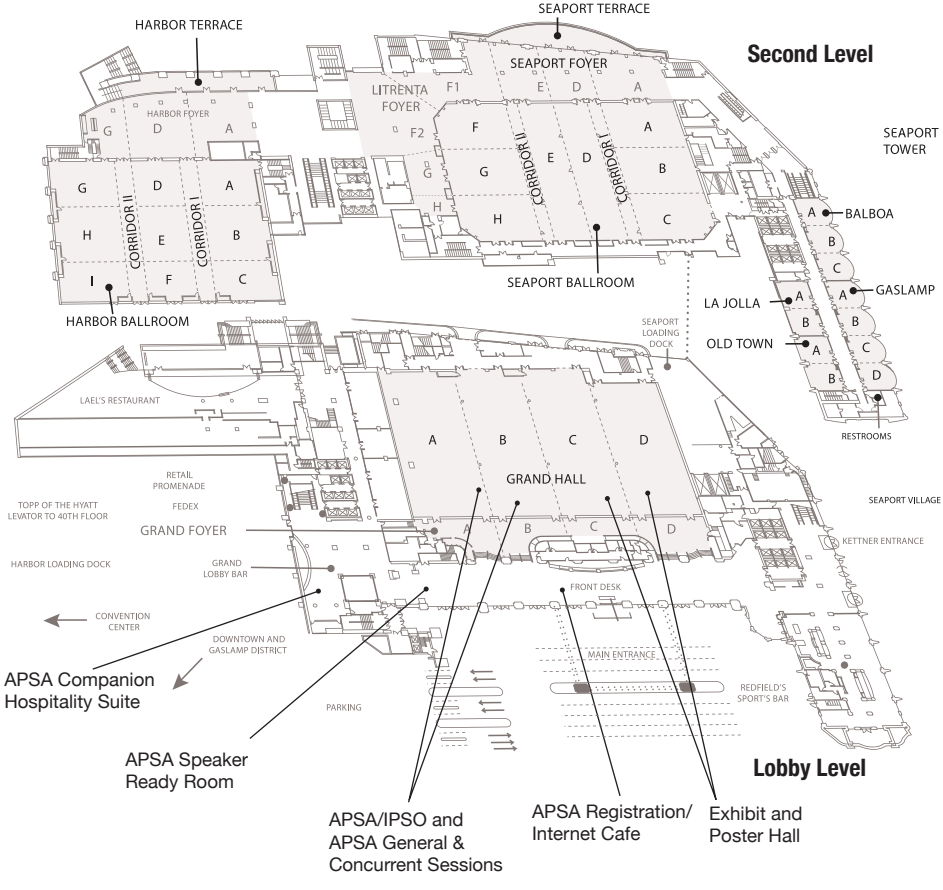
APSA 2016 ANNUAL MEETING MAY 15-17, 2016
APSA-IPSO SYMPOSIUM MAY 14-15, 2016

MANCHESTER GRAND
HYATT SAN DIEGO
SAN DIEGO, CA USA

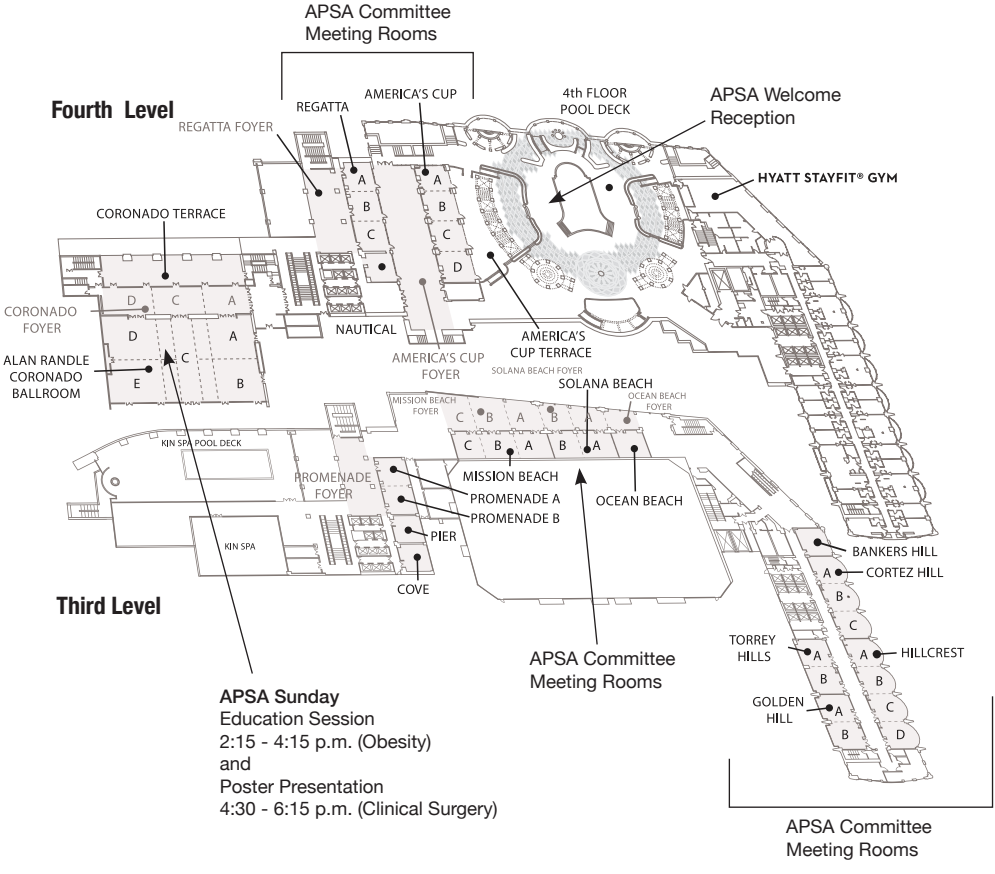
FINAL PROGRAM

eapsa.org
ipsosurgeons.org

Manchester Grand Hyatt Floorplan



Manchester Grand Hyatt Floorplan



APSA Sunday
Education Session
2:15 - 4:15 p.m. (Obesity)
and
Poster Presentation
4:30 - 6:15 p.m. (Clinical Surgery)

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

American Pediatric Surgical Association
Administrative Offices
One Parkview Plaza, Suite 800
Oakbrook Terrace, IL USA • Telephone: +1-847-686-2237
Fax: +1-847-686-2253
E-mail: eapsa@eapsa.org www.eapsa.org

Lee Ann Clark
Executive Director
lclark@eapsa.org

Marina Petrulla
Administrative Director
mpetrulla@eapsa.org

Annie Cox
Administrator
acox@eapsa.org

Liz Freyn
Conference Director
lfreyn@eapsa.org

Christopher Viglione
Conference Registration and
Exhibits Manager
cviglione@eapsa.org

Meagan Comerford
Marketing Communications Manager
mcomerford@eapsa.org

Kismet Saglam
Education Director
ksaglam@eapsa.org

Nikita Brown
Accountant
nbrown@kellencompany.com

Rita Wallace
Order Processing Specialist
rwallace@kellencompany.com

Go to the APSA website at www.eapsa.org and:

- Join the discussions on the All-Member Group
- Update your profile
- Connect with APSA colleagues

Table of Contents

Governance

Board of Governors 2015 – 2016

Mary E. Fallat
President
2015-2016
+1-502-629-8638
mefall01@louisville.edu

Daniel von Allmen
Treasurer
2014-2017
+1-513-636-7365
daniel.vonallmen@
cchmc.org

Diana L. Farmer
President-Elect
2015-2016
+1-916-734-3190
diana.farmer@ucdmc.
ucdavis.edu

Rebecka L. Meyers
Governor
2015-2018
+1-801- 662-2950
rebecka.meyers@
imail.org

Michael D. Klein
Immediate Past President
2014-2015
+1-313-745-5840
mdkleinmd1@me.com

Marleta Reynolds
Governor
2013-2016
+1-312-227-4334
mreynolds@
luriechildrens.org

John H.T. Waldhausen
Secretary
2015-2018
+1-206-987-1177
john.waldhausen@
seattlechildrens.org

David J. Schmeling
Governor
2014-2017
+1-612-285-7642
DJS1211@gmail.com

APSA Congratulates Incoming Board Members

Henri R. Ford
President-Elect
2016-2017
+1-323-361-2104
hford@chla.usc.edu

Gail E. Besner
Governor
2016-2019
+1-614-722-3900
gail.besner@
nationwidechildrens.org

Past Presidents

Robert E. Gross
1970-1971

Thomas M. Holder
1975-1976

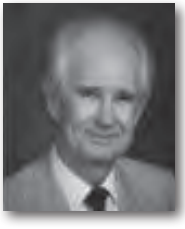
C. Everett Koop
1971-1972

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

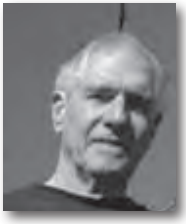
Judson G. Randolph
1984-1985

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

Robert C. Shamberger
2011-2012

Keith T. Oldham
2012-2013

Thomas M. Krummel
2013-2014

Michael D. Klein
2014-2015

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

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

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
Alfred A. deLorimier 1983–1986

Past Officers (cont.)

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

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.

Alliance for Childhood Cancer (ACC)
Anthony D. Sandler

American Academy of Orthopaedic Surgeons (AAOS)
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 (AAP)
SoSu Smart Tots Operations
Brian Kenney

American Board of Surgery (ABS)
Marjorie J. Arca

Pediatric Surgery Board (PSB)
John H.T. Waldhausen

American College of Radiology (ACR)
Appropriateness Criteria Panel
Richard A. Falcone

American College of Surgeons (ACS)
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 (CoC)
Kenneth W. Gow

American Medical Association RUC (Relative Value Update Committee)
Samuel D. Smith

National Institute of Child Health and Human Development
National Advisory Committee
Charles S. Cox, Jr.

Trauma Center Association of America (TCAA)
Pediatric Committee
Michael L. Nance

APSA Committees 2015–2016

Annual Meeting Planning Ad Hoc
Marjorie J. Arca
Daniel J. Ostlie
Daniel von Allmen

Audit
Peter W. Dillon, *Chair*, 2015-2017
pdillon1@hmc.psu.edu
Michael J. Allshouse, *Vice Chair*, 2015-2017
John J. Aiken, 2013-2016
Gail E. Besner, 2013-2016
Brendan T. Campbell, 2015-2018
Steven C. Raynor, 2013-2016
Edward P. Tagge, 2015-2018
Charles J. Stolar, *Ex Officio*

Bylaws
Diana L. Farmer, *Chair*, 2015-2016
diana.farmer@ucdmc.ucdavis.edu
Kenneth S. Azarow, 2013-2016
Mike K. Chen, 2013-2016
Christopher P. Coppola, 2015-2018
Roshni A. Dasgupta, 2013-2016
Romeo C. Ignacio, 2014-2017
Jacob C. Langer, 2013-2016
Grace Mak, 2014-2017
Daniel J. Ostlie, 2014-2017
Jacqueline M. Saito, 2014-2017
David T. Schindel, 2015-2018
Sandra S. Tomita, 2015-2018

Cancer
Max R. Langham, Jr., *Chair*, 2015-2017
mlangham@uthsc.edu
Roshni A. Dasgupta, *Vice Chair*, 2015-2017
Bill Chiu, 2014-2017
John M. Draus, 2014-2017
Ankush Gosain, 2013-2016
Todd E. Heaton, 2015-2018
Angela V. Kadenhe-Chiweshe, 2013-2016
Jaimie D. Nathan, 2015-2018
Erika Newman, 2014-2017
Mary Beth Madonna, 2015-2018
Joseph T. Murphy, 2015-2018
Sanjeev A. Vasudevan, 2014-2017
Andrea A. Hayes-Jordan, *Ex Officio*
Rebecka L. Meyers, *Ex Officio*

Childhood Obesity
Jeffrey L. Zitsman, *Chair*, 2014-2016
jlz2@cumc.columbia.edu
Mark J. Holterman, *Vice Chair*, 2014-2016
Patrick C. Bonasso, 2015-2018
Allen F. Browne, 2014-2017
Mattias Bruzoni, 2013-2016
Mike K. Chen, 2015-2018
Joy Collins, 2014-2017
Daniel DeUgarte, 2011-2017
Mohammad Emran, 2014-2017
Bradley C. Linden, 2011-2017
Marc P. Michalsky, 2010-2016
Holly L. Neville, 2014-2017
Ann O'Connor, 2014-2017
Samir R. Pandya, 2014-2017
Faisal G. Qureshi, 2013-2016
Elizabeth J. Renaud, 2014-2017
Kirk W. Reichard, 2015-2018
Mark L. Wulkan, 2015-2018

Education
Marjorie J. Arca, *Chair*, 2015-2017
MArca@chw.org
Steven L. Lee, *Vice Chair*, 2015-2017
Joanne E. Baerg, 2012-2016
Katherine A. Barsness, 2014-2017
Elizabeth A. Beierle, 2013-2019
Kathryn Q. Bernabe, 2015-2018
Guy F. Brisseau, 2013-2016
Casey M. Calkins, 2015-2018
Cynthia D. Downard, 2015-2018
Colleen M. Fitzpatrick, 2014 -2017
Kenneth W. Gow, 2011-2017
John D. Horton, 2015-2018
Eunice Huang, 2015-2018
Romeo C. Ignacio, Jr., 2013-2016
Rodrigo B. Interiano, 2014-2017
Joseph A. Iocono, 2008-2017
Brian Kenney, 2014-2017
Patricia Lange, 2013-2016
Charles M. Leys, 2015-2018
Andreas H. Meier, 2011-2017
Biren P. Modi, 2014-2017
Hannah G. Piper, 2015-2018
David M. Powell, 2014-2017
Wolfgang Stehr, 2014-2017
Jill S. Whitehouse, 2015-2018
Jill M. Zalieckas, 2015-2018
Kurt F. Heiss, *Ex Officio*

APSA Committees 2015–2016 (cont.)

CME Subcommittee
David M. Powell, *Chair,* 2010-2017
dmpowellmd@gmail.com

Patient/Family Subcommittee
Patricia Lange, *Co-chair*, 2013-2016
plange@mcvh-vcu.edu
Joanne E. Baerg, *Co-chair,* 2012-2016
jbaerg@llu.edu
Romeo C. Ignacio, Jr., *Co-chair,* 2015-2016
rcignacio@yahoo.com
Hannah G. Piper, 2015-2018

PSSAP Subcommittee
David M. Powell, *Chair,* 2014-2017
dmpowellmd@gmail.com
Marjorie J. Arca, 2012-2017
Robert A. Cusick, 2015-2021
Carroll M. Harmon, 2010-2016
Saleem Islam, 2015-2020
Daniel J. Ledbetter, 2014-2020
Craig W. Lillehei, 2010-2016
Rebecka L. Meyers, 2014-2019

Simulation Subcommittee
Katherine A. Barsness, *Chair*, 2014-2017
kbarsness@luriechildrens.org
Joseph A. Iocono, 2011-2017
John D. Horton, 2015-2018
Patricia Lange, 2011-2016
Andreas H. Meier, 2013-2017
Biren P. Modi, 2014-2017
David M. Powell, 2011-2017
Jill M. Zalieckas, 2015-2018

Students/Residents Subcommittee
Joseph A. Iocono, *Chair*, 2012- 2017
jiocono@uky.edu
Kenneth W. Gow, 2013-2017
Andreas H. Meier, 2012-2017

Ethics and Advocacy
Erin E. Rowell, *Chair*, 2014-2016
erowell@luriechildrens.org
Deborah S. Loeff, *Vice Chair*, 2015-2017
Daniel A. Beals, 2015-2018
John F. Beale, 2015-2018
Elizabeth A. Beierle, 2010-2016
Arthur Cooper, 2015-2018
Mauricio A. Escobar, Jr., 2015-2018
Jeremy G. Fisher, 2015-2018
Richard D. Glick, 2015-2018
Fawn C. Lewis, 2014-2017
Claudia M. Mueller, 2013-2016
Sarah A. Jones-Sapienza, 2015-2018
Robert L. Weinsheimer, 2014-2017
John R. Wesley, 2010-2016
Aviva L. Katz, *Ex Officio*

Fetal Diagnosis and Treatment
Christopher S. Muratore, *Chair*, 2014-2016
Christopher_Muratore@brown.edu
Terry L. Buchmiller, *Vice Chair*, 2014-2016
N. Scott Adzick, 2014-2017
Loren Berman, 2015-2018
Brad A. Feltis, 2010-2016
Stephen J. Fenton, 2015-2018
Cynthia A. Gingalewski, 2015-2018
Kathleen Graziano, 2014-2017
Shinjiro Hirose, 2011-2017
Corey W. Iqbal, 2014-2017
Shaun M. Kunisaki, 2014-2017
Oliver J. Muensterer, 2015-2018
Zaria C. Murrell, 2015-2018
George B. Mychaliska, 2013-2016
Karl G. Sylvester, 2013-2016
Darrell Cass, *Ex Officio, NAFTnet Representative*

Global Pediatric Surgery
Marilyn W. Butler, *Chair*, 2014-2016
mwbutler@gmail.com
Ai-Xuan L. Holterman, *Vice Chair*, 2013-2016
Georges Azzie, 2012-2018
Amina M. Bhatia, 2014-2017
Robert A. Cusick, 2011-2018
Daniel DeUgarte, 2015-2018
Michael Ganey, 2015-2018
Ted J. Gerstle, 2015-2018
Monica Langer, 2015-2018
Harold N. Lovvorn, III, 2014-2017
Donald E. Meier, 2014-2016
Benedict C. Nwomeh, 2012-2018
Nathan M. Novotny, 2015-2018
Doruk E. Ozgediz, 2012-2016
David H. Rothstein, 2015-2018
Julie Sanchez, 2015-2018
Marshall M. Stone, 2015-2018
Keith T. Oldham, *Ex Officio*
Diana L. Farmer, *Ex Officio*

APSA Committees 2015–2016 (cont.)

Global Strategic Planning Subcommittee
Diana L. Farmer, *Chair*, 2012-2018
diana.farmer@ucdmc.ucdavis.edu
Amina M. Bhatia, 2014-2017
Marilyn W. Butler, 2014-2016
Robert A. Cusick, 2011-2018
Ai-Xuan L. Holterman, 2013-2016
Harold N. Lovvorn, III, 2014-2017
Donald E. Meier, 2014-2016
Benedict C. Nwomeh, 2012-2018
Keith T. Oldham, 2012-2018
Doruk E. Ozgediz, 2012-2016

Health Policy and Advocacy
Max R. Langham, Jr., *Chair*, 2015-2017
mlangham@uthsc.edu
Marion C. Henry, *Vice Chair*, 2015-2017
Alana Beres, 2015-2017
David P. Bliss, 2015-2018
Kendra G. Bowman, 2015-2017
Peter W. Dillon, 2015-2016
George W. Holcomb, III, 2015-2016
Aviva L. Katz, 2015-2018
Dennis P. Lund, 2015-2017
J. Duncan Phillips, 2015-2018
L. R. Scherer, III, 2015-2016
Holly L. Williams, 2015-2017
Patrick Bailey, *Ex Officio*
Charles D. Vinocur, *Ex Officio*
Mary E. Fallat, *Ex Officio*

History Ad Hoc
Diana L. Farmer, *Co-chair*
dlfarmer@ucdavis.edu
Louis M. Marmon, *Co-chair*
lmarmon@childrensnational.org
William T. Adamson
Philip L. Glick
Dale G. Johnson
Michael D. Klein
Rebecka L. Meyers
David M. Powell

Women in Pediatric Surgery Subcommittee
Kathryn D. Bass
Mary E. Fallat
Danielle S. Walsh

Industry Advisory
Katherine A. Barsness, *Chair*, 2014-2017
kbarsness@luriechildrens.org
Marc P. Michalsky, *Vice Chair*, 2014-2017
Matthew S. Clifton, 2014-2017
Mike K. Chen, 2014-2017
Karen A. Diefenbach, 2013-2016
James D. Geiger, 2013-2016
Timothy D. Kane, 2013-2016
Sang Lee, 2015-2018
David E. Sawaya, Jr., 2015-2018

Informatics and Telemedicine
Todd A. Ponsky, *Chair*, 2015-2017
tponsky@gmail.com
Benedict C. Nwomeh, *Vice Chair* ,
2015-2017
Gudrun Aspelund, 2014-2017
Nicholas E. Bruns, 2015-2018
Jason Fisher, 2014-2017
Mathew T. Harting, 2013-2016
Steven S. Rothenberg, 2013-2016
Oliver S. Soldes, 2015-2018
Sohail R. Shah, 2015-2018
Charles L. Snyder, 2014-2017

Membership and Credentials
Harry Applebaum, *Chair*, 2015-2017
happlebaum@mednet.ucla.edu
Robert A. Cowles, *Vice Chair*, 2015-2017
Obinna O. Adibe, 2015-2018
Nicole M. Chandler, 2015-2018
Jeffrey W. Gander, 2015-2018
Loretto A. Glynn, 2012-2018
Tarun Kumar, 2014-2017
Kevin P. Mollen, 2015-2018
Richard H. Pearl, 2010-2016
Ravi S. Radhakrishnan, 2015-2018
Shawn Jason Stafford, 2015-2018

New Technology
Erik D. Skarsgard, *Chair*, 2015-2017
eskarsgard@cw.bc.ca
Sean S. Barnett, *Vice Chair* 2015-2017
Sanjeev Dutta, 2013-2016
Ian C. Glenn, 2015-2018
Harsh Grewal, 2015-2018
Marcus Jarboe, 2012-2018
Aviva L. Katz, 2015-2018
Sunghoon Kim, 2015-2018

APSA Committees 2015–2016 (cont.)

Hanmin Lee, 2014-2017
Stefan Scholz, 2014-2017
Bethany J. Slater, 2015-2018
Steven Teich, 2013-2016
James K. Wall, 2013-2016
Russell K. Woo, 2013-2016
Osnat Zmora-Beloosesky, 2015-2018

Nominating

Steven Stylianos, *Chair*, 2015-2016
ss128@cumc.columbia.edu
Marilyn W. Butler, 2015-2016
Cynthia D. Downard, 2015-2016
Ronald B. Hirschl, 2015-2016
Michael D. Klein, 2015-2018
Thomas M. Krummel, 2014-2017
Keith T. Oldham, 2013-2016
Erik D. Skarsgard, 2015-2016

Outcomes and Evidence-based Practice

Cynthia Downard, *Chair*, 2015-2017
c0down01@louisville.edu
Adam Goldin, *Vice Chair*, 2015-2017
Meghan A. Arnold, 2014-2017
Mary T. Austin, 2012-2016
Robert J. Baird, 2015-2018
Danielle B. Cameron, 2016-2017
Li Ern Chen, 2012-2016
Roshni A. Dasgupta, 2012-016
Katherine J. Deans, 2013-2016
Karen A. Diefenbach, 2015-2018
Robert L. Gates, 2015-2018
Julia E. Grabowski, 2014-2017
Tim Jancelewicz, 2014-2017
Dave R. Lal, 2015-2018
Milissa A. McKee, 2013-2016
Elizabeth J. Renaud, 2012-2016
Julia S. Shelton, 2015-2018
Regan F. Williams, 2014-2017
Saleem Islam, *Ex Officio*
Shawn Rangel, *Ex Officio*

E-Blast/Literature Review Subcommittee

Regan F. Williams, *Chair,* 2015-2017
rfwillia@uthsc.edu
Milissa A. McKee, *Vice Chair*, 2013-2016

IT/Website Subcommittee

Tim Jancelewicz, *Chair*, 2014-2017
tjancele@uthsc.edu

Survey Subcommittee

Elizabeth J. Renaud, *Chair*, 2014-2016
bj_renaud@yahoo.com
Julia E. Grabowski, *Vice Chair*, 2014-2017

Practice

David M. Notrica, *Chair,* 2014-2016
dnotrica@surgery4children.com
James C. Gilbert*, Co-Vice Chair*, 2014-2016
Barry M. Newman, *Co-Vice Chair*, 2015-2017
John F. Bealer, 2014-2017
John C. Bleacher, 2015-2018
John C. Densmore, 2014-2017
John J. Doski, 2012-2018
Michael J. Goretsky, 2014-2017
Donavon Hess, 2014-2017
Ramin Jamshidi, 2015-2018
Stephen G. Kimmel, 2013-2016
Don K. Nakayama, 2010-2016
Kyriacos Panayides, 2015-2018
Samir Pandya, 2015-2018
Ravi S. Radhakrishnan, 2015-2018
Jose H. Salazar, 2015-2018
Robert D. Schlechter, 2015-2018
David J. Schmeling, 2013-2016
Andrew M. Schulman, 2013-2016
Stephen B. Shew, 2014-2017
Samuel D. Smith, 2014-2017
Douglas Y. Tamura, 2015-2018
Dennis W. Vane, 2010-2016
David E. Wesson, 2014-2017

Program

Daniel J. Ostlie, *Chair*, 2015-2017
dostlie@phoenixchildrens.com
Casey M. Calkins, *Vice Chair*, 2015-2017
Jennifer Aldrink, 2014-2017
Catherine C. Chen, 2014-2017
Anne Fischer, 2015-2018
Gerald Gollin, 2014-2017
Andre V. Hebra, 2012-2018
Sundeep G. Keswani, 2013-2016
Eugene S. Kim, 2014-2017
Shaun M. Kunisaki, 2015-2018
Troy A. Markel, 2015-2018
Sean E. McLean, 2015-2018

APSA Committees 2015–2016 (cont.)

Peter S. Midulla, 2014-2017
Michael J. Morowitz, 2015-2018
George B. Mychaliska, 2013-2016
Peter F. Nichol, 2013-2016
David A. Rodeberg, 2015-2018
Samuel Z. Soffer, 2014-2018
Shawn D. St. Peter, 2015-2018
Adam M. Vogel, 2013-2016

Publications

Douglas Miniati, *Chair*, 2015-2017
dminiati@yahoo.com
Mary J. Edwards, *Vice Chair*, 2015-2017
Mary T. Austin, 2015-2018
Darrell L. Cass, 2015-2018
Patrick W. Dillon, 2013-2016
David M. Gourlay, 2014-2017
Thomas E. Hamilton, 2013-2016
Ai-Xuan L. Holterman, 2012-2016
Eunice Huang, 2014-2017
Catherine J. Hunter, 2015-2018
Cassandra M. Kelleher, 2015-2018
Francois I. Luks, 2015-2018
Kasper Wang, 2015-2018
Edmund Yi-Bin Yang, 2014-2017
Anne C. Fischer, *Ex Officio*
David L. Sigalet, *Ex Officio*

Research Ad Hoc

Martin L. Blakely, *Chair*, 2015-2017 martin.
blakely@vanderbilt.edu
Gail E. Besner, *Vice Chair*, 2015-2017
Adam C. Alder, 2015-2017
Charles S. Cox, Jr., 2015-2018
Andrew M. Davidoff, 2015-2017
Katherine J. Deans, 2015-2018
Adam Goldin, 2015-2018
Gretchen Jackson, 2015-2018
Tippi MacKenzie, 2015-2018
Shawn D. St. Peter, 2015-2017

Surgical Critical Care

Pramod S. Puligandla, *Chair,* 2015-2017
pramod.puligandla@mcgill.ca
Samir K. Gadepalli, *Vice Chair*, 2012-2017
Shahab F. Abdessalam, 2015-2018
Robert D. Acton, 2015-2018
Pablo Aguayo, 2015-2018
Jennifer H. Aldrink, 2015-2018
Mary Arbuthnot, 2015-2017
Kelly M. Austin, 2012-2016
J. Craig Egan, 2015-2018
Alexander Feliz, 2015-2018
Raquel Gonzalez, 2012-2016
Chad E. Hamner, 2012-2016
David Juang, 2012-2017
Denise B. Klinkner, 2015-2018
Faisal G. Qureshi, 2012-2016
Robert L. Ricca, 2014-2017
David H. Rothstein, 2014-2017
Ana Ruzic, 2015-2018
Jill M. Zalieckas, 2012-2017
Daniel J. Ostlie, *Ad Hoc*
Brian Kenney, *Ex Officio*

Surgical Quality and Safety

Shawn J. Rangel, *Chair*, 2014-2016
Shawn.Rangel@childrens.harvard.edu
KuoJen Tsao, *Vice Chair*, 2014-2016
Fizan Abdullah, 2013-2016
Loren Berman, 2014-2017
David W. Bliss, 2010-2016
Marybeth Browne, 2014-2017
Robert H. Connors, 2014-2017
Melvin S. Dassinger, 2015-2018
Belinda Hsi Dickie, 2015-2018
Emily T. Durkin, 2015-2018
Helene Flageole, 2015-2018
Adam Goldin, 2013-2016
Michael J. Goretsky, 2013-2016
Stephanie A. Kapfer, 2015-2018
Anne C. Kim, 2015-2018
Lisa E. McMahon, 2015-2018
Peter C. Minneci, 2014-2017
Katherine T. Flynn-O'Brien,
2015-2018
Daniel K. Robie, 2014-2017
Joel Shilyansky, 2015-2018
David E. Skarda, 2014-2017
Joseph J. Tepas, 2009-2017

APSA Committees 2015–2016 (cont.)

