcA + DM-maltose; or 4) Lr-WT + DM-maltose. Control pups were unstressed and breast fed. Pups were sacrificed by 96 hours and intestinal tissue collected for histopathological analysis.

Results

Compared to no therapy, Lr-WT did not prove effective in reducing experimental NEC (65% vs 61%, $p>0.05$). Affirming previous studies, administration of Lr-WT + DM-maltose significantly decreased the incidence of NEC (65% vs. 16%, $p< 0.002$). In contrast, compared to Lr-WT + DM-maltose, administration of Lr-ΔhdcA + DM-maltose resulted in significant loss (albeit, not total) of beneficial effects (16% vs. 45%, $p< 0.05$).

Conclusion

We show here that the anti-inflammatory attributes of Lr contribute, in part, to its ability to protect the intestines from NEC. This finding, in combination with our previous results demonstrating the importance of the antimicrobial attributes of Lr, suggests that both infectious and inflammatory components may contribute to the etiology of NEC.

Research: Necrotizing Enterocolitis (cont.)

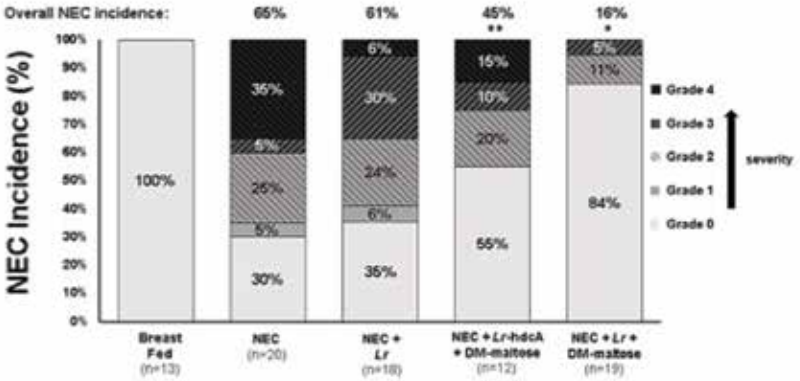


Figure 1. Incidence of NEC. Grade 0, no visible histological villus damage; grade 1, distal villus enterocyte detachment; grade 2, sloughing of enterocytes to the mid villus level; grade 3, loss of the entire villus with preservation of the crypts; and grade 4, transmural necrosis. Histological injury grade ≥ 2 was considered positive for NEC. *$p<0.05$ vs. NEC; **$p<0.05$ vs NEC + *Lr* + DM-maltose.

Research: Necrotizing Enterocolitis (cont.)

S71

IS ILEUS A CAUSE AS OPPOSED TO A CONSEQUENCE OF NEC? REVERSAL OF INTESTINAL DYSMOTILITY REDUCES THE SEVERITY OF EXPERIMENTAL NEC THROUGH INCREASED NEURON SIGNALING

Mark L. Kovler, MD, Mitchell R. Ladd, William Fulton, Yukihiro Yamaguchi, Thomas Prindle, Sanxia Wang, Chhinder Sodhi, David J. Hackam, MD

Johns Hopkins Children's Center, Baltimore, MD, USA

Purpose

Ileus is the earliest clinical sign of necrotizing enterocolitis (NEC), and reflects impairment of the enteric nervous system. Current thinking attributes ileus as a consequence rather than a cause of NEC development. However, early ileus could cause luminal distention and impaired perfusion, resulting in NEC. We now hypothesize that early administration of prokinetic agents to treat ileus will attenuate NEC severity, and sought to investigate the mechanisms involved.

Methods

NEC was induced in neonatal C57BL/6 mice (equal numbers of male and female) through four days of formula-gavage, hypoxia, and NEC stool treatment. Mice with NEC were administered either formula alone (n=12) or with the addition of one of two prokinetic agents which act as serotonin agonists in the enteric nervous system: metoclopramide (n=9) or cisapride (n=10), each 1.0ug/kg daily in the NEC model, and were compared to breast-fed controls (n=11). Motility was measured by treating mice with 200ul of FITC-Dextran fluorescent dye by oral gavage. After 30 minutes, mice were sacrificed, and motility was expressed as gastrointestinal transit percent. Disease severity was determined by histologic score and expression of lipocalin-2. Neuronal density was assessed by Tuj1 staining. Comparisons were by ANOVA.

Results

Intestinal motility was reduced in NEC (FF-NEC 57.2±13.6%, BF-control 98.9±1.6%, $p<0.05$), yet restored by prokinetic agents (metoclopramide 76.5±7.0%, cisapride 73.5±5.0%). Strikingly, restoration of motility significantly reduced NEC severity (severity score: FF-NEC 3±.5, metoclopramide 1.5±.5, cisapride 1.5±.5, $p<0.05$) and reduced lipocalin-2 (FF-NEC 99.4±51.3, BF-control 6.3±1.5, metoclopramide 19.4±4.7, cisapride 12.9±8.2, $p<0.05$). In determining the mechanisms involved, prokinetic agents did not alter enteric neuron expression, indicating that enteric neuron damage was an early event.

Conclusion

Contrary to current thinking, the administration of pro-kinetic agents significantly reduced NEC severity, indicating that ileus is an early cause, and offering new therapeutic approaches for infants with this devastating disease.

Research: Necrotizing Enterocolitis (cont.)

S72

TETRAHYDROBIOPTERIN AMELIORATES EXPERIMENTAL NECROTIZING ENTEROCOLITIS BY REDUCING THE OXIDATIVE STRESS

Shogo Seo, MD, PhD, Hiromu Miyake, MD, Mashriq Alganabi, MD, Maarten Janssen Lok, MD, Joshua S. O'Connell, MD, Carol Lee, Bo Li, PhD, Agostino Pierro, MD

The Hospital for Sick Children, Toronto, ON, Canada

Background and Hypothesis

Oxidative stress leading to nitric oxide synthesis dysregulation is implicated in the pathogenesis of necrotizing enterocolitis (NEC). Tetrahydrobiopterin (BH4) is a cofactor of nitric oxide synthase (NOS). When exposed to oxidative stress, BH4 becomes catalytically incompetent, resulting in a cascade of BH4 loss. When BH4 bioavailability is limited, NOS generates reactive oxygen species (ROS) instead of NO. In addition, BH4 is a scavenger of ROS. BH4 can be administered clinically to adults and children. We hypothesized that BH4 reduces ROS production and has beneficial effects in experimental NEC.

Methods

We studied experimental NEC and BH4 administration in C57BL/6 mice (approval number: 44032). NEC was induced by gavage feeding of hyperosmolar formula, hypoxia, and lipopolysaccharide administration between postnatal day 5 and 9. Mice in the BH4 treatment group (NEC+BH4) were exposed to NEC induction and received intra-peritoneal injection of BH4 once a day during NEC induction. Breast fed pups served as control. On postnatal day 9 the terminal ileum was harvested. Severity of NEC, intestinal inflammation (TNFα by qPCR) and intestinal oxidative stress (Thiobarbituric acid reactive substances; TBARS by Colorimetry) were evaluated. Data are mean ± SD.

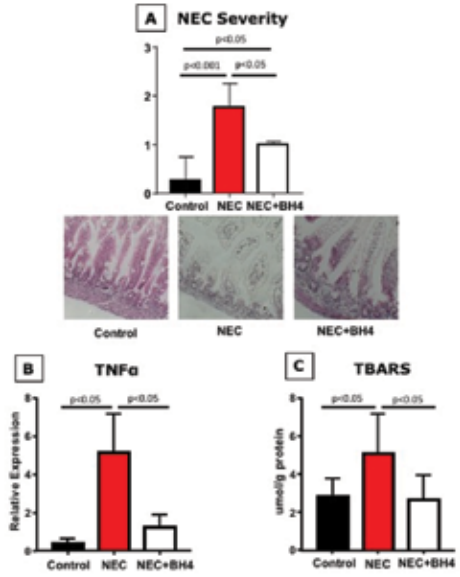
Results

The severity of NEC was significantly decreased in NEC+BH4 group compared to NEC group (figure A). Similarly, the intestinal inflammation (TNFα expression) and the intestinal oxidative stress (TBARS) were significantly decreased in the NEC+BH4 group compared to NEC alone ($p< 0.05$; figure B and C). There were no differences between control and NEC+BH4 in intestinal inflammation and oxidative stress ($p> 0.05$; figures B and C).

Conclusions

Tetrahydrobiopterin administration during experimental NEC reduces severity of the disease, intestinal inflammation and production of reactive oxygen species. Administration of tetrahydrobiopterin in neonates at risk of developing severe NEC can prevent the disease progression by reducing the production of reactive oxygen species.

Research: Necrotizing Enterocolitis (cont.)



Research: Necrotizing Enterocolitis (cont.)

S73

MITOCHONDRIAL DNA IS ELEVATED IN PLASMA OF INFANTS WITH NECROTIZING ENTEROCOLITIS AND ACUTE ABDOMEN

Georgina Navoly[1], Claire Deakin[1], Haris Achilleos[1], Tim Scorrer[2], Mark Peters[1], Nigel J. Hall, MD[3], **Simon Eaton, PhD**[4]

[1]UCL Great Ormond Street Institute of Child Health, London, England, United Kingdom, [2]Queen Alexandra Hospital, Portsmouth, England, United Kingdom, [3]Southampton Children's Hospital, Southampton, England, United Kingdom, [4]Department of Paediatric Surgery, UCL-Great Ormond Street Institute of Child Health, London, England, United Kingdom

Purpose

Mitochondrial DNA (mtDNA) released from necrotic cells may act as a damage associated molecular pattern (DAMP) and is believed to be a key propagator of the systemic inflammatory response. We hypothesised that cell-free mtDNA would be elevated in plasma of infants with conditions in which there is intestinal necrosis, such as necrotizing enterocolitis (NEC) and acute abdomen.

Methods

Ethically approved prospective observational study between May 2013 and September 2016. Cell-free-DNA was isolated from plasma samples of 4 groups of patients: preterm control (n=47; born at <32 weeks, with no suspected NEC); infants with NEC (Bell stage II-III) (n=33); infants and children with other acute abdominal pathology and suspected intestinal ischaemia (acute abdomen, n=28) and infants with no evidence of intestinal pathology having a laparotomy/laparoscopy for other reasons (term control; n=19). mtDNA was analysed using a MT-CO3 mitochondrial gene specific real-time PCR assay, and quantified as copy number/ml plasma. Data were compared using Mann-Whitney test.

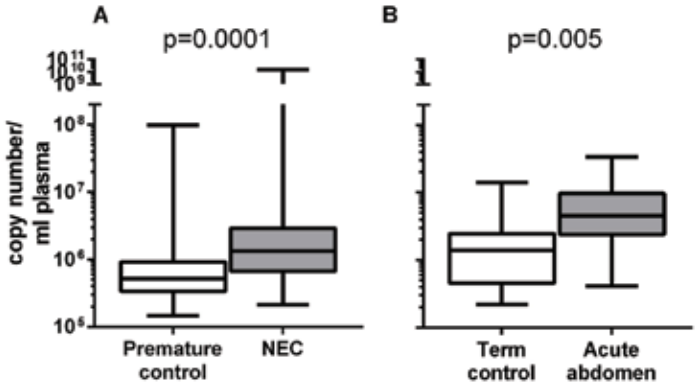
Results

Plasma mtDNA was significantly elevated in plasma samples from NEC infants compared with premature controls (Figure A). mtDNA was also significantly elevated in infants with acute abdomen compared with term controls (Figure B).

Conclusions

Circulating cell-free mtDNA is significantly elevated in infants having diseases involving necrosis of the intestine. We speculate that this mtDNA, along with other DAMPs released from necrotic cells may contribute to the systemic inflammatory response syndrome seen in NEC and similar conditions. mtDNA may be useful as a marker of intestinal necrosis in infants.

Research: Necrotizing Enterocolitis (cont.)



Scientific Session 4: Practice, Education, Trauma

Wednesday, May 22 | 8:30 a.m. – 9:30 a.m.
Salons A-F

S74

IS IT ENDOMETRIOSIS?

Rachel Hanke, MD[1], Andrew de Fazio, MD[2], Todd A. Ponsky, MD[1], Ceana Nezhat, MD[3]
[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]New York Presbyterian Brooklyn Methodist Hospital, Brooklyn, NY, USA, [3]Nezhat Medical Center, Atlanta, Georgia, Atlanta, GA, USA

Tweet it! Is it endometriosis? Let's examine the appearance of this potentially missed source of abdominal pain in adolescent females, and a systematic approach to evaluate for it. @Tponsky @RaeHankeMD #APSA50

Endometriosis is a common cause of abdominal pain in young adults, but the overall incidence in adolescent females appears to be low based on diagnosis by pediatric surgeons. Young patients who present to gynecology with chronic abdominal pain often saw three physicians prior to laparoscopy for confirmation of endometriosis, leading to a 23-month delay in treatment. As pediatric surgeons, we are often the surgical gynecologist for many patients, and frequently perform diagnostic laparoscopies for abdominal pain. Is the incidence in the pediatric population higher than we think, and a source of pain we should be considering during a diagnostic laparoscopy? To determine this, we must first know what to look for. This video will demonstrate what endometriosis looks like and a systematic approach to identify it. With implementation of this approach, pediatric surgeons may find an unexpected source for abdominal pain in adolescent females.

Scientific Session 4: Practice, Education, Trauma (cont.)

S75

EXPLORING THE GENDER GAP: LETTERS OF RECOMMENDATION TO PEDIATRIC SURGERY FELLOWSHIP

Arika L. Hoffman, MD[1], Rachel Ghoubrial[1], Melanie McCormick[2], Praise Matemavi[1], Robert Cusick, MD[3]

[1]University of Nebraska Medical Center, Omaha, NE, USA, [2]University of Minnesota Medical Center, Minneapolis, MN, USA, [3]Division of Pediatric Surgery, University of Nebraska Medical Center College of Medicine, Omaha, NE, USA

Tweet it! @exploringthegendergap Gendered differences in letters of recommendation for applicants applying to pediatric surgery fellowsip

Background
Letters of recommendation (LOR) are considered one of the most important predictors of matching into a pediatric surgery fellowship. In 2008 female surgeons made up 17.9% of the workforce, a number that has increased only slightly in the last decade. To investigate potential unconscious bias in the selection process, we determined if gendered differences exist in LOR written for resident candidates.

Methods
Following institutional IRB approval, we conducted a retrospective review of blinded LOR to a fellowship program between 2015-2017. A dictionary of agentic and communal terms was used to explore differences based on applicant gender and academic rank and gender of the author.

Results
Of the 364 LOR reviewed for 49 female and 48 male applicants, male surgeons wrote 82.5% of letters. Overall male applicant letters were more likely to contain agentic terms ($p=0.042$). Furthermore, program directors and department chairs used more agentic terms in male letters than female letters ($p=0.030$) and ($p=0.021$) respectively. Male applicant letters contained more first name occurrences ($p=0.0082$). Female applicant letters contained more socio-communal phrases referencing an applicant's spouse/family ($p=0.010$) and 4.9% of female letters referenced a spouse's accomplishments vs. 0% of male letters. Approaching statistical significance: female applicant letters containing conjoining adjectives, "the applicant is pleasant, intelligent, and warm" ($p=0.051$) and the phrase "the applicant is mature" ($p=0.052$). We found no difference in an applicant's research experience ($p=0.06$) or leadership qualities ($p=0.067$). However male applicants research descriptions were more likely to contain active possessive language ($p=0.027$). For example, "he published", "he developed", "he presented" vs. "she was an author", "her contribution resulted in presentations".

Conclusion
We confirmed gender differences exist in LOR written for fellowship applicants. Thus, LOR are gatekeeping practices that may contribute to persistent gender gaps in surgery.

Scientific Session 4: Practice, Education, Trauma (cont.)

S76

ASSESSMENT OF OPERATIVE AUTONOMY AND READINESS FOR INDEPENDENT PRACTICE AMONG PEDIATRIC SURGERY FELLOWS

Benjamin Zendejas, MD, MSc[1], Craig W. Lillehei, MD[1], Brian C. George, MD[2], Biren P. Modi, MD[3]

[1]Boston Children's Hospital, Boston, MA, USA, [2]University of Michigan, Ann Arbor, MI, USA, [3]Center for Advanced Intestinal Rehabilitation and Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA

Purpose

It is difficult to estimate trainee readiness for independent practice based on paper-based operative performance assessment forms (OPRS) currently used at many pediatric surgery training programs. The System for Improving and Measuring Procedural Learning (SIMPL) "app" allows case by case assessment of trainees using three easily understood scales (autonomy, performance, and case complexity). Dictated feedback is encouraged and evaluations take <20 seconds to complete. We investigated the quantity and quality of performance assessments after SIMPL implementation.

Methods

A pediatric surgery-specific procedural taxonomy for SIMPL was developed from the ACGME procedural library. SIMPL was piloted and implemented in a single pediatric surgery training program. With IRB approval, participants were surveyed and descriptive analysis of the operative assessments and survey responses was undertaken.

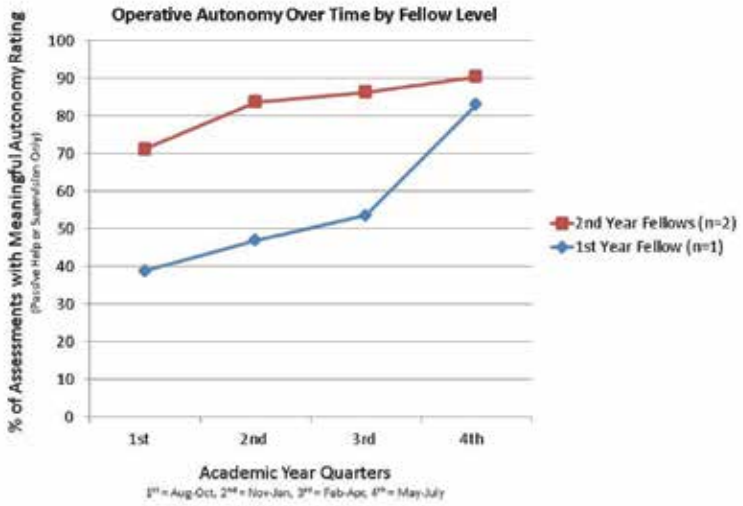
Results

For the three years prior to implementing SIMPL, OPRS assessments were completed on average 9.6 times/fellow/year and limited to 6 procedure types. In contrast, in the year following SIMPL implementation, 565 (39% of cases) assessments were completed by 21 faculty for 3 fellows for 148 unique procedures within a median of 8.5 hours. Recorded feedback accompanied 61% of assessments. 2ndyear fellows were more likely to be deemed autonomous (81% ratings; passive help or supervision only) and practice ready (84%) vs. 1st year fellow (50%; p<0.001 both), with improvements over time (Figure). Nearly all (94%) participants surveyed (87.5% response rate) preferred SIMPL over OPRS and suggested items for improvement, such as automated reminders.

Conclusion

Within pediatric surgery, this is the first implementation of an "app"-based performance evaluation tool. With its ease of use, SIMPL drastically increased the volume of operative evaluations and diversified the case mix while demonstrating expected and graduated performance improvements over time. Use of such technology across pediatric surgery fellowship sites should allow for more robust metrics to evaluate fellows' performance.

Scientific Session 4: Practice, Education, Trauma (cont.)



Scientific Session 4: Practice, Education, Trauma (cont.)

S77

ARTIFICIAL INTELLIGENCE AND VISUAL RECOGNITION IN COMPUTER-AIDED DIAGNOSIS: A PROOF OF CONCEPT FEMUR FRACTURE MODEL

Alejandra M. Casar Berazaluce, MD[1], Alexander T. Gibbons, MD, MS[2], Rachel Hanke, MD[1], Todd A. Ponsky, MD[1]

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]Akron Children's Hospital, University Heights, OH, USA

Purpose

Computer-aided diagnosis is a technology that combines artificial intelligence with medical imaging to assist in the detection of specific pathologies to facilitate or enhance a physician's diagnosis. Most current algorithms require thousands of images and involve great efforts in preprocessing, segmentation, and structuring by data specialists that can delay implementation into clinical practice. With the exponential advances in machine learning and visual recognition, deep neural networks have evolved to create novel algorithms with minimal input processing using libraries available online through open access. With this proof-of-concept model, we evaluate the feasibility of creating a working femur fracture detection tool using IBM Watson Studio.

Methods

A mid-shaft femur fracture model was selected due to the relative simplicity of two-dimensional x-ray imaging and the relatively large features of its anatomy. A Google Image search was performed, and 80 images were selected for this study under a fair use policy. All images were cropped to remove patient identifiers. 4 images were discarded due to incompatible formatting. A binary outcome of yes or no fracture was employed. 32 positive and 34 negative controls were used to train the model. 10 images were used for testing, 5 in each group. The diagnostic threshold was established at 0.8.

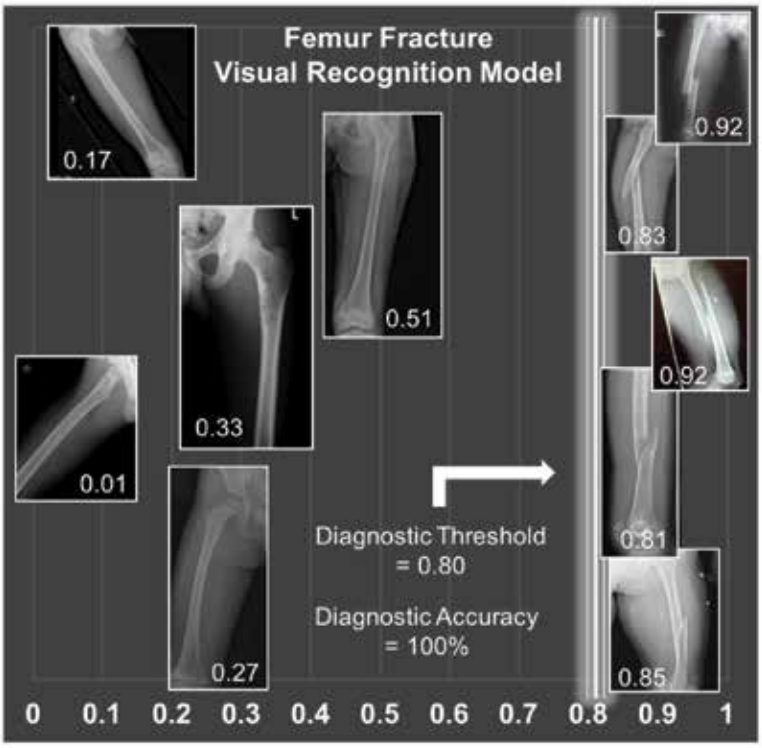
Results

The model had a diagnostic accuracy of 100%. The fracture group had a mean probability of 0.87, SD=0.05. The negative control had a mean probability of 0.29, SD=0.18. The difference between the means was found to be statistically significant at p=0.0001 in an unpaired t-test.

Conclusion

Custom visual recognition models using artificial intelligence and machine learning are a feasible pathway to creating diagnostic tools. Further studies with a greater selection of higher quality images and a wide range of diagnoses and imaging modalities are warranted to explore the possibilities afforded by this technique.

Scientific Session 4: Practice, Education, Trauma (cont.)



Scientific Session 4: Practice, Education, Trauma (cont.)

S78

PREDICTORS OF DISPARITIES IN PEDIATRIC MORTALITY FROM MOTOR VEHICLE CRASHES AMONG US COUNTIES

Ali A. Mokdad, MD, MS[1], Samir Pandya, MD[2], Lindsey Wolf[3], Mark Ryan[1], Faisal Qureshi, MD[4]

[1]University of Texas Southwestern, Dallas, TX, USA, [2]University of Texas Southwestern Medical Center, TX, USA, [3]Brigham and Women's Hospital, Boston, MA, USA, [4]UT Southwestern Medical Center, Dallas, TX, USA

Tweet it! Disproportionately high MVC mortality in children among US rural counties and communities with poor access to pediatric trauma centers. @amokdad12 @UTSW_Surgery @UTSWSurgeryLife

Background

Motor vehicle crashes (MVCs) are a leading cause of unintentional deaths among children in the US. We previously demonstrated marked differences in MVC mortality among US counties. In this study, we investigate county-level drivers of MVC mortality in children.

Methods

Using the Fatality Analysis Reporting System between 2010 and 2015, we identified MVCs deaths, defined as crashes on US public roads resulting in a death within 30 days, among children below the age of 15 years. We used a Bayesian hierarchical mixed effects Poisson model, to evaluate the association between MVC mortality and county-level availability of a pediatric trauma center, urban-rural classification, and emergency response time.

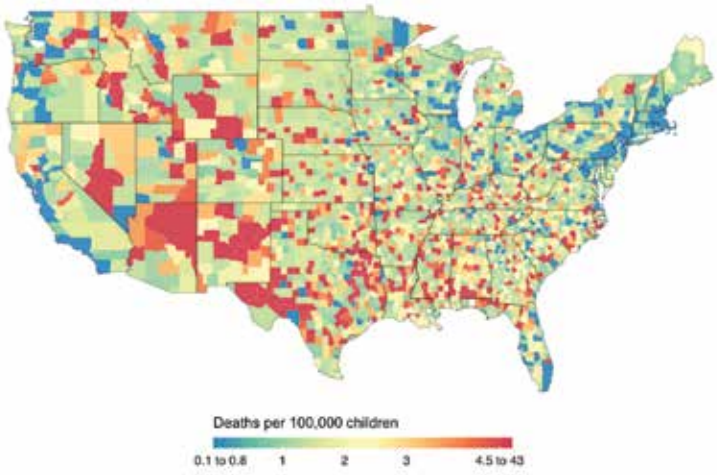
Results

We identified 4,958 children deaths over the study period. The average mortality was 1.6 (95% credibility interval, CI, 1.5–1.7) deaths per 100,000 children. County-level mortality ranged between 0.8 (10th percentile) and 4.5 (90th percentile) deaths per 100,000 children (Figure 1). Availability of a high level (level 1 or 2) pediatric trauma center was associated with a reduction in mortality (odds ratio (OR)=0.36, 95% CI, 0.29–0.44). Compared to large metropolitan counties, rural counties were associated with a higher mortality (OR=4.0, 95% CI, 3.5–4.5). A total of 1,850 children (37%) died in rural counties, despite only 14% of children living in these counties. In addition, 58% of the deaths in rural counties occurred prior to arriving to a hospital. Response time, which was associated with increased mortality (for every minute delay: OR=1.12, 95% CI, 1.11–1.13), was increased in rural counties as compared to large metropolitan counties (9.3 vs 13.3 minutes, P<0.001).

Conclusion

Differences in MVC deaths in children among US counties are related to the availability of pediatric trauma centers and rural designation of counties. Our findings highlight specific communities in the US in need of resources to ensure expedient access to trauma centers.

Scientific Session 4: Practice, Education, Trauma (cont.)



Scientific Session 4: Practice, Education, Trauma (cont.)

S79

TIMING OF NUTRITIONAL ASSISTANCE BENEFIT DISTRIBUTION IS ASSOCIATED WITH RATES OF ADMISSION FOR CHILD ABUSE AND NEGLECT: AN INTERSTATE ANALYSIS OF 3574 ADMISSIONS

Emily R. Christison-Lagay, MD[1], Andrea Asnes, MD[2], **Daniel G. Solomon, MD**[2]

[1]Yale School of Medicine, New Haven, CT, USA, [2]Yale University School of Medicine, New Haven, CT, USA

Tweet it! Hungry Families = Abused Children: Risk of admission for child abuse increases with time since distribution of Supplemental Nutrition Assistant Program (SNAP) Benefits.

Purpose

Recent literature suggests rates of abusive head trauma are associated with negative macroeconomic indicators. We hypothesized a similar microeconomic relationship between admissions for child abuse with time from distribution of supplemental nutritional assistance program (SNAP) benefits.

Methods

The Pediatric Health Information System (PHIS) database was queried to identify dates of admission for injured children with explicit ICD-9/10 codes for abuse and neglect. California and Texas distribute benefits during the first 10 calendar days, while Florida, Illinois and Ohio distribute benefits over 20 days. Abuse admission rates during the first and last weeks of months were compared between narrow/early distribution and long distribution states.

Results

From 1/1/2012 - 12/31/2017, 3574 admissions with codes for abuse were identified at PHIS centers: 1170 in FL/IL/OH, 2404 in CA/TX. In CA/TX where SNAP benefits are front loaded, 22.4% of admissions occurred during the first 7 calendar days of the month while 25.4% of admissions occurred during the last 7 days of the month (RR 1.13) (p=0.03). 18.2% of deaths due to abuse occurred during the first 7 days of the month and 25% during the last 7 days (p=0.14). In FL/IL/OH where SNAP benefits are distributed throughout the month, 21.8% of admissions occurred during the first 7 calendar days while 22.4% of admissions occurred during the last 7 calendar days (RR 1.02) (p=0.78). 20.8% of deaths from abuse occurred during the first 7 days and 27.0% during the last 7 calendar days (p=0.44).

Conclusions

There is a significant correlation with early and narrow distribution of monthly SNAP benefits and increases in abuse admissions later in the month when compared to longer benefit distribution periods- suggesting that as household resources dwindle, there is greater likelihood for child abuse. This data provides support for greater or continuous allotment of nutritional support to at risk families.

Ethics

Wednesday, May 22 | 10:45 a.m. – 11:30 p.m.
Salons A-F

S80

SURGERY AT THE END OF LIFE: A NATIONAL MULTICENTER CASE SERIES FROM CHILDREN'S HOSPITALS

Ryan M. Antiel, MD, MS[1], Michael D. Traynor, MD[1], Matt Hall[2], Thane A. Blinman, MD[3], Michael L. Nance, MD[3], Pirooz Eghtesady[4], Sandi Lam[5], Chris Feudtner[3]

[1]Mayo Clinic, Rochester, MN, USA, [2]Children's Hospital Association, Lenexa, KS, USA, [3]Children's Hospital of Philadelphia, Philadelphia, PA, USA, [4]Washington University in St. Louis, St. Louis, MO, USA, [5]Texas Children's Hospital, Houston, TX, USA

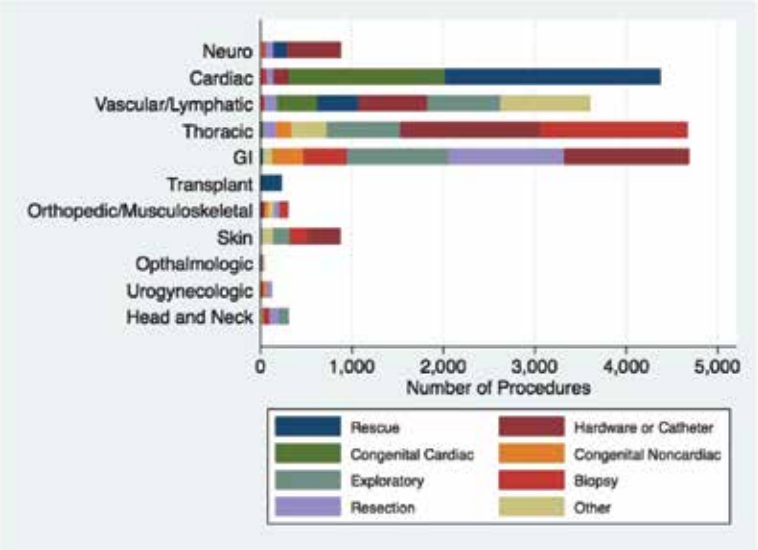
Purpose
While a large percentage of adults are known to undergo surgery at the end of life, patterns of surgery on pediatric patients at the end of life are not well characterized.

Methods
We conducted a retrospective analysis of patients 0-19 years who died during 1,641,252 hospital admissions from January 2013 to December 2015 within 47 US children's hospitals of the Pediatric Health Information System. We identified surgical patients using ICD-9 codes. We assessed the volume and variation of procedures during terminal hospitalizations for non-traumatic causes.

Results
Among 12,396 terminal hospitalizations, 11,567 (93%) patients underwent a total of 20,097 surgical procedures. 5,178 (45%) patients were female, and the median age was 0.3 years (IQR: 0, 6.7). Median hospital length of stay was 7 days (IQR: 2, 26) and the median estimated cost was $51,665 (IQR: $16,842, $186,715). The most commonly coded procedures were extracorporeal membrane oxygenation cannulation (11%, n=2,207); chest tube placements (6%, n=1,111); lung incisions (4%, n=831); gastrostomy tube (2%, n=311), and tracheostomy (1.5%, n=300). Overall, the majority of procedures involved the following systems: gastrointestinal (23%, n=4,684); thoracic (23%, n=4,670); cardiac (22%, n=4,374); and vascular or lymphatic (18%, n=3,606). Classifying procedures according to likely purpose, the most common typologies were to insert or address hardware (24%, n=4,839); attempt to rescue patient from mortality (16%, n=3,230); for exploration (15%, n=3,006), obtain a biopsy sample (13%, n=2,540); and to address congenital cardiac conditions (11%, n=2,176).

Conclusion
Nearly all pediatric patients undergo multiple surgical procedures during their terminal hospitalization. Accordingly, pediatric surgeons play a pivotal role in end of life care.

Ethics (cont.)


Neuro
Cardiac
Vascular/Lymphatic
Thoracic
GI
Transplant
Orthopedic/Musculoskeletal
Skin
Opthalmologic
Urogynecologic
Head and Neck
0
1,000
2,000
3,000
4,000
5,000
Number of Procedures
Rescue
Congenital Cardiac
Exploratory
Resection
Hardware or Catheter
Congenital Noncardiac
Biopsy
Other

Ethics (cont.)

S81

TIMING OF RECONSTRUCTIVE SURGERY FOR PATIENTS WITH DISORDERS/ DIFFERENCES OF SEX DEVELOPMENT (DSD): PRELIMINARY ANALYSIS OF STAKEHOLDER VIEWS ON SUCCESSFUL OUTCOMES

Kathleen van Leeuwen, MD[1], Erica M. Weidler[1], Melissa Gardner[2], Tara Schafer-Kalkhoff[3], Alison S. Baskin[2], Kristina I. Suorsa[2], Meilan M. Rutter[3], David E. Sandberg[2]

[1]Phoenix Children's Hospital, Phoenix, AZ, USA, [2]Department of Pediatrics and Communicable Diseases, University of Michigan Medical School, Ann Arbor, MI, USA, [3]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Purpose

To understand how stakeholders evaluate the process involved in making complex surgical decisions for patients with DSD.

Methods

Stakeholders (n=34) in DSD care (patients, n=6; parents, n=3; healthcare specialists, n=13; and relevant non-provider professionals, n=12) completed interviews exploring determinants and features of successful outcomes. Recordings were coded and analyzed using qualitative data software. Codes for "Process of Decision-Making" and "Specific Successful Outcome–Surgery/ Appearance/Function" were further searched using keywords "surgery", "procedure," or "timing."

Results

The majority of participants specifically mentioned decision-making, informed consent and/or patient autonomy when discussing surgical procedures or interventions. Three adult and one adolescent patient believed the decision for a surgical procedure should rest with the patient. One patient felt they would have been comfortable with the decision if their parent had decided for them to have surgery at an earlier age. All parents felt there were trade-offs associated with choosing early genital and/or gonadal surgery. Participants noted that early surgery could help bring a sense of normalcy to the child, but there was also a fear of resentment if the wrong decision was made. The majority of providers (psychology, child life, endocrinology, neonatology, adolescent medicine, nursing, surgery) and non-provider professionals (bioethics, healthcare administration, clinical research, and law) believed that a thorough discussion about informed consent was important and that patients should be given the autonomy to choose when possible. They also stressed that in the absence of immediate medical need, surgery should be deferred.

Conclusion

DSD include a wide range of diagnoses, some of which may require reconstruction to relieve obstruction, achieve continence, and/or address anatomical differences. Patients desired autonomy and parents expressed conflict over tradeoffs regarding timing of surgery. Providers and other professionals stressed the importance of process and education around surgical decisions. Ongoing research is examining how stakeholders decide among options associated with tradeoffs.

Ethics (cont.)

S82

ETHICAL ASPECTS ON ORGAN PROCUREMENT FROM CHILDREN BORN WITH ANENCEPHALY

Julia E. Mildenberger, Oliver J. Muensterer, MD, PhD

Pediatric Surgery, University Medicine of the Johannes Gutenberg University Mainz, Mainz, Rheinland-Pfalz, Germany

Tweet it! Allowing anencephalic organ donation would add up to 4000 pediatric organ donors per year in the United States, substantially alleviating current organ shortage. However, high ethical and moral hurdles need to be considered.

Background

Donor organs are scarce, especially for young children. About 1 of 1000 children is born with anencephaly. The vast majority of affected patients have a life expectancy less than a few days. While the brain stem is usually intact, these patients lack cortex and therefore, conscience. The goal of this essay is to discuss the different interests of anencephalic organ donation (AOD) from an ethical standpoint.

Methods

The medical literature was searched in pubmed using the terms . A timeline of publication frequency was established. Popular press articles were searched using google, and a Google Trend analysis was performed on the frequency of web searches on the topic over the last 10 years. Using this knowledge, persons and groups of interest were identified along with their standpoints. These were discussed under deontological and utilitarian principles.

Results

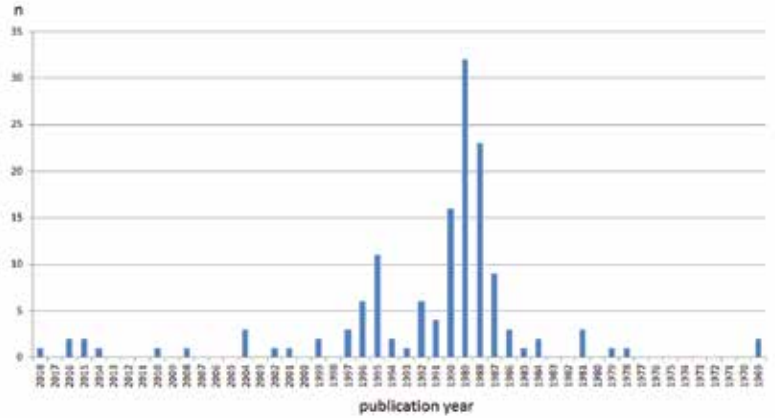
Since the AOD in 1969, over 100 organs from anencephalic donors were transplanted, and over 70 peer-review articles have been published on the topic, mostly in the 1980s/1990s (figure). There was decreasing trend of internet searches on AOD over the last 10 years (figure). Most pediatric associations and societies oppose AOD, while some affected parents are vehemently in favor of making it possible. The greatest medical and surgical challenge is determining the time of death in an expedited manner so that procurement is possible.

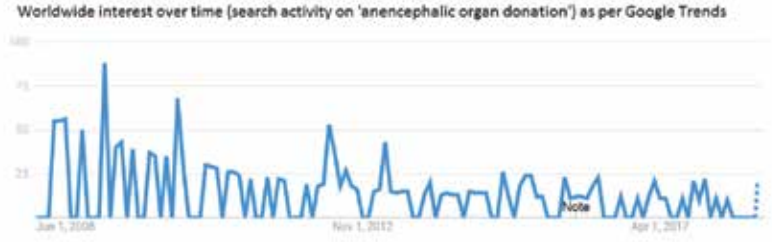
Conclusion

Allowing AOD would add up to 4000 pediatric organ donors per year in the United States, substantially alleviating current organ shortage. However, high ethical and moral hurdles need to be considered. Interestingly, affected parents often advocate for AOD. Only a reasonable discourse can produce an algorithm that would be beneficial and acceptable to all involved.

Ethics (cont.)

Figure: Number of publications on AOD by year (above). Google search activity in the past 10 years (below).





Quick Shots I:

Quick Shots 1: Gastrointestinal Surgery

Sunday, May 19 | 5:15 p.m. – 6:15 p.m.

Salon G

Q1

SURGERY IN CHILDREN WITH VERY EARLY ONSET INFLAMMATORY BOWEL DISEASE

Aimee G. Kim, MD, Jeremy Adler, Ronald B. Hirschl, MD, Samir K. Gadepalli, MSc, MD, MBA
University of Michigan, Ann Arbor, MI, USA

Purpose

Very early onset inflammatory bowel disease (VEO-IBD), diagnosed in children under 6 years of age, is a growing sub-population of pediatric IBD with unique challenges in diagnosis and treatment. Literature on surgical management and outcomes is scarce. We investigated our institution's VEO-IBD cohort and surgical experience.

Methods

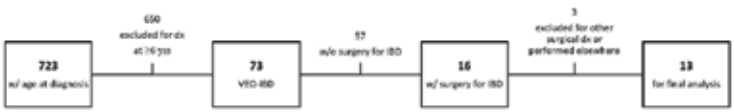
Using a retrospective chart review of a prospectively collected quality improvement registry, all cases of VEO-IBD (diagnosed <6 years) enrolled at our institution between January 2009 and July 2018 were identified. Patients with other major unrelated conditions and/or those who underwent surgery at other institutions, or by adult surgery, were excluded from analysis. Data related to patient demographics, diagnosis, medical management, timing to first IBD-related surgical intervention, complications, and outcomes were analyzed. Descriptive statistics were applied for analysis.

Results

Of 723 patients with IBD and a documented age of diagnosis, 73 (10%) were classified as VEO-IBD. Thirteen (18%) underwent initial IBD-related surgical intervention at a median age of 7.5 years (interquartile range [IQR]: 5.6-11.4), with 7/13 (54%) occurring within 2 years of diagnosis. At the time of surgery, 10 patients were thought to have ulcerative colitis and 3 Crohn's disease; however, 4 patients (31%) had their diagnosis changed at least once. The most common indication for initial surgical intervention was disease refractory to medical management (92%). Eleven of 13 (85%) were on combination therapy (≥2 agents). The median length of stay post-operatively was 6 days (IQR: 4-8) with 1 major immediate complication (anastomotic leak requiring diverting ileostomy), and 2 complications related to an ileostomy (dehydration requiring re-admission and peri-stomal pyoderma gangrenosum).

Conclusion

Ours is the first study to specifically investigate the role of surgery in VEO-IBD. Nearly 1 in 5 required surgical intervention, half within 2 years of diagnosis. Initial diagnosis changed in almost a third.



Quick Shots I (cont.)

Q2

EFFECTS OF PARENTAL ACTIVATION IN CHILDREN WITH INTESTINAL FAILURE

Chinwendu Onwubiko, MD, PhD[1], Michelle C. Shroyer, MPH[1], J. Skyler Graham, BS[1], Linda Wilkinson, MSN, CRNP[1], David P. Galloway, MD[1], Gretchen P. Jackson, MD, PhD[2], Colin A. Martin, MD[1]

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Purpose

Patient activation is knowledge, skill, and confidence in managing one's health. High activation levels have been associated with improved outcomes in adults, but few studies have been done in parents of pediatric patients. We sought to examine the relationship of parental activation to outcomes in pediatric intestinal failure (IF) patients.

Methods

Caregivers of patients with IF completed a Patient Activation Measure® (PAM; Insignia Health, Portland, OR) and health literacy test during a patient encounter. Data collected included demographics, length of bowel, parenteral nutrition (PN) dependence, number of medical care encounters, and central venous catheter (CVC)-associated data. Relationships between activation and outcomes were examined with Fisher's exact and Mann-Whitney tests where appropriate, with significance at $p<0.05$.

Results

Caregivers of 55 patients have been enrolled since January 2018. The mean activation raw score was 79.1 +/-14.7, with 69.1% of caregivers being highly activated (PAM level = 4, scale 1-4); no caregivers recorded the lowest activation score. Median health literacy score of guardians was 6 (IQR 5-7; scale 1-8). Median patient age was 4.8y (IQR 2.1-9.3y), and the median length of time from diagnosis was 4.3y (IQR 2.0-7.5y). Most patients had 10-50% remaining small bowel (45.5%, n=25) and were on PN (54.5%, n=30). High level of activation was not significantly associated with enteral autonomy, fewer hospitalizations/emergency room visits, nor better growth z-scores. There were fewer median CVC infections/1000 catheter days in children with highly-activated parents (6.7 [IQR 3.9-9.1] vs 2.9 [IQR 0.9-7.3]), though not significant ($p=0.097$). Highly activated caregivers had higher health literacy scores ($p=0.02$).

Conclusion

Parental activation levels of IF children were not associated with enteral autonomy, patient growth, hospitalizations, but higher activation was associated with higher health literacy and trended towards fewer CVC infections. High activation in IF parents may be related to the severity and chronicity of the disease.

Quick Shots I (cont.)

Q3

OUTCOMES AND BURDEN OF DISEASE IN ADOLESCENTS WITH NEONATAL ONSET SHORT BOWEL SYNDROME

Sam M. Han, MD[1], Jamie Knell, MD[1], Owen Henry, BS[2], Charles R. Hong[1], Grace Y. Han[1], Steven J. Staffa[2], Biren P. Modi, MD[1], Tom Jaksic, MD[1]

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Tweet it! Outcomes and burden of disease in adolescents with short bowel syndrome: The overall burden of disease remains high for adolescents who remain dependent on parenteral nutrition, however achievement of enteral autonomy is feasible with long-term multidisciplinary rehabilitation.

Purpose

The study aims to describe outcomes and burden of disease in adolescents with neonatal-onset short bowel syndrome (SBS).

Methods

Adolescents 10-19 years of age, defined by WHO criteria, with history of neonatal-onset short bowel syndrome, parenteral nutrition (PN)-dependence ≥90 days and followed by a large, multidisciplinary intestinal rehabilitation center 2009-2018 were included. Non-parametric testing was applied to assess differences in disease burden between PN-dependent and independent adolescents. Survival analysis generated Kaplan-Meier curves for achievement of enteral autonomy.

Results

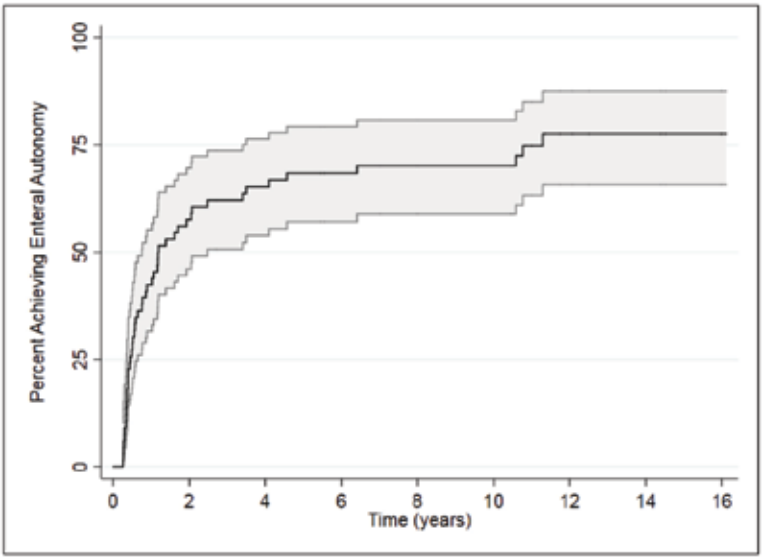
In 70 adolescents with SBS studied, N(76%) achieved enteral autonomy at median(IQR) follow up from disease onset of 10(7,14) years while N(66%) remained transplant free. All reaching adolescence during the study period survived; necrotizing enterocolitis (37%) and gastroschisis (17%) were the two most common causes of SBS. Compared to PN independent patients, those remaining on PN had a shorter neonatal residual bowel length (32(21,54)cm vs. 65(43,87)cm,p=0.01) and a lower serum citrulline concentration (11(8,20)umol/L vs. 23(17,31)umol/L,p<0.001). In adolescents receiving PN, 62% required at least one hospitalization over the prior year compared to 16% in patients weaned off PN(p=0.01). Of those remaining on PN, 54% received at least one procedure over the prior year compared to 22% in those who achieved enteral autonomy(p=0.04). Adolescents on PN had a higher number of outpatient clinic appointments (6(3,15) vs. 2(1,5), p=0.02) and prescribed medications (9(6,14) vs. 4(3,8), p=0.0016). Three patients achieved enteral autonomy after 6 years of follow-up and four after 10 years of follow-up(Figure 1).

Conclusion

Long-term survival for adolescents with neonatal-onset short bowel syndrome is excellent. Of the cohort studied, there was no mortality, and over 75% achieved enteral autonomy. The overall burden of disease remains high for adolescents who remain dependent on parenteral nutrition, however achievement of enteral autonomy is feasible with long-term multidisciplinary rehabilitation, even more than a decade from disease-onset.

Quick Shots I (cont.)

Figure 1. Kaplan-Meier curve with 95% confidence intervals shown for achievement of enteral autonomy without transplantation from the time of initial insult in patients (n=66) with neonatal onset short bowel syndrome.



Quick Shots I (cont.)

Q4

DOES FOLLOWING A MANAGEMENT ALGORITHM FOR ADHESIVE SMALL BOWEL OBSTRUCTION DECREASE THE INCIDENCE OF BOWEL LOSS?

Brittany L. Johnson, MD [1], Giovanni A. Campagna[2], Adam M. Vogel, MD[1], Bindi J. Naik-Mathuria, MD[1]

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Purpose

Adhesive small bowel obstruction (ASBO) is common, and children are at increased risk of bowel loss when operation is delayed. Our aim was to test the effectiveness of a proposed management algorithm.

Methods

Retrospective, IRB approved, chart review of children treated for ASBO between 2011-2015 at a single center. A management algorithm was developed and clinical data, imaging, and outcomes were reviewed to determine whether adherence would have led to improved outcomes. Descriptive statistics, chi-square, and non-parametric tests were used for analysis.

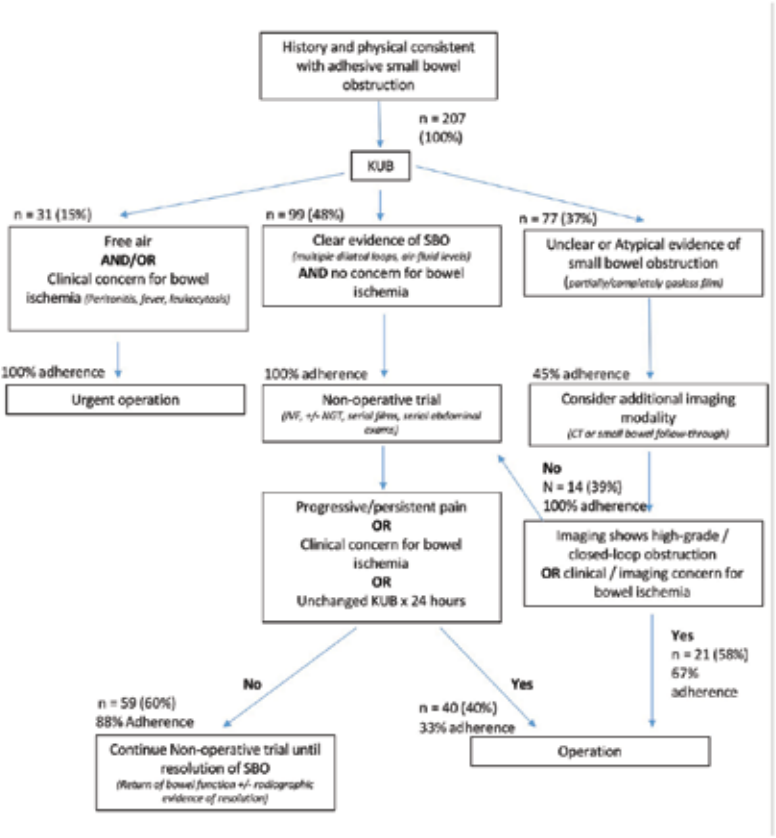
Results

Of 207 patients who met criteria for ASBO (median age 7), 47% were managed operatively and 53% non-operatively. 15% (31/207) were identified as requiring urgent operation and the rest were initially managed non-operatively (Figure 1). 37% of initial radiographs had unclear/atypical evidence of ASBO; however, only 45% received further imaging for clarification. 67% (14/21) of these patients were taken to operation per the algorithm, while operation was delayed in 33% (7/21). Incidence of bowel resection between these two groups was the same (4 (19%) vs. 4 (19%), $p = 0.2$). Of the non-operative trial group, 24 hours after admission, 40% (40) met criteria for operation per the algorithm, but only 33% (13/40) underwent operation at this point. Incidence of bowel resection was significantly lower in this group that followed the algorithm compared to delayed operation (10% vs. 23%, $p = 0.007$). Excluding those requiring urgent operation, had the algorithm been followed, need for bowel resection would have been lower and bowel length loss higher (12% vs. 25%, $p=0.009$ and 19 cm vs 12 cm, $p=0.003$).

Conclusion

For children admitted with adhesive small bowel obstruction, following the proposed management algorithm may aid in identifying need for timely operative management and lead to less bowel loss. A prospective trial is necessary to confirm these findings.

Quick Shots I (cont.)



Quick Shots I (cont.)

Q5

LIPOCALIN-2 INCREASES INTESTINAL PERMEABILITY AND REDUCES ADAPTATION THROUGH CHANGES IN THE GUT MICROBIOME IN SHORT BOWEL SYNDROME

Ailan Zhang, MD, PhD[1], Menghan Wang[1], Elizabeth O'Hare[1], Thomas Prindle[2], William Fulton[2], Chhinder Sodhi[2], David J. Hackam, MD[2], Cynthia Sears[1], Samuel M. Alaish, MD[1]

[1]Johns Hopkins University, Baltimore, MD, USA, [2]Johns Hopkins Children's Center, Baltimore, MD, USA,

Tweet it! Precise anti-lipocalin-2 therapies and the use of fecal transplantation may improve intestinal adaptation in short bowel syndrome patients and reduce the need for parenteral nutrition and intestinal transplantation. Samuel Alaish @ pedisurg

Purpose

Lipocalin-2 plays a key role in pro-inflammatory conditions such as inflammatory bowel disease and nonalcoholic steatohepatitis. Using a 75% small bowel resection (SBR) in a mouse as our model for short bowel syndrome (SBS) , we have previously shown that LCN2 -/- mice that underwent SBR had increased survival, decreased intestinal permeability and increased intestinal expression of carbohydrate enzymes, as compared to wild-type mice that underwent SBR. In addition, LCN2 -/- mice that underwent SBR had an intestinal microbiome similar to sham-operated animals, in contrast to the increased relative abundance of Proteobacteria found in wild-type SBR mice. In this study, we hypothesize that LCN2 exerts changes in intestinal permeability and adaptation through the microbiome.