Patricia A. Valusek, 2014-2017
Jeannie Y. Chun, *Ad Hoc*
Charles D. Vinocur, *Ex Officio*
Kurt F. Heiss, *Ex Officio*
Cynthia D. Downard, *Ex Officio*

Trauma

David M. Gourlay, *Chair*, 2015-2017
dgourlay@chw.org
John Petty, *Vice Chair*, 2015-2017
Duane S. Duke, 2015-2018
Brett W. Engbrecht, 2014-2017
James W. Eubanks, III, 2013-2016
David L. Gibbs, 2013-2016
Jeffrey H. Haynes, 2014-2017
Mubeen Jafri, 2014-2017
Martin S. Keller, 2013-2016
Nathan S. Kreykes, 2014-2017
Shawn D. Larson, 2015-2018
Robert W. Letton, Jr., 2015-2018
Bindi Naik-Mathuria, 2012-2018
Isam W. Nasr, 2015-2018
Mitchell R. Price, 2013-2016
Jose M. Prince, 2015-2018
Dylan Stewart, 2015-2018
Steven Stylianos, 2014-2017
Adam M. Vogel, 2013-2016
Richard A. Falcone, Jr., *Ex Officio*

Workforce

James D. Geiger, *Chair*, 2013-2016
jgeiger@med.umich.edu
William T. Adamson, *Vice Chair*, 2013-2016
James Dunn, 2014-2017
Stephen P. Dunn, 2015-2018
Brian F. Gilchrist, 2013-2016
Cynthia A. Gingalewski, 2014-2017
Freida M. Hulka, 2015-2018
Daniel C. Little, 2015-2018
P. Cameron Mantor, 2014-2017
Louis M. Marmon, 2014-2017
Abigail E. Martin, 2015-2018
Allen L. Milewicz, 2015-2018
Stacey Moore-Olufemi, 2015-2018
Sara K. Rasmussen, 2015-2018
Daniel A. Saltzman, 2010-2016
Richard G. Weiss, 2012-2018

Transplantation Subcommittee

Abigal E. Martin, 2015-2018
Stephen P. Dunn, 2015-2018

Pediatric Surgery Training Program Directors

Alabama

Mike K. Chen, MD
University of Alabama Medical Center
University of Alabama at Birmingham
1600 7th Ave., South, ACC300
Birmingham, AL 35233
+1-205-939-9751
mike.chen@childrensal.org

Arkansas

Samuel D. Smith, MD
University of Arkansas for Medical Sciences
Arkansas Children's Hospital
800 Marshall St.
Little Rock, AR 72202
+1-501-364-2943
smithsamueld@uams.edu

California

Gerald Gollin, MD
Loma Linda University and Children's Hospital
Division of Pediatric Surgery
11175 Campus St., CP 21111
Loma Linda, CA 92354
+1- 909-558-4619
ggollin@llu.edu

Jeffrey S. Upperman, MD
University of Southern California
Children's Hospital of Los Angeles
4650 Sunset Blvd.
MS #100
Los Angeles, CA 90027
+1-323-361-7078
jupperman@chla.usc.edu

Timothy J. Fairbanks, MD
Rady Children's Hospital
3030 Children's Way, Suite 107
San Diego, CA 92123
+1-858-966-7711
tfairbanks@rchsd.org

Craig T. Albanese, MD, MBA
Stanford University Medical Center
Lucile Packard Children's Hospital
780 Welch Road, Suite 206
Stanford, CA 94305-5733
+1-650-724-3664
calbanese@lpch.org

Colorado

Frederick M. Karrer, MD
University of Colorado Children's Hospital
Department of Pediatric Surgery
13123 E. 16th Ave., B-323
Aurora, CO 80045
+1-720-777-6571
fritz.karrer@childrenscolorado.org

Connecticut

Christine M. Finck, MD
University of Connecticut
Connecticut Children's Medical Center
282 Washington St.
Hartford, CT 06106
+1-860-610-4227
cfinck@connecticutchildrens.org

Robert A. Cowles, MD
Yale-New Haven Hospital
Yale University School of Medicine
P.O. Box 208062
New Haven, CT 06520-8062
+1-203-785-2701
robert.cowles@yale.edu

Delaware

Barry A. Hicks, MD
Thomas Jefferson/A.I. DuPont Hospital for Children
1600 Rockland Road
Wilmington, DE 19803
+1-302-651-5999
barry.hicks@nemours.org

Pediatric Surgery Training Program Directors (cont)

District of Columbia

Andrea T. Badillo, MD
George Washington University
Children's National Medical Center
111 Michigan Ave., N.W.
Washington, DC 20010
+1-202-476-2151
abadillo@cnmc.org

Florida

Cathy A. Burnweit, MD
Miami Children's Hospital
3200 SW 60th Court, Suite 201
Miami, FL 33155
+1-305-662-8320
cathy.burnweit@mch.com

Saleem Islam, MD
University of Florida
P.O. Box 100286
Gainesville, FL 32610
+1-352-273-8825
Saleem.islam@surgery.ufl.edu

Paul D. Danielson, MD
John's Hopkins Medicine All Children's Hospital
601 Fifth St. South
Dept. 70-6600
St. Petersburg, FL 33701
+1-727-767-8810
paul.danielson@allkids.org

Georgia

Matthew S. Clifton, MD
Emory University School of Medicine
Children's Healthcare of Atlanta
1405 Clifton Road NE
3rd Fl. Surgical Services
Atlanta, GA 30322
+1-404-785-0781
mclifto@emory.edu

Illinois

Marleta Reynolds, MD
Lurie Children's Hospital of Chicago
225 E. Chicago Ave.
Box #285
Chicago, IL 60611
+1-312-227-4334
mreynolds@luriechildrens.org

Grace Mak, MD
University of Chicago
Comer Children's Hospital
5839 S. Maryland Ave. MC 4062
Chicago, IL 60637
+1-773-834-0516
gmak@surgery.bsd.uchicago.edu

Indiana

Alan P. Ladd, MD
Indiana University School of Medicine
JW Riley Hospital for Children
702 Barnhill Drive, Suite 2500
Indianapolis, IN 46202
+1-317-274-4681
aladd@iupui.edu

Kentucky

Cynthia D. Downard, MD
Louisville-Kosair Children's Hospital
315 E Broadway, Suite 565
Louisville, KY 40202
+1-502-629-8630
c0down01@louisville.edu

Maryland

Samuel M. Alaish, MD
The Johns Hopkins Hospital
Bloomberg Children's Center, Suite 7331
1800 Orleans St.
Baltimore, MD 21287
+1-443-287-3160
salaish1@jhmi.edu

Massachusetts

Craig W. Lillehei, MD
Children's Hospital Boston
Dept. of Surgery
300 Longwood Ave.
Boston, MA 02115
+1-617-355-3039
craig.lillehei@childrens.harvard.edu

Michigan

Scott E. Langenburg, MD
Wayne State University/Detroit Medical Center
Children's Hospital of Michigan
3901 Beaubien Blvd.
Detroit, MI 48201
+1-313-745-5881
langburg@mac.com

Pediatric Surgery Training Program Directors (cont)

Daniel H. Teitelbaum, MD
University of Michigan Medical Center
1500 E. Medical Center Drive F3970
Mott Children's Hospital
Ann Arbor, MI 48109-0245
+1-734-764-6482
dttlbm@umich.edu

Mississippi

Christopher J. Blewett, MD
University of Mississippi Medical Center
2500 N. State St.
Jackson, MS 39216
+1-601-984-5050
cblewett@umc.edu

Missouri

Dennis W. Vane, MD, MBA
Saint Louis University/Cardinal Glennon Children's Medical Center
1465 South Grand Blvd.
Saint Louis, MO 63104
+1-314-577-5629
dvane@slu.edu

Shawn D. St. Peter, MD
University of Missouri at Kansas City
Children's Mercy Hospital
2401 Gillham Road
Kansas City, MO 64108
+1-816-983-6465
sspeter@cmh.edu

Patrick A. Dillon, MD
Washington University/B-JH/SLCH Consortium
St. Louis Children's Hospital
One Children's Place, Suite 5S60
St. Louis, MO 63110
+1-314-454-6022
dillonp@wustl.edu

Nebraska

Robert A. Cusick, MD
Children's Hospital of Omaha
8200 Dodge St.
Omaha, NE 68114
+1-402-955-7400
rcusick@childrensomaha.org

New York

Samuel Z. Soffer, MD
Cohen Children's Medical Center
269-01 76th Ave.
New Hyde Park, NY 11040
+1-718-470-3636
ssoffer@nshs.edu

William Middlesworth, MD
Morgan Stanley Children's Hospital of NY
3959 Broadway
CHN 216-B
New York, NY 10032
+1-212-342-8585
wm61@cumc.columbia.edu

Carroll M. Harmon, MD
SUNY at Buffalo
Women's and Children's Hospital of Buffalo
219 Bryant St.
Buffalo, NY 14222
+1-716-878-7802
Charmon@kaleidahealth.org

Ohio

Daniel von Allmen, MD
Cincinnati Children's Hospital Medical Center
3333 Burnet Ave.
Cincinnati, OH 45229
+1-513-636-7365
Daniel.vonAllmen@cchmc.org

Benedict C. Nwomeh, MD
Nationwide Children's Hospital
700 Children's Drive ED-379
Columbus, OH 43205
+1-614-722-3914
benedict.nwomeh@nationwidechildrens.org

Pediatric Surgery Training Program Directors (cont)

Oklahoma

P. Cameron Mantor, MD
Oklahoma Univ Medical Center
1200 Everett Drive, Suite 2320
Oklahoma City, OK 73104
+1-405-271-5922
cameron-mantor@ouhsc.edu

Oregon

Sanjay Krishnaswami, MD
Oregon Health and Sciences University
3181 SW Sam Jackson Park Road
Portland, OR 97239
+1-503-460-0065
krishnas@ohsu.edu

Pennsylvania

Barbara A. Gaines, MD
University of Pittsburgh Medical Ctr.
Children's Hospital of Pittsburgh
Department of Pediatric General & Thoracic Surgery
One Children's Hospital Drive
4401 Penn Ave.
Pittsburgh, PA 15224
+1-412-692-8288
barbara.gaines@chp.edu

Thane A. Blinman, MD
Children's Hospital of Philadelphia
34th Street and Civic Center Blvd.
Philadelphia, PA 19104
+1-215-590-4510
blinman@email.chop.edu

Rajeev Prasad, MD
St. Christopher's Hospital for Children
Erie Ave. at Front St.
Philadelphia, PA 19134
+1-215-427-5446
rajeev.prasad@tenethealth.com

Rhode Island

Thomas F. Tracy, Jr., MD
Brown University
Hasbro Children's Hospital
593 Eddy St., Room 147
Providence, RI 02903
+1-401-444-7605
ttracy@lifespan.org

Tennessee

Eunice Huang, MD
University of Tennessee Div of Pediatric Surgery Health Science Center
51 N. Dunlap, Suite 220
Memphis, TN 38105
+1-901-287-6031
ehuang@uthsc.edu

Dai H. Chung, MD
Vanderbilt University Medical Center
Monroe Carell Jr. Children's Hospital at Vanderbilt
2200 Children's Way, Suite 7100
Nashville, TN 37232
+1-615-936-1050
dai.chung@vanderbilt.edu

Texas

KuoJen Tsao
University of Texas
6431 Fannin St. Suite 5.256
Houston, TX 77030
+1-713-500-7300
KuoJen.Tsao@uth.tmc.edu

Jed G. Nuchtern, MD
Baylor College of Medicine
Texas Children's Hospital
6701 Fannin St. Suite 1210
Houston, TX 77030-2399
+1-832-822-3135
nuchtern@bcm.tmc.edu

Diana L. Diesen, MD
Dallas Children's Hospital
1935 Medical District Drive
Suite D2032
Dallas, TX 75235
+1-214-456-6040
dld5b@hotmail.com

Utah

Douglas C. Barnhart, MD
University of Utah Primary Children's Medical Center
100 N. Mario Capecchi, Suite 2600
Salt Lake City, UT 84113-1103
+1-801- 662-2950
douglas.barnhart@imail.org

Pediatric Surgery Training Program Directors (cont)

Washington
John H.T. Waldhausen, MD
Children's Hospital and Regional Medical Center
4800 Sand Point Way, N.E.
PO Box 5371/W7753
Seattle, WA 98105
+1-206-987-1177
john.waldhausen@seattlechildrens.org

Wisconsin
Casey M. Calkins, MD
Children's Hospital of Wisconsin
999 N. 92nd St. Suite C320
Milwaukee, WI 53226
+1-414-266-6558
ccalkins@chw.org

CANADA
Alberta
Andrew L. Wong, MD
University of Calgary
Alberta Children's Hospital
2888 Shaganappi Trail
Calgary, AB T5B 6A8
+1-403-955-7253
wongal87@yahoo.ca

British Columbia
Sonia A. Butterworth, MD
University of British Columbia B.C. Children's Hospital
Pediatric General Surgery
4480 Oak St.
Vancouver, BC V6H 3V4
+1-604-875-2667
sbutterworth-02@cw.bc.ca

Nova Scotia
Rodrigo L.P. Romao, MD
Dalhousie University Department of Surgery
IWK Health Centre Children's Site
5950-5980 University Ave.
Halifax, NS B3J 3G9
+1-902-470-8114
rodrigo.lp.romao@gmail.com

Ontario
Agostino Pierro, MD
University of Toronto
The Hospital for Sick Children
Room 1526 Hill Wing
1526-555 University Ave.
Toronto, ON M5G 1X8
+1-416-813-7340
agostino.pierro@sickkids.ca

Kyle Cowan, MD
University of Ottawa General Surgery Program
Children's Hospital of Eastern Ontario
401 Smyth Road
Ottawa, ON K1H 8L1
+1-613-737-7600 x 2675
kcowan@cheo.on.ca

Helene Flageole, MD
McMaster Children's Hospital
1200 Main St., W. #4E8
Hamilton, ON L8N 3Z5
+1-905-521-2100 x75244
flageol@mcmaster.ca

Quebec
Pramod S. Puligandla, MD
McGill University, Department of Pediatric Surgery
Montreal Children's Hospital
2300 Tupper St.
Montreal, QC H3H 1P3
+1-514-412-4438
Pramod.puligandla@mcgill.ca

Pediatric Surgery Training Program Directors (cont)

Michel Lallier, MD
Universite de Montreal, Departement de
Chirurgie
Hopital Sainte-Justine
3175 Cote Ste-Catherine
Montreal, QC H3T 1C5
+1-514-345-4915
Michoubidou@videotron.ca

Association of Pediatric Surgery Training Program Directors

President
Daniel von Allmen

Secretary
Barbara A. Gaines

APSA Foundation

20th Anniversary APSA FOUNDATION ENRICHMENT GRANTS 1996-2016

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 Enrichment Grant to qualified applicants. Twenty years later, the APSA Foundation has been established and has provided more than $560,000 in grant support for our young pediatric surgeon-scientists (see list below). The return on investment has been extraordinary!

Yet APSAF needs your support to continue to invest in the future of our profession.

Initially, only two percent of the APSA membership contributed to the fledgling Foundation. The corpus of the Foundation grew slowly, and the first Enrichment Grant was awarded in 1996 to Dr. Michael Caty in the amount of $9,825; this year two grants of $25,000 have been awarded, yet less than 20% of the membership have contributed to the Fund.

2016 marks the 20th anniversary of providing Enrichment Grant awards by the APSA Foundation. We ask that all the members of APSA (particularly those who have not previously donated) help us celebrate this important milestone by considering a special contribution to the Foundation. Please make plans to visit the APSA Foundation booth during this year's Annual Meeting, discuss the Enrichment Grant process with a member of the APSAF Board, and commit to increasing your level of participation. Thank you for all you do for pediatric surgery and especially for what your next gift to the APSAF can achieve in the future!

The APSA Foundation Board of Directors

Jay L. Grosfeld, MD, *Chairman*
Daniel Robie, MD, *APSA Foundation Agent*
John H.T. Waldhausen, MD, *Secretary*
Daniel von Allmen, MD, *Treasurer*

Board Members: APSA Past Presidents Thomas Krummel, MD, Keith Oldham, MD, Michael Klein, MD

Members-at-large: Max Langham, MD, Jessica Kandel, MD
Ex Officio member: Mary Fallat, MD, current APSA President

Visit the APSA website for a comprehensive look at the Foundation's 20-year history: http://www.eapsa.org/about-apsa/apsa-foundation/about-the-foundation/

APSA Foundation Grant Recipients

Your tax-exempt contributions to APSAF have energized young and deserving pediatric surgeons to become some of the leading surgeon-scientists of the future.

2015

William H. Peranteau, MD
In Utero Hematopoietic Cell Transplantation for the Treatment of Congenital Disorders
$25,000

Bradley J. Segura, MD
The Role of Enteric Glia in Pediatric Intestinal Inflammation
$25,000

2014

Hannah G. Piper, MD
The Role of Intestinal Microbiota in Children with Intestinal Failure and Bacterial Overgrowth
$25,000

David Stitelman, MD
In Utero Delivery of Synthetic Nanoparticles for Gene Editing in the Central Nervous System
$25,000

2013

Ankush Gosain, MD
Splenic Neurovascular Units in Hirschsprung's Associated Enterocolitis
$25,000

David M. Gourlay, MD
IAP Prevents Intestinal Inflammation in the Newborn Intestine
$25,000

Shawn D. Larson, MD
Inflammasome Activation is Critical for Neonatal Emergency Myelopoiesis and Expansion of Hematopoietic Stem Cells for Inflammation
$25,000

2012

Harold N. Lovvorn, III, MD
Induced Pluripotent Stem Cells for the Study of Wilms' Tumorigenesis
$25,000

KuoJen Tsao, MD
Errors and Adverse Events in the Setting of the Neonatal Surgery Performed in the NICU
$25,000

2011

Shaun M. Kunisaki, MD
Mesenchymal Stem Cell Regulation of Fetal Lung Development in Diaphragmatic Hernia
$25,000

Peter F. Nichol, MD
Using a Genetic Model of Duodenal Atresia to Understand Regenerative Mechanisms within the Intestine
$25,000

APSA Foundation Grant Recipients (cont.)

2010
Cynthia D. Downard, MD
Control of Intestinal Microcirculation in NEC
$25,000

Cassandra M. Kelleher, MD
Extracellular Components Critical to Alveolarization: Contributions of Elastin
$25,000

2009
Tippi C. MacKenzie, MD
Maternal Immune Response *In Utero* Hematopoietic Stem Cell Transplantation
$25,000

Kelly A. Miller, MD
The Pathogenic Role of Enteric Glia in Hirschsprung's Enterocolitis
$25,000

2008
Douglas N. Miniati, MD
Role of Notch4 Signaling in Aberrant Pulmonary Vascular Development
$25,000

2007
Allan M. Goldstein, MD
Role of Sonic Hedgehog in Enteric Nervous System Development
$25,000

2006
James C.Y. Dunn, MD
Enteric Nervous System Regeneration for Hirschsprung's Disease
$25,000

2005
Elizabeth A. Beierle, MD
Focal Adhesion Kinase and Vascular Endothelial Growth Factor Receptor-3 in Human Neuroblastoma
$10,000

Kerilyn K. Nobuhara, MD
Intestinal Dysmotility in Fetal Repair of Gastroschisis
$10,000

2004
Karl G. Sylvester, MD
Liver Regeneration and Stem Cell Regulation via the WNT Signaling Pathway
$10,000

Christopher K. Breuer, MD
Do Tissue Engineered Venous Conduits Grow? Investigating the Growth Potential of Tissue Engineered Venous Conduits in a Juvenile Lamb Model
$10,000

APSA Foundation Grant Recipients (cont.)

2003
Peter F. Ehrlich, MD
Injury Prevention through Brief Intervention: A Novel Approach to Pediatric Injury Prevention
$10,000

2002
Mary Beth Madonna, MD
Growth Factor Receptor Signaling and its Relationship to Cell Proliferation and Differentiation in a Neuroblastoma Cell Line
$10,000

2001
Anthony Stallion, MD
Intestinal Ischemia Reperfusion Injury Contributes to the Initiation of the Systemic Inflammatory Response Syndrome
$10,000

2000
Edward M. Barksdale, Jr., MD
The Therapy of Neuroblastoma-induced Disorders of Dendropoiesis of Dendritic Cell Development
$10,000

1999
Steven Stylianos, MD
Evidence-Based Guidelines for Resource Utilization in Pediatric Spleen/Liver Injury
$5,000

1998
Gail E. Besner, MD
Heparin-Binding EGF-like Growth Factor (HBEGF) and Intestinal Ischemia Reperfusion Injury
$7,500

1997
Charles N. Paidas, MD
Septation of the Cloaca
$8,000

1996
Michael G. Caty, MD
Preservation of Intestinal Mucosal Structure and Function with Intraluminal Oxygenated Perfluorocarbon
$9,825

The American Pediatric Surgical Association Foundation thanks the following individuals who have contributed to the Foundation.

(Donations received as of April 10, 2016.)

WILLIAM E. LADD SOCIETY
($10,000 or more)
Bleacher, John C.
Coran, Arnold G.
Engum, Scott A.
Farmer, Diana L.
Fonkalsrud, Eric W.
Ford, Henri R.
Grosfeld, Jay L.
Hays, Daniel M.
Klein, Michael D.
Knowles, Joan
Krummel, Thomas M.
LaQuaglia, Michael P.
Noseworthy, John
Oldham, Keith T.
Powell, Randall W.
Raffensperger, John
Schmeling, David J.
Schwartz, Marshall Z.
Shamberger, Robert C.
Wesley, John R.
West, Karen W.

ROBERT E. GROSS BENEFACTORS
($5,000 - $9,000)
Altman, R. Peter
Anderson, Glen F.
Ashcraft, Keith W.
Beaver, Bonnie L.
Billmire, Deborah F.
Breaux, Charles W.
Caniano, Donna Anne
Cosentino, Catherine
Donahoe, Patricia K.
Doody, Daniel P.
Dunn, James C. Y.
Ellis, Dick G.
Filston, Howard C.
Fiore, Nicholas F.
Ford, Edward G.
Gilchrist, Brian F.
Harrison, Michael R.
Hendren, W. Hardy
Holcomb, George W.
Hulka, Frieda Marie
Kapfer, Stephanie A.
Kays, David W.
Ladd, Alan P.
Lankau, Charles
Lund, Dennis P.
Martin, Abigail E.
Meier, Donald E.
Minifee, Paul K.
Puranik, Subhash R.
Rescorla, Frederick J.
Reynolds, Marleta
Rodgers, Bradley M.
Rouse, Thomas M.
Sandler, Anthony D.
Scherer, L. R. (Tres)
Shaul, Donald B.
Sherman, Neil J.
Smith, C.D.
Stylianos, Steven
Taylor, Lesli Ann
Toyama, William M.
Tracy, Thomas F.
Tunell, William P.
Vane, Dennis W.
von Allmen, Daniel
Weinberger, Malvin
Ziegler, Moritz M.

GOLD SUPPORTER LEVEL
($1,000 - $4,999)
Acton, Robert D.
Adolph, Vincent R.
Adzick, N. Scott
Alaish, Samuel M.
Anderson, Kathryn D.
Anderson, Scott A.
Andrews, David A.
Arensman, Robert M.
Asch, Morris J.
Austin, Kelly M.
Azarow, Kenneth S.
Azizkhan, Richard G.
Baldwin, Charles E.
Barlow, Barbara Ann
Barnhart, Douglas C.
Bass, Kathryn D.
Beierle, Elizabeth A.
Besner, Gail E.
Bliss, David P.
Borger, James A.
Bower, Richard J.
Brand, Theodore
Brandt, Mary L.
Brennom, William S.
Burnweit, Cathy A.
Calkins, Casey M.
Campbell, John R.
Carr, Michael G.
Cass, Darrell L.
Cavett, Clinton M.
Chahine, A. Alfred
Chen, Li Ern
Christian, Jeffrey S.
Cilley, Robert E.
Coln, C. Dale
Colombani, Paul M.
Cooper, Arthur
Coren, Charles
Coughlin, John P.
Curci, Michael R.
Curran, Thomas J.
Cusick, Robert A.
de Lorimier, Alfred A.
DeVries, Catherine Rhu
Dibbins, Albert W.
Dillon, Peter W.
Dimler, Michael
Dolgin, Stephen E.
Doolin, Edward J.
Dorman, George W.
Doski, John J.
Downey, Earl C.
Drucker, David E. M.
Dunn, Stephen P.
Ehrlich, Peter F.
Ein, Sigmund H.
Emmens, Robert W.
Escobar, Mauricio A.
Fallat, Mary E.
Feins, Neil
Fidler, Christopher D.
Filler, Robert M.
Fischer, Anne C.
Fishman, Steven J.
Flageole, Helene
Folkman, M. Judah
Gandhi, Rajinder P.
Gauderer, Michael W.L.
Gingalewski, Cynthia A.
Ginsburg, Howard B.
Glick, Philip L.
Goodwin, Charles
Goretsky, Michael J.
Groff, Diller B.
Groner, Jonathan I.
Guttman, Frank M.
Guzzetta, Philip C.
Hamilton, Thomas E.
Hardin, William D.
Harris, Burton H.
Hartman, Gary E.
Healey, Patrick
Heiss, Kurt F.
Hicks, Barry A.
Hicks, Leon Milton
Hill, J. Laurance
Hirsch, Sarah L.
Hirschl, Ronald B.

APSA Foundation Contributors (cont.)

Hoelzer, Dennis J.
Holder, Thomas M.
Holland, Randall M.
Holterman, Ai-Xuan L.
Hong, Andrew R.
Jan, Dominique M.
Johnson, Dale G.
Jolley, Stephen G.
Kessler, Edmund
Kim, Heung Bae
Kim, Peter C. W.
Kim, Samuel H.
King, Denis R.
Klotz, Donald
Laberge, Jean-Martin
Lally, Kevin P.
Lam, Vinh T.
Langenburg, Scott E.
Langer, Jacob C.
Langham, Jr., Max R.
Latchaw, Laurie A.
Ledbetter, Daniel J.
Lee, Yi-Horng
Lemon, David G.
Letton, Robert W.
Lewis, Fawn C.
Lewis, J. Eugene
Leys, Charles M.
Lillehei, Craig W.
Lobe, Thom E.
Loeff, Deborah S.
Long, Julie A.
Luck, Susan R.
Luks, Francois I.
Lynch, James M.
Maddox, John R.
Madonna, Mary Beth
Magnuson, David K.
Marr, Clifford C.
McBride, Whitney J.
McGahren, Eugene D.
McGill, Leigh C.
Meagher, David P.
Meyers, Rebecka L.
Midulla, Peter S.
Morgan, William W.
Moriarty, Kevin P.
Morrow, Stephen E.
Moss, R. Lawrence
Muenchow, Sharon K.
Murphy, J. Patrick
Neblett, Wallace W.
Newman, Barry M.
O'Neill, James A.
Ortiz-Justiniano, Victor N.
Ostlie, Daniel J.
Othersen, H. Biemann
Pearl, Richard H.
Pendse, Prabhakar D.
Pinch, Lewis W.
Pittinger, Timothy P.
Powell, David M.
Priebe, Cedric J.
Radhakrishnan, Jayant
Randolph, Judson
Ratner, Michael H.
Raynor, Stephen C.
Reyes, Hernan M.
Reyes, Jorge D.
Rice, Henry E.
Ricketts, Richard R.
Riehle, Kimberly J.
Robie, Daniel K.
Rosser, Samuel B.
Rothenberg, Steven S.
Rothstein, David
Rowe, Marc I.
Ryan, Daniel P.
Ryckman, Frederick C.
Sawin, Robert
Saxton, Mark L.
Scaife, Eric R.
Schullinger, John N.
Shaw, Anthony
Silen, Mark L.
Skarsgard, Erik D.
Skinner, Michael A.
Slim, Michel S.
Snyder, Charles L.
Soldes, Oliver S.
Stolar, Charles J.
Superina, Riccardo A.
Talbert, James L.
Teich, Steven
Teitelbaum, Daniel H.
Templeton, John M.
Tepas, Joseph J.
Torres, Ascension M.
Touloukian, Robert J.
Turner, Charles S.
Upperman, Jeffrey S.
Valusek, Patricia A.
Vaughan, W. Glaze
Vegunta, Ravindra K.
Velcek, Francisca T.
Wagner, Charles W.
Waldhausen, John H.T.
Warner, Brad W.
Weber, Thomas R.
Weinberg, Gerard
Wesson, David E.
Whalen, Thomas V.
Wiener, Eugene S.
Wilkinson, Albert H.
Wulkan, Mark L.
Zitsman, Jeffrey L.

DONOR LEVEL
(up to $1,000)
Able, Luke
Acierno, Stephanie P.
Adamson, William T.
Adelman, Susan H.
Adkins, E. Stanton
Adkins, John C.
Adler, Dorit
Alexander, Frederick
Allshouse, Michael J.
Almond, P. Stephen
Alonso, Maria H.
Amoury, Raymond A.
Anderson, Alan E.
Andrassy, Richard J.
Andrews, H. Gibbs
Andrews, Walter S.
Applebaum, Harry
Arthur, L. Grier
Askew, Allyson A.
Atkinson, James B.
Austin, Mary T.
Baesl, Thomas J.
Bagwell, Charles E.
Bailey, Patrick
Bailey, William Carl
Barksdale, Edward M.
Barsness, Katherine A.
Beardmore, Harvey E.
Beck, A. Robert
Bell, Martin J.
Bergman, Kerry S.
Besser, Arthur S.
Bilik, Ron
Birken, Gary
Bishop, Patte J.
Black, Preston R.
Black, Richard E.
Black, Timothy L.
Blair, Geoffrey K.
Bleicher, Michael A.
Bloss, Robert S.
Bodenstein, Lawrence
Boles, E. Thomas
Bond, Sheldon J.
Boswell, William C.
Bourque, Michael D.
Breuer, Christopher K.
Breuer, Julie G.
Brown, Rebeccah L.
Browne, Allen F.
Buchmiller, Terry L.
Buckner, Donald M.
Bufo, Anthony J.
Buntain, William
Burd, Randall S
Burrington, John D.
Butler, Marilyn W.

APSA Foundation Contributors (cont.)

Cain, Walter S.
Campbell, Brendan Thomas
Campbell, David P.
Campbell, Timothy J.
Canty, Timothy G.
Cartwright, Karen C.
Casas-Melley, Adela
Caty, Michael G.
Chaet, Mark S.
Chang, Chris C. N.
Chang, Jack HT
Chen, Mike K.
Chen, Steve C.
Chiu, Priscilla
Chung, Dai H.
Chwals, Walter J.
Cigarroa, Francisco G.
Cobb, Mason
Cohn, Eric
Collins, David L.
Coln, Charles Eric
Connors, Robert H.
Cooke, Ronald W.
Cooney, Donald R.
Coran, Charles
Coryllos, Elizabeth
Courtney, Richard A.
Cradock, Thomas V.
Croitoru, Daniel P.
Crombleholme, Timothy M.
Crow, John P.
Crowe, C. Peter
Cywes, Robert
D'Angio, Giulio J.
Dahman, Bassam M.
David, Joseph S.
DeCou, James M.
Dekelboum, Allen M.
DeRoss, Anthony
DiFiore, John W.
Dokler, Maryanne L.
Downard, Cynthia D.
Draus, John M.
Du Bois, Jeffrey J.
Dudgeon, David L.
Eichelberger, Martin R.
El-Shafie, Mohamed
Emil, Sherif G. S.
Engle, Kimberly K
Fagelman, Kerry M.
Falcone, Richard A.
Falla, Anita
Fecteau, Annie H.
Feltis, Brad A.
Figueroa Otero, Ivan
Finck, Christine M.
Flake, Alan W.
Foglia, Robert P.
Foster, George L.
Fowler, Carol L.
Frantz, Frazier W.
Free, Edward A.
Friedman, David L.
Frykman, Philip K.
Fullerton, Monte W.
Garcia, Victor
Garza, Jennifer
Geiger, James D.
Geissler, Grant H.
German, John C.
Ghory, Mary Jo
Gibbs, David L.
Gibson, Peter
Gittes, George K.
Glasser, James G.
Glynn, Loretto A.
Goldstein, Allan M.
Gollin, Gerald
Gorra, Adam S.
Gosain, Ankush
Gosche, John R.
Graham, D. David
Greenfeld, Jonathan Ian
Greenholz, Stephen K.
Grisoni, Enrique R.
Haase, Gerald M.
Hall, Dale G.
Haller, Jacob Alexander
Hansbrough, Faith
Harmel, Richard P.
Harmon, Carroll M.
Harrison, Marvin W.
Hartin, Charles W.
Haynes, Jeffrey H.
Hearne, Linda
Heaton, Todd E.
Hebra, Andre Von
Hechtman, Daniel H.
Hedrick, Holly L.
Henderson, Bruce M.
Henderson, Janette A.
Henry, Marion C.
Hight, Donald W.
Hirsh, Michael P.
Hitch, David C.
Hixson, S. Douglas
Hodin, Earl
Holgersen, Leif
Hollabaugh, Robert S.
Hollands, Celeste
Holterman, Mark J.
Hopkins, James William
Horton, John D.
Howard, Michael R.
Huang, Yuan-Chao
Hutchins, Carol
Idowu, Olajire
Iocono, Joseph A.
Ishitani, Michael B.
Islam, Saleem
Izant, Robert J.
Jacir, Nabil
Jackson, Richard
Jaksic, Tom
Jegathesan, Subramania
Johnson, Frank R.
Jona, Juda Z.
Jones, Stephanie A.
Jones-Sapienza, Sarah A.
Kanchanapoom, Visut
Kandel, Jessica J.
Karp, Melvyn P.
Karrer, Frederick M.
Katz, Aviva L.
Kavianian, Ali
Kelly, Robert E.
Kennedy, Alfred P.
Kennedy, Richard
Kenney, Brian
Kim, Hyun Hahk
Kitano, Yoshihiro
Klein, Gerald J.
Klein, Robert L.
Kling, Karen M.
Kokoska, Evan R.
Konefal, Stanley H.
Koop, C. Everett
Kosloske, Ann M.
Krasna, Irwin H.
Kuenzler, Keith A.
Kugaczewski, Jane T.
Kulungowski, Ann M.
Kunisaki, Shaun M.
Kurkchubasche, Arlet G.
Lacey, Stuart R.
Lafer, Dennis J.
Lamkin, Susan B.
Landman, Matthew P.
Langer, Monica
Lanning, David A.
Larson, Shawn D.
Lawrence, John P.
Lazar, Eric L.
Lee, Steven L.
Levitt, Marc A.
Levy, Marc S.
Liebert, Peter S.
Lister, Julius
Livsey, Jacob
Loe, William
LoSasso, Barry E.
Lovvorn, Harold N.
Lynch, James P.
Lynn, Hugh B.
MacKenzie, Tippi
Mackie, George G.
Mallory, Baird

APSA Foundation Contributors (cont.)

Malo, Leslie
Manktelow, Anne
Manning, Peter B.
Martin, Lester W.
Martinez Leo, Bruno
Martinez-Frontanilla, Luis A.
Maurer, Karl J.
Mazziotti, Mark V.
McGowan, George
McLennon, Noel J.
Meier, Andreas H
Meller, Janet L.
Menchaca, John
Merianos, Demetri J.
Middlesworth, William
Miller, David
Miller, James P.
Miniati, Doug
Mirza, Medo
Mollen, Kevin P.
Mooney, David P.
Moore-Olufemi, Stacey
Morden, Robert S.
Morgan, Ross A.
Morton, Duncan
Moulton, Steven L.
Musemeche, Catherine A.
Nagaraj, Hirikati S.
Nahmad, Michel H.
Nanagas, Victor N.
Ndiforchu, Fombe
Nechter, Jed
Newman, Kurt D.
Nguyen, Luong T.
Nicolette, Linda A.
Nikaidoh, Hisashi
Noble, H. George S.
Nuss, Donald
Oiticica, Claudio
Olsen, Margaret M.
Olutoye, Oluyinka O.
Paidas, Charles N.
Palder, Steven
Pandya, Samir R.
Parker, Paul M.
Patel, Haroon
Pegoli, Walter
Pena, Alberto
Peranteau, William H.
Pettitt, Barbara J.
Philippart, Arvin I.
Pietsch, John B.
Piper, Hannah G.
Pippus, Kenneth G.
Pitt, Roger M.
Pohlson, Elizabeth C
Ponsky, Todd A.
Pranikoff, Thomas
Prasad, Rajeev
Price, Mitchell R.
Puligandla, Pramod S.
Pulito, Andrew R.
Qureshi, Faisal G.
Ramenofsky, Max L.
Rangel, Shawn J.
Ranne, Richard D.
Ratner, Irving A.
Reddy, P. Prithvi
Rettig, Arthur
Ricca, Robert L.
Ringer, Jayme
Roback, Stacy
Robertson, Frank M.
Rowe, George A.
Saad, Saad A.
Sachs, Barry F.
Saenz, Nicholas C.
Safford, Shawn D.
Saites, Constantine G.
Saltzman, Daniel A.
SanFilippo, J. Anthony
Santos, Mary Catherine
Sato, Thomas T.
Sauvage, Lester R.
Schaller, Robert T.
Schindel, David T.
Schlatter, Marc G.
Schlechter, Robert D.
Schnitzer, Jay J.
Schuster, Samuel R.
Seashore, John H.
Seider, Erica
Shafer, Alan D.
Shaker, Issam J.
Shilyansky, Joel
Shim, Walton K. T.
Shochat, Stephen J.
Shrock, Peter
Sieber, William K.
Sigalet, David L.
Signer, Richard D.
Smith, E. Ide
Smith, Melvin D.
Smith, Samuel D.
Sneider, Erica
Snyder, Howard M.
Sola, Juan E.
Sonnino, Roberta E.
Stafford, Perry Worthington
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.
Thompson, W. Raleigh
Towne, Barbara H.
Trump, David S.
Tsao, KuoJen
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.
Weiss, Richard G.
Weissberg, Alan
Weitzman, Jordan
White, John J.
Wilson, Jay Mark
Wolf, Stephen A.
Wong, Andrew L.
Woolley, Morton M.
Wrenn, Earle L.
Yamataka, Atsuyuki
Yedlin, Steven
Yokoi, Akiko
Zeller, Kristen A.
Zerella, Joseph

Membership

Award Recipients

APSA Distinguished Service Award Recipients
Patricia K. Donahoe
Jay L. Grosfeld
W. Hardy Hendren
Harvey E. Beardmore
Lucian L. Leape
Thomas M. Holder
Marc I. Rowe
Stephen L. Gans

Robert E. Gross Award for Excellence in Pediatric Research and Achievement
Michael R. Harrison – 2016
Robert Bartlett, MD – 2015
Bradley M. Rodgers, MD - 2014

ACS/APSA Executive Leadership Program in Health Policy and Management Scholarship Award Recipients
David P. Bliss - 2016
Mike K. Chen - 2015
Max R. Langham, Jr. - 2014
Steven Teich - 2013
Peter W. Dillon - 2012
Patrick V. Bailey - 2011
Aviva L. Katz - 2010
Dennis P. Lund - 2009
George W. Holcomb, III - 2008

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

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

Award Recipients (cont.)

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

Award Recipients (cont.)

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

APSA Posters of Distinction

Basic Science

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

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

Award Recipients (cont.)

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

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

The Sheikh Zayed Institute Award for Innovation in Pediatric Surgery

This award, in the amount of $10,000, is presented for Best Innovation abstract. The award is supported by a generous grant from the Sheikh Zayed Institute for Pediatric Surgical Innovation at Children's National Medical Center, Washington, DC. The winning presentation is selected by a special committee.

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

Award Recipients (cont.)

Quality Award for Value in Surgery
Kathy Schall, MD - 2014
Jason W. Nielsen, MD - 2014

Travel Fellowship
The Travel Fellowship, supported by APSA and the APSA Foundation, is an annual award for young surgeons from a resource-poor area outside the United States and Canada to attend and experience the educational and networking opportunities of the APSA Annual Meeting. The winner attends and presents at the APSA Annual Meeting. The Travel Fellowship is supported by a generous grant from Sidra Medical and Research Center.

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

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 2015 – 2016

The APSA Board of Governors and Membership Congratulates Our Newest Members

Regular Members

Adibe, Obinna O.
Ahmed,Tamer A.
Akay, Begum
Askegard-Giesmann, Johanna R.
Beres, Alana
Dingeldein, Michael W.
Dzakovic, Alexander
Fenton, Stephen J.
Fialkowski, Elizabeth
Fitzgerald, Tamara
Fraser, Jason D.
Garrison, Aaron P.
Greenspon, Yosef J.
Grethel, Erich J.
Grossman, Eric
Guner, Yigit S.
Hanna, Angela M.
Heaton, Todd E.
Hogan, Anthony R.
Kanard, Robert C.
Kulungowski, Ann M.
Laituri, Carrie A.
Lesher, Aaron P.
Malek, Marcus M.
Marwan, Rony
Murrell, Zaria C.
Petrosyan, Mikael
Roach, Jonathan P.
Roaten, Jeffrey B.
Rodriguez, Jose Ruben
Roybal, Jessica L.
Ruscher, Kimberly A.
Smithers, Charles J.
Wall, James K.
Wallenstein, Kim
Walters, Kenneth C.
Whitehouse, Jill S.
Zequeira, Jorge J.

Associate Members

De la Torre, Luis
Sau, Indranil

International Members

Aboud, Mohammed J.
Martinez Leo, Bruno
McLennon, Noel J.
Yalcin, Sule

New Members 2015 – 2016

Candidate Members

Alvarez-Alleude, Carlos R.
Barlow, Meade P.
Berdan, Elizabeth A.
Boomer, Laura A.
Bowdish, Elizabeth A.
Carlisle, Erica M.
Chernoguz, Artur
Falk, Gavin A.
Gross, Erica R.
Hartwich, Joseph E.
Hill, Sarah J.
Hollinger, Laura E.
Jeziorczak, Paul M.
Kelley-Quon, Lorraine
Kiser, Michelle M.
Lofberg, Katrine
Nace, Gary
Naiditch, Jessica A.
Ralls, Matthew
Rhee, Daniel S.
Short, Scott S.
Tabak, Benjamin D.
Thirumoorthi, Arul S.
Thorson, Chad M.
Wright, Tiffany N.

Resident Members

Abd el-Shafy, Ibrahim
Anderson, Kathryn T.
Bairdain, Sigrid
Cameron, Danielle B.
Chotai, Pranit
Craig, Brian T.
Dickinson, Catherine M.
Flynn-O'Brien, Katherine T.
Glenn, Ian C.
Gonzalez-Hernandez, Jessica
Goodman, Laura
Grayson, Britney
Hamilton, Emma C.
Heinzerling, Nathan P.
Held, Jenny M.
Hill, Sarah J.
Jensen, Amanda
Khan, Faraz A.
Kotagal, Meera
Livingston, Michael H.
Lizardo, Radhames E.
Nolan, Heather R.
Olson, Jacob K.
Polites, Stephanie F.
Rellinger, Eric J.
Rowland, Kathryn J.
Staszak, Jessica K.
Walker, Sarah K.
Watson, Carey L.
Wilson, Nicole H.
Wong, Kaitlyn E.
Wood, Melissa L.

New Members 2015-2016

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 (2015–2016)

C. Dale Coln, 2016
Pieter A. deVries, 2016
Daniel M. Hays, 2016
Sigmund H. Ein, 2015
Hugh B. Lynn, 2015
Judson G. Randolph, 2015
William "Bill" Sieber, 2015
John M. Templeton, Jr., 2015
C. Eric Walburgh, 2015

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
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
Jacob A. Haller, 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

Charter Members (cont.)

Lester W. Martin, Bellbrook, OH
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

Friday, May 13

7:00 a.m. – 2:00 p.m.	APSA Board of Governors Meeting	*America's Cup A/B 4th Level, Harbor Tower*
2:30 p.m. – 6:00 p.m.	Association of Pediatric Surgery Training Program Directors Meeting	*Cortez Hill A/B/C 3rd Level, Seaport Tower*
3:00 p.m. – 7:00 p.m.	Registration Open	*Grand Hall Foyer, Lobby Level*
3:00 p.m. – 7:00 p.m.	Speaker Ready Room Open	*Grand Hall Foyer, Lobby Level*
3:00 p.m. – 7:00 p.m.	Internet Café Open/Twitter Fall	*Grand Hall Foyer, Lobby Level*
3:00 p.m. – 7:00 p.m.	APSA-IPSO Poster Presenter Set-up	*Grand Hall Foyer, Lobby Level*

Saturday, May 14

APSA-IPSO Symposium

6:00 a.m. – 8:00 a.m.	Committee Meetings (See page 59 for Ancillary Meeting Schedule)	
6:30 a.m. – 5:00 p.m.	Registration Open	*Grand Hall Foyer, Lobby Level*
6:30 a.m. – 5:00 p.m.	Speaker Ready Room Open	*Grand Hall Foyer, Lobby Level*
6:30 a.m. – 5:00 p.m.	Internet Café Open/Twitter Fall	*Grand Hall Foyer, Lobby Level*
6:30 a.m. – 5:30 p.m.	APSA-IPSO Poster Viewing	*Grand Hall Foyer, Lobby Level*
7:00 a.m. – 8:00 a.m.	APSA-IPSO Continental Breakfast	*Grand Hall Foyer, Lobby Level*
8:00 a.m. – 8:15 a.m.	Presidents' Welcome	*Grand Hall C, Lobby Level*
8:15 a.m. – 9:30 a.m.	**MIS: Getting the Diagnosis in the 21st Century: The Choice of Minimally Invasive Techniques and Molecular Correlates**	*Grand Hall C, Lobby Level*
9:30 a.m. – 10:00 a.m.	Refreshment Break	*Grand Hall Foyer, Lobby Level*
10:00 a.m. – 11:30 a.m.	**Cancer Abstracts**	*Grand Hall C, Lobby Level*
11:30 a.m. – Noon	**APSA-IPSO Symposium Poster Session**	*Grand Hall C, Lobby Level*
Noon – 1:30 p.m.	Lunch on your own	
1:30 p.m. – 3:30 p.m.	**Reconstruction Options in Cancer Surgery**	*Grand Hall C, Lobby Level*
3:30 p.m. – 3:45 p.m.	Refreshment Break	*Grand Hall Foyer, Lobby Level*
3:45 p.m. – 5:00 p.m.	**Spectacular and Challenging Cases**	*Grand Hall C, Lobby Level*
6:00 p.m. – 7:30 p.m.	APSA-IPSO Symposium Reception *(for registered APSA-IPSO Symposium attendees only)*	*Marina Courtyard, Lobby Level*
6:30 p.m. – 10:00 p.m.	APSA Publications Committee Meeting *(by invitation)*	*Cortez Hill C 3rd Level, Seaport Tower*

Sunday, May 15

APSA-IPSO Symposium/Education Day

6:00 a.m. – 7:30 a.m.	Committee Meetings (See page 59 for Ancillary Meeting Schedule)	
6:00 a.m. – 7:30 a.m.	Continental Breakfast	*Grand Hall Foyer, Lobby Level*
6:30 a.m. – 5:00 p.m.	Registration Open	*Grand Hall Foyer, Lobby Level*
6:30 a.m. – 5:00 p.m.	Speaker Ready Room Open	*Grand Hall Foyer, Lobby Level*
6:30 a.m. – 5:00 p.m.	Internet Café Open/Twitter Fall	*Grand Hall Foyer, Lobby Level*
7:30 a.m. – 7:45 a.m.	President's Welcome	*Grand Hall A/B, Lobby Level*

Schedule-at-a-Glance (cont.)

7:45 a.m. – 8:00 a.m.	**NEW** Past President Tribute	*Grand Hall A/B Lobby Level*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Suite Open	*Grand Lobby Lounge, Lobby Level*
8:00 a.m. – 11:00 a.m.	**Education Session I:** IPSO – Rare Tumors	*Grand Hall A/B, Lobby Level*
11:00 a.m. – Noon	**Outcomes and Evidence-based Practice Committee Systematic Reviews**	*Grand Hall A/B, Lobby Level*
11:00 a.m. – 3:00 p.m.	Exhibit Set-up	*Grand Hall C/D, Lobby Level*
Noon – 12:15 p.m.	**NEW** Health Policy Scholar Update Max R. Langham, Jr., MD, *University of Tennessee, Memphis, TN USA* Peter W. Dillon, MD, *Penn State Hershey Medical Center, Hershey, PA USA*	*Grand Hall A/B, Lobby Level*
12:15 p.m. – 12:45 p.m.	Box Lunch Pick-up	*Grand Hall Foyer, Lobby Level*
12:45 p.m. – 2:15 p.m.	**Case Debates and Controversies**	*Grand Hall A/B, Lobby Level*
2:15 p.m. – 4:15 p.m.	**Concurrent Education Sessions II & III**	
	Education Session II: The 4 Ps of Optimization of Care Through Innovation: Patients, Partnerships, Procedures, Pragmatism	*Grand Hall A/B, Lobby Level*
	Joint Session with APSNA **Education Session III:** Childhood Obesity and the Pediatric Surgery Team	*Coronado C-E Ballroom 4th Level, Harbor Tower*
3:00 p.m. – 7:00 p.m.	Poster Presenter Set-up	*Grand Hall C/D, Lobby Level*
3:00 p.m. – 5:30 p.m.	Exhibit Hall Open	*Grand Hall C/D, Lobby Level*
4:15 p.m. – 5:15 p.m.	Wine and Cheese Reception in the Exhibit Hall	*Grand Hall C/D, Lobby Level*
4:30 p.m. – 6:15 p.m.	**Concurrent Poster Sessions**	
	Poster Session I: Basic Science, CDH, Critical Care	*Grand Hall A/B, Lobby Level*
	Poster Session II: Clinical Surgery	*Coronado C-E Ballroom 4th Level, Harbor Tower*
6:30 p.m. – 7:00 p.m.	New Member Rehearsal *(by invitation)*	*Grand Hall A/B, Lobby Level*
7:00 p.m. – 9:00 p.m.	APSA Welcome Reception *(for registered APSA attendees)*	*4th Floor Pool Deck 4th Level, Seaport Tower*

Monday, May 16

6:00 a.m. – 7:30 a.m.	Committee Meetings (See page 59 for Ancillary Meeting Schedule)	
6:15 a.m. – 7:30 a.m.	APSA Foundation Board Meeting *(by invitation)*	*Cortez Hill A 3rd Level, Seaport Tower*
6:30 a.m. – 7:30 a.m.	Continental Breakfast	*Grand Hall C/D, Lobby Level*
6:30 a.m. – 1:00 p.m.	Poster Hall Open	*Grand Hall C/D, Lobby Level*
6:30 a.m. – 1:00 p.m.	Exhibit Hall Open	*Grand Hall C/D, Lobby Level*
6:30 a.m. – 2:00 p.m.	Registration Open	*Grand Hall Foyer, Lobby Level*
6:30 a.m. – 2:00 p.m.	Speaker Ready Room Open	*Grand Hall Foyer, Lobby Level*
6:30 a.m. – 2:00 p.m.	Internet Café Open/Twitter Fall	*Grand Hall Foyer, Lobby Level*
7:30 a.m. – 9:00 a.m.	**NEW Plenary Session I**	*Grand Hall A/B, Lobby Level*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Suite Open	*Grand Lobby Lounge, Lobby Level*

Schedule-at-a-Glance (cont.)

9:00 a.m. – 10:00 a.m.	**Robert E. Gross Lecture** presented by Mary E. Fallat, MD, *University of Louisville, Louisville, KY USA*	*Grand Hall A/B, Lobby Level*
10:00 a.m. – 10:45 a.m.	Refreshment Break	*Grand Hall C/D, Lobby Level*
10:45 a.m. – 12:15 p.m.	**Concurrent Scientific Sessions I & II**	
	Scientific Session I: Clinical Surgery I – CDH, Anorectal, IBD, General	*Grand Hall A, Lobby Level*
	Scientific Session II: Neonatal, Venolymphatic Malformations, Pancreaticobiliary	*Grand Hall B, Lobby Level*
12:15 p.m. – 1:15 p.m.	**Innovation Session**	*Grand Hall B, Lobby Level*
1:15 p.m.	Leisure Time	
1:30 p.m. – 3:30 p.m.	Benjy Brooks Society Luncheon *(pre-registration required)*	*America's Cup A-D* *4th Level, Harbor Tower*
1:30 p.m. – 7:30 p.m.	**Ultrasound for Pediatric Surgeons** *(pre-registration required)*	*Coronado Ballroom* *4th Level, Harbor Tower*
4:30 p.m. – 5:30 p.m.	Residents Reception	*America's Cup A-D* *4th Level, Harbor Tower*
5:00 p.m. – 6:30 p.m.	*Journal of Pediatric Surgery* Reception *(by invitation)*	*Cortez Hill A-B* *3rd Level, Seaport Tower*
6:30 p.m. – 7:30 p.m.	APSA Foundation Reception *(by invitation)*	*Marina, Lobby Level*

Tuesday, May 17

6:00 a.m. – 4:00 p.m.	Registration Open	*Grand Hall Foyer, Lobby Level*
6:00 a.m. – 4:00 p.m.	Speaker Ready Room Open	*Grand Hall Foyer, Lobby Level*
6:00 a.m. – 4:00 p.m.	Internet Café Open/Twitter Fall	*Grand Hall Foyer, Lobby Level*
6:30 a.m. – 7:00 a.m.	Annual Business Meeting	*Grand Hall B, Lobby Level*
6:30 a.m. – 8:00 a.m.	Continental Breakfast for Nonmembers	*Grand Hall C/D, Lobby Level*
6:30 a.m. – 10:00 a.m.	Poster Hall Open	*Grand Hall C/D, Lobby Level*
6:30 a.m. – 10:00 a.m.	Exhibit Hall Open	*Grand Hall C/D, Lobby Level*
7:00 a.m. – 8:00 a.m.	Town Hall Meeting	*Grand Hall B, Lobby Level*
8:00 a.m. – 9:15 a.m.	**Concurrent Scientific Sessions III & IV**	
	Scientific Session III: Clinical Surgery II — Quality Improvement	*Grand Hall A, Lobby Level*
	Scientific Session IV: Basic Science II — NEC/Intestinal Ischemia, Short Gut/Tissue Engineering	*Grand Hall B, Lobby Level*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Suite Open	*Grand Lobby Lounge, Lobby Level*
9:15 a.m. – 10:00 a.m.	Poster Presenters Take Down Presentations	*Grand Hall C/D, Lobby Level*
9:15 a.m. – 10:00 a.m.	Refreshment Break	*Grand Hall C/D, Lobby Level*
10:00 a.m.	Exhibit Dismantle	*Grand Hall C/D, Lobby Level*
10:00 a.m. – 11: 00 a.m.	***Journal of Pediatric Surgery* Lecture** presented by Michael W. Collins, PhD, *University of Pittsburgh Medical Center, Pittsburgh, PA USA*	*Grand Hall A/B, Lobby Level*
11:00 a.m. – Noon	**NEW Plenary Session II**	*Grand Hall A/B, Lobby Level*

Schedule-at-a-Glance (cont.)

Noon – 12:45 p.m.	**Jay and Margie Grosfeld Lecture** presented by Vinay Nadkarni, MD, MS, *Children's Hospital of Philadelphia, University of Pennsylvania, Philadelphia, PA USA*	*Grand Hall A/B, Lobby Level*
12:45 p.m. – 1:15 p.m.	Box Lunch Pick-up	*Grand Hall Foyer, Lobby Level*
1:15 p.m. – 1:45 p.m.	APSA Foundation Scholars William H. Peranteau, *Children's Hospital of Philadelphia, Philadelphia, PA USA* Bradley J. Segura, *University of Minnesota, Masonic Children's Hospital, Minneapolis, MN USA*	*Grand Hall A/B, Lobby Level*
1:45 p.m. – 2:15 p.m.	Travel Fellows Christian Pais, MD, *Military Hospital, Dept. of Pediatric Surgery, Quito, Ecuador* Esther Saguil, *MD, Philippine General Hospital, Manila, Philippines*	*Grand Hall A/B, Lobby Level*
2:15 p.m. – 2:30 p.m.	New Member Introductions	*Grand Hall A/B, Lobby Level*
2:30 p.m. – 3:15 p.m.	**NEW Plenary Lecture** presented by Mary L. Brandt, MD, *Baylor College of Medicine, Houston, TX USA*	*Grand Hall A/B, Lobby Level*
3:15 p.m. – 4:15 p.m.	**Video Session**	*Grand Hall A/B, Lobby Level*
4:30 p.m. – 5:30 p.m.	NaT Reception (by invitation)	*Cortez Hill A/B 3rd Level, Seaport Tower*
6:30 p.m. – 7:00 p.m.	President's Reception	*Marina Courtyard, Lobby Level*
7:00 p.m. – 10:00 p.m.	President's Banquet	*Grand Hall A/B, Lobby Level*
10:00 p.m.	**Meeting Concludes**	

Ancillary Meeting by Group

Committee	Date/Time	Room
AAP Publications Committee	Monday, May 16, 6:00 a.m. - 7:00 a.m.	America's Cup A 4th Level Harbor Tower
AAP SoSu Committee on Delivery of Surgical Care	Saturday, May 14, 7:00 a.m. - 8:00 a.m.	Torrey Hills B 3rd Level Seaport Tower
AAP SoSu EC	Saturday, May 14, Noon - 3:30 p.m.	Cortez Hill C 3rd Level Seaport Tower
AAP SoSu Strategic Planning	Saturday, May 14, 10:30 a.m. - 12:30 p.m.	Cortez Hill B 3rd Level Seaport Tower
ABS PSB Focus Group	Sunday, May 15, 6:30 p.m. - 7:15 p.m.	Ocean Beach 3rd Level Seaport Tower
APSA Foundation Board	Monday, May 16, 6:15 a.m. - 7:30 a.m.	Cortez Hill A 3rd Level Seaport Tower
APSA Foundation Reception *by invitation*	Monday, May 16, 6:30 p.m. - 7:30 p.m.	Marina, Lobby Level
Association of Pediatric Surgery Training Program Directors (APSTPD)	Friday, May 13, 2:30 p.m. - 6:00 p.m.	Cortez Hill A-C 3rd Level Seaport Tower
Audit Committee	Saturday, May 14, 7:00 a.m. - 8:00 a.m.	Torrey Hills A 3rd Level Seaport Tower
Baylor (BCM) Reunion	Monday, May 16, 5:00 p.m. - 7:00 p.m.	Nautical 4th Level Harbor Tower
Benjy Brooks Luncheon	Monday, May 16, 1:30 p.m. - 3:30 p.m.	America's Cup A-D 4th Level Harbor Tower
Board of Governors	Friday, May 13, 7:00 a.m. - 2:00 p.m.	America's Cup A-B 4th Level Harbor Tower
Cancer Committee	Sunday, May 15, 6:30 a.m. - 7:30 a.m.	Golden Hill A 3rd Level Seaport Tower
Childhood Obesity Committee	Monday, May 16, 6:00 a.m. - 7:15 a.m.	Cortez Hill B 3rd Level Seaport Tower

Ancillary Meeting by Group (cont.)