Methods

Under an ACUC-approved protocol, we performed a 75% SBR on both C57Bl/6J [n=6] and LCN2-/- mice (C57Bl/6J background) [n=6], which mimics the resection seen in some SBS patients. Sham-operated C57Bl/6J [n=6] and LCN2-/- [n=6] mice served as controls. One week later, the mice underwent euthanasia, and cecal contents were collected. A 4% fecal slurry was created from each mouse and gavage fed (fecal transplant) into individual germ-free mice. One week later, the germ-free mice were weighed; intestinal permeability was assayed; euthanasia was performed, and intestine was collected. Statistical analysis was performed using ANOVA with $p<0.05$ considered significant.

Results

Germ-free mice that received fecal matter from LCN2 -/- SBR mice gained 6% of their body weight and had decreased intestinal permeability and longer jejunal villi; whereas, germ-free mice that received transplants from wild-type SBR mice lost 3% of their body weight and had increased intestinal permeability and shorter villi by comparison, $*p<0.05$ (Figure 1).

Conclusion

LCN2 alters the microbiome following SBR which leads to increased intestinal permeability and reduced adaptation. Inhibition of LCN2 may be a novel therapeutic target to improve intestinal adaptation in SBS.

Quick Shots I (cont.)

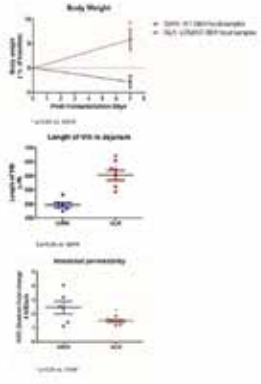


Figure 1 (left):

Upper graph shows body weight of germ free mice increases following fecal transplant from LCN2 KO SBR mice (GLR in rust color); whereas, germ free mice lose weight following fecal transplant from wild-type SBR mice (OWR in blue color).

Middle graph shows jejunal villi length is significantly longer in germ free mice following fecal transplant from LCN2 KO SBR mice (GLR in rust) as compared to wild-type SBR mice (OWR in blue).

Lower graph shows intestinal permeability is significantly lower in germ free mice following fecal transplant from LCN2 KO SBR mice (GLR in rust color) as compared to wild-type SBR mice (OWR in blue color).

Quick Shots I (cont.)

Q6

MORE IS LESS: THE ADVANTAGES OF PERFORMING COMBINED LAPAROSCOPIC CHOLECYSTECTOMY AND ERCP FOR PEDIATRIC CHOLEDOCHOLITHIASIS

Kristin Gee, MD[1], R. Ellen Jones, MD[2], Cameron Casson, MD[3], Lorrie S. Burkhalter[4], David Troendle[5], Bradley Barth[5], Alana Beres, MD[5]

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Introduction
Endoscope retrograde cholangiopancreatography (ERCP) is the standard of care for treatment of choledocholithiasis in adult and pediatric patients. Patients generally undergo separate procedures under general anesthesia in the same hospitalization for ERCP and laparoscopic cholecystectomy. We hypothesized that performing a combined laparoscopic cholecystectomy with ERCP for pediatric choledocholithiasis would reduce costs without increasing complications or anesthesia time.

Methods
After IRB approval, we evaluated all patients admitted to our institution from 2007-2017 with a diagnosis of choledocholithiasis who underwent both ERCP and laparoscopic cholecystectomy during the same admission. We identified 14 who underwent a combined laparoscopic cholecystectomy with ERCP. Of the remaining separate cases, 37 were randomly selected to perform at 2:1 matched case control study. Demographic and clinical data were collected including age, ethnicity, insurance status, pre-operative imaging and laboratory findings, total length of anesthesia, total cost of stay, post-operative complications and follow up. Comparative analysis was completed with t tests and chi-squared tests.

Results
There was no difference in age between the concurrent and separate procedure cohorts (14.3±1.9 vs 14.2±3.9 years, p=0.9). On initial presentation, there was no difference in white blood cell count (9.7±3.4/mL vs 8.1±2.6/mL, p=0.1), total bilirubin (5.0±5.3mg/dL vs 5.1±9.5mg/dL, p=0.9) or common bile duct size on ultrasound (7.4mm±3.2 vs 8.9mm±3.0, p=0.1) between groups. Additionally, there was no difference in total length of anesthesia between concurrent and separate. (117.9±40 vs 108.7±39 minutes, p=0.4). There was also no significant difference in readmission rate, surgical site infection or emergency department visits between the combined and separate cohorts. Patients who underwent a combined procedure had a significantly lower total cost of stay than patients who underwent a separate procedure (45,597±11,512 vs 61,103±18,205, p=0.006).

Conclusion
In pediatric patients with choledocholithiasis, performing a combined laparoscopic cholecystectomy with ERCP led to decreased costs without difference in anesthesia time or complications.

Quick Shots I (cont.)

Q7

NORMALIZATION OF SERUM LIPASE LEVELS VERSUS RESOLUTION OF ABDOMINAL PAIN: A COMPARISON OF PRE-OPERATIVE MANAGEMENT IN CHILDREN WITH BILIARY PANCREATITIS

Kristin Gee, MD[1], David Rosenberg[2], Eugene Kim, MD[1]

[1]Children's Hospital Los Angeles, Los Angeles, CA, USA, [2]University of Illinois College of Medicine, Chicago, IL, USA

Introduction

Controversy exists over the timing of cholecystectomy for biliary pancreatitis in children. Some await normalization of lipase levels while others are guided by resolution of abdominal pain, however there is minimal data to support either practice. We hypothesized that resolution of abdominal pain is equivalent in outcome to awaiting normalization of lipase.

Methods

After IRB approval, the medical record was queried for all cases of cholecystectomy for biliary pancreatitis at our institution from 2007-2017. Patients were stratified into two cohorts: those managed pre-operatively by normalization of serum lipase levels versus resolution of abdominal pain. Demographics, serum lipase levels, post-operative complications, cost of stay, readmissions, and return to the emergency department were collected and analyzed using univariate analysis, Mann-Whitney tests and multivariate regression.

Results

Seventy-four patients met inclusion: 29 patients had lipase levels trended until normalization compared to 45 patients who had resolution of abdominal pain prior to cholecystectomy. Amongst the two cohorts there was no difference in age, gender, or ethnicity. Trended patients were found to have more serum lipase levels tested (8.5±6.2 vs 3.4±2.5, $p<0.0001$). The trended cohort was significantly more likely to require pre-operative TPN (48% vs 11%, $p=0.007$) and had a longer time before resuming a diet (10±7.3 vs 4.6±2.4 days, $p<0.0001$). We found no difference in the duration of surgery, post-operative complications, readmission rates or return visits to the emergency department between groups. Trended patients had a longer length of stay compared to non-trended patients (12±10.8 vs 5±4.1 days, $p<0.0001$) and had a higher total cost of stay ($38,094±25,910 vs $20,205±5,918, $p=0.0007$).

Conclusion

Our data suggests that in children with biliary pancreatitis, proceeding with cholecystectomy after resolution of abdominal pain is equivalent in outcomes to trending serum lipase levels but is more cost effective with a decreased length of stay and need for pre-operative TPN.

Quick Shots I (cont.)

Q8

IS BILIARY DYSKINESIA SUFFICIENT TO ACCEPT THE RISKS OF ELECTIVE CHOLECYSTECTOMY IN THE PEDIATRIC POPULATION?

Lilly Bayouth, MD[1], Laurie Driscoll[2], Kari Beasley[3], Danielle Walsh[2], David Rodeberg, MD[2], Shannon Longshore[2]

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Background

Biliary dyskinesia (BD), though not life-threatening, can impact quality of life in children. Elective cholecystectomy can provide immediate and long-term symptom relief; however, not all surgeons offer cholecystectomy, citing operative risk as a deterrent. This study evaluates operative outcomes in pediatric patients with BD compared to those with all other accepted indications for laparoscopic cholecystectomy.

Methods

Retrospective chart review of patients ages 5-17 years who underwent laparoscopic cholecystectomy during 2010-2016 at this children's hospital was completed. Descriptive, pre-operative, and post-operative outcomes data was collected and analyzed by standard statistical methods using Intellectus.

Results

A cohort of 119 patients, (76.5% female, mean age 13.5 +/- 3.4 years) underwent laparoscopic cholecystectomy for these indications: BD (43.7%), symptomatic cholelithiasis (29.4%), cholelithiasis in sickle cell disease (20.2 %), gallstone pancreatitis (2.5%), choledocholithiasis (3.4%), acute cholecystitis (1.7%), and biliary colic (1.7%). An additional diagnosis of chronic generalized abdominal pain was present in 9%. Additional procedures combined with cholecystectomy occurred in 25%. Post-operative pathology demonstrated chronic cholecystitis in 82% of all patients and 100% of BD patients. The complication rate in BD patients was 0.84% (n=54) and 2.52% in other gallbladder diseases (n =65) (p=0.405) (Table 1). Mean length of stay was shorter for BD patients compared to other gallbladder disease, 0.9 +/- 0.8 day and 2.5 +/- 2.6 days, respectively, $p<0.001$. At initial follow up, 70.2% of BD patients reported symptom resolution; 15% reported symptom improvement. (n=47).

Conclusions

Post-operative diagnosis of chronic cholecystitis in all BD patients suggests BD to be a pathologically significant disease. LOS and complication rates were lower in children with BD compared to other gallbladder diseases. Minimal operative morbidity combined with improved quality of life through resolution of symptoms supports the use of elective laparoscopic cholecystectomy for the treatment of symptomatic BD.

Quick Shots I (cont.)

Q9

PAIN RESOLUTION AND GLYCEMIC CONTROL IN PEDIATRIC PATIENTS AFTER TOTAL PANCREATECTOMY WITH ISLET CELL AUTOTRANSPLANTATION FOR CHRONIC PANCREATITIS

Natalie Fillman, MD[1], Mark Kijek[1], Justyna Golebiewska[1], Piotr Bachul[1], Monica Para[1], Lindsay Basto[1], Laurencia Perea[1], Karolina Golab[1], Ling-jia Wang[1], Martin Tibudan[1], John Fung[1], Jeffrey Matthews[1], Piotr Witkowski[1], **Mark B. Slidell, MD, MPH**[2]

[1]University of Chicago, Chicago, IL, USA, [2]Comer Children's Hospital, The University of Chicago, Chicago, IL, USA

Purpose

Chronic pancreatitis (CP) in pediatric patients is often associated with genetic mutations (PRSS1, CFTR, or SPINK1). Patients may develop opioid dependence, exocrine/endocrine insufficiency, and cancer. Total pancreatectomy with islet autotransplantation (TP-IAT) can relieve pain and achieve glycemic control superior to TP alone, with occasional insulin-independence. We evaluated TP-IAT in young patients to identify factors associated with pain resolution, glycemic control, and dependence on exogenous insulin.

Methods

We retrospectively reviewed 11 patients under age 21 who underwent TP-IAT using a prospectively-maintained database and IRB-approved protocol. Variables included age, BMI, islet yield, opioid use, αcell function, HbA1c, and c-peptide.

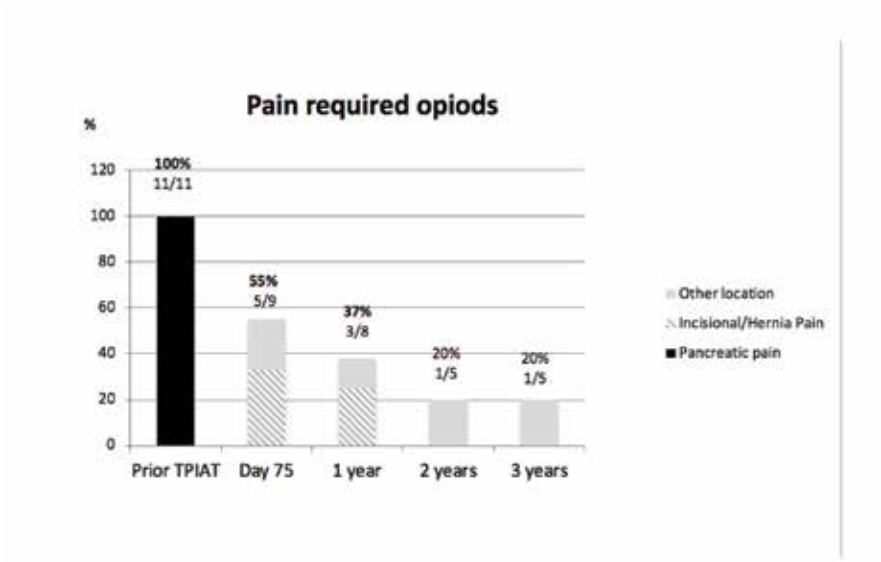
Results

Preoperatively, all 11 patients were opioid-dependent and 1 required insulin. CP was associated with CFTR or PRSS1mutations in 8 (74%), idiopathic in 2, and autoimmune in 1. After TP-IAT, opioid requirements decreased by day 75. No patients experienced pancreatic-type pain but 55% reported "non-pancreatic" pain. Long-term insulin independence (A1c<6.3) was achieved by 5/11 (45%) within 1-year, and by 3/5 (60%) at 2, 3 and 4-year follow up. Insulin dependence after TP-IAT was associated with higher BMI (26.4 [21.7-32.7] versus 18.8 [18-21.2]; p=0.02), and fewer infused islets per kilogram (IEQ/kg) 1,286 [1,005-3,150] versus 4,220 [3,483- 5,177]. Fewer islets were isolated in patients with longer duration of CP (R -0.79, p=0,003).

Conclusion

In pediatric patients, TP-IAT provided resolution of pancreatic pain in all patients but half reported non-pancreatic abdominal discomfort. Insulin independence was achieved in about 60%. Insulin independence was associated with shorter preoperative duration of CP, higher islet yield, and lower BMI.

Quick Shots I (cont.)



Quick Shots I (cont.)

Q10

TEMPORARY GASTRIC ELECTRICAL STIMULATION IN CHILDREN WITH GASTROPARESIS PREDICTS LONG-TERM SUCCESS

Neha Malik, Christopher Jolley, Saleem Islam, MD

University of Florida College of Medicine, Gainesville, FL, USA

Tweet it! Temporare gastric stimulation predicts long term outcome in children with Gastroparesis and functional dyspepsia

Background

Gastroparesis is a debilitating and poorly understood condition that is being diagnosed more frequently in children. Effective medical therapies are extremely limited, and few of those are even available for children. Surgical management has been unsuccessful in long term relief, other than gastric electrical stimulation (GES) which has had more symptom relief for selected patients. Patient selection however remains a challenge, therefore this study aims to investigate the outcomes of using temporary GES (tGES) to help choose patients for long term therapy.

Methods

A retrospective review of all children and adolescents who underwent temporary GES at a single institution was performed and variables regarding demographics, clinical course, comorbidities, therapy, outcomes and responses were collected. The cohort was divided into responders and non-responders (NR) and comparative statistics done to assess differences.

Results

Overall, 140 patients underwent tGES during the study period with an average age of 13.6 years (1.8-18 yrs.), 76.4% females, and 86% Caucasian. 74 had endoscopic leads placed, while 66 trans G tube. 93 responded and had permanent implants, while 47 did not. Responders tended to be older, slightly more female and more Caucasians. NR cases had significantly less abdominal pain (p=0.004) as a presenting symptom but other features (nausea, emesis, bloating, satiety, reflux and lower GI symptoms) were similar, including the same total symptom score. Gastric emptying scores were no different. 80.6% of responders had good symptom control at 2-3 years from implant, while NR had 23% improvement.

Conclusions

tGES is an effective method to assess response to stimulation therapy before permanent implant, and is predictive of long term response as well. There was no clinical way to separate the two groups. NR outcomes are varied, with a significantly higher requirement for supplemental feeding and hospitalization. Further research is needed to understand this group better.

Quick Shots I (cont.)

Q11

MANAGEMENT OF CHOLEDOCHAL CYST BY ISOPERISTALTIC HEPATICOJEJUNOSTOMY WITHOUT ROUX-EN-Y

Abdul Hanif, MBBS, MS, MMEd, Jaglul Gaffer. Khan, MD, Kaniz Hasina, Nazmus Sakib, Mahbubul Alam, MD, Syed Abdull Adi, MD

Dhaka Medical College & Hospital, Dhaka, Dhaka, Bangladesh

Tweet it! Simple surgical technique #Choledochal cyst by #hepaticojejunostomy without #Roux-en-Y

Purpose

Primary cyst excision combined with biliary reconstruction is the standard treatment of choledochal cysts. Roux-en-Y hepatico-jejunostomy (RYHJ) or hepatico-dudenostomy (HD) are the most commonly used techniques for biliary reconstruction. A new simple surgical technique is described in this study is cyst excision combined with biliary reconstruction by antecolic Isoperistaltic hepaticojejunostomy without Roux- en Y. All patients were studied as regard to details of clinical presentation, diagnostic tools, operative details and satisfactory outcome.

Methods

This retrospective study included 08 patients with choledochal cysts, who were treated during the period from 2014 to 2018. Complete excision of the extra-hepatic cysts was done in all patients. All patients were studied as regard to the details of clinical presentation, diagnostic tools, operative details, and outcome. Statistical comparison was done with unpaired t- test, with P value less than 0.05 considered significant.

Results

Age, sex, mean operative time and hospital stay were studied. Postoperative oral feeding was started from 4th POD and drain was removed on 7th POD. Recurrent upper abdominal pain was the commonest presenting symptom in all patients. The mean age is 7.3 ± 2.02 years. The mean operative time was 135 ± 12 minutes. The hospital stay was 8 ± 1.5 days. There were no major intraoperative complications. Biliary leakage occurred in one patient which treated successfully by conservative management.

Conclusions

Antecolic Isoperistaltic hepaticojejunostomy following excision of the choledochal cyst without Roux-en Y is an new alternative technique which avoids intestinal complications may result from conventional Roux-en Y. More over this simple yet less time consuming technique has satisfactory results till to date. However more case studies and long term follow up is required for final comment.

Quick Shots I (cont.)

Q12

IMPLEMENTATION OF A PEDIATRIC ENHANCED RECOVERY PATHWAY DECREASES NARCOTIC UTILIZATION AND SHORTENS TIME TO FULL FEEDING

Michael R. Phillips, MD[1], Gregory S. Maves, MD[2], M Concetta. Lupa[1], Sara L. Pittenger[1], Lyla Hance[1], Sean E. McLean, MD[1], Andrea A. Hayes-Jordan, MD[3], William T. Adamson, MD[4]

[1]The University of North Carolina, Chapel Hill, NC, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA, [3]The University of North Carolina School of Medicine , Chapel Hill, NC, USA, [4]Nemours Children's Hospital, Orlando, FL, USA

Tweet it! #UNCPedsERAS pathway decreases narcotic utilization, shortens time to full feeds, and may decrease length of stay

Introduction

The benefits of enhanced recovery after surgery (ERAS) pathways are well established in adults, but little data exist demonstrating their efficacy or verifying the key components for success in children. We implemented an ERAS protocol for pediatric patients undergoing surgery for inflammatory bowel disease.

Methods

This is a single institution retrospective case review from January 2016-April 2018. Preoperatively patients received a carbohydrate beverage and Acetaminophen. Patients received an epidural catheter or regional block for open or laparoscopic procedures, respectively. Intraoperative IV fluid administration was standardized. Our primary endpoints were the use of regional anesthesia, time to 120mls of PO intake (POI), length of stay (LOS), narcotic utilization, and 30-day surgical outcomes. We compared our results to patients with the same CPT codes at our institution who underwent surgery from April 2014-September 2015. Continuous and categorical variables were compared using a nonparametric T-test and Fisher's exact test, respectively ($p<0.05$).

Results

There were 23 control patients and 28 ERAS patients with similar demographics, surgical approaches, and utilization of neuraxial anesthesia. ERAS patients experienced a significant increase in the use of regional anesthesia, faster time to POI, and a non-significant trend toward a shorter LOS. ERAS patients used less opioids in the peri-op and floor areas, contributing to decreased daily narcotic use. There were similar 30-day outcomes.

Conclusion

This study demonstrates the potential effectiveness of a simple ERAS pathway in pediatric patients. While this is one of the larger studies published to date, it is limited in its sample size and scope of the ERAS protocol. The study demonstrates that narcotic utilization, time to feeding, and potentially LOS may be positively impacted through standardization of care in appropriately selected patients without negatively impacting 30-day outcomes.

Quick Shots I (cont.)

Enhanced Recovery - IBD			
Category	Control (n=23)	ERAS (n=28)	p-value
Age (yr)	14.1 (1.9)	12.6 (3.4)	0.06
Weight (kg)	48.1 (12.9)	46.5 (18.6)	0.7
ASA Status	2.9 (0.3)	2.6 (0.5)	0.02
Length of Procedure (min)	202.9 (80.9)	190.9 (89.5)	0.6
Laparoscopic surgery	8 (34.8%)	12 (42.9%)	0.6
Epidural	13 (56.5%)	13 (46.4%)	0.6
Block	1 (4.3%)	12 (42.9%)	0.002
Any epidural/regional	14 (60.9%)	24 (85.7%)	0.06
Length of Stay (hr)	235.8 (195.2)	155.8 (84.7)	0.06
Time to PO Intake >120mls (hr)	65.5 (48.6)	39.0 (25.0)	0.02
Periop Morphine Equiv (mg/kg)	0.58 (0.27)	0.28 (.16)	0.00001
Floor PCA Morphine Equiv (mg)	153.4 (230.0)	35.6 (117.6)	0.02
Floor IV prn Morphine (mg)	35.0 (68.37)	5.7 (8.6)	0.03
Floor oxycodone (mg)	83.6 (106.0)	34.4 (35.6)	0.03
Total Floor Morphine Equiv (mg/kg)	6.3 (7.4)	1.3 (2.4)	0.002
Daily Floor Morphine Equiv (mg/kg/day)	0.7 (0.9)	0.2 (0.2)	0.01
Return to the ER within 30 days	4 (17.3%)	2 (7.1%)	0.4
Re-admission within 30 days	4 (17.3%)	5 (17.9%)	1.0
Unplanned reoperation within 30 days	2 (8.7%)	0 (0%)	0.2

Quick Shots I (cont.)

Q13

COST-EFFECTIVENESS ANALYSIS OF THE SURGICAL MANAGEMENT OF INFANTS UNDER 1 YEAR OF AGE WITH FEEDING DIFFICULTIES

Yangyang R. Yu, MD, MS[1], Megan E. Cunningham, MD[2], Annalyn S. Demello[2], Eric H. Chiou[2], Panagiotis Kougias[3], David E. Wesson[2], Mary L. Brandt, MD[3], Monica E. Lopez, MD[3]

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Purpose

We performed a cost-effectiveness comparison of the surgical management of infants with feeding difficulty to assess outcomes and costs of common strategies.

Methods

Infants with feeding difficulty undergoing a gastrostomy (GT), fundoplication, or gastrojejunostomy (GJ) were prospectively enrolled. A validated GERD symptom severity questionnaire (GSQ) and visual analog scale (VAS) to assess quality of life(QOL) were administered at baseline, 1 month, and every 6 months. Data collected included demographics, resource utilization, diagnostic studies, and costs. VAS scores were converted to quality adjusted life months (QALMs), and costs per QALM were compared using a decision tree model.

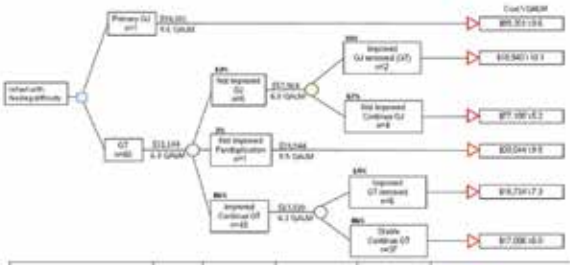
Results

Fifty patients initially had a GT alone (71% laparoscopically); one had a primary GJ. Median age was 4 months (IQR 3-8 months). Median follow-up was 11 months (IQR 5-13 months). Forty-three did well with GT alone. Six (12%) required conversion from GT to GJ; 1 required a fundoplication. Of those with GT alone, six (14%) improved and GT was removed after a mean of 7±3 months. Overall, median GSQ score was 173 at baseline and 18 after 1 year($p<0.001$). VAS scores also improved from 70/100 at baseline to 85/100 at 1 year ($p<0.001$). ED visits (59%), readmissions (47%), and clinic visits (88%) cost $58,091, $1,442,139, and $216,739, respectively. GJ had significantly higher costs for diagnostic testing compared to GT (median $8,768 vs. $1,007, $p<0.001$). Conversion to GJ resulted in costs of $68,241 per QALM gained, while primary GJ resulted in costs of $24,200 per QALM gained compared to GT only [Figure].

Conclusions

Most patients improved with GT alone, without needing GJ or fundoplication. GT and GJ were associated with improvement in symptoms and QOL. GJ patients reported greater gains in QALMS but incurred higher costs. Further analysis of willingness to pay for each additional QALM will help determine the value of care.

Quick Shots I (cont.)



Interventions	Total QALM	Incremental QALM	Total Cost	Incremental Cost	Incremental Cost Effectiveness Ratio (ICER)
GT only (n=40)	6.3	-	$17,030	-	-
GT converted to GJ (n=8)	6.6	+0.6	$57,964	+$40,944	$69,241
Primary GJ (n=1)	8.8	+2.4	$86,331	+$82,291	$34,299
GT with fundoplication (n=1)	9.5	+3.3	$29,044	+$12,024	$3,644

Figure. Decision tree model for the management of infants with feeding difficulty and comparison of incremental cost effectiveness ratio (cost per QALM) gained of interventions with respect to GT only

Quick Shots I (cont.)

Q14

RACIAL AND ETHNIC DISPARITIES IN THE USE OF EPIDURAL ANALGESIA IN CHILDREN UNDERGOING MAJOR ABDOMINAL SURGERY

Dalya M. Ferguson, MD[1], Jonathan K. Chica, MD[1], Jonathan Rodean, MPP, BS[2], Marisa A. Bartz-Kurycki, MD, MS[1], Pascal Owusu-Agyemang, MD[3], KuoJen Tsao, MD[1], Mary T. Austin, MD, MPH[1]

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Purpose

Racial and ethnic disparities are a pervasive problem within healthcare and have been observed in the treatment of acute and chronic pain. However, this has not been well-studied in the pediatric population. This study aimed to determine whether disparities exist in epidural analgesia use for pediatric patients undergoing major abdominal operations.

Methods

Using the Pediatric Health Information System (PHIS) database, a retrospective review of all patients ≤18 years old who underwent a major abdominal operation between 2004-2017 as defined by the All Patient Refined Diagnosis Related Groups (APR-DRG) was performed. Demographic and clinical characteristics were compared between those who received epidural analgesia and those who did not. A generalized linear model with random effects for hospital was used to determine the adjusted odds of receiving epidural analgesia.

Results

A total of 48,167 patients underwent a major abdominal operation during the study period. Of these, 6.5% (3,157) received epidural analgesia. Most were non-Hispanic white (NHW) (57%), <1 year old (34%), and male (57%). In our multivariate model that adjusted for age, gender, race/ethnicity, insurance status, severity of illness within each APR-DRG, and year of operation, non-Hispanic black (NHB) race/ethnicity and age < 1 year were associated with a decreased odds of receiving epidural analgesia compared to NHW race/ethnicity and age 12-18 years, respectively. The odds of receiving epidural analgesia for a major abdominal operation increased within each time period (see Table).

Conclusion

The use of epidural analgesia in children has increased over the last decade. However, NHB race/ethnicity was independently associated with a decreased odds of receiving epidural analgesia after adjusting for other important clinical and sociodemographic factors. Further studies are needed to understand the factors driving this disparity.

Quick Shots 2

Quick Shots 2: Thoracic and Colorectal Surgery
Sunday, May 19 | 5:15 PM – 6:15 PM
Salons A-F

Q15

USE OF AUTOLOGOUS BLOOD PATCH IN PEDIATRIC PATIENTS WITH A PERSISTENT AIR LEAK

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University of Utah, Salt Lake City, UT, USA

Purpose
Autologous blood patch (ABP) pleurodesis for persistent air leak has been well described in adults, but the experience in the pediatric population is limited. The purpose of this patient series was to describe the experience with ABP at a single tertiary children's hospital.

Methods
A retrospective study was performed of all thoracic procedures done by the pediatric surgery service over three years. Medical records were reviewed for documentation of ABP including: reason for the thoracic procedure, timing of ABP, volume used, and time to removal of chest tube.

Results
Ten patients underwent a total of 17 ABPs. The median age of patients was 12 years (IQR 6-16). The underlying reasons for a thoracic procedure included: blebectomy for spontaneous pneumothorax (2), need for lung biopsy (2), resection of known malignant tumor (2), empyema (2), resection of a congenital lobar emphysema (1), and iatrogenic pneumothorax after central line placement (1). The median number of days of persistent air leak before first ABP was 7.5 days (IQR 7-10). A second ABP was performed in 6 cases with a third procedure performed in one case. 9/10 patients had complete resolution of leak; 1 had placement of an endobronchial valve. The median volume of blood instilled via the chest tube was 2 ml/kg (IQR 1.3-2). The tube was clamped for 4 hours following ABP and then returned to suction. The median number of days after last blood patch before chest tube removal was 3.5 days (IQR 2-6). None of the patients developed respiratory compromise during ABP and no infectious complications were identified following ABP.

Conclusions
Our cohort demonstrates that ABP for persistent air leak following thoracic surgery is effective with minimal morbidity in children. We believe ABP can be used early and in patients with a broad range of underlying lung pathology.

Quick Shots 2 (cont.)

Q16

MINIMIZING VARIANCE IN PEDIATRIC SURGICAL CARE THROUGH IMPLEMENTATION OF A SPONTANEOUS PNEUMOTHORAX MANAGEMENT PROTOCOL: A MULTI-INSTITUTION STUDY

Aaron J. Cunningham, MD[1], **Minna M. Wieck, MD**[2], Claire Ostertag-Hill[1], Mubeen A. Jafri, MD[3], Katrine M. Lofberg, MD[4], Kenneth S. Azarow, MD[1], Marilyn W. Butler, MD[3], Nicholas A. Hamilton, MD[1], Sanjay Krishnaswami, MD[1], Andrew Zigman, MD[5], Elizabeth A. Fialkowski[1]

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Tweet it! A standard management protocol for spontaneous pneumothorax can reduce the use of computed tomography in children and demonstrates the efficacy and safety of observation in small pneumothoraces. Work done @ OHSUDoernbecher, @OHSUsurgery, @unningham

Purpose

Controversy persists regarding primary operative intervention and routine use of preoperative computed tomography (CT) in the management of spontaneous pneumothorax in children. As part of a larger institutional initiative to standardize pediatric surgical care, we implemented a protocol for the management of spontaneous pneumothorax to align care and improve resource utilization.

Methods

A nonoperative management protocol for spontaneous pneumothorax was initiated at two children's hospitals, among nine pediatric surgeons in May 2015. Retrospective data were collected for 2.5 years before and after implementation, excluding a 6-month transition period. Demographics, clinical data and outcomes were collected. Admitted patients were stratified by size of pneumothorax. Small pneumothoraces (<20%) were observed. Large pneumothoraces (>20%) underwent tube thoracostomy and negative pressure therapy. Persistent air leak on post-procedure day 4 or recurrent pneumothorax prompted surgical resection. Wilcoxon Rank-Sum and Fisher's Exact tests were performed.

Results

Forty-six primary spontaneous pneumothoraces (pre-protocol =20, protocol =26) were identified in 44 patients. Demographics and clinical outcomes are reported in Table 1. Forty-two subjects (91%) underwent initial nonoperative management with observation or tube thoracostomy (protocol compliance 69%). Following protocol implementation thoracostomy tube duration, length of stay, cost and recurrences were unchanged. Use of CT, however, was significantly less (19% vs. 55%, p=0.015) following implementation. Observation of small pneumothoraces occurred in 36% of nonoperative subjects. Observation was associated with decreased length of stay (1.53 vs. 6.25 days, p<0.001) and cost ($3,679 vs. $14,708, p<0.001) without subsequent increased operative intervention (20% vs. 32%, p=0.497) or recurrence (20% vs. 52%, p=0.057) as compared to those with tube thoracostomy.

Quick Shots 2 (cont.)

Conclusion

Implementation of a standard protocol for the management of primary spontaneous pneumothorax can streamline care and reduce the use of CT in children without increasing length of stay, cost or readmission. Observation of small pneumothoraces can occur without increased risk of subsequent failure.

Quick Shots 2 (cont.)

Q17

EVALUATING PATIENT COMPLIANCE OF PECTUS CARINATUM ORTHOSES WITH TEMPERATURE SENSOR

Elissa Port, Catherine Hunter, MD, Katherine King, Marleta Reynolds, MD

Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

Background

Compliance in patients prescribed a pectus carinatum (PC) orthosis is limited to report by the patient or parent. Evaluation of the deformity is limited to subjective assessment through physical exam and photography. We previously demonstrated that White Light Scanning (WLS), a novel 3D imaging modality, offers an objective alternative that is quick, inexpensive, and safe. Additionally, we showed that a WLS-derived proxy for Haller Index, called the Hebal-Malas Index (HMI) that is used in measuring the surgical correction of pectus excavatum can also be used to evaluate PC deformity pre- and post-bracing intervention. The purpose of this study was to demonstrate the use of a temperature sensor placed in PC orthoses to evaluate weartime and therefore compliance.

Methods

We conducted a prospective review of pre-intervention WLS scans in pediatric patients with PC from 2015-2018. HMI was obtained from the pre-intervention and post-intervention WLS scans. Temperature sensor data was downloaded at each patient visit. Analysis assessed the differences of pre- and post-intervention measurements and the average daily weartime in hours.

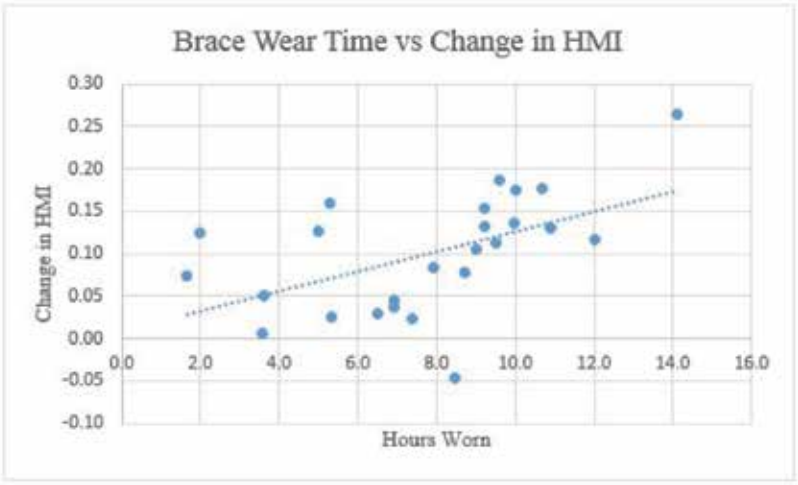
Results

Of 25 patients with both pre- and post-bracing WLS and usable temperature sensor data, 13(52%) wore their brace for an average of 8 or more hours, as prescribed by the surgeon. Average hours worn per day was 7.7(SD: 3.08) and average days braced was 520(SD: 242). All but one patient showed improvement in their PC deformity. T-test analysis showed that those who wore their brace for 8 or more hours per day showed overall greater improvement than those who wore their brace for 1-7 hours ($p<0.02$). Additionally, Figure 1 shows that greater hours worn correlates with greater improvement in carinatum deformity ($r=0.52$, $p<0.01$).

Conclusion

Temperature sensors have the potential to evaluate patient compliance of pectus carinatum orthoses and measure the impact of weartime on change in deformity.

Quick Shots 2 (cont.)



Quick Shots 2 (cont.)

Q18

ANESTHETIC EXPOSURE AND NEURODEVELOPMENTAL OUTCOMES IN TERM INFANTS WITH ESOPHAGEAL ATRESIA AND TRACHEOESOPHAGEAL FISTULA

Nupur Gupta, Jason JT. Mayne, **Priscilla P.L. Chiu, MD, PhD**, Aideen Moore, MD
The Hospital for Sick Children, Toronto, ON, Canada

Tweet it! Anesthetic exposure in childhood is not correlated with adverse neuro-developmental outcome

Exposure to general anesthesia (GA) in early infancy has been a concern due to the potential impact on neurodevelopment. Infants with esophageal atresia with/or without tracheoesophageal fistula (EA/TEF) often undergo multiple, prolonged procedures under GA. Our objective was to examine anesthetic exposure and neurodevelopmental outcomes in a cohort of children with EA/TEF.

A single-center retrospective study of term infants with EA/TEF born between 2000 and 2015 was conducted. With IRB consent, data collected included anesthetic procedures, total anesthesia exposure time, neurodevelopmental outcomes and use of specialist interventions. Pearson correlation evaluated the effect of anesthetic exposure on neurodevelopmental status at age 24-39 months.

Of the 61 term infants identified, mean length of anesthetic exposure time before age 3 years was 7.1 (range 2.3–36.2) hours. Patients required 2 (mean, range 1-11) procedures under anesthesia, 74% were performed before age 1. The most common major procedures performed (mean 2, range 1-8) were EA/TEF repair, fundoplication, cardiac repair and anorectoplasty, while the most frequent minor procedures (mean 1, range 0-3) were esophagoscopy, rigid bronchoscopy and MRI. Anesthetic exposure time and number of procedures were not found to be associated with adverse neurodevelopmental outcomes at age 24-39 months. Neurodevelopmental assessment showed that motor delay was found in 11% of children, cognitive delay in 11% and language delay in 20%, similar to reported outcome studies on complex surgical children. Five infants (8.2%) required major cardiac surgery, there was no significant association with adverse outcome in these, or if the cohort was analysed for major procedures only. There was a trend to more frequent cognitive delay in children with genetic abnormalities, $p=0.07$.

Despite the complex neonatal course of infants with EA/TEF, increased anesthetic exposure did not correlate with adverse neurodevelopmental outcomes. Use of targeted interventions may benefit infants who present with language and motor delays.

Quick Shots 2 (cont.)

Q19

SUCCESSFUL TREATMENT OF FLOYD TYPE I TRACHEAL AGENESIS WITH TRACHEALIZATION AND ESOPHAGOTRACHEOPLASTY USING 3D-PRINTED EXTERNAL BIORESORBABLE SPLINT

Anthony Tsai[1], **Morgan K. Moroi**[1], Joseph B. Clark[2], Andrea Les[3], Barry Fell[1], Thomas Samson[4], Dino Ravnic[4], Scott J. Hollister[5], Glenn E. Green[3], Robert E. Cilley, MD[6], Peter Dillon, MD[1]

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Tweet it! Learn more about the successful treatment of an infant survivor with Floyd type I tracheal agenesis with trachealization and esophagotracheoplasty using a 3D-printed external bioresorbable stent. @PSU_Surgery @antsai @ morgan_moroi

Purpose

Tracheal agenesis (TA) is a rare congenital anomaly with overwhelming mortality and few treatment solutions. Most newborns die shortly after birth, with only seven survivors reported in the literature. We present the successful multidisciplinary management of an infant survivor with Floyd type I TA.

Methods

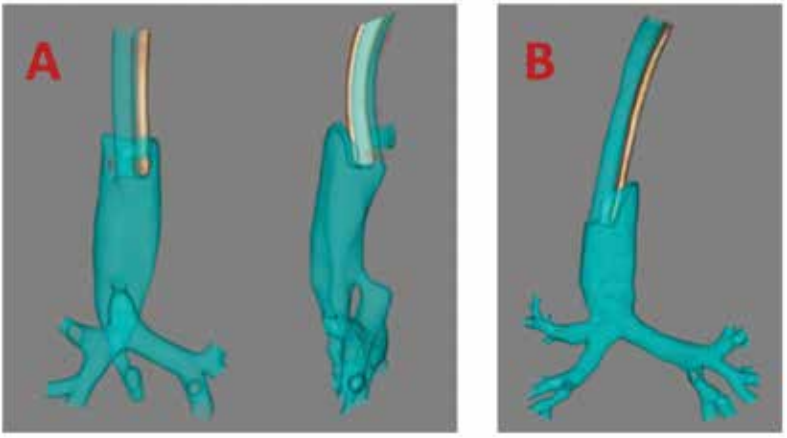
We performed an extensive literature review, risk and benefit analysis of possible long-term solutions, and tomographic imaging with 3-dimensional (3D) reconstruction to engineer and implant a 3D-printed bioresorbable stent for external esophageal airway support.

Results

A 41-week, 3.5 kg female was born at a referring hospital. She developed acute respiratory distress and bradycardia requiring chest compressions and intubation. After stabilizing and transferring to our facility, she was taken to the operating room where type I TA was diagnosed on bronchoesophagoscopy. After consultation with the family regarding diagnosis, a laparotomy was performed, the esophagus was transected distal to the esophagotracheal fistula, and a gastrostomy was performed. At 15 days of age, she underwent airway esophagostomy for tracheostomy tube intubation and creation of cervical esophagostomy. Over the next months, serial bronchoscopy was performed for airway maintenance. Satisfactory growth and weight gain were achieved. With FDA and IRB approval, at 5 months of age, the patient underwent repair of the atrioventricular septal defect followed by airway reconstruction with "trachealization of the esophagus": esophagotracheal fistula resection, esophagotracheoplasty, and placement of a 3D-printed polycaprolactone stent. At 9 months of age, the patient has experienced a favorable postoperative course with significant improvement in respiratory status without need for maintenance bronchoscopy. Neurologic status is intact and she demonstrates appropriate interaction with family and providers. Discharge to home with ventilator support is anticipated soon.

Quick Shots 2 (cont.)

Conclusion
TA is often a fatal, difficult-to-treat pathology. We detail a successful and effective treatment strategy involving implantation of a 3D-printed external bioresorbable stent for infants with TA.



Quick Shots 2 (cont.)

Q20

CERIUM OXIDE NANOPARTICLE CONJUGATED WITH MICRORNA-146A TREATS LUNG INJURY BY DECREASING REACTIVE OXYGEN SPECIES IN BLEOMYCIN INDUCED MURINE MODEL OF PULMONARY FIBROSIS

Sarah A. Hilton, MD, MSHS[1], Carlos Zgheib[1], Hanan Elajaili[1], Lindel C. Dewberry, MD[1], Maggie Hodges[1], Junyi Hu[1], Junwang Xu[1], Sudipta Seal[2], Eva Nozik-Grayck[1], Kenneth W. Liechty, MD[3]

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Tweet it! CNPmiR146a Treats Lung Injury

Introduction

Bronchopulmonary dysplasia (BPD) contributes to morbidity and mortality in former pre-term infants. Pathogenesis is characterized by chronic inflammation and increased oxidative stress leading to pulmonary fibrosis. We hypothesized that a novel therapeutic directed at reducing inflammation and oxidative stress may also reduce fibrosis. MicroRNA-146a is a key regulatory molecule in the NFkB mediated inflammatory response, with downstream effects on pro-inflammatory cytokines. MicroRNA-146a was conjugated to cerium oxide nanoparticles (CNP146a), which are scavengers of reactive oxygen species and rapidly taken up by epithelial cells. Our group has recently found histologic mouse specimens 14 days post-bleomycin induced injury demonstrates decreased inflammation, hemorrhage, and fibrosis in animals treated with concurrent CNP146a. The aim of this project was to further explore the mechanism of action of CNP146a to reduce lung inflammation and fibrosis, and to evaluate if CNP146a could rescue lung injury with administered after bleomycin.

Methods

Ten juvenile (8 week) male C57BL/6 mice, underwent intratracheal instillation of bleomycin (3units/kg), PBS (control), or bleomycin and a single dose of CNP146a (100ng) at day 3 or 7 post injury. Animals were euthanized 14 days post injury. Reactive oxygen species were measured in frozen lung by Electron Paramagnetic Resonance (EPR) using the CMH EPR probe.

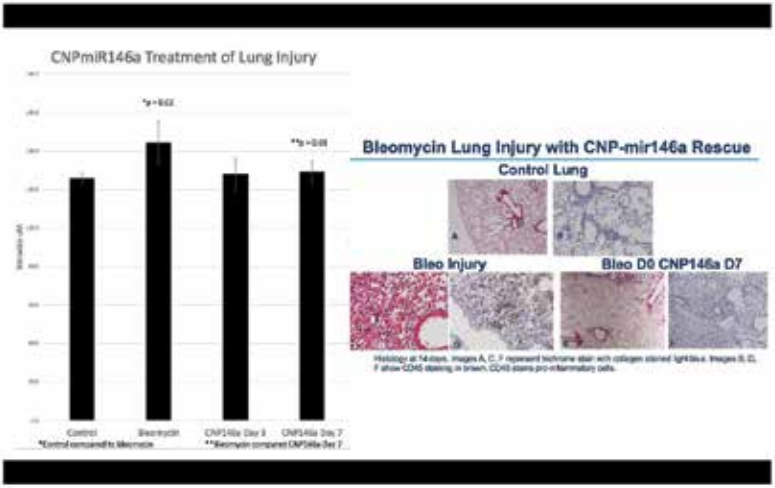
Results

Histologically lungs treated with CNP146a at day 3 or day 7 showed less fibrosis. Nitroxide levels increased in the lungs of bleomycin-treated mice compared to control PBS mice. Treatment with CNP146a at day 7 significantly decreased nitroxide accumulation in lungs. ($p<0.03$).

Conclusions

CNP-146a is a new therapeutic that may prevent and treat chronic pulmonary disease in former pre-term infants. This data indicates that improvement seen histologically is at least in part due to decreased ROS present in the lungs treated with CNP-146a. This strategy synergistically target both reactive oxygen species and production of inflammatory cytokines.

Quick Shots 2 (cont.)



Quick Shots 2 (cont.)

Q21

NATURAL EXCRETION OF ENDOLUMINAL SPRINGS AFTER SPRING-MEDIATED INTESTINAL LENGTHENING

Genia Dubrovsky, MD[1], Anne-Laure Thomas, MS[2], Shant Shekherdimian[3], James C.Y. Dunn, MD[4], **Jordan S. Taylor, MD**[4]

[1]UCLA David Geffen School of Medicine, Los Angeles, CA, USA, [2]Stanford University School of Medicine, Stanford, CA, USA, [3]UCLA, Los Angeles, CA, USA, [4]Stanford University, Stanford, CA, USA

Purpose

Spring-mediated intestinal lengthening has been studied in numerous animal models to effectively achieve up to a 3-fold increase in length. However, both the implantation and retrieval of springs has previously required surgery. In this study, we are interested in determining whether it is possible for springs to safely pass out of the intestine on their own without re-operation, by using dissolvable sutures to secure the springs.

Methods

Juvenile mini-Yucatan pigs (n=6) underwent laparotomy for nitinol spring implantation within the intestine. Springs were secured by intestinal plication or narrowing of the intestine around the springs. Dissolvable sutures were used for the plication. Post-operatively pigs were kept on a liquid diet the first 3 weeks and then advanced to a regular diet. Spring position was followed with radiographs. Pigs were euthanized at either 3 weeks or 2 months. At that time, intestinal segments were retrieved and evaluated for lengthening and histological changes. T-tests were used for analysis.

Results

Pigs tolerated their diet and advancement to a regular diet did not result in any complications. At 3 weeks, there was a 2-fold increase in intestinal length and all springs were in their original locations. At 2 months, springs were found to have safely passed out of the intestine without any complications, and there was a 1.7-fold increase in length (FIGURE). All lengthened segments of intestine showed significant increase in muscularis propria thickness and in crypt depth when compared to unlengthened intestine ($p < 0.001$).

Conclusions

Implanted endoluminal springs are effective in achieving intestinal lengthening. When secured with dissolvable sutures, they are also able to safely pass out of the intestine without any further surgical intervention. These results indicate that multiple operations are not needed to implant and retrieve springs, and may be important in developing future therapies for short bowel syndrome.

Quick Shots 2 (cont.)

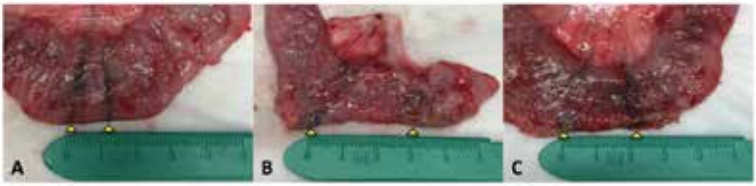


FIGURE. A) Jejunum at 60 days without an implanted spring. B) Jejunum at 21 days with an implanted spring (removed) that has lengthened. C) Jejunum at 60 days with an implanted spring (passed without intervention) that has lengthened.

Quick Shots 2 (cont.)

Q22

THE DUAL-STAGED PATHWAY FOR CLOSURE IN CLOACAL EXSTROPHY: SUCCESSFUL EVOLUTION IN COLLABORATIVE SURGICAL PRACTICE

John Jayman, BS[1], Jason Michaud[2], Mahir Maruf[1], Matthew Kasprenski[1], Rachel Davis[1], Bruce Trock[2], Paul Sponseller[2], John P. Gearhart[1]

[1]Johns Hopkins School of Medicine, Baltimore, MD, USA, [2]Johns Hopkins Medical Institutes, Baltimore, MD, USA,

Tweet it! A staged bladder closure and osteotomy in cloacal exstrophy - evolution of the Dual-staged pathway. We present our experience with this surgical approach.

Introduction

A successful bladder and abdominal wall closure is critical in the management of cloacal exstrophy (CE). This study examines closure outcomes and practices over the last 4 decades at the authors' institution. Beginning in 1995, the authors' institution standardized CE closure and post-op management with the incorporation of staged pelvic osteotomy into staged CE bladder closure, termed the Dual-Staged pathway. The authors' hypothesize that the Dual-Staged pathway has provided better outcomes in CE closures.

Methods

A prospective database of 1332 Exstrophy-Epispadias Complex (EEC) patients was reviewed for CE patients closed between 1975 and 2015. The Dual-Staged pathway consists of a staged osteotomy and a staged bladder closure in CE patients with a diastasis greater than 4 cm. To evaluate the Dual-Staged pathway, outcomes of closure at the authors' institution were compared between two equal, twenty-year periods before and after its implementation. Data on the timing of closure, post-operative management, surgical complications, and outcomes were collected.

Results

There were 49 CE patients with 50 closures at the authors' institution from 1975-2015. The overall success rate of closures from 1975-1994 was 88% (14 of 16), while the success rate of the Dual-Staged pathway was 100% (n=34), p=0.098. Twenty-two (65%) primary and 12 (35%) secondary closures were conducted with the Dual-Staged pathway. Overall complication rates of the Dual-Staged Pathway remained similar to previous closures (29% vs 25%, p=0.99). Since the incorporation of the Dual-Staged Pathway, patients referred for closure had a larger pre-closure diastasis (7.2 cm vs 5.1 cm, p= 0.011).

Conclusion

The standardized Dual-Staged pathway of closure has proven successful in 34 primary and re-operative cloacal closures in the past 20 years. With this approach, the authors feel that the Dual-Staged pathway offers patient safety and better outcomes.

Quick Shots 2 (cont.)

Q23

SUCTION RECTAL BIOPSY IS SAFE AND ACCURATE IN PREMATURE INFANTS

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Tweet it! Pediatric surgical dogma states that biopsies to rule out Hirschsprung disease may be inaccurate in preterm neonates, but is this teaching substantiated? We challenge this claim in our study, "Suction Rectal Biopsy is Safe and Accurate in Premature Infants." @devinrhalleran

Background

The appropriate timing for a suction rectal biopsy in premature infants with suspected Hirschsprung disease (HD) is unclear. The traditional approach of waiting until near term corrected age/weight results in a significant delay in diagnosis with associated morbidity. Few data are available to substantiate the dogma commonly held by pediatric surgeons and pediatric pathologists that biopsies may be inaccurate in preterm neonates. We aimed to address this question.

Methods

We performed a single institution case-control study of all patients who underwent suction biopsies at less than 37 weeks corrected age from 2009-2018 and assessed age, weight at biopsy, pathology, procedural complications, and clinical outcome. All specimens were examined according to a standard protocol.

Results

Forty-nine patients underwent suction biopsy at less than 37 weeks corrected age over the study period. The mean gestational age at the time of biopsy was 35.2 weeks (range 32.1–36.6 weeks) and mean weight was 2126 g (range 1590–3100 g). Five (10%) of these infants had biopsies positive for HD. All 5 later underwent pull-through operations and had pathologic confirmation of an aganglionic segment. The remaining 44 neonates (90%) had biopsies showing ganglion cells. None were later found to have HD. The subset who underwent biopsy at less than 2000 g (16/44) had 100% sensitivity and specificity (2 true positives, 14 true negatives). There were no complications.

Conclusion

These results suggest that suction biopsy can be safely performed in preterm infants as small as 1590–2000 g with a high degree of accuracy. Clinicians should not hesitate to biopsy a premature infant when warranted.

Quick Shots 2 (cont.)

Q24

VARIABILITY OF THE TRANSITION ZONE LENGTH IN HIRSCHSPRUNG'S DISEASE

Hemanshoo Thakkar, MBBS, BSc, FRCS (Paeds)[1], Simon Blackburn[1], Joe Curry[1], Paolo De Coppi[1], Stefano Giuliani[1], Neil Sebire[2], Kate Cross[1]

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Purpose

Surgical management of HD involves fully excising the TZ for fully ganglionic anastomosis. The literature suggests that routine resection of at least 5cm of ganglionic bowel proximal to the aganglionic segment may reduce the incidence of TZ pull-through. In our experience, the length of the TZ zone can be significantly greater than this. Our aim was to evaluate the length of TZ in a series of patients having primary surgery for HD to assess its impact in terms of technical completion and outcome.

Methods

A retrospective review was conducted for all patients with HD undergoing surgery between January 2010 and September 2018 at our institution. Any patients previously operated elsewhere were excluded. Our preference has been to perform a single-stage pull-through where possible. Data was collected on patient demographics, age at presentation, need for a pre-pull-through stoma and complications following surgery. The study received institutional approval (#2395).

Results

48 patients underwent primary pull-through surgery during the study period. 36/48 (75%) were male. 20/48 (42%) patients were diagnosed outside the neonatal period (6 weeks - 50 months). 21/48 (44%) patients needed a stoma prior to their definitive pull-through surgery. The median age at pull-through was 6 months (1-84 months) with 44/48 (92%) of patients undergoing a Duhamel procedure. The median length of the TZ was 2.0cm (0.3-22.9cms). 11/48 (23%) of patients had a TZ >5cm. In this group, 6/11 (55%) presented late, 6/11 (55%) needed a stoma and 3/11 (27%) have needed further surgery including one patient that had a TZ pull-through.

Conclusions

The TZ length in HD is highly variable up to 23cms in our series with nearly 25% >5cm. We would strongly advocate circumferential intra-operative frozen sections of the proximal donut in all cases to avoid having a TZ pull-through.

Quick Shots 2 (cont.)

Q25

FACTORS PREDICTING THE NEED FOR VAGINAL REPLACEMENT AT THE TIME OF THE DEFINITIVE RECONSTRUCTION OF A CLOACAL MALFORMATION

Alejandra Vilanova-Sánchez, MD[1], Devin R. Halleran, MD[2], Carlos A. Reck-Burneo, MD[2], Kate McCracken[3], Geri Hewitt, MD[2], Alessandra Gasior[2], Laura Weaver[2], Hira Ahmad, MD[2], Allison Akers[2], Jordon Jaggers[2], Marc A. Levitt, MD[2], Richard J. Wood, MD[2]

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Tweet it! Vaginal length predicts the need for vaginal replacement in patients with cloaca.

Background
A subset of patients with cloacal malformations require vaginal replacement during their primary reconstruction, increasing the complexity of the procedure. Identifying factors which predict the need for vaginal replacement would facilitate operative planning.

Methods
We retrospectively reviewed patients who underwent primary cloacal reconstruction at our Center from January 2014 to September 2018. The preoperative length of the common channel, urethra, and vagina, were recorded from results of a preoperative endoscopy and 3D cloacagram. The number of cervices, sacral ratio, presence of hydrocolpos, vaginal septum, or tethered cord were also assessed.

Results
50 patients underwent primary reconstruction at a median age of 0.9 years [range 0.7 - 1.5]. 17 of 50 patients (34%) underwent a total urogenital mobilization (TUM). None of these patients required vaginal replacement, and all had a short common channel (≤3cm), and a urethral length of at least 1.5cm. 33 of 50 (66%) patients underwent a complete urogenital separation due to the fact that their urethra was less than 1.5 cm in length. Nineteen of these 33 patients (58%) required vaginal replacement. In the group who underwent urogenital separation, patients requiring vaginal replacement had a significantly shorter vaginal length (4.2cm [2.0 SD] vs 6.6 cm [2.8 SD] ($p<0.01$). There was no difference in urethral or common channel length, number of cervices, sacral ratio, presence of a vaginal septum, hydrocolpos or tethered cord, between those who did and did not require vaginal replacement respectively.

Conclusions
Urethral and common channel length accurately determined which patients underwent a TUM and which required urogenital separation to reconstruct their cloacal malformation. In patients requiring urogenital separation, shorter vaginal length is predictive of the need for vaginal replacement. Preoperative measurements of the common channel, urethra and vaginal length is essential for operative planning and determining the complexity of the reconstruction.

Quick Shots 2 (cont.)

Q26

LONG-TERM IMPACT OF A BOWEL MANAGEMENT PROGRAM IN TREATING FECAL INCONTINENCE IN PATIENTS WITH ANORECTAL MALFORMATIONS

Richard J. Wood, MD[1], Alejandra Vilanova-Sánchez, MD[2], Devin R. Halleran, MD[1], Carlos Reck-Burneo, MD[1], Yuri V. Sebastiao, PhD[3], Hira Ahmad, MD[1], Onnalisa Nash[1], Kristina Booth[1], Casey Trimble[1], Pooja Zahora[1], Cheryl Baxter[1], Sarah Driesbach[1], Andrea Wagner[1], Stacie Leeper[1], Alessandra Gasior, DO[1], Marc A. Levitt, MD[1]

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Background

Many patients with anorectal malformations (ARM) need a bowel management program (BMP) to manage fecal incontinence or severe constipation. Prior literature has not reported outcomes beyond one week. The aim of our study was to evaluate the sustainability of results using standardized definitions and validated parent reported outcomes measures (PROMS).

Methods

A retrospective review of prospectively-collected data of patients with ARM who attended our 1 week BMP from 2015-2017 was performed. Patients were considered clean for stool if they had 1 or fewer accidents per week. Validated tools were used to access fecal continence (Baylor), constipation (Cleveland), urinary symptoms (Vancouver), and quality of life (PedsQL) at the start of BMP week and 1 year after.

Results

There were 149 patients with ARM (90 male) with a median age of 6.6 years (IQR 4.9-9.6). All patients (100%) soiled at the start of the program. 97 (65%) patients were treated with enemas and 52 (35%) laxatives. At 1 year after BMP, 112 patients (75%) were clean for stools. Patients on enemas (n=78, 80%) were more likely to be clean than those on laxatives (n=34, 65%) ($p=0.043$). There was a significant improvement in Baylor (27.2 vs. 18.4, $p<0.0001$) and Vancouver (13.1 vs. 9.7, $p=0.004$) scores from the initial visit to the 1-year post BMP. There was no statistical significant difference between Cleveland (9.6 vs. 9.0, $p=0.16$) or PedsQL (77.7 vs. 78.1, $p=0.42$) scores.

Conclusion

A formal bowel management program using either enemas or laxatives offers significant benefits in the treatment of fecal continence in patients with ARM and also seems to help urinary continence. These changes appear to be sustainable over a period of at least one year. Further study is required to determine why significant clinical improvement does not translate into improved quality of life scores.

Quick Shots 2 (cont.)

Q27

REAL-TIME MAGNETIC RESONANCE IMAGING AND CYSTOSCOPY TO AVOID MISPLACEMENT AND ROOF IN ANORECTAL MALFORMATION CORRECTIVE SURGERY

Matthew W. Ralls, MD[1], Karen Speck[1], Maria Ladino-Torres[1], Peter Mackie, MD[2], Marcus D. Jarboe, MD[1]

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Purpose

Laparoscopic assisted anorectoplasty (LAARP) for anorectal malformations has been performed for many years, but is not without its disadvantages. LAARP requires blind placement of a straight trocar through the sphincter muscle complex (SMC), which is thin and often curved. A second potential problem is leaving a remnant of original fistula (ROOF) when performing the fistula takedown. A ROOF can require reoperation. Our group uses real-time (RT) magnetic resonance imaging (MRI) to delineate the SMC and directs a needle through the complex in a muscle sparing technique. During fistula takedown, simultaneous laparoscopic and cystoscopic visualization is used to determine the appropriate level of ligation to avoid a ROOF.

Methods

Children were safely placed under anaesthesia and into a lithotomy position stabilizer that is MRI compatible. RT MRI needle guidance was performed under the direction of the authors (Siemens Espree 1.5T MRI with T1 Flash RT Sequence) followed immediately by laparoscopic rectal mobilization. Once the fistulae were adequately mobilized, cystoscopy was performed to identify the fistula and urethral anatomy. Ligation was performed with a 2-0 PDS endoloop under direct laparoscopic and cystoscopic visualization, maintaining a scope within the urethral lumen during ligation. The pull-through was performed using the needle to guide dilation to create a tract for the neo-rectum. Charts of patients who underwent RT MRI-LAARP were reviewed. Demographics, anatomy, number of needle passes, OR duration and complications are reported.

Results

Four children underwent RT MRI-guided LAARP with cystoscopic visualization of fistula ligation. Operative time ranged from 266-412 minutes. Hospital stay ranged from 3-5 days. There were no intraoperative complications. One patient had temporary urinary retention post-op.

Conclusions

Muscle sparing laparoscopic assisted anorectoplasty using real-time MRI in conjunction with cystoscopy is feasible, facilitates needle placement through the SMC and provides confidence in appropriate fistula ligation.

Quick Shots 2 (cont.)

Q28

LAPAROSCOPIC MORGAGNI HERNIA REPAIRS WITH AN INTUITIVELY-CONTROLLED ARTICULATING INSTRUMENT

Mercedes Pilkington, MD[1], **Christa N. Grant, MD**[2], James D. Geiger, MD[1]

[1]University of Michigan, Ann Arbor, MI, USA, [2]Penn State Hershey Children's Hospital, Hershey, PA, USA

This video demonstrates the laparoscopic repair of two Morgagni hernias utilizing a novel laparoscopic tool. The first patient was diagnosed incidentally when admitted for a pneumothorax shortly after birth and delayed repair was planned. The diaphragmatic hernia was repaired primarily at 6 months of age. The second patient underwent omphalocele repair on the first day of life. She was later diagnosed with a Morgagni hernia after presenting with an upper respiratory tract infection at 12 months old. While awaiting elective repair she presented with a bowel obstruction and urgent diagnostic laparoscopy was performed. The incarcerated hernia was reduced with adhesions noted between the terminal ileum and heart as the patient was discovered to have no pericardium. The diagnosis of incomplete Pentalogy of Cantrell was made. She underwent laparoscopic reduction and mesh-reinforced repair of the hernia. The anatomy of her incomplete Pentalogy is demonstrated as is the repair utilizing the laparoscopic intuitively-controlled articulating instrument.

Quick Shots 3

Quick Shots 3: Oncology (basic science and clinical)

Sunday, May 19 | 5:15 p.m. – 6:15 p.m.

Salons H-J

Q29

PEDIATRIC CLEAR CELL SARCOMA OF THE KIDNEY: A REPORT FROM THE NATIONAL CANCER DATABASE

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Purpose

Pediatric clear cell sarcoma of the kidney (CCSK) is a rare pediatric renal malignancy. We utilized the National Cancer Database (NCDB) to describe the patient and tumor characteristics, treatment strategies, prognostic indicators, and outcomes in this population.

Methods

We reviewed the NCDB for patients <18 years of age with a diagnosis of CCSK between 2004 and 2014. Differences in Kaplan-Meier survival distributions were compared using log-rank tests. Univariate and multivariate Cox proportional hazard regression models were used to identify predictors of mortality. A P-value of ≤0.05 was considered significant. Analysis was performed using Stata 14/MP (StataCorp LP; College Station, TX).

Results

One-hundred and twenty-two patients were identified. There was no gender predisposition; the median age of diagnosis was 2 years (interquartile range [IQR] 1-3 years) and a majority were white (75.4%). Twelve patients (9.8%) were found to have metastasis at the time of diagnosis. All patients received surgical intervention with positive surgical margins being found in 15.4% of patients. The median tumor size was 12.0 cm (IQR 10-14 cm). Most patients were also treated with a multi-agent chemotherapy regimen (87.7%) and radiation (86.9%). The one- and five-year OS for the total cohort was 97.3% and 92.1% respectively. Multivariate analysis revealed that only the presence of positive lymph node invasion was associated with decreased survival (HR=5.77; CI 0.96-34.7, P=0.05).

Conclusions

Clear cell sarcoma of the kidney is a rare pediatric malignancy that is treated with multi-modal therapy including surgery, chemotherapy and radiation in most cases. We present the largest retrospective analysis of pediatric patients with this diagnosis. Our data demonstrates excellent five-year survival in this group of patients. Positive regional lymph nodes, which signify at least stage III disease, predict worse patient outcomes.

Quick Shots 3 (cont.)

Q30

COMPLICATIONS FOLLOWING NEPHRON-SPARING SURGERY FOR WILMS TUMOR

Hannah R. Spiegl, BS[1], Andrew J. Murphy[1], David Yanishevski, BS, Candidate for MD[1], Rachel Brennan[1], Chen Li, MD, Zhaohua Lu[1], Joseph M. Gleason[2], Andrew M. Davidoff, MD[1]

[1]St. Jude Children's Research Hospital, Memphis, TN, USA, [2]University of Tennessee Health Science Center, Memphis, TN, USA

Purpose

As long-term complications of childhood cancer treatment, including renal dysfunction, are increasingly recognized, nephron-sparing surgery (NSS) for Wilms tumor is being performed more often to preserve functional renal parenchyma. We sought to review the early post-operative complications associated with NSS.

Methods

A retrospective review of all patients who underwent NSS at our institution from 2000-2017 was performed. For comparison, a similar number of radical nephrectomy (RN) patients were reviewed. Surgery details, margin status and early (30-day) post-operative complications were assessed. Statistical analyses were conducted using SAS 9.4.

Results

Sixty Wilms tumor patients underwent NSS; however, five were excluded due to concomitant RN. Forty-six (83.6%) of the 55 NSS cases had synchronous bilateral Wilms tumor and underwent bilateral NSS. The remaining nine had unilateral NSS due to prior RN (4), prior contralateral NSS (4), or congenital solitary kidney (1). Fifty-four consecutive patients who underwent unilateral RN since 2010 were also evaluated. Twenty NSS patients (36.4%) experienced 21 post-operative complications. These included: prolonged urine leak (9), eight of whom required intervention (stent insertion/manipulation); infection (8), four of which were UTIs; transient renal insufficiency (1); and intussusception (3). Seven RN patients (13.0%) experienced surgical complications which included infection (4), three of which were UTIs; and intussusception (3). Average intraoperative blood loss was significantly increased in NSS as compared to RN (507.33mL and 287.88mL, respectively, $P<0.0001$), as was the incidence of positive tumor resection margins (20 [36.3%] and 12 [22.2%], respectively, $P=0.037$).

Conclusions

In our experience, peri-operative complications, primarily prolonged urine leak and blood loss, as well as positive margins, were more frequent in patients undergoing NSS as compared to RN. However, the complications were easily managed, although positive margin status often necessitated more intensive adjuvant therapy, suggesting that in selected cases, NSS is a safe and effective alternative to RN.

Quick Shots 3 (cont.)

Q31

3D PRINTING FOR THE SURGICAL PLANNING OF NEPHRON-SPARING SURGERY FOR BILATERAL WILMS TUMOR

Joshua N. Honeyman, MD[1], Darshit Thakrar, MD[2], Shawn Gottschalk[2], Michael Magnetta, MD[2], Rajeev Chaudhry, MD[2], Stefan Scholz, MD[2], James Cooper, MD[2], Marcus Malek, MD[2], Kelly Austin, MD[2]

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Purpose

Bilateral Wilms tumor (BWT) is associated with high rates of renal failure, and nephron-sparing surgery has become the standard approach to facilitate preservation of renal function while ensuring good oncologic outcomes. We propose that 3D printed models will prove useful tools to facilitate operative planning for nephron-sparing surgery.

Methods

The preoperative CT scan was post-processed utilizing Materialise Mimics and Materialise 3-matic to segment the kidneys, tumor, vasculature and collecting system. 3D PDF files were generated and reviewed with the radiology and surgical services. A 3D model was printed in clear resin on a Formlabs Form 2 SLA 3D printer. The model was painted to highlight surgically relevant anatomy.

Results

Our patient is a 4-year-old female who presented after an abdominal CT scan identified one dominant left renal mass and two smaller right renal masses. With a diagnosis of BWT, she received neoadjuvant chemotherapy according to the Children's Oncology Group protocol AREN0534. Preoperative assessment utilizing the 3D printed model suggested that the right kidney would be amenable to two limited partial nephrectomies, but joining the masses into a single resection would unnecessarily remove normal renal tissue and require entering the collecting system. Although the tumor on the left was limited to the upper pole, a partial nephrectomy would leave a large defect in the collecting system without sufficient tissue for reconstruction. Using our model, this plan was explained and demonstrated to the surgical team and the family. The patient underwent two right partial nephrectomies and a left radical nephrectomy. She is currently receiving adjuvant chemotherapy with preserved renal function.

Conclusion

3D printing of BWT is useful in the surgical planning for partial nephrectomy, potentially increasing nephron preservation and facilitating family and surgical team education. This is an important area for future prospective evaluation of surgical planning and communication.

Quick Shots 3 (cont.)

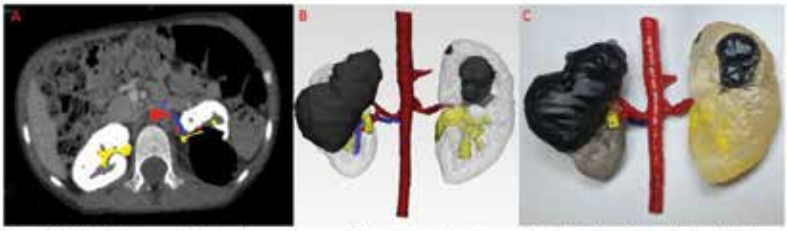


Fig. 1: (a) Axial CT image of bilateral renal tumors, (b) *posterior view* of computer 3D volumetric model, and (c) the correlating *posterior view* of the printed 3D model in resin. In all three images, red structures are arteries, blue are veins, yellow is collecting system, black is tumor, and white is renal parenchyma.

Quick Shots 3 (cont.)

Q32

OUTCOMES AFTER LOCAL THERAPY FOR LIVER METASTASES IN PATIENTS WITH FAVORABLE HISTOLOGY WILMS TUMOR: A SINGLE INSTITUTION STUDY

Todd E. Heaton, MD, MPH, Michael V. Ortiz, MD, James A. Saltsman, MD, Neerav Shukla, Michael P. LaQuaglia, MD, Rachel Kobos, MD, Peter G. Steinherz, Suzanne L. Wolden

Memorial Sloan Kettering Cancer Center, New York, NY, USA

Purpose

To evaluate local therapy outcomes, including surgical resection and whole-liver radiation therapy (WLRT) to 19.5Gy, for the treatment of liver metastasis in patients with favorable-histology Wilms tumor (FHWT).

Methods

With IRB approval, we reviewed records of patients with FHWT liver metastasis treated after 1990. We assessed clinical characteristics, progression-free survival (PFS), overall survival (OS), and adverse effects of WLRT and surgery (utilizing Common Terminology Criteria for Adverse Events (CTCAE) v4.03).

Results

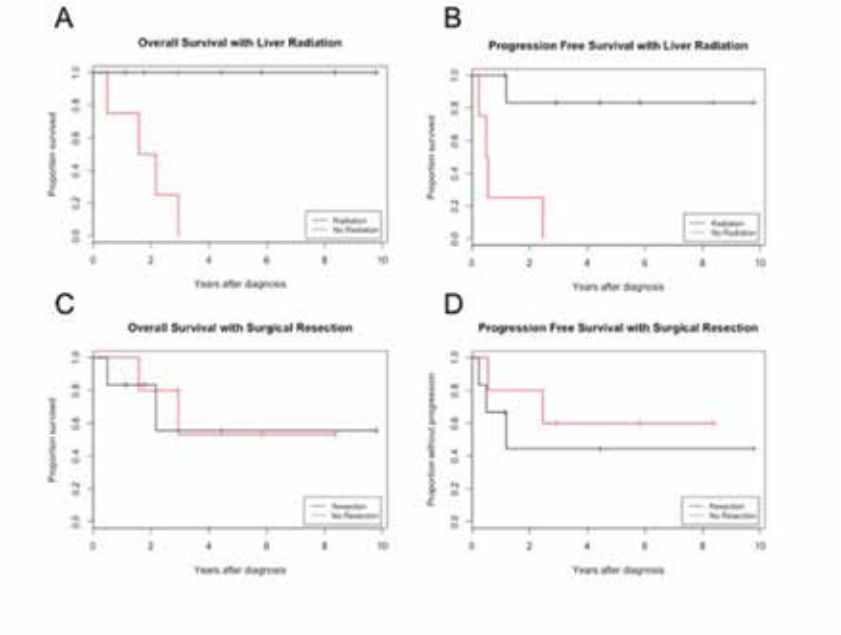
We analyzed 11 patients (7 female). Median age at diagnosis was 6.2yr (range 2-10yr). Six had right-sided primary tumors. At diagnosis, 5 patients had stage 4 disease and 4 had liver metastases. Seven developed liver metastases upon relapse. Four-year OS and PFS for the entire cohort were 55% and 52%, respectively, with a median follow-up of 4.4years (range 1.1-9.8yr) for survivors. In addition to intensive chemotherapy, 4 patients underwent resection and WLRT, 3 underwent WLRT only, 2 underwent resection only, and 2 received only chemotherapy. The WLRT group (n=7) developed no recurrences in the liver, with 1 patient recurring outside the liver. Compared with no WLRT, WLRT was associated with better 4-yr OS (100% vs 0%, p=0.002) and PFS (86%, p=0.02). Surgical resection had no effect on OS or PFS. Liver metastasis at relapse portended a worse 4-yr OS than liver metastasis at diagnosis (p=0.02). During WLRT, patients experienced mild nausea and fatigue, and 5 of 7 developed Grade 1 hepatotoxicity. After WLRT clotting, hepatic, and renal function parameters remained normal.

Conclusion

WLRT to 19.5Gy is safe in pediatric patients and showed promising efficacy for the treatment of FHWT with hepatic metastases. This small cohort could inform treatment recommendations in future randomized trials.

Quick Shots 3 (cont.)

Outcomes after local therapy in patients with Liver metastasis from FHWT.



Quick Shots 3 (cont.)

Q33

RENOVASCULAR HYPERTENSION IN CHILDREN: SURGICAL MANAGEMENT AND OUTCOMES AT A SINGLE CENTER INTERDISCIPLINARY PROGRAM

Stephanie Kim, MD[1], Deborah R. Stein[2], Michael A. Ferguson[2], Diego Porras[2], Gulraiz Chaudry[2], Michael N. Singh[2], Leslie Smoot[2], Heung Bae Kim, MD[2], Khashayar Vakili[2]

[1]Boston Children's Hospital, Brighton, MA, USA, [2]Boston Children's Hospital, Boston, MA, USA

Tweet it! Midaortic Syndrome (MAS), characterized by aortic stenosis with varying involvement of visceral and renal arteries, has serious consequences from extreme hypertension. Surgeries can help prevent such consequences, or even cure some!

Purpose

Renovascular hypertension (rHTN) in children may be secondary to isolated renal artery stenosis (iRAS) or midaortic syndrome (MAS), characterized by aortic stenosis with varying involvement of visceral and renal arteries. Here, we present our surgical experience to treat rHTN within our interdisciplinary program.

Methods

We performed a retrospective chart review of patients who underwent surgery for rHTN from 2011 to 2017. Patients with inflammatory aortitis were excluded.

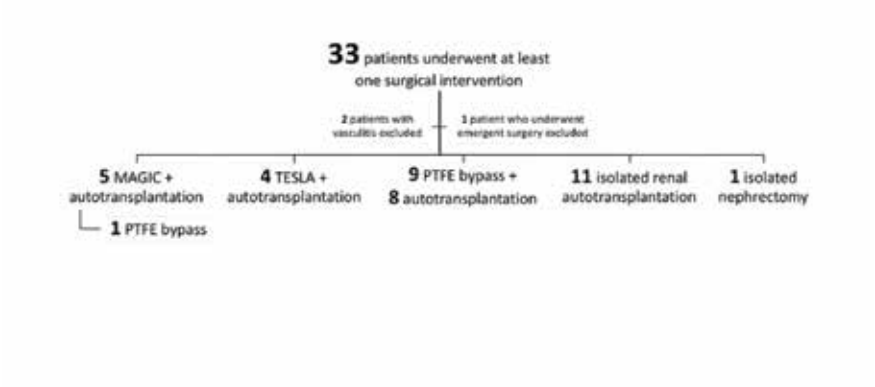
Results

Thirty patients were identified, 10 with iRAS and 20 with MAS. Median age at presentation and at surgery were 6.8 years (range 30 days-17 years) and 9.2 years (range 10 months-18 years), respectively. MAS-associated syndromes included neurofibromatosis 1 (n=5, 17%) and Williams syndrome (n=2, 6.7%), though most were idiopathic. At surgery, 7 patients (23%) had stage 1 hypertension, 16 (53%) had stage 2, and 7 (23%) had normal blood pressure on a median of 3 antihypertensive medications. Surgeries included: 5 mesenteric artery growth improves circulation (MAGIC), 4 tissue expander-stimulated lengthening of arteries (TESLA), and 10 PTFE-graft aortic bypass, including one after previous MAGIC procedure; all but one had at least one renal autotransplantation. Eleven patients underwent isolated renal autotransplantation, and one underwent isolated nephrectomy [Figure]. Follow-up of 27 patients at a median of 2.2 years (15 days-7 years) demonstrated 21 (78%) with normal blood pressure (12 off medications), 3 (11%) with stage 1 hypertension, and 3 (11%) with stage 2, with a median of 1 antihypertensive medication for the entire cohort (range 0-6). Six (20%) had complications requiring reoperation, and 4 (13%) underwent transcatheter interventions after their surgical procedure. There were no mortalities.

Conclusions

Pattern of vascular involvement leading to renovascular hypertension in children is variable and complex. An interdisciplinary approach to surgical decision-making may contribute to excellent outcomes following renal autotransplantation, PTFE-graft bypass or autologous vessel reconstruction methods (TESLA, MAGIC).

Quick Shots 3 (cont.)



Quick Shots 3 (cont.)

Q34

PERIOPERATIVE OUTCOMES AFTER HEPATECTOMY IN CHILDREN: A NSQIP ANALYSIS

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Purpose

Although uncommon, liver resections are sometime necessary in children for benign and malignant disease. However majority of the current knowledge regarding perioperative morbidity is based on data, from small single institutional series. Our aim was to describe perioperative outcomes after pediatric hepatectomies at a national level using the American College of Surgeons National Surgical Quality Improvement Program Pediatric (NSQIP-P) database.

Methods

The NSQIP-P data set was used to identify children who underwent hepatectomy between 2012 and 2016. Thirty-day perioperative outcomes were analyzed for patients undergoing major (left/right hepatectomy or trisectionectomy) and minor (partial hepatectomy) resections.

Results

There were a total of 732 children who underwent 390 (53%) major and 342 (47%) minor resections. The mean age was 2.5 years, with 52% males, 80% ASA >2, and 67% undergoing surgery for malignancy. 30-day postoperative complications occurred in 37% of children (excluding transfusions), these included 2% wound infections, 3% organ space infections, 15% pulmonary complications, 7% readmissions, 9% reoperations, and 1% mortality (Table). Perioperative transfusions were required in 51% of patients and was independently associated with increased overall perioperative morbidity (OR 1.81, 95% CI 1.28-2.56). After adjusting for available confounders trisectionectomy but not left/right hepatectomy, was independently associated with a higher complication rate compared to partial hepatectomy (OR 1.94, 95% CI 1.08-3.49).

Conclusion

To our knowledge, this study analyzes the largest series of hepatic resections in children. Hepatectomy, particularly extended resections in children are associated with significant perioperative morbidity. We are unable to determine if disease pathology or lower surgical volume and therefore surgeon experience is driving the high morbidity. Further investigation into contributing factors of adverse outcomes is warranted to advance the care of children undergoing liver surgery.

Quick Shots 3 (cont.)

Q35

PROGRESSIVE ACCUMULATION OF MUTATIONS ASSOCIATED WITH HEPATOCELLULAR CARCINOMAS IN PATIENTS WITH CONGENITAL PORTOSYSTEMIC SHUNTS

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Purpose

To identify mutations in liver tumours of patients with congenital portosystemic shunts (CPS), and clarify which may contribute to malignant transformation.

Methods

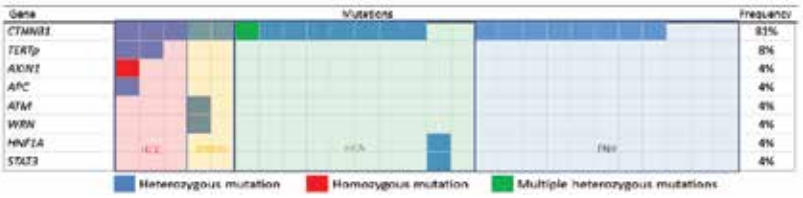
Single-centre retrospective cohort study of patients with CPS. Type 1 defined as end-to-side and Type 2 defined as side-side. DNA was extracted from all histological tumour specimens and available respective background liver. Next generation sequencing was performed for a panel of 52 genes. Categorical data compared using a one-tailed Fisher's test. P value of <0.05 was considered significant.

Results

46 patients with CPS were identified [median age 8 months (IQR 1month– 14 years)]. 21(46%) had liver tumours with higher frequency in Type1 CPS [11/12 (92%) vs.10/24 (42%) ; P < 0.01]. 26 samples were available for gene sequencing. 3/3 (100%) hepatocellular carcinomas(HCCs), 2/2 were well differentiated hepatocellular neoplasms(WDHNs) 8/10 (80%) hepatocellular adenomas(HCAs), and 7/11 (67%) focal nodular hyperplasia(FNH) had somatic mutations in CTNNB1. Mutations affecting the ß-Trcp motif of Exon 3 (amino acids 32-37) and phosphorylation sites (amino acids 41 and 45) accounted for 18/21 (81%) of CTNNB1 mutations. These were more common in aggressive tumours (WDHN, HCC) 5/5 (100%) compared to benign 13/21 (FNH, HCA) tumours but this failed to reach significance (P = 0.16). The presence of multiple mutations was seen with increasing progressive frequency from 2/21 benign to 3/5 aggressive tumours – this difference was statistically significant (P = 0.03). TERT promoter was mutated in 2 HCCs. 1 HCA had mutations of HNF1A and STAT3). Other mutations found were in ATM, WRN, APC, and AXIN1 – all in aggressive tumours.

Conclusions

Tumours are associated with pathogenic somatic CTNNB1 mutations from an early stage of progression from benign to malignant whereas multiple mutations occur at high frequency in aggressive tumours.



Quick Shots 3 (cont.)

Q36

PRIMARY MESENCHYMAL TUMORS OF THE LIVER IN CHILDREN: A POPULATION-BASED ANALYSIS OF A RARE PEDIATRIC TUMOR

Thuy Tran[1], Bethany Slater[2]

[1]University of Illinois at Chicago- MGH, Chicago, IL, USA, [2]University of Chicago, Chicago, IL, USA

Purpose

Primary liver sarcomas in children are extremely rare malignancies. Clinical outcomes and prognostic factors associated with long-term survival remain poorly understood.

Methods

We queried the Surveillance, Epidemiology, and End Results database (SEER) to identify patients with malignant sarcoma of the liver from 1988 to 2012. Demographic factors, tumor characteristics, and long-term disease-specific survival (DSS) were evaluated. Multivariate Cox regression analysis was performed to determine predictors of survival.

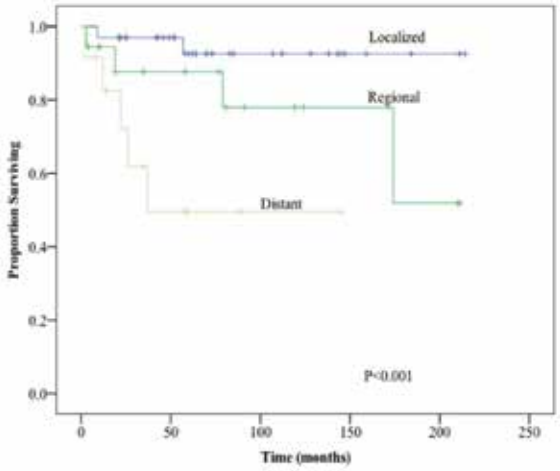
Results

Eighty-nine children (<17 years old) were diagnosed with primary sarcomas of the liver. The median age of diagnosis was 8 years (IQR 5-12 years) and 53.9% were female. The majority were Caucasian (70.8%), while the remaining were African American (15.7%) and Asian (11.2%). Localized disease was observed in 40.4%, regional disease in 27%, and distant disease in 30.3%. Histologies include embryonal sarcoma (74.2), rhabdomyosarcoma (6.7%), hemangioendothelioma (5.5%), hemangiosarcoma (3.4%), and other (10.2%). The majority of patients (>90%) had undifferentiated or high grade disease. Segmental liver resection was performed in 32.7%, major hepatectomy (hemihepatectomy or trisegmentectomy) in 37%, and orthotopic liver transplantation in 2.2% of children. Surgery offers superior long-term outcomes compared to those who didn't undergo resection (5-year DSS 83.7% vs. 24.2%, P<0.001). Among those who underwent surgical resection, extent of disease was associated with survival (5-year DSS for localized 92.6% vs. regional 87.7% vs. distant disease 49.5%,P<0.001). On multivariate analysis, surgery was associated with a significant reduction in mortality (HR 0.36, 95%CI 0.14-0.93,P=0.036).

Conclusion

Contrary to previously reported outcomes in those with primary mesenchymal liver sarcomas, surgical resection should be the mainstay treatment in children with primary liver sarcomas and is associated with favorable outcomes in those with localized or locoregional disease. While most children who succumb to solid malignancies do so because of burden of metastatic disease, palliative resection can offer a survival benefit compared to no surgical resection.

Quick Shots 3 (cont.)



Quick Shots 3 (cont.)

Q37

ZIKA VIRUS AS AN ONCOLYTIC TREATMENT FOR HEPATOBLASTOMA

Joseph Mazar, PhD, Peter Phelan, Jeanne Brooks, Kenneth Alexander, Tamarah Westmoreland

Nemours Children's Hospital, Orlando, FL, USA

Tweet it! Zika virus treatment of hepatoblastoma Treatment of hepatoblastoma cells with Zika virus leads to total cell lysis in only 96 hours and appears dependent upon CD24 as a cell surface receptor. This offers a potential novel therapy for this difficult to treat pediatric cancer.

Purpose

Despite intensive therapies, children with hepatoblastomas continue to have poor prognoses. We propose the use of Zika virus as a means of treating children with hepatoblastoma. Previous work in neuroblastomas revealed that they are susceptible to Zika virus and the cell surface receptor, CD24, was required for tumor cell lysis. Based upon these findings, we propose that Zika virus infection could be used as a primary or rescue therapy for children with hepatoblastomas.

Methods

We utilized the hepatoblastoma cell line HUH-6 to examine cell cytotoxicity after treatment with Zika virus. Data was collected every day over a five day period using fluorescence-based real-time detection assays for kinetic analysis as well as endpoint determination. Cell survival was also directly correlated with examination by bright field microscopy. In addition, qRT-PCR was performed to determine if CD24 expression was present in HUH-6 cells.

Results

qRT-PCR confirmed that CD24 expression was present in HUH-6 cells at even higher levels than that seen previously in neuroblastoma cells, predicting susceptibility to Zika virus-mediated cell lysis in hepatoblastoma cells. After treatment with Zika virus, significant increases in cell cytotoxicity were confirmed in the HUH-6 cells as early as 24 hours, increasing dramatically in a time-dependent manner, and plateauing by 96 hours. Examination by bright field microscopy confirmed total cell lysis at this time point (compared to 100% confluency in uninfected cells).

Conclusion

The effectiveness of Zika virus in the treatment of human hepatoblastoma cells correlates with results seen previously in neuroblastomas, though the rate of increase in cell cytotoxicity appears to be even more rapid. Previously identified cells that expressed CD24 showed significant susceptibility to Zika virus-mediated tumor cell lysis, a result which is corroborated in the HUH-6 hepatoblastomas, further validating the potential for CD24 as a prognostic marker for Zika efficacy as a therapeutic treatment.

Quick Shots 3 (cont.)

Q38

CONSOLIDATED CANCER CARE DOES NOT PROVIDE BENEFITS FOR SURVIVAL OR READMISSION RATES IN CHILDREN WITH METASTATIC NEUROBLASTOMA

Harold J. Leraas, MD, MHS, MA[1], Brian Ezekian[2], Aaron M. Tarnasky[3], Christopher R. Reed, MD[1], Sarah Jane Commander[2], Tamara N. Fitzgerald, MD[4], Henry E. Rice, MD[1], Elisabeth T. Tracy[1]

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Purpose

Consolidated cancer care has been touted to improve patient care by providing all oncologic treatments in a centralized location with organized provider teams. Previous studies hypothesized that consolidated care would improve patient survival, reduce complications, and reduce cost. We sought to examine survival of patients receiving multimodal care for neuroblastoma. We hypothesized that consolidated care would provide benefits in survival and readmission for children treated at a single center.

Methods

We queried the 2017 National Cancer Database for children who had undergone surgical resection and radiation therapy for neuroblastoma. Patients were compared by treatment at one facility vs. separate facilities. Pearson's chi-square test, Kruskall-Wallis test, generalized logistic regression, and Kaplan-Meier curves were used to compare children who received consolidated care to those receiving fragmented care. Subset analysis was conducted for children with metastatic disease.

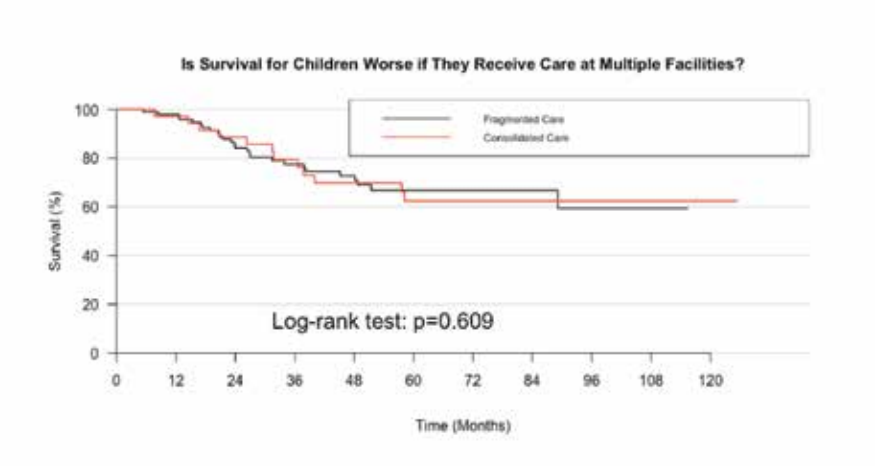
Results

We identified 154 patients with neuroblastoma treated with surgical resection and radiation therapy; 104 had documented metastatic disease. There was no significant difference between the fragmented and consolidated care group based on age, sex, race, tumor size, tumor grade, node positivity, margin positivity, or chemotherapy treatment (all $P>0.05$). These findings were true in subset analysis of metastatic patients. Multivariate analysis of mortality risk demonstrated that metastatic disease (OR 4.69, $P=0.02$), but not fragmented care, age, node positivity, or treatment with immunotherapy was significantly associated with patient mortality (all $p>0.05$). Kaplan-Meier analysis demonstrated no difference in long-term survival based on fragmentation of care in metastatic patients and the overall study population (log-rank $P=0.926$).

Conclusion

For children with advanced neuroblastoma, fragmented care does not increase risk of mortality or readmission. This should be considered when planning care for families that live far from consolidated treatment centers. Further examination of less severe disease and other tumor types is necessary to clarify the benefits of consolidated oncologic care.

Quick Shots 3 (cont.)



Quick Shots 3 (cont.)

Q39

IMPACT OF MYCN STATUS ON RESPONSE OF HIGH-RISK NEUROBLASTOMA TO NEOADJUVANT CHEMOTHERAPY

David Yanishevski, BS, Candidate for MD, M. Beth McCarville, Mikhail Doubrovin, Xiwen Zhao, Zhaohua Lu, Sara Federico, Wayne L. Furman, Andrew J. Murphy, Andrew M. Davidoff, MD, Hannah R. Spiegl, BS

St. Jude Children's Research Hospital, Memphis, TN, USA

Purpose

MYCN-amplification in neuroblastoma is associated with an aggressive phenotype. However, its impact on initial tumor response to neoadjuvant chemotherapy is unknown. We evaluated this impact to assist in pre-operative planning for patients with high-risk neuroblastoma.

Methods

In this retrospective study, primary tumor response, as assessed by percentage volume change on CT scan, and degree of tumor resection, as assessed by the operating surgeon (≥ or <90%), were compared in 84 high-risk neuroblastoma patients, thirty-four (40%) MYCN-amplified and fifty (60%) non-amplified, treated at our institution from 1999-2016. In addition, the response of metastatic disease was assessed on MIBG scan by the change in Curie score, the maximum score being 28 (one point for primary tumor being avid, 1-3 points for avidity in any of nine body segments). Fisher's exact test or Wilcoxon rank sum test were used to compare these variables between patients with and without MYCN-amplification.

Results

MYCN-amplification, as compared to MYCN non-amplification, was associated with a greater mean percentage reduction in primary tumor volume after neoadjuvant chemotherapy (72.27% and 46.83% respectively, p=0.001) as well as the absolute average decrease of tumor volume (576.91±89.35cm3 and 355.11±67.92cm3, respectively, p=0.022). The percentage of patients with a Curie score >2 at diagnosis who had a score ≤2 after induction chemotherapy was not significantly different (23.53% and 16% respectively, p=0.37), however. Overall, 72 patients (85.7%) were able to have ≥90% of their primary tumor/locoregional disease resected, an outcome that was not significantly influenced by MYCN status (79.41% and 90% respectively, p=0.361).

Conclusions

In our experience, MYCN-amplification in high-risk neuroblastoma was associated with a better response of the primary tumor, but not metastatic sites, to induction chemotherapy than non-amplified tumors, with a significantly greater decrease in tumor volume. However, this did not significantly impact the ability to resect ≥90% of the primary tumor/locoregional disease.

Quick Shots 3 (cont.)

Q40

DEPLETION OF PULMONARY ALVEOLAR MACROPHAGES INHIBITS METASTATIC OUTGROWTH IN A MOUSE MODEL OF OSTEOSARCOMA

Caroline W. Maloney, MD, PhD[1], Michelle P. Kallis, MD[2], Morris Edelman[3], Marc Symons[4], Bettie Steinberg[4], Samuel Soffer, MD[5]

[1]Zucker School of Medicine at Hofstra/Northwell, Cohen Children's Medical Center at Northwell Health, New Hyde Park, NY, USA, [2]Zucker School of Medicine at Hofstra/Northwell, Cohen Children's Medical Center at Northwell Health, New York, NY, USA, [3]Hoftstra Northwell School of Medicine, New Hyde Park, NY, USA, [4]Northwell Health Feinstein Institute for Medical Research, New Hyde Park, NY, USA, [5]Northwell Health, Division of Pediatric Surgery, Steven and Alexandra Cohen Children's Hospital, New Hyde Park, NY, USA

Tweet it! Outcomes for patients with metastatic osteosarcoma have not improved in the last 30 years. Repurposing the EGFR inhibitor gefitinib offers a novel therapy for pulmonary metastasis in osteosarcoma by altering immunosuppressive macrophages in the lung microenvironment. @cmaloney212

Background

Pulmonary metastasis is the most common cause of mortality in osteosarcoma (OS) patients. Alveolar macrophages (AM) facilitate lung homeostasis by creating an immunosuppressive environment. However, immunosuppressive macrophages have been shown to promote metastasis. We have demonstrated that macrophages promote OS invasion which can be blocked by modulating macrophage activity with the drug gefitinib. Furthermore, gefitinib reduced pulmonary metastatic burden in a mouse model of OS. We hypothesize that AMs promote OS metastasis and that depletion of AMs will inhibit metastasis.

Methods

Mouse OS cells (K7M2) were implanted into the tibia of BALB/c mice (n=38). One week post-implantation mice were randomized to 4 groups (n=9-10/group): Group 1: Control chow, control liposomes; Group 2: Control chow, clodronate liposomes; Group 3: Gefitinib chow, control liposomes; Group 4: Gefitinib chow, clodronate liposomes. For selective AM depletion, mice were intranasally administered clodronate every four days, starting one week after tumor implantation. Control mice received PBS liposomes. Concurrently, mice were treated with either gefitinib-impregnated or control chow. Lungs were harvested 4 weeks after tumor implantation and metastatic burden was calculated.

Results

Both gefitinib treatment and AM depletion with clodronate resulted in reduction in metastatic burden ($p<0.01$). Histologic analysis of clodronate-treated lungs revealed extensive lymphocytic infiltrate and lymphoid hyperplasia. Treatment with gefitinib in the absence of alveolar macrophages induced no additional reduction of metastatic burden. (Fig 1).

Conclusions

Selective depletion of alveolar macrophages with clodronate inhibited the development of metastatic disease and increased immune cell infiltration. Treatment with gefitinib in the absence of macrophages had no additional effect, suggesting gefitinib acts by impacting alveolar macrophages.

Quick Shots 3 (cont.)

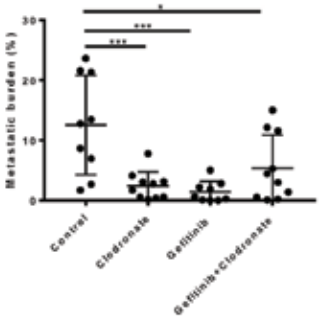


Figure 1. Depletion of alveolar macrophages with clodronate one week after tumor implantation decreases lung metastatic burden in a mouse model of osteosarcoma in a manner similar to treatment with gefitinib. Combination of clodronate with gefitinib abrogated the drugs' effects. Data expressed as mean ± SD (n=9-10/group); compared by one-way ANOVA. *p<0.05 , ***p<0.001

Quick Shots 3 (cont.)

Q41

RISK OF STRUCTURAL RECURRENCE IN PEDIATRIC PAPILLARY THYROID MICROCARCINOMA: DOES MICROCARCINOMA DEFINE A VERY LOW RISK GROUP?

David J. Worhunsky, MD[1], Kayleigh Herrick-Reynolds, MD[2], Glenda Callendar, MD[1], Catherine Dinauer, MD[1], Emily R. Christison-Lagay, MD[1]

[1]Yale School of Medicine, New Haven, CT, USA, [2]Walter Reed Medical Center, Bethesda, MD, USA

Tweet it! Papillary Thyroid Microcarcinoma does not define a very low risk group in children

Purpose

Thyroid lobectomy is recommended for adults diagnosed with papillary thyroid microcarcinoma (<1cm) with quoted structural recurrence rates of 0.5-5%. However, there is a paucity of published recurrence data regarding pediatric papillary thyroid microcarcinoma (pPTMC) and current American Thyroid Association guidelines recommend total thyroidectomy as a minimum treatment for pediatric papillary thyroid cancer (pPTC). We sought to investigate whether pPTMC could be stratified as in adults as very low risk for recurrence and might be treated by lobectomy alone.

Methods

A single institution retrospective review of all patients diagnosed with pPTMC between 2002-2016 in whom at least 18 months of follow up data was available. Comparison was made to low risk tumors >1cm. Prognostic factors of events were analyzed using univariate Cox model-based analyses.

Results

A total of 16 patients with pPTMC were identified. Median age at diagnosis was 17 years (range 6-20) and median duration of follow-up was 64 months (range 23-109). Five patients (31%) exhibited multifocal (MF) disease and 6 patients (38%) were found to have lymph node (LN) involvement on pathology. MF disease was highly associated with LN involvement (p=0.036). Nodal involvement was limited to the central neck compartment in 4 patients and extended to the lateral neck in 2 patients. On the basis of risk stratification by nodal involvement, 62% patients would have been considered low risk, 25% patients intermediate risk, and 13% patients high risk. Of 8 patients undergoing BRAF sequencing, 5 (63%) were positive. There were 2 recurrences (13%) at 15 and 25 months.

Conclusion

pPTMC does not represent a very low risk risk category of pPTC. Lobectomy is not appropriate this population given the frequency of multifocal disease, nodal metastasis and a recurrence rate that is equivalent to low risk tumors >1cm (p=1.0).

Quick Shots 3 (cont.)

Q42

PROPHYLACTIC PREOPERATIVE PLATELET TRANSFUSION FOR THROMBOCYTOPENIC PEDIATRIC PATIENTS LEADS TO HIGHER POSTOPERATIVE PLATELET TRANSFUSION VOLUMES WITHOUT REDUCED RISK OF BLEEDING

Mackenzie Moore, Daniel A. Saltzman, MD, Robert D. Acton, MD, Bradley J. Segura, **Donavon J. Hess, MD, PhD**

University of Minnesota, Minneapolis, MN, USA

Purpose

Thrombocytopenia is prevalent in critically ill pediatric patients where surgical intervention is often indicated. Preoperatively, providers may attempt prophylactic transfusion to prevent bleeding complications. However, it may be difficult to achieve a predetermined platelet level due to a high level of refractoriness leading to multiple transfusions. Transfusions are associated with several adverse effects. We hypothesize that patients who do not undergo preoperative platelet transfusion will have lower platelet transfusion volumes without any associated risk of a bleeding complication.

Methods

We reviewed records (2011 – 2016) for pediatric general surgery patients at our tertiary referral children's hospital. We included patients with a platelet level below 50 x106 mL, excluding patients with necrotizing enterocolitis (n = 49). We compared four-week post-operative platelet transfusion levels using Student's t test and multivariate linear regression.

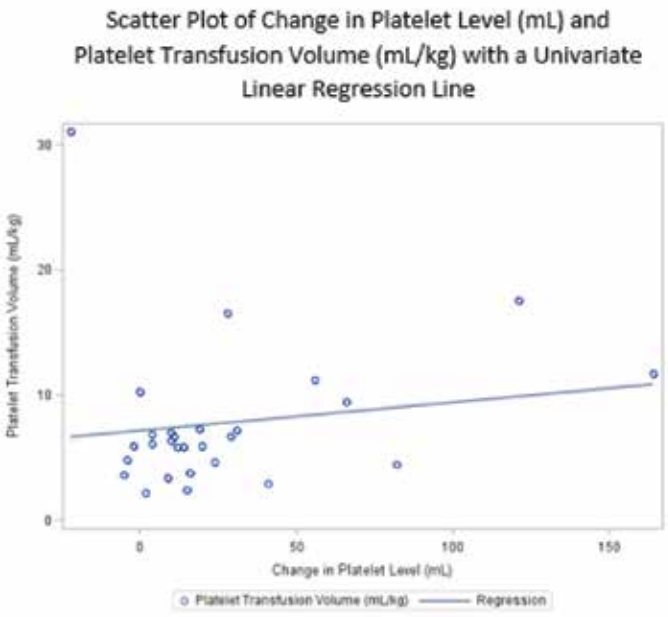
Results

No patient had a postoperative bleeding complication. Patients that were not preoperatively transfused (n = 11) had a combined operative and postoperative platelet volume of 36.0 mL/kg, compared to 102.4 mL/kg (0.007), with 13 fewer donor exposures ($p < 0.001$). There was a 3.8 mL/kg increase in postoperative platelet transfusion volume for every 1 mL/kg increase in preoperative platelet transfusion volume ($p < 0.001$) and a 2.7 mL/kg increase for every resulted platelet level test (p 0.002). Further, among patients that had a platelet test resulted following preoperative transfusion (n = 30) we found that there was not a significant association between transfusion volume (mL/kg) and change in platelet level (mL), (q 0.97; SE, 1.19; p 0.425).

Conclusions

At our institution, we found that abstaining from pre-operative platelet transfusion for thrombocytopenic patients did not lead to an increased risk of bleeding complication. Instead, we found that these patients experienced fewer transfusions and donor exposures up to four weeks post-operative.

Quick Shots 3 (cont.)



Quick Shots 4

Quick Shots 4: Basic Science and Trauma

Wednesday, May 22 | 9:30 a.m. – 10:30 a.m.

Salon G

Q43

INTESTINAL STEM CELLS AND EZH2 ARE INVOLVED IN THE PATHOGENESIS OF NEONATAL INTESTINAL INJURY

Adam E. Minich[1], **Bo Li, PhD**[2], Carol Lee[2], Hiromu Miyake, MD[2], Marissa Cadete[2], Agostino Pierro, MD[2]

[1]The Hospital for Sick Children, Concord, ON, Canada, [2]The Hospital for Sick Children, Toronto, ON, Canada

Background

Necrotizing enterocolitis (NEC) is characterized by reduction in actively-proliferating Lgr5+ intestinal epithelial stem cells (ISC), which is linked to impaired intestinal regeneration. Enhancer of zeste homologue 2 (Ezh2) regulates ISC by supressing gene expression through histone methylation, promoting stemness and limiting their differentiation. We have previously demonstrated that Ezh2 is impaired in experimental and human NEC.

Purpose

To determine whether Ezh2 ablation in Lgr5+ ISCs leads to NEC-like injury.

Methods

In vivo study, to conditionally knockout Ezh2 in Lgr5+ ISCs, experiments were performed on Lgr5-GFP-IRES-CreERT2;Ezh2f/f mice (Lgr5ΔEzh2) and Ezh2+/+ controls. All mice were administered tamoxifen once/day via oral gavage on postnatal days 3-5 (P3-5). Mice were sacrificed on P9 and ileal sections were analyzed blindly using a defined scoring system. Changes in Lgr5+ ISC mRNA expression and Ki67+ proliferating epithelial cells were assessed via qPCR and immunofluorescence, respectively. Ex vivo study, Intestinal epithelial crypts were isolated ex vivo from Lgr5ΔEzh2 and control terminal ileal tissue and were grown into intestinal organoids in Matrigel. Growth and differentiation were compared by analyzing organoid size and budding after 7 days. Organoid expression of Ezh2, Lgr5, and Ki67 were analyzed via qPCR.