Committee	Date/Time	Room
Education Committee	Saturday, May 14, 6:30 a.m. - 8:00 a.m.	Golden Hill A 3rd Level Seaport Tower
Ethics Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	Cortez Hill C 3rd Level Seaport Tower
Fetal Diagnosis & Treatment Committee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	Golden Hill B 3rd Level Seaport Tower
Florida Association of Pediatric Surgeons (FAPS)	Tuesday, May 17, 4:30 p.m. - 5:30 p.m.	Cortez Hill C 3rd Level Seaport Tower
Global Pediatric Surgery Dinner *by invitation*	Monday, May 16, 7:30 p.m.	Sally's On The Water
Global Pediatric Surgery Committee	Monday, May 16, 6:30 a.m. - 7:30 a.m.	Golden Hill A 3rd Level Seaport Tower
Global Pediatric Surgery TF	Monday, May 16, 4:00 p.m. - 5:00 p.m.	Golden Hill B 3rd Level Seaport Tower
Health Policy & Advocacy Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	Golden Hill B 3rd Level Seaport Tower
Hirschsprung's Disease Interest Group	Sunday, May 15, 6:30 a.m. - 7:30 a.m.	Cortez Hill A 3rd Level Seaport Tower
History Ad Hoc Committee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	Torrey Hills A 3rd Level Seaport Tower
Industry Advisory Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	Torrey Hills A 3rd Level Seaport Tower
Informatics & Telemedicine Committee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	Cortez Hill B 3rd Level Seaport Tower
JPS Reception *by invitation*	Monday, May 16, 5:00 p.m. - 6:30 p.m.	Cortez Hill A-B 3rd Level Seaport Tower
Membership & Credentials Committee	Monday, May 16, 6:30 a.m. - 7:30 a.m.	Torrey Hills B 3rd Level Seaport Tower

Ancillary Meeting by Group (cont.)

Committee	Date/Time	Room
NaT Reception	Tuesday, May 17, 4:30 p.m. - 5:30 p.m.	Cortez Hill A-B 3rd Level Seaport Tower
New Technology Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	America's Cup C 4th Level Harbor Tower
Outcomes and Evidence-based Practice Committee	Saturday, May 14, 7:00 a.m. - 8:00 a.m.	Golden Hill B 3rd Level Seaport Tower
Patient/Family Subcommittee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	Torrey Hills B 3rd Level Seaport Tower
Practice Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	America's Cup D 4th Level Harbor Tower
Program Committee	Sunday, May 15, 6:30 a.m. - 7:30 a.m.	Cortez Hill C 3rd Level Seaport Tower
Publications Committee	Saturday, May 14, 6:30 p.m. - 10:00 p.m.	Cortez Hill C 3rd Level Seaport Tower
Research Ad Hoc Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	Ocean Beach 3rd Level
Residents Reception	Monday, May 16, 4:30 p.m. - 5:30 p.m.	America's Cup A-D 4th Level Harbor Tower
Simulation Subcommittee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	America's Cup C 4th Level Harbor Tower
Simulation-based Education Study Group *by invitation*	Saturday, May 14, 6:00 a.m. - 7:00 a.m.	Cortez Hill A 3rd Level Seaport Tower

Ancillary Meeting by Group (cont.)

Committee	Date/Time	Room
Surgical Critical Care Committee	Saturday, May 14, 7:00 a.m. - 8:00 a.m.	Cortez Hill B 3rd Level Seaport Tower
Surgical Quality & Safety Committee	Monday, May 16, 4:30 p.m. - 6:00 p.m.	Golden Hill A 3rd Level Seaport Tower
Trauma Committee	Monday, May 16, 7:00 a.m. - 8:00 a.m.	America's Cup A 4th Level Harbor Tower
Workforce Committee	Sunday, May 15, 6:30 a.m. - 7:30 a.m.	America's Cup D 4th Level Harbor Tower

Ancillary Meeting by Day

Committee	Date/Time	Room
Friday, May 13		
Board of Governors	Friday, May 13, 7:00 a.m. - 2:00 p.m.	America's Cup A-B 4th Level Harbor Tower
Association of Pediatric Surgery Training Program Directors (APSTPD)	Friday, May 13, 2:30 p.m. - 6:00 p.m.	Cortez Hill A-C 3rd Level Seaport Tower
Saturday, May 14		
Simulation-based Education Study Group	Saturday, May 14, 6:00 a.m. - 7:00 a.m.	Cortez Hill A 3rd Level Seaport Tower
Education Committee	Saturday, May 14, 6:30 a.m. - 8:00 a.m.	Golden Hill A 3rd Level Seaport Tower
AAP SoSu Committee on Delivery of Surgical Care	Saturday, May 14, 7:00 a.m. - 8:00 a.m.	Torrey Hills B 3rd Level Seaport Tower
Audit Committee	Saturday, May 14, 7:00 a.m. - 8:00 a.m.	Torrey Hills A 3rd Level Seaport Tower
Outcomes Committee and Evidence-based Practice	Saturday, May 14, 7:00 a.m. - 8:00 a.m.	Golden Hill B 3rd Level Seaport Tower
Surgical Critical Care Committee	Saturday, May 14, 7:00 a.m. - 8:00 a.m.	Cortez Hill B 3rd Level Seaport Tower
AAP SoSu Strategic Planning	Saturday, May 14, 10:30 a.m. - 12:30 p.m.	Cortez Hill B 3rd Level Seaport Tower
AAP SoSu EC	Saturday, May 14, Noon - 3:30 p.m.	Cortez Hill C 3rd Level Seaport Tower
Publications Committee	Saturday, May 14, 6:30 p.m. - 10:00 p.m.	Cortez Hill C 3rd Level Seaport Tower

Ancillary Meeting by Day (cont.)

Committee	Date/Time	Room
Sunday, May 15		
Fetal Diagnosis & Treatment Committee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	Golden Hill B 3rd Level Seaport Tower
History Ad Hoc Committee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	Torrey Hills A 3rd Level Seaport Tower
Informatics & Telemedicine Committee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	Cortez Hill B 3rd Level Seaport Tower
Patient/Family Subcommittee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	Torrey Hills B 3rd Level Seaport Tower
Simulation Subcommittee	Sunday, May 15, 6:00 a.m. - 7:30 a.m.	America's Cup C 4th Level Harbor Tower
Cancer Committee	Sunday, May 15, 6:30 a.m. - 7:30 a.m.	Golden Hill A 3rd Level Seaport Tower
Hirschsprung's Disease Interest Group	Sunday, May 15, 6:30 a.m. - 7:30 a.m.	Cortez Hill A 3rd Level Seaport Tower
Program Committee	Sunday, May 15, 6:30 a.m. - 7:30 a.m.	Cortez Hill C 3rd Level Seaport Tower
Workforce Committee	Sunday, May 15, 6:30 a.m. - 7:30 a.m.	America's Cup D 4th Level Harbor Tower
ABS PSB Focus Group	Sunday, May 15, 6:30 p.m. - 7:15 p.m.	Ocean Beach 3rd Level Seaport Tower

Committee	Date/Time	Room
Monday, May 16		
AAP Publications Committee	Monday, May 16, 6:00 a.m. - 7:00 a.m.	America's Cup A 4th Level Harbor Tower
Childhood Obesity Committee	Monday, May 16, 6:00 a.m. - 7:15 a.m.	Cortez Hill B 3rd Level Seaport Tower
Health Policy & Advocacy Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	Golden Hill B 3rd Level Seaport Tower

Ancillary Meeting by Day (cont.)

Committee	Date/Time	Room
Monday, May 16		
Industry Advisory Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	Torrey Hills A 3rd Level Seaport Tower
New Technology Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	America's Cup C 4th Level Harbor Tower
Practice Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	America's Cup D 4th Level Harbor Tower
Research Ad Hoc Committee	Monday, May 16, 6:00 a.m. - 7:30 a.m.	Ocean Beach 3rd Level
Ethics Committee	Monday, May 16, 6:00 a.m. -7:30 a.m.	Cortez Hill C 3rd Level Seaport Tower
APSA Foundation Board	Monday, May 16, 6:15 a.m. -7:30 a.m.	Cortez Hill A 3rd Level Seaport Tower
Membership & Credentials Committee	Monday, May 16, 6:30 a.m. - 7:30 a.m.	Torrey Hills B 3rd Level Seaport Tower
Global Pediatric Surgery Committee	Monday, May 16, 6:30 a.m. -7:30 a.m.	Golden Hill A 3rd Level Seaport Tower
Trauma Committee	Monday, May 16, 7:00 a.m. - 8:00 a.m.	America's Cup A 4th Level Harbor Tower
Global Pediatric Surgery TF	Monday, May 16, 4:00 p.m. - 5:00 p.m.	Golden Hill B 3rd Level Seaport Tower
Surgical Quality & Safety Committee	Monday, May 16, 4:30 p.m. - 6:00 p.m.	Golden Hill A 3rd Level Seaport Tower
JPS Reception *by invitation*	Monday, May 16, 5:00 p.m. - 6:30 p.m.	Cortez Hill A-B 3rd Level Seaport Tower
Baylor (BCM) Reunion	Monday, May 16, 5:00 p.m. - 7:00 p.m.	Nautical 4th Level Harbor Tower
Residents Reception	Monday May 16, 6:30 p.m. - 7:00 p.m.	America's Cup A-D 4th Level Harbor Tower
APSA Foundation Reception *by invitation*	Monday, May 16, 6:30 p.m. - 7:30 p.m.	Marina, Lobby Level

Ancillary Meeting by Day (cont.)

Committee	Date/Time	Room
Monday, May 16		
Global Pediatric Surgery Dinner *by invitation*	Monday, May 16, 7:30 p.m.	Sally's On The Water
Tuesday, May 17		
Florida Association of Pediatric Surgery (FAPS)	Tuesday, May 17, 4:30 p.m. - 5:30 p.m.	Cortez Hill C 3rd Level Seaport Tower
NaT Reception	Tuesday, May 17, 4:30 p.m. - 5:30 p.m.	Cortez Hill A-B 3rd Level Seaport Tower

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 research efforts.

The APSA Annual Meeting covers the breadth of pediatric surgery and is intended to acquaint attendees with the latest research findings, updates on evidence-based care guidelines, innovations in quality improvement and clinical discoveries and trends that influence the day-to-day practice of pediatric surgery. Specific sessions relating to educating members on new developments in medical technology have been added to supplement the traditional sessions on clinical practice and basic science research chosen by the Program and Education Committees. The scientific sessions consist of basic research and practical clinical presentations. The poster sessions are intended to provide young investigators an opportunity to share preliminary clinical research, basic science work and novel ideas.

Accreditation Statement

The American Pediatric Surgical Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education 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 2016 Annual Meeting

APSA designates this live activity for a maximum of 20 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

APSA-IPSO Symposium

APSA designates this live activity for a maximum of 10 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Delegates attending all sessions of the APSA-IPSO Symposium and APSA 2016 Annual Meeting can claim a maximum of 27.5 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 (ACCME) 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 (CME) 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.

Penny L. Andrews
Draeger supplied equipment for the study (ventilators, monitors, neonatal beds)

Sean Barnett
Ownership/Interest: Ascend Innovations, Inc.

Michael Collins
Stockholder: Co-Founder/Board Member, ImPACT Applications

Marcus G. Davey
Grant/Research Support: Internal funding.
Intellectual Property: Hospital-owned

Ian Finlay
Ownership/Interest: Action Ortho Sante

Alan W. Flake
Grant/Research Support: Internal funding.
Intellectual Property: Hospital-owned

Joerg Fuchs
Cooperation treaty between presenter's institution and Karl Storz Company

Kathleen M. Gura
Consulting: BASF. Intellectual Property: Fresenius Kabi

Nader M. Habashi
Draeger supplied equipment for the study (ventilators, monitors, neonatal beds)

David A. Hinds
Salary: 23andMe, Inc.

Sumeet V. Jain
Draeger supplied equipment for the study (ventilators, monitors, neonatal beds)

Michaela C. Kollisch-Singule
Draeger supplied equipment for the study (ventilators, monitors, neonatal beds)

Hollie Lai
Grant/Research Support: Siemen's Medical Solutions USA, Inc.

Peter F. Nichol
Stockholder/Ownership: MedAware Systems

Gary F. Nieman
Draeger supplied equipment for the study (ventilators, monitors, neonatal beds)

Samir Pandya
Consultant: Carefusion Industry Advisory Board (October 2014 - October 2015)

Disclosures (cont.)

Emily A. Partridge
Grant/Research Support: Internal funding.
Intellectual Property: Hospital-owned

Todd Ponsky
Ownership/Interest: Global Cast MD

Mark Puder
Consulting: BASF. Grant/Research Support: BASF. Intellectual Property: Fresenius Kabi

Joshua Satalin
Draeger supplied equipment for the study (ventilators, monitors, neonatal beds)

Carrie J. Shawber
Grant/Research Support: Eisai. Intellectual Property: Eisai

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.

Sean Barnett – New Technology Committee
Ownership/Interest: Ascend Innovations, Inc.

Sanjeev Dutta – New Technology Committee
Johnson & Johnson, employee, stock + cash comp; Stryker, consultant, cash comp

Romeo Ignacio – Education Committee
Abbott Laboratories, stockholder; AbbVie, stockholder

Daniel Ostlie, MD – Program Committee
JustRight Surgical, Part Owner

Samir Pandya – Practice Committee
Consultant: Carefusion Industry Advisory Board (October 2014 - October 2015)

Todd Ponsky – Informatics and Telemedicine Committee
Ownership/Interest: Global Cast MD

Steven Teich – New Technology Committee
EndoStim, Inc., consultant

Robert E. Gross Lecture

Monday, May 16, 2016 | 9:00 - 10:00 a.m.
Mary E. Fallat, MD
Hirikati S. Nagaraj Professor and Chair
Div. of Pediatric Surgery, Dept. of Surgery,
University of Louisville
Louisville, KY USA

Redefining Ladd's Path

Mary E. Fallat, MD, FACS, FAAP, is APSA's current president and Surgeon-in-Chief of Kosair Children's Hospital, chief of pediatric surgery and the first Hirikati S. Nagaraj endowed Professor in Pediatric Surgery at the University of Louisville. She is also the program director of the U of L Pediatric Surgery Training Program, serves on the ACS Board of Governors, is the chair of the AAP Committee on Bioethics.

Fallat's Research Laboratory in Reproductive Endocrinology and Study of Hormone MIS at Kosair Children's Hospital focuses on the current treatment of CDH; assessing the financial burden of community-acquired MRSA; neonates with gastrointestinal perforations; abdominal lymphangioma in children; early human ovarian follicle classification; receptor expression and *in vitro* growth; and comparison of assay techniques for determination of serum levels of MIS.

She has been the recipient of more than 40 grants and has served on the editorial board of various publications. Fallat has presented at numerous scientific conferences and authored hundreds of articles. She has served in leadership roles to a variety of organizations including the AAST, the American Heart Association, ACS, AAP, ABS, APSTPD, the Institute of Medicine and the Children's Hospital Association.

Her work has been honored with awards including: the Golden Cross Award for Trauma System Development in Kentucky from the American College of Emergency Physicians, Kentucky Chapter; the National EMSC Heroes Award 2008 Policy Leader of Distinction; the Kosair Charities Roger Fox Award; the Compassionate Physician of the Year – Jewish Hospital/St. Mary's Hospital Foundation and the Leonard Tow Humanism in Medicine Award from the University of Louisville.

Journal of Pediatric Surgery Lecture

Tuesday, May 17, 2016 | 10:00 - 11:00 a.m.

Michael W. Collins, PhD
Director, Concussion Program
University of Pittsburgh Medical Center
Pittsburgh, PA USA

Sport-Related Concussion: Moving in the Right Direction

Michael "Micky" Collins, PhD, is an internationally renowned expert in sports-related concussion. A leading clinician and researcher, Collins serves as director and a founding member of the UPMC Sports Medicine Concussion Program. Established in 2000, it was the first program of its kind and remains the largest research and clinical program focused on the assessment, treatment, rehabilitation, research and education of sports-related mild traumatic brain injury in athletes of all levels. The program has roughly 20,000 patient visits annually, attracting patients embodying youth, high-school, collegiate and pro athletes with concerns about safe return to play and clinical management and treatment of sports concussion.

Collins has been the lead author or co-author on more than 90 peer-reviewed research articles, and has delivered more than 350 presentations at scientific meetings. He currently has upward of $6 million in research funding from entities including the NFL-GE Head Health Challenge, NIH, Major League Baseball and the U.S. Army Special Operations Command.

He has been an instrumental source in developing concussion-management policy in youth sports, state legislation on youth safety, the Centers for Disease Control's concussion toolkit and pioneering targeted treatment pathways for his patients. He is a co-founder of ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing), the most widely used computerized sports-concussion evaluation system that has become a standard of care in nearly all organized sports at all levels. He is a leader in educating and implementing the proper usage of such baseline and post-injury neurocognitive testing as one tool to help determine an injury's severity and recovery for safe return to play.

Collins has trained thousands of physicians and certified athletic trainers and advises and consults numerous athletic organizations and teams — including various NFL teams, MLB clubs, NCAA programs, USA Rugby and Cirque De Soleil. He also serves on the editorial boards of various publications. He has received numerous honoring his dedication to the diagnosis, management and treatment of sports-related concussion.

Jay and Margie Grosfeld Lecture

Tuesday, May 17, 2016 | Noon –12:45 p.m.

Vinay Nadkarni MD, MS, FCCM, FERC, FAHA
Professor and Endowed Chair
Children's Hospital of Philadelphia, University of Pennsylvania
Philadelphia, PA USA

Resuscitating Resuscitation: Disruptive Innovations — Learning from the Past, Present and Toward a Brighter Future!

Vinay Nadkarni, MD, MS, FCCM, FERC, FAHA, is the Endowed Chair of Critical Care Medicine, director of the Center for Simulation, Advanced Education and Innovation at Children's Hospital of Philadelphia and the associate director of the Center for Resuscitation Science at the University of Pennsylvania Perelman School of Medicine. He is an internationally recognized physician-scientist with a longstanding commitment to the discovery, translation and implementation of shock, trauma and resuscitation science. He serves as co-chair of the International Liaison Committee on Resuscitation (ILCOR, 2007-2015), the leading scientific liaison collaborative for the resuscitation councils of Europe, Canada, Latin America, South Africa, Asia, Australia and New Zealand. He was chairman of the national AHA Emergency Cardiovascular Committee 2006-2010. With national colleagues, he formed a scientific advisory board, which founded and obtained funding for an AHA National Registry of CPR to collect, analyze, and publish national trends in the process and outcomes of in-hospital cardiac arrest.

As the founding medical director of the Center for Simulation, Advanced Education and Innovation, he pioneered one of the first and most recognized simulation education programs dedicated to children in the world. Since 2001, CHOP has contributed to the development, testing and adaptation of novel computerized simulators, skill-training programs and teaching/learning approaches.

Nadkarni has authored more than 250 peer-reviewed manuscripts and 30 book chapters. His appointment to the board of directors of the World Federation of Pediatric Intensive and Critical Care Societies (2007-2013) and the AHA's Science Advisory and Coordinating Council and 2006-2020 AHA Strategic Planning Committees herald his ability to influence the national and international research and training agendas. He has trained, mentored and advised more than 100 young physician-scientists. Nadkarni has received numerous major awards honoring his lifelong focus on simulation and its potential to improve care for pediatric patients worldwide.

Plenary Lecture

Tuesday, May 17, 2016 | 2:30 - 3:15 p.m.
Mary L. Brandt, MD
Professor of Surgery and Pediatrics and Senior Associate Dean of Student Affairs
Baylor College of Medicine
Houston, TX USA

Sustaining a Career

Mary L. Brandt, MD, is a professor of Surgery, Pediatrics and Ethics at Baylor College of Medicine. She is a recognized educator and has been the recipient of numerous teaching awards. She has held various leadership roles in education and is currently Senior Associate Dean of Student Affairs at Baylor College of Medicine.

Brandt is a busy pediatric surgeon based at Texas Children's Hospital, with clinical expertise in general pediatric surgery, bariatric surgery, endocrine surgery, biliary atresia and anorectal malformations. She has served in a number of national leadership positions in the American Academy of Pediatrics, the American Pediatric Surgical Association, the American Board of Surgery (Pediatric Surgery Board) and is a Governor of the American College of Surgeons. Brandt is an established and successful clinical researcher with more than 170 peer reviewed publications, 26 chapters and 2 books published to date.

As a mentor to students, residents and faculty, she has developed a strong interest in self-care for physicians and speaks regularly on compassion fatigue, work-life balance and the art of medicine. She writes about these issues in her blog, www.wellnessrounds.org, and is currently working on a book titled "Don't Hurt Anything that Has a Name: A Field Guide to Learning and Practicing Medicine."

APSA 2016 Foundation Scholars

Tuesday, May 17 | 1:15 – 1:30 p.m.

William H. Peranteau
Children's Hospital of Philadelphia
Philadelphia, PA USA

***In Utero* Hematopoietic Cell Transplantation for the Treatment of Congenital Disorders**

Tuesday, May 17 | 1:30 – 1:45 p.m.

Bradley J. Segura
University of Minnesota, Masonic Children's Hospital
Minneapolis, MN USA

The Role of Enteric Glia in Pediatric Intestinal Inflammation

APSA 2016 Travel Fellows

Tuesday, May 17 | 1:45 – 2:00 p.m.

Christian Pais, MD
Military Hospital, Dept. of Pediatric Surgery
Quito, Ecuador

Pediatric Surgery, My "Axis of Action"

"My passion is the work with tumors, protocols, hard surgeries, dissections, etc. [I am] looking for a better prognosis in the patient."

Dr. Christian Pais is dedicated to providing high-quality treatment to pediatric patients and to sharing knowledge with pediatricians and pediatric surgeons to help their practice. He plans to develop pediatric surgery in a first level hospital, create a surgical training program for residents and develop one of the most important centers in the management of pediatric tumors in Quito, Ecuador. His professional experience includes serving as chief of residents, chief of emergency and chief of surgery at various hospitals in Ecuador.

Tuesday, May 17 | 2:00 – 2:15 p.m.

Esther Saguil, MD
Philippine General Hospital
Manila, Philippines

The Practice of Pediatric Surgery in the Philippines

"I hope to be able to do what I do for a long time – teach and assist residents and medical students, take care of pediatric surgical patients, and basically, take care of our own."

Dr. Esther Saguil is one of only 49 pediatric surgeons in a country with a population reaching 100 million, 60% of whom are under the age of 18. She devotes her entire clinical practice to caring for pediatric patients with neglected surgical diseases who are referred to the Philippine General Hospital, the primary teaching Institution of the University of the Philippines College of Medicine and a public hospital serving the poor and uninsured. In addition to her clinical practice, Saguil is dedicated to mentoring medical students and clinical research. She has published in peer-reviewed journals and also presented at various medical conferences.

APSA Past Meeting Lectures

Journal of Pediatric Surgery Lectures

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

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

APSA Past Meeting Lectures (cont.)

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

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

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

APSA Past Meeting Lectures (cont.)

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

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

APSA Past Meeting Lectures (cont.)

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

Jay & Margie Grosfeld Lectures

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

APSA Past Meeting Lectures (cont.)

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

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

International Guest Lectures

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

APSA Past Meeting Lectures (cont.)

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

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?

APSA 2016 Annual Meeting Program in Detail

Program in Detail

Saturday, May 14

APSA-IPSO SYMPOSIUM

Presidents' Welcome

8:00 a.m. – 8:15 a.m.

IPSO President **Stephen J. Shochat, MD** and APSA President **Mary E. Fallat, MD**

MIS: Getting the Diagnosis in the 21st Century: The Choice of Minimally Invasive Techniques and Molecular Correlates

8:15 a.m. – 9:30 a.m. *Grand Hall C, Lobby Level*

Moderators: Mary E. Fallat, MD; Stephen J. Shochat, MD

Learning Objectives

At the conclusion of this session, participants will be able to:

- assess when MIS is safe and when it could impair cure/relapse rates
- differentiate perspectives of PET Scan for surgery
- illustrate the importance of genetic markers in pediatric cancer diagnosis and treatment

Laparoscopy
Joerg Fuchs, MD

Thoracoscopy
Israel Fernandez-Pineda, MD

PET Scan Predictability in Pediatric Solid Tumors
Hollie Lai, MD

Genetic Marker
Jed G. Nuchtern, MD

Discussion

Cancer Abstracts

10:00 a.m. – 11:30 a.m. *Grand Hall C, Lobby Level*

Moderators: Simone Abib, MD; Max R. Langham, Jr., MD

Learning Objectives

At the conclusion of this session, participants will be able to:

- network with and question a group of ISO investigators
- analyze clinical outcomes
- discuss long-term surgical related morbidity in children

IPSO 1

OUTCOMES OF CHEST WALL RESECTIONS IN PEDIATRIC SARCOMA PATIENTS

Carmen Lopez[1], Arlene Correa, PhD[2], Ara A. Vaporciyan, MD[2], Mary T. Austin, MD, MPH[2], David C. Rice, MD[2], Andrea A. Hayes-Jordan, MD[2].

[1]University of Texas Health Science Center - Houston, Houston, TX, USA, [2]MD Anderson Cancer Center, Houston, TX, USA.

Program in Detail (cont.)

IPSO 2

PREDICTORS OF NODAL METASTASIS IN PEDIATRIC DIFFERENTIATED THYROID CANCER

Jina Kim, MD, Zhifei Sun, MD, Mohamed A. Adam, MD, Sanziana A. Roman, MD, Obinna O. Adibe, MD, Henry E. Rice, MD, Elisabeth T. Tracy, MD.

Duke University Medical Center, Durham, NC, USA.

IPSO 3

PREDICTORS FOR THE DEVELOPMENT AND FUNCTIONAL OUTCOMES OF SCOLIOSIS IN LONG-TERM SURVIVORS OF SARCOMA

Rodrigo B. Interiano, MD, Sue C. Kaste, DO, Chenghong Li, PhD, Deo Kumar Srivastava, PhD, Bhaskar N. Rao, MD, Daniel M. Green, MD, Leslie L. Robison, PhD, Andrew M. Davidoff, MD, Kirsten K. Ness, PhD, Melissa M. Hudson, MD, Israel Fernandez-Pineda, MD.

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

IPSO 4

COMPREHENSIVE EVALUATION OF LONG-TERM RENAL FUNCTION IN PATIENTS TREATED FOR SYNCHRONOUS BILATERAL WILMS TUMOR

Rodrigo B. Interiano, MD[1], Kathleen Kieran, MD[2], M. Elizabeth McCarville, MD[1], Noel Delos Santos, MD[3], Shenghua Mao, PhD[1], Jianrong Wu, PhD[1], Rachel C. Brennan, MD[1], Matthew J. Krasin, MD[1], Mark A. Williams, MD[1], Daniel M. Green, MD[1], Andrew M. Davidoff, MD[1].

[1]St. Jude Children's Research Hospital, Memphis, TN, USA, [2]University of Iowa Children's Hospital, Iowa City, IA, USA, [3]University of Tennessee Health Science Center, Memphis, TN, USA.

IPSO 5

PREDICTORS OF RECURRENCE IN PEDIATRIC PAPILLARY THYROID CANCER

Jill Rubinstein, MD, PhD[1], Kayleigh Herrick-Reynolds[2], Raffaella Morotti, MD[1], Manju Prasad, MD[1], Catherine Dinauer, MD[1], Robert Udelsman, MD, MBA[1], **Emily Christison-Lagay, MD[1]**.

[1]Yale-New Haven Children's Hospital, New Haven, CT, USA, [2]Yale Medical School, New Haven, CT, USA.