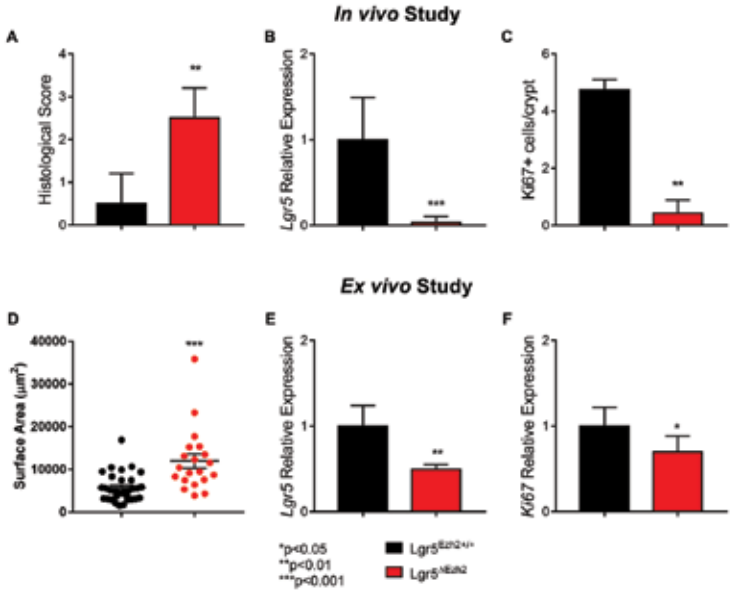
Results

In vivo study: Lgr5ΔEzh2 mice experienced higher injury scores compared to controls, indicating greater intestinal injury (A). They also had decreased Lgr5 expression (B) and less Ki67+ cells/crypt (C). Ex vivo study: intestinal organoids grown from Lgr5ΔEzh2 crypts were bigger in size (D), had more buds, and had reductions in Ezh2, Lgr5 (E), and Ki67 expression (F).

Conclusion

We demonstrated that eliminating Ezh2 from intestinal stem cells induces NEC-like intestinal injury. Ezh2 in intestinal stem cells is important in the development of neonatal intestinal NEC injury. This study provides information on the molecular mechanism of NEC development and translational implications for treatment.

Quick Shots 4 (cont.)



Quick Shots 4 (cont.)

Q44

SHORT-CHAIN FRUCTO-OLIGOSACCHARIDES PROVIDE INTESTINAL PROTECTION AGAINST EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Haitao Zhu, MD, Richard Y. Wu, MD(c), PhD, Bo Li, PhD, Mashriq Alganabi, M.D., Maarten Janssen Lok, M.D., Carol Lee, Jia Liu, Kathene C. Johnson-Henry, Philip M. Sherman, Agostino Pierro, MD

The Hospital for Sick Children, Toronto, ON, Canada

Background
Short-chain fructo-oligosaccharides (scFOS) are prebiotic oligosaccharides with anti-inflammatory properties that can be added to infant formula. The role of scFOS in the development of necrotizing enterocolitis (NEC) has not been explored.

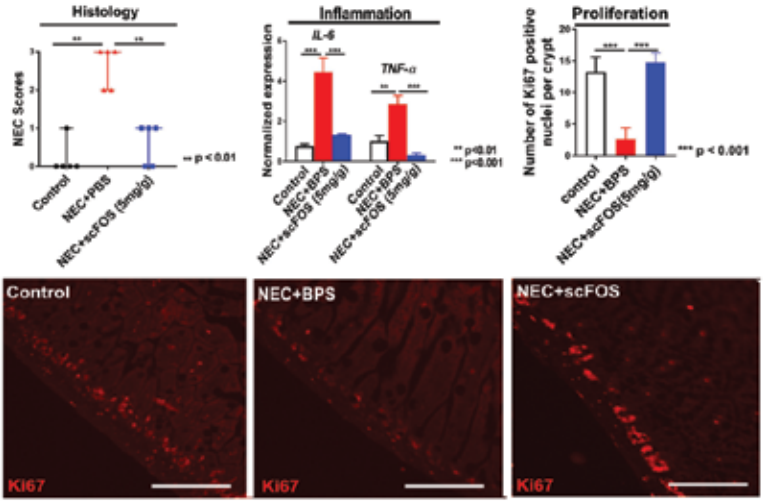
Purpose
The aim of this study was to investigate the effects of scFOS on intestinal injury in experimental NEC and to explore underlying mechanisms.

Methods
NEC was induced in C57BL/6 mice by combination of hypoxia, gavage feeding of hyperosmolar formula and lipopolysaccharide administration between postnatal days 5 and 9. Control groups (n=5) remained with their mother to breastfeed, whereas NEC groups received daily gavage feeding of formula with added phosphate buffered saline (PBS; n=5) or scFOS (5mg/g; n=5). After sacrifice, distal ileum was harvested and mucosal injury was scored histologically (score 3 = maximal damage). Inflammatory cytokines IL-6 and TNF-αwere measured by real-time PCR. Epithelial proliferation was examined using Ki67 immunofluorescence staining. Groups were compared using Kruskal-Wallis test and $p < 0.05$ was considered significant.

Results
Intestinal injury was significantly improved in NEC mice receiving scFOS supplemented formula (median score of 0.2 with IQR=0-1) compared to NEC+PBS (median score of 2.6 with IQR=1-3) (Figure). Administration of scFOS significantly reduced expression of IL-6 and TNF-αmRNAs and enhanced enterocyte proliferation (Ki67 staining) (Figure).

Conclusion
Short-chain fructo-oligosaccharides protect the intestine from the epithelial damage related to NEC. This beneficial effect is associated with decreased epithelial inflammation and with enhanced enterocyte proliferation. This study suggests that short-chain fructo-oligosaccharides can represent a protective feeding supplement in neonates at risk of developing NEC.

Quick Shots 4 (cont.)



Quick Shots 4 (cont.)

Q45

REMOTE ISCHEMIC CONDITIONING REDUCES THE INJURY ASSOCIATED WITH EXPERIMENTAL INTESTINAL ISCHEMIA/REPERFUSION

Hiromu Miyake, MD, Shogo Seo, MD, PhD, Carol Lee, Bo Li, PhD, Agostino Pierro, MD
The Hospital for Sick Children, Toronto, ON, Canada

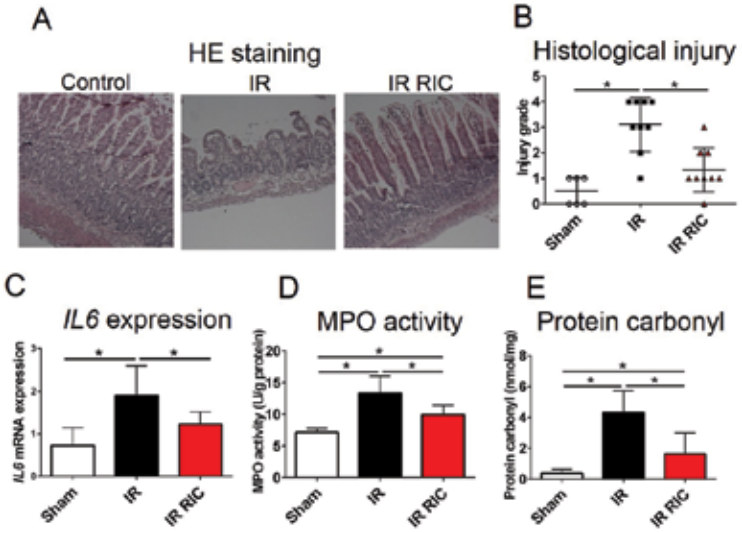
Background
Midgut volvulus is associated with intestinal ischemia/reperfusion (IR) injury and can progress to severe intestinal damage. Delay can occur between suspecting a volvulus and surgery. Remote ischemic conditioning (RIC) can reduce the injury caused by IR in distant organs. The aim of this study was to investigate whether RIC protects the intestine from IR injury.

Methods
Following ethical approval (#45733), we investigated intestinal IR injury in 3 weeks old SD rats. Animals underwent: (i) sham laparotomy (n=6), (ii) intestinal IR injury (n=8), or (iii) intestinal IR plus RIC (n=8). Intestinal IR injury was obtained by 45 minutes occlusion of superior mesenteric artery followed by de-occlusion. Intestinal reperfusion was confirmed in all cases. During mesenteric ischemia, one group received RIC (4 cycles of 5 minutes of hind limb ischemia by tourniquet followed by 5 minutes reperfusion). The animals were sacrificed 24 hours after surgery. Morphology of the ileum (HE staining) was evaluated using an established score. We assessed intestinal inflammation (IL6 expression by qPCR and myeloperoxidase (MPO) activity) and oxidative stress (protein carbonyl by ELISA). Data is reported as mean and SD.

Results
Significant intestinal injury was present after IR. However, this injury was reduced to normal level in IR+RIC group (Figure A,B). Expression of inflammatory cytokine IL6 was lower in IR+RIC group compared to IR alone (Figure C). Similarly, MPO activity was lower in IR+RIC compared to IR (Figure D). Protein carbonyl was also significantly lower in IR+RIC compared to IR, indicating lower oxidative stress in IR+RIC group (Figure E).

Conclusion
Remote ischemic conditioning attenuated intestinal injury, inflammation and oxidative stress in experimental intestinal ischemia/reperfusion injury. Remote ischemic conditioning can be useful in children with suspected midgut volvulus to reduce the intestinal injury that can occur while waiting for volvulus de-rotation.

Quick Shots 4 (cont.)



Quick Shots 4 (cont.)

Q46

PHARMACOLOGIC TOLL-LIKE RECEPTOR (TLR4) INHIBITION IN TRAUMATIC BRAIN INJURY ATTENUATES NEUROINFLAMMATION AND IMPROVES COGNITIVE OUTCOMES BY PROMOTING MONOCYTE INFILTRATION

Young Chun, MD[1], Jose Alonso-Escalante[2], Bruno Soares[1], William Fulton[3], Chhinder Sodhi[3], David J. Hackam, MD[3], Isam W. Nasr, MD[4]

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Tweet it! Pharmacologic Toll-like receptor 4 (TLR4) Inhibition in Traumatic Brain Injury Attenuates Neuroinflammation and Improves Cognitive Outcomes by Promoting Monocyte Infiltration #PedsSurgery#APSA2019#APSA @YoungChun16 @nasr_isam

Purpose

TBI induces a robust neuroinflammatory response that activates the innate immune system. We sought to investigate the effect of pharmacologically inhibiting the innate immune signaling pathways using a novel Toll-like receptor 4 (TLR4) inhibitor, C34 in a murine TBI model.

Methods

A murine controlled cortical impact TBI model was used. Three experimental groups: (1) wild-type (WT) control, (2)WT+C34 (1-day treatment), (3)WT+C34 (7-day treatment). MRI measured lesion volume. RT-PCR quantified cytokine gene expression. Flow Cytometry assessed microglial and monocyte activation. Behavioral testing was initiated on post-injury day (PID) 7 and 28. Statistical analysis: Student's T-test and One-way ANOVA.

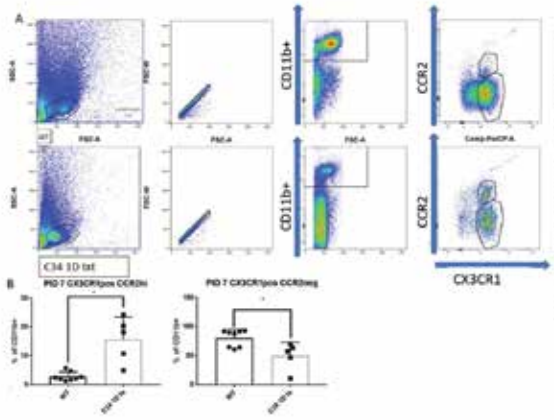
Results

The WT+C34 group had significantly decreased pro-inflammatory cytokines (TNFα p=0.0010, IL-1, p=0.03) and anti-inflammatory cytokines (IL-10 p=0.0067, TGFαp=0.004) compared to WTs on PID1. Apoptosis markers, Caspase (p=0.0001), Bad (p=0.0001) and Bax (p=0.02) were significantly downregulated in the treatment group on PID1. There was no difference in gene expression on PID7 or PID35. Behavioral testing (water-maze) showed that the 1-day treatment group showed significant improvement in latency during week 1 testing and platform entries on week 4 testing (p=0.026). Flow Cytometry showed that infiltrating monocytes are significantly increased with 1-day C34 treatment on PID7 (p=0.0007). Brain injury volumes on PID35, MRI showed no significant difference when C34 was given for 1 day; but lesion size is significantly increased with 7-day C34 treatment (p=0.01).

Conclusion

Our findings demonstrate that TLR4 plays an early role in the pathogenesis of TBI-induced neuroinflammation. Early, short-term pharmacologic inhibition of the TLR4 pathway with C34 attenuates the inflammatory response and leads to improved neurocognitive outcomes compared to the prolonged 7-day treatment. Moreover, an increase in the infiltrating monocyte population may play an important role in neurorecovery after TBI.

Quick Shots 4 (cont.)



Flow Cytometry from brain parenchyma was used to evaluate monocyte/microglial populations after traumatic brain injury. A) The gating strategy is shown. CD11b+ cells are monocytes and microglia. CCR2hi are monocytes and CCR2lo are microglia. B) We show that with 1-Day treatment of the TLR4 inhibitor, C34 the infiltrating monocyte population on PID 7 is increased significantly compared to WT. This finding suggests that early TLR4 signaling pathways may impact the downstream immune response by increasing monocyte infiltration to the injured brain parenchyma after traumatic brain injury.

Quick Shots 4 (cont.)

Q47

HUMAN HEPATIC PROGENITOR CELLS GENERATE TISSUE ENGINEERED LIVER COMPRISED OF MAJOR HEPATIC CELL TYPES IN A 3-MONTH MURINE MODEL

Anthony I. Squillaro, MD, MPH, Alexa M. Fode, Laura-Marie A. Nucho, Samuel M. Zuber, David F. Chang, Christopher R. Schlieve, Tracy C. Grikscheit, MD

Children's Hospital Los Angeles, Los Angeles, CA, USA

Tweet it! Using #stemcell science and #tissueengineering with the hope to fix babies with liver disease @ChildrensLA @drTonyMD23

Purpose

End stage liver failure is morbid and fatal. Although transplantation has improved patient outcomes, problems remain with donor supply, lifelong immunosuppression, and graft survival. An alternative might be cell therapy with the donor material derived from human induced pluripotent stem cells (iPSC) in order to offer a scalable off-the-shelf cell therapy that produces, in vivo, tissue engineered liver (TELi). We previously generated TELi in murine models from donor cells differentiated from iPSC via an 11-day protocol. We hypothesized that evolving this protocol to a 17-day differentiation grown in a suspension system would be compatible with scalable manufacturing and might improve the donor cell source to generate TELi for a future therapy to treat liver failure.

Methods

Human iPSC line LiPSC-GR 1.1 was directly differentiated to hepatic progenitor cells (HPC) after 17 days in suspension culture. HPCs were seeded onto a polyglycolic acid/poly-L lactic acid scaffold and implanted into the subcutaneous tissue or omentum of immunodeficient NOD/SCID mice. TELi implants were harvested at 6 weeks (n=4) and 3 months (n=6). H&E and immunofluorescence staining were performed to detect tissue architecture, hepatocytes (HSA, albumin, HNF4a), cholangiocytes (CK19), and donor human cells (mitochondria, lamin).

Results

At 6 weeks, albumin, HNF4a, and CK19 positive cells were identified. Three-month TELi contained HSA and CK19-positive cells (Fig.1 A&B). These cells co-stained with human specific nuclear lamin and mitochondrial markers, confirming that TELi was composed of the donor hepatic progenitor cells. Six week and 3-month TELi explants exhibited ductular structures resembling biliary epithelium.

Conclusion

Human iPSCs directed to HPCs and implanted into long-term murine models generated TELi containing hepatocyte-marked cells with biliary structures also present. Further refinement of this protocol might allow an efficient donor cell population for future cell therapy.

Quick Shots 4 (cont.)

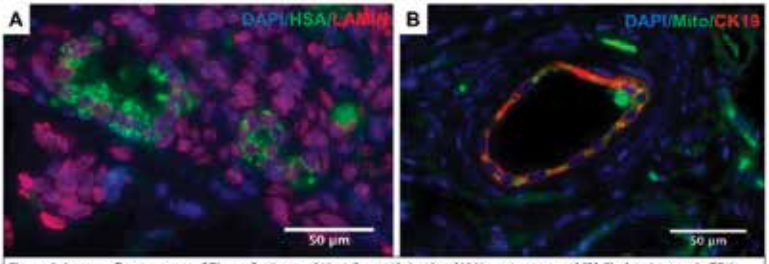


Figure 1: Immunofluorescence of Tissue Engineered Liver 3-month *in-vivo*. (A) Hepatocytes and (B) Cholangiocytes in TELi.

Quick Shots 4 (cont.)

Q48

AUTOLOGOUS TRANSPLANTATION OF SKIN-DERIVED PRECURSOR CELLS IN A PORCINE MODEL

Anne-Laure Thomas, MS[1], **Jordan S. Taylor, MD**[2], Nhan Huynh[3], Genia Dubrovsky, MD[4], Jean Paul Chadarevian[5], Angela Chen[5], Samuel Baker[6], James C.Y. Dunn, MD[2]

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Background
Skin-derived precursor cells have been shown to differentiate into peripheral neural cells in vitro, and generate ganglion-like structures in vivo. The goal of this study is to obtain neuro-glial progenitors from skin and to transplant these autologous cells in a large animal model of aganglionosis for regenerating the myenteric nervous plexuses.

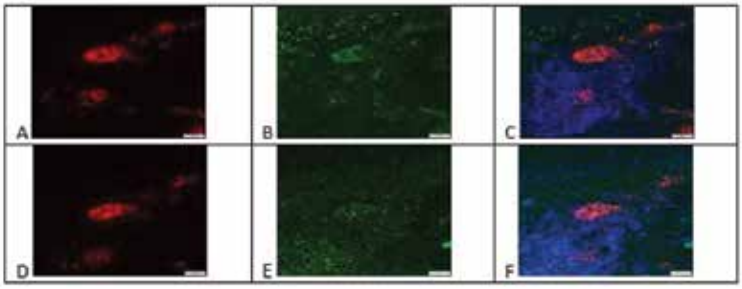
Methods
Juvenile mini-Yucatan pigs underwent skin procurement from their forelimbs. Skin cells were plated in wells or cultured in suspension with neuro-glial selective medium. A chemical denervation was performed on an isolated segment of colon in pigs. Autologous skin-derived precursor cells were fluorescently labeled prior to injection within the wall of the newly aganglionic segment of colon. The injected colon was retrieved within a week after cell transplantation.

Results
Forelimb skin yielded cells expressing neural crest and multipotency markers p75 Nerve Growth Factor Receptor and SOX9 in over 50% of these cells in vitro, as well as early lineage related gene of neural and glial precursor Nestin and GFAP, and differentiated markers b-Tubulin III and S100b, for both methods of cell culture. Cells retained the red fluorescent label over time and were detected in the submucosal plexus of the colon wall for 7 days. Nestin and p75 markers were observed after transplantation (Figure 1).

Conclusions
Skin is a source of neural crest stem cells that can be obtained in a minimally invasive way. Neuro-glial precursor cells may be obtained in vitro without induction of pluripotency. Injected cells survived within the colon wall for at least one week. This approach may lead to a cell-based therapy for patients with colonic motility disorders.

Figure1. Porcine colon wall processed by immunohistochemistry after injection of autologous red-labeled skin-derived precursor cells. (A)-(D)Red fluorescently labeled injected cells. (B)P75-NGF receptor, and (E)Nestin filament, shown in green immunofluorescence. (C)-(F)Merged pictures. Nuclei shown in blue. Scale-bar 100um.

Quick Shots 4 (cont.)



Quick Shots 4 (cont.)

Q49

IDENTIFICATION OF A NOVEL CIRP RECEPTOR AND ITS ROLE IN SEPSIS

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Tweet it! TREM-1 has been implicated as a biomarker in pediatric sepsi. We present work identifying TREM-1 as a novel receptor for cold-inducible RNA binding protein and developing a peptide that interferes with this interaction,improving sepsis outcomes. @NLDenning @cohen_childrens

Purpose

Worldwide, sepsis is a leading cause of death in the pediatric population. Cold-inducible RNA-binding protein (CIRP) is elevated extracellularly during sepsis, fueling global inflammation and potentiating acute lung injury. Triggering receptor expressed on myeloid cells-1 (TREM-1) is an activating, pro-inflammatory cell surface receptor. We have recently reported that CIRP upregulates TREM-1 expression and propagates TREM-1's deleterious pro-inflammatory effects during sepsis. We now hypothesize a receptor-ligand interaction exists between CIRP and TREM-1 and have developed a small peptide, M3, to prevent this interaction and mitigate sepsis severity.

Methods

The interaction between recombinant murine(rm) CIRP and rmTREM-1 was determined by surface plasma resonance (SPR). Using confocal microscopy, fluorescence resonance energy transfer (FRET) assay was performed to directly investigate cell surface interactions of CIRP with TREM-1 in RAW264.7 cells. Macrophages were stimulated with rmCIRP with and without M3 and cytokine levels in the supernatants were assayed. M3's effect on systemic inflammation and overall sepsis survival was then examined using two murine models of sepsis in C57BL/6 mice: endotoxemia and cecal ligation and puncture.

Results

SPR determined strong binding between CIRP and TREM-1 with a KD of 1.17 X 10-7 M. The confocal and FRET images in RAW264.7 cells demonstrated colocalization and confirmed association of CIRP and TREM-1. Stimulation of macrophages with rmCIRP significantly upregulated TNF-αlevels, while this upregulation was inhibited by co-treatment with M3 in a dose dependent manner ($p<0.01$). Treatment with M3 attenuated serum levels of pro-inflammatory cytokines (TNF-α IL-1α IL-6) and improved seven day survival in murine models of endotoxemia and polymicrobial sepsis ($p<0.05$).

Conclusion

TREM-1 serves as a novel receptor for CIRP. Inhibition of this receptor ligand interaction by the small peptide M3 decreases inflammation and improves survival in murine models of sepsis. Targeting this interaction is a promising therapeutic avenue for the treatment of sepsis.

Quick Shots 4 (cont.)

Q50

FETAL ENZYME REPLACEMENT AND STEM CELL TRANSPLANTATION RESCUE BRAIN MICROGLIA IN MURINE MUCOPOLYSACCHARIDOSIS TYPE 7

Quoc-Hung Nguyen, MD, Bowen Wang, Carlo Eikani, Lucas Smith, Jeremy Shea, Russell Witt, Saul Villeda, Tippi Mackenzie

UCSF, San Francisco, CA, USA

Purpose

MPS7 is a lysosomal storage disorder that causes multi-organ dysfunction. Although postnatal enzyme replacement therapy (ERT) to replace missing glucuronidase (GUS) is available, this approach does not improve neurologic outcome due to the blood-brain barrier (BBB). We have previously shown that in utero ERT (IUERT) improved neurologic outcomes. Here, we determine whether IUERT specifically targets the brain microglia, the natural storehouse of GUS, and whether in utero hematopoietic stem cell transplantation (IUHSCT) results in microglial engraftment as a strategy for permanent correction.

Methods

For IUERT, we injected MPS7 fetuses at E14.5 with GUS and analyzed brain microglia for enzyme activity on E18.5. We also stained brains for CD68 to determine if IUERT decreases microglial inflammation. For IUHSCT, we transplanted HSCs from CX3CR1-GFP donor mice (in which microglia are green) into E14.5 fetal recipients. We examined engraftment in blood and bone marrow and stained brains to detect donor-derived microglia.

Results

After IUERT, we detected GUS activity in 6 of 7 treated pups. Quantification of GUS revealed that 24.6 ± 9.5% of microglia produced GUS, and individual microglia GUS levels were above 50% of normal. (Fig. 1A). In contrast, GUS activity was not seen in adult animals treated with GUS after BBB formation. In one cohort treated with IUERT and harvested as adults, CD68 staining revealed decreased brain inflammation (Fig. 1B). After IUHSCT, we detected multilineage engraftment (8.5±2.2%) in blood and bone marrow of 9 mice (Fig. 1C), with some beain donor-derived microglia, indicated by co-staining for GFP and a second microglial marker (Fig. 1D).

Conclusion

IUERT can penetrate the BBB and decrease brain inflammation. IUHSCT results in microglial engraftment and increasing chimerism or transplanting earlier may further improve results. These findings support fetal therapy for MPS7 and related diseases, for which we are currently developing a clinical protocol.

Quick Shots 4 (cont.)

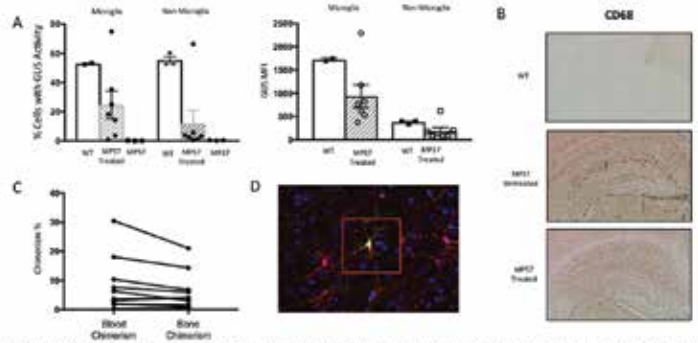

Figure 1. A) Mice underwent IUERT at E14.5 and were harvested at E18. GUS enzyme was detected in microglia and non-microglia by flow cytometry (left graph). The mean fluorescence intensity (MFI) of GUS was higher in microglia compared to non-microglia (right graph). Untreated MPS7 mice have undetectable levels of GUS. B) CD68 staining showed decreased brain inflammation in IUERT mice. C) Donor-derived leukocyte chimerism was established in blood and bone marrow after IUHSCT. D) Confocal imaging after immunofluorescent staining for iba1 (microglia, red), DAPI (nuclei, Blue) and GFP (donor, green) showing co-localised engrafted microglia (red box) in chimeric mice.

Quick Shots 4 (cont.)

Q51

ASSOCIATION OF BLOOD COMPONENT RATIOS WITH 24-HOUR MORTALITY IN INJURED CHILDREN RECEIVING MASSIVE TRANSFUSION

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Tweet it! In a study of 583 massively transfused injured children, patients transfused at ≥1:1 plasma to red cell ratio had a 51% lower risk of death at 24 hours after arrival in the ED compared to patients with <1:2 ratio. @elissakbutler

Purpose

The optimum ratio of blood components for massive transfusion in pediatric trauma patients remains unknown. Our objective was to determine if higher plasma:RBC (red blood cell) and platelet:RBC ratios are associated with lower 24-hour mortality.

Methods

This was a cohort study using the Pediatric Trauma Quality Improvement Program Database from January 1, 2014, to December 31, 2016. Injured children (≤14 years) who received massive transfusion (≥40 mL/kg total blood products in initial 24 hours of treatment) were included (n=583). Using multivariable Poisson regression analysis, the association between ratios of plasma:RBC and platelet:RBC and 24-hour mortality were assessed. Level of significance was set at α=0.05.

Results

Overall 24-hour mortality was 19.7% among pediatric patients receiving massive transfusion (95% CI: 16.6 to 23.2%). There was 51% (aRR 0.49, 95% CI: 0.27 to 0.87, p=0.02) lower risk of death at 24 hours for the high (≥1:1) plasma:RBC ratio group and a 40% (aRR 0.60, 95% CI: 0.39 to 0.92, p=0.02) lower death risk for the medium (≥1:2 and <1:1) plasma:RBC ratio group compared to the low ratio group (<1:2). High platelet:RBC ratio was not associated with decreased mortality (aRR: 0.94, 95% CI 0.51 to 1.71, p=0.83).

Conclusions and Relevance

Massive transfusion with plasma:red blood cell ratio >1:2 was associated with improved 24-hour survival in severely injured pediatric trauma patients. While these findings represent the largest study evaluating blood product ratios in pediatric trauma patients, further prospective studies are needed to determine if higher plasma:red blood cell ratios improve overall outcomes.

Quick Shots 4 (cont.)

Q52

SECONDARY OVERTRIAGE IN A PEDIATRIC LEVEL ONE TRAUMA CENTER

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Purpose

The American College of Surgeons recommends undertriage and overtriage rates of 5% and 35%, respectively, and many studies have explored means to optimize these rates. However, few have examined the prevalence of secondary overtriage (SO), or the unnecessary transfer of minimally injured patients to higher level trauma centers. We sought to determine the incidence and impact of SO in our pediatric level one trauma center.

Methods

We performed a retrospective review of all trauma activations from 2015 through 2017, and gathered data on demographics, injury severity score (ISS), number of operations, intensive care unit (ICU) and hospital length of stay (LOS), disposition from the emergency department (ED) and on discharge, hospital charges, and mortality. SO was defined as transferred patients who required neither ICU admission nor an operation, with ISS ≤ 9 and LOS ≤ 24 hours. We compared SO patients against all other trauma activation transfers, and against patients meeting similar criteria transported from the trauma scene.

Results

We identified 1,789 trauma activations: 28.4% were Level 1 activations, and 71.6% Level 2. In this group, 753 (42.1%) patients were transfers, and 335 (44.5%) met our above definition for SO. Demographics were similar between SO patients and other transfers, but SO patients had a shorter mean travel distance (52.7 vs 57.4 mi; $p = 0.03$). Compared to similar patients transported from the trauma scene, SO patients were more likely to be Caucasian and to be admitted (29.2% vs 52.2%; $p < 0.001$), resulting in a significantly increased inpatient stay and hospital charges.

Conclusions

SO represents a significant burden to trauma centers and systems which could potentially be minimized. Trauma centers should focus on providing education to referring hospitals and appropriate trauma activation. Future research should identify predictive factors for appropriate transfers and the criteria for trauma activations for transferred patients.

Quick Shots 4 (cont.)

Q53

DOWNWARD TRENDS IN PANCREATECTOMY OF MODERATE AND SEVERE BLUNT PANCREATIC TRAUMA IN CHILDREN

David M. Notrica, MD[1], Bethany L. Sussman[1], Lois W. Sayrs, MD[1], Brenna McElenney[2], Tanner Ellsworth[2], Justin Lee[1], Kate Davenport[1]

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Purpose

There is little information known about yearly trends in pancreatectomy for moderate to severe pediatric blunt pancreatic trauma. This study analyzes a large national sample of pediatric pancreatic injury patients to assess trends in the management of pediatric pancreatic injury.

Method

Retrospective National Inpatient Sample data from 2000-2014 were collected on patients <18 years old with pancreatic injury using ICD 9/10 codes. Moderate to severe patients were analyzed for trends in management. Descriptive and regression models were used to analyze trends in pancreatic injury and pancreatectomy. Mann Whitney-U tests were used to analyze group differences.

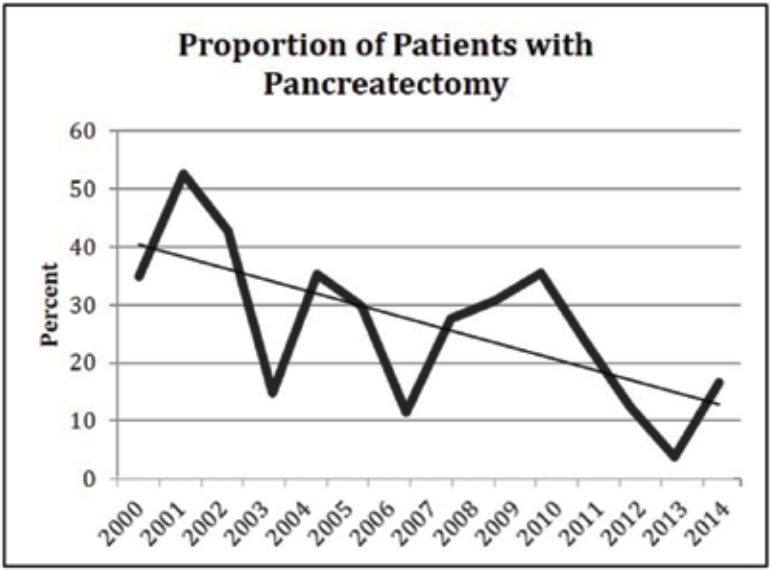
Results

During the study period, there were 6,134 pancreatic injuries, and 466 were moderate to severe. Overall, 82% were male and median age was 14 [IQR:7,16]. The age distribution was trimodal with peaks at ages 1,7, and 17 years. Mechanism of injury (MOI) varied by age with the peaks driven by abuse, bicycle and motor vehicle, respectively. The median length of stay (LOS) was 8 days [IQR:7,11] and has increased by 15% since 2000 ($p<0.001$). The overall mortality rate was 12% and has shown a 52% decrease since 2000 ($p=0.03$). The overall number of pancreatectomies was 124 and there has been a 52% decrease in the proportion of patients undergoing pancreatectomy since 2000 ($p=0.01$). The median LOS did not differ between patients who did (8.9 [IQR:6.4,13.6]) and did not (9.1 [IQR:4.1,23]) undergo pancreatectomy ($p=0.2$).

Conclusion

Pancreatic injury has a trimodal age distribution that varies with MOI. Approximately 27% of children with moderate to severe pediatric blunt pancreatic trauma over the study period underwent pancreatectomy. The proportion of patients undergoing pancreatectomy in this group decreased by 52% over the study period; there was also 15% increase in LOS and a 52% decrease in mortality.

Quick Shots 4 (cont.)



Quick Shots 4 (cont.)

Q54

POST-DISCHARGE OUTCOMES IN PEDIATRIC TRAUMA: AN EXAMINATION OF SURGICAL PEDIATRIC PATIENTS AT AN URBAN TRAUMA CENTER AFTER A PENETRATING INJURY

Gabriel Siegel, BS, Aaron Katrikh, Timothy C. Lee, MD, Daniel Webster, Connor Wakefield, Justin Mis, Jennifer Poirier, Matthew Kaminsky, MD, Ami Shah

Rush Medical College, Chicago, IL, USA

Tweet it! Gun violence is a serious public health issue in the United States. But what happens post-discharge for pediatric victims of gun violence? Check out this abstract for a few answers. #outcomesresearch #gunviolence

Purpose

In Chicago, 16% of gun violence involved individuals younger than eighteen with 115 resulting in a fatality in 2017. It is well-established that pediatric patients are at greater risk for failure to follow-up (FTF) after a penetrating trauma and existing literature does not explicitly examine adverse events that occur post-discharge. We sought to assess FTF, emergency department (ED) utilization, and re-hospitalization rates for surgical pediatric patients post-penetrating trauma. A better understanding of how to serve this complex population may aid in reducing morbidity, recidivism, and the perpetuation of violent crime.

Methods

A retrospective study was conducted on surgical patients (ages 0-18) with penetrating trauma admitted to a level-one trauma center in Chicago from 2008-2016. To examine potential predictors of FTF, nested linear models were created from EMR data.

Results

We reviewed 257 patient records (average age of 15.9±3.6) that suffered a penetrating trauma with an injury severity score (ISS) of 11.6±13.1. Overall FTF rate was 33.4% with a 11% post-discharge ED visit and 9.0% re-hospitalization rate within 12 months. Ethnicity ($p=0.01$) was an independent predictor of FTF and patients discharged home were almost two times as likely to have perfect compliance compared to other discharge settings ($p=0.02$). ICU and hospital length of stay, income, and ISS did not predict FTF ($p=0.06$-0.99).

Conclusion

We found marked differences in rates of ED utilization, re-hospitalization, and failure to follow-up than cited in previous literature. Further study is necessary to expand our sample population and determine characteristics that predict post-discharge outcomes for pediatric victims of gun violence. Establishing benchmarks for post-discharge outcomes for pediatric trauma should be a priority for trauma centers as a means of cost containment and reducing recidivism. Therefore, an evidence-based tool that provides risk estimates for failure to follow-up should be developed to aid clinicians in the post-discharge period.

Quick Shots 4 (cont.)

Q55

IDENTIFYING POPULATIONS AT RISK FOR CHILD ABUSE: A NATIONWIDE ANALYSIS

Hallie J. Quiroz, MD[1], Joshua P. Parreco, MD[2], Brent A. Willobee, MD[1], Anthony Ferrantella, MD[1], Chad M. Thorson, MD[1], Rishi Rattan, MD[1], Juan E. Sola, MD[1], Eduardo A. Perez, MD[1]

[1]University of Miami Miller School of Medicine, Miami, FL, USA, [2]University of Miami Miller School of Medicine - Department of Surgery, Miami, FL, USA

Tweet it! Identifying at-risk children for future abuse, can we prevent? Utilizing past admissions may help to improve efforts to determine whether a child is at risk for future abuse. Healthcare team members must maintain constant vigilance to decrease the prevalence of childhood trauma.

Purpose

Child abuse is a national epidemic that often goes unrecognized. The objective of this study was to determine at-risk populations that have been hospitalized prior to their admission for child abuse.

Methods

The Nationwide Readmissions Database for 2010-2014 was queried for all patients ≤ 18 years hospitalized for child abuse. Outcomes included previous admissions and their associated diagnoses to determine at-risk populations. χ^2 analysis was used for comparison between cohorts and significance set at $p<0.05$. Results were weighted for national estimates.

Results

31,153 children were hospitalized for abuse (half due to physical abuse) during the study period. Half of these children were < 1 year old and 56% were male. Children <13 years were more likely to be admitted for physical abuse (88% vs. 70%) and neglect (84% vs. 77%) while children ≥ 13 years were more likely to have sexual abuse (85% vs. 24%) and emotional abuse (80% vs. 41%), all $p<0.001$. 11% (n=3487) had previous admissions (one in three to a different hospital) while 3% (n=1069) had multiple hospitalizations. 60% of prior admissions were for chronic conditions and 12% were for traumatic injuries. Children with chronic conditions were more likely to have sexual abuse (89% vs. 57%, $p<0.001$) and emotional abuse (75% vs. 60%, $p<0.01$). 25% of chronic diagnoses were psychiatric, who were also more likely to have sexual and emotional abuse (47% vs. 5.5% and 10% vs. 1%, all $p<0.001$).

Conclusion

Child abuse is a significant cause of childhood morbidity and trauma. This study uncovers a hidden population of children with past admissions for chronic conditions, especially psychiatric diagnoses, that are significantly associated with abuse. Improved measures to accurately identify at-risk children must be further studied to decrease future childhood abuse and trauma.

Quick Shots 4 (cont.)

Q56

THE EFFECT OF A TEDDYBEAR HOSPITAL PROJECT ON CHILDRENS' ANATOMICAL KNOWLEDGE, ANXIETY, AND MEDICAL STUDENT PROFESSIONALISM

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Tweet it! A Teddybear Hospital Project for preschool children and medical students on their pediatric surgical rotation increases the kids' knowledge on anatomy and healthy lifestyle, decreases their anxiety towards doctors, and helps medical students sharpen their communicative skills.

Background
The project Teddybear Hospital was founded by medical students and is an educational effort to increase children's knowledge of anatomy, healthy lifestyle, and decrease their anxiety towards medical personnel. It also teaches medical students professionalism. However, very little is known about the project's effectiveness.

Methods
Children ages 4-6 years were offered to bring their stuffed animals to the Teddybear Hospital to have them checked up and treated for any possible conditions. Senior medical students who passed the pediatric surgery rotation staffed the hospital, examined the patients, performed ancillary studies, and interacted with the children as caregivers. The Children's knowledge on anatomy, healthy lifestyle was assessed by playing pre- and postinterventional multichoice games. The level of anxiety towards doctors was assessed by a 6-staged smiley scale before and after the visit. Informed consent was obtained and the pre- and postinterventional results were statistically compared.

Results
A total of 61 children (mean age 5.2y, 31 girls) participated in the study. Knowledge of the children increased on healthy lifestyle by 1.4 points (95% CI 1.01-1.79, $p<0.05$), and on anatomy by 5.1 points (95%CI 4.37 to 5.73, $p<0.01$). Anxiety decreased by 1 smiley (from 3.2 to 2.2, $p<0.001$). Thirty-two medical students participated. They self-reported a higher level of confidence and professionalism after taking part in the project by survey.

Conclusions
Preschool participation in a Teddybear Hospital increased knowledge on anatomy and healthy lifestyle, and decreases anxiety towards doctors. It also helped medical students playfully acquire communication skills and professionalism during their interaction with the children. The implementation of regular Teddybear Hospitals should therefore be considered a worthwhile educational tool for academic pediatric medical and surgical centers.

Quick Shots 4 (cont.)

Figure: Complex issues are evaluated by a computed tomography scanner at the Teddybear Hospital (left). A patient being anesthetised for surgery while the caregiver is watching (right).

Quick Shots 5

Quick Shots 5: Fetal Basic Science, Neonatal, Fetal Clinical

Wednesday, May 22 | 9:30 a.m. – 10:30 a.m.

Salons H-J

Q57

CORD BLOOD MICRORNAS AS NOVEL PREDICTORS OF SEVERITY IN CONGENITAL DIAPHRAGMATIC HERNIA

Quoc-Hung Nguyen, MD, Idit Kosti, Ishan Paranjpe, Carlo Eikani, Marina Sirota, Tippi Mackenzie

UCSF, San Francisco, CA, USA

Purpose

Severe pulmonary hypertension (pHTN) is the primary cause of morbidity and mortality in congenital diaphragmatic hernia (CDH). Prenatal assessments such as lung-head ratio (LHR) measure the severity of lung hypoplasia as a surrogate for pHTN but are not always accurate. MicroRNAs (miRNA) are circulating nucleic acids that regulate gene expression and may be useful biomarkers in multiple clinical settings. We sequenced miRNAs in the cord blood of CDH patients to determine whether miRNA can predict the severity of pHTN.

Methods

Cord blood samples were drawn from babies with severe CDH (n=9), mild CDH (n=9), and healthy controls (n=10). Severity was classified by the degree of pHTN measured by echocardiogram at 2 weeks (severe: ≥ systemic pulmonary artery pressure; mild <2/3 systemic), which we have previously reported correlates with outcome. We performed high-throughput sequencing and analyzed differential expression of miRNA among groups. We also used KEGG pathway enrichment to identify signaling pathways influenced by differentially expressed miRNAs.

Results

Babies who developed severe pHTN had 24 differentially expressed miRNA at the time of birth compared to those with mild CDH or healthy controls (Figure 1). Among them, miR-486-3p has been implicated in hypoxic stress, increased VEGF signaling, and angiogenesis. KEGG pathway analysis revealed 111 genes of differentially expressed miRNAs that were involved in 30 physiologic pathways, including hypoxia-inducible factor-1 (involved in angiogenesis) and PI3K-AKT (involved in cell cycle and proliferation).

Conclusion

Babies who develop severe pHTN are born with a different profile of miRNAs, particularly those that influence genetic pathways implicated in hypoxia and angiogenesis. These biomarkers can be used for predicting disease severity, particularly if future studies confirm that they are also detectable in maternal blood. Our findings also suggest possible molecular mechanisms (and pharmacological targets) for the vascular remodeling seen in patients with severe pHTN.

Quick Shots 5 (cont.)

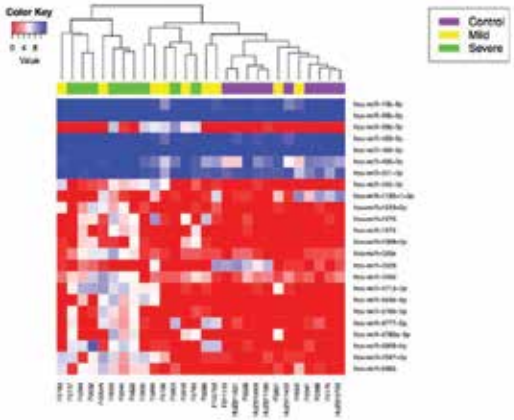

Figure 1. Heatmap of differentially expressed MiRNA's between severe CDH, mild CDH, and term controls. Cutoff for differential expression includes fold-change greater than 1.3, and false discovery rate of <0.05 .

Quick Shots 5 (cont.)

Q58

DELAYED ECMO DECANNULATION IN PATIENTS WITH CONGENITAL DIAPHRAGMATIC HERNIA: IS IT SAFE TO LEAVE CANNULAS IN PLACE?

Mercedes Pilkington, MD[1], George B. Mychaliska, MD[2], Marcus D. Jarboe, MD[1], Meghan A. Arnold, MD[1], Ronald B. Hirschl, MD[1], Samir K. Gadepalli, MSc, MD, MBA[1]

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Purpose

The practice of "cutting away" from the ECMO circuit and leaving heparinized cannulas in place prior to decannulation is controversial. Benefits are ready access for reinitiation of ECLS but potential risks include thrombotic and embolic events. The aim of this study is to determine the safety and efficacy of this strategy in patients with congenital diaphragmatic hernia (CDH) who require ECMO.

Methods

A retrospective review of electronic health records was performed on all patients with CDH who underwent elective ECMO decannulation between January 2014-September 2018. Descriptive statistics are presented as medians with interquartile range.

Results

During the study period, 19 of 27 patients who underwent veno-arterial ECMO cannulation for CDH were electively decannulated (70%). After a median ECMO run of 11.6 days [6.1-19.5], all patients were "cut away" for a median of 26 hours [20.5-43.5] prior to decannulation. One patient required re-initiation at 36 hours for a pulmonary hypertensive crisis (5%). At "cut away", 11/19 (58%) patients were on at least one medication for pulmonary hypertension and 12/19 (63%) were on at least one agent for vasoactive support; only two patients required neither (11%). There were no major bleeding complications or embolic events while "cut away" and four (21%) patients had clots removed from the cannulas without clinical sequelae. A single patient was recannulated 16 days following initial decannulation for sepsis and pulmonary hypertension (5%).

Conclusion

Our data suggests that "cutting away" from ECMO support in patients with congenital diaphragmatic hernia is safe and can allow a period of observation without significant complications. This strategy may be particularly helpful in patients at risk for recannulation, but better prognostic criteria need to be established to identify this cohort.

Quick Shots 5 (cont.)

Q59

LOW POSTNATAL CRI VALUES ARE ASSOCIATED WITH THE NEED FOR ECMO IN NEWBORNS WITH CDH

Ryan C. Phillips, MD[1], Niti Shahi, MD[2], Jason Gien, MD[1], Kenneth W. Liechty, MD[3], Ahmed I. Marwan, MD[3], John P. Kinsella, MD[1], Jane Mulligan[4], Steven L. Moulton, MD[1], David Leopold[1]

[1]University of Colorado School of Medicine, Aurora, CO, USA, [2]Childrens, Aurora, CO, USA, [3]University of Colorado School of Medicine; Colorado Fetal Care Center, Children's Hospital Colorado, Aurora, CO, USA, [4]Flashback Technologies Inc., Louisville, CO, USA

Purpose

Twenty-five to thirty percent of newborns with congenital diaphragmatic hernia (CDH) require extracorporeal membrane oxygenation (ECMO) for postnatal hemodynamic support; however, no technology can accurately predict which newborns will require ECMO. The Compensatory Reserve Index (CRI) is a new FDA cleared monitoring technology that uses pulse oximetry to continuously trend compensatory changes in pulsatile waveforms from normovolemia (CRI=1) to decompensation (CRI=0). Previous studies in adults have shown that declining CRI values <0.24 are associated with increasing risk for decompensation; the lower the CRI value, the greater the risk. We hypothesized that postnatal CRI values would be lower in newborns with a CDH who required ECMO than those who did not require ECMO.

Methods

CipherOx® CRI M1 devices were used to prospectively monitor newborns with CDH. We retrospectively compared CRI values from delivery to ECMO (group 1) versus delivery to surgical repair and no ECMO (group 2). Results are presented as medians and interquartile ranges (IQR).

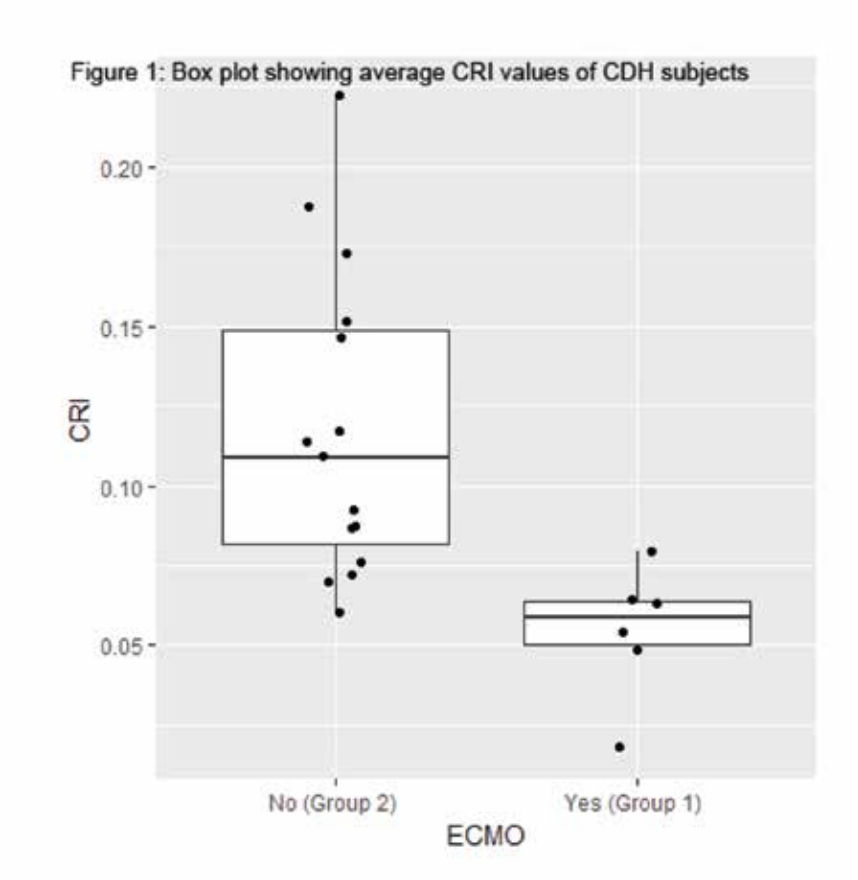
Results

Twenty-one newborns had postnatal CRI values available for analysis. Six underwent ECMO within 33 hours of delivery; median CRI prior to ECMO was 0.059 and IQR CRI values were 0.05-0.064. Fifteen underwent surgical repair and never required ECMO; median CRI from birth to 72 hours was 0.113 and IQR CRI values were 0.082-0.154. CRI values were significantly lower in newborns that required ECMO, versus those who did not ($p=0.0027$; Figure 1). All subjects had average CRI values of less than 0.24, range 0.018-0.223.

Conclusion

Humans, from newborns to adults, share elemental features of the pulsatile waveform that are associated with progression to decompensation. These features may be exploited to aid in the early decision to initiate ECMO, before newborns with CDH experience prolonged periods of hypoxemia and hypotension. Further studies are needed to determine if CRI can improve CDH-related morbidity and mortality.

Quick Shots 5 (cont.)



Quick Shots 5 (cont.)

Q60

SURGICAL MANAGEMENT OF GASTROESOPHAGEAL REFLUX DISEASE IN PATIENTS WITH CONGENITAL DIAPHRAGMATIC HERNIA: SYNCHRONOUS LADD'S SURGERY MAY BE PROTECTIVE

Heron D. Baumgarten, MD, MPH[1], Zoya Butt[2], Robin C. Cook[2], Audrey A. Foster[2], Dana L. Bartholomew[2], Lisa M. Herkert[2], Samantha E. Adams[2], Natalie E. Rintoul[2], William H. Peranteau, MD[2], Holly L. Hedrick, MD[2], Thane A. Blinman, MD[2]

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Purpose

Gastroesophageal reflux disease (GERD) complicates care of patients with congenital diaphragmatic hernia because the lower esophageal sphincter may be compromised but also because gastric emptying may be slowed. Surgical management (fundoplication, Ladd's procedure, or both) addresses these mechanisms, but most focus is confined to fundoplication. This study evaluates the effect of synchronous Ladd's surgery on clinical outcomes.

Methods

A retrospective chart review of all patients treated for CDH from 2000-2017 was performed. Patients who underwent FETO (fetal endoscopic tracheal occlusion), died, or were lost to follow up were excluded. Analysis focused on severity of CDH presentation, timing and type of GERD surgery, respiratory support, reflux symptoms, and feeding outcomes.

Results

The review included 313 patients. GERD surgery was performed for 100 patients. Forty-nine patients underwent Ladd's surgery, 39 underwent fundoplication, and 12 underwent both procedures. Thirty-five patients underwent synchronous Ladd's surgery and CDH repair (71.4%). Those who had Ladd's surgery were more likely to be discharged on exclusive oral feeding, and time to first- and full-enteric feeding was earlier on average than the other groups. Comparing patients who underwent Ladd's at the time of CDH repair to those who underwent Ladd's at a later date, synchronous Ladd's surgery resulted in shorter time to first-enteric feed (p=0.01), shorter time on mechanical ventilation (p=0.03), and shorter hospital stays (p=0.002).

Conclusion

Ladd's surgery, when performed at the time of CDH repair, may result in improved outcomes for CDH patients. Attention to gastric emptying prior to fundoplication should be considered for patients with CDH.

Quick Shots 5 (cont.)

Q61

AMNIOTIC FLUID STEM CELL EXOSOMES PROMOTE FETAL LUNG MATURATION IN AN IN VIVO MODEL OF CONGENITAL DIAPHRAGMATIC HERNIA

Louise Montalva, MD[1], Rebeca Lopes Figueira[2], Lina Antounians[1], Karina Miura[1], Lourenço Sbragia Neto, MD[2], Augusto Zani[1]

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Purpose

Pulmonary hypoplasia and hypertension remain the main determinants for the high morbidity and mortality rates in congenital diaphragmatic hernia (CDH). We previously showed that treatment with Amniotic Fluid Stem Cell exosomes (AFSC-exosomes) promotes lung growth and maturation in experimental CDH. Herein, we investigated the molecular pathways that AFSC-exosome treatment activates in the hypoplastic lung.

Methods

AFSC-exosomes were isolated via ultra-centrifugation from AFSC conditioned medium and characterized by size (Nanoparticle tracking), morphology (electron microscopy), and surface markers (CD63, Hsp70, TSG101, Flotillin-1).
Rabbit fetuses (protocol #275216) were allocated to the following groups: control (n=9); CDH (n=9), which underwent surgical creation of diaphragmatic hernia on gestational day (E) 25; 3. CDH+TO (n=9), which underwent CDH creation (E25) and tracheal occlusion (TO, E27); 4. CDH+TO+AFSC-exosomes (n=9), which underwent CDH creation (E25), TO and intra-tracheal injection of AFSC-exosomes (E27). Lungs were harvested at E31. RNA sequencing was conducted on RNA from all samples (TruSeq library preparation, Illumina sequencing). Differentially expressed genes were identified with DESeq. Confirmation was obtained with RT-qPCR.

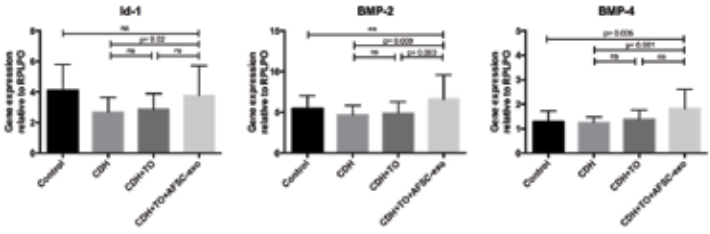
Results

We found that the bone morphogenetic protein (BMP) signaling, involved in both alveolar maturation and pulmonary angiogenesis, was the main target of AFSC-exosomes. Id-1, a major BMP downstream transcriptional target, was decreased in lungs of CDH fetuses compared to control ($p<0.0001$). TO alone did not rescue the expression of Id-1, whereas TO+AFSC-exosomes increased Id-1 back to control levels (Figure). Two BMP ligands, BMP-2 and BMP-4, had increased expression in lungs treated with TO+AFSC-exosomes compared to untreated CDH lungs, whereas TO alone had no beneficial effect (Figure).

Conclusion

This is the first in vivo study unveiling the main pathway that is activated by the administration of AFSC-exosomes and explaining their role in promoting fetal lung maturation. This novel cell-free therapy could be a valuable addition to tracheal occlusion in selected babies with CDH.

Quick Shots 5 (cont.)



Quick Shots 5 (cont.)

Q62

PREDICTING THE NEED AND BENEFIT OF DESCENDING AORTOPEXY IN ADDITION TO POSTERIOR TRACHEOPEXY FOR THE SURGICAL TREATMENT OF TRACHEOBRONCHOMALACIA

Wendy Jo Svetanoff, MD[1], Benjamin Zendejas, MD, MSc[2], C. Jason. Smithers[2], Leah Frain[2], Gary Visner[2], Christopher W. Baird[2], Sanjay P. Prabhu[2], Russell Jennings, MD[2], Thomas E. Hamilton, MD[2]

[1]Boston Children's Hospital, Brookline, MA, USA, [2]Boston Children's Hospital, Boston, MA, USA

Purpose

Compression of the left mainstem bronchus contributes to respiratory difficulties in patients with tracheobronchomalacia (TBM). Posterior aortic displacement (descending aortopexy) is an adjunct to posterior tracheopexy to increase bronchial diameter. Identification of the Artery of Adamkiewicz (AoA) before moving the aorta is critical to preventing neurologic injury. We investigated preoperative variables that may predict which patients benefit from a descending aortopexy and its impact on requiring additional procedures.

Methods

Retrospective chart review identified patients who underwent posterior tracheopexy with or without descending aortopexy (May 2012–October 2017). Aortic positioning compared to the anterior spinal border (ASB) and AoA were identified on dynamic CT angiograms. Left mainstem bronchial (LMSB) compression was assessed using dynamic tracheobronchoscopy. Logistic regression was employed to determine variables associated with descending aortopexy and need for further airway procedures; $p<0.05$ was significant.

Results

Seventy patients underwent descending aortopexy with posterior tracheopexy, and 118 underwent posterior tracheopexy alone. Seventeen of 40 patients (42.5%) with AoA identification had a take-off within the operative field (T10 or higher). On multivariate analysis, >50% LMSB compression (n= 72, OR 7.5, $p<0.0001$), >50% aortic diameter anterior to ASB (n=89, OR 2.14, $p=0.049$), and year of surgery (≥2016 [n=122] vs ≤2015 [n=66], OR 4.39, $p=0.0006$) were associated with increased likelihood of performing a descending aortopexy. Subsequently, descending aortopexy was associated with decreased need (OR 0.29, $p=0.0073$) for additional airway procedures (namely anterior aortopexy), while extreme prematurity (<30 weeks) was associated with increased need (OR 3.88, $p=0.02$).

Conclusion

Descending aortopexy, in addition to posterior tracheopexy, should be considered for patients with tracheobronchomalacia who have > 50% left mainstem compression and/or > 50% aortic diameter anterior to the spine. In these patients, addition of a descending aortopexy substantially decreased the need for further procedures. CT angiogram and dynamic tracheobronchoscopy are crucial for patient selection and operative planning.

Quick Shots 5 (cont.)

Q63

EFFECTS OF INTRAOPERATIVE TEMPERATURES ON POSTOPERATIVE INFECTIONS IN INFANTS

Ruchi Amin, MD, Sarah Walker, MD, Marjorie J. Arca, MD, Ankur Datta, MD
Medical College of Wisconsin, Milwaukee, WI, USA

Purpose
Intraoperative hypothermia has been shown to increase the risk of post-operative infectious complications in adults. We sought to characterize whether intraoperative temperatures similarly affect infants and neonates.

Methods
We conducted a single institution retrospective review of patients < 6 months old who underwent general surgical procedures from November 2013 to October 2015 at a free-standing Level I ACS Children's Surgical Center. Data obtained included weight and age at surgery, ASA physiologic status, wound class, case length, blood transfusion within 72 hours of surgery, and administration of prophylactic antibiotics. Intraoperative temperatures were classified as hypothermia (T < 36°C), normothermia (T= 36.0 to 37.9 °C) and hyperthermia (T > 38°C). The primary outcome of surgical site infections (SSI) occurring within 30 days after operation was modeled using logistic regression. Extensive model building was not possible due to the small number of events, but adjusted analyses of the effect of hypo- or hyperthermia were performed by including covariates that were significant univariate predictors at a 0.2 level for at least one of the outcomes.

Results
There was a 2.8% SSI rate in all 885 patients and 3.7% SSI rate in 243 newborns. For all patients, bivariate analysis for SSI showed lower operative weight, blood transfusion, higher ASA, longer anesthesia time and hyperthermia were significantly associated with SSI. In multivariate analyses, only hyperthermia (OR 3.5 [1.3, 9.0] p=0.0109) and blood transfusion OR 3.6 [1.3, 10.3], p=0.0160) were the only risk factors found to be significantly associated with SSI. In newborns, none of the variables, including hypothermia or hyperthermia, was significantly associated with SSI.

Conclusions
In infants, intraoperative hypothermia does not seem to be associated with SSI. In contrast, hyperthermia may confer a higher risk for SSI. The number of newborns in our study may not have allowed us to analyze these relationships fully.

Quick Shots 5 (cont.)

Q64

IN UTERO TREATMENT OF MYELOMENINGOCELE WITH PLACENTAL MESENCHYMAL STROMAL CELLS RESCUES AMBULATION IN THE OVINE MODEL – SELECTION OF AN OPTIMAL CELL LINE

Laura Galganski, MD[1], Priyadarsini Kumar[1], Melissa Vanover[1], Christopher Pivetti[1], Jamie Anderson[1], Lee Lankford[1], Zachary Paxton[1], Karen Chung[1], Mennatalla Hegazi[1], Kaeli Yamashiro[1], Aijun Wang[1], Diana L. Farmer, MD[2]

[1]University of California, Davis, Sacramento, CA, USA, [2]University of California, Davis: UC Davis Children's Hospital, Carmichael, CA, USA

Purpose

In preparation for clinical trials, we sought to determine how in vitro identity assays inform which placental mesenchymal stromal cell (PMSC) donors produce high rates of ambulation following in utero treatment in the ovine model of myelomeningocele.

Methods

PMSC banks were created following explant culture of three discarded early gestation placental donors. At passage 5, in vitro neuroprotection for each donor was assessed by indirect co-culture of PMSCs in a neuronal injury model. Donor ability to rescue neurons was compared to treatment without PMSCs. Secretion levels of brain-derived neurotropic factor (BDNF) and hepatocyte growth factor (HGF) were measured by ELISA. For in vivo testing, myelomeningocele defects were surgically created in 28 fetuses and repaired with PMSCs at 3x105 cells/cm2 of extracellular matrix (ECM) from Donor 1 (D1, n=7), Donor 2 (D2, n=6) and Donor 3 (D3, n=5) and compared to ECM alone (no PMSCs, n=10). Ambulation was defined as scores of ≥ 13 on the Sheep Locomotor Rating Scale (SLR).

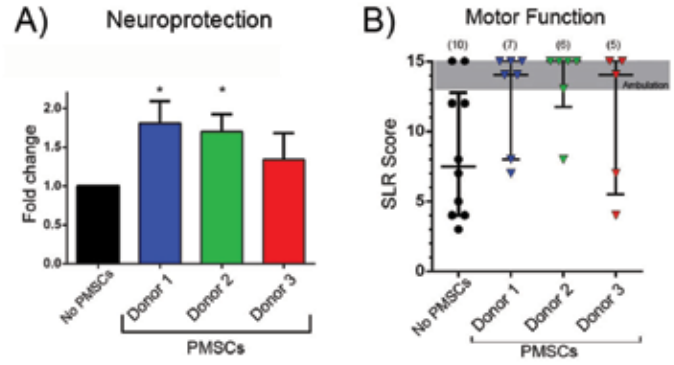
Results

Neuroprotective capability was 1.7 (D1), 1.6 (D2) and 1.3 (D3). Donor 1 and 2 had significantly higher neuroprotection than no PMSCs (p= 0.01, ANOVA, Tukey's)(Figure 1A). All donors secreted both BDNF and HGF with mean levels 304.8±194.2 pg/ml and 57.9±14.2 ng/ml (D1), 290±69.2 and 86.8±29.2 (D2) and 294.3±186.8 and 75.9±11.2 (D3) respectively, without differences among donors (p=0.99, p=0.27, ANOVA). In vivo, median SLR scores were 14 (D1), 15 (D2) and 14 (D3) compared to 7.5 without PMSCs (p=0.11 ANOVA). The rate of ambulation in lambs was highest in the two donors with significantly improved neuroprotection (71%, D1 and 83%, D2) and lowest in Donor 3 (60%) compared to without PMSCs (20%) (Figure 1B).

Conclusion

The in vitro neuroprotection assay may allow selection of optimal PMSC donors that produce high rates of ambulation in the ovine model of myelomeningocele.

Quick Shots 5 (cont.)



Quick Shots 5 (cont.)

Q65

REPEAT DOSING IN THE RETINOIC ACID MODEL OF TRANSAMNIOTIC STEM CELL THERAPY FOR SPINA BIFIDA

Sarah A. Tracy, MD, Alexander V. Chalphin, MD, Stefanie P. Lazow, MD, Ina Kycia, MD, Christopher Chan, Adam Finkelstein, David Zurakowski, Dario O. Fauza, MD

Boston Children's Hospital, Boston, MA, USA

Purpose

Transamniotic stem cell therapy (TRASCET) with mesenchymal stem cells (MSCs) can trigger coverage of experimental spina bifida, by mechanisms unknown. We sought to examine the impact of repeat dosing in the rodent model, as a means to garner further mechanistic insight.

Methods

Following IACUC approval, 23 time-dated pregnant Sprague-Dawley dams exposed to retinoic acid for the induction of fetal neural tube defects were divided into three groups: one untreated and two groups receiving volume-matched intra-amniotic injections of a concentrated suspension of amniotic fluid-derived MSCs (afMSCs) at either one (n=52), or two (n=42) time-points in gestation. Infused afMSCs consisted of syngeneic Lewis rat cells with mesenchymal progenitor identity confirmed by flow cytometry, labeled with green fluorescent protein. Animals were euthanized at term. Defect coverage was categorized only if the presence of a rudimentary neoskin was confirmed histologically. Statistical comparisons were by the Wald test ($p<0.05$).

Results

Fetal survival to term was 85% (44/52) after a single injection and 38% (38/99) after two injections ($p<0.001$), with 32 untreated survivors. Among those with isolated spina bifida (n=82), there was a statistically significant higher coverage rate (partial or complete) after a single injection vs. dual injection ($p=0.019$) and vs. no treatment ($p<0.001$). There were no significant differences in coverage rates between the dual injection and untreated groups ($p=0.355$). Labeled cells were detected comparably in both treatment groups, homing to bone.

Conclusions

The effects of transamniotic stem cell therapy are not dose-dependent, at least in the retinoic acid model of spina bifida. Combined with the absence of donor cells in the neoskin overlying the defect, this finding suggests that such effects are centered on a lasting host response to the intra-amniotic injection of donor cells. Further mechanistic investigation into this response could lead to additional non-surgical strategies for prenatal coverage of spina bifida.

Quick Shots 5 (cont.)

Q66

A COMPARISON BETWEEN PLACENTAL AND AMNIOTIC MESENCHYMAL STEM CELLS IN TRANSAMNIOTIC STEM CELL THERAPY FOR EXPERIMENTAL GASTROSCHISIS

Alexander V. Chalphin, MD, Sarah A. Tracy, MD, Stefanie P. Lazow, MD, Ina Kycia, MD, David Zurakowski, Dario O. Fauza, MD

Boston Children's Hospital, Boston, MA, USA

Purpose

We sought to compare placental- and amniotic fluid-derived mesenchymal stem cells (pMSCs and afMSCs, respectively) in transamniotic stem cell therapy (TRASCET) for gastroschisis.

Methods

Following IACUC approval, a gastroschisis was surgically created in 126 rat fetuses at gestational day 18 (E18; term=E21-22). Animals were divided in four groups: untreated (n=28) and three groups receiving volume-matched intra-amniotic injections of either saline (n=33), or a suspension of 2x106cells/mL of afMSCs (n=32), or pMSCs (n=33) at the time of operation. Infused afMSCs and pMSCs consisted of syngeneic rat cells with mesenchymal progenitor identity confirmed by flow cytometry, labeled with green fluorescent protein. Animals were euthanized at term. Comprehensive computerized measurements of total and segmental (serosa, muscularis, and mucosa) intestinal wall thicknesses - surrogates of bowel damage - were performed in 396 fields by three blinded observers. Statistical comparisons were by nested ANOVA, logistic regression (Wald test) and Levene's test (two-tailed $p<0.05$).

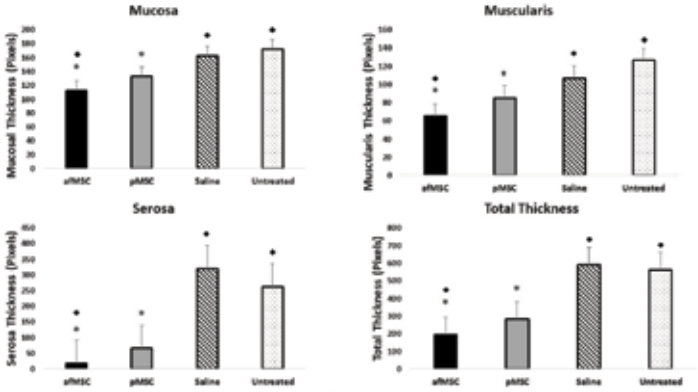
Results

Overall survival with gastroschisis was 32% (40/126), with no significant differences between groups (all $p>0.05$). Among survivors, there were statistically significant decreases in segmental and total bowel wall thicknesses in both the afMSC and pMSC groups vs. the untreated ($p<0.001$ to 0.003) and saline ($p<0.001$ to 0.011) groups (figure). There were significant differences between the afMSC and pMSC groups favoring the former in both therapeutic impact and its variability ($p<0.001$ to 0.031). There were no significant differences between the untreated and saline groups (all $p>0.05$). Labeled cells were comparably identified within the intestinal wall in the afMSC and pMSC groups.

Conclusions

Both placental and amniotic mesenchymal stem cells can mitigate bowel damage in experimental gastroschisis after concentrated intra-amniotic injection, with amniotic cells leading to improved and more consistent outcomes. This finding broadens the cell source options for transamniotic stem cell therapy for gastroschisis, while pointing to amniotic cells as preferred.

Quick Shots 5 (cont.)



* p<0.05 vs. untreated and saline, +p<0.05 vs. pMSC

Quick Shots 5 (cont.)

Q67

DEVELOPMENT OF A UTERINE TONE MONITORING DEVICE FOR FETAL SURGERY

Saif I. Al-Juboori, PhD[1], Irina Marii[2], Ahmed I. Marwan, MD[3]

[1]University of Colorado Denver- Anschutz Medical Campus, Aurora, CO, USA, [2]University of Colorado Denver- Anschutz Medical Campus, Golden, CO, USA, [3]University of Colorado School of Medicine; Colorado Fetal Care Center, Children's Hospital Colorado, Aurora, CO, USA

Purpose

The premise of fetal intervention rests on accurate monitoring and control of uterine contractions. Maintaining profound uterine hypotonia is a central tenet of fetal surgery and Ex-utero Intrapartum Treatment (EXIT) procedures. Among others, preterm labor and fetal circulation interruption are profound risks of inadequate uterine relaxation that can potentially lead to premature termination of the procedure. Currently, uterine tone assessment is achieved by manual palpation and visual inspection of the uterus, which is prone to misestimation. Therefore, a direct objective method for continuous and quantitative measurement of uterine tone is needed.

Methods

We developed the UteroTek device (provisional patent #62/679,433) to acquire objective uterine tone measurements and performed preliminary studies in our rabbit fetal tracheal occlusion model. The device is equipped with a force sensor with a sensitivity range of 0.2 – 20N and programmed to read and display a force response every 0.5s at 0.5,1, or 1.5mm deflections. Baseline uterine force measurements were taken every 0.5s and response to thermal injury from the left and right rabbit uterine horns at 26 days of gestation was documented. Changes in force readout from baseline value were interpreted as mechanical deformations of the uterus. The device was also tested on abdominal muscles for comparative measurements.

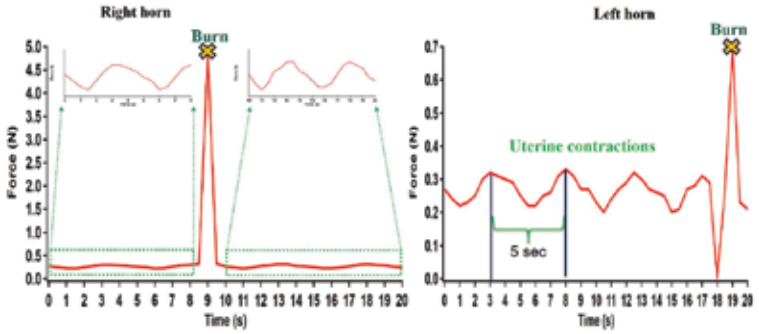
Results

Abdominal and uterine muscles responded to thermal injury with variable intensities correlating with the magnitude and duration of the stimulus. While no periodic maternal abdominal muscle contractions were detected, uterine contractions were recorded at 1.5mm deflection every 5s (12 contractions/minute) with quick return to baseline following thermal injury (Figure 1).

Conclusions

We conclude that the current UteroTek device is more sensitive at deeper deflections (1.5mm) and captures the sinusoidal nature of uterine contractions in the rabbit model. UteroTek has the potential to provide objective data that will affect the practice and conduct of fetal surgery.

Quick Shots 5 (cont.)



Quick Shots 5 (cont.)

Q68

ADHERENCE TO AND OUTCOMES OF A UNIVERSITY-CONSORTIUM GASTROSCHISIS PATHWAY

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Purpose

Our university consortium created a pathway to standardize and improve care of patients with gastroschisis by promoting avoidance of routine intubation and paralysis during silo placement, expeditious abdominal wall closure, discontinuation of antibiotics/narcotics within 48 hours of closure, and a feeding protocol. We sought to evaluate adherence to and outcomes of this pathway.

Methods

The gastroschisis pathway was implemented in 2015, and adherence was prospectively monitored. Outcomes were compared with a historical cohort (2007-2012). Wilcoxon rank-sum test and Fisher's exact test were utilized where appropriate to identify significant differences ($p<0.05$).

Results

Seventy cases of inborn gastroschisis uncomplicated by ischemic bowel, atresia/stricture, or death were evaluated. Paralysis was avoided for silo placement in 76%. Within 48 hours of abdominal wall closure, antibiotics were discontinued in 80% and narcotics were discontinued or limited to minimal prn dosing in 76%. Feeds were initiated within 48 hours of non-bilious orogastric output in 81% and reached goal in less than 10 days in 81%. Comparison of outcomes with those of the historical cohort is summarized (Table). While mechanical ventilation and antibiotic days and age at initiation of feeds were reduced in the contemporary cohort, there was no difference in length of stay. A skin closure technique was performed in 66% of which 46% were performed at bedside without intubation, anesthesia, or the assistance of an operating-room team.

Conclusion

Our gastroschisis pathway was implemented with good adherence. Despite less invasive support and earlier feed initiation, the lack of difference in length of stay suggests that intestinal dysmotility intrinsic to gastroschisis remains a rate limiting factor for discharge. We will promote adoption of the bedside skin closure technique and minimal use of narcotics with the goal of reducing the need for intubation and anesthesia exposure during the neonatal period.

Quick Shots 5 (cont.)

Q69

UMBILICAL ACCESS IN LAPAROSCOPIC SURGERY IN INFANTS LESS THAN 3 MONTHS OF AGE: A SURVEY OF THE AMERICAN PEDIATRIC SURGICAL ASSOCIATION

Matthew P. Landman, MD, MPH, Deborah Billmire, MD

Indiana University, Indianapolis, IN, USA

Purpose

Laparoscopy is commonplace in pediatric surgery. Abdominal access via the umbilicus may present a unique challenge in neonates and young infants predisposing them to complications. We hypothesized that these complications may occur more than described in the literature.

Methods

Members of the American Pediatric Surgical Association were anonymously surveyed in February of 2018 via REDCap regarding technique of umbilical access in infants less than 3 months of age and complications experienced during umbilical access. Approval was obtained from the IRB and the APSA Outcomes and Evidence-based Practice Committee.

Results

The response rate was 31.3% (329/1050). 62.3% of respondents performed 21 or greater neonatal laparoscopic procedures annually. 34 of 322 respondents reported a direct complication from umbilical access for laparoscopy in this age group (10.6%). Surgeons described 33 specific cases with complications related to umbilical access, with laparoscopic pyloromyotomy making up 51.5% (17/33). Air embolism was the most common complication; 15.4% of surgeons reported not knowing about the possibility of air embolism. 41% of surgeons confirm intra-abdominal placement of the umbilical trocar prior to insufflation. There was no association between any complication and where the umbilical trocar was placed (above/below/through umbilicus) or placement technique in patients with no umbilical cord stump. There may be an association between complication and where the umbilicus is entered in patients with an umbilical cord stump still in place ($p = 0.013$).

Conclusions

Umbilical access for laparoscopy in neonates and infants less than 3 months of age can present a unique challenge and result in significant complications. Other than a small group of surgeons (n=12) who enter the abdomen above the umbilicus, all techniques and methods had complications. Surgeons should be aware of these risks and be prepared to manage them emergently if they arise.

Quick Shots 5 (cont.)

Q70

SURGICAL MANAGEMENT OF ACUTE AORTOILIAC THROMBOSIS IN A NEONATE

Bryan V. Dieffenbach, MD, Bharath Nath, Heung Bae Kim, MD
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Neonatal aortic thrombosis is a rare but potentially life-threatening condition. Treatment is patient-specific and may include expectant management, therapeutic anticoagulation, systemic thrombolysis or surgical thrombectomy. The majority of cases are managed non-operatively with variable success. We present a case of acute aortoiliac thrombosis in a nine-day-old girl managed successfully with open aortic and bilateral iliac artery thrombectomies. Our patient presented to an outside hospital on day-of-life nine with one day of fussiness, feeding intolerance and anuria. Examination revealed pallor of the lower extremities with absent femoral and pedal pulses. Doppler signals were absent. Laboratory testing indicated acute renal failure. Duplex ultrasonography revealed a large occlusive thrombus extending from the SMA origin to the bilateral common femoral arteries. Therapeutic anticoagulation was initiated. Hematology consultation recommendations included systemic thrombolysis which was ultimately not pursued due to concern for bleeding risk. A peritoneal dialysis catheter was placed on the evening of presentation and dialysis initiated in the setting of acute anuric renal failure. The patient was transferred to our institution after no improvement by day-of-life nineteen. CT angiography confirmed thrombosis of the aorta below the SMA involving the origins of both renals but also demonstrated viability of the majority of both kidneys likely due to the rapid development of collaterals. The patient was taken to the operating room the following day for open aortic and bilateral iliac artery thrombectomies. Post-operatively, urine output increased and renal function recovered rapidly enough that she required no additional dialysis. Interval duplex ultrasonography revealed patency of the aorta, bilateral renal and iliac arteries. This case demonstrates that surgical thrombectomy can be a safe and effective method for the treatment of symptomatic aortic thrombosis in neonates and can prevent permanent end organ damage in select cases.

Quick Shots 6

Quick Shots 6: Clinical, Education and Innovation

Wednesday, May 22 | 9:30 a.m. – 10:30 a.m.

Salons A-F

Q71

TRENDS IN THE USE OF SURGICAL ANTIBIOTIC PROPHYLAXIS IN GENERAL PEDIATRIC SURGERY: ARE WE MISSING THE MARK FOR BOTH STEWARDSHIP AND INFECTION PREVENTION?

Seema Anandalwar, MD, MPH, Carly Milliren, Dionne Graham, PhD, Mark Kashtan, MD, MPH, Jonathan L. Hills-Dunlap, MD, MPH, Shawn J. Rangel, MD, MSCE

Boston Children's Hospital, Boston, MA, USA

Purpose

Appropriate spectrum of coverage for surgical antibiotic prophylaxis (SAP) is essential for both infection prevention and antibiotic stewardship. The purpose of this study was to examine compliance with SAP spectrum guidelines for commonly performed pediatric surgical procedures.

Methods

Retrospective study of children undergoing elective surgical procedures using the PHIS database from 10/2015-6/2018. Published consensus guidelines were used to establish criteria for SAP (clean cases with foreign body implantation or clean-contaminated cases) and appropriate antimicrobial agents based on procedures and organ system involved. Exclusion criteria included ED visit within 2 days of surgery, immunodeficiency disorders, and administration of antibiotics or steroids the day prior to surgery. Intravenous antibiotics received on the day of surgery were considered prophylaxis. The rate of adherence to appropriate agents was calculated for each procedure where SAP was indicated, with undertreatment defined as use of inappropriately narrow-spectrum antibiotics (or omission of SAP) and overtreatment as inappropriately broad-spectrum antibiotics.

Results

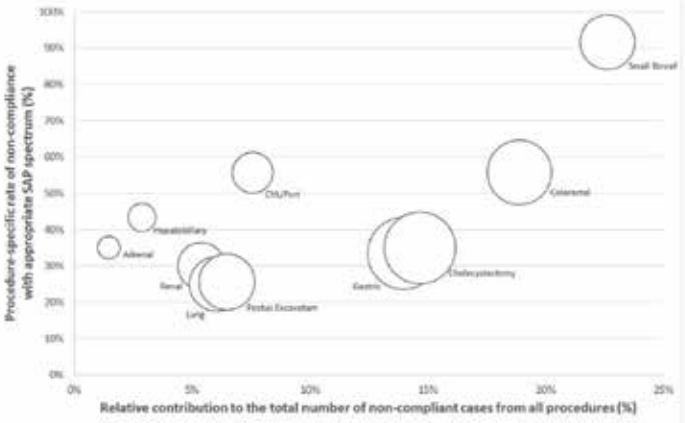
19,544 patients were included representing 10 procedure groups. Overall compliance with appropriate spectrum of coverage was 56%, with 42% of noncompliant cases representing undertreatment and 57% overtreatment. Procedures with the highest rates of undertreatment included CVL/ports (43%) and hepatobiliary (22%) procedures. Procedures with the greatest relative contribution to all undertreated cases from all procedures included cholecystectomy (18%) and gastric procedures (17%). Procedures with the highest rates of overtreatment included small bowel (77%), colorectal (38%), and hepatobiliary (22%) procedures, and procedures with the greatest relative contribution to all overtreated cases included small bowel (33%), colorectal (22%) and gastric (12%) procedures (Figure).

Conclusions

Non-compliance to surgical antibiotic prophylaxis guidelines is common in pediatric surgery, with both over- and under-treatment being common themes. The results of this study highlight several high priority conditions where education and improved compliance with guidelines is needed to optimize both antibiotic stewardship and infection prevention.

Quick Shots 6 (cont.)

Figure. Prioritization framework for antibiotic stewardship efforts based on non-compliance (both under- and over-treatment) to spectrum guidelines. Bubble size = case volume.



Quick Shots 6 (cont.)

Q72

COST-EFFECTIVE METHODS OF OPTIMIZING ANTIBIOTIC STEWARDSHIP IN PEDIATRIC NON-COMPLICATED APPENDICITIS

Angie M. Kao, MD[1], Sean R. Maloney[1], Tanushree Prasad[1], Thomas Schmelzer, MD[2], Daniel A. Bambini, MD[2], Andrew M. Schulman[2], Graham H. Cosper, MD[2]

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Purpose

Acute non-complicated appendicitis is the most common pediatric surgical diagnosis and has been identified as a high-impact target for antimicrobial stewardship interventions, given the wide variability in antibiotic regimens within and between centers. Unnecessary carbapenem use and inadvertent postoperative dosing contributes to increased antimicrobial resistance and inefficient resource utilization. After observing wide institutional variability, a quality improvement initiative was developed targeting standardization of antibiotics for non-complicated appendicitis. We hypothesized that implementation of a standardized pathway would reduce unnecessary antimicrobial use and improve cost-efficiency of care.

Methods

A clinical practice guideline (CPG) [preoperative single dose ceftriaxone and metronidazole for non-penicillin allergic] was developed for non-complicated appendicitis and implemented into the standard orderset in June 2017. Perioperative data was collected prospectively during the study period (June 2016-August 2018). Patients treated pre-and post-CPG implementation were compared using univariate analysis, with statistical significance set at $p<0.05$.

Results

A total of 167 patients, including 58 pre-CPG and 109 post-CPG, underwent laparoscopic appendectomy. There were no differences in mean age (11.7vs.11.0 years, $p=0.45$), leukocytosis (15.3vs.15.5, $p=0.82$), or time from diagnosis to OR (8.9vs.8.8hours, $p=0.71$) between cohorts. Compared to pre-CPG, post-CPG patients were more likely to receive recommended antibiotics (13.8%vs.90.8%, $p<0.0001$), with a significant reduction in carbapenem use (81.0%vs.9.2%, $p<0.0001$). Post-CPG patients also received fewer postoperative antibiotic doses (25.9%vs.9.2%, $p=0.004$) and had lower pharmacy costs per patient ($123.20vs. $67.70, $p<0.0001$), leading to 50% reduction in total pharmaceutical costs ($2620vs. $1296, $p<0.0001$). There were no differences in complications (1.7%vs.2.8%, $p=1.00$) or readmissions (5.2%vs.1.8%, $p=0.38$).

Conclusion

Implementation of a recommended antibiotic regimen for pediatric non-complicated appendicitis significantly reduced excess antibiotic dosing and pharmacy costs, resulting in improved antimicrobial stewardship and resource utilization. Using standardized orders to minimize practice variation and increase provider compliance, this study demonstrates the cost-effective impact of antimicrobial stewardship efforts in pediatric surgical patient populations.

Quick Shots 6 (cont.)

Q73

OBESITY-RELATED DIFFERENCES IN MANAGEMENT AND OUTCOMES OF CHILDREN WITH APPENDICITIS: IMPLICATIONS FOR TREATMENT DELAY, RADIATION STEWARDSHIP, AND INFECTION PREVENTION

Jonathan L. Hills-Dunlap, MD, MPH, Carly Milliren, Dionne Graham, PhD, Seema Anandalwar, MD, MPH, Mark Kashtan, MD, MPH, Shawn J. Rangel, MD, MSCE

Boston Children's Hospital, Boston, MA, USA

Tweet it! Is obesity independently associated with disparities in management and outcomes of children with appendicitis? New study suggests yes.

Purpose

Childhood obesity is an increasing public health concern, and obesity-related surgical disparities in children have not been well characterized. The purpose of this study was to examine the influence of obesity on management and outcomes in children with appendicitis.

Methods

Retrospective cohort study of patients undergoing appendectomy at 29 children's hospitals using the NSQIP-Pediatric Appendectomy Pilot Database from 1/2013-6/2015. Obesity was defined as BMI >95th percentile by age and gender. Multivariate mixed-effects logistic regression was used to examine the influence of obesity on hospital transfer rate (from referral hospital to NSQIP hospital), preoperative imaging (ultrasound, CT), negative appendectomy rate, 30-day postoperative complications as defined by NSQIP, and 30-day hospital revisits after adjusting for patient characteristics (age, gender, race, ethnicity, insurance status) and hospital-level effects.

Results

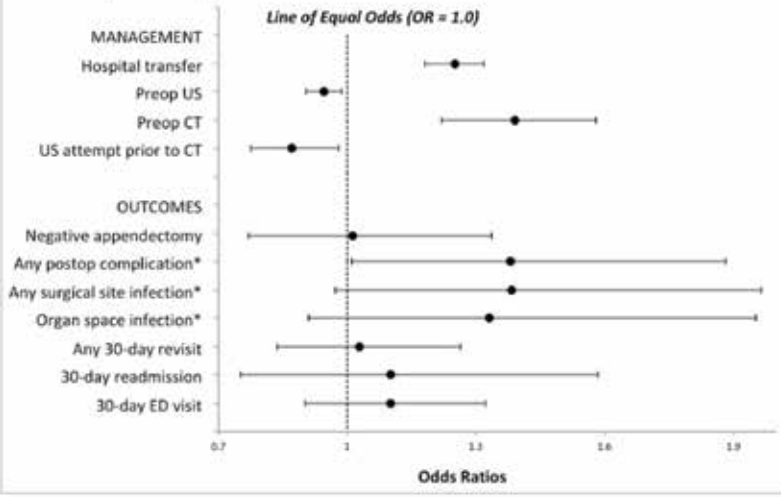
7,544 children were included, of which 14% were obese. Compared to non-obese children, obese children were more likely to have been transferred for definitive care (OR 1.25, 95%CI: 1.18-1.32, $p<0.01$), more likely to receive a preoperative CT scan (OR 1.39, 95%CI: 1.22-1.58, $p<0.01$), and less likely to have undergone an initial ultrasound attempt when a preoperative CT scan was performed (OR 0.87, 95%CI: 0.78-0.98, $p=0.02$). Obese children with complicated appendicitis were more likely to experience postoperative complications (OR 1.38, 95%CI: 1.01-1.88, $p=0.04$), with the greatest relative increase in odds associated with any SSI (OR 1.38, 95%CI: 0.97-1.96, $p=0.07$) and organ space infections (OR 1.33, 95%CI: 0.91-1.95, $p=0.15$). No differences were found for other outcomes (Figure).

Conclusions

Disparities exist in the care of obese children with appendicitis, some of which may have implications for treatment delay, unnecessary radiation exposure, and postoperative complications. Strategies to eliminate disparities should include exploring drivers of hospital transfer, encouraging utilization and technical optimization of ultrasound, and investigating the nature and risk of postoperative complications in obese children.

Quick Shots 6 (cont.)

Figure. Comparing management and outcomes of obese to non-obese (reference group) children with appendicitis. Outcome variables marked with an asterisk (*) were limited to only patients with complicated appendicitis.



Quick Shots 6 (cont.)

Q74

QUANTIFYING THE EFFECT OF RESIDENT EDUCATION ON PATIENT COSTS AND OUTCOMES IN PEDIATRIC APPENDICITIS

Mark V. Mazziotti, MD, MEd[1], **Brittany L. Johnson, MD** [2], Megan E. Cunningham, MD[2], Sara C. Fallon, MD[1], Sohail R. Shah, MD, MSHA[1], Monica E. Lopez, MD[1]

[1]Baylor College of Medicine, Houston, TX, USA, [2]Texas Children's Hospital, Houston, TX, USA

Purpose

Appendectomy is commonly performed within our hospital system, which features a freestanding main children's hospital (MH) and a community campus hospital (CH) without residents. This dual setting provides a unique opportunity to evaluate the effect of resident involvement on appendicitis management and outcomes.

Methods

We retrospectively reviewed all appendicitis cases from January 2016 -January 2018, excluding incidental and interval appendectomies and cases performed by surgeons who operate exclusively at either campus. Data were analyzed using Wilcoxon rank and Fisher's exact tests.

Results

2,397 appendectomies were performed during the study period. 752 were excluded. 1,645 appendectomies remained for analysis. Mean age for all patients was 10.6 years. The proportion of simple to complex appendicitis was similar between hospitals (MH 61% simple, 39% complex; CH 60% simple, 40% complex, p=1.0). Operative time was significantly longer with residents (MH 56.55 vs CH 42.67 minutes for complex appendicitis; MH 36.88 vs CH 20.96 minutes for simple appendicitis; p<.0001). There was no difference in postoperative length of stay for complex appendicitis (MH 4.56 vs CH 4.10; p=0.32) but a significant difference in the postoperative length of stay for simple appendicitis (MH 36.88 vs CH 20.96 hours; p<.0001). No difference in readmission rate, intra-abdominal abscess (IAA) rate, or 30 day return to emergency center (EC) rate was seen between the hospitals. Using mean operative times, OR charges were the same for complex appendicitis for both hospitals but increased 31.5% when residents assisted in simple appendicitis at the MH.

Conclusion

Resident involvement results in a significant increase in operative time in complex and simple appendicitis, a significant increase in postoperative length of stay for simple appendicitis, and a 31.5% increase in operative charges for simple appendicitis. Despite these "costs" of resident education, no difference in readmissions, EC visits, or IAA rate was seen with resident involvement.

Quick Shots 6 (cont.)

Q75

CHILDREN'S SURGICAL VERIFICATION: DEVELOPMENT OF A QUALITY AND SAFETY TOOL TO EVALUATE PEDIATRIC SURGICAL CARE AND TEACH THE SURGICAL QUALITY PROCESS

Erik G. Pearson, MD, Emily Weinschreider, Heather Shininger, RN, Kelly Kogut, MD

Sunrise Children's Hospital, Las Vegas, NV, USA

Tweet it! Quality improvement is a fundamental pillar of pediatric surgical care and the Children's Surgical Verification program of the ACS. "The Blue Sheet" is a tool we developed to teach the quality process and encourage a team approach to QI at Sunrise Children's Hospital.

Introduction

Children's Surgical Verification is a process developed by the American College of Surgeons to define optimal resources and improve care for children with surgical needs. We developed a tool for auditing operative outcomes in the pediatric surgical population and teaching physicians and staff about the quality process.

Methods

We developed a quality assessment tool for peri-operative and post-operative outcomes known as "The Blue Sheet." For each pediatric surgical patient the pre-operative safety checklist was completed and following the operation any intra-operative or anesthetic complications were noted. Each patient was followed up at 48 hours following surgery and again at 30 days for adverse events. We retrospectively evaluated 2092 pediatric patients over the previous two quarters between January and July 2018.

Results

Over two quarters beginning in January 2018, 2092 pediatric patients received surgical care utilizing "The Blue Sheet." Patients were followed up at 48 hours by phone or by inpatient query and between quarters 1 and 2 follow-up improved from 81% to 88%. We were able to identify 50 adverse events at 48h and a total of 83 adverse events at 30 days in the first quarter. In the second quarter there were 44 adverse events at 48h and 80 events at 30 days. Prior to introduction of the tool we were not able to clearly audit all adverse events.

Conclusion

"The Blue Sheet" quality and safety tool enabled us to identify post-operative adverse events at 48 hours and 30 days following surgery and review these events at the patient level. Utilization of this tool has also taught staff about the quality process and has been the impetus for a team approach to quality improvement.

Quick Shots 6 (cont.)

Children's Surgical Safety Checklist

Date: _____

BRIEFING

Initiated by: Circulator
Includes: Parent, PI, Preop RN, Surgeon, Anes.

- ☐ Armband in place
- ☐ Weight in kg verified & on white board

Preferred method of parent contact:
#_____
☐ Phone call ☐ Text messages

[Insert patient sticker here]
Patient Identification: Two unique identifiers

Patient Coming from? ☐OTHER _____
☐NICU ☐PICU ☐PEDS ☐PEDS ED ☐HOME

Patient weight: _____kg
- Verified with MedTech I&O screen

Allergies: _____
Procedure: _____
Site /Side: _____
Site mark completed? ☐ YES ☐ N/A
Standard SCD's in place (Children 12yo+)?
☐ YES ☐ N/A

Pregnancy test:
- **Females 10yo+** _____

For babies < 6 months *"See back for algorithm"*
Warming Measures: Consider Warming Measures:
i.e. Warming Blanket, Warm Forced Air, Warming lights
Room Temp: _____ **RH:** _____

TIMEOUT

Initiated by: Surgeon
Includes: All personnel in OR

Present for Procedure:
-[Surgeon] Dr. _____
-[Anesthesiologist] Dr. _____
ASA: _____

Introduction:
- All team members introduce themselves: Name & Role
- Will there be additional "Time Outs" for multiple procedures?

Correct patient, procedure & side?
- Images displayed & verified as correct by surgeon
- Procedure is verified with consent
- Site/side is verified with markings and reports
- Position is correct

Safety concerns for this patient?
- Appropriate pre-op antibiotic selected & started
- Verify Medication/Solution Dose, Max Dose and Labeling
- Anticipated blood loss, need for blood
- Appropriate IV access
- Implants and equipment needed
- Fire Risk
- Expected length of procedure

DEBRIEFING

Initiated by: Circulator or Surgeon
Includes: Entire OR team

Surgeon Verifies:
- Name of procedure to be recorded
- Diagnosis to be recorded
- Wound classification to be recorded:
  - ☐ Clean ☐ Contaminated
  - ☐ Clean-contaminated ☐ Dirty
- Name of specimen to be recorded / labeled
- Diagnosis to be recorded

Circulator Verifies:
- Correct counts
- Equipment problems/process failures
- Correct specimen labeling & delivery to path
- Delay/codes
- Needed changes to preference card
- Armband in place

All team members:
- Key concerns for postoperative period
- Airway concerns during transport & recovery
- EBL to record, potential ongoing blood loss
- Need for post op labs/imaging
- Communication to accepting team
- Meds secured & med waste disposed properly

Required Post-op Monitoring:
☐Standard PACU ☐ 2hr ☐ 3hr ☐ 6hr ☐ 12hr

Patient Going to?
☐OR-NNICU ☐OR-NPICU ☐Other _____ (Remember "Transfer Timeout")
☐PACU-NPICU ☐PACU-NFloor ☐PACU-NHome

Completed by: _____

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ADVERSE EVENTS

Intra-op: (Complete at end of procedure)

Y	N	
☐	☐	Intraoperative awareness: Explicit awareness during Anesthesia
☐	☐	Operation: On incorrect patient
☐	☐	Operation: On incorrect side
☐	☐	Operation: Wrong operation performed
☐	☐	Surgical Fire and/or Patient Burns
☐	☐	Did the patient receive Regional Anesthesia? (i.e. spinal, epidural, nerve blocks anesthesia)

Within 48hrs of Operation:

Y	N	
☐	☐	Transfusion Reaction
☐	☐	Inadvertent Extubation
☐	☐	Unanticipated Reintubation
☐	☐	Severe Anaphylaxis w/Hives, Wheezing, or Hemodynamic effects
☐	☐	Definite aspiration
☐	☐	Cardiac Arrest: Defib or Compressions
☐	☐	Malignant Hyperthermia: Definite, suspected, or use of Dantrolene
☐	☐	Institution of Massive Transfusion Protocol (MTP)
☐	☐	Unanticipated need for ECMO
☐	☐	Stroke or coma
☐	☐	Visual loss: Permanent impairment or Total Loss of Sight

Within 30days of Operation:

☐	☐	Death	☐ ☐ Unanticipated: Return to OR
☐	☐	VTE	☐ ☐ Unanticipated: Inpatient Admission
☐	☐	Unanticipated: Transfer to another institution for higher level of patient care	

Children's Hospital | Amazing Together

Children's Surgical Safety Report

[Insert patient sticker here]

Algorithm
For babies < 6 months

Quality Project Stickers

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Quick Shots 6 (cont.)

Q76

COMPLICATIONS WHILE AWAITING ELECTIVE INGUINAL HERNIA REPAIR IN INFANTS: NOT AS COMMON AS YOU THOUGHT

Anthony Ferrantella, MD[1], Juan E. Sola, MD[1], Joshua P. Parreco, MD[2], Brent A. Willobee, MD[1], Hallie J. Quiroz, MD[1], Emily L. Ryon, MD[1], Clara Reyes-Miranda, ARNP[3], Rishi Rattan, MD[1], Chad M. Thorson, MD[1], Eduardo A. Perez, MD[1]

[1]University of Miami Miller School of Medicine, Miami, FL, USA, [2]University of Miami Miller School of Medicine - Department of Surgery, Miami, FL, USA, [3]Department of Pediatric Hospital Medicine, Nicklaus Children's Hospital, Miami, FL, USA

Tweet it! Complications in infants awaiting inguinal hernia repair might not be as common as you've been taught! The University of Miami team presents how the Nationwide Readmissions Database revealed that unplanned readmissions are not very common and actual complications are quite rare.

Purpose

The dogma of early inguinal hernia repair in infants, especially those born prematurely, has dominated clinical practice due to reports of a high frequency of incarceration and significant complications associated with untreated inguinal hernias. Here, we aim to evaluate the true incidence of complications following discharge and subsequent surgery for inguinal hernia repair.

Methods

The Nationwide Readmissions Database (2010-2014) was queried to identify infants (age <1 year) with the diagnosis of inguinal hernia. We compared the frequency and characteristics of: inguinal hernia repair performed during index admission, discharge from index admission without hernia repair, and non-elective readmissions (up to 1 year later) with a primary diagnosis of symptomatic inguinal hernia. Chi-square test was used to compare cohorts.

Results

Overall, we identified 33,530 infants (16,624 premature and 16,906 full-term) diagnosed with an inguinal hernia during index admission. Inguinal hernia repair during index admission was performed less often for premature compared to full-term infants (38% vs 58%, $p<0.001$). Of the infants discharged without hernia repair, 11% of premature and 9% of full-term infants required non-elective readmission for symptomatic inguinal hernia within 1 year, and the 30-day readmission rate was only 6% for each cohort. 7% of premature and 4% of full-term infants initially discharged underwent hernia repair during these unplanned readmissions. Premature infants were more likely than full-term infants to be readmitted to a different hospital (55% vs 31% of readmissions, $p<0.001$) and to undergo hernia repair during that hospital stay (66% vs 43%, $p<0.001$). Although 14% of readmitted infants requiring hernia repair underwent additional procedures, none of them required orchiectomy, oophorectomy, or bowel resection.

Conclusion

Readmission rates for complications related to an untreated inguinal hernia in infants may be significantly lower than previously reported, and the occurrence of significant associated morbidity is quite rare.

Quick Shots 6 (cont.)

Q77

LAPAROSCOPIC ASSISTED VERSUS OPEN VP SHUNT PLACEMENT IN CHILDREN - AN OUTCOMES STUDY USING THE ACS-NSQIP PEDIATRIC DATABASE

Michael R. Arnold, MD[1], Mark Van Poppel[2], Scott Wait[2], Caroline Reinke[1], Sarah Jernigan, MD[2], Andrew M. Schulman[3]

[1]Carolinas Medical Center, Charlotte, NC, USA, [2]Carolinas Neurosurgery and Spine Associates, Charlotte, NC, USA, [3]Levine Children's Hospital, Charlotte, NC, USA

Tweet it! Laparoscopy: Improving outcomes for children undergoing VP shunt placement

Introduction
Ventriculoperitoneal (VP) shunt placement is one of the most common treatments for hydrocephalus in children. However, reoperation is frequently required to revise the intraperitoneal portion of the shunt. Historically, shunt placement was performed via laparotomy, but our institution has recently adopted a practice of laparoscopic assisted placement of the intraperitoneal portion of the shunt, performed by pediatric surgeons. Recently, the American College of Surgeons National Surgical Quality Improvement Project – Pediatric began collecting targeted data for VP shunt placement. We sought to examine the outcomes of laparoscopic assisted versus open placement of VP shunt.

Methods
The ACS NSQIP-Pediatric targeted CSF shunt database from 2016 was queried for children undergoing VP shunt placement. Patients were divided into two groups; laparoscopic and open. 30-day outcomes were compared between groups.

Results
A total of 1,325 patients underwent VP shunt placement during the study period, with 97 performed laparoscopically and 1,228 performed open. Patient demographics between groups was similar. Total hospital length of stay (6.6 vs 14.8 days; $p<0.01$) was shorter in the laparoscopic-assisted group. The time from operation to discharge was also shorter in the laparoscopic-assisted group (4.2 vs 7.9; $p<0.01$). Unplanned interventions were more frequent in the open group (2.1% vs 3.1%; $p<0.01$). The surgical site infection rate was similar between groups (1.0% vs 2.7% $p=0.32$), and there was no significant difference in readmissions within 30 days.

Conclusion
Laparoscopic VP shunt placement appears to be superior to open shunt placement; with patients demonstrating a decrease in total length of stay, decreased post-operative length of stay, and fewer unplanned interventions.

Quick Shots 6 (cont.)

Q78

IMPROVING RESOURCE UTILIZATION AND OUTCOMES USING A MINIMALLY INVASIVE PILONIDAL PROTOCOL

Hajar R. Delshad, MS, PA-C[1], Owen Henry, BS[2], David P. Mooney, MD, MPH[1]

[1]Boston Children's Hospital, Harvard Medical School, Boston, MA, USA, [2]Department of Surgery, Boston Children's Hospital and Harvard Medical School, Boston, MA, USA

Tweet it! Fed up with Pilonidals? @hajarpa presents significant progress using pit picking & laser epilation to drastically improve outcomes and decrease cost with minimal morbidity.

Purpose

To evaluate the resource utilization of surgical excision (SE) versus pit picking +/- laser epilation (PP) for moderate and severe pilonidal disease (PD) in adolescents.

Methods

Following IRB approval, a simple random sample of 17 patients with PD who underwent SE by one of eight surgeons were identified in a departmental billing system and compared with 34 consecutive patients with moderate or severe PD managed with PP in our Pilonidal Care Clinic from March 2016 forward. Data analyzed included age, number of visits, total care duration, laser epilations (LE), operations, operating room (OR) time and condition at last visit. Charges were standardized for 2018. Inpatient charges, disability days and home care charges were not analyzed. Chi-squared and two-tailed Student's t-tests were used for statistical analysis.

Results

There was no difference between SE and PP patients in age (mean 17 vs. 17.1 years, $p=0.93$), number of visits (7.4 vs. 6.8, $p=0.56$), or duration of care (17.2 vs. 11.9 months, $p=0.14$). The SE group underwent an average 1.6 resections/patient (cumulative 2,598 OR minutes) and no LE, while PP patients underwent an average 1.4 procedures/patient (6 in OR for procedural anxiety; cumulative 258 OR minutes) and 3.5 LEs/patient. One SE and no PP procedures required admission. At last follow-up, 18% of SE and 82% of PP patients were fully healed or asymptomatic; while 82% of SE and 12% of PP patients were symptomatic ($p<0.01$). Two PP patients (6%) were referred for resection – one for inability to tolerate treatments (Special Needs) and another for failure to improve. The average episode of care charges were $29,098 for SE versus $7,708 for PP ($p<0.01$).

Conclusion

Pit picking, with laser epilation as needed, reduces charges and improves outcomes compared with surgical excision for moderate and severe pilonidal disease in adolescents, without increasing care duration.

Quick Shots 6 (cont.)

Q79

PILONIDAL PIT AND SINUS EXCISION WITH TREPHINATION AND CURETTAGE IN ADOLESCENTS AND YOUNG ADULTS

Michelle P. Kallis, MD[1], Charlotte Kvasnovsky, MD[1], Barrie S. Rich, MD[2], Aaron M. Lipskar, MD[3]

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Tweet it! Pit and sinus excision with trephination offers a new minimally invasive approach to pilonidal disease with low morbidity, good outcomes, and high patient satisfaction. @michelle_kallis @Cohen_Childrens

Purpose

The optimal surgical treatment for pilonidal disease should have low complication rates, cause minimal pain, allow for quick return to normal activity, and maintain an acceptable recurrence rate. Pilonidal pit and sinus excision with trephination and curettage is a less invasive procedure as compared to standard pilonidal excisions. We examined our initial experience utilizing this technique at our tertiary care children's hospital.

Methods

A retrospective review of all patients undergoing surgery for pilonidal disease from November 2016 to April 2018 was performed. Patients were contacted for telephone follow-up survey between 5 and 22 months post-operatively.

Results

134 patients were identified (17.8 +4.45 years). Five patients underwent excision with off-midline closure, and these cases were excluded from further analysis. All patients were discharged home on the day of surgery. 91.1% of patients did not require narcotics in the PACU, and 89% described no pain at all in the PACU. There were no clinically significant perioperative complications. Average follow-up was 13.0 +4.6 months. During outpatient follow-up visits, 29.5% of patients reported mild recurrent symptoms and 13.2% of patients required repeat pit and sinus excision. Response rate for the telephone survey was 25%. Of respondents, 60% returned to work or school within 3 days following surgery. Additionally, 81% did not require narcotic pain medication and 66.7% stopped using any form of pain medication within 3 days. Patients were very satisfied with their cosmetic result and their overall surgical experience with average scores of 4.78 +0.49 and 4.72 +0.57 respectively on a 5-point Likert scale. If a friend or family member had pilonidal disease, 97% would recommend the less invasive procedure.

Conclusion

Pilonidal pit and sinus excision with trephination and curettage has low morbidity, acceptable recurrence rates, is well-liked by patients, and has become the primary procedure in our practice for pilonidal disease.

Quick Shots 6 (cont.)

Q80

TRAINEE AUTONOMY IN THE OPERATING ROOM: WHAT DO PARENTS KNOW AND WANT TO KNOW?