IPSO 6

INTRA-TUMORAL IMPLANTATION OF VINCRISTINE/DOXORUBICIN-LOADED SILK FOAM DECREASED ORTHOTOPIC NEUROBLASTOMA TUMOR GROWTH AND CREATED FIRST ANIMAL MODEL OF LARGE CELL NEUROBLASTOMA

Jamie Harris, MD[1], Jeannine Coburn, PhD[2], Jennifer Poirier, PhD[1], David L. Kaplan, PhD[2], Bill Chiu, MD[3].

[1]Rush University Medical Center, Chicago, IL, USA, [2]Tufts University Medical Center, Boston, MA, USA, [3]University of Illinois Chicago, Chicago, IL, USA.

Program in Detail (cont.)

Saturday, May 14 (cont.)

IPSO 7

HEPATOBLASTOMA IN CHILDREN AGED LESS THAN SIX MONTHS AT DIAGNOSIS: A REPORT FROM THE INTERNATIONAL CHILDHOOD LIVER TUMOUR STUDY GROUP (SIOPEL)

Patrizia Dall'Igna, MD[1], Laurence Brugières, MD[2], Michela Casanova, MD[3], Sophie Branchereau, MD[4], Daniel C. Aronson, MD[5], Piotr Czauderna, MD[6], Jean de Ville de Goyet, MD[7], Steven W. Warmann, MD[8], Rita Alaggio, MD[9], Giovanni Cecchetto, MD[1], Beate Haeberle, MD[10], Rudolf Maibach, PhD[11], Giorgio Perilongo, MD[12].

[1]Pediatric Surgery, Dept. of Women's and Children's Health, University of Padua, Padua, Italy, [2]Dépt. de Pédiatrie, Service d'Oncologie Pédiatrique, Institut Gustave Roussy, Villejuif, France, [3]Pediatric Oncology Unit, Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy, [4]Chirurgie Pediatrique, Bicetre Hospital, Paris, France, [5]Division of Pediatric Surgery, Queen Elisabeth Central Hospital, University of Malawi, Blantyre, Malawi, [6]Pediatric Surgery, Medical University of Gdansk, Gdansk, Poland, [7]Pediatric Surgery, Bambino Gesù Children's Hospital, Rome, Italy, [8]Department of Pediatric Surgery and Pediatric Urology, University Children's Hospital, Tuebingen Germany, [9]Pediatric Pathology, DIMED Dept., University of Padua, Padua, Italy, [10]Department of Pediatric Surgery, University of Munich, Munich Germany, [11]Department of Statistics, International Breast Cancer Study Group (IBCSG) Coordinating Center, Berne, Switzerland, [12]Department of Women's and Children's Health, University of Padua, Padua, Italy.

IPSO 8

WIDE EXCISIONAL MARGINS DO NOT IMPROVE SURVIVAL IN PEDIATRIC MELANOMA

Jina Kim, MD, Zhifei Sun, MD, Brian R. Englum, MD, Obinna O. Adibe, MD, Henry E. Rice, MD, April KS Salama, MD, Paul J. Mosca, MD, Elisabeth T. Tracy, MD.

Duke University Medical Center, Durham, NC, USA.

IPSO 9

A 20-YEAR RETROSPECTIVE ANALYSIS OF CT-BASED PRE-OPERATIVE IDENTIFICATION OF PULMONARY METASTASES IN PATIENTS WITH OSTEOSARCOMA: A SINGLE-CENTER REVIEW

Todd E. Heaton, MD, Valerie Pallos, Paul A. Meyers, MD, Alexander J. Chou, MD, Anita P. Price, MD, Michael P. La Quaglia, MD.

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

APSA-IPSO Poster Session

11:30 a.m. – Noon *Grand Hall C, Lobby Level*

Moderators: Simone Abib, MD; Max R. Langham, Jr., MD

IPSO-P1

NATURAL KILLER CELL ASSISTED IMMUNOTHERAPY DECREASES INCIDENCE OF METASTASIS IN AN ORTHOTOPIC NEUROBLASTOMA MOUSE MODEL

Jeremy R. Jackson, MD, Hong-Wei Wu, MD, Jianping Sun, MD, Larry Wang, MD, PhD, Robert C. Seeger, MD, Eugene S. Kim, MD.

Children's Hospital Los Angeles, Los Angeles, CA, USA.

Program in Detail (cont.)

IPSO-P2

TREATMENT OUTCOMES IN PEDIATRIC MELANOMA - ARE THERE BENEFITS TO SPECIALIZED CARE?

Benjamin Freemyer, BS[1], Carla L. Warnake, MS[2], Andrea Hayes-Jordan, MD[2], Cynthia Herzog, MD[2], **Mary T. Austin, MD, MPH[2]**.

[1]University of Texas Medical School at Houston, Houston, TX, USA, [2]University of Texas MD Anderson Cancer Center, Houston, TX, USA.

IPSO-P3

PEDIATRIC HEAD AND NECK MELANOMA: A NATIONAL CANCER DATA BASE REVIEW

Morgan K. Richards, MD, MPH[1], Adam B. Goldin, MD, MPH[2], Kenneth W. Gow, MD[2], John Doski, MD[3], Melanie Goldfarb, MD[4], Jed Nuchtern, MD[5], Monica Langer, MD[6], Elizabeth A. Beierle, MD[7], Sanjeev Vasudevan, MD[5], Sanjay R. Parikh, MD[2].

[1]University of Washington, Seattle, WA, USA, [2]Seattle Children's Hospital, Seattle, WA, USA, [3]Methodist Children's Hospital of South Texas, San Antonio, TX, USA, [4]John Wayne Cancer Institute, Santa Monica, CA, USA, [5]Baylor College of Medicine, Houston, TX, USA, [6]Maine Children's Cancer Program, Portland, ME, USA, [7]University of Alabama, Birmingham, AL, USA.

IPSO-P4

A NOVEL ORTHOTOPIC XENOGRAFT FOR HEPATOBLASTOMA

Jingling Jin, PhD[1], Roma Patel, BS[1], Yan Shi, MD[1], Irene Ma, MD[2], Sarah Woodfield, PhD[1], Beatrice Bissig-Choisat, PhD[1], Igor Stupin, DVM[1], Zbigniew Starosolski, PhD[1], Ananth Annapragada, PhD[1], Donald Parsons, MD, PhD[1], Karl-Dimiter Bissig, PhD[1], Dolores Lopez-Terrada, MD, PhD[1], Ketan Ghaghada, PhD[1], **Sanjeev A. Vasudevan, MD**[1].

[1]Baylor College of Medicine, Houston, TX, USA, [2]Mayo Clinic, Phoenix, AZ, USA.

IPSO-P5

SACROCOCCYGEAL TERATOMA: A SINGLE-CENTER EXPERIENCE IN EAST AFRICA

Erik N. Hansen, MD[1], John K.M. Nyagetuba, MBChB, MMed[1], Damaris N. Ndambuki, MBChB[2], Philip Blasto, MBChB[2].

[1]AIC-Kijabe Hospital/Bethany Kids, Kijabe, Kenya, [2]Tenwek Hospital, Bomet, Kenya.

IPSO-P6

WITHDRAWN

IPSO-P7

UNDIFFERENTIATED EMBRYONAL SARCOMA OF THE LIVER, A CASE SERIES FROM A SINGLE INSTITUTION

Pablo Lezama-Del Valle, MD, Ivan Bautista Hernandez, MD, Miguel Angel Palomo Colli, MD.

Hospital Infantil de Mexico Federico Gomez, Mexico City, Mexico.

IPSO-P8

RUPTURED LIVER TUMORS. SURGICAL MANAGEMENT AND OUTCOMES AT A COMPREHENSIVE PEDIATRIC CANCER CENTER

Pablo Lezama-Del Valle, MD, Andrea de Icaza Gonzalez, MD, Miguel Angel Palomo Colli, MD, Luis Enrique Juarez Villegas, MD, Stanislaw Sadowinski Pine, MD.

Hospital Infantil de Mexico Federico Gomez, Mexico City, Mexico.

Program in Detail (cont.)

Saturday, May 14 (cont.)

Reconstruction Options in Cancer Surgery

1:30 p.m. – 3:30 p.m. *Grand Hall C, Lobby Level*

Moderators: Jan Godzinski, MD; Rebecka L. Meyers, MD

Learning Objectives

At the conclusion of this session, participants will be able to:

- communicate the basis of reconstructive surgery in several sites
- employ proper surgical techniques
- troubleshoot and avoid complications and tricks in reconstructive surgery

Head and Neck and Chest Wall
Sajid Qureshi, MD

Vascular Reconstruction
Michael P. LaQuaglia, MD

Discussion

Genitourinary Reconstruction Following Cancer Surgery in Children
Bruce H. Broecker, MD

Pelvic Reconstruction Following Sarcoma Resection
David A. Rodeberg, MD

Discussion

Spectacular and Challenging Cases

3:45 p.m. – 5:00 p.m. *Grand Hall C, Lobby Level*

Moderators: Robert C. Shamberger, MD; Michael P. LaQuaglia, MD

Learning Objective

In this session participants will be able to:

- analyze difficult cases by discussing the experts' and participants' experiences

Response with HB High Risk Chemo and Heroic Surgery
Rebecka L. Meyers, MD

Upfront Regressive Resection for a Massive Pleuropulmonary Blastoma
Pablo Lezama-Del Valle, MD, MSc

Pelvic Sarcoma Requiring Pelvic Exoneration, Hemisacrectomy with Reconstruction

Sanjeev A. Vasudevan, MD

Program in Detail (cont.)
Sunday, May 15
APSA-IPSO SYMPOSIUM/EDUCATION DAY

Education Session I: IPSO – Rare Tumors

8:00 a.m. – 11:00 a.m. *Grand Hall A/B, Lobby Level*

Moderators: Roshni A. Dasgupta, MD; Joerg Fuchs, MD

Learning Objectives

At the conclusion of this session, participants will be able to:

- assess several pediatric rare tumors
- apply the basic surgical techniques for every rare tumor
- determine what to do and what NOT to do in each rare tumor

Pleuropulmonary Blastoma and Melanoma
Genetics and Report of the International Registry
Doug Miniati, MD

The European Experience
Giovanni Cecchetto, MD

Pediatric Melanoma
Mary T. Austin, MD, MPH

Discussion

Adrenocortical Tumors

Genetics: New insights in the genetics of pediatric adrenocortical tumors
Raul Ribeiro, MD

Surgical Guidelines
Simone Abib, MD

Discussion

Rare Soft Tissue Sarcomas
Rare Soft Tissue Sarcomas: Chemotherapy Sensitive vs Insensitive
Andrea A. Hayes-Jordan, MD

The IPSO Approach
Jan Godzinski, MD

Discussion

Outcomes and Evidence-based Practice Committee Systematic Reviews

11:00 a.m. – Noon *Grand Hall A/B, Lobby Level*

Moderator: Cynthia D. Downard, MD, MMSc

Non-accidental Trauma and Screening Tools for Child Maltreatment
Katherine J. Deans, MD, MHSc; Li Ern Chen, MD, MSCS; Mary T. Austin, MD, MPH

Learning Objectives

At the conclusion of this session, participants will be able to:

- explain the overall impact, utilization and advantages of automated hospital-based screening tools for non-accidental trauma
- recognize the impact of health disparities on screening for non-accidental trauma in children and adolescents
- compare the different ways screening tools are implemented in adult and pediatric emergency units

Program in Detail (cont.)

Sunday, May 15 (cont.)

Surgery for Pediatric Ovarian Masses and Torsion
Elizabeth J. Renaud, MD; Roshni A. Dasgupta, MD, MPH

Learning Objectives

At the conclusion of this session, participants will be able to:

- relate the current recommendations for surgical staging of pediatric and adolescent ovarian masses
- evaluate clinical situations in which ovarian preservation surgery may be safely attempted in the presence of an ovarian mass
- assess the risks and benefits of ovarian detorsion and to determine what long-term imaging is necessary after detorsion

Health Policy Scholar Update

Noon – 12:15 p.m.

Max R. Langham, Jr., MD; Peter W. Dillon, MD

Reframing Surgical Care: Understanding Complexity and Promoting Teaming

Pediatric Surgery Case Debates and Controversies

12:45 p.m. – 2:15 p.m. *Grand Hall A/B, Lobby Level*

Moderators: Carroll M. Harmon, MD; Todd A. Ponsky, MD

Learning Objective

At the conclusion of this session, participants will be able to:

- debate treatment options for difficult pediatric surgical cases.

Concurrent Education Session II: The 4 Ps of Optimization of Care Through Innovation: Patients, Partnerships, Procedures, Pragmatism

2:15 p.m. – 4:15 p.m. *Grand Hall A/B, Lobby Level*

Moderator: Erik D. Skarsgard, MD

Learning Objectives

At the conclusion of this session participants will be able to:

- integrate lessons learned from a review of our history of innovation
- recognize and differentiate clinical care, innovative therapy and clinical research
- communicate the importance of patient engagement in innovative therapy evaluation and implementation
- apply the concept of "innovating for quality:" using evidence to innovate selectively and responsibly in a resource-limited healthcare system
- identify opportunities for personal involvement and action that they can use when they return to their system

Introduction to Surgical Innovation from a Historical Perspective
Stefan L. Scholz, MD

Learning Objectives

At the conclusion of this session participants will be able to:

- describe historical examples of surgical innovation
- differentiate drivers, enablers and paradoxes of innovation

Program in Detail (cont.)

- recognize and explain how innovation is critical to surgical progress with the potential for significant health policy implications
- discuss specific barriers to innovation for children

Innovative Therapy: Definition and an Ethical Framework for Providing Innovative Surgical Therapy to Children
Sean J. Barnett, MD; Aviva L. Katz, MD

Learning Objectives

At the conclusion of this session participants will be able to:

- define and differentiate clinical care, clinical research (requiring IRB approval) and innovative therapy along the care continuum
- explain how the informed consent (assent) process differs between clinical care and innovative therapy, how patients/families can "partner" in innovation
- identify and manage the different aspects of conflict of interest, both from the surgeon and institutional point of view, when introducing an innovative therapy
- describe the role of the FDA in pediatric device approval and the use of devices off-label

Procedural Innovation for the Practicing Pediatric surgeon
Marcus Jarboe, MD; James K. Wall, MD

Learning Objectives

At the conclusion of this session participants will be able to:

- negotiate the challenges and opportunities around the introduction of new technologies and techniques into practice
- build a framework promoting safe introduction of new technology and techniques into clinical practice
- determine the appropriate (hospital) regulatory oversight, ethics committee involvement and informed consent for new technology and techniques

Sustainable, Quality-based Innovation
Russell K. Woo, MD; James K. Wall, MD

Learning Objectives

At the conclusion of this session participants will be able to:

- define the need for sustainable innovation
  - environment of limited health care resources
  - innovation in pediatric surgery directed at increasing value: improving health care outcomes while decreasing cost
  - innovating for the global community
- discuss the concept of innovating for quality
  - collaboration of maturing surgical disciplines: quality improvement and technology innovation
  - validated systems for quality assessment have the potential to identify areas in most need of improved outcomes
  - technology and process innovation can be directed at these areas

Program in Detail (cont.)

Sunday, May 15 (cont.)

Concurrent Education Session III: Childhood Obesity and the Pediatric Surgery Team

Joint Session with APSNA

2:15 p.m. – 4:15 p.m. *Coronado C-E Ballroom, 4th Level, Harbor Tower*

Moderator: Jeffrey L. Zitsman, MD

Learning Objectives

At the conclusion of this session, participants will be able to:

- assess the physical needs of the surgical patient with obesity, the medical concerns and the management issues that may differ from patients of normal body weight and size
- identify the current research into causes and management of obesity including genetic/epigenetic factors and brown adipose tissue
- implement intraoperative and perioperative guidelines to manage the child with obesity who is undergoing non-weight loss surgery
- explain the current status of weight loss surgery in children and adolescents

Care of the Patient with Obesity
Lori Lynch, MSN

Obesity as a Metabolic Disease
Jeffrey Schwimmer, MD

Pediatric Surgery in the Patient with Obesity
Samir R. Pandya, MD

Current Status of Weight Loss Surgery and Other Interventions in Young Patients
Robert C. Kanard, MD

Concurrent Poster Session I: Basic Science, CDH, Critical Care

4:30 p.m. – 6:15 p.m. *Grand Hall A/B, Lobby Level*

Moderators: Eugene S. Kim, MD; Sean E. McLean, MD

P1

DOES THE *EX UTERO* INTRAPARTUM TREATMENT TO EXTRACORPOREAL MEMBRANE OXYGENATION PROCEDURE CHANGE MORBIDITY OUTCOMES FOR HIGH-RISK CONGENITAL DIAPHRAGMATIC HERNIA SURVIVORS?

Hester F. Shieh, MD, Jay M. Wilson, MD, Catherine A. Sheils, MD, C. Jason Smithers, MD, Virginia S. Kharasch, MD, Ronald E. Becker, MD, Mollie Studley, MS, Donna Morash, RN, Terry L. Buchmiller, MD.

Boston Children's Hospital, Boston, MA, USA.

Program in Detail (cont.)

P2

PREVALENCE AND PATIENT-RELATED RISK FACTORS ASSOCIATED WITH AUTISM IN CONGENITAL DIAPHRAGMATIC HERNIA

Enrico Danzer, MD, Casey Hoffman, PhD, Jo Ann D'Agostino, DNP, CRNP, Antiel Ryan, MS, Antiel M. Ryan, MS, Marsha Gerdes, PhD, Judy Bernbaum, MD, Natalie E. Rintoul, MS, Lisa M. Herkert, CRNP, William H. Peranteau, MD, Alan W. Flake, MD, N. Scott Adzick, MD, Holly L. Hedrick, MD.

CHOP, Philadelphia, PA, USA.

P3

THE PEDIATRIC SURGEON-SCIENTIST: SUCCEEDING IN TODAY'S ACADEMIC ENVIRONMENT

Chad M. Moles, BSPH[1], Allan M. Goldstein, MD[2], Michael J. Morowitz, MD[3], **Sundeep G. Keswani, MD**[1].

[1]Texas Children's Hospital, Houston, TX, USA, [2]MassGeneral Hospital for Children, Boston, MA, USA, [3]Children's Hospital of Pittsburgh, Pittsburgh, PA, USA.

P4

CLOT DISSOLUTION FOR CRITICAL SMALL BOWEL ISCHAEMIA

Kate Cross, BMed, Hons, Alexander Cho, BSc, MBBS, Simon Blackburn, BSc, MBBS, MEd, Joanna Stanwell, MA, MBBChir, Paula Lister, BCh, MB, MRCPCH, Edward M. Kiely, Joseph Curry, MBBS, Paolo De Coppi, MD, PhD.

Great Ormond Street Hospital, London, United Kingdom.

P5

EXTRACORPOREAL LIFE SUPPORT USE IN PEDIATRIC TRAUMA: A REPORT FROM THE NATIONAL TRAUMA DATA BANK

Joshua Watson, MD, Brian Englum, MD, Jina Kim, MD, Obinna Adibe, MD, Henry Rice, MD, Mark Shapiro, MD, Mani Daneshmand, MD, Elisabeth Tracy, MD.

Duke University, Durham, NC, USA.

P6

EPITHELIAL DEVELOPMENT IN 3D HUMAN LUNG ORGANOIDS FROM NEONATES WITH CONGENITAL DIAPHRAGMATIC HERNIA

Guihua Jiang, MS, Kendal A. Walker, BS, Julie Di Bernardo, PhD, Briana R. Dye, BS, Jason R. Spence, PhD, Shaun M. Kunisaki, MD, MSc.

University of Michigan, Ann Arbor, MI, USA.

P7

CERVICAL SPINE CLEARANCE IN PEDIATRIC TRAUMA: A SINGLE INSTITUTION'S EXPERIENCE

Mary Arbuthnot, DO, David Mooney, MD, MPH.

Boston Children's Hospital, Boston, MA, USA.

Program in Detail (cont.)

Sunday, May 15 (cont.)

P8

3D MICROGRAVITY ASSAY OF CHD5 EFFECT ON NEUROBLASTOMA CELL LINES

Robert Redden, MSc, Alexis Lukach, BS, Morgan Reed, BS, Garrett Brodeur, MD, **Edward J. Doolin, MD**.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

P9

MILK FAT GLOBULE-EGF FACTOR VIII DEFICIENCY INCREASES LUNG INFLAMMATION AND MORTALITY IN NEONATAL SEPSIS

Laura W. Hansen, MD[1], Adam Khader, MD, PhD[1], Weng-Lang Yang, PhD[2], Jeffrey M. Nicastro, MD[1], Gene Coppa, MD[1], Ping Wang, MD[2], Jose M. Prince, MD[3].

[1]Hofstra North Shore-LIJ School of Medicine, Manhasset, NY, USA, [2]The Feinstein Institute for Medical Research, Manhasset, NY, USA, [3]Cohen Children's Medical Center, New Hyde Park, NY, USA.

P10

***EX VIVO* COMPARISON OF EXTRACORPOREAL MEMBRANE OXYGENATION CIRCUITS AND CANNULAE TO EVALUATE SOURCES OF HEMOLYSIS**

Julie Monteagudo, MD, Ciaran O'Brien, BA, Christine A. Schad, MD, Francesca Rapido, MD, Kenmond Fung, CCP, Michael Brewer, CCP, David A. Bateman, MD, MS, William Middlesworth, MD.

Columbia University Medical Center, New York, NY, USA.

P11

THE EFFECT OF GLUCAGON-LIKE PEPTIDE-2 THERAPY IN A PRECLINICAL MODEL OF NEONATAL SHORT BOWEL SYNDROME WITH DISTAL INTESTINAL RESECTION

David W. Lim, MDCM, MEd[1], Justine M. Turner, MBBS, PhD[1], Patricia L. Brubaker, PhD[2], Donna F. Vine, PhD[1], Patrick N. Nation, PhD[1], Pamela R. Wizzard, BSc, RAHT[1], David L. Sigalet, MD, PhD[3], David L. Bigam, MD, MSc[1], Paul W. Wales, MD, MSc[4].

[1]University of Alberta, Edmonton, AB, Canada, [2]University of Toronto, Toronto, ON, Canada, [3]University of Calgary, Calgary, AB, Canada, [4]University of Toronto & Hospital for Sick Children, Toronto, ON, Canada.

P12

A NOVEL INFLAMMATORY MEDIATOR CAUSES LUNG INJURY IN SEPSIS

Alexandra C. Bolognese, MD[1], Weng-Lang Yang, PhD[2], Zhimin Wang, MD[2], Jeffrey Nicastro, MD[1], Gene F. Coppa, MD[1], Ping Wang, MD[2].

[1]Hofstra Northwell School of Medicine, Manhasset, NY, USA, [2]The Feinstein Institute for Medical Research, Manhasset, NY, USA.

P13

INCREASED INTESTINAL MUCOSAL GROWTH IN GNOTOBIOTIC MICE

Chasen Greig, MD, Arik Alper, MD, Andrew Goodman, PhD, Neeru Gandotra, PhD, Robert A. Cowles, MD.

Yale University School of Medicine, New Haven, CT, USA.

Program in Detail (cont.)

P14

AGGRESSIVE SURGICAL MANAGEMENT OF CONGENITAL DIAPHRAGMATIC HERNIA — WORTH THE EFFORT?

Matthew T. Harting, MD, MS[1], Laura Hollinger, MD[1], Kuojen Tsao, MD[1], Jay M. Wilson, MD[2], Luke R. Putnam, MD, MS[1], Pam A. Lally, MD[1], Charles C. Miller, PhD[1], Kevin P. Lally, MD, MS[1].

[1]University of Texas Medical School at Houston, Houston, TX, USA, [2]Children's Hospital Boston, Boston, MA, USA.

P15

DEFECT SIZE PREDICTS MORBIDITY AT DISCHARGE FOR INFANTS WITH CONGENITAL DIAPHRAGMATIC HERNIA

Luke R. Putnam, MD, MS[1], Matthew T. Harting, MD, MS[1], KuoJen Tsao, MD[1], Francesco Morini, MD[2], Pamela A. Lally, MD[1], Kevin P. Lally, MD, MS[1].

[1]University of Texas Health Science Center at Houston, Houston, TX, USA, [2]Ospedale Pediatrico Bambino Gesù, Rome, Italy.

P16

THE RISK OF MIDGUT VOLVULUS IN PATIENTS WITH ABDOMINAL WALL DEFECTS: A MULTI-INSTITUTIONAL STUDY

Jason Fawley, MD[1], Abdelhafeez Abdelhafeez, MD[2], Jessica Schultz, BSN[1], Allison Ertl, MS[3], Laura Cassidy, PhD[3], Susan Sharp, PhD[4], Shawn St. Peter, MD[4], Amy Wagner, MD[1].

[1]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]The Children's University Hospital, Dublin, Ireland, [3]Medical College of Wisconsin, Milwaukee, WI, USA, [4]Children's Mercy Hospital, Kansas City, MO, USA.

Concurrent Poster Session II: Clinical Surgery

4:30 p.m. – 6:15 p.m. *Coronado C-E Ballroom, 4th Level, Harbor Tower*

Moderators: Michael J. Morowitz, MD; Adam M. Vogel, MD

P17

A RANDOMIZED-CONTROLLED TRIAL TO ASSESS ADVANCEMENT OF ENTERAL FEEDINGS FOLLOWING SURGERY FOR HYPERTROPHIC PYLORIC STENOSIS

Troy A. Markel, MD, Melissa R. Scott, BSN, RN, Alan P. Ladd, MD.

Indiana University School of Medicine, Indianapolis, IN, USA.

P18

IS SURGICAL RESECTION NECESSARY FOR INFANTILE HEMANGIOMAS? A COMPARISON BETWEEN PROPRANOLOL AND CORTICOSTEROIDS

Carlos R. Alvarez-Allende, MD, Thomas Crafton, BS, Miho Watanabe, MD, Carol Chute, RN, CNP, Adrienne Hammill, MD, PhD, Belinda Dickie, MD, PhD, Denise Adams, MD, Mekibib Altaye, PhD, Roshni Dasgupta, MD, MPH.

Cincinnati Children's Hospital, Cincinnati, OH, USA.

Program in Detail (cont.)

Sunday, May 15 (cont.)

P19

DOES YOUR APPENDECTOMY COST MORE THAN MINE? AN ANALYSIS OF COSTS ASSOCIATED WITH PRACTICE PATTERN VARIATION

Simone Langness, MD[1], Jonathan Halbach, DO[2], Erin Ward, MD[1], Katherine Davenport, MD[3], Stephen Bickler, MD[3], Karen Kling, MD[3], Timothy Fairbanks, MD[3].

[1]UC San Diego, San Diego, CA, USA, [2]Naval Medical Center, San Diego, CA, USA, [3]Rady Children's Hospital, San Diego, CA, USA.

P20

NEPHROBLASTOMA TREATMENT MEASURES AND OUTCOMES ASSOCIATED WITH HIGH AND LOW VOLUME CENTERS

Morgan K. Richards, MD, MPH[1], Adam B. Goldin, MD, MPH[2], Alexandra Savinkina, BA[3], John Doski, MD[4], Melanie Goldfarb, MD[5], Jed Nuchtern, MD[6], Monica Langer, MD[7], Elizabeth A. Beierle, MD[8], Sanjeev Vasudevan, MD[6], Kenneth W. Gow, MD[9] , Mehul V. Raval, MD[3].

[1]University of Washington, Seattle, WA, USA, [2]Seattle Children's Hospital, Seattle, WA, USA, [3]Emory University School of Medicine, Atlanta, GA, USA, [4]Methodist Children's Hospital of South Texas, San Antonio, TX, USA, [5]John Wayne Cancer Institute, Santa Monica, CA, USA, [6]Baylor College of Medicine, Houston, TX, USA, [7]Maine Children's Cancer Program, Portland, ME, USA, [8]University of Alabama, Birmingham, Birmingham, AL, USA.

P21

LAPAROSCOPIC VERSUS OPEN PEDIATRIC GASTROSTOMY TUBE PLACEMENT: A PEDIATRIC NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM (PNSQIP) ANALYSIS

Inna N. Lobeck, MD, Rebekah Karns, PhD, Phylicia Dupree, MD, Roshni Dasgupta, MD.

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

P22

LAPAROSCOPIC PEDIATRIC INGUINAL HERNIA REPAIR: A PILOT STUDY IN A NOVEL GUINEA PIG ANIMAL MODEL

Maria Carmen Mora, MD[1], Katharine R. Bittner, MD[1], Kaitlyn E. Wong, MD[1], Kevin P. Moriarty, MD[2], David B. Tashjian, MD[2], Michael V. Tirabassi, MD[2].

[1]Baystate Medical Center, Tufts University School of Medicine, Springfield, MA, USA, [2]Baystate Children's Hospital, Tufts University School of Medicine, Springfield, MA, USA.

P23

IMPACT OF CHILDHOOD OBESITY ON OUTCOMES FOLLOWING APPENDECTOMY

Cordelie Witt, MD, Adam Goldin, MD, Monica Vavilala, MD, Frederick Rivara, MD, MPH.

University of Washington, Seattle, WA, USA.

Program in Detail (cont.)