Calista M. Harbaugh, MD[1], Beth A. Fischer, MD[2], Amy E. Lawrence, MD[2], Devin R. Halleran, MD[3], Loren N. Thomas[1], Rylee Kim[1], Katherine J. Deans, MD, MHSc[2], Peter C. Minneci, MD, MHSc[2], Gurjit Sandhu, MD[1], Ronald B. Hirschl, MD[1]

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Tweet it! Find out what parents know and want to know about fellow autonomy in the operating room @harbauc @Ronstoppable

Purpose

Surgical training paradigms are shifting toward competency-based models that promote earlier autonomy. This study sought to assess parent knowledge, opinion, and willingness to consent to fellow autonomy in their child's operation.

Methods

A convenience sample of 100 parents of children aged 0-17 years were surveyed during new patient evaluations in pediatric surgery clinics at two academic tertiary children's hospitals (1/23/2018-4/20/2018). Parents completed a 29-item electronic survey capturing (1) knowledge, (2) opinions, and (3) willingness to consent to fellow involvement in their child's operation in both standard and competency-based models of surgical training. McNemar's test was used to assess willingness to consent in standard and competency-based training models ($p<0.05$). IRB approval was obtained at both sites and verbal consent obtained from participants.

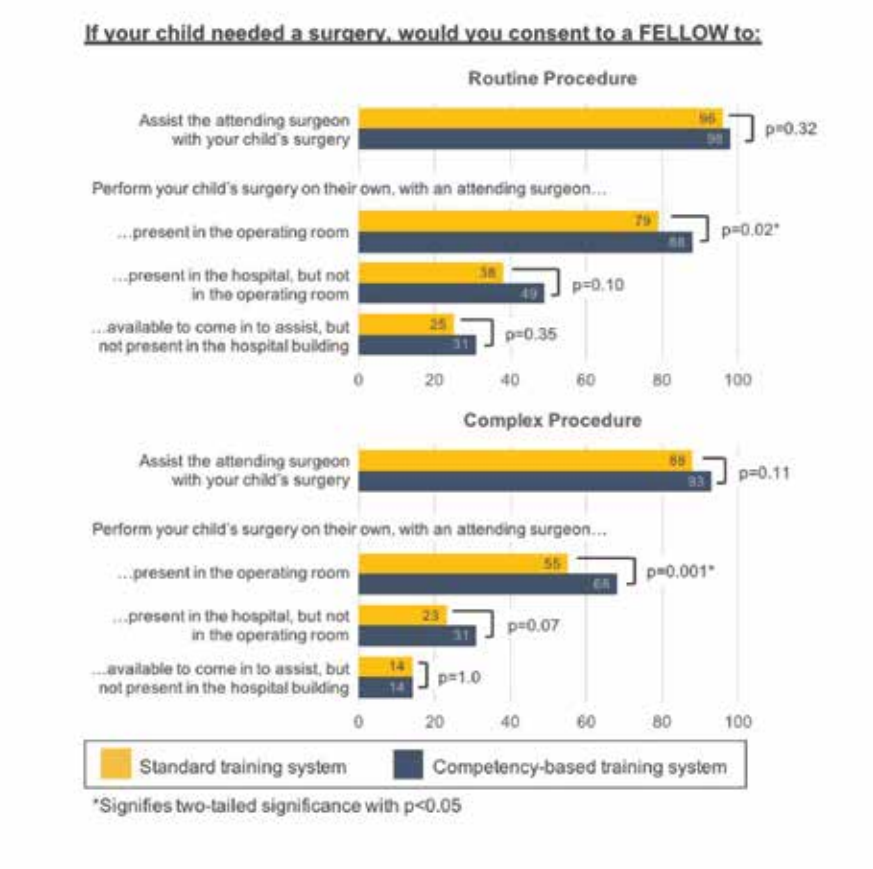
Results

Respondents were 76% female, 41% age 30-39 years old, and 79% white. The fellow role was correctly identified by 35% of respondents. Most parents wanted to know (58%) and expected to be asked permission (83%) if a trainee was involved in their child's operation. Few parents (18%) did not want trainees involved. For routine procedures, parents would consent to a fellow assisting the attending (96%) and independently operating with the attending present (79%). They were less likely to consent if the attending was elsewhere in the hospital (39%) or outside of the hospital (25%). Similar trends existed for complex procedures. Although competency-based training increased willingness to consent across levels of autonomy, it was statistically significant only for fellow independence with the attending in the operating room (Figure).

Conclusion

Parents expect to consent to trainee participation in their child's operation. Ethical tension underlies the need for autonomy to prepare trainees for future practice and transparency, which may limit parental consent. This study suggests that surgeons in academic settings must better balance transparency and autonomy when obtaining parent consent.

Quick Shots 6 (cont.)



Quick Shots 6 (cont.)

Q81

A NOVEL COMBINED CAUTERY-SUCTION DEVICE: THE FIRST PRODUCT OF A SURGICAL DEVICE INNOVATION FELLOWSHIP

Gabriel Jose Ramos-Gonzalez, MD[1], Alexander Yang, BE[2], Kyle Wu, MD[1], Robert Crum, MD[1], Heung Bae Kim, MD[1]

[1]Boston Children's Hospital, Boston, MA, USA, [2]Harvard Medical School, Boston, MA, USA

Tweet it! A novel device that combines electrocautery and suction capabilities into a single instrument, allowing surgeons to toggle between these essential modalities efficiently and seamlessly.

Purpose

Surgeons constantly alternate between electrocautery and suction, which can result in suboptimal operative conditions. Repeated instrument exchange is both time-consuming and frustrating, and was identified as a clinical need by members of our Surgical Innovation Fellowship(SIF). We describe the process of conceptualizing and developing a novel surgical device that can rapidly toggle between electrocautery and suction, while maintaining the full function of each modality.

Methods

The SIF consisted of a multidisciplinary team of mentors that guided the surgical fellow through the process of ideation and device development. Initial designs were developed using Solidworks® (Dassault Systemes, France) and subsequent rapid prototyping was done using an Eden 260VS 3-D printer (Stratasys, Eden Prairie, MN). Functional and ergonomic prototypes were later created in partnership with Smithwise (Newton, MA), a medical device development company.

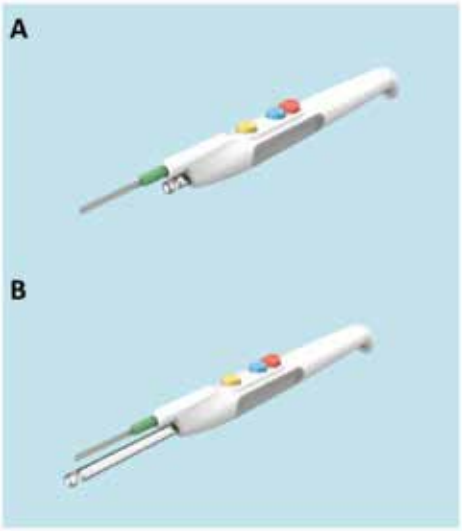
Results

A single-use combined cautery-suction device was created in which a suction tip can be deployed and retracted with the push of a button. In order to avoid the need for an additional power source, we hypothesized that the device could utilize power from standard operating room suction to deploy and retract the suction tip. In the retracted position, the suction tip is proximal to the cautery tip allowing unimpeded use of the cautery, yet remaining active as a smoke evacuator [Figure 1A]. In the deployed position, the suction tip is mechanically locked in place beyond the cautery tip to allow for both fluid suction and blunt dissection capabilities [Figure 1B]. A provisional patent application for this device was filed in May 2018(C1233.70143US00).

Conclusion

This novel device combines electrocautery and suction capabilities into a single instrument, allowing the surgeon to toggle between these essential modalities efficiently and seamlessly. Our hospital based SIF may be a useful model to train surgical residents to successfully navigate the surgical device innovation pipeline.

Quick Shots 6 (cont.)



Quick Shots 6 (cont.)

Q82

SPRAYABLE, BIODEGRADABLE, INTRINSICALLY ADHESIVE, AND ANTIMICROBIAL WOUND DRESSING

Lung Lau, MD[1], Omar Ayyub, PhD[2], John Daristotle[2], Priya Srinivasan, PhD[1], Xiaofang Wu, PhD[1], Mousumi Basu[1], Peter Kofinas, PhD[2], Anthony Sandler, MD[1]

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Purpose

Wounds can be difficult to dress, especially in the pediatric population, given wound variability and painful dressing changes. We have studied a novel wound dressing that can be sprayed in a "no-touch" technique to form a polymer mat by method of solution blowspinning. This deposits a biodegradable poly(lactic-co-glycolic acid) and poly(ethylene glycol) (PLGA-PEG) film with antimicrobial silver (Ag) nitrate. This study evaluates this novel dressing in terms of adhesiveness and wound healing in a porcine partial-thickness wound model.

Methods

With IACUC approval, partial-thickness skin wounds were created by dermatome on Yorkshire pigs, with 12 wounds (4cm x 1.5cm) per animal. Wounds were randomized into dressing by Tegaderm, blowspun PLGA-PEG or PLGA-PEG Ag (n=8 per dressing). Wound healing was followed by full-thickness biopsies at post wound day (PWD) 7 and 35, the experimental endpoint. Tegaderm and polymer dressings were monitored for adhesion, and histological analysis was performed with measurements of epidermal and dermal thickness. At the endpoint, wounds were also measured for expression levels of collagen-1, collagen-3, TGF-beta, and alpha-smooth muscle actin by real-time PCR.

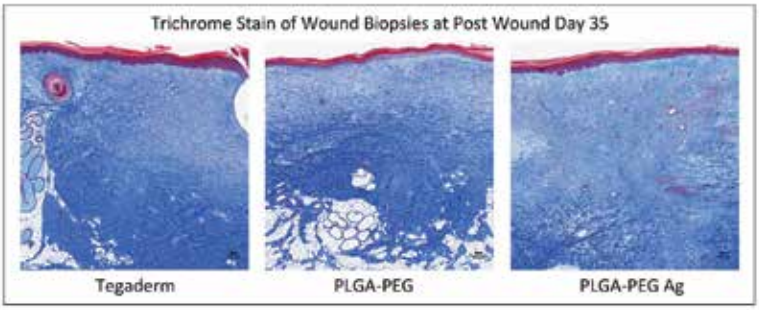
Results

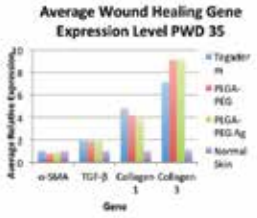
No wound complications developed, with all wounds epithelialized by PWD 14 on inspection. All eight Tegaderm wounds had dressing loss while only three wounds in the blowspun groups. On PWD 7, the average dermal thickness in the Tegaderm group was greater compared to those covered with PLGA-PEG and PLGA-PEG Ag (2025μm, 1649μm, 1544μm, respectively, $p<0.05$). By PWD 35, all wounds were histologically similar ($p>0.05$) in epidermal and dermal thickness as well as in wound healing gene expression levels (Figure 1).

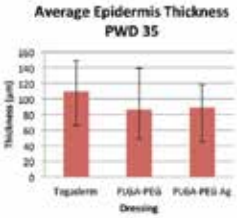
Conclusion

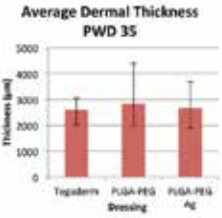
Compared to a conventional occlusive dressing, blowspun dressings of PLGA-PEG or PLGA-PEG Ag show equivalent degree of wound healing at the experimental endpoint. With its bio-absorable quality and quick, spray-on "no-touch" application, solution blowspinning appears to have major advantages over conventional wound dressings.

Quick Shots 6 (cont.)









Quick Shots 6 (cont.)

Q83

ANSWERING THE QUESTIONS: EARLY RESULTS FROM APSA'S EXPERT ROGRAM

Charles L. Snyder, MD[1], Steven Lee, MD[5], Marjorie J. Arca, MD[6], Elizabeth A. Beierle, MD[7], Erik Skarsgard, MD[10], Saleem Islam, MD[8], Robert Cusick, MD[9], Janice Taylor, MD, MEd[2], Craig W. Lillehei, MD[3], David Powell, MD[4]

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]University of Florida, Gainesville, FL, USA, [3]Boston Children's Hospital, Boston, MA, USA, [4]Stanford University, Palo Alto, CA, USA, [5]UCLA, Los Angeles, CA, USA [6]Medical College of Wisconsin, Milwaukee, WI, USA, [7]University of Alabama at Birmingham, Birmingham, AL, USA, [8]University of Florida College of Medicine, Gainesville, FL, USA, [9]Division of Pediatric Surgery, University of Nebraska Medical Center College of Medicine, Omaha, NE, USA, [10]British Columbia Children's Hospital, Vancouver, British Columbia, Canada

Introduction

Peer-reviewed English-language scientific journals collectively publish about 2.5 million articles a year, increasing annually by 3-5%. The expanding internet, rapid electronic dispersion of information, and ubiquitous social media all amplify the deluge of data reaching the practicing surgeon. APSA's online educational materials are meant to guide continuing education for its members. The purpose of this study was to evaluate usage.

Methods

The APSA ExPERT program (Exam-based Pediatric Surgery Educational Reference Tool) provides CME via pre-created courses (spaced learning, nineteen self-assessment tests, literature reviews, and specific topics - critical care, oncology, trauma) and custom courses. We reviewed the results of these courses/tests to assess areas of strengths and knowledge gaps among pediatric surgeons.

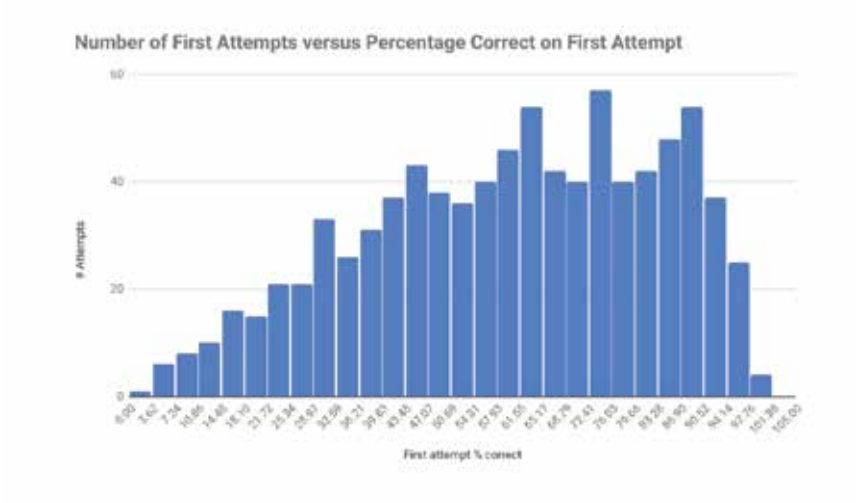
Results

1034 questions were answered; after excluding those with less than 10 attempts, 870 were left. There have been 38,997 first attempts at answering questions, with an average success rate of 60% (2.6% - 100%). The questions were categorized to identify areas with knowledge gaps and topics that were easily answered correctly. 82/870 (9.4%) questions were initially answered incorrectly by at least 3/4ths of respondents. The top most-missed categories were: 17/82 (21%) oncology, 10/82 (12%) neonatal, 8/82 (9%) GI, and 6/82 (7%) each for trauma, GU, and critical care. Spaced learning (via weekly emails) was the most used vehicle, followed by articles of interest and Pediatric Surgical Self-Assessment Programs.

Conclusion

Expansion and maintenance of knowledge in pediatric surgery is an important but increasingly difficult task. Surgeons 'know what they know', but identifying knowledge gaps (both known and 'unknown unknowns') is difficult. Analysis of data from online reviews and tests may help focus learning and allow a feedback system for the APSA membership to enhance lifelong learning.

Quick Shots 6 (cont.)



Quick Shots 6 (cont.)

Q84

INCREASING ACCEPTANCE OF INTERNET-BASED EDUCATIONAL PROGRAMS BY PEDIATRIC SURGEONS

Janice Taylor, MD, MEd[1], Charles L. Snyder, MD[2], David Powell, MD[3]

[1]University of Florida, Gainesville, FL, USA, [2]Children's Mercy Hospital, Kansas City, MO, USA, [3]Stanford University, Palo Alto, CA, USA

Purpose

Needs assessment is a critical component of educational program design. Follow-up assessment is important to evaluate and improve existing programs. Internet-based resources offered by the American Pediatric Surgical Association (APSA), the Exam-based Pediatric surgery Educational Reference Tool (ExPERT) and the Pediatric Surgery Not a Textbook (NaT), were established over 6 years ago. It was an appropriate time for a follow-up assessment.

Methods

A voluntary 25-question survey approved by the APSA Professional Development Committee was distributed via email to the APSA membership. It included questions regarding practice demographics, preferences for accessing and maintaining medical knowledge, and use of APSA-supported materials. Multiple choice, Likert scale, and free responses were used. Mann-Whitney analysis was performed ($p<0.05$).

Results

294 members responded. 43% were in academic practice with a pediatric surgery training program. The top three preferences for obtaining and maintaining medical knowledge were national meetings (27%), ExPERT (24%), and the NaT (20%). This compares to an assessment in 2014 of 222 respondents, who indicated that electronic programs were less desired (16%) for continuing medical education. Cost was cited by over one-third of those who did not subscribe to ExPERT or the NaT. Over 50% of the respondents claimed they always read the question discussion in ExPERT regardless of whether their answer was correct. Although evidence-based, reference links were rarely followed. Over 86% would still subscribe to APSA resources if there were no CME requirement. The most frequently cited knowledge gap was fetal therapy (30%).

Conclusions

APSA's electronic educational resources are well-utilized and valued. The utilization and preference of electronic programs has increased. Although annual association meetings continue to be the most popular method for keeping up-to-date, more surgeons now prefer the combination of ExPERT and the NaT. Room for improvement exists in affordability and prioritizing specific knowledge gaps.

Poster Display

Sunday, May 19 | 4:00 p.m. – 9:00 p.m.
Monday, May 20 | 8:00 a.m. – 2:00 p.m.
Tuesday, May 21 | 6:30 a.m. – 11:00 a.m.

P1

3-YEAR PROSPECTIVE ANALYSIS OF AN ULTRASOUND SCORING SYSTEM FOR PEDIATRIC APPENDICITIS TO REDUCE RADIATION EXPOSURE

Anna McGuire, MD[1], Christopher Gitzelmann, MD[2], Colleen Davis, MD, MPH[3], Johan Blickman, MD, PhD[4], Kori Wolcott, RN, BSN[1], Walter Pegoli, MD[2], Derek Wakeman, MD[2], James Sanders, MD[5]

[1]University of Rochester Medical Center, Rochester, NY, USA, [2]University of Rochester Department of Surgery, Rochester, NY, USA, [3]University of Rochester Department of Emergency Medicine, Rochester, NY, USA, [4]University of Rochester, Rochester, NY, USA, [5]University of Rochester Department of Orthopedic Surgery, Rochester, NY, USA

Purpose
This study sought to reduce the need for CT scans in the work up of suspected appendicitis in pediatric patients. The goal was to minimize radiation exposure without an increase in negative appendectomies or missed appendicitis through the use of a standardized combined clinical and ultrasound scoring system.

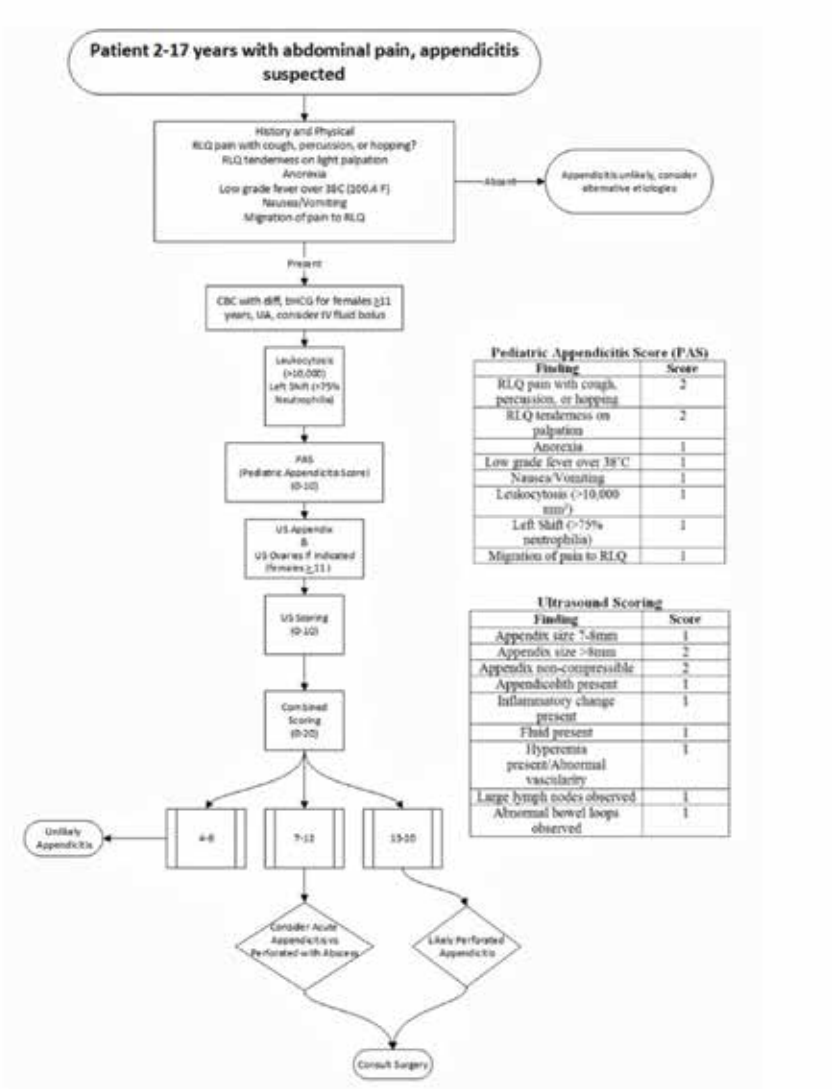
Methods
Retrospective chart review resulted in the creation of the protocol seen below (Figure). The protocol was implemented prospectively in May 2015 in the pediatric emergency department at a university hospital. The first 3 months were analyzed to ensure consistency with the retrospective review. All cases of suspected appendicitis in children ages 2-17 were analyzed from May 2015 through April 2018. The ultrasound score was combined with the Pediatric Appendicitis Score (PAS) for a maximum total score of 20 (Figure). Children with abdominal trauma, prior abdominal surgery, and those transferred with a CT were excluded.

Results
679 cases were reviewed. Of those, 538 went to the OR for appendectomy. 141 cases had appendicitis ruled out. 3 month analysis to confirm validity showed sensitivity=0.972, specificity=0.882, positive predictive value=0.946, and negative predictive value=0.938. Overall there was a 36.93% reduction in CT scan utilization (p=0.0002), with a 27.17% reduction in CT scan utilization preoperatively (p=0.01). The negative appendectomy rate was 3.3% which was consistent with prior to implementation of the protocol. 55.6% of the negative appendectomies had CT scans and 50% had a total score less than 7. There were 2 cases of missed appendicitis.

Conclusion
Implementation of the protocol below has resulted in a significant reduction in CT utilization, and subsequent radiation exposure, in the workup appendicitis. The scoring system has minimized operator variability associated with ultrasound making it an accurate and reliable first line diagnostic modality for suspected appendicitis.

Poster Display (cont.)

Figure: Appendicitis scoring protocol



Pediatric Appendicitis Score (PAS)

Finding	Score
RLQ pain with cough, percussion, or hopping	2
RLQ tenderness on palpation	2
Anorexia	1
Low grade fever over 38°C	1
Nausea/Vomiting	1
Leukocytosis (>10,000 mm³)	1
Left Shift (>75% neutrophilia)	1
Migration of pain to RLQ	1

Ultrasound Scoring

Finding	Score
Appendix size 7-8mm	1
Appendix size >8mm	2
Appendix non-compressible	2
Appendicolith present	1
Inflammatory change present	1
Fluid present	1
Hyperemia present/Abnormal vascularity	1
Large lymph nodes observed	1
Abnormal bowel loops observed	1

Poster Display (cont.)

P2

CEFTRIAXONE WITH METRONIDAZOLE IS SUPERIOR TO CEFOXITIN IN THE TREATMENT OF UNCOMPLICATED APPENDICITIS IN CHILDREN

Mark Kashtan, MD, MPH[1], Patrice Melvin, MPH[1], Dionne Graham, PhD[1], Seema Anandalwar, MD, MPH[1], Jonathan L. Hills-Dunlap, MD, MPH[1], Shawn J. Rangel, MD, MSCE[1], Danielle B. Cameron, MD, MPH[2]

[1]Boston Children's Hospital, Boston, MA, USA, [2]Massachusetts General Hospital, Boston, MA, USA

Tweet it! Which antibiotic is most appropriate for uncomplicated appendicitis? @MarkKashtanMD

Purpose

Recently published data has demonstrated equipoise between extended-spectrum (anti-pseudomonal) and narrow-spectrum antibiotics in the management of uncomplicated appendicitis. However, narrow-spectrum regimens have not been compared to each other. The purpose of this study was to compare outcomes and cost between the two most commonly utilized narrow-spectrum regimens, cefoxitin and ceftriaxone combined with metronidazole.

Methods

Retrospective cohort study using clinical data from the NSQIP-Pediatric Appendectomy Pilot Database merged with cost data from the Pediatric Health Information System database from 1/2013-6/2015. Diagnosis of uncomplicated appendicitis was established through review of pathology and operative reports. Mixed-effects logistic regression was used to compare the adjusted odds of incisional SSIs, organ space infections (OSIs), and hospital revisits between groups after propensity matching on patient characteristics and markers of disease severity (WBC quartile, antibiotic treatment days, postoperative LOS).

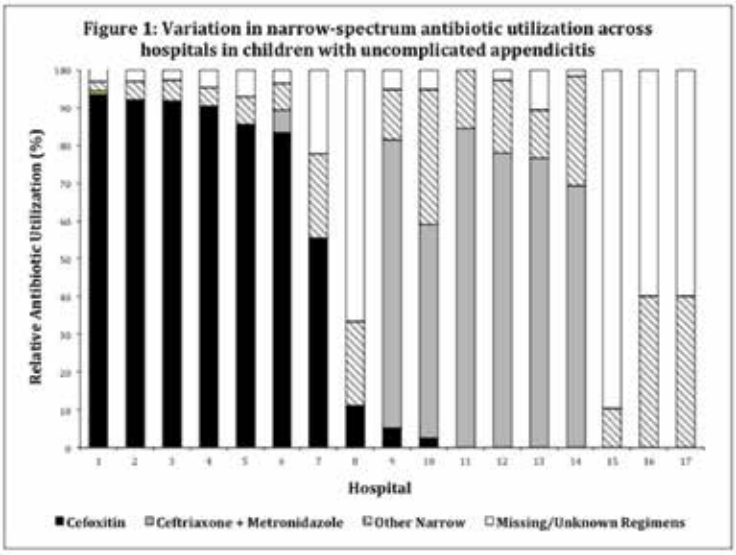
Results

1,091 patients from 17 hospitals met inclusion criteria. Of those receiving narrow-spectrum regimens, 43.4% received ceftriaxone plus metronidazole and 34.1% received cefoxitin (Figure 1). No differences in patient characteristics or disease severity were found between groups following matching (n=203/group). The overall rates of incisional SSI, OSI and revisits in the matched group were 0.5%, 0.25% and 5.9%, respectively. In the multivariate model, no differences were found between ceftriaxone plus metronidazole and cefoxitin for incisional SSIs (OR: 0.41[0.00, 3.47], p=0.25), OSIs (OR: 1.00[0.00, 19.00], p=0.50) or revisits (OR: 1.19[0.52, 2.74], p=0.67). The median cost of ceftriaxone plus metronidazole was 83% higher than that of cefoxitin ($149.00 vs. $81.30, p<0.01).

Conclusion

The incidence of infectious complications was exceedingly low for all patients, and no differences in outcomes were found between antibiotic regimens. Cefoxitin should be considered the preferred antibiotic in the management of uncomplicated appendicitis based on cost and the antibiotic stewardship principle of using the fewest agents with the narrowest appropriate spectrum of coverage.

Poster Display (cont.)



Poster Display (cont.)

P3

NATIONWIDE READMISSION ANALYSIS OF CHILDREN UNDERGOING NONOPERATIVE MANAGEMENT OF ACUTE APPENDICITIS

Arturo J. Rios-Diaz, MD[1], **Courtney L. Devin, MD**[1], David Metcalfe[2], Adam C. Berger[1], Loren Berman, MD[3], Francesco Palazzo[1]

[1]Department of Surgery, Thomas Jefferson University Hospital, Philadelphia, PA, USA, [2]University of Oxford, John Radcliffe Hospital, Nuffield Department Of Orthopaedics, Rheumatology And Musculoskeletal Sciences (NDORMS), Oxford, England, United Kingdom, [3]Nemours - Alfred I. duPont Hospital for Children, Wilmington, DE, USA

Tweet it! Nationwide Analysis of Children Undergoing Nonoperative Management of Acute Appendicitis: This approach is associated with higher readmission rates for both uncomplicated and complicated cases, and almost a quarter of these patients require a delayed procedure within 6 months.

Purpose

Appendectomy is the gold standard treatment for acute appendicitis. In children, there is a growing interest in nonoperative management (NOM). However, there is no national data on healthcare utilization when this strategy is used. We hypothesized that patients treated non-operatively have a higher readmission rate.

Methods

Pediatric patients (<18 years) admitted with an ICD-9-CM diagnosis of acute appendicitis (with or without peritonitis or with abscess) were identified from the 2010-2015 Nationwide Readmission Database (NRD). Incomplete follow up and transfers were excluded. We compared readmission rates at 30- and 180-days of patients treated operatively and nonoperatively. Multivariable logistic regression models were used to adjust for patient and hospital characteristics.

Results

Of the 130,330 children with acute appendicitis, 96.6% were treated operatively and 3.4% nonoperatively. Patients treated nonoperatively were significantly (all p<0.001) more likely to be younger [mean age 10 vs. 12 years] and female [43.5% vs. 38.1%], admitted to a teaching hospital [78.8% vs. 59%], have peritonitis [40.8% vs. 21.7%] or abscess [38.5% vs 12.4%], and have longer length of stay [mean days 4.12 vs. 2.88]. The NOM group had higher readmission rates at 30- [12.8% vs. 4.3%] and 180-days [27.9% vs. 5.9%, all p<0.001]. Risk-adjusted analysis confirmed the independent association of NOM with increased readmission at 30 [adjusted Odds Ratio 2.03 (95% confidence interval 1.62-2.56)] and 180 [aOR 3.88 (3.31-4.55)] days. In the NOM cohort, 22.5% underwent delayed appendectomy, drain placement, or bowel resection within 180 days (48% elective).

Conclusion

NOM of acute appendicitis in children is associated with higher readmission up to 6 months after discharge. Almost a quarter of these patients eventually require a delayed procedure, and over half of these procedures are unplanned. This management approach results in an increased utilization of inpatient healthcare and may impact health-related quality of life for the patient and family.

Poster Display (cont.)

P4

VARIABILITY, OUTCOMES AND COST ASSOCIATED WITH THE USE OF PARENTERAL NUTRITION IN CHILDREN WITH COMPLICATED APPENDICITIS

Mark Kashtan, MD, MPH, Dionne Graham, PhD, Jonathan L. Hills-Dunlap, MD, MPH, Seema Anandalwar, MD, MPH, Shawn J. Rangel, MD, MSCE

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Tweet it! Should we be using parenteral nutrition in kids with complicated appendicitis? And are we even using it in the right patients? @MarkKashtanMD

Purpose

The utility of parenteral nutrition (PN) for short periods of nutritional support in children with complicated appendicitis is not well defined. The goal of this study was to examine the influence of PN on outcomes and cost in this patient population.

Methods

Retrospective cohort study of 1,073 children with complicated appendicitis at 29 hospitals participating in the NSQIP-Pediatric Appendectomy Pilot Collaborative (1/2013-6/2015). Logistic regression with random effects was used to compare patients who received PN to those who did not after propensity matching on demographic characteristics and LOS as a surrogate of disease severity. Outcomes included any complications, SSIs and hospital revisits (all NSQIP-defined). Cost data were obtained from the Pediatric Health Information System database and merged with clinical data from NSQIP.

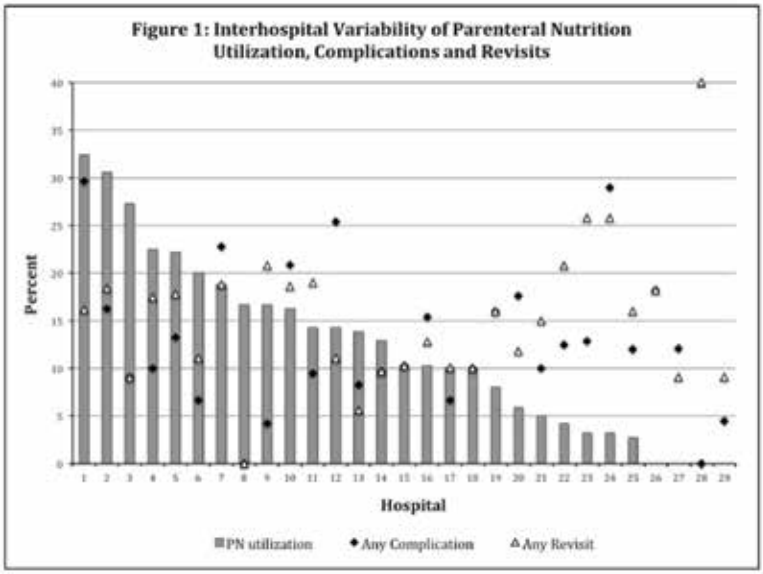
Results

PN utilization ranged from 0% to 32.4% across hospitals (overall 13.6%), and no association was found between PN utilization and outcomes at the hospital level (Figure 1). Significant predictors for receiving PN were age ≥8 years ($p=0.01$) and longer LOS ($p<0.01$). Underweight status (BMI <5th percentile for age and gender) was not a significant predictor ($p=0.14$). Outcomes for patients who received PN were similar to those who did not for any complications (28.2% vs. 30.5%, OR 0.89[0.50, 1.59], $p=0.69$), SSIs (22.9% vs. 28.2%, OR: 0.75[0.41, 1.36], $p=0.35$) and revisits (16.8% vs. 18.3%, OR: 0.91[0.48, 1.74], $p=0.78$). Adjusted mean cost was 42% higher for patients who received PN ($30,266 vs. $21,325, $p<0.01$).

Conclusion

Parenteral nutrition utilization was not associated with improved outcomes after adjusting for possible confounders. Younger and underweight patients, who had the greatest potential to benefit from supplemental nutrition, were equally or less likely to receive parenteral nutrition than other patients. Given this finding along with the high cost of parenteral nutrition, further investigation is needed to identify which patients may benefit from this intervention.

Poster Display (cont.)



Poster Display (cont.)

P5

A NSQIP ANALYSIS OF POST-OPERATIVE ANTIBIOTIC UTILIZATION IN UNCOMPLICATED APPENDICITIS

Charlene Dekonenko, MD, Robert M. Dorman, MD, Janelle Noel-MacDonnell, MD, Tolulope A. Oyetunji, MD

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Purpose

In 2010, APSA published recommendations supporting the use of pre-operative antibiotics in patients with non-perforated appendicitis. However, no evidence was found to support antibiotic use in the post-operative period. Compliance with these recommendations varies greatly. Post-operative antibiotic use in these patients can increase length of stay, cost, and resistance to antibiotics. We sought to determine the rate of post-operative antibiotic utilization in uncomplicated appendicitis following publication of the APSA recommendations.

Methods

Targeted appendectomy procedure files from NSQIP (2015-2016) were merged with corresponding base NSQIP files and queried for children with uncomplicated appendicitis. Descriptive statistics were calculated for all demographic and appendectomy variables. Further analysis was conducted on the population that received antibiotics following discharge. Statistical analysis was completed in STATA v15.

Results

We identified 4,637 patients treated for non-perforated appendicitis. 62% were male, median age was 11.5 years [IQR 9, 14], and total length of stay (LOS) was 1 day [IQR 1, 2]. 426 patients (9.2%) were prescribed oral antibiotics upon discharge. Of those, total LOS was 2 days [IQR 1, 3] compared to 1 day [IQR 1, 1] for those discharged without antibiotics (p=<0.001). Median preoperative length of stay was 0 days in both groups ([IQR 0,1] p=0.53) while median postoperative length of stay was 2 days [IQR 1, 3] for those discharged on oral antibiotics compared to 1 day [IQR 1,1] for those discharged without antibiotics (p=<0.001). This translates to a minimum of two additional days of antibiotics use in this subset of patients.

Conclusion

Discharge antibiotics are given in almost 10% of patients with uncomplicated appendicitis despite lack of evidence supporting this practice. Continued efforts to standardize practice in this patient population are needed.

Poster Display (cont.)

P6

WHAT'S IN YOUR CPG?: ANALYSIS OF PRACTICE VARIATION TO PRIORITIZE COMPARATIVE EFFECTIVENESS RESEARCH IN THE POSTOPERATIVE MANAGEMENT OF COMPLICATED APPENDICITIS

Seema Anandalwar, MD, MPH, Jonathan L. Hills-Dunlap, MD, MPH, Mark Kashtan, MD, MPH, Shawn J. Rangel, MD, MSCE

Boston Children's Hospital, Boston, MA, USA

Purpose

Many approaches to postoperative antibiotic management have been reported for complicated appendicitis, however there remains a paucity of comparative data to establish superiority. The goal of this survey-based analysis was to characterize major areas of practice variation in order to prioritize comparative effectiveness research (CER) efforts.

Methods

Surgical representatives from 106 NSQIP-Pediatric hospitals were surveyed about use of clinical practice guidelines (CPG) within their department to standardize postoperative antibiotic management. The survey captured information about antibiotic choice, endpoints for treatment (mandatory course vs. variable course using goal-directed endpoints), use of postoperative WBC data to modify treatment duration (routine draw for all patients vs. selective based on clinical course, timing of WBC draw if obtained, WBC threshold used for making changes, treatment changes if thresholds were met), and role of postoperative imaging.

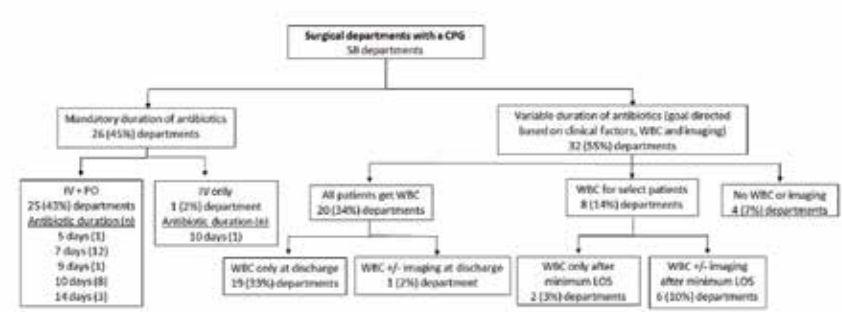
Results

Surgical representatives from 79 hospitals completed the survey (75% response rate), of which 58 (78%) reported having a CPG standardizing care. 45% of CPGs used a mandatory antibiotic course (range:7-14 days), and 55% used a variable course dependent on goal-directed endpoints. 88% of goal-directed CPG's used a postoperative WBC count to determine need for treatment change or further imaging (figure). WBC thresholds used for this purpose ranged from 10,000/mm3-15,000/mm3, and treatment changes and imaging decisions made in response to thresholds were highly variable. The most common IV agents used were ceftriaxone+metronidazole (55%) and piperacillin/tazobactam (34%), and the most common oral regimen used was amoxicillin/clavulanate (74%). Overall, the 58 CPGs represented 33 unique antibiotic treatment pathways.

Conclusions

Substantial variation exists in the antibiotic management of children with complicated appendicitis. CER efforts should initially seek to establish optimal treatment duration for mandatory approaches and optimal use of WBC data in goal-directed approaches, followed by a comparative analysis of mandatory vs. goal-directed approaches using both antibiotic utilization and SSI endpoints.

Poster Display (cont.)



Poster Display (cont.)

P7

THE INCOMPLETE EVALUATION OF ABDOMINAL PAIN IN ADOLESCENT FEMALES: WE NEED TO DO BETTER

Amy E. Lawrence, MD[1], Yuri V. Sebastiao, PhD[2], Emma Hostetler[1], Karen Leonhart[3], Geri Hewitt, MD[4], Peter C. Minneci, MD, MHSc[1], Katherine J. Deans, MD, MHSc[1]

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]Center for Surgical Outcomes Research, Nationwide Children's Hospital, Columbus, OH, USA, [3]The Research Institute at Nationwide Children's Hospital, Columbus, OH, USA, [4]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA

Purpose

Female patients with acute abdominal pain require investigation of gynecologic as well as gastrointestinal and genitourinary etiologies. Starting at 11 years of age, eliciting a sexual history and screening for sexually transmitted infection (STI) is recommended by the AAP. The goal of our study was to determine the frequency of evaluation of gynecologic causes of abdominal pain in adolescent girls seen in a large free-standing children's hospital setting.

Methods

We performed a retrospective review of girls between 12 and 21 years of age presenting to the emergency department or urgent care centers at a single pediatric institution with the chief complaint of abdominal pain during 2016. Frequency analyses of demographic and clinical characteristics are presented.

Results

One thousand eighty-three girls presented with a chief complaint of abdominal pain. Menarche was documented in 85% of patients, sexual history in 52%, and assessment of contraception use in 28%. Pregnancy testing was performed in 77%. STI testing was performed in 31%; 27% of patients who reported sexual activity were not screened for STI. Only 37% of patients who reported both sexual activity and vaginal discharge underwent a pelvic exam. Surgical consultation was obtained in 18%. Compared to patients who did not receive a surgical consultation, patients with surgical consultation were less likely to have sexual history documented (39% vs 52%, p=0.03) and were more likely to have pregnancy testing (90% vs. 77%, p=0.009) and STI testing (84% vs. 70%, p=0.007). The most common diagnosis at hospital discharge was abdominal pain of unknown etiology (38%).

Conclusion

Our results raise concerns that there may be deficiencies in the evaluation of gynecologic sources of abdominal pain in adolescent girls treated at a primarily pediatric hospital. Future studies are being directed towards comparing diagnostic processes across primarily pediatric, mixed, and primarily adult hospital systems.

Poster Display (cont.)

P8

ENTEROCOLITIS COMPLICATING HIRSCHSPRUNG DISEASE: THE ROLE OF (C-159T CODON) POLYMORPHISM BIOMARKERS IN THE CLINICAL FOLLOW UP

Mohammed J. Aboud, MD

Ministry of Health, Al Diwaniya, Al Qadisiyah, Iraq

Purpose

Enterocolitis (EC) is the most common and serious complication of Hirschsprung's disease (HD). The prognosis and outcome of EC depend on early diagnosis and effective management. The present study was established to evaluate the role of (C-159t) gene polymorphism biomarkers in patients developed such complication.

Methods

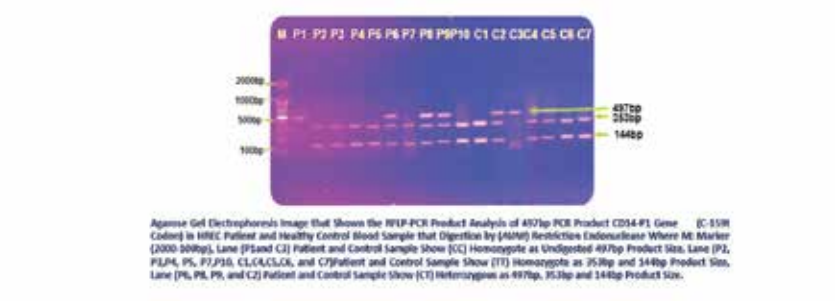
We conducted a prospective study for all the patients with Hirschsprung's disease complicating EC admitted and managed in our pediatric surgery unit, from the period 1st of January 2014 to the end of December 2016. All patients developing EC were evaluated with sepsis screen tests, blood culture, subjected to broad-range PCR and PCR–restriction fragment length polymorphism (RFLP). The ethics committees of the health authorities approved the study.

Results

The distribution of (C-159t codon) polymorphism was detected by PCR-RFLP technique. At this locus there are three genotypes; homozygote (TT) at 353bp, heterozygous (CT) at 497bp, 353bp and 144bp, and wild-type (CC) which still undigested. TT genotype was significantly increased by 13.1 times for those patients with EC associated sepsis. Having a CC genotype significantly decreases the risk of EC associated sepsis by 5.9 times. Presence of T allele significantly increased the risk of having sepsis by 5.9 times in the patients with EC.

Conclusion

There is a significantly higher prevalence of detection of (C-159t) gene polymorphism among the Hirschsprung's patients associated EC. This gene may play a major role in the pathogenesis and EC development. More studies incorporating this gene are warranted.



Agarose Gel Electrophoresis Image that Shown the RFLP-PCR Product Analysis of 497bp PCR Product CD14-P1 Gene (C-159t Codon) in HREC Patient and Healthy Control Blood Sample that Digestion by (AluNI) Restriction Endonuclease Where M: Marker (2000-100bp), Lane (P1and C3) Patient and Control Sample Show (CC) Homozygote as Undigested 497bp Product Size, Lane (P2, P3,P4, P5, P7,P10, C1,C4,C5,C6, and C7)Patient and Control Sample Show (TT) Homozygote as 353bp and 144bp Product Size, Lane (P6, P8, P9, and C2) Patient and Control Sample Show (CT) Heterozygous as 497bp, 353bp and 144bp Product Size.

Poster Display (cont.)

P9

MULTI-INSTITUTIONAL REVIEW OF BOWEL MANAGEMENT STRATEGIES IN CHILDREN WITH ANORECTAL MALFORMATIONS AND HIRSCHSPRUNG DISEASE

Katherine J. Baxter, MD[1], Jose Garza[2], Michael D. Rollins, MD[3], Kaylea Drake[4], Ron W. Reeder[4], Richard J. Wood, MD[5], Jeffrey Avansino, MD[6], Casey M. Calkins, MD[7], **Megan M. Durham, MD**[8]

[1]Emory University, Children's Healthcare of Atlanta, [2]Children's Healthcare of Atlanta, Atlanta, GA, USA, [3]Primary Children's Hospital, University of Utah, Salt Lake City, UT, USA, [4]University of Utah, Salt Lake City, UT, USA, [5]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA, [6]Seattle Children's Hospital, Seattle, WA, USA, [7]The Medical College of Wisconsin, Milwaukee, WI, USA, [8]Children's Healthcare of Atlanta, Emory University, Atlanta, GA, USA

Tweet it! Bowel Management for Anorectal Malformations: Multi-institutional study describing the current use of laxatives, enemas, fiber and antegrade enemas, stratified by type and severity of anorectal and sacral anomaly. @ katie_j_baxter

Purpose

To describe bowel management strategies in anorectal malformation (ARM) and Hirschsprung disease (HD) and explore the association of ARM type and severity with various treatment strategies using data from a multi-institutional consortium.

Methods

Bowel function and bowel management strategies were reviewed from a cohort of children enrolled at Pediatric Colorectal and Pelvic Learning Consortium (PCPLC) member sites. The PCPLC was organized as a consortium of multidisciplinary specialists to facilitate research on colorectal and pelvic disorders. A centralized registry was created, currently enrolling from 5 U.S. institutions. Patients were included in this study if they had a diagnosis of ARM or HD, and left clinic on a bowel management plan.

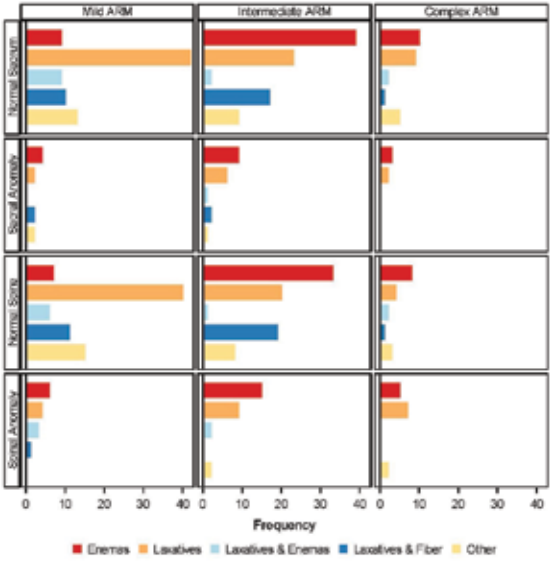
Results

A total of 368 enrolled patients were reviewed. Anatomy of the primary anomaly and associated anomalies (spinal and sacral) were used to sub-categorize patients [ARM-Mild (36%), Intermediate (42.8%) and Complex anomalies (12.8%); HD- Rectosigmoid transition zone (76%), long segment (11%) and total colon (5.5%)]. Constipation was the most common chief complaint(ARM 75.5%, HD 76.6%), followed by fecal incontinence (ARM 28.5%, HD 23.4%). Toilet-trained patients frequently reported stool accidents (ARM 35.6% and HD 35.7% weekly accidents). Accidents were characterized as smears (~ 50% ARM, HD) and as both smears and complete bowel movements (~30% ARM, HD). All sub-groups employed laxative, enema, fiber strategies (Figure). Enema therapy was used more frequently in the Intermediate ARM, Complex ARM and HD with transition proximal to rectosigmoid. Laxative therapy was employed most frequently in Mild ARM and rectosigmoid transition HD. Surgical antegrade enema access was common in toilet-trained patients overall (20% ARM), and most common in intermediate ARM with severe sacral anomalies.

Poster Display (cont.)

Conclusions

This is the first report focusing on current bowel management strategies for patients with ARM or HD from the PCPLC. Individual patient characteristics are explored for impact on strategy utilization.



Poster Display (cont.)

P10

ENETEROCOLITIS EPISODES IN CHILDREN WITH HIRSCHSPRUNG DISEASE: RESULTS FROM THE PEDIATRIC COLORECTAL AND PELVIC LEARNING CONSORTIUM

Michael D. Rollins, MD[1], Kaylea Drake[2], Ron W. Reeder[2], Richard J. Wood, MD[3], Jeffrey Avansino, MD[4], Megan M. Durham, MD[5], Casey M. Calkins, MD[6], Brian T. Bucher, MD[2], on behalf of the Pediatric Colorectal and Pelvic Learning Consortium[7]

[1]Primary Children's Hospital, University of Utah, Salt Lake City, UT, USA, [2]University of Utah, Salt Lake City, UT, USA, [3]Center for Colorectal and Pelvic Reconstruction, Nationwide Children's Hospital, Columbus, OH, USA, [4]Seattle Children's Hospital, Seattle, WA, USA, [5]Children's Healthcare of Atlanta, Emory University, Atlanta, GA, USA, [6]The Medical College of Wisconsin, Milwaukee, WI, USA, [7]Pediatric Colorectal and Pelvic Learning Consortium, Salt Lake City, UT, USA

Purpose

To describe Hirschsprung-associated enterocolitis (HAEC) episodes and determine patient-level predictors for HAEC using data from a multi-institutional consortium.

Methods

We performed a multicenter prospective cohort study of children with Hirschsprung disease (HD) evaluated at member sites of the Pediatric Colorectal and Pelvic Learning Consortium (PCPLC). The PCPLC was organized in 2016 as an international consortium of surgeons and specialists to facilitate research on HD, anorectal malformations, and other colorectal and pelvic disorders. Following inception, a centralized patient registry was created which currently includes information from 5 U.S. institutions. Patients were included in this study if they had a diagnosis of HD, had undergone a pull-through procedure, and completed an intake questionnaire. HAEC episodes were identified from parent history and available medical records. We abstracted patient demographics and comorbidities to describe the presentation and management of HAEC.

Results

A total of 104 patients were enrolled, of which 41 (39%) had a history of HAEC. In patients with a history of HAEC, 9 (22%) had at least one episode pre-pull-through procedure and 34 (85%) had at least one episode post-pull-through. Enterocolitis requiring hospitalization occurred in 29 (73%) patients. The most frequent HAEC symptoms included: abdominal distension (59%), vomiting (49%), diarrhea (42%), and explosive stools (32%). Most common treatments included antibiotics (83%) and irrigations (83%). In univariable analysis, there were no significant patient-level predictors associated with postoperative HAEC, including age, race, cardiovascular/chromosomal anomalies, transition zone anatomy, or frequency of bowel movements (Table).

Conclusions

This is the first report of patients with HD from the PCPLC. HAEC episodes were common in children referred to a colorectal specialty clinic; however we did not identify any patient-level predictors for enterocolitis. Our work demonstrates the value of a multi-institutional consortium for studying rare pediatric colorectal anomalies and highlights the complex etiology of HAEC.

Poster Display (cont.)

P11

COMPARISON OF POST-OPERATIVE PAIN CONTROL MODALITIES FOR PECTUS EXCAVATUM REPAIR

Charlene Dekonenko, MD[1], Robert M. Dorman, MD[1], Yara Duran[1], David Juang, MD[1], Pablo Aguayo, MD[1], Jason D. Fraser, MD[1], Tolulope A. Oyetunji, MD[1], Charles L. Snyder, MD[2], George W. Holcomb, MD[1], Daniel L. Millspaugh, MD[1], Shawn D. St. Peter[1]

[1]Children's Mercy Kansas City, Kansas City, MO, USA, [2]Children's Mercy Hospital, Kansas City, MO, USA

Purpose

Postoperative pain following bar placement pectus excavatum is the dominant factor in the post-operative course and determines the length of stay. We previously conducted a randomized trial showing minimal differences between epidural and patient-controlled analgesia (PCA). We recently concluded enrollment of a second, 2-center trial of epidural versus PCA with more robust protocols for both. In this study, we compared the outcomes of cryoablation to our recent results with epidural and PCA protocols.

Methods

We conducted a prospective observational study with a perioperative pain control protocol using intercostal cryoablation for patients undergoing bar placement for pectus excavatum. Results are reported here and compared with those of a recently concluded trial comparing epidural analgesia with PCA. Comparison of medians was performed using Kruskal-Wallis H tests with alpha 0.05.

Results

There were 35 consecutive patients treated with cryoablation compared to 32 epidural and 33 PCA patients from the trial. There was no difference in gender, height, or weight (Table). Subjects receiving cryoablation were older and had a higher correction index. Operating time was longer with cryoablation (median 101 min, versus 58 and 57 min for epidural and PCA groups, $p<0.01$). Cryoablation resulted in far less time to pain control with oral medication and a dramatic decrease in length of stay (LOS) where most patients are discharged on post-operative day 1. We have encountered no patient with post-operative neuralgia.

Conclusion

Intercostal cryoablation during minimally invasive pectus excavatum repair significantly reduces length of stay and time to oral pain medication alone compared with both epidural and patient-controlled analgesia.

Poster Display (cont.)

P12

ENHANCED RECOVERY* PROTOCOL FOR THE MINIMALLY INVASIVE NUSS REPAIR

Maria Tecos[1], Spencer Bright[2], Elizabeth Lyden[1], Jessica Goeller[3], Brian Jones, MD[3], Robert Cusick, MD[3], Stephen Raynor[3]

[1]University of Nebraska Medical Center, Omaha, NE, USA, [2]Rockhurst University, Kansas City, MO, USA, [3]Children's Hospital and Medical Center, Omaha, NE, USA

Tweet it! Enhanced Recovery Protocol for NUSS Repair - Multimodal pain management protocol reduces the length of stay and promotes outpatient pain control after Nuss repair, with the potential to expedite postoperative recovery and decrease opioid use.

Purpose

Minimally invasive repair of pectus excavatum (MIRPE) is the predominant method for correction of pectus excavatum (PE). MIRPE yields excellent results in the majority of patients, but is associated with severe postoperative pain often requiring extended inpatient length of stays (LOS). We present a protocolized multimodal approach to perioperative pain management that decreases LOS and achieves adequate outpatient pain control in MIRPE patients.

Methods

Retrospective (114 patients, 3/2003-12/2017) and prospective (13 patients, 5/2018-present) chart reviews were completed over 15 years at a single institution. Data collection encompassed patient demographics, PE disease factors, comorbidities, treatments, LOS, and inpatient pain medication use. Pain medication usage was converted to morphine equivalents (MME). Patients who underwent Ravitch repair, MIRPE in conjunction with other procedures, or those with prohibitive comorbidities were excluded. Two-group analyses were completed via 2-sample T-test, and multiple group analyses utilized ANOVA; $p < 0.05$ defined statistical significance. Multivariable linear regression models and correlation coefficients were also used.

Results

114 patients in the retrospective arm (old protocol-OP) were treated with varying methods of pain control, including patient-controlled analgesia (PCA), epidurals, and paravertebral blocks. 13 patients treated under the new protocol (NP) received perioperative pain counseling, single shot paravertebral nerve blocks, PCA, and a multimodal oral pain medication regimen comprised of a combination of opiates and non-opiate adjuncts. Mean LOS for the OP was 4.39 days, versus 1.85 (p-value<0.0001) for the NP. NP patients required oral opioids for an average 9.9 days outpatient, without pain medication refills.

Conclusions

Our multimodal pain management protocol reduces LOS, and promotes outpatient pain control after MIRPE. Standardizing perioperative pain management utilizing a multimodal analgesic regimen after MIRPE has the potential to expedite postoperative recovery and decrease opioid use.

*"Enhanced Recovery" is not associated with trademarks held by, nor were these techniques developed by the ERAS Society

Poster Display (cont.)

P13

PARENT PERCEPTIONS OF POSTOPERATIVE PAIN MANAGEMENT AFTER OPIOID REDUCTION PROGRAM IN PEDIATRIC PATIENTS

Dalya M. Ferguson, MD, Elisa I. Garcia, Nutan B. Hebballi, KuoJen Tsao, MD

McGovern Medical School at The University of Texas Health Science Center at Houston, Houston, TX, USA

Tweet it! @HealthScoutBlog presents on parent perceptions of post-discharge pain control in pediatric surgery patients after implementing an opioid reduction program. Pain well controlled overall, but orchiopexy and cholecystectomy may be areas for improvement.

Purpose

Opioid misuse and abuse is a public health crisis in the United States. In response, many surgeons have limited their postoperative opioid prescribing. After initiating an opioid reduction program, we surveyed parents of pediatric surgery patients to ascertain whether post-discharge analgesia remains adequate.

Methods

From June through October 2018, parents of pediatric (<18 years) general surgery patients were given an adapted, validated Total Quality Pain Management survey in English or Spanish at the first postoperative appointment. Discharge medications were determined by the surgeon. Non-opioid regimens included acetaminophen and/or ibuprofen. Clinical details and discharge prescriptions were collected by chart review. A state controlled substance prescription monitoring website was searched to ascertain whether opioid prescriptions were filled or obtained elsewhere.

Results

Of 59 surveys, 94.9% were completed in English. Laparoscopic appendectomy was the most common procedure (28.8%), followed by gastrostomy tube placement (13.6%), cholecystectomy (6.8%), and orchiopexy (6.8%). 66.1% of cases were minimally invasive (laparoscopic, thoracoscopic). Only 4 (6.8%) opioid prescriptions were written for 3 patients who underwent Nuss procedures and 1 patient who underwent umbilical hernia repair. Children who received opioids did not experience any narcotic-related complications. Parents of 8 (16.3%) children did not receive opioids reported their child was sleepy after taking medications. Maximum reported scores on the 10-point visual analog pain scale varied significantly by procedure and patient. Reported pain with movement was highest in orchiopexy (median 9, IQR 7-9) and cholecystectomy (median 7, IQR 4.5-8.5) patients, none of whom received opioids. Overall, most parents were satisfied with their child's pain regimen; 89.1% indicated they would want the same medications after future surgeries.

Conclusion

Despite dramatically reducing opioid prescriptions, post-discharge pain appears well controlled in pediatric patients. However, parents perceive under-treatment of pain after certain operations (orchiopexy, cholecystectomy). Further study is needed to determine ideal postoperative pain management.

Poster Display (cont.)

P14

TRANS-INCISIONAL VERSUS LAPAROSCOPIC-GUIDED RECTUS SHEATH BLOCK FOR PEDIATRIC SINGLE-INCISION LAPAROSCOPIC CHOLECYSTECTOMY: A PROSPECTIVE, RANDOMIZED TRIAL

Jeremy D. Kauffman, MD, Cristen N. Litz, MD, Sandra M. Farach, MD, JoAnn C. DeRosa, Anh Thy H. Nguyen, Ernest K. Amankwah, MD, Raquel Gonzalez, MD, Paul D. Danielson, MD, Nicole M. Chandler, MD

Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA

Tweet it! What's the optimal method of rectus sheath block after pediatric single-incision laparoscopic cholecystectomy? This double-blinded randomized controlled trial demonstrated similar effectiveness of trans-incisional and laparoscopic-guided techniques. @NChandlerMD @jdkauff10

Purpose

The purpose of our study was to compare the effectiveness of two methods of rectus sheath block (RSB) for pain control following single-incision laparoscopic cholecystectomy (SILC).

Methods

Following IRB approval and informed consent, patients 10-21 years old presenting to our institution for SILC from 2015-2018 were randomized to either trans-incisional or laparoscopic-guided RSB. Apart from the RSB technique, perioperative care protocols were identical between groups. All procedures were performed by one of three surgeons. Pain scores were assessed with validated measures upon arrival in the post-anesthesia care unit (PACU) and at 10-minute intervals for 60 minutes after awakening, followed by 30-minute intervals until discharge. Patients and those assessing them were blinded to the RSB technique. The primary outcome was pain score 60 minutes after PACU arrival. Secondary outcomes included pain scores at first awakening and at discharge, morphine equivalents (ME) per kilogram (kg) administered, and PACU length of stay (LOS). Statistical differences in outcomes between treatment groups were assessed using the Kruskal-Wallis test with significance at α=0.05.

Results

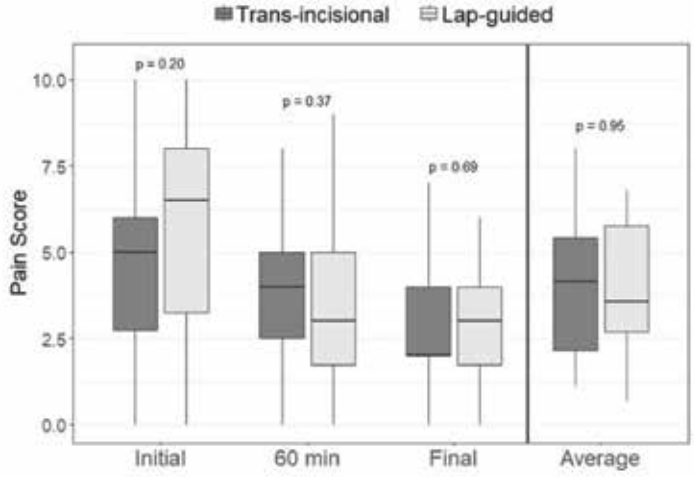
The mean age of the 48 patients was 15.7 years (range=11-21); the majority (79.1%) were female. There were no statistically significant differences detected in demographic variables, operative time, intraoperative analgesic administration, or frequency of attending surgeon between trans-incisional (n=24) and laparoscopic-guided (n=24) treatment groups. The median (interquartile range) 60-minute pain score in the trans-incisional group was 4.0 (IQR=2.0-5.0) as compared to 3.0 (IQR=1.5-5.0) in the laparoscopic-guided group (p=0.368). No significant differences were detected in pain scores at awakening or at discharge (Figure 1), median ME/kg administered (0.13 (IQR=0.05-0.18) vs 0.08 (IQR=0.04-0.11), p=0.278) or median PACU LOS (1.9 (IQR=1.8-2.3) vs 2.1 (IQR=1.7-2.4) hours, p=0.350).

Poster Display (cont.)

Conclusion

The findings of this double-blinded randomized controlled trial suggest that trans-incisional and laparoscopic-guided rectus sheath block exhibit similar effectiveness in controlling pain following pediatric single-incision laparoscopic cholecystectomy.

Figure 1. Pain scores at three time points in the post-anesthesia care unit following single-incision laparoscopic cholecystectomy, stratified by technique of rectus sheath block.



Poster Display (cont.)

P15

LONG-TERM FOLLOWUP OF PEDIATRIC OPEN AND LAPAROSCOPIC INGUINAL HERNIA REPAIR

Sani Yamout, MD[1], Sora Ely, MD[2], Helene Fevrier, MPH[1], Lisa Herrinton, PhD[1], **Albert J. Chong, MD**[3], Florencia Beleniski

[1]Kaiser Permanente, Oakland, CA, USA, [2]UCSF East Bay Surgery, [3]Kaiser Permanente, San Francisco, CA, USA

Tweet it! We present a long-term followup of large number of pediatric patients undergoing single incision laparoscopic inguinal hernia repair compared to concurrent open repair. We address concerns regarding recurrence, technical difficulties, and operative times.

Background
Pediatric laparoscopic inguinal hernia repair is not widely accepted. We used the Kaiser Permanente Northern California experience to compare open and laparoscopic repairs.

Study Design
Children 0-14 years who underwent inguinal hernia repair during 2010-16 were classified into five groups: (1) open unilateral repair without contralateral exploration; (2) open unilateral repair with laparoscopic exploration of the contralateral side ("open+explore"); (3) open bilateral repair, which allowed clear visualization of the contralateral internal inguinal ring; (4) laparoscopic unilateral repair; and (5) laparoscopic bilateral repair. Outcomes included ipsilateral reoperation, metachronous contralateral repair, incision time, and complications. Proportional hazards analysis of second surgeries accounted for differences in length of postoperative follow-up.

Results
Among 1,697 children, the initial operation was open unilateral, 683; open+explore, 275; open bilateral, 198; lap unilateral, 336; and lap bilateral, 205. Follow-up averaged 3.6 years after open and 2.6 years after laparoscopic surgery. Among 683 patients who received open unilateral surgery without contralateral exploration, 3.8% (N=26) required a metachronous contralateral repair, while this percentage was 0.7% (2/275) for the open+explore patients and 0.9% (3/336) for the laparoscopic unilateral patients ($p<0.01$). The rate of ipsilateral recurrence was 0.8% (10/1156) for the open repairs and 0.3% (2/541) for the laparoscopic repairs. After adjustment, bilateral laparoscopic repair had the same incision time as open unilateral surgery ($p=0.96$), while it was 22 minutes shorter than open+explore ($p<0.0001$). Chart review confirmed 5 postoperative infections in 1,156 patients with open surgery (0.43%) and 6 infections in 541 patients with laparoscopic surgery (1.11%) ($p=0.11$), corresponding to 0.37% among 1,354 open sides and 0.80% among 746 laparoscopic sides ($p=0.19$).

Conclusion
The laparoscopic and open approaches used in our study have similar low ipsilateral reoperation rates, incision times, and complications. The use of laparoscopy to visualize the contralateral side resulted in a significantly lower rates of metachronous contralateral repair.

Poster Display (cont.)

P16

NATIONAL TRENDS IN FUNDOPLICATION FOR INFANTS DEMONSTRATE DECLINING OPERATIVE RATES AND SIGNIFICANT INTER-HOSPITAL VARIABILITY

James M. Prieto, MD[1], Matthew T. Brigger, MD[2], Karen M. Kling, MD[3], Timothy J. Fairbanks, MD[3], Stephen W. Bickler, MD[3], Nicholas C. Saenz, MD[3], Sneha I. Nicholson[3], David A. Lazar, MD[3]

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Purpose

To identify nationwide trends in fundoplication procedures for infants, and evaluate the variation among institutional practices.

Methods

Retrospective, cross-sectional analysis of the Kids' Inpatient Database from 2000 to 2012, and the Pediatric Health Information System (PHIS) database for the year 2016. Infants undergoing fundoplication and/or gastrostomy tube (GT) placement were identified using ICD-9-CM codes.

Results

Nationwide GT placement in infants <1-year old increased linearly during the study period (range 5963-7821, $r=0.95$, $p=0.01$). In contrast, fundoplication rates followed a parabolic curve, peaking in 2006 ($n=3899$) and steadily decreasing through 2012 ($n=3554$, $r=0.97$, $p<0.05$). Using PHIS, 159,720 infants <6-months old were identified from 46 hospitals. GT placements were performed at an average hospital rate of 30.0 ± 16.4 placements per 1000 infants discharged (range 6.2-70.9). Fundoplications occurred at an average hospital rate of 5.9 ± 5.3 per 1000 infants discharged (range 0.3-19.7). Hospital rates of GT placement followed a normal distribution, while rates of fundoplication were skewed leftward ($p<0.01$) with 7 centers accounting for the majority of fundoplications within the database. Significantly more inter-hospital variation occurred for fundoplication rates compared to GT placement (coefficient of variation 0.89 vs 0.54, respectively, $p=0.02$). There was a >40-fold difference in the ratio of fundoplication per GT performed across centers (range 2-86%, figure 1). No differences in mean ratio of fundoplication per GT performed were appreciated based on hospital ranking or ACS Children's Surgery Verification.

Conclusion

Fundoplication rates for infants are decreasing, despite a steady increase in GT placement. There is considerable variation in the practice of fundoplication between children's hospitals, with some centers greater than 40-times more likely to perform a fundoplication in association with GT placement than others. Further study of fundoplication should be undertaken to understand institutional practices, evaluate aerodigestive outcomes in these infants, and establish more universal guidelines for operative indications.

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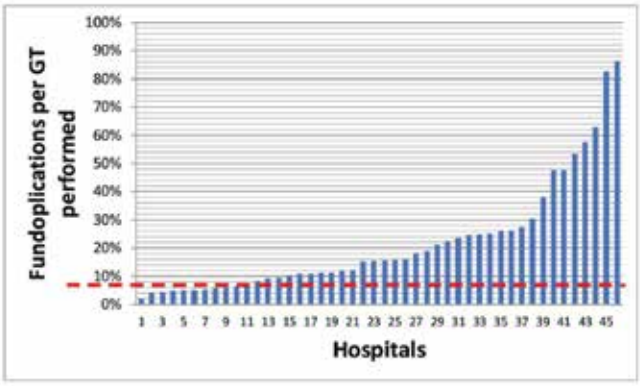

Fig 1. Inter-hospital variation of fundoplication per gastrostomy tube placement performed (using the PHIS database, dotted line represents the median)

Poster Display (cont.)

P17

LONG-TERM ANALYSIS OF GASTROINTESTINAL DISEASE BURDEN IN PATIENTS WITH A HISTORY OF NEC

Adil J. Malek, MD[1], Lea Mallett[2], Lauren Sager[3], Hayden W. Stagg[4], Lena Perger, MD[5]

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Purpose

Limited long-term outcome data exists for neonates with a history of necrotizing enterocolitis (NEC). We previously established that NEC neonates have a decreased rate of weight gain over a 20-year period relative to control-matched peers. Our aim was to determine if a difference in gastrointestinal (GI) disease burden existed between these two groups as a potential explanation for the observed difference in weight.

Methods

A retrospective matched cohort study included neonates diagnosed with NEC and control-matched subjects for birth year (between 1989 and 2007), birth weight, and gestational age. The primary outcome was GI disease burden measured by International Classification of Diseases (ICD) 9 and ICD-10 GI codes collected from visits after NICU discharge until August 2018. Diagnosis codes were consolidated into related categories. Association between history of NEC and GI categories was determined by logistic regression with an offset to control for variable follow-up lengths. Significance was determined by a p-value less than 0.05.

Results

359 neonates were included: 190 with NEC; 169 controls. 73%, 22%, and 5% of NEC cases were Bell's stage I, II, and III, respectively. Median gestational age was 29 weeks, median birth weight was 1240g, and median time to last follow-up was 10.5 years (IQR 3.8-15.2). 43760 codes were reviewed with 4329 codes classified under GI. History of NEC was significantly associated with overall likelihood of having any GI diagnosis, dysphagia, failure to thrive, feeding difficulties, and malabsorption ($p<0.05$). History of NEC was not associated with diagnoses of vitamin deficiencies, diarrhea, constipation, dehydration, or vomiting.

Conclusions

NEC neonates exhibit increased medical GI morbidity in long-term follow-up potentially contributing to the observed decrease in rate of weight-gain relative to their control-matched peers. Data analysis for this study is ongoing and will include an analysis of neurodevelopmental and GI surgical diagnoses.

Poster Display (cont.)

P18

FILLING THE GAP: OBJECTIVE DATA TO GUIDE PEDIATRIC SURGERY APPLICANTS WHO FAIL TO MATCH ON THE FIRST ATTEMPT

S. Christopher Derderian, MD, Michael Benge, Frederick Karrer, MD, Jonathan Roach
Children's Hospital Colorado, Denver, CO, USA

Purpose
Acquiring a pediatric surgery fellowship is an arduous process. In 2017, 44 programs participated in the NRMP match for pediatric surgery, there were 94 applications, and only 42 (45.2%) matched. For those who fail to match but remain committed to pediatric surgery, objective data to assess the utility of pediatric surgical sub-specialty fellowships (PSSF) is lacking.

Methods
Names of PSSF graduates between 2014 and 2018 were obtained from training programs. They were then contacted to participate in a voluntary 14-question survey.

Results
From the APSA website, 66 PSSFs are advertised. After excluding research and dedicated international fellowships, 36 PSSF programs at 24 institutions remained. Seventy-one graduated fellow's names were obtained. Twenty-two (31%) were international fellows and two (3%) had previously completed a pediatric surgical fellowship and excluded from further analysis. Of the 47 fellows included, 30 (64%) ultimately obtained a pediatric surgical fellowship (Figure), 11 (37%) of whom matched at the same institution they completed their PSSF. The type of PSSF was not predictive of matriculation into a pediatric surgical fellowship (Table). Thirty (64%) of the 47 study participants completed a satisfaction survey. While all but two found their fellowships to be at least satisfactory, those who matched were more likely to recommend their PSSF than those who did not (100% vs 63%, respectively, p=0.01). Within the cohort of fellows who did not match into pediatric surgery, all who completed a critical care fellowship (4/4) use/plan to use the skills obtained during their PSSF while only 1 of 4 completing other PSSF do.

Conclusion
The rate of matriculation from a PSSF into a pediatric surgery fellowship was 64% with no significant difference among sub-specialties. Among fellows who did not match, those completing a critical care PSSF were more likely to use their fellowship training than those completing another PSSF.

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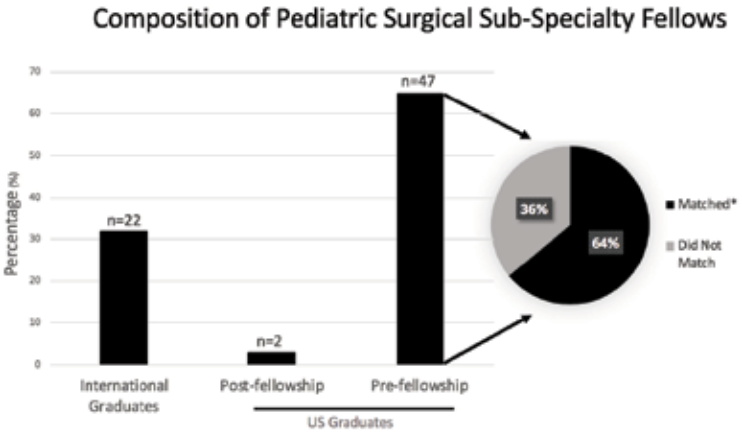

*Defined by matriculation into an ACGME accredited pediatric surgical fellowship
Post-fellowship sub-specialty training included colorectal and surgical oncology

Poster Display (cont.)

P19

THE PEDIATRIC SURGERY CASE-MIX ENGINE: A NOVEL ANALYTIC TOOL TO ASSIST THE MAINTENANCE AND DEVELOPMENT OF PEDIATRIC SURGICAL FELLOWSHIP PROGRAMS

Irene Isabel P. Lim[1], Keith A. Kuenzler[2], Sandra S. Tomita[2], Howard B. Ginsburg[2], **Jason C. Fisher, MD**[2]

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Tweet it! Is your practice "fellowship-ready"? Check out the Pediatric Surgery Case-Mix Engine: a novel, web-based tool that rapidly assesses index case distribution across a practice to assist in maintenance and development of pediatric surgery fellowship programs. @NYUPedSurgery

Purpose

The growth of pediatric surgical fellowship programs continues to prompt discussion on sufficient case-mix exposure and the impact on future workforce. As hospital systems rapidly restructure, long-standing fellowship programs risk disruptions in index case patterns, while consolidating surgical practices may offer new and robust training opportunities. Current programs rely on trainee self-reporting into the Accreditation Council for Graduate Medical Education (ACGME) Accreditation Data System (ADS). Potential training programs have no access to ACGME-ADS, and have limited standardized resources to assess their current case-mix. We envisioned a novel tool that any practice – with or without a fellowship, and independent of trainee compliance – can utilize for rapid analysis of their case-mix, to ensure both current and potential trainees receive adequate exposure to ACGME-defined index cases.

Methods

We developed a dynamic web application that allows uploading of any de-identified spreadsheet of surgical caselogs. The application then generates aggregate reports of case-mix volume for 'Defined Categories' based on 2018 ACGME definitions, which can be exported in various formats. Alpha testing (internal validation) against usability and regulatory criteria was performed between June and December 2017.

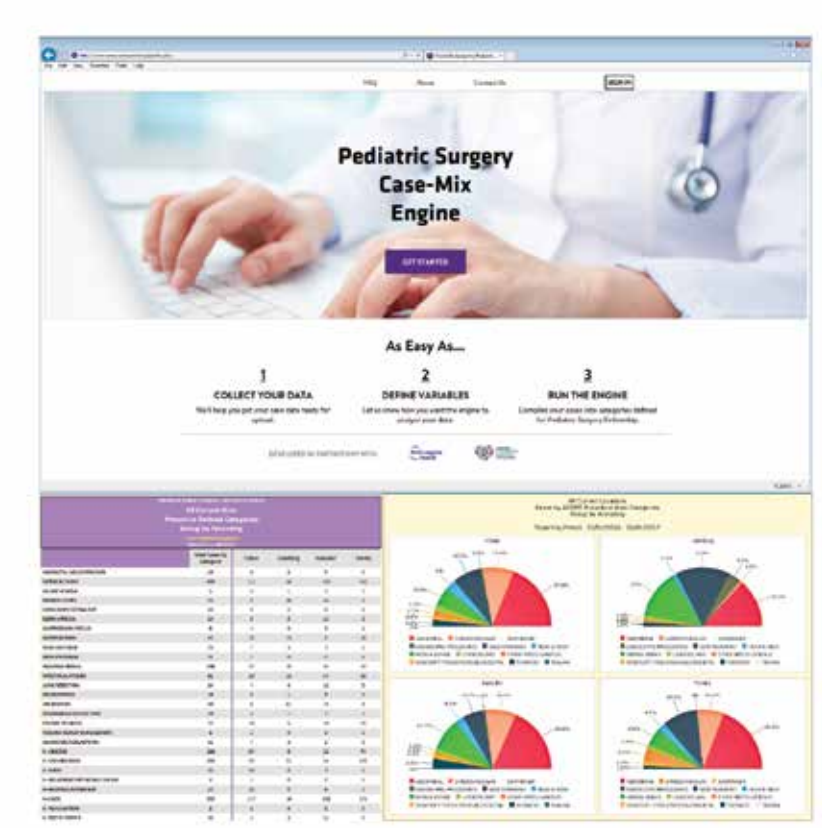
Results

The Pediatric Surgery Case-Mix Engine was successfully deployed as a web-application in an institutional production environment. Quarterly and annual Engine reports rapidly identified differential distribution of index cases across individual surgeons and practice locations (Figure).

Conclusions

A simple web application can provide pediatric surgical practices with detailed analysis of their index cases relative to current fellowship requirements. On-demand case-mix reporting enhances practice flexibility when considering how to best deploy trainees for index case exposure. Strategic development of low cost, high performing custom informatics may help the pediatric surgery community better navigate the development and maintenance of fellowship programs against an ever-changing workforce landscape.

Poster Display (cont.)



Poster Display (cont.)

P20

NIH FUNDING FOR PEDIATRIC SURGEON-SCIENTISTS

Kejal Shah, MD[1], Joseph Drews, MD[2], Julie Breuer[2], Gail E. Besner, MD[2], Christopher Breuer, MD[2]

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Tweet it! NIH Funding for Pediatric Surgeon-Scientists. Relative NIH funding for surgeons is decreasing. Is it declining in pediatric surgery? What are the characteristics of NIH-funded pediatric surgeons in 2018? How strong is the pediatric surgeon-scientist pipeline? @kvshah19

Purpose

There were 37 National Institutes of Health (NIH)-funded pediatric surgeons in 2015. Despite overall increases, the relative funding allocated to surgeons has declined by 25% recently. Academic productivity has played an important role in the growth of pediatric surgery, but the characteristics of successfully-funded pediatric surgeons are incompletely understood. Our objective was to characterize traits of NIH-funded pediatric surgeons.

Methods

The American Pediatric Surgical Association (APSA) database was queried for all members and run through the NIH Research Portfolio Online Reporting tools (RePORT) system. The system was queried for 2018 NIH funding, funding institute, and grant mechanism. PubMed and department websites were used to extract surgeon-scientist and institution-specific characteristics, including academic rank, years in practice, publications, previous Career Development (K) award, number of hospital beds, size of practice, and institution. Single and multivariable linear regression were used to determine associations between surgeon or institutional characteristics and 2018 funding.

Results

Among 851 APSA members, 24 surgeons (2.8%) from 13 institutions received Research (R), Training (T), Program (P), or Cooperative Agreement (U) level NIH funding in fiscal year 2018. Eighteen (75.0%) are professors, with a median of 19 years in practice (IQR 16-24). Six (25%) received a previous K award. Funded pediatric surgeons have a median of 94 peer-reviewed publications (IQR 73-131.5). Median 2018 funding is $780,123 (IQR $442,180-$1,220,206), with R as the most common grant mechanism (19 surgeons). On univariate analysis, professorship ($p=0.02$), years in practice ($p=0.001$), and P grant mechanism ($p<0.001$) were significantly associated with increased funding. No characteristics were significantly associated with 2018 funding on multivariate analysis. Two additional surgeons received K awards in 2018.

Conclusion

NIH-funded pediatric surgeons are predominantly senior faculty. There are currently only three assistant professors and two pediatric surgeons with development awards, suggesting the pediatric surgeon-scientist pipeline is drying up.

Poster Display (cont.)

P21

SPECIALIZATION IN PEDIATRIC SURGERY: RESULTS OF A SURVEY TO THE AMERICAN PEDIATRIC SURGICAL ASSOCIATION

Barrie S. Rich, MD[1], Gail E. Besner, MD[2], Samir K. Gadepalli, MSc, MD, MBA[3], Mehul V. Raval, MD, MS[4], Jared Silverberg, David H. Rothstein, MD, MS[5]

[1]Cohen Children's Medical Center at Hofstra/Northwell, Manhasset, NY, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA, [3]University of Michigan, Ann Arbor, MI, USA, [4]Ann & Robert H. Lurie Children's Hospital of Chicago; Surgical Outcomes and Quality Improvement Center, Northwestern University Feinberg School of Medicine, Chicago, IL, USA, [5]John R. Oishei Children's Hospital, Buffalo, NY, USA

Purpose

To characterize group practice patterns and individual attitudes surrounding specialization within the field of pediatric surgery.

Methods

Anonymous survey of non-resident members of the American Pediatric Surgical Association collecting demographic data, opinions regarding benefits and downsides of specialization, and group practice patterns.

Results

Of 1,118 members surveyed, we received 455 responses (38.3% response rate). Demographics of respondents are listed in Table 1. Respondents typically worked in large academic hospitals (62.2%) and a plurality had been in practice more than 20 years (37.2%). A majority labelled themselves 'general pediatric surgeons' (60.1%), while 36.4% considered themselves a general surgeon with a specific clinical focus, and 3.6% reported practicing solely within a specific niche. The most common role of the specialist was as a practice content expert available for consultation for each relevant case (51.5%). The most common niches included oncology (10.4%), complex anorectal malformations (9.5%), and chest wall deformities (8.5%). Specialties felt to be necessary include transplant (66.6%), fetal interventions (65.9%), and bariatrics (43.7%). Opinions about specialization were variable: 41.2% of respondents felt that specialization improves patient care while 39.2% believe it is detrimental to the well-roundedness of pediatric surgeons. Only 10.2% felt that specialists should practice solely within their specialty. Half of respondents felt additional specialization training is necessary (50.8%), but less than one third of specialists had received further training (29%). Practice at an academic hospital or at a fellowship training program appeared predictive of likelihood of specialization, while length of time in practice did not.

Conclusion

While many pediatric surgeons report that specialization may benefit patient care, concerns exist regarding the unfavorable affect it may have on the individual surgeon. A better understanding of how specialization affects both quality and outcomes would help to clarify its utility.

Poster Display (cont.)

P22

IMPLEMENTATION OF INTENTIONAL STRATEGIES AIMED TO REDUCE THE INFLUENCE OF IMPLICIT BIAS IN PEDIATRIC SURGERY FELLOW SELECTION AND RECRUITMENT: A PILOT PROJECT

Erika A. Newman, MD[1], Shaun M. Kunisaki, MD, MSc[2], **Peter Mackie, MD**[1]

[1]C.S Mott Children's Hospital, University of Michigan, Ann Arbor, MI, USA, [2]Johns Hopkins Children's Center, Baltimore, MD, USA,

Introduction

Medical educators seek to build programs that reflect the diverse patient populations in which they serve. There is evidence that gender and racial bias exists in medical training. Strategies to reduce implicit bias in fellowship match processes may enhance recruitment of qualified women and ethnic minority candidates. To address this, we broadened the traditional model of candidate selection to incorporate intentional strategies to reduce implicit bias.

Methods

Pediatric surgery fellowship interviews were conducted at a single training center without faculty access to the candidate's CV or letters of recommendation until after the interview. Interviews included standardized behavior-based questions designed to assess critical attributes associated with a successful pediatric surgeon. Candidates were scored based on CV and personal statement (50%), the overall interview score (30%), and responses to the standardized interview questions (20%). Broad effort was made to eliminate subjective discussions. Faculty received interview guidelines through The University Strategies and Tactics for Recruiting to Improve Diversity and Excellence (STRIDE) Workshop. An evaluation survey was sent to all participants.

Results

There were 25 candidates interviewed (15 women; 10 men). Rank list was calculated and submitted without subjective adjustments. The 12 highest ranked candidates were 50% women and 50% men with deep diversity in background, training experiences, abilities, and career goals. Among the 76% of candidates responding, 40% agreed that blinded interviews reduced bias, 40% were neutral and 20% did not feel that the interview structure reduced bias. Among 100% faculty responding, 66.67% agreed that the structured process reduced bias, 11.11% were neutral and 22.22% did not agree.

Conclusions

This pilot work details progress towards multifaceted practices that may reduce the influence of implicit bias in fellow selection. Although candidates and faculty have different perspectives regarding structured interviews, intentional strategies to address implicit bias are critical to achieve workforce diversity.

Poster Display (cont.)

P23

SURGEON AND HOSPITAL VOLUME FOR INDEX NEONATAL PEDIATRIC SURGERY CASES IN U.S. CHILDREN'S HOSPITALS

Liese C. C Pruitt, MD, David E. Skarda, Douglas C. Barnhart, MD, Brian T. Bucher, MD
University of Utah, Salt Lake City, UT, USA

Purpose
With the rising number of fellowship-trained pediatric surgeons there are concerns about whether or not surgeons continue to do a sufficient volume of index neonatal pediatric surgeries to maintain competency. We sought to describe the operative experience of pediatric surgeons nationally at children's hospitals.

Methods
We performed a retrospective cohort study using the Pediatric Hospital Information Systems database. Patients were selected using International Classification of Diseases diagnosis and procedure codes for gastroschisis, esophageal atresia and tracheoesophageal fistula (EA/TEF), congenital diaphragmatic hernia (CDH), and Hirschsprung disease (HD) from 2007-2017. Using unique hospital and physician identifiers we calculated the number of procedures performed for each condition for each pediatric surgeon and each hospital.

Results
The median (range) yearly hospital volume for gastroschisis, EA/TEF, CDH, and HD was 5.7 (0.9-17), 4.7 (1.1-20.2), 2.4 (0.6-11.8), 4 (1.0-8.8), respectively (Figure). The median (range) yearly surgeon volume for gastroschisis, EA/TEF, CDH, and HD was 0.9 (0.1-4.6), 0.7 (0.1-4.5), 0.7 (0.1-6.0), 0.7 (0.1-6.0), respectively (Figure). The median (IQR) of the highest volume surgeon at each hospital accounted for 31% (22-52%), 24% (16%-40%), 32% (24%-45%), 46% (32%-69%) of gastroschisis, EA/TEF, CDH, and HD cases respectively. High-volume surgeons for one neonatal condition were more likely to be high-volume in another condition (Pearson's r= 0.25-0.33). The percentage of cases done by the highest volume surgeon varied by neonatal condition (p=0.0006) and decreased between the first year of the study and the last year of the study (p=0.03).

Conclusions
Even in free-standing children's hospitals surgeon volume are low for index neonatal procedures. Our analysis shows clustering of index cases that are done by relatively few surgeons. This clustering has been decreasing over the past decade.

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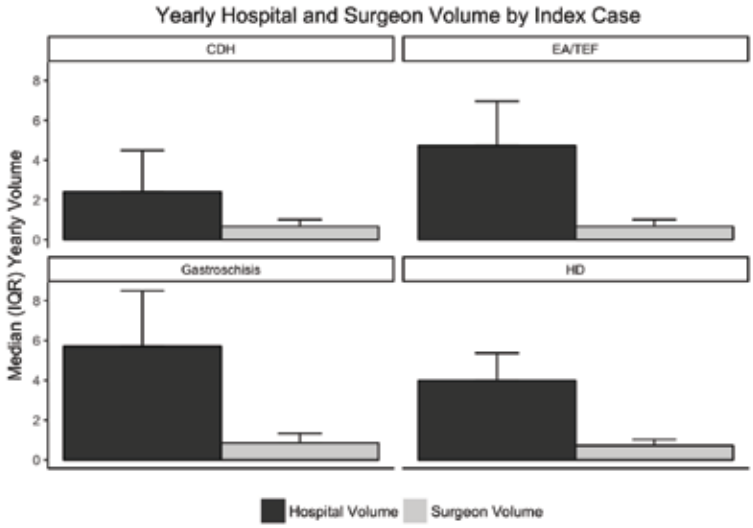

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P24

EVOLUTION OF PUBLICATIONS IN JOURNAL OF PEDIATRIC SURGERY (JPS)– A 20-YEAR ANALYSIS

Russell B. Hawkins, MD, Gwendolyn Gillies, Goeto Dantes, Saleem Islam, MD
University of Florida College of Medicine, Gainesville, FL, USA

Tweet it! How the Journal of Pediatric Surgery is changing - a 2 decade analysis

Background
JPS is considered to be the premier pediatric surgery publication in the US. The purpose of this review was to assess the body of research published in *Journal of Pediatric Surgery* over the past two decades and assess the changes over time in both clinical and basic science research publications as well as the impact on either clinical care or breakthroughs in basic science understanding that may have translated.

Methods
All papers published in the *JPS* in 1997, 2007, and 2017 were reviewed, and articles chosen and sorted into six categories: Necrotizing Enterocolitis, Abdominal Wall Defects, congenital diaphragmatic hernia (CDH), Appendicitis, Trauma, and Neuroblastoma/Wilms tumor. Further classification as either basic or clinical research was performed. All basic science research articles were compared with current clinical guidelines and literature to assess translation and relative clinical application today.

Results
There was a significant decrease in publications on CDH from 1997 to 2017, with concomitant significant increases in appendicitis and trauma articles. A downtrend was seen in the proportion of basic science articles published per year (table). There was a trend to overall reduction in articles per year in *JPS* (annual number over 3 years) (543.3 vs. 400.3, p=0.06). Of 16 basic science articles published in 1997, two were found to have translated into clinical practice. Basic science reports for CDH did not change over 20 years, while those for NEC evolved into new areas.

Conclusions
Our data reflect significant fluctuations not only in the topics of pediatric surgical research over time, but also in the type of research being done. There has been a significant shift in the type and proportion of articles published in *JPS*, making it much more clinically oriented. Further in depth analysis will help to understand these shifts and evolution for *JPS*.

Poster Display (cont.)

P25

A NOVEL MODEL OF US METROPOLITAN PEDIATRIC SURGEON DENSITY

Jonathan Vacek, MD[1], Yazan K. Rizeq[1], Benjamin T. Many, MD[2], Ferdynand Hebal[1], Seth D. Goldstein, MD, MPhil[1], Hassan Ghomrawi[1], Fizan Abdullah, MD[1]

[1]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, [2]Ann & Robert H. Lurie Children's Hospital of Chicago, Northwestern University, Chicago, IL, Chicago, IL, USA

Tweet it! New model for benchmarking pediatric surgeon density among metropolitan areas supports this metric as being normally distributed. This is a step in the right direction to objectively define the needed supply of pediatric surgeons for a metropolitan area. #PSdensity

Purpose

The number of new pediatric surgeons trained per year has been steadily increasing, but pediatric population growth rates have slowed over that time. Previous descriptions of pediatric surgeon density may be inaccurate since they have used total population in a metropolitan area rather than the proportion of children. We aimed to analyze pediatric surgeon density of major US metropolitan areas in 2018.

Methods

Using American Pediatric Surgical Association (APSA) membership as a surrogate metric for number of surgeons, we organized the membership into metropolitan areas. From US Census projection models we estimated pediatric populations (number of people < 18 years of age) for metropolitan areas. We plotted the areas and established a regression line with a range of one standard deviation (SD) from the line. We performed a logarithmic transformation of the data to analyze distribution.

Results

We observed 134 metropolitan areas above the regression line and 66 below. When we applied a one standard deviation cutoff we observed 28 metropolitan areas below the regression and 11 cities above. 140 metropolitan areas (70%) were within one standard deviation away from the regression. The median pediatric surgeon density was one surgeon for every 8311 children. After a logarithmic transformation, the data were found to be normally distributed.

Conclusion

We conclude most US metropolitan areas have similar pediatric surgeon densities when considering contemporary pediatric population size. Our model is useful for a descriptive analysis when doing comparative benchmarking between metropolitan areas. It lacks the ability to define workforce saturation. This type of analysis will need to be performed with other factors being taken into account, such as pediatric surgeons' research and administrative responsibilities.

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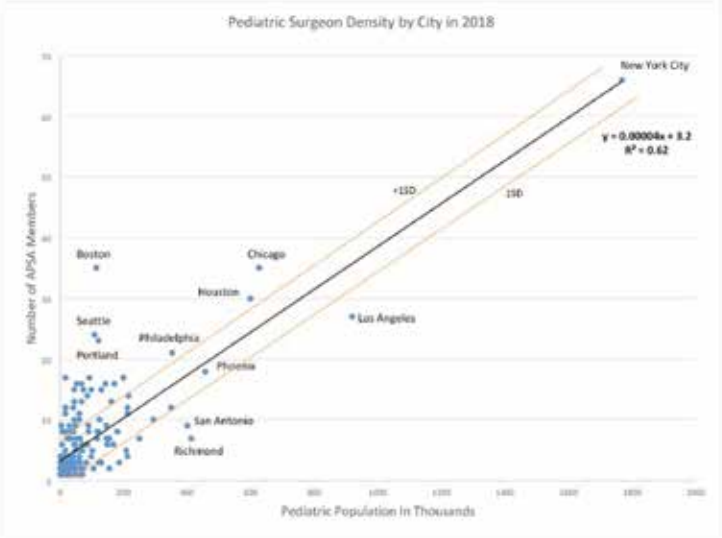

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P26

THE EVIDENCE ON EVIDENCE-BASED MEDICINE DECISION MAKING AMONG PEDIATRIC SURGEONS

Matthew S. Alexander, MD, MHA[1], Erica M. Carlisle, MD[2]

[1]UIHC, Iowa City, IA, USA, [2]University of Iowa Stead Family Children's Hospital, Iowa City, IA, USA

Purpose

Pediatric surgeons are challenged to make decisions regarding patients with rare conditions with limited published data. This may be difficult for surgeons trained in the evidence-based medicine (EBM) era who are taught to prioritize data-driven decision making/counseling. We sought to determine if formal EBM education impacts how pediatric surgeons make clinical decisions/council families of patients with rare conditions.

Methods

A web-based survey was distributed to APSA members per APSA Outcomes and Evidence-Based Committee Subcommittee on Survey Development and institutional IRB approval. Survey assessed impact of formal EBM training on surgeon decision making/counseling in settings of rare conditions in which limited data exists. Decision-making and communication patterns were statistically compared across professional rank and educational background.

Results

202 (15.6 %) APSA members completed the survey. 96 (47%) reported no EBM training, 89 (44%) reported EBM training, and 17 (8%) were unsure. 'Best available research' was the preferred tenant of EBM across educational background. EBM trained surgeons rely on literature more than clinical experience (56% vs. 44%; $p < 0.01$), a difference not appreciated in those lacking EBM training (50.2% vs. 49.8%; $p = 0.88$). Compared to 12% of fellows, 37% of surgeons with >10yr experience prefer to rely on clinical judgment as opposed to published evidence when discussing rare conditions ($p < 0.01$).

Conclusion

Surgeons with EBM training rely upon published literature as opposed to clinical experience when caring for patients with rare conditions. This may make it difficult for surgeons to counsel patients/families when little data exists. EBM training must therefore expand to focus not only upon integration of data into counseling, but also counseling with limited data. Given our finding that as surgical careers progress, decision-making preferences shift toward experience rather than data, EBM training must also focus on integration of experience with literature to assure balanced counseling.

Poster Display (cont.)

P27

SCREENING FOR INTIMATE PARTNER VIOLENCE IN THE PEDIATRIC SURGERY CLINIC: A FEASIBILITY STUDY

Ishna Sharma, MD[1], Jordan Zajac[1], Sarah Neubert[1], Susan DiVietro[1], Rebecca Beebe[1], Garry Lapidus[1], Brendan T. Campbell[2]

[1]Connecticut Children's Medical Center, Hartford, CT, USA, [2]American College of Surgeons, Committee on Trauma, Chicago, IL, USA

Tweet it! One in three American women will experience intimate partner violence (IPV) in her lifetime, and IPV exposure adversely impacts child health. The objective of this study was to implement a tablet-based IPV screening tool in an outpatient pediatric surgery clinic.

Purpose

One in three American women will experience intimate partner violence (IPV) in her lifetime, and IPV exposure adversely impacts child health. The American Academy of Pediatrics recommends routine IPV screening, but there are many obstacles to consistent screening. The objective of this study was to implement a tablet-based IPV screening tool in an outpatient pediatric surgery clinic and evaluate the feasibility of providing a social work consult to positive screens in real time.

Methods

For 30 consecutive days, in July and August 2018, a validated, tablet-based IPV screening questionnaire was administered to women (n=245) bringing their child to a pediatric surgery outpatient clinic. Eligible participants were English-speaking females who were not accompanied by another adult. Medical assistants provided eligible women with the tablet prior to their visit with the pediatric surgeon. Women with positive IPV screens were discreetly identified by a color change on the tablet screen and offered a real-time social work referral. Data was collected using Qualtrics (a HIPAA compliant data management system) and analyzed using SPSS 16.0.

Results

Of the 1020 women presenting to the pediatric surgery clinic during the study period, 245 were eligible for IPV screening (24%). 561 women (55%) were accompanied by another adult and were therefore ineligible for screening. Of the eligible women (n=245), 57% were successfully screened. Thirteen (9%) screened positive, and one received a social work consult. Twelve women who screened positively refused a social work consult during their visit.

Conclusion

IPV screening is feasible in an outpatient pediatric surgery clinic. Nearly one in ten women in our practice screened positive for IPV exposure. The next phase of this study will integrate the screening tool into multiple hospital departments and will include an automatic a social work referral for all positive screens.

Poster Display (cont.)

P28

SOCIAL SCREENING IN PEDIATRIC SURGERY CLINICS WITHIN A TERITARY CHILDREN'S HOSPITAL

Robert Baird, MDCM, MSc[1], Bonnie He[1], Damian Duffy[2], Robert Baird, MDCM, MSc[1], Douglas Courtemanche[3], Christine Loock[4]

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Purpose

Children living with adverse childhood experiences (ACEs) and adverse social determinants of health (SDoH) experience higher rates of poor health outcomes; however, much of the current literature in SDoH/ACEs focuses on primary care, with little data about pediatric surgical specialties. We investigated how social determinants of health influence the lives of pediatric surgical patients and families.

Methods

For this quality improvement project (IRB exempt: H17-01274), we created a survey consisting of 28 multiple choice and open-ended questions about SDoH, including the validated ACE and resiliency questionnaires. A convenience sample of families visiting outpatient surgical clinics at a tertiary pediatric hospital between January and September 2018 was used. The survey was voluntarily completed by 176 families in the waiting rooms of ten Pediatric surgical clinics: Cleft Palate/Craniofacial, Plastic Surgery, General Surgery and others.

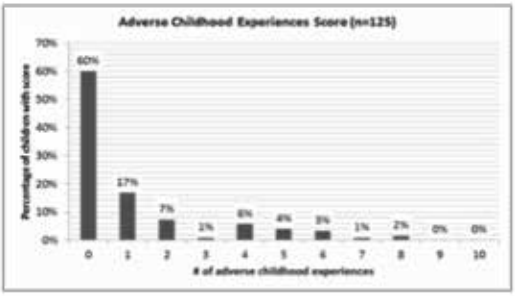
Results

While almost all families had a primary care provider (n=174, 94.3%), 75.5% (n=155) reported being able to turn to them for assistance. Almost a quarter (21.8%, n=86) of participants identified as a visual/cultural minority. Nearly half of participants reported having difficulty making ends meet (n=173, 46.8%), and one in five (n=168, 19.6%) stated the cost of medical supplies and medicines affected adherence to treatment plans. Parents frequently expressed a desire for more disease-specific information (59%, n=115), disability eligibility (44%, n=86) and assistance with the cost of medicines/supplies (51%, n=99). Sixteen percent of children in our study had an ACE score of 4 or more (≧4) (n=125)(Figure 1), compared to the US national average of 12.5%, where ACE scores ≧4 are significantly related to poorer health outcomes.

Conclusion

Our results demonstrate that social and economic factors clearly affect the lives of many surgical patients and families. This data supports quality improvement interventions, such as advocating for social screening and social work presence during surgical clinic visits.

Poster Display (cont.)



Poster Display (cont.)

P29

PEDIATRIC OBESITY IN THE UNITED STATES: LOWER SOCIOECONOMIC STATUS MAY LEAD TO INADEQUATE TREATMENT

Numa Perez, MD[1], Cornelia Griggs[2], Sahael Stapleton[1], Fatima Stanford[1], Janey Pratt[3], David Chang, PhD, MPH, MBA[1], Cassandra M. Kelleher, MD[4]

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Tweet it! @numap_rez: Pediatric obesity disproportionately affects minorities w/ Medicaid and lower income, yet MBS is most often performed on patients with private insurance and higher income, leaving the population with most need without access to the best treatment for their disease.

Purpose

The purpose of this study was to examine utilization patterns of metabolic and bariatric surgery (MBS) across race and socioeconomic status among pediatric patients.

Methods

The National Inpatient Sample was used to identify patients 2-19 years old undergoing MBS from 2015-2016. National weighted estimates were calculated, and statistics were obtained using chi square analysis and logistic regression.

Results

An estimated 2,550 MBS were performed. On multivariate analysis adjusted for age, gender, race, payer, median household income (hereon income), hospital location and setting, black and Hispanic patients (OR 1.26, 1.28; $p<0.001$), patients with Medicaid (OR 1.22; $p<0.001$), and patients in income quartiles #1-3 (OR 1.52, 1.42, 1.31; $p<0.001$), were more likely to carry a diagnosis of obesity than whites, privately insured patients, and patients in income quartile #4, respectively. Nevertheless, patients with Medicaid (OR 0.35; $p<0.001$) and in income quartiles #1-3 (OR 0.42, 0.57, 0.59; $p<0.005$) were less likely to undergo MBS than those privately insured or in income quartile #4. Among patients who underwent MBS, Hispanics were more likely to have Medicaid (OR 2.25; $p=0.006$), and both black and Hispanic patients were more likely to be in income quartiles #1-3 (OR 2.12, 2.13; $p<0.05$) than whites. There were no significant differences in complication rates based on race, insurance, or median household income.

Conclusion

Pediatric obesity disproportionately affects non-white populations, who are more likely to have Medicaid as primary insurance, and lower median household income. On the other hand, metabolic and bariatric surgery is most often performed on patients with private insurance and with higher relative income, leaving the population with the most need without access to the best treatment for their disease. Provider referral patterns need to be closely examined and conscious efforts should be made to actively target this most vulnerable population and decrease an already wide disparity.

Poster Display (cont.)

P30

WHEN PRIMARY REPAIR IS NOT ENOUGH: A COMPARISON OF SYNTHETIC PATCH VERSUS MUSCLE FLAP REPAIR FOR LARGE CONGENITAL DIAPHRAGMATIC HERNIA

Emrah Aydin[1], **Heather R. Nolan, MD**[1], Jose L. Peiro[1], Patricia Burns[1], Beth A. Rymeski, MD[1], Foong-Yen Lim, MD[2]

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Purpose

Primary closure is often inadequate for large congenital diaphragmatic hernia (CDH) defects and necessitates surgical repair by prosthetic patch or autologous muscle flap. The aim of our study was to evaluate the outcome of open patch versus flap repair, specifically the rate of diaphragmatic reherniation.

Methods

A retrospective review (IRB #2017-6361) was performed on all CDH patients repaired from 2005-2016 at a single academic children's hospital. All patients alive with available data as of July 2017 were included. Those that underwent open repair with prosthetic patch or muscle flap were compared.

Results

We identified 171 patients in the study period that underwent repair: 151 (88.3%) survived to discharge, 9 expired after discharge and 11 were lost to follow up, leaving 131 (86.8%) long-term survivors for the study. Median follow-up was 5 years. Open CDH repair was performed in 119 patients (90.8%) of which 28 (23.5%) underwent primary repair, 34 (28.6%) patch repair, and 57 (47.9%) flap repair. Overall, 6/119 (5%) patients reherniated, 1/28 (3.6%) in the primary group, 3/34 (8.8%) in the patch group, and 2/57 (3.5%) in the flap group. When comparing the prosthetic patch repair to the muscle flap repair, there was no significant difference in the number of patients who recurred nor time to reherniation (3 vs. 2, $p=0.295$; 5.5 ± 0.00 months vs. 53.75 ± 71.06 months, $p=0.288$). One patient in the patch group recurred twice.

Conclusion

Both muscle flap and patch repair of large congenital diaphragmatic hernia defects are feasible and durable with a relatively low risk of recurrence.

Poster Display (cont.)

P31

NECROTIZING ENTEROCOLITIS FOLLOWING GASTROSCHISIS REPAIR: AN UPDATE

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Purpose

Necrotizing enterocolitis (NEC) is a known complication of gastroschisis with an incidence above the expected rate in the neonatal population. While many physicians today are aware of this association, the last publication to explore this association in detail and identify possible risk factors of NEC in gastroschisis patients was published over twenty years ago. From our large database of patients with gastroschisis managed by a single group of pediatric surgeons, we reviewed our experience and the recent literature to update what is known about gastroschisis and NEC.

Methods

From 2001 to 2017, a gastroschisis registry was maintained. Data from 218 gastroschisis patients were reviewed. Patient demographics and hospital course were reviewed. Patients with confirmed NEC were compared to those without NEC.

Results

Two hundred eighteen patients were born with gastroschisis during the time frame of this study. We observed a 5% rate (11 of 218) of NEC. Five patients (45%) developed recurring NEC and 4 patients (36%) were readmitted for NEC development following initial discharge. Variables associated with NEC included low gestational age (P=0.016) and low birth weight (P=0.003). Patients born prior to 37 weeks gestation had a 4.8 times greater risk of developing NEC than those born at term. Rates of IUGR were not statistically different between NEC and non-NEC patients. The method of delivery (cesarean vs vaginal), use of a silo, and form of nutrition were not significantly associated with NEC development.