P24

CHAAMPS BOWEL MANAGEMENT CAMP: MOVING BEYOND DICHOTOMOUS CLASSIFICATION SCHEMES FOR THE TREATMENT OF FECAL INCONTINENCE

Ferdynand Hebal, MD, Katherine A. Barsness, MD, MS, Elizabeth Nanney, BSN, APN, Hayley Sparks, BS, Karen Rychlik, MS, Mary Beth Madonna, MD.

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

P25

CLINICAL VALIDITY AND RELEVANCE OF ACCIDENTAL PUNCTURE OR LACERATION AS A PATIENT SAFETY INDICATOR FOR CHILDREN

Heather L. Short, MD, Kurt Heiss, MD, Mark Wulkan, MD, Mehul Raval, MD, MS.

Emory University, Atlanta, GA, USA.

P26

THYROID HURTHLE CELL CARCINOMA IN CHILDREN: A RARE AND INDOLENT MALIGNANCY

T.K. Pandian, MD, MPH, Zahraa Al-Hilli, MBBCh, Amy E. Glasgow, MHA, Elizabeth B. Habermann, PhD, MPH, Geoffrey B. Thompson, MD, Christopher R. Moir, MD.

Mayo Clinic, Rochester, MN, USA.

P27

GENERAL ENDOTRACHEAL GE VS. NON-ENDOTRACHEAL REGIONAL ANESTHESIA RA FOR ELECTIVE INGUINAL HERNIA SURGERY IN VERY PRETERM NEONATES - A SINGLE INSTITUTION EXPERIENCE

Juan Gurria, MD, Philip Kuo, BS, Luisa Christensen, MD, Ai-Xuan Holterman, MD.

Univeristy of Illinois, Peoria, IL, USA.

P28

MULTI-MODAL PEDIATRIC PAIN MANAGEMENT WITH HOME-GOING CONTINUOUS PARAVERTEBRAL BLOCK FOR NUSS PROCEDURE

Natalie M. Dean, MD, Dawit T. Haile, MD, Christopher R. Moir, MD, D. Dean Potter, MD.

Mayo Clinic, Rochester, MN, USA.

P29

OUTCOMES AFTER TOTAL THYROIDECTOMY IN CHILDREN AT A PEDIATRIC GENERAL SURGERY CENTER

Jennifer L. Carpenter, MD[1], Sarah C. Fallon, MD[1], Yangyang R. Yu, MD[1], Ionna D. Athanassaki, MD[2], Mary L. Brandt, MD[2], David E. Wesson, MD[2], Monica E. Lopez, MD[2].

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

Program in Detail (cont.)

Sunday, May 15 (cont.)

P30

LYMPHOCYTE DEPRESSION AND POSTOPERATIVE ABSCESS AFTER APPENDECTOMY IN CHILDREN

Daniel L. Lodwick, MD, MS, Jennifer N. Cooper, MS, PhD, Katherine J. Deans, MD, MHSc, Peter C. Minneci, MD, MHSc, Rajan K. Thakkar, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

P31

LAPAROSCOPIC SLEEVE GASTRECTOMY AS FIRST-LINE SURGICAL TREATMENT FOR MORBID OBESITY IN ADOLESCENTS

Aslam Ejaz, MD, MPH[1], Pankti Patel, MD[1], Raquel Gonzalez-Heredia, MD, PhD[1], Enrique Elli, MD[1], Mark Holterman, MD, PhD[2], Robert Kanard, MD[1].

[1]University of Illinois at Chicago, Chicago, IL, USA, [2]University of Illinois at Peoria, Peoria, IL, USA.

P32

ULTRASOUND-GUIDED INTERNAL ANAL SPHINCTER BOTULINUM TOXIN INJECTION FOR TREATMENT OF OBSTRUCTIVE DEFECATION DUE TO HIRSCHSPRUNG'S DISEASE AND INTERNAL ANAL SPHINCTER ACHALASIA

Joseph T. Church, MD, Daniel H. Teitelbaum, MD, Marcus D. Jarboe, MD.

University of Michigan Health System, Ann Arbor, MI, USA.

P33

SACRAL NERVE STIMULATION: PRELIMINARY OUTCOMES IN CONSTIPATION AND INCONTINENCE

Meredith Barrett, MD, Laurie C. Wilde, NP, Daniel H. Teitelbaum, MD, Peter F. Ehrlich, MD.

Mott Children's Hospital, Ann Arbor, MI, USA.

Monday, May 16

Plenary Session I

7:30 a.m. – 9:00 a.m. *Grand Hall A/B, Lobby Level*

Moderators: Shawn D. St. Peter, MD; Mary E. Fallat, MD

1

INADEQUATE PROTEIN AND ENERGY DELIVERY IN PEDIATRIC SURGICAL CRITICAL CARE

Cristine S. Velazco, MD, MS, David Zurakowski, PhD, Brenna S. Fullerton, MD, Lori J. Bechard, PhD, MEd, RD, Tom Jaksic, MD, PhD, Nilesh M. Mehta, MD.

Boston Children's Hospital, Boston, MA, USA.

Program in Detail (cont.)

2

THE EFFECT OF A DONOR BREAST MILK PROGRAM ON THE INCIDENCE AND SEVERITY OF SURGICAL NECROTIZING ENTEROCOLITIS IN PREMATURE INFANTS

Tiffany Zens, MD[1,3], Andrew Rogers, MD[1,3], Sally Norlin, RD[2], Peter Nichol, MD, PhD[1,3], Daniel Ostlie, MD,[1,3] Charles Leys, MD, MSCI[1,3].

[1]Division of Pediatric Surgery, Department of Surgery, University of Wisconsin School of Medicine, Madison, WI, USA, [2]Division of Clinical Nutrition, Meriter Unity Point Hospital, USA, [3]University of Wisconsin Hospital and Clinics, American Family Children's Hospital, Madison, WI, USA.

3

CHALLENGING SURGICAL DOGMA IN THE MANAGEMENT OF ESOPHAGEAL ATRESIA WITH TRACHEOESOPHAGEAL FISTULA: OUTCOMES FROM THE MIDWEST PEDIATRIC SURGERY CONSORTIUM

Dave R. Lal, MD, MPH[1], Samir K. Gadepalli, MD, MBA[2], Cynthia D. Downard, MD, MMSc[3], Daniel J. Ostlie, MD[4], Ruth Swedler, MS[5], Tom Chelius, MS[5], Thomas T. Sato, MD[1], on behalf of the Midwest Pediatric Surgery Consortium[1].

[1]Medical College of Wisconsin/Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]University of Michigan/C.S. Mott Children's Hospital, Ann Arbor, MI, USA, [3]University of Louisville, Louisville, KY, USA, [4]University of Wisconsin, Madison, WI, USA, [5]Medical College of Wisconsin, Milwaukee, WI, USA.

4

HUMAN ENTERIC NEURAL STEM CELLS SURVIVE AND DIFFERENTIATE FOLLOWING TRANSPLANTATION INTO EMBRYONIC AND POSTNATAL AGANGLIONIC INTESTINE

Lily S. Cheng, MD, Nandor Nagy, PhD, Ryo Hotta, MD, Hannah K. Graham, BS, Allan M. Goldstein, MD.

Massachusetts General Hospital, Boston, MA, USA.

5

SUCCESS AND DURATION OF DYNAMIC BRACING FOR PECTUS CARINATUM: A FOUR-YEAR PROSPECTIVE STUDY

Sherif Emil, MD, CM[1], **Marika Sevigny, BS[1]**, Robert Baird, MD, CM[1], Jean-Martin Laberge, MD[1], Kathleen Montpetit, MS[2], Jade Goyette, BS[2], Ian Finlay, BS[2].

[1]Montreal Children's Hospital; McGill University Health Centre & Shriners Hospital for Children Canada, Montreal, QC, Canada, [2]Shriners Hospital for Children Canada, Montreal, QC, Canada.

6

FETAL OVINE REPAIR OF MYELOMENINGOCELE WITH PLACENTAL MESENCHYMAL STROMAL CELLS PRESERVES HIND LIMB MOTOR FUNCTION: ARE THESE IMPROVEMENTS IN MOTOR FUNCTION DURABLE?

Benjamin A. Keller, MD, James C. Becker, MD, Erin G. Brown, MD, Lee Lankford, MA, Christopher D. Pivetti, MS, Taryn M. Selby, MA, Zoe M. Saenz, BS, Aijun Wang, PhD, Diana L. Farmer, MD.

University of California, Davis, Sacramento, CA, USA.

Program in Detail (cont.)

Monday, May 16 (cont.)

7

GENOME-WIDE ASSOCIATION STUDY IDENTIFIES SUSCEPTIBILITY LOCI FOR ACUTE APPENDICITIS

Ekaterina Orlova, MS, MPH, Andrew Yeh, MD, Brian Firek, MS, M. Michael Barmada, PhD, Robert E. Ferrell, PhD, David N. Finegold, MD, Candace M. Kammerer, PhD, John R. Shaffer, PhD, David C. Whitcomb, MD, PhD, Sarangarajan Ranganathan, MD, David A. Hinds, PhD, Michael J. Morowitz, MD.

University of Pittsburgh, Pittsburgh, PA, USA.

8

CHROMOSOMAL VARIANTS OF UNKNOWN SIGNIFICANCE(VUS): A NOT SO INSIGNIFICANT FINDING IN NEONATES WITH CONGENITAL DIAPHRAGMATIC HERNIA

Stephanie M. Cruz, MD, Adesola C. Akinkuotu, MD, Darrell L. Cass, MD, Timothy C. Lee, MD, Rodrigo R. Ruano, MD, PhD, Stephen E. Welty, MD, Ignatia B. Van den Veyver, MD, Oluyinka O. Olutoye, MD, PhD.

Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA.

9

TAKING A STEP BACK: ASSESSING THE OUTCOMES OF MULTIPLE STEP PROCEDURES

Meredith Barrett, MD[1], Farokh R. Demehri, MD[1], Graham C. Ives, BS[1], Kristen Schaedig, BS[2], Adina B. Robinson, BS[2], Meghan A. Arnold, MD[1], Pamela I. Brown, MD[1], Daniel H. Teitelbaum, MD[1].

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

10

LOW D-DIMER PREDICTS THE ABSENCE OF INTRACRANIAL HEMORRHAGE IN PEDIATRIC BLUNT HEAD TRAUMA

Simone Langness, MD[1], Jonathan Halbach, DO[2], Erin Ward, MD[1], Julie Robles, BS[1], Katherine Davenport, MD[3], Stephen Bickler, MD[3], Karen Kling, MD[3], Julia Grabowski, MD[4], Timothy Fairbanks, MD[3].

[1]UC San Diego, San Diego, CA, USA, [2]Naval Medical Center, San Diego, CA, USA, [3]Rady Children's Hospital, San Diego, CA, USA, [4]Lurie Children's Hospital, Chicago, IL, USA.

Robert E. Gross Lecture

Mary E. Fallat, MD, University of Louisville, Louisville, KY USA

Redefining Ladd's Path
9:00 a.m. – 10:00 a.m. *Grand Hall A/B, Lobby Level*

Learning Objectives

At the conclusion of this session, participants will be able to:

- recognize the rich history and role of pediatric specialty surgeons in trauma care
- describe the landscape of children's emergency healthcare across the country including EMS and hospital preparedness

Program in Detail (cont.)

- describe the unmet trauma and acute care surgical needs of children and possible approaches to the vision of training pediatric surgeons

Concurrent Scientific Session I: Clinical Surgery I — CDH, Anorectal, IBD, General

10:45 a.m. – 12:15 p.m. *Grand Hall A, Lobby Level*

Moderators: Samuel Z. Soffer, MD; Daniel von Allmen, MD

11

IMPACT OF OBJECTIVE ECHOCARDIOGRAPHIC CRITERIA FOR TIMING OF CONGENITAL DIAPHRAGMATIC HERNIA (CDH) REPAIR

Scott Deeney, MD, Lisa Howley, MD, Kenneth W. Liechty, MD, Ahmed I. Marwan, MD, Jason Gien, MD, John Kinsella, MD, Timothy M. Crombleholme, MD.

University of Colorado School of Medicine, Aurora, CO, USA.

12

SHORT-TERM NEURODEVELOPMENTAL OUTCOME IN CONGENITAL DIAPHRAGMATIC HERNIA (CDH): THE IMPACT OF EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) AND TIMING OF CDH REPAIR

Enrico Danzer, MD, Casey Hoffman, PhD, Jo Ann D'Agostino, DNP, CRNP, James T. Connelly, BS, RRT-NPS, Marsha Gerdes, PhD, Judy Bernbaum, MD, Natalie E. Rintoul, MD, Lisa M. Herkert, CRNP, William H. Peranteau, MD, Alan W. Flake, MD, N. Scott Adzick, MD, Holly L. Hedrick, MD.

CHOP, Philadelphia, PA, USA.

13

WHAT IS THE IMPACT OF CEPHALAD VENOUS DRAINAGE ON COMPLICATIONS IN NEONATAL VENOVENOUS ECMO? IS ADDITIONAL DRAINAGE IN VENOVENOUS EXTRACORPOREAL MEMBRANE OXYGENATION ASSOCIATED WITH LESS COMPLICATIONS?

Gezzer Ortega, MD, MPH[1], Amit K. Vij, BS[2], Jose H. Salazar, MD[3], Gean Gilot, BS, MS[2], Peter Rycus, MPH[4], Ronald B. Hirschl, MD[5], Alana L. Beres, MDCM[6], Faisal G. Qureshi, MD[6].

[1]Outcomes Research Center, Department of Surgery, Howard University College of Medicine, Washington, DC, USA, [2]Howard University College of Medicine, Washington, DC, USA, [3]Department of Surgery, University of Maryland Medical Center, Baltimore, MD, USA, [4]Extracorporeal Life Support Organization, Ann Arbor, MI, USA, [5]Section of Pediatric Surgery, Department of Surgery, University of Ann Arbor, MI, USA, [6]Department of Surgery, Division of Pediatric Surgery, University of Texas Southwestern, Dallas, TX, USA.

14

CONTEMPORARY SHORT- AND LONG-TERM OUTCOMES IN PATIENTS WITH UNREMITTING CONSTIPATION AND FECAL INCONTINENCE TREATED WITH A MALONE ANETGRADE CONTINENCE ENEMA (MACE) PROCEDURE

Scott C. Dolejs, MD[1], John K. Smith, BA[1], Justin Sheplock, BSE[1], Joseph M. Croffie, MD[2], Frederick J. Rescorla, MD[2].

[1]Indiana University Health, Indianapolis, IN, USA, [2]Riley Hospital for Children, Indianapolis, IN, USA.

Program in Detail (cont.)

Monday, May 16 (cont.)

15

EFFECTIVENESS OF SENNA VS POLYETHYLENE GLYCOL AS LAXATIVE THERAPY IN CHILDREN WITH CONSTIPATION AFTER ANORECTAL MALFORMATION CORRECTION

Karla A. Santos-Jasso, MD, MSc[1], José L. Arredondo, MD, MSc, PhD[1], Jorge E. Maza, MD, MSc[1], Pablo Lezama, MD, MSc[2].

[1]National Institute of Pediatrics, México Distrito Federal, Mexico, [2]Hospital Infantil de México, México Distrito Federal, Mexico.

16

PEDIATRIC CROHN'S DISEASE SURGICAL EXPERIENCE OVER 15 YEARS IN A SINGLE INSTITUTION

Jose L. Diaz-Miron, MD, **Raphael C. Sun, MD**, Charles M. Samson, MD, Jacqueline M. Saito, MD, Robet J. Rothbaum, MD, Patrick A. Dillon, MD.
Washington University in St. Louis, St. Louis, MO, USA.

17

TRANS-ABDOMINAL REDO ILEAL POUCH SURGERY FOR PEDIATRIC PATIENTS

Olga A. Lavryk, MD, Erman Aytac, MD, Anthony L. DeRoss, MD, Jean H. Asnburn, MD, Feza H. Remzi, MD.

Cleveland Clinic, Cleveland, OH, USA.

18

INFLUENCE OF WEIGHT AT ENTEROSTOMY REVERSAL ON OUTCOMES IN INFANTS AFTER EMERGENT NEONATAL STOMA CREATION

Lindsay J. Talbot, MD[1], Robert D. Sinyard, BS[2], Kristy L. Rialon, MD[2], Brian R. Englum, MD[2], Elisabeth T. Tracy, MD[3], Henry E. Rice, MD[3], Obinna O. Adibe, MD, MHS[3].

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]Department of Surgery, Duke University, Durham, NC, USA, [3]Division of Pediatric Surgery, Duke University, Durham, NC, USA.

19

THE RISK OF A SYMPTOMATIC INGUINAL HERNIA IN CHILDREN WITH ASYMPTOMATIC PATENT PROCESSUS VAGINALIS

[1]**Katrina L. Weaver, MD**, [2]Ashwini S. Poola, MD, [3]Joanna L. Gould, MD, [4]Susan W. Sharp, PhD, [5]Shawn D. St. Peter, MD, [6]George W. Holcomb III, MD, MBA.

Children's Mercy Hospital, Kansas City, MO, USA.

Concurrent Scientific Session II: Neonatal, Venolymphatic Malformations, Pancreaticobiliary

10:45 a.m. – 12:15 p.m. *Grand Hall B, Lobby Level*

Moderators: Troy A. Markel, MD; Diana L. Farmer, MD

Program in Detail (cont.)

20

LIMITING VENTILATOR ASSOCIATED LUNG INJURY IN A PRE-TERM PORCINE NEONATAL MODEL

Michaela C. Kollisch-Singule, MD[1], Sumeet V. Jain, MD, MBA[1], Zhiyong Liu, MD[1], Penny L. Andrews, RN[2], Joshua Satalin, BS[1], Yan Zhou, MD[1], Guirong Wang, PhD[1], Andreas Meier, MD, MEd[1], Louis A. Gatto, PhD[3], Gary F. Nieman, BA[1], Nader M. Habashi, MD[2].

[1]SUNY Upstate Medical University, Syracuse, NY, USA, [2]R. Adams Cowley Shock Trauma Center, Baltimore, MD, USA, [3]SUNY Cortland, Cortland, NY, USA.

21

VARYING EFFECT OF ISOFLURANE EXPOSURE ON THE FETAL OVINE BRAIN AT DIFFERENT GESTATIONAL AGES: IMPLICATIONS FOR FETAL THERAPY

Stephanie M. Cruz, MD, Oluyinka O. Olutoye, MD, PhD, Adesola C. Akinkuotu, MD, Fariha Sheikh, MD, Irving J. Zamora, MD, Adekunle Adesina, MD, PhD, Olutoyin A. Olutoye, MD, MSc.

Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA.

22

PRENATAL GROWTH CHARACTERISTICS OF LYMPHATIC MALFORMATIONS

William H. Peranteau, MD, Suzanne D. Iyoob, BA, Matthew M. Boelig, MD, Holly L. Hedrick, MD, Alan W. Flake, MD, Beverly G. Coleman, MD, N. Scott Adzick, MD.

The Children's Hospital of Philadelphia, Philadelphia, PA, USA.

23

SUSTAINED ANTI-PROLIFERATIVE EFFECT OF SIROLIMUS ON LYMPHATIC MALFORMATION DERIVED CELLS AND INDUCTION OF PROGENITOR CELL DIFFERENTIATION

Christine A. Schad, MD[1], Julie Monteagudo, MD[1], Maria Gnarra, MD[2], June K. Wu, MD[1], Angela V. Kadenhe-Chiweshe, MD[1], Carrie J. Shawber, PhD[2].

[1]Morgan Stanley Children's Hospital of New York Presbyterian, Columbia University Medical Center, New York, NY, USA, [2]Columbia University Medical Center, New York, NY, USA.

24

THE ROLE OF FREE FATTY ACID RECEPTOR GPR120 IN A MODEL OF PARENTERAL NUTRITION LIVER INJURY

Gillian L. Fell, MD, PhD[1], Prathima Nandivada, MD[2], Bennet S. Cho, BA[1], Lorenzo Anez-Bustillos, MD[1], Meredith A. Baker, MD[1], Duy Dao, MD[1], Amy Pan, BA[1], Kathleen M. Gura, PharmD[1], Mark Puder, MD, PhD[1].

[1]Boston Children's Hospital, Boston, MA, USA, [2]Beth Israel Deaconess Medical Center, Boston, MA, USA.

25

TRANS-AMNIOTIC STEM CELL THERAPY (TRASCET) IN A LEPORINE MODEL OF GASTROSCHISIS

Christina Feng, MD, Christopher D. Graham, MD, Hester Shieh, MD, Joseph A. Brazzo, MS, John P. Connors, BS, Lucas Rohrer, Alexander Papadakis, David Zurakowski, PhD, Dario O. Fauza, MD, PhD.

Boston Children's Hospital, Boston, MA, USA.

Program in Detail (cont.)

Monday, May 16 (cont.)

26

IMPLICATIONS OF ANTICIPATED NEONATAL SURGICAL INTERVENTION ON MATERNAL MILK CYTOKINE PRODUCTION IMPACTS NEONATAL OUTCOMES

Rebecca M. Rentea, MD[1], Amy J. Wagner, MD[2], David M. Gourlay, MD[2], Melissa Christensen, BS[2], Jennifer L. Liedel, MD[3].

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [3]Children's Hospital at Montefiore and Children's Hospital of Wisconsin, New York, NY, USA.

27

OUTCOMES OF TOTAL PANCREATECTOMY AND ISLET AUTOTRANSPLANTATION IN YOUNG CHILDREN

Megan Berger, MD, Melena Bellin, MD, Daniel A. Saltzman, MD, Gregory Forlenza, MD, Kaustav Majumdar, MBBS, Martin Freeman, MD, Gregory Beilman, MD, Ty Dunn, MD, Michael Murati, MD, Joshua Wilhelm, MS, David E.R. Sutherland, MD, PhD, Sarah Jane Schwarzenberg, MD, Srinath Chinnakotla, MD.

University of Minnesota, Minneapolis, MN, USA.

28

RECANALIZATION OF PROLONGED EXTRAHEPATIC PORTAL VEIN OBSTRUCTION IN PEDIATRIC PATIENTS

Sydne L. Muratore, MD, Siobhan Flanagan, MD, David Hunter, MD, Robert Acton, MD.

University of Minnesota, Minneapolis, MN, USA.

Innovation Session

12:15 p.m. – 1:15 p.m. *Grand Hall B, Lobby Level*

Moderators: Shaun M. Kunisaki, MD; Rebecka L. Meyers, MD

i1

THE UTILITY OF ADDITIVE MANUFACTURING (3D PRINTING) AND SIMULATION FOR PREOPERATIVE PLANNING IN CONJOINED TWIN SEPARATION

T.K. Pandian, MD, MPH, Nimesh D. Naik, MD, Jane M. Matsumoto, MD, Christopher R. Moir, MD.

Mayo Clinic, Rochester, MN, USA.

i2

A NOVEL TECHNIQUE TO MEASURE SEVERITY OF CHEST DEFECTS IN PATIENTS WITH PECTUS EXCAVATUM USING WHITE LIGHT SCANNING

Ferdynand Hebal, MD, Bryan Malas, MHPE, CO, **Marleta Reynolds, MD**.

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

Program in Detail (cont.)

i3

AUTOMATED DATA EXTRACTION: MERGING CLINICAL CARE WITH REAL-TIME COHORT-SPECIFIC RESEARCH AND QUALITY IMPROVEMENT DATA

Ferdynand Hebal, MD, Michael L. Miller, MD, Elizabeth Nanney, BS, APN, George Lales, MS-MIS, Katherine A. Barsness, MD.

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

i4

CONTROLLED TISSUE EXPANSION FOR SHORT BOWEL SYNDROME TREATMENT USING OSMOTIC HYDROGEL: A FEASIBILITY STUDY

Riccardo Coletta, MD[1], Claudio Olivieri, MD[2], Valeria Solari, PhD[1], Basem A. Khalil[1], Alessandro Inserra, PhD[2], Antonino Morabito, MD, Prof[1].

[1]Royal Manchester Children's Hospital, Manchester, United Kingdom, [2]Ospedale Pediatrico Bambino Gesù, Rome, Holy See (Vatican City State).

i5

A NOVEL METHOD FOR IDENTIFYING HIGH RADIATION BURDEN FROM COMPUTED TOMOGRAPHY

Daniel L. Lodwick, MD, MS, Jennifer N. Cooper, MS, PhD, Peter C. Minneci, MD, MHSc, Katherine J. Deans, MD, MHSc.

Nationwide Children's Hospital, Columbus, OH, USA.

i6

TOWARD PHYSIOLOGIC EXTRACORPOREAL SUPPORT OF THE PREMATURE INFANT: UMBILICAL CORD CANNULATION PROVIDES SUPERIOR OXYGENATOR FLOWS, OXYGEN DELIVERY AND HEMODYNAMIC STABILITY

Matthew A. Hornick, MD, Marcus G. Davey, PhD, Emily A. Partridge, MD, PhD, Aliza M. Olive, MD, Theodore R. Weiland 3rd, BS, Jenny Kim, BA, Orlando Castillo, BA, Jiancheng Han, MD, Kevin C. Dysart, MD, William H. Peranteau, MD, Alan W. Flake, MD.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

i7

XENOGENEIC DECELLULARIZED OESOPHAGEAL TRANSPLANTATION IS ACHIEVABLE IN A LARGE ANIMAL MODEL

Edward Hannon, MBChB, MRCS, Federico Scottoni, MBChB, Lizzie Maughan, MBBS, MRCS, Luca Urbani, PhD, Carlotta Camilli, MSc, Colin Butler, MBBS, MRCS, Rui Rachel Wong, BSc, Claire Crowley, MSc, Simon Eaton, PhD, **Paolo De Coppi, MD, PhD**.

Institute of Child Health/University College London, London, United Kingdom.

Program in Detail (cont.)

Tuesday, May 17

Concurrent Scientific Session III: Clinical Surgery II — Quality Improvement

8:00 a.m. – 9:15 a.m. *Grand Hall A, Lobby Level*

Moderators: Jennifer H. Aldrink, MD; John H.T. Waldhausen, MD

29

SURGICAL SITE INFECTION REPORTING: MORE THAN MEETS THE AGAR

Luke R. Putnam, MD, MS[1], Tiffany G. Ostovar-Kermani, MD, MPH[1], Andrea Le Blanc, MPH[2], Kathryn T. Anderson, MD, MPH[1], Galit Holzmann-Pazgal, MD[1], Kevin P. Lally, MD, MS[1], KuoJen Tsao, MD[1].

[1]University of Texas Health Science Center at Houston, Houston, TX, USA, [2]Children's Memorial Hermann Hospital, Houston, TX, USA.

30

INCREASED RISK OF SURGICAL SITE INFECTION IN OBESE AND OVERWEIGHT PEDIATRIC PATIENTS

Brian P. Blackwood, MD[1], Colin D. Gause, MD[1], Irene Helenowski, PhD[2], Timothy B. Lautz, MD[1], Julia Grabowski, MD[1], Catherine J. Hunter, MD[1].

[1]Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, [2]Northwestern University Feinberg School of Medicine, Chicago, IL, USA.

31

PEDIATRIC SURGICAL READMISSIONS: ARE THEY TRULY PREVENTABLE?

Erin G. Brown, MD, Debra Burgess, RN, Richard J. Bold, MD, Diana L. Farmer, MD.

University of California, Davis, Sacramento, CA, USA.

32

INCREASED CAPTURE OF PEDIATRIC SURGICAL COMPLICATIONS UTILIZING A NOVEL CASE-LOG WEB APPLICATION

Jason C. Fisher, MD, Sandra S. Tomita, MD, Keith A. Kuenzler, MD, Howard B. Ginsburg, MD.

NYU Langone Medical Center, New York, NY, USA.

33

THE FINANCIAL IMPACT OF FLIPPING THE COIN

Katherine W. Gonzalez, MD, Shiva R. Reddy, BLA, Angela A. Mundakkal, BLA, Shawn D. St. Peter, MD.

Children's Mercy Hospital, Kansas City, MO, USA.

Program in Detail (cont.)

34

A MULTI-INSTITUTIONAL EVALUATION OF PARENTAL PERCEPTION REGARDING THE NECESSITY OF AN IN-PERSON POSTOPERATIVE VISIT FOR ROUTINE PEDIATRIC SURGERY

Erol M. Knott, DO, PhD[1], Terri-Ann Wattsman, MD[2], Shawn D. St. Peter, MD[1], Charles L. Snyder, MD[1], Sanghee Suh, BS[2], John P. Murphy, MD[1], Walter S. Andrews, MD[1], George W. Holcomb III, MD[1], Ashley K. Sherman, MA[1], Pablo Aguayo, MD[1], David Juang, MD[1], Corey W. Iqbal, MD[1], Richard J. Hendrickson, MD[1], **Sohail R. Shah, MD, MSHA[1]**.

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]Carilion Clinic, Roanoke, VA, USA.

35

IMPROVING OUTCOMES IN CORRECTION OF PECTUS EXCAVATUM WITH A GOAL-DIRECTED PRE-OPERATIVE PHYSICAL THERAPY PROGRAM

Robert L. Gates, MD, Susan Denninger, DPT, James Green, MD, Brianna Knott, BS, Dawn Blackhurst, PhD.

Greenville Hospital System, Greenville, SC, USA.