Conclusions

The overall incidence of NEC has decreased compared to earlier reports. NEC does complicate the hospital course for patients, significantly increasing duration of in-hospital treatment. NEC in gastroschisis differs in comparison to traditional NEC, presenting later in life. Risk factors identified include low gestational age and low birth weight. Avoiding elective preterm deliveries may decrease the rate of NEC in gastroschisis.

Poster Display (cont.)

P32

COMPUTED TOMOGRAPHY REDUCTION IN PEDIATRIC TRAUMA PATIENTS

Elaa Mahdi, MD, MPH[1], Nicole Toscano[2], Robert M. Dorman, MD[3], Colleen Davis, MD, MPH[4], Anne Brayer[4], James Sanders, MD[5], Mitchell Chess[6], Christopher Gitzelmann, MD[2], Walter Pegoli, MD[2], Derek Wakeman, MD[2]

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Tweet it! Computed Tomography Reduction in Pediatric Trauma Patients

Purpose

Unnecessary computed tomography (CT) scanning increases health care costs and places children at increased risk of developing fatal cancers. Previously, we retrospectively validated imaging algorithms targeted to reduce CT scans in children with blunt traumatic injuries. We hypothesized that prospective implementation of these imaging guidelines would reduce unnecessary CT imaging.

Methods

Imaging algorithms for the head, cervical spine, chest, and abdomen/pelvis where implemented prospectively during pediatric trauma team activations from July 2017 – June 2018. This interventional cohort was compared to a historical cohort from July 2016 – June 2017. A blinded chart review was performed to determine whether imaging was indicated. Patients with penetrating mechanism, suspicion of non-accidental trauma, and CT imaging prior to arrival in the intervention group were excluded. Statistical analyses were performed with Mann Whitney u-tests.

Results

There were 107 CT scans performed on 42 patients during the control period compared to 87 scans on 56 patients following implementation of guidelines. The percentage of non-indicated CT's decreased from 45% to 29%. After algorithm implementation, the median number of CT's per patient per month significantly shifted (> 6 subsequent data points below the median) from 2.6 to 1.5 ($p<.001$). Similarly, the median number of non-indicated CT's per patient per month significantly shifted from 1.1 to 0.4 ($p=.001$) (Figure). Most of the reduction was observed in chest imaging. There were no clinically significant missed injuries observed.

Conclusions

Implementation of imaging algorithms for pediatric blunt trauma patients resulted in a 36% relative reduction in the percentage of non-indicated CT scans obtained without endangering patient care. This corresponds to approximately one fewer CT scan per patient with a concomitant cost savings of ~ $900 and radiation reduction of ~ 650 mGy*cm per patient. Utilization of imaging guidelines can reduce healthcare utilization and radiation exposure in this vulnerable population.

Poster Display (cont.)

Figure: The run chart depicts CT utilization reduction in pediatric blunt trauma patients following imaging algorithm implementation in July 2017. The solid line represents the number of non-indicated CT's per patient per month. The dashed line represents the median with a significant shift seen after intervention. The month/year are on the x-axis.

Poster Display (cont.)

P33

VALIDATION OF THE PEDIATRIC RESUSCITATION AND TRAUMA OUTCOME (PRESTO) SCORE IN INJURED CHILDREN IN A SOUTH-AFRICAN QUATERNARY TRAUMA CENTRE

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Purpose

The Pediatric RESuscitation and Trauma Outcome (PRESTO) model was developed for standardized risk-adjustment in pediatric trauma and is adapted to low-resource settings. It includes easily-accessible demographic and physiologic variables that are available at point-of-care in virtually any setting. The purpose of this study was to evaluate the PRESTO model's ability to predict in-hospital mortality in a South African pediatric trauma unit by comparing it to the widely used Injury Severity Score (ISS).

Methods

Ethics approval was obtained (BCA207/09). Data prospectively collected between 2007-2017 in the Inkosi Albert Luthuli Central Hospital Trauma Registry were retrospectively reviewed. Injured children under 14 years of age were included if they were admitted to hospital or died as a result of their injury. We excluded patients with minor injuries who were treated and discharged home and patients with incomplete hospital disposition data. Receiver-Operating Characteristic (ROC) curves were constructed for PRESTO and ISS, and the areas under the curve (AUC) were compared using Delong's test. The sensitivity and specificity of PRESTO were calculated at different prognostic threshold values.

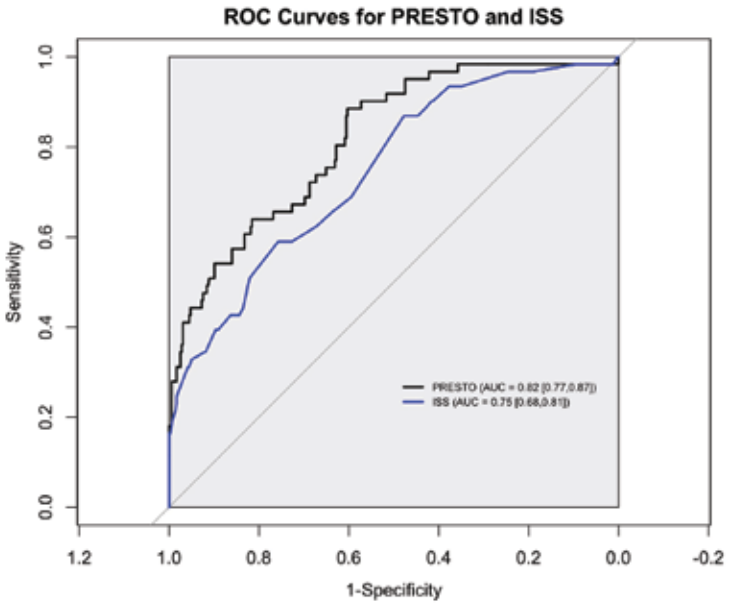
Results

We identified 419 patients; 67 died in hospital (16%). The AUC for PRESTO and ISS were 0.82 (95% confidence interval CI [0.76-0.87]) and 0.75 (CI [0.68, 0.81]), respectively. This difference trended towards statistical significance (p=0.07). Using the optimal threshold of 0.13 described in the original publication, PRESTO had a 97% sensitivity and 37% specificity, while a threshold of 0.50 yielded 90% sensitivity and 54% specificity. The mean predicted probability of in-hospital death among patients who died was 0.79. Using this value as a threshold yielded the 57% sensitivity and 85% specificity.

Conclusion

This analysis has demonstrated the validity of the PRESTO model for in-hospital mortality prediction for pediatric trauma patients in the setting of a dedicated high-complexity trauma unit in a South African trauma referral centre.

Poster Display (cont.)



Poster Display (cont.)

P34

TREPHINATION FOR PEDIATRIC PILONIDAL DISEASE RESULTS IN FEWER WOUND COMPLICATIONS AND SIMILAR RECURRENCE COMPARED TO WIDE EXCISION

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Purpose
To evaluate surgical outcomes of trephination compared to wide excision in children undergoing initial surgical treatment of pilonidal disease.

Methods
A single-center retrospective review was conducted of all pilonidal excisions performed between September 2017 and September 2018, a period corresponding to the adoption of trephination at our institution. Patients who had a prior surgical excision of pilonidal disease were excluded. Surgical treatment was categorized as either trephination or wide excision via an open or closed-wound technique. Outcomes were evaluated and data analyzed by Chi-squared and one way ANOVA tests.

Results
One-hundred and five patients were identified, with a mean follow up of 4.7 months. Trephination was performed in 57% of patients. In the remaining 43% of patients who underwent wide excision, 62% of the wounds were left open. There was no significant difference in age, sex, or BMI among the three groups. Compared to both the open and closed techniques, trephination was associated with fewer wound complications (17% vs 29% vs 3%, respectively, $p=.005$), and post-operative visits (4.4 vs 2.7 vs 1.4, respectively, $p<0.0001$). There was no significant difference in recurrence rates between the three groups.

Conclusion
Trephination for pilonidal disease in pediatric patients is associated with a lower wound complication rate and fewer post-operative visits than wide excision techniques. Recurrence rates are not significantly different between the various surgical methods. Further prospective study would be useful to describe long term outcomes of patients undergoing trephination for pilonidal disease.

Poster Display (cont.)

P35

MANAGEMENT OF PERSISTENT LOW SUSPICION CERVICAL LYMPHADENOPATHY IN PEDIATRIC PATIENTS

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Tweet it! Pesky lymph node won't go away! Do we really need to be following kids with persistent lymphadenopathy when our suspicion for malignancy is low? @michelle_kallis @Cohen_Childrens

Purpose

Cervical lymphadenopathy in children is typically self-limited. However, management of persistent, low suspicion lymphadenopathy remains unclear. We examined outcomes of patients presenting to our institution with cervical lymphadenopathy to assess management and outcomes in this patient subset.

Methods

Retrospective review of children < 17 years undergoing ultrasound for cervical lymphadenopathy from August 2013 to July 2018 (n=301). We compared patients undergoing biopsy on initial presentation (IB)(n=23), delayed biopsy, (DB) (n=14), or no biopsy within study duration(NB)(n=264).

Results

The mean age of patients was 7.6 + 4.4 years and 68% were male. The malignancy rate in the study population was 1 %. All 3 of these patients had concerning initial examinations and were in the IB group. Eighty-eight percent of patients did not undergo biopsy. These patients had low suspicion exams. 79% of NB patients had resolution of adenopathy within 1 month. Remainder of NB patients (n=55) experienced persistent adenopathy > 2 months. Mean follow-up for these patients was 7.4 months (range: 2 -28 months). Clinical exams remained stable, and no patient developed symptoms prompting increased concern for malignancy. However, they underwent an average of 3.6 (SD+0.25) radiographic and/or serologic examinations during follow-up. DB patients had a mean follow-up time of 9.4 months (range: 1 -42 months). DB patients underwent an average of 5.0 (SD+ 0.22) diagnostic examinations. Indications for DB patients to undergo biopsy varied but included persistence of symptoms and presence of additional enlarged nodes; none ultimately were diagnosed with malignancy.

Conclusion

Patients with persistent low suspicion lymphadenopathy are often followed for long durations with numerous studies, increasing cost and anxiety. However, few patients developed clinical changes prompting biopsy, and none ultimately had malignancy. All patients with malignancy had high-suspicion exams and underwent immediate biopsy. Patients without high-risk characteristics can be considered for reduced surveillance.

Poster Display (cont.)

P36

NON-INVASIVE EVALUATION OF VARICES AND MONITORING PORTAL HYPERTENSION USING 2D SHARE WAVE ELASTOGRAPHY IN CHILDREN WITH EXTRAHEPATIC PORTAL VEIN OBSTRUCTION

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Purpose

The purpose of the study was to analyze the reliability of spleen stiffness measurement (SSM) by two-dimensional shear wave elastography (2D-SWE) in the detection of esophageal varices and monitoring of their reduction in children with extrahepatic portal vein obstruction (EHPVO) after surgery.

Methods

39 children (29 with EHPVO, 10 controls) underwent SSM by SWE. 29 children with EHPVO underwent upper gastrointestinal (UGI) endoscopy. Assessment of the presence and severity of esophageal varices (EV) on UGI endoscopy was performed according to Alvarez classification, and gastric varices (GV) by Sarin's classification. We compared data from 4 groups of patients: group A – patients with EHPVO and without large spontaneous portosystemic shunts (n=12), group B – patients with EHPVO and with large spontaneous portosystemic shunts (n=8), group C – patients with EHPVO and after surgical portosystemic shunts (n=9) and group D – normal subjects (n=10).

Results

According to UGI endoscopy in group A all children have high grade of EV and in 71% cases we observed GV. Spleen stiffness in this group was significantly higher (75.3±3.8 kPa, $p<0.001$) compared to other groups. Spleen stiffness significantly decreased after surgical shunting procedures (group C), but remained elevated compared with controls (group D) (28.47±3,1 vs 17.85±1.3 kPa, $p<0.05$).Children in group B in 80% cases had low grade EV and SSM was higher - 36.2±5.16 kPa ($p<0.05$) compared to controls.

Conclusions

SSM by 2D-SWE is optimal screening modality for detecting presence and degree of esophageal and gastric varices in children with EHPVO. As for monitoring portal hypertension SSM seems to be a useful tool to monitor reduction of esophageal varices occurring during surgical therapy.

Poster Display (cont.)

P37

WHO WAS THE FIRST WOMAN PEDIATRIC SURGEON IN THE UNITED STATES?

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Purpose

Historical literature on pediatric surgery has not clearly identified the first woman to practice pediatric surgery. Our purpose was to identify the first fellowship-trained female pediatric surgeon in the United States.

Methods

We conducted an extensive review of the history of pediatric surgeons in North America focusing on female surgeons. In addition to a literature review and interviews with surgeons with historical knowledge, archivists and historians from the American Pediatric Surgical Association, the American Academy of Pediatrics Section on Surgery, the American Board of Surgery and the American College of Surgeons served as resources for this research.

Results

Rowena Spencer, Benjy Brooks, Louise Schnaufer, Jessie Ternberg, Elizabeth Coryllos, Blanca Smith, Kathryn Anderson and Ann Kosloske were the key female pioneers in pediatric surgery. Although each of these women made major contributions to pediatric surgery, Rowena Spencer deserves the designation of first female pediatric surgeon in the United States by being the first of these women to complete fellowship training in 1949.

Conclusions

Based on available information, Rowena Spencer was the first woman trained in pediatric surgery in North America. Although other women may have preceded her in general surgery with a focus on the surgical care of children, Dr. Spencer deserves the designation of first female pediatric surgeon in the United States.

Poster Display (cont.)

P38

SURGERY ACCELERATES METASTASIS THROUGH ALTERATION OF MACROPHAGE FUNCTIONAL PHENOTYPE IN A MOUSE MODEL OF OSTEOSARCOMA

Michelle P. Kallis, MD[1], Caroline W. Maloney, MD, PhD[2], Marc Symons[3], Bettie Steinberg[3], Samuel Soffer, MD[4]

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Tweet it! Surgical Excision and Metastasis: How does surgery alter the metastatic environment to promote metastasis in a model of osteosarcoma? @michelle_kallis @Cohen_Childrens

Purpose

Surgery accelerated metastasis refers to enhancement of metastatic disease following surgical resection. Distant metastasis, not the primary tumor, is the cause of death in most cancer patients. We have previously shown that surgically accelerated metastasis is mitigated through macrophage inhibition in a model of osteosarcoma (OS). We now examine changes in macrophage phenotype in the perioperative period, which may explain this effect.

Methods

Mouse OS cells (K7M2) were implanted into the tibia of BALB/c mice (n=30). One week post-implantation mice were randomized to 3 groups: Tumor bearing controls (n=10), amputation of the primary tumor bearing limb (n=10), and amputation of the contralateral limb (n=10). Lungs were harvested 48 hours after amputation and analyzed by flow cytometry. M1 (anti-tumor) and M2 (pro-tumor) macrophages were identified using cell-surface markers MHCII and CD206, respectively. The immunosuppressive cell-type, myeloid-derived suppressor cells (MDSCs), were identified by dual positivity for CD11b and GR-1. As macrophage function can alter T-cell recruitment, we examined changes in helper T-cell and cytotoxic T-cell populations using CD4 and CD8 cell-surface markers, respectively.

Results

Mice undergoing amputation of the primary tumor bearing limb or amputation of the contralateral limb showed reduction in M1 macrophages and increase in M2 macrophages within the lungs compared to non-operative tumor bearing controls, shifting the M2/M1 ratio toward an M2 phenotype (3.5 and 4.7 respectively vs 1.6; $p<0.01$). Mice undergoing primary tumor or contralateral limb amputation demonstrated an increase in MDSCs (16.7% and 24.9% vs 9.4%; $p<0.01$). There was no change in percentage of CD4+ or CD8+ cells present in the lungs ($p> 0.05$).

Conclusion

Surgical stress alters macrophage phenotype toward a pro-tumor state (M2), and promotes an immunosuppressive environment (MDSC) in the acute perioperative period. These immunological changes may contribute to the increased pulmonary metastases seen following primary tumor removal in this model of OS.

Poster Display (cont.)

P39

ENHANCER OF ZESTE 2 MODULATES THE NOTCH PATHWAY IN NEUROBLASTOMA

Adele P. Williams, MD[1], Raoud Marayati, MD[1], Laura L. Stafman, MD, PhD[1], Jamie M. Aye, MD[1], Jerry E. Stewart, BS, Elizabeth A. Beierle, MD, Colin Quinn

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Purpose

Five-year survival for high risk neuroblastoma remains less than 50%. Investigation of the mechanisms responsible for aggressive disease is necessary to identify novel therapeutic targets and improve survival. EZH2, a component of the Polycomb repressive complex-2, has been shown to regulate the Notch pathway in multiple malignancies. Recently, EZH2 overexpression in neuroblastoma was shown to correlate with decreased survival, and we have shown that EZH2 inhibition decreases viability of neuroblastoma tumor cells in vitro. We hypothesized that the tumorigenic effects of EZH2 in neuroblastoma were due in part to changes in Notch2 expression as well as its resultant downstream effectors.

Methods

MYCN amplified (WAC2) and MCYN non-amplified (SK-N-AS) cell lines were utilized to study the effects of EZH2 silencing with siRNA and pharmacologic inhibition with small molecule GSK343 on Notch2 and its downstream effector, HES1. Western blotting assessed total protein expression of Notch2 and HES1 and qRT-PCR quantified mRNA abundance of both Notch2 and HES1.

Results

Silencing of EZH2 with siRNA led to a mild decrease in Notch2 protein expression with an increase in HES1 protein. EZH2 inhibition with GSK343 resulted in no significant change in total Notch2 protein, but an increase in HES1 protein levels. These findings were supported by qRT-PCR which demonstrated that the abundance of Notch2 mRNA was decreased following silencing of EZH2, while the abundance of HES1 mRNA increased.

Conclusions

Based on these findings, the tumorigenic effects of EZH2 in neuroblastoma may be due in part to its modulation of the Notch downstream effector, HES1. The nominal change in Notch2 mRNA and protein expression suggests that the elevation of HES1 resulted from epigenetic or post-translational changes in Notch2. The mechanisms responsible for these findings are currently being investigated and will help clarify the mechanisms responsible for the maintenance of the malignant neuroblastoma phenotype.

Poster Display (cont.)

P40

NITROFEN-MEDIATED PULMONARY ARTERY ENDOTHELIAL CELLULAR DYSFUNCTION IS ATTENUATED BY MESENCHYMAL STROMAL CELL-DERIVED EXTRACELLULAR VESICLES: IMPLICATIONS FOR CONGENITAL DIAPHRAGMATIC HERNIA

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Purpose

Pathophysiologic pulmonary vaso-reactivity is a hallmark of congenital diaphragmatic hernia (CDH). Previous investigation has shown that mesenchymal stromal cell-derived extracellular vesicles (MSCEv) alter pulmonary vascular contractility. Herein, we characterize the nature of the interaction between MSCEv and human pulmonary artery endothelial cells (HPAEC).

Methods

HPAECs were cultured, either with or without exposure to nitrofen (known to cause CDH), and subsequently, nitrofen-exposed HPAECs were treated with MSCEv or control. HPAEC viability, architecture, production of reactive oxygen species (ROS), endothelial dysfunction-associated protein levels (PPARγ, LOX-2, LOX-1, NF-κB, eNOS, and ET1), and the nature of MSCEv-cellular interaction were assessed.

Results

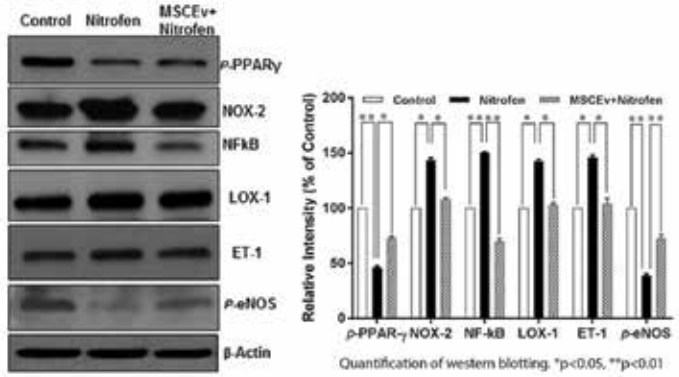
HPAEC viability was inversely proportional and architecture compromise proportional to nitrofen dose (0.05-1.0 mg/ml); 0.1 mg/ml was used for further study. There was a 2.1 fold increase in ROS levels in nitrofen-exposed HPAECs versus control ($p<0.001$) and MSCEv treatment attenuated ROS levels by 1.5 fold versus nitrofen-exposed HPAECs ($p<0.01$). Nitrofen-induced alterations in endothelial dysfunction-associated proteins are shown (Figure) and exposure to MSCEv restored more physiologic expression. MSCEv uptake was greater among nitrofen-exposed HPAEC (80% increase, $p<0.05$). Exposure to a clathrin-mediated endocytosis inhibitor decreased cellular uptake by 46% ($p<0.05$).

Conclusions

HPAEC exposure to nitrofen led to pathophysiologic cellular changes consistent with known vasculopathy in CDH. MSCEv treatment led to a more physiologic cellular response, including expression of critical endothelial dysfunction-associated proteins in this experimental in vitro model of nitrofen-induced CDH. Furthermore, we showed that MSCEv were preferentially taken up by cells treated with nitrofen via clathrin-dependent endocytosis. These data reveal a potential mechanism of cellular interaction and critical signaling pathway alterations that characterize MSCEv-mediated attenuation of pulmonary vascular dysfunction in CDH-associated pulmonary hypertension.

Poster Display (cont.)

Figure



Western blotting of endothelial dysfunction-associated proteins

Quantification of western blotting. *p<0.05, **p<0.01

Poster Display (cont.)

P41

ABERRANT EXPRESSION OF PERIOSTIN IN AN EX VIVO HUMAN LUNG ORGANOID MODEL OF CONGENITAL DIAPHARGMATIC HERNIA

Guihua Jiang[1], Juan Biancotti[1], Kenneth Ho[1], Allen Liu[1], Marc Hershenson[1], **Shaun M. Kunisaki, MD, MSc**[2], Jason Spence, PhD

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Tweet it! Interesting findings from the Kunisaki lab @shaunkunisaki on the role of periostin, a mechanical stress response protein, in a novel disease-in-a-dish model of human CDH lung development.

Purpose

The molecular mechanisms associated with aberrant lung development in congenital diaphragmatic hernia (CDH) are poorly understood. We have previously shown that 3D lung-like structures, known as lung organoids, can be generated from induced pluripotent stem cells (iPSCs) derived from CDH patients. The purpose of this study was to evaluate the expression of periostin (POSTN), a mesenchymal stress response molecule critical for organ remodeling, within lung organoids exposed to mechanical compression forces.

Methods

Following IRB approval, day 20-60 lung organoids were generated from clonal populations of transgene-free iPSCs derived from infants (n=7) with isolated, non-syndromic CDH. To mimic extrinsic compression forces that occur in fetal CDH, organoids were placed in micro-mechanical compression chambers under continuous loading forces (0.0-0.4 kPa, n=7 per group). Micro-tissues were evaluated by immunofluorescence and quantitative gene expression with lung organoids derived from normal infants (n=5) employed as controls. Statistical analyses were performed, as appropriate ($p<0.05$).

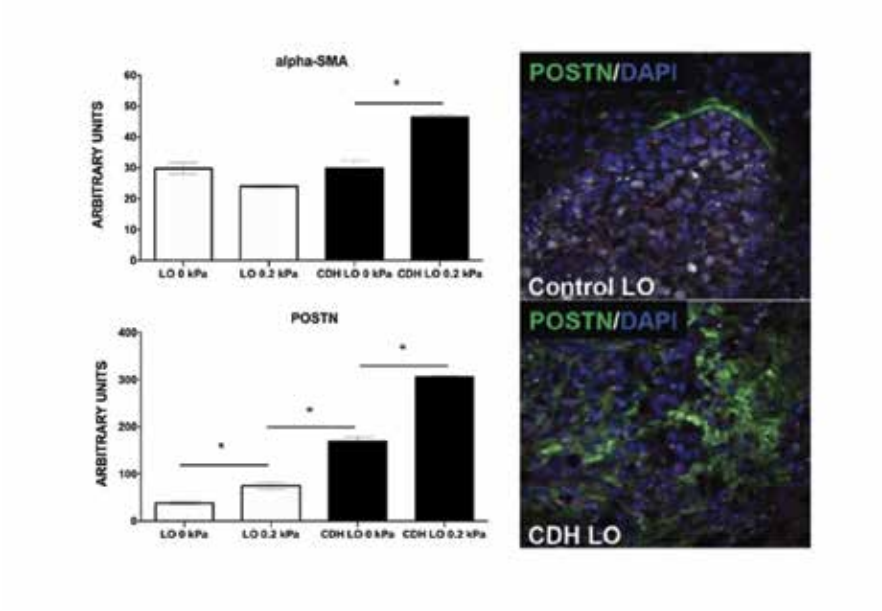
Results

Quantitative alveolar epithelial gene expression, as revealed by surfactant protein, PDPN, and ADP5, was significantly downregulated in all lung organoids under mechanical compression. However, mesenchymal gene expression, as shown by alpha-SMA, vimentin, and desmin, was significantly upregulated among CDH lung organoids (Figure). Confocal microscopy demonstrated co-localization of POSTN and a-SMA in all lung organoids. Immunofluorescent staining showed increased POSTN expression in the CDH mesenchyme relative to that in normal controls. These data were further supported by upregulation of POSTN gene expression in CDH compared to controls (305.5+/-4.4 vs. 74.8+/-13.0, respectively; p=0.0016) under the same compression stimulus (Figure).

Conclusions

Collectively, these data suggest both primary and secondary developmental abnormalities within the CDH lung mesenchyme associated with aberrant POSTN expression. Further work using this ex vivo compression system may serve as a novel platform to better understand the role of mechanical stress on altered matricellular dynamics during CDH lung development.

Poster Display (cont.)



Poster Display (cont.)

P42

PRETERM NEONATES HAVE PERSISTENT NEUTROPHIL VELOCITY AND TRANSCRIPTOMIC CHANGES THAT FAIL TO RESOLVE AS THEY REACH TERM CORRECTED GESTATIONAL AGE

Russell B. Hawkins, MD[1], Steven L. Raymond[1], Ricardo Ungaro[2], Maria-Cecilia Lopez[2], Lyle L. Moldawer[1], James L. Wynn[1], Shawn D. Larson, MD[1]

[1]University of Florida College of Medicine, Gainesville, FL, USA, [2]University of Florida, Gainesville, FL, USA

Tweet it! Human preterm neonates have diminished neutrophil velocity and marked transcriptomic changes at birth, and these changes fail to resolve as the patient reaches full-term corrected gestational age

Purpose

Preterm neonates have reduced host protective immunity, in part due to functional and quantitative deficiencies in neutrophil function. Here we sequentially evaluated PMN function and transcriptomics in very low birth weight neonates at birth and until they reached corrected gestational age.

Methods

Following IRB approval, serial low-volume blood samples (<300 µL) were collected from human preterm and full-term neonates. For preterm neonates < 32 weeks, blood was drawn on day four of life, then every three days for the first three weeks of life, then weekly thereafter until hospital discharge. Microfluidic devices (Raymond et al, PLoS One, 2016) were loaded with Hoechst-stained whole blood and spontaneous neutrophil migration was recorded for ten hours with a time-lapse fluorescent microscope. CD66b+ PMNs were also collected to perform GeneChip™ transcriptomic analysis.

Results

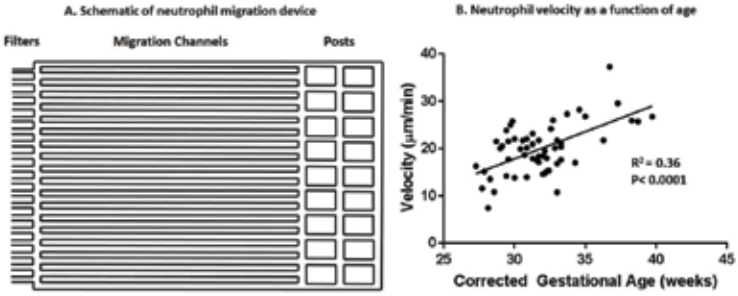
Fifty-seven preterm whole blood samples were analyzed from ten preterm neonates enrolled at an average gestational age of 29.5 weeks and were compared to nine full-term infants. PMN velocity was significantly lower in preterm vs full-term infants ($p<0.05$). Linear regression revealed a significant, positive correlation between corrected gestational age and neutrophil velocity (Figure 1B; $R2 = 0.36$, $p<0.0001$). Compared to full-term neonates, preterm neonates had 629 significantly different genes (FDR<0.001). Although PMN gene expression evolved over time in preterm neonates, genome-wide expression patterns at corrected full-term gestational age remained significantly different from full-term infants.

Conclusions

To date, no study has performed serial assessment of neutrophil function or transcriptomics over time in human preterm neonates. Preterm neonates have reduced spontaneously migrating neutrophil velocity which improves as the patient matures. However, PMN transcriptomic changes in preterm neonates remain persistently altered compared to full-term infants. Reduced neutrophil function and altered transcriptomics at early gestational ages may partially explain increased susceptibility to sepsis at these time points.

Poster Display (cont.)

Figure 1



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P43

EXAMINATION OF THE ROLE OF MYOCARDIN-RELATED TRANSCRIPTION FACTORS IN INTESTINAL ANASTOMOTIC HEALING

Paul McGaha, MD, Cullen McCarthy, Noah Rozich, James Griffith, Jeremy Johnson, William Berry

University of Oklahoma Health Science Center, Oklahoma City, OK, USA

Tweet it! @McGahaMD REGULATION OF MYOCARDIN RELATED TRANSCRIPTION FACTORS PLAY A SIGNIFICANT ROLE IN INTESTINAL ANSTOMOSIS HEALING- MRTF regulation may be key in anastomitic healing or breakdown. Investigation of the role of MRTFs has potential for therapy in anastomotic healing.

Purpose

Failure of intestinal anastomosis presents a significant problem in the pediatric population, yet the cellular mechanisms involved in anastomotic healing are not fully understood. A poorly healed intestinal anastomosis may result in leakage of bowel content which could ultimately lead to death due to sepsis. We have previously shown that myocardin-related transcription factors (MRTF-A and MRTF-B) play a significant role in myofibroblast function in cutaneous wound healing. We hypothesize that altered MRTF-A and MRTF-B activity may negatively impact myofibroblast function during anastomotic healing and that their increased expression may promote normal function in a setting where risk of a failed anastomosis is high.

Methods

An intestinal anastomosis was created in a C57BL/6 mouse and the tissue at the anastomotic junction was collected 7 days following repair. Trichrome stain was used to visualize collagen and immunostaining with smooth muscle alpha actin (SMαA) to detect myofibroblasts. Human intestinal myofibroblasts depleted of both MRTF-A and MRTF-B were photographed and subjected to western blot analyses. Conversely, western blot analyses were performed on cells that ectopically expressed MRTF-A and MRTF-B. Pro-contractile gene expression (SMαA,SM22α) was analyzed in all western blot analyses.

Results

SMαA positive myofibroblasts are enriched at the sight of the properly healed intestinal anastomosis. Depletion of MRTF-A and MRTF-B in human intestinal fibroblasts leads to a collapse of the cytoskeleton and down-regulation of myofibroblast pro-contractile genes SMαA and SM22α. Lastly, ectopic expression in human intestinal myofibroblasts results in the induction of myofibroblast pro-contractile gene expression.

Conclusion

Various conditions, such as immunosuppression, have been shown to affect intestinal anastomotic healing. MRTF-A and MRTF-B are critical to intestinal myofibroblast function, therefore therapeutic agents that increase MRTF-A and MRTF-B activity would likely be successful in increasing anastomotic strength and thereby decreasing morbidity, mortality, and healthcare expenditure following intestinal operations

Poster Display (cont.)

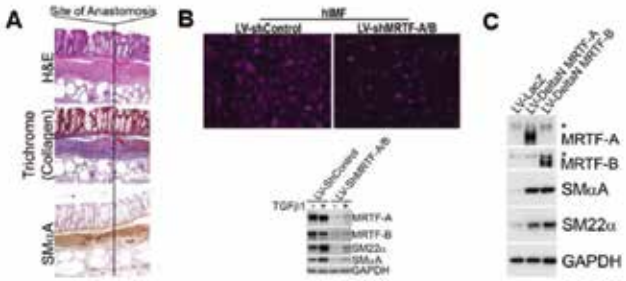

Figure 1. Role of MRTF-A and MRTF-B in intestinal myofibroblasts. A) SMαA positive myofibroblasts are enriched at anastomotic junctions. B) Depletion of MRTF-A and MRTF-B in human intestinal myofibroblasts results in the breakdown of the cytoskeleton and reduction in the expression of pro-contractile genes. C) Ectopic expression of MRTF-A and MRTF-B can upregulate the expression of pro-contractile genes in intestinal myofibroblasts.

Poster Display (cont.)

P44

INCREASED CHOLANGIOCYTE DIFFERENTIATION OF PROMININ-1 HEPATIC PROGENITOR CELLS IN EXPERIMENTAL BILIARY ATRESIA

Elaa Mahdi, MD, MPH, Michael Fenlon, Jiabo Xu, Alison Glazier, Calvin Lee, Nicolas Malkoff, Kasper Wang, MD

Children's Hospital Los Angeles, Los Angeles, CA, USA

Tweet it! INCREASED CHOLANGIOCYTE DIFFERENTIATION OF PROMININ-1 HEPATIC PROGENITOR CELLS IN EXPERIMENTAL BILIARY ATRESIA

Purpose

Despite surgical drainage, most infants with Biliary Atresia (BA) progress toward liver cirrhosis. We previously demonstrated that baseline generative capacity of Prominin-1 (Prom1)-expressing hepatic progenitor cells (HPC), which is 60-fold higher in newborn mice compared to adults, is predominantly toward hepatocyte, not cholangiocyte, differentiation. Following cholestatic liver injury in adults, Prom1-expressing HPC give rise to biliary ductular reactions, which promote liver fibrosis. We previously described the expansion of PROM1positive (pos) HPC in BA. Therefore, we hypothesized that experimental BA drives Prom1 HPC differentiation toward cholangiocytes.

Methods

To study the Prom1 HPC differentiation, lineage tracing was performed in both neonatal and adult Prom1cre-ert2/+Rosa26lsl-GFP/+ mice. To induce experimental BA, intraperitoneal (IP) Rhesus rotavirus (RRV) was injected on postnatal day (P) 0 (vs saline control). On P2, tamoxifen (TAM) was injected IP to induce green fluorescent protein (GFP) labeling of Prom1 HPCs and their progeny. Livers were collected at P7. For adult mice (6-8 weeks), Prom1 HPCs were labeled with TAM injection. Cholestatic liver injury was induced with bile duct ligation (BDL) 7 days later (vs sham laparotomy), and livers collected 14 days thereafter. Immunofluorescence was performed, costaining for cholangiocyte marker CK19 or myofibroblastic marker aSMA. ImageJ was used for imaging analysis. Unpaired t-test with significance level $p<0.05$ was performed.

Results

Following RRV injury, the P7 pups exhibited increased GFP/CK19 cholangiocyte marker co-positivity, indicative of cholangiocyte differentiation within biliary ductular reactions, compared to sham (35.3±4.6% vs 9.8±3.4%, mean±S.D, $p=0.002$, $n=6$); this was comparable to the increase in co-positivity seen in adult mice 14 days following BDL (48±6.2%, $p=0.046$, $n=6$). GFP/aSMA, indicative of myofibroblastic differentiation, was rarely observed in both pups and adults following injury.

Conclusions

Neonatal Prom1 HPCs exhibit increased cholangiocyte differentiation following RRV-induced cholestatic injury, mimicking adult cholestatic liver injury with little myofibroblastic differentiation. Biliary differentiation may contribute to BA-associated fibrosis.

Poster Display (cont.)

P45

INTESTINAL RE-ENDOTHELIALISATION: MESOANGIOBLAST PROMOTES REGENERATION OF A STABLE AND ORGANISED VASCULATURE IN A WHOLE TISSUE ENGINEERED ORGAN

Paolo De Coppi, Professor [1], Alessandro F. Pellegata[1], Federico Scottoni[1], Susanna Eli[1], Simone Russo[1], Dipa Natarajan[2], Carlotta Camilli[1], Aslan Gjinovci[1], Simon Eaton, PhD[3], Giulio Cossu[2], Paolo De Coppi[4]

[1]UCL Great Ormond Street Institute of Child Health, London, England, United Kingdom, [2]University of Manchester, Division of Cell Matrix Biology & Regenerative Medicine, London, England, United Kingdom, [3]Department of Paediatric Surgery, UCL-Great Ormond Street Institute of Child Health, London, England, United Kingdom, [4]Specialist Neonatal and Paediatric Surgery, Great Ormond Street Hospital for Children, London, England, United Kingdom

Purpose

The lack of a functional vascular tree is the main hurdle that separates whole-organ tissue engineering (WOTE) from the clinical translation. Nutrition and delivery of oxygen in avascular tissue is limited to a few hundred micrometres by gas diffusion and it is not sufficient to generate tissues of relevant dimensions, which is the crucial aim of WOTE. Endothelial cells alone cannot form a functional and stable vasculature over time, while previous studies suggested that pericytes may improve vessels durability. This study aims at understanding the mechanisms by which endothelial cells and pericyte cross-talk to develop a mature vasculature in a decellularised scaffold to engineer a whole organ.

Methods

Human umbilical vein endothelial cells (HUVECs) and paediatric Mesoangioblasts (MAB), which constitute a subset of pericytes, were co-cultured to unveil the mechanisms behind their crosstalk. Cells were also co-seeded within the vasculature of an acellular rat intestine using a customised bioreactor to describe the mechanism of revascularization within a tissue specific extracellular matrix (Fig.1a). In-vivo heterotopic model was set up to assess anastomosis and durability of the engineered vasculature (Fig.1a).

Results

HUVECs supported by MABs can give rise to an organised, perfused and long-lasting vasculature both in-vitro and in-vivo (Fig. 1a-b). MABs which were co-seeded with HUVECs into the vasculature of the acellular intestinal scaffold are able to locate in a perivascular position around the vessel, improving HUVECs' re-endothelialisation. Vice versa, HUVECs help the differentiation of Mesoangioblasts towards smooth muscle, known to be essential for a functional and mature endothelium. Finally, the newly formed vasculature was able to better anastomose in-vivo with the host vasculature when both cells types were present, with the presence of patent and perfused vessels.

Conclusion

MAB allow the formation of organised vessels by HUVEC in a decellularised intestine. Functional vasculature may help delivering WOTE.

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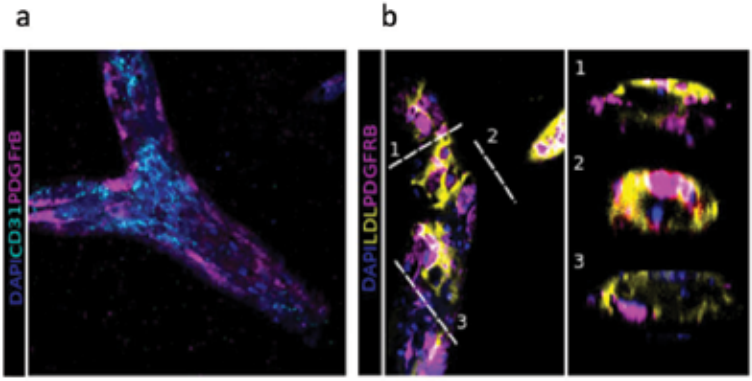

Fig. 1. a. Mesoangioblasts surround re-endothelialised vessels. b. engineered vessels are patent as LDL perfusion

Poster Display (cont.)

P46

EFFECT OF PLASMA TREATMENT ON CELLULAR MIGRATION ON A POLYURETHANE SYNTHETIC SCAFFOLD

Ishna Sharma, MD[1], Alex Blanchette[2], Heather Wanczyk[2], William Fodor[3], Todd Jensen[2], Eyone Jones[1]

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Tweet it! Esophageal atresia affects 1/4,000-5,000 live births per year, and 7% are long gap. Our studies have focused on use of a polyurethane scaffold with extra luminal plasma treatment to bridge the gap. We sought to determine whether plasma treatment influenced regeneration.

Purpose

Esophageal atresia affects 1/4,000-5,000 live births per year, and 7% are long gap. Our studies have focused on use of a polyurethane scaffold with extraluminal plasma treatment to bridge the gap. Plasma treatment is a method used to increase wettability and cell adhesion. Our prior large animal studies that use scaffolds have extraluminal cell growth and extrude intraluminally by 3 weeks. We sought to determine whether extraluminal or intraluminal plasma treatment differentially influenced cell migration and regeneration.

Methods

Wild type Sprague-Dawley rats, divided into 2 groups (n=29 per group), underwent cervical esophagus patch scaffold implantation, and harvest at postoperative day 7. The patch in group 1 was extraluminally plasma treated with a chemical vapor deposition process, creating a hydrophilic polyurethane mesh on the outer surface. The patch in group 2 was intraluminally plasma treated creating a hydrophilic inner surface. Native biopsy tissue served as the control. Harvested esophageal specimens were stained with H&E and trichrome, and analyzed by PCR. Student's T test and ANOVA were used for PCR data. SPSS 16.0 software was used for statistics.

Results

All animals survived and tolerated liquid diet. In group 1, all scaffold patches had extruded intraluminally. In group 2, 10 patches (34.5%) extruded intraluminally and 19 patches (65.5%) extruded extraluminally, with $p<1e-7$ compared to group 1. Histology showed muscle layer regeneration with incomplete epithelial growth in group 1, and only muscle regeneration in group 2. PCR showed elevated VEGFa expression suggesting similar angiogenic activity for both groups.

Conclusion

We conclude that differential plasma treatment of a synthetic scaffold can significantly affect the type of cellular adhesion and migration and influences the stage of esophageal regeneration. In addition, muscular ingrowth appears to occur first on our polyurethane scaffold. Further studies are required to examine longer time course of regeneration and circumferential implants.

Poster Display (cont.)

P47

ROCK1 INHIBITOR IS PROTECTIVE AGAINST ADHERENS JUNCTION DISRUPTION IN NECROTIZING ENTEROCOLITIS

Christie Buonpane[1], Guillermo Ares[2], Carrie Yuan[3], Doug Wood[3], Catherine Hunter, MD[4]

[1]Northwestern University/Lurie Children's Hospital, Chicago, IL, USA, [2]University of Illinois at Chicago, Chicago, IL, USA, [3]Northwestern University, Chicago, IL, USA, [4]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA

Purpose

Necrotizing enterocolitis (NEC) is a devastating neonatal disease that is associated with intestinal barrier dysfunction. E-cadherin is an adherens junction and is integral in maintaining intestinal barrier integrity. Protein kinase ROCK1 causes E-cadherin dissociation and loss of cell-cell adhesion. We hypothesize that E-cadherin is decreased in NEC and that inhibition of ROCK1 will protect against adherens junction disruption.

Methods

Human intestinal samples were obtained from pediatric patients undergoing bowel resection with and without NEC. Findings were compared with two experimental models of NEC. 1) in vivo rat pup model: clean formula (control); hypoxia + bacteria-containing formula (NEC); NEC + ROCK inhibitor (RI). Rat intestines collected on day 4 were scored for degree of injury. 2) in vitro Caco-2 cells: clean media (control); LPS + TNFαin media (NEC). Changes in mRNA, protein and localization were analyzed by RT-PCR, western blot and immunofluorescence were analyzed.

Results

Patients with NEC had significantly lower E-cadherin levels than controls (RNA: $p=0.02$; Protein: $p<0.0001$). Similar findings were found in rats with decreased E-cadherin protein in NEC ($p=0.03$). Additionally, E-cadherin gene expression was decreased in NEC at Day 1,3,7,10 in Caco-2 cells ($p<0.04$). Immunofluorescent staining showed a decreased expression of E-cadherin in humans, rats and Caco-2 cells with NEC. Sub-cellular fractionation revealed high levels of CTF3 fragments (C-terminus of E-cadherin, signifying dissociation) in experimental NEC versus controls. RI treated rats had lower injury scores ($p=0.02$). Experimental Caco-2 cells and rats treated with RI showed preservation of normal E-cadherin staining without loss of epithelial architecture. Additionally, apoptag detection of cell death was significantly increased in experimental NEC rats; however, treatment with RI showed similarly low levels of apoptosis as in the control group.

Conclusion

E-cadherin is decreased in NEC. Inhibition of ROCK1 is protective in experimental NEC, causing decreased apoptosis and preservation of E-cadherin.

Poster Display (cont.)

P48

CITRULLINE EFFECTIVELY REDUCES THE RATE AND SEVERITY OF NECROTIZING ENTEROCOLITIS COMPARED TO SODIUM HYDROSULFIDE IN THE PREMATURE PIGLET MODEL

Candace C. Style, MD, MS [1], Mariatu Verla[2], Barbara Stoll[3], Patricio Lau[3], Ling Yu[3], Aleena Karadeya[3], Sai Konda[3], Douglas Burrin[3], Oluyinka Olutoye, MD[2]

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Introduction
Recent studies suggest that nitric oxide (NO) and hydrogen sulfide (H2S) precursors improve bowel ischemia, protect intestinal cells from oxidative stress and may be potential treatments for necrotizing enterocolitis (NEC). We hypothesized that early treatment of premature piglets with citrulline will result in a greater reduction of the incidence of NEC compared to sodium hydrosulfide (NaHS).

Methods
Premature piglets were delivered by caesarian section and received parenteral nutrition (PN) for 96 h. Enteral feeds (EF) every 3h were initiated after 48h. After the initial 12h, piglets were randomized to receive 1 of 3 treatments - control (alanine, 150 μmol/kg/h), NO precursor Citrulline (150 μmol/kg/h), or endogenous gasotransmitter NaHS 2 mg/kg, once daily infused over 3h. Clinical parameters and abdominal near infrared spectroscopy (A-NIRS) were monitored continuously. Presence of NEC was validated using a histologic score and anatomical NEC severity score.

Results
Fifty-one piglets were randomized to control (18), citrulline (19) and NaHS (11) groups. Overall incidence of NEC was 32%. There was no statistical significant difference in A-NIRS within the first hour of birth amongst groups ($p=0.378$). Citrulline resulted in a significantly lower NEC rate (10%) compared to controls (39%). Surprisingly, NaHS treatment resulted in a marked increase in NEC rate (64%, $p<0.05$. Figure 1). A-NIRS declined with NaHS treatment group after initiation of feeds, but remained significantly elevated in the citrulline group ($p<0.05$). There was no significant difference in heart rate or oxygen saturation amongst the three groups.

Conclusion
In the premature piglet model, continuous citrulline supplementation decreased the incidence of NEC but NEC rates were increased in those that received NaHS. A dose response of treatment precursors would be helpful to define a suitable therapeutic range.

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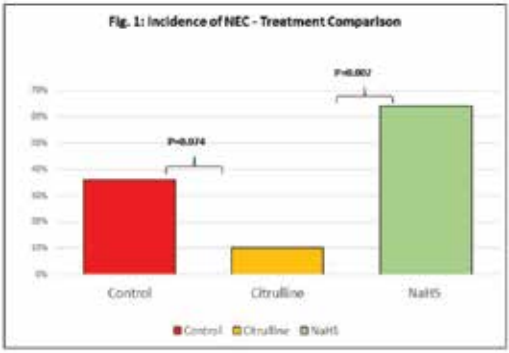


Poster Display (cont.)

P49

CNP-MIR146A DECREASES DISEASE ACTIVITY INDEX IN A MURINE DSS COLITIS MODEL

Lindel C. Dewberry, MD[1], Carlos Zgheib[1], Sarah A. Hilton, MD, MSHS[1], Sudipta Seal[2], Gulsu Sener[3], Melissa Krebs[3], Junyi Hu[1], Junwang Xu[1], Kenneth W. Liechty, MD[4]

[1]University of Colorado, Aurora, CO, USA, [2]University of Central Florida, Aurora, CO, USA, [3]School of Mines, Golden, CO, USA, [4]University of Colorado School of Medicine; Colorado Fetal Care Center, Children's Hospital Colorado, Aurora, CO, USA

Background

Inflammatory bowel disease, specifically ulcerative colitis, is characterized by inflammation, oxidative stress, and a disrupted mucosal barrier. Our lab has previously shown that miR146a downregulates inflammation, and that conjugation with cerium oxide nanoparticles (CNP) as a delivery vehicle further reduces oxidative stress. This therapeutic has been effective in treating diseases where oxidative stress and inflammation are pathogenic including diabetic wound healing, heart failure, and acute lung injury. We hypothesize that this novel strategy targeting oxidative stress and inflammation could be used in a colitis model where inflammation and oxidative stress play a central role.

Methods

To test this hypothesis, we first developed a colitis model using 3% DSS to induce colitis in 8-week-old, male C57/BL6 wild type mice for 5 days. Then, we developed a therapeutic delivery model where mice were treated per rectum with PBS as control, or 10ng CNP-miR146a in a liquid, viscous 11% silk fibroin, or zitterionic gel. Once delivery of CNP-miR146a was optimized, mice (n=5) were treated with 20ng of CNP-miR146a zwitterionic gel for 4 days starting day 5 of DSS administration, and euthanized at day 10. They were compared to those treated with a control gel and those receiving no treatment. Disease activity index (DAI) was measured daily and score was calculated based on weight loss, stool consistency, and blood within the stool.

Results

Gene expression demonstrated the highest levels of miR146a using the zwitterionic gel as a delivery vehicle (Figure 1a). Treatment with CNP-miR146a zwitterionic gel resulted in a significantly lower DAI at day 7 (day 3 of treatment, $p<0.001$) (Figure 1b).

Conclusion

In a murine DSS colitis model, zwitterionic gel represents the optimal local drug delivery vehicle. Furthermore, CNP-miR146a zwitterionic gel decreases DAI, suggesting its potential as a novel therapy for acute colitis. Further studies are needed to examine mechanism of action.

Poster Display (cont.)

Figure 1A: Gene expression of miR146a using various CNP-miR146a delivery vehicles

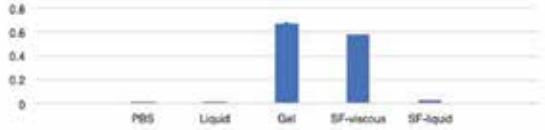
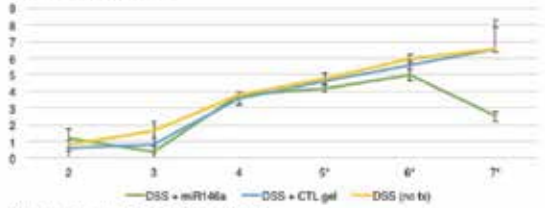


Figure 1B: Disease Activity Index (DAI) over time between DSS mice treated with CNP-miR146a gel, control gel, and no treatment



*denotes days of treatment with CNP-miR146a zwitterionic gel

Poster Display (cont.)

P50

WEIGHT LOSS AFTER SLEEVE GASTRECTOMY IN MICE INVOLVES A LEPTIN-DEPENDENT BUT FXR-INDEPENDENT MECHANISM

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Introduction

Obesity affects 18.5% of children and adolescents in the United States. Many comorbidities are associated with obesity, such as diabetes and steatohepatitis. Sleeve gastrectomy (SGx) leads to weight-independent improvements in various comorbidities, but via unclear mechanisms. Leptin is an appetite-suppressing hormone secreted by adipose tissue. Farnesoid X receptor (FXR) is a nuclear hormone receptor involved in the regulation of lipid and glucose metabolism. We therefore hypothesized that weight-loss and improvements after SGx may be secondary to an FXR-dependent pathway involving decreased leptin resistance.

Methods

Wild type (WT, C57BL/6J) and FXR whole-body knock out (KO) mice were fed either a high fat (HFD) or isocaloric control diet (CD) for 3 months prior to undergoing either a SGx or a sham operation. Postoperative weights were recorded weekly. Mice were euthanized at 1, 2, and 3 months after surgery. Leptin levels were analyzed using a magnetic bead assay. Mann-Whitney U test was used to determine significance ($p < 0.05$).

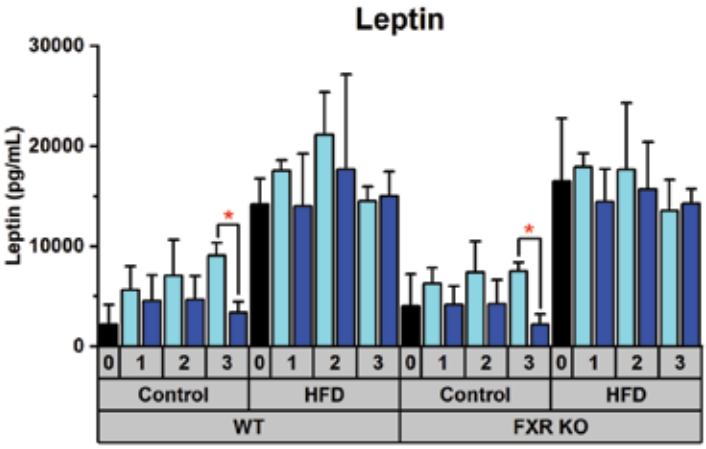
Results

SGx-CD mice sustained a lower percent weight gain at 3 months postoperatively compared to sham-CD mice (1 versus 23, WT and 4 versus 12, FXR) than SGx-HFD mice compared to sham-HFD mice (33 versus 57, WT and 11 versus 22, FXR). SGx-CD mice had decreased leptin levels compared to sham-CD mice at all postoperative time points. Leptin levels were statistically significant in this cohort at postoperative month 3. SGx-HFD mice had decreased leptin levels compared to sham-HFD mice only at postoperative months 1 and 2. These trends were consistent between both WT and FXR KO mice.

Conclusion

Decreased leptin resistance is crucial for sustained weight loss, but FXR does not play a significant role in the improvement of leptin resistance. A sustained HFD after SGx can eliminate decreased leptin resistance acquired after SGx.

Poster Display (cont.)



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