36

UTILITY OF ROUTINE PELVIC X-RAY IMAGING IN PEDIATRIC BLUNT TRAUMA

Robert M. Dorman, MD[1], Hibbut-ur-Rauf Naseem, MD[1], Arianne T. Train, DO[1], Kunal Chadha, MD[2], Frank Carnevale, MD[2], Kathryn D. Bass, MD[3], David H. Rothstein, MD, MS[3].

[1]Department of Pediatric Surgery, Women & Children's Hospital of Buffalo, Buffalo, NY, USA, [2]Department of Emergency Medicine, Women & Children's Hospital of Buffalo, Buffalo, NY, USA, [3]Department of Surgery, Women & Children's Hospital of Buffalo, Buffalo, NY, USA.

Concurrent Scientific Session IV: Basic Science II — NEC/Intestinal Ischemia, Short Gut/Tissue Engineering

8:00 a.m. – 9:15 a.m. *Grand Hall B, Lobby Level*

Moderators: Marleta Reynolds, MD; Sundeep G. Keswani, MD

37

STROMAL CELL SOURCE DOES NOT IMPACT SURVIVAL OR MESENTERIC PERFUSION FOLLOWING INTESTINAL ISCHEMIA

Amanda R. Jensen, MD, Morenci M. Manning, MS, Sina Khaneki, MD, Troy A. Markel, MD.

Indiana University School of Medicine, Indianapolis, IN, USA.

38

EPIGENETIC REGULATION OF INTESTINAL STEM CELL POPULATION DURING EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Bo Li, PhD, **Raffaello Bonacchi, MD**, Adam Minich, MD, Carol Lee, MSc, Elke Zani-Ruttenstock, MD, Augusto Zani, MD, PhD, Agostino Pierro, MD.

The Hospital for Sick Children, Toronto, ON, Canada.

Program in Detail (cont.)

Tuesday, May 17 (cont.)

39

INTESTINAL STEM CELL ACTIVITY IS REDUCED DURING EXPERIMENTAL NECROTIZING ENTEROCOLITIS BUT IS RECOVERED BY ADMINISTRATION OF AMNIOTIC FLUID STEM CELLS

Elke Zani-Ruttenstock, MD[1], Augusto Zani, MD, PhD[1], Bo Li, PhD[1], Paolo De Coppi, MD, PhD[2], Carol Lee, MSc[1], Agostino Pierro, MD[1].

[1]The Hospital for Sick Children, Toronto, ON, Canada, [2]University College London Institute of Child Health, London, United Kingdom.

40

METABOLIC DYSFUNCTION IN PREMATURE INFANTS IS ASSOCIATED WITH NECROTIZING ENTEROCOLITIS

Tiffany J. Sinclair, MD[1], Zachary J. Kastenberg, MD, MS[1], R. Larry Moss, MD[2], Gregory M. Enns, MB, ChB[1], Tina M. Cowan, PhD[3], Gary M. Shaw, DrPH[1], David K. Stevenson, MD[1], Robert J. Currier, PhD[4], Curt Scharfe, PhD[5], Kelli K. Ryckman, PhD[6], Laura L. Jelliffe-Pawlowski, PhD[7], Karl G. Sylvester, MD[1].

[1]Lucile Packard Children's Hospital, Stanford University School of Medicine, Stanford, CA, USA, [2]Nationwide Children's Hospital, Ohio State University, Columbus, OH, USA, [3]Stanford Health Care, Stanford University School of Medicine, Stanford, CA, USA, [4]California Department of Public Health, Richmond, CA, USA, [5]Stanford University, Stanford, CA, USA, [6]University of Iowa, College of Public Health, Iowa City, IA, USA, [7]University of California San Francisco School of Medicine, San Francisco, CA, USA.

41

INTESTINAL EPITHELIAL INJURY FOLLOWING MATERNAL SEPARATION IS RESCUED BY HYDROGEN SULFIDE

Bo Li, PhD, **Augusto Zani, MD, PhD**, Zechariah Martin, MD, Carol Lee, MSc, Elke Zani-Ruttenstock, MD, Agostino Pierro, MD.

The Hospital for Sick Children, Toronto, ON, Canada.

42

CHANGES IN THE INTESTINAL MICROBIOTA IN CHILDREN WITH SHORT BOWEL SYNDROME UNDERGOING TREATMENT FOR BACTERIAL OVERGROWTH

Hannah G. Piper, MD, Lorrie Burkhalter, CCRC, Barbara Drews, APNP, Nandini Channabasappa, MD, Andrew Y. Koh, MD.

University of Texas Southwestern Medical Center, Dallas, TX, USA.

Program in Detail (cont.)

43

COMBINATION TROPHIC PEPTIDE THERAPY FOR NEONATAL SHORT BOWEL SYNDROME

David W. Lim, MDCM, MEd[1], Crystal Lévesque, PhD[2], Donna F. Vine, PhD[1], Mitsuru Muto, MD, PhD[1], Patrick N. Nation, PhD[1], Pamela R. Wizzard, BSc, RAHT[1], Julang Li, PhD[3], David L. Sigalet, MD, PhD[4], David L. Bigam, MD, MSc[1], Justine M. Turner, MBBS, PhD[1], Paul W. Wales, MD, MSc[5].

[1]University of Alberta, Edmonton, AB, Canada, [2]South Dakota State University, Brookings, SD, USA, [3]University of Guelph, Guelph, ON, Canada, [4]University of Calgary, Calgary, AB, Canada, [5]University of Toronto & Hospital for Sick Children, Toronto, ON, Canada.

44

THE EFFECT OF ENTEROID SEEDING DENSITY ON THE PRODUCTION OF TISSUE ENGINEERED INTESTINE (TEI)

Barrett P. Cromeens, DO, PhD, Yanchun Liu, MD, Johnathan Stathopolous, BS, Natalie Huibregtse, BS candidate, Gail E. Besner, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Journal of Pediatric Surgery **Lecture**

Michael W. Collins, PhD
University of Pittsburgh Medical Center, Pittsburgh, PA USA

Sport-Related Concussion: Moving in the Right Direction
10:00 a.m. – 11: 00 a.m. *Grand Hall A/B, Lobby Level*

Learning Objectives

At the conclusion of this session, participants will be able to:

- discuss topics of concerns and public misperceptions of sport-related concussion
- conceptualize concussion as a heterogeneous entity
- discuss assessment findings that help establish targeted clinical pathways for concussion
- discuss how clinical management, treatment and rehabilitative directives are dictated by these clinical trajectories

Plenary Session II

11:00 a.m. – Noon *Grand Ballroom A/B, Lobby Level*

Moderators: David A. Rodeberg, MD; Michael D. Klein, MD

45

ARE WE USING THE RIGHT DATA TO OPTIMIZE THE FUTURE PEDIATRIC SURGERY WORKFORCE IN THE UNITED STATES?

Lori A. Gurien, MD, MPH, Melvin S. Dassinger, MD, Jeffrey M. Burford, MD, Samuel D. Smith, MD.

Arkansas Children's Hospital, Little Rock, AR, USA.

Program in Detail (cont.)

Tuesday, May 17 (cont.)

46

PREDICTING THE FUTURE POPULATION OF PEDIATRIC SURGEONS

Tate R. Nice, MD, MSPH, Mike Chen, MD.

Children's of Alabama, Birmingham, AL, USA.

47

TISSUE-ENGINEERED LIVER RESCUES HEPATIC FAILURE IN AN ARGINASE-1 KNOCKOUT MODEL

Andrew Trecartin, MD[1], Nirmala Mavila, PhD[1], Ryan Spurrier, MD[1], Gloria Cantero, PhD[2], Kasper Wang, MD[1], Gerald S. Lipshutz, MD[2], Tracy Grikscheit, MD[1].

[1]Children's Hospital Los Angeles, Los Angeles, CA, USA, [2]UCLA Department of Surgery, Los Angeles, CA, USA.

48

MEASURING THE VALUE OF A CLINICAL PRACTICE GUIDELINE FOR CHILDREN WITH PERFORATED APPENDICITIS

Jamie R. Robinson, MD[1], Elenir B.C. Avitscher, MD, PhD, MBA[2], James C. Gay, MD, MMHC[2], Zachary I. Willis, MD[1], Luke R. Putnam, MD, MS[2], Andrew Anglemeyer MMHC[1], Jon E. Tyson, MD, MPH[2], Martin L. Blakely, MD, MS[1].

[1]Vanderbilt University Medical Center, Nashville, TN, USA, [2]Vanderbilt Children's Hospital, Nashville, TN, USA.

49

ENHANCING THE ABILITY OF *LACTOBACILLUS REUTERI* TO PROTECT INTESTINES FROM EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Jacob K. Olson, MD, Christopher J. McCulloh, MD, Jason B. Navarro, BS, Lauren Mashburn-Warren, PhD, Natalie Huibregtse, BS candidate, Steven D. Goodman, PhD, Gail E. Besner, MD.

Research Institute at Nationwide Children's Hospital, Columbus, OH, USA.

50

A CALL FOR A STANDARD EVIDENCE-BASED DEFINITION OF PERFORATED APPENDICITIS

Andrew P. Rogers, MD, Tiffany Zens, MD, Charles M. Leys, MD, MSCI, Peter F. Nichol, MD, PhD, Daniel J. Ostlie, MD.

University of Wisconsin, Madison, WI, USA.

51

CURRENT USE AND OUTCOMES OF HELICOPTER TRANSPORT IN PEDIATRIC TRAUMA: A REVIEW OF 18,291 TRANSPORTS

Brian R. Englum, MD[1], Kristy L. Rialon, MD[1], Jina Kim, MD[1], Mark L. Shapiro, MD[1], John E. Scarborough, MD[2], Henry E. Rice, MD[1], Obinna O. Adibe, MD, MHS[1], Elisabeth T. Tracy, MD[1].

[1]Duke University Medical Center, Durham, NC, USA, [2]University of Wisconsin School of Medicine and Public Health, Madison, WI, USA.

Program in Detail (cont.)

Jay and Margie Grosfeld Lecture

Vinay Nadkarni, MD, MS
Children's Hospital of Philadelphia, University of Pennsylvania, Philadelphia, PA USA

Resuscitating Resuscitation: Disruptive Innovations — Learning from the Past, Present and Toward a Brighter Future!

Noon – 12:45 p.m. *Grand Hall A/B, Lobby Level*

APSA Foundation Scholars

1:15 p.m. – 1:45 p.m. *Grand Hall A/B, Lobby Level*

William H. Peranteau
Children's Hospital of Philadelphia, Philadelphia, PA USA
In Utero **Hematopoietic Cell Transplantation for the Treatment of Congenital Disorders**

Bradley J. Segura
University of Minnesota, Masonic Children's Hospital, Minneapolis, MN USA
The Role of Enteric Glia in Pediatric Intestinal Inflammation

Travel Fellows

1:45 p.m. – 2:15 p.m. *Grand Hall A/B, Lobby Level*

Christian Pais, MD,
Military Hospital, Dept. of Pediatric Surgery, Quito, Ecuador
Pediatric Surgery, My "Axis of Action"

Esther Saguil, MD,
Philippine General Hospital, Manila, Philippines
The Practice of Pediatric Surgery in the Philippines

Plenary Lecture

Mary L. Brandt, MD
Baylor College of Medicine, Houston, TX USA

Sustaining a Career

2:30 p.m. – 3:15 p.m. *Grand Hall A/B, Lobby Level*

Learning Objectives

At the conclusion of this session, participants will be able to:

- define the unique stresses that contribute to limiting careers in pediatric surgery
- describe methods to increase "quality of work" to increase career satisfaction

Video Session

3:15 p.m. – 4:15 p.m.

Moderators: Anne C. Fischer, MD; David J. Schmeling, MD

Program in Detail (cont.)

Tuesday, May 17 (cont.)

V1

LAPAROSCOPIC ASSISTED GASTRIC PULL-UP FOR LONG-GAP ESOPHAGEAL ATRESIA —TECHNICAL ASPECTS

Hans Joachim Kirschner, MD, Joerg Fuchs, MD.

University Children's Hospital Tuebingen, Tuebingen, Germany.

V2

THORACOSCOPIC REPAIR OF A SYMPTOMATIC CONGENITAL CERVICAL LUNG HERNIATION

Stephen J. Fenton, MD, Justin H. Lee, MD.

University of Utah School of Medicine, Salt Lake City, UT, USA.

V3

MINIMALLY INVASIVE REPAIR OF PECTUS CARINATUM

Robert Kelly, MD[1], **Sherif Emil, MD, CM[2]**.

[1]Children's Hospital of the King's Daughters; East Virginia Medical School, Norfolk, VA, USA, [2]Montreal Children's Hospital; McGill University Health Centre, Montreal, QC, Canada.

V4

FORCED STERNAL ELEVATION AS AN ADJUNCT TO THE NUSS PROCEDURE FOR PECTUS EXCAVATUM

Barry LoSasso, MD, Gerald Gollin, MD.

Rady Children's Hospital and Sharp Memorial Medical Center, San Diego, CA, USA.

V5

INTERCOSTAL CRYOABLATION: A NOVEL METHOD OF PAIN MANAGEMENT FOR THE NUSS PROCEDURE

Y. Julia Chen, MD, Benjamin Keller, MD, Jacob Stephenson, MD, Amy Rahm, MD, Rebecca Stark, MD, Shinjiro Hirose, MD, Gary Raff, MD.

University of California, Davis, Medical Center, Sacramento, CA, USA.

V6

ENDOSCOPIC MANAGEMENT OF A DUODENAL WEB

Lauren Wood, BS[1], Zach Kastenberg, MD[2], Tiffany Sinclair, MD[2], Stephanie Chao, MD[2], **James Wall, MD[2]**.

[1]Stanford School of Medicine, Palo Alto, CA, USA, [2]Lucile Packard Children's Hospital Stanford, Palo Alto, CA, USA.

Program in Detail (cont.)

V7

OPERATIVE VIDEO: ANORECTAL MALFORMATION. RECTOPERINEAL FISTULA WITH VAGINAL AGENESIS

Victoria A. Lane, MBChB, Richard J. Wood, MD, Carlos Reck, MD, Geri Hewitt, MD, Marc A. Levitt, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Annual Meeting concludes with the President's Reception and Banquet.

APSA-IPSO Symposium Cancer Abstracts

APSA-IPSO Symposium Cancer Abstracts

Cancer Abstracts
Saturday, May 14, 10:00 – 11:30 a.m.

IPSO 1

OUTCOMES OF CHEST WALL RESECTIONS IN PEDIATRIC SARCOMA PATIENTS

Carmen Lopez, BS[1], Arlene Correa, PhD[2], Ara A. Vaporciyan, MD[2], Mary T. Austin, MD, MPH[2], David C. Rice, MD[2], Andrea A. Hayes-Jordan, MD[2].

[1]University of Texas Health Science Center - Houston, Houston, TX, USA, [2]MD Anderson Cancer Center, Houston, TX, USA.

Purpose:
Chest wall tumors in pediatric patients are rare. This study aims to evaluate treatment, survival and functional outcomes in pediatric patients who have undergone chest wall resections secondary to sarcomas.

Methods:
An IRB approved, retrospective review was performed all patients < 19 years old who underwent chest wall resections for sarcoma between 1999 and 2014 at a single institution quaternary referral cancer center. Functional outcome data was extracted from medical records and graded. Univariable and multivariable Cox regressions were completed.

Results:
Of 44 patients, Ewing's sarcoma(n=18) and osteosarcoma(n=16) were most common. Other sarcomas included synovial sarcoma, chondrosarcoma, rhabdomyosarcoma. Gore-Tex® mesh or, a Marlex® mesh and methyl methacrylate sandwich was used in 22 patients, and 9 children did not require reconstruction. Twenty-four (54.5%) patients had normal activity, 3 (6.8%) had occasional discomfort, 2 (4.5%) had pain impairing function, 7(15.9%) required medication or physical therapy for impairment and 8 (18.2%) needed additional surgery. Five children (11.4%) developed scoliosis and all of these patients had posterior rib tumors. Median overall survival for the entire cohort was 73.46 ± 11.37 months. Histology (p=0.003), location of tumor on the ribs (p=0.007) and surgical margins (p=0.011) were significantly associated with overall survival. Tumors on the middle (p=0.003) and posterior (p=0.032) portions of the ribs had a much lower chance of death than those with tumors on the anterior part of the chest wall. There was no significant correlation between number of ribs resected or position of tumor on the ribs and functional outcome (p=0.2). There was no significant correlation between disease-free survival and tumor size, number of ribs resected, material, neoadjuvant or adjuvant radiotherapy, or presence scoliosis.

Conclusion:
Despite an aggressive approach, outcomes are good. Scoliosis is more common in posterior rib resections. Histology, location of the tumor and surgical margins impact survival but, type of reconstruction does not.

APSA-IPSO Symposium Cancer Abstracts (cont.)

IPSO 2

PREDICTORS OF NODAL METASTASIS IN PEDIATRIC DIFFERENTIATED THYROID CANCER

Jina Kim, MD, Zhifei Sun, MD, Mohamed A. Adam, MD, Sanziana A. Roman, MD, Obinna O. Adibe, MD, Henry E. Rice, MD, Elisabeth T. Tracy, MD.

Duke University Medical Center, Durham, NC, USA.

Purpose:
Persistent or recurrent locoregional disease is associated with worse disease-free survival in pediatric differentiated thyroid cancer. However, there is limited data identifying risk factors for nodal metastasis in children.

Methods:
The 1998 - 2011 Surveillance, Epidemiology and End Results Program database was queried for patients ≤ 18 years of age diagnosed with papillary or follicular thyroid cancer who underwent nodal examination. Patients were grouped by absence or presence of nodal metastasis, as documented by pathology. Multivariable logistic regression methods were used to identify independent risk factors for nodal metastasis.

Results:
In total, 1,075 children met study criteria: 734 (68%) had nodal metastases, while 341 (32%) did not, with a median age of 16 years in both groups. After adjustment for patient and tumor characteristics, independent risk factors for nodal metastasis included larger tumor size (T1b: odds ratio [OR] 2.02, 95% confidence interval [CI] 1.22 - 3.34, $p = 0.006$; T2: OR 3.37, 95% CI 2.03 - 5.60, $p < 0.001$; T3: OR 3.39, 95% CI 1.69 - 6.81, $p = 0.001$), extra-thyroidal extension (OR 7.28, 95% CI 4.07 - 13.01, $p < 0.001$), and multifocal disease (OR 1.94, 95% 1.33 - 2.84, $p = 0.001$). Follicular histology was associated with lower risk of nodal metastasis, compared to papillary histology (OR 0.05, 95% CI 0.02-0.19, $p < 0.001$). Age, sex, and race did not increase risk of nodal metastasis in pediatric differentiated thyroid cancer (all $p > 0.05$).

Conclusions:
Tumor size, extra-thyroidal extension, and multifocal disease are independent risk factors for nodal metastases in pediatric differentiated thyroid cancer, while follicular histology is protective. Children with differentiated thyroid cancer who demonstrate these risk factors should have careful preoperative evaluation for evidence of lateral cervical lymph node metastases, and the central compartment should be evaluated intraoperatively, with consideration of possible lymphadenectomy.

APSA-IPSO Symposium Cancer Abstracts (cont.)

IPSO 3

PREDICTORS FOR THE DEVELOPMENT AND FUNCTIONAL OUTCOMES OF SCOLIOSIS IN LONG-TERM SURVIVORS OF SARCOMA

Rodrigo B. Interiano, MD, Sue C. Kaste, DO, Chenghong Li, PhD, Deo Kumar Srivastava, PhD, Bhaskar N. Rao, MD, Daniel M. Green, MD, Leslie L. Robison, PhD, Andrew M. Davidoff, MD, Kirsten K. Ness, PhD, Melissa M. Hudson, MD, Israel Fernandez-Pineda, MD.
St. Jude Children's Research Hospital, Memphis, TN, USA.

Introduction:
The 5-year survival rate for children with sarcoma continues to increase due to improved adjuvant therapies and surgical procedures; longer survival has led to the recognition of chronic health conditions, such as scoliosis, related to their prior therapy. We sought to study the association of sarcoma therapy with the development of scoliosis.

Methods:
Patient demographics, treatment regimens and functional outcomes at the last follow-up visit for all patients who survived for 5+ years treated for a sarcoma between 10/1964 and 10/2002 at our institution were reviewed. The diagnosis of scoliosis (Cobb angle >15 degrees) was determined by an independent study radiologist based on the last imaging available. Functional performance (including pulmonary function) and standardized questionnaires were completed in a long-term follow-up clinic. Multiple regression analyses were performed on all continuous outcomes; log-binomial/Poisson regression with robust variance estimate was used for binary outcomes.

Results:
Of 367 patients identified, 54.8% were male, with median age at diagnosis of 11.8 (range: 0.0-24.8) years and median age at follow-up of 33.1 (range: 19.3-63.8) years. Scoliosis was validated by imaging in 100 (27.2%) patients. Chest radiation [relative risk (RR): 1.88 (95% confidence interval [CI]: 1.21-2.92, $p<0.005$,)] and chest wall resection [RR: 2.64 (CI: 1.79-3.89), $p<0.0001$] were associated with an increased incidence of scoliosis; thoracotomy without rib resection ($p=0.78$) was not. Scoliosis, in turn, was associated with worse pulmonary function outcomes [RR: 2.90 (CI: 1.94-4.34), $p<0.0001$], and self-reported health outcomes, including functional impairment [RR: 1.60 (CI: 1.07-2.38), $p<0.05$] and cancer-related pain [RR: 1.55 (CI: 1.11-2.16), $p<0.01$].

Conclusions:
Children with sarcoma are at-risk of developing scoliosis when treatment regimens include chest radiation or chest wall resection but not thoracotomy without rib resection. The identification of these risk factors may now allow for early intervention designed to prevent the adverse functional and social outcomes observed in the patients in our series.

APSA-IPSO Symposium Cancer Abstracts (cont.)

IPSO 4

COMPREHENSIVE EVALUATION OF LONG-TERM RENAL FUNCTION IN PATIENTS TREATED FOR SYNCHRONOUS BILATERAL WILMS TUMOR

Rodrigo B. Interiano, MD[1], Kathleen Kieran, MD[2], M. Elizabeth McCarville, MD[1], Noel Delos Santos, MD[3], Shenghua Mao, PhD[1], Jianrong Wu, PhD[1], Rachel C. Brennan, MD[1], Matthew J. Krasin, MD[1], Mark A. Williams, MD[1], Daniel M. Green, MD[1], Andrew M. Davidoff, MD[1].

[1]St. Jude Children's Research Hospital, Memphis, TN, USA, [2]University of Iowa Children's Hospital, Iowa City, IA, USA, [3]University of Tennessee Health Science Center, Memphis, TN, USA.

Objectives:
Five percent of children with Wilms tumor present with bilateral disease. Comprehensive assessment of long-term renal function in this population is lacking. We evaluated renal function in patients treated at our institution for synchronous bilateral Wilms tumor (BWT) between 2001-2014 and used these data to determine the optimal method for estimating glomerular filtration rate (eGFR).

Methods:
Surgical approach, adjuvant therapy and pathology reports were reviewed for patients with at least six months follow-up from completion of therapy. eGFRs, as assessed by the Schwartz formula (based on creatinine and body length) and Chronic Kidney Disease in Children (CKiD) formula (based on creatinine, body length, BUN, and cystatin C), were compared to measured GFR (mGFR) determined by ^{99m}Tc-DTPA scanning. Urine studies, including microalbumin, β-microglobulin and FE_{Na} were performed.

Results:
Forty-two patients were identified; 6 (14.3%) patients died from progressive disease (n=5) or second malignancy (n=1). Of the remaining 36 patients, 28 (77.8%) had adequate follow-up, and are included in this analysis. Renal function was assessed after median follow-up from last surgical procedure of 5.2 (range: 1.4-13.4) years. The median mGFR (n=25) was 97 (range: 56-155) mL/min/1.73m^2, while the median $eGFR_{Schwartz}$ (n=28) and $eGFR_{CKiD}$ (n=17) were 103.3 (range: 67.8-159.5) mL/min/1.73m^2 and 79.7 (range: 58.3-180.7) mL/min/1.73m^2, respectively (p=0.130 and p=0.753 when compared to mGFR, respectively). One patient had $eGFR_{CKiD}$<60 mL/min/1.73m^2, while another had mGFR<60 mL/min/1.73m^2. Eleven (39.3%) patients had at least one abnormal urine study (microalbumin>30µg/g creatinine, n=3; β-2 microglobulin>133µg/g creatinine, n=9; FE_{Na}>1%, n=4).

Conclusions:
In our series of children treated for BWT, there was a very low incidence (2/28, 7.1%) of abnormally low GFR. Neither method for estimating GFR gave a significantly different result from the measured GFR, suggesting that the Schwartz equation is adequate for this patient population, although specific urine tests may be more sensitive for detecting subtle renal dysfunction.

APSA-IPSO Symposium Cancer Abstracts (cont.)

IPSO 5

PREDICTORS OF RECURRENCE IN PEDIATRIC PAPILLARY THYROID CANCER

Jill Rubinstein, MD, PhD[1], Kayleigh Herrick-Reynolds, BS[2], Raffaella Morotti, MD[1], Manju Prasad, MD[1], Catherine Dinauer, MD[1], Robert Udelsman, MD, MBA[1], **Emily Christison-Lagay, MD**[1].

[1]Yale-New Haven Children's Hospital, New Haven, CT, USA, [2]Yale Medical School, New Haven, CT, USA.

Purpose:
Papillary thyroid cancer (PTC) is rare in children with an annual incidence of 0.32 cases/100,000. On account of this rarity, treatment approaches have been historically extrapolated from the adult experience. However, PTC in the pediatric population tends to manifest differently than in adults, with more extensive disease, a greater likelihood of both lymph node involvement and early distant metastases, and a greater propensity for recurrence. Despite this more aggressive phenotype, the prognosis remains favorable, with >90% survival rates at 30 years. These differences highlight the need for specific pediatric treatment paradigms.

Methods:
A retrospective review of all patients aged ≤20 years, with at least 24 months of follow-up, treated for PTC at a single center between 2002-2012. Fisher's Exact test and Cox Proportional Hazard were used to estimate the effect of risk factors on disease recurrence.

Results:
53 cases of PTC were diagnosed with a mean age at diagnosis of 16.4 years and a mean length of follow up 64 months. Disease recurred in 15(28.3%) patients at a median of 24 months (range 8.0-78.1 months). There were no deaths from disease. On univariate analysis, predictors of recurrence included size >2cm(p=0.0024), presence of lateral neck disease(p=0.0001), lymphovascular invasion(p=0.019), extracapsular invasion(p=0.0001), non-Caucasian race(p=0.011), and thyroidectomy without central neck dissection(p=0.0038). Age, gender, history of thyroiditis, adjuvant use of radioactive iodine, BRAF positivity, and tumor multifocality were not significant predictors of recurrence. Multivariate analysis identified race (p=0.041) and nodule size >2cm (p=0.033) as independent predictors of recurrence.

Conclusion:
Pediatric PTC follows an indolent course with excellent long-term survival; however, nearly a third of patients will experience disease recurrence. Predictors of recurrence are not only tumor specific but also vary by race and choice of operative procedure. This observation has important counseling implications and further supports the role of an aggressive operative approach including central neck dissection.

APSA-IPSO Symposium Cancer Abstracts (cont.)

IPSO 6

INTRA-TUMORAL IMPLANTATION OF VINCRISTINE/DOXORUBICIN-LOADED SILK FOAM DECREASED ORTHOTOPIC NEUROBLASTOMA TUMOR GROWTH AND CREATED FIRST ANIMAL MODEL OF LARGE CELL NEUROBLASTOMA

Jamie Harris, MD[1], Jeannine Coburn, PhD[2], Jennifer Poirier, PhD[1], David L. Kaplan, PhD[2], Bill Chiu, MD[3].

[1]Rush University Medical Center, Chicago, IL, USA, [2]Tufts University Medical Center, Boston, MA, USA, [3]University of Illinois Chicago, Chicago, IL, USA.

Purpose:
Treatment of neuroblastoma, most common pediatric solid extracranial tumor, involves systemic chemotherapy, which has serious side effects. We hypothesize that intra-tumoral implantation of sustained-release silk foam containing chemotherapy can decrease tumor growth.

Methods:
Human neuroblastoma KELLY cells were cultured with vincristine and doxorubicin to determine half maximal inhibitory concentration(IC_{50}). *In-vitro* release profiles of silk foams were determined. Orthotopic KELLY tumors were established in immunocompromised mice until tumor reached >300mm^3 before performing intra-tumoral implantation of foam loaded with vincristine25µg doxorubicin200µg(Vin25Dox200F), vincristine25µg doxorubicin400µg(Vin25Dox400F), vincristine50µg doxorubicin200µg(Vin50Dox200F), vincristine50µg doxorubicin400µg(Vin50Dox400F), or drug-free(CONT), 8 mice per group. Treatment groups were compared to equivalent single intravenous dose. Endpoints included tumor volume>1000mm^3 or weight loss>20%. Tumor growth was analyzed using ANOVA and logistic regression. Tumors were stained with hematoxylin and eosin(H&E), TUNEL, and Ki67.

Results:
IC_{50} of vincristine was 5.7±2ng/mL, 20±0ng/mL for doxorubicin. Release studies showed 18µg of Vin50F and 25µg of Dox400F released immediately, and 18µg and 100µg released over 20 days, respectively. Days to reach >1000mm^3(DTR1000) for the tumor were longer when treated with Vin25Dox200F(23±10.72d), Vin25Dox400F(18.6±8.49d), Vin50Dox200F(57.27±51.44d), and Vin50Dox400F(27.33±11.09d) compared to CONT(10.62±3.3d)($p<0.001$-0.02), and no difference between Vin50Dox200F and Vin50Dox400F($p=0.25$). Vin25Dox200F had slower tumor growth compared to Vin25Dox200IV($p=0.037$). Vin50Dox200IV had 22.42% weight loss one-week post-treatment; higher IV doses were not tested. Vin50Dox200IV had greater weight loss compared to Vin50Dox200F(22.42%v10.59%)($p<0.001$). Histology of Vin50Dox200F-treated tumors showed necrosis adjacent to foam, a zone of apoptosis then viable cells. At least one animal per treatment group had tumor remission of 25 days before recurrence. These remission/recurrence tumors had large nuclei and prominent nucleoli, consistent with large cell neuroblastoma.

Conclusions:
Intra-tumoral implantation of combined vincristine/doxorubicin-loaded sustained-release silk foam decreased neuroblastoma tumor growth and was more effective than single dose intravenous administration. We created the first experimental model of large cell neuroblastoma.

APSA-IPSO Symposium Cancer Abstracts (cont.)

IPSO 7

HEPATOBLASTOMA IN CHILDREN AGED LESS THAN SIX MONTHS AT DIAGNOSIS: A REPORT FROM THE INTERNATIONAL CHILDHOOD LIVER TUMOUR STUDY GROUP (SIOPEL)

Patrizia Dall'Igna, MD[1], Laurence Brugières, MD[2], Michela Casanova, MD[3], Sophie Branchereau, MD[4], Daniel C. Aronson, MD[5], Piotr Czauderna, MD[6], Jean de Ville de Goyet, MD[7], Steven W. Warmann, MD[8], Rita Alaggio, MD[9], Giovanni Cecchetto, MD[1], Beate Haeberle, MD[10], Rudolf Maibach, PhD[11], Giorgio Perilongo, MD[12].

[1]Pediatric Surgery, Dept. of Women's and Children's Health, University of Padua, Padua, Italy, [2]Dépt. de Pédiatrie, Service d'Oncologie Pédiatrique, Institut Gustave Roussy, Villejuif, France, [3]Pediatric Oncology Unit, Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy, [4]Chirurgie Pediatrique, Bicetre Hospital, Paris, France, [5]Division of Pediatric Surgery, Queen Elisabeth Central Hospital, University of Malawi, Blantyre, Malawi, [6]Pediatric Surgery, Medical University of Gdansk, Gdansk, Poland, [7]Pediatric Surgery, Bambino Gesù Children's Hospital, Rome, Italy, [8]Department of Pediatric Surgery and Pediatric Urology, University Children's Hospital, Tuebingen Germany, [9]Pediatric Pathology, DIMED Dept., University of Padua, Padua, Italy, [10]Department of Pediatric Surgery, University of Munich, Munich, Germany, [11]Department of Statistics, International Breast Cancer Study Group (IBCSG) Coordinating Center, Berne, Switzerland, [12]Department of Women's and Children's Health, University of Padua, Padua, Italy.

Objective:
To report the results of a retrospective study aiming to asses if age < 6 months at the time of diagnosis influences the clinical presenting features of hepatoblastoma (HB), the response to treatment and the ultimate patients' outcome..

Methods:
The 695 patients, who entered into the consecutive international cooperative trials on HB run by the SIOPEL group, from 1990 to 2004 (SIOPEL 1, 2, 3 trials), were analyzed.

Results:
Ninety-one children (13%) met the study criteria and represents the study population. Twelve patients (13%) were premature; 6 were affected by Beckwith-Wiedemann syndrome, and 4 of them had been born premature; 3 had hemi-hypertrophy. All the 5 patients with distant metastases had lung deposits. Four patients had a serum AFP value < 100 ng/ml, while 11 had an elevated AFP but normal per age. Eighty-four patients (92%) went to surgery after preoperative chemotherapy; 7 were not operated on because of progressive disease. The complete tumor resection was obtained in 76 patients (90%), either by partial hepatectomy (69) or primary orthotopic liver transplantation. The 5 years OS and EFS of this cohort of patients are 91% (95%CI 84-96%) and 87% (95%CI 78-92) respectively (median follow-up 5.6 years). Seven patients died, all of disease: 5 never had surgery and 2 for progressive disease after local relapse. Two out of 4 patients with AFP < 100 ng/ml at diagnosis died of disease and all but one of the 5 presenting with lung metastases. No toxic deaths occurred.

Conclusions:
HB occurring in children aged < 6 months at diagnosis do not encompass a peculiar subtype of HB. The present standards of care recommended to these young children seem to guarantee a good outcome, and also for them AFP < 100 ng/mL and lung metastases seem to be negative prognostic factors.

APSA-IPSO Symposium Cancer Abstracts (cont.)

IPSO 8

WIDE EXCISIONAL MARGINS DO NOT IMPROVE SURVIVAL IN PEDIATRIC MELANOMA

Jina Kim, MD, Zhifei Sun, MD, Brian R. Englum, MD, Obinna O. Adibe, MD, Henry E. Rice, MD, April KS Salama, MD, Paul J. Mosca, MD, Elisabeth T. Tracy, MD.

Duke University Medical Center, Durham, NC, USA.

Purpose:
Wide excision is the standard of care for adults with primary melanoma. Although adult melanoma guidelines are often applied to children, age-appropriate surgical margins have not been defined for pe-diatric melanoma.

Methods:
The 1998 – 2012 National Cancer Data Base was queried for patients less than 20 years of age diagnosed with invasive cutaneous melanoma. Those who underwent Mohs surgery were excluded. Patients were grouped by whether they underwent excision with wide margins (> 1 cm) or narrower margins (≤ 1 cm). Multivariable regression methods were used to compare resection margin positivity and overall survival.

Results:
In total, 2,527 patients met study criteria: 1,886 (75%) patients underwent excision with wide margins while 641 (25%) had narrower margins. Breslow depth was similar between the two groups, as were oth-er tumor characteristics including presence of ulceration, mitotic index, and lymph node involvement (all $p > 0.05$). Children who underwent excision with wide margins did not experience improved overall survival, compared to those who received narrower margins (85% vs. 91% at 15 years, $p = 0.38$). After adjustment for patient, tumor, and treatment characteristics, wide margins still did not improve surviv-al (adjusted hazard ratio 1.99, 95% confidence interval [CI] 0.64 – 6.18, $p = 0.24$). Additionally, wide margins did not reduce the risk of margin positivity (odds ratio 0.60, 95% CI 0.18 – 2.00, $p = 0.41$).

Conclusions:
Excisional margins greater than 1 cm does not appear to provide long-term survival benefit for children with invasive cutaneous melanoma. Although further studies are needed to define the optimal extent of initial resection in pediatric melanoma, our study suggests that margins < 1 cm may be acceptable.

APSA-IPSO Symposium Cancer Abstracts (cont.)

IPSO 9

A 20-YEAR RETROSPECTIVE ANALYSIS OF CT-BASED PRE-OPERATIVE IDENTIFICATION OF PULMONARY METASTASES IN PATIENTS WITH OSTEOSARCOMA: A SINGLE-CENTER REVIEW

Todd E. Heaton, MD, Valerie Pallos, BA, Paul A. Meyers, MD, Alexander J. Chou, MD, Anita P. Price, MD, Michael P. La Quaglia, MD.

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

Purpose

Cooperative group studies support complete metastasectomy in osteosarcoma (OS). Minimally invasive techniques have been applied; however, these methods are dependent on pre-operative CT scans to predict the presence and number of metastases. In this study we assess the accuracy of pre-operative CT compared to findings at thoracotomy and determine if that accuracy has improved over time.

Methods

We reviewed OS thoracotomies performed at our institution from 1996-2015. The number of lesions on the pre-operative non-contrast chest CT was compared to the number of OS metastases seen on final pathology (viable=viable malignant cells; non-viable=osteoid only).

Results

Eighty-eight patients underwent 161 thoracotomies with a median of 14 days (range, 1-85) between CT scan and surgery. There was a median of 2 CT-identified lesions (range, 0-15), and a median of 4 operative resections (range, 1-25) per thoracotomy. Overall, 52 thoracotomies (32.3%) revealed a greater number of total OS metastases at surgery than CT-identified lesions. Thirty-four of these (21.1%) had a greater number of viable metastases than CT-identified lesions. The overall correlation between CT and pathology was poor (Kendall Tau-b Correlation = 0.508; strongest correlation = 1, weakest correlation = 0). These large discrepancies and poor correlations persisted despite subgroup analysis by CT slice thickness, the decade of thoracotomy, and the total number of CT-identified lesions (Table 1).

Conclusions

The utility of CT in pre-operatively quantifying and localizing OS metastases later found at thoracotomy has not improved over the last 20 years. Poor correlation persists regardless of slice thickness or the number of CT-identified lesions. Consequently, we believe an open technique with direct lung palpation is necessary for identification and resection of OS metastases.

APSA-IPSO Symposium Cancer Abstracts (cont.)

Table 1.

Comparisons of the numbers of CT-identified lesions for each thoracotomy and the pathologic findings, including Kendall Tau-b correlation coefficients were possible, with subanalyses by time period (top), number of CT lesions (middle), and slice thickness (bottom).

		CT Predictive Of # of Mets	CT Underestimated		Total Operations	Kendall Tau
			Viable Mets	Total Mets		
Date Of Surgery	Full Cohort	109	34 (21.1%)	52 (32.3%)	161	0.508
	1996-2005	48	17 (23.6%)	24 (33.3%)	72	0.461
	2006-2015	61	17 (19.1%)	28 (31.5%)	89	0.532
Lesions On CT	No Mets on CT	4	3 (27.3%)	7 (63.6%)	11	NA
	1 met on CT	33	8 (16.7%)	15 (31.3%)	48	NA
	>1 met on CT	72	23 (22.5%)	30 (29.4%)	102	0.380
CT Slice Size	1.25mm	19	9 (28.1%)	13 (40.6%)	32	0.430
	5mm	90	25 (19.4%)	39 (30.2%)	129	0.528

APSA-IPSO Symposium Posters

APSA-IPSO Symposium Posters

APSA-IPSO Posters
Saturday, May 14, 11:30 – 12:15 p.m.

IPSO-P1

NATURAL KILLER CELL ASSISTED IMMUNOTHERAPY DECREASES INCIDENCE OF METASTASIS IN AN ORTHOTOPIC NEUROBLASTOMA MOUSE MODEL

Jeremy R. Jackson, MD, Hong-Wei Wu, MD, Jianping Sun, MD, Larry Wang, MD, PhD, Robert C. Seeger, MD, Eugene S. Kim, MD.

Children's Hospital Los Angeles, Los Angeles, CA, USA.

Purpose:
Residual metastatic disease following tumor resection represents a major clinical challenge and the primary cause of death in children with high-risk neuroblastoma. In January 2015, the anti-GD2 monoclonal antibody ch14.18 became the first FDA approved pediatric cancer drug for neuroblastoma, but 40% of children go on to develop tumor recurrence and disease progression. To augment the immune response, we hypothesized that the addition of activated natural killer cells (NK) to ch14.18 would decrease the incidence of metastatic disease and increase survival in mice.

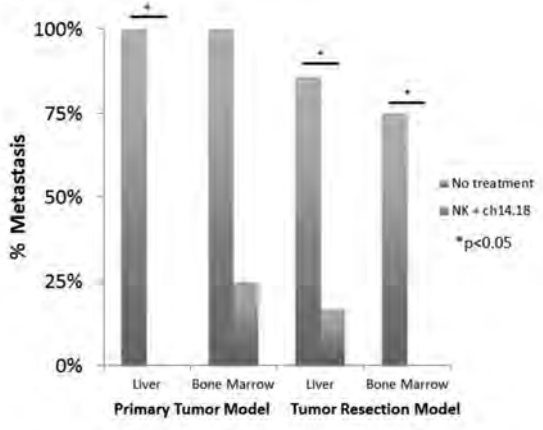
Methods:
One million CHLA-255 human neuroblastoma cells were implanted into left kidneys of 27 NSG mice. Mice were divided into control tumor, NK+ch14.18, tumor resection only and NK+ch14.18+resection groups. Tumors were resected on day 7 in tumor resection groups. Mice in the NK+ch14.18 and NK+ch14.18+resection groups were treated twice a week for 4 weeks. Metastasis was assessed in the liver and bone marrow by histopathology with significance ($p<0.05$) determined by Fisher's exact test. Survival was analyzed using Kaplan-Meier method with significance determined by log-rank test.

Results:
In non-resected primary tumor mice, metastasis was markedly lower in mice treated with NK+ch14.18 compared to untreated mice (0/7 vs 6/6 liver, $p<0.0006$; 1/4 vs 4/4 bone marrow, $p=0.142$). Similarly, in mice which underwent primary tumor resection, the incidence of metastatic disease was significantly lower in NK+ch14.18 treated mice compared to untreated mice (1/6 vs 6/7 liver, $p<0.03$; 0/5 vs 3/4 bone marrow; $p<0.05$) (Figure 1). Overall survival between groups was not significantly different.

Conclusion:
The combined treatment of natural killer cells with anti-GD2 antibody ch14.18 significantly reduces the incidence of metastatic disease both in primary tumor and tumor resection models of neuroblastoma *in vivo*. Repeated infusion of activated NK cells with ch14.18 may serve as a therapeutic option for the treatment of metastatic disease in children with high-risk neuroblastoma.

APSA-IPSO Symposium Posters (cont.)

Figure 1



APSA-IPSO Symposium Posters (cont.)

IPSO-P2

TREATMENT OUTCOMES IN PEDIATRIC MELANOMA - ARE THERE BENEFITS TO SPECIALIZED CARE?

Benjamin Freemyer, BS[1], Carla L. Warnake, MS[2], Andrea Hayes-Jordan, MD[2], Cynthia Herzog, MD[2], **Mary T. Austin, MD, MPH**[2].

[1]University of Texas Medical School at Houston, Houston, TX, USA, [2]University of Texas MD Anderson Cancer Center, Houston, TX, USA.

Purpose:
To evaluate the impact of hospital specialization on treatment outcomes in pediatric melanoma.

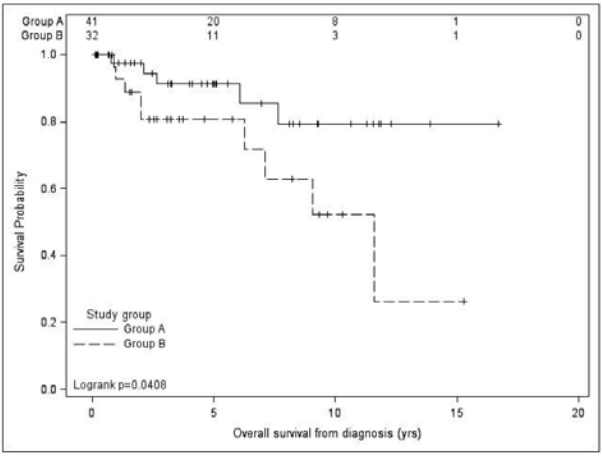
Methods:
After IRB approval, we retrospectively reviewed all patients < 18 years old diagnosed with cutaneous melanoma and evaluated in a comprehensive cancer center between 2000 and 2015. We compared overall survival (OS) and disease-free survival (DFS) between patients who underwent surgical treatment at a National Cancer Institute (NCI)-designated comprehensive cancer center (Group A, n=146) to those who underwent initial surgical treatment at a non-NCI hospital or outpatient surgery center (Group B, n=58). Demographic and clinical factors were compared using Fisher's exact test or Wilcoxon rank sums test as appropriate. Kaplan-Meier survival curves were compared using the log-rank test.

Results:
The median age at diagnosis was 13.7 years (range 1.2-17.8 years). The 5-year OS from diagnosis and 5-year DFS was 94.3% (95%CI 89.7%, 96.9%) and 89.8% (95%CI 84.2%, 93.4%), respectively. Group A patients were more likely White, family history of skin cancer, thinner primaries, and earlier stage disease (all $p < 0.05$). Group B patients were more likely to receive adjuvant therapy (50% versus 32%, $p<0.05$). Group A had significantly better OS and DFS with a 5-year OS of 96.8% (95% CI 91.8%, 98.8%) and 5-year DFS of 94.4% (95% CI 88.5%, 97.3%) compared to 5-year OS of 87.5% (95% CI 74.2%, 94.2%) and 5-year DFS of 77.2% (95% CI 62.5%, 86.7%) in Group B (both $p<0.001$). The survival differences were most notable in Stage 3 and 4 patients (Figure 1). Other factors associated with a higher risk of death included Non-white race/ethnicity, primary tumor ulceration, lymphovascular invasion, Breslow thickness > 4mm, stage 3 or 4 disease, unknown primary, older age, and receipt of adjuvant therapy (all $p<0.05$).

Conclusion:
Surgical treatment at a comprehensive cancer center may improve outcomes for pediatric melanoma especially for patients presenting with later stage disease.

APSA-IPSO Symposium Posters (cont.)

Kaplan-Meier Survival Curves for Stage III and IV Patients



APSA-IPSO Symposium Posters (cont.)

IPSO-P3

PEDIATRIC HEAD AND NECK MELANOMA: A NATIONAL CANCER DATA BASE REVIEW

Morgan K. Richards, MD, MPH[1], Adam B. Goldin, MD, MPH[2], Kenneth W. Gow, MD[2], John Doski, MD[3], Melanie Goldfarb, MD[4], Jed Nuchtern, MD[5], Monica Langer, MD[6], Elizabeth A. Beierle, MD[7], Sanjeev Vasudevan, MD[5], Sanjay R. Parikh, MD[2].

[1]University of Washington, Seattle, WA, USA, [2]Seattle Children's Hospital, Seattle, WA, USA, [3]Methodist Children's Hospital of South Texas, San Antonio, TX, USA, [4]John Wayne Cancer Institute, Santa Monica, CA, USA, [5]Baylor College of Medicine, Houston, TX, USA, [6]Maine Children's Cancer Program, Portland, ME, USA, [7]University of Alabama, Birmingham, AL, USA.

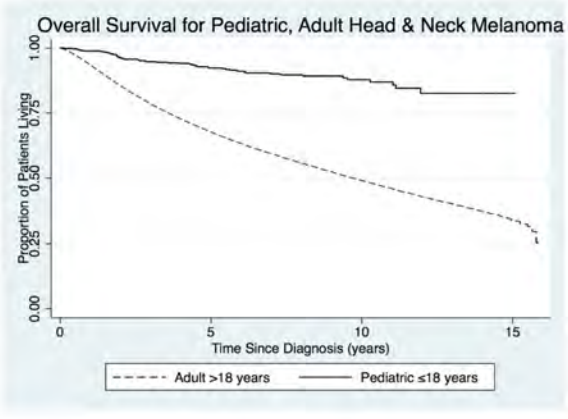
Purpose:
The primary purpose of this study was to establish survivorship for pediatric head and neck melanoma. The secondary objective was to compare demographic, tumor and treatment characteristics between pediatric and adult head and neck melanoma.

Methods:
We performed a retrospective cohort study of pediatric (≤18 years) and adult patients (>18 years) with a primary diagnosis of head and neck melanoma captured in the National Cancer Data Base from 1998-2012. Adjusted Cox regression examined survival differences. Demographic, tumor and treatment characteristics were compared using χ^2, Wilcoxon rank-sum and t-tests for categorical and continuous variables ($p<0.05$). Generalized linear models estimated the risk of nodal sampling, nodal metastases and positive margin status.

Results:
Of the 84,744 patients with head and neck melanoma, 657 were ≤18 years. Pediatric and adult patients had similar demographic characteristics. Pediatric patients were more likely to have melanoma, NOS and less likely to have lentigo maligna histologic subtypes (Pediatric: 56.5% melanoma, NOS; 24.0% superficial spreading; 0.8% lentigo maligna; Adult: 48.0% melanoma, NOS; 19.9% superficial spreading; 14.4% lentigo maligna; $p<0.001$). Pediatric patients presented with greater tumor depth (median, interquartile range Pediatric: 0.75mm (0.17, 2.0 mm); Adult 0.60mm (0.20, 1.7mm); $p=0.048$) and were more likely to have nodal examination at surgical resection ($p<0.001$). Of those who underwent nodal sampling, pediatric patients were significantly more likely to have nodal metastases ($p<0.001$). Pediatric patients were more likely to have negative margins ($p=0.04$) and had higher overall survival relative to adults (HR 0.30, 95% CI 0.22-0.39). Pediatric five- and ten-year survival was significantly higher than for adults (5-year: Pediatric 92.3%, 95%CI 89.6-94.4%; Adult 67.7%, 95% CI 67.3-68.1%; 10-year: Pediatric 87.9% 95%CI 83.8-91.0%; Adult 49.1% 95%CI 48.6-49.6%).

Conclusion:
Although pediatric patients with head and neck melanoma presented with greater tumor depth and were more likely to have nodal metastases, their overall survival was better.

APSA-IPSO Symposium Posters (cont.)



APSA-IPSO Symposium Posters (cont.)

IPSO-P4

A NOVEL ORTHOTOPIC XENOGRAFT FOR HEPATOBLASTOMA

Jingling Jin, PhD[1], Roma Patel, BS[1], Yan Shi, MD[1], Irene Ma, MD[2], Sarah Woodfield, PhD[3], Beatrice Bissig-Choisat, PhD[3], Igor Stupin, DVM[3], Zbigniew Starosolski, PhD[3], Ananth Annapragada, PhD[3], Donald Parsons, MD, PhD[3], Karl-Dimiter Bissig, PhD[3], Dolores Lopez-Terrada, MD, PhD[3], Ketan Ghaghada, PhD[3], **Sanjeev A. Vasudevan, MD**[1].

[1]Baylor College of Medicine, Houston, TX, USA, [2]Mayo Clinic, Phoenix, AZ, USA, [3]Baylor College of Medicine, HOUSTON, TX, USA.

Purpose:
Preclinical testing for hepatoblastoma is limited to subcutaneous murine models that do not recapitulate the large hepatic tumors seen in children. We hypothesize that direct injection of hepatoblastoma cell lines into the liver of immune deficient mice can create a clinically relevant model.

Methods:
HepG2, HepT1, and Huh-6 hepatoblastoma cell lines were transduced with the luciferase gene. Ncr-Mu and NOG mice were injected in the right or left hepatic lobes with 1-2 x 106 tumor cells suspended in PBS or matrigel through a right flank (right lobe) or midline incision (left lobe). Serum AFP was measured with ELISA. Mouse imaging was performed with IVIS and MRI. Histopathology was performed. RNA sequencing was obtained on the cell lines compared to normal liver and hepatoblastoma primary tumors.

Results:
With injection in the right hepatic lobe, 2/5 (40%) and 4/5 (80%) of HepG2, 3/7 (43%) and 3/7 (43%) of HepT1, and 4/9 (44%) and 5/9 (56%) of Huh-6 displayed luciferase activity at 2 and 4 weeks, respectively. The addition of matrigel enhanced tumor implantation to 80% in HepT1. Left lobe implantation decreased implantation to 22% for HepT1 and 0% in HepG2 and Huh-6. MRI and necropsy demonstrated large exophytic tumors originating from the injected lobe with robust neovascularization from portal and hepatic vein vascular beds. Human AFP levels were detectable in the mouse serum for HepG2 and Huh-6. Histopathology showed a typical hepatocellular morphology, detectable AFP and glypican-3 levels in HepG2 and Huh-6 tumors; however, HepT1 tumors showed a desmoplastic, undifferentiated morphology, low levels of AFP and glypican-3. RNA sequencing showed the cell lines clustered together and with a post chemotherapy tumor sample.

Conclusions:
Hepatoblastoma cell lines can be used to create clinically relevant orthotopic xenografts for preclinical testing.

APSA-IPSO Symposium Posters (cont.)

IPSO-P5

SACROCOCCYGEAL TERATOMA: A SINGLE-CENTER EXPERIENCE IN EAST AFRICA

Erik N. Hansen, MD[1], John K.M. Nyagetuba, MBChB, MMed[1], Damaris N. Ndambuki, MBChB[2], Philip Blasto, MBChB[2].

[1]AIC-Kijabe Hospital/Bethany Kids, Kijabe, Kenya, [2]Tenwek Hospital, Bomet, Kenya.

Purpose:
To review the presentation and histopathology of sacrococcygeal tumors presenting to a single hospital in rural East Africa.

Methods:
The clinic-pathologic databases of a rural hospital in East Africa were searched for cases of sacrococcygeal tumors. Twenty-one cases were identified, presenting between February 1st, 2004 and June 1st, 2015. Non-parametric tests were used to compare groups with $\alpha = 0.05$.

Results:
Twenty-one (18 female) patients underwent resection at a median age of 44wks (0.6 - 1842) - 4 malignant yolk sac tumors, 3 teratomas with immature elements, and 14 mature teratomas. The age at first diagnosis of a mass was significantly later (p=0.017) in malignant (median 96wk) vs benign (median 0 wks) cases. The median age of presentation for treatment for malignant and benign cases was 96 wk (69-115) and 31wk (1-1842), respectively. All malignant and 11 of 17 benign cases presented for treatment after 8wks old. Only six patients presented for treatment within the first month of life. There was no difference (p=0.49) in Altman classification between malignant and benign tumors. Four patients died (2 unresectable/metastatic yolk sac tumors, 1 recurrent yolk sac tumor, 1 benign tumor) after a median follow-up of 9wks (0-281).

Conclusion:
Patients with sacrococcygeal tumors in East Africa commonly present for treatment after the neonatal period given the limited healthcare resources of the region. This delay in diagnosis is likely responsible for the overall high malignancy and subsequent mortality rates seen. However, contrary to Western teaching, no malignant tumors were seen in patients treated in infancy.

APSA-IPSO Symposium Posters (cont.)

IPSO-P6
WITHDRAWN

APSA-IPSO Symposium Posters (cont.)

IPSO-P7

UNDIFFERENTIATED EMBRYONAL SARCOMA OF THE LIVER, A CASE SERIES FROM A SINGLE INSTITUTION

Pablo Lezama-Del Valle, MD, Ivan Bautista Hernandez, MD, Miguel Angel Palomo Colli, MD.

Hosptial Infantil de Mexico Federico Gomez, Mexico City, Mexico.

Tweet about it! Undifferentiated embryonal sarcoma of the liver: upfront resection a good strategy w/high survival – IPSO-P7 #eAPSA2016

Purpose:
To report a case series with high survival based on initial resection.

Methods:
A retrospective review was conducted, including patients with the diagnosis of a malignant liver tumor at a single institution, from January 2000 through December 2014. A chart review of those with the diagnosis of undifferentiated sarcoma of the liver was completed. The analysis included descriptive statistcs and a survival analysis.

Results:
During the period of study, 165 malignant liver tumors were identified. 136 were hepatoblastoma, 14 were hepatocellular carcinoma, 8 were transitional malignant liver tumors, and 8 (4.8%) were undifferentiated sarcoma of the liver. The M:F ratio was 3:1. Al the patients had large cystic tumors at diagnosis, all larger than 5 cm in diameter, 7 (87.5%) were PRETEXT III, and 1 (12.5%) was PRETEXT II. The tumor involved the right lobe in 7 cases. Two patients underwent drainage procedure elsewhere. Seven patients underwent initial resection, 1 left lobectomy and 6 extended right lobectomy. One patient underwent a biopsy followed by neoadjuvant chemotherapy without response, and also underwent an extended right lobectomy. Six cases required a thoracoabdominal incision because of the tumor size. All of the patients received adjuvant chemotherapy. Two patients had a local relapse, one was rescued with further surgery and another had progression and died. Seven patients survived, from 1 to 12 years.

Conclusion:
In this series, an aggressive surgical approach was associated with a high survival rate. An upfront resection is indicated if considered technically possible. Any attempt of drainage should be avoided.

APSA-IPSO Symposium Posters (cont.)

IPSO-P8

RUPTURED LIVER TUMORS. SURGICAL MANAGEMENT AND OUTCOMES AT A COMPREHENSIVE PEDIATRIC CANCER CENTER

Pablo Lezama-Del Valle, MD, Andrea de Icaza Gonzalez, MD, Miguel Angel Palomo Colli, MD, Luis Enrique Juarez Villegas, MD, Stanislaw Sadowinski Pine, MD.
Hosptial Infantil de Mexico Federico Gomez, Mexico City, Mexico.

Tweet about it! Although the rupture a liver tumor can become a catastrophe, in our series a high proportion of patients could be rescued IPSO-P8 #eAPSA2016

Purpose:
To report a case series of ruptured tumors within a large cohort of pediatric liver tumors from a single institution.

Methods:
A retrospective chart review was conducted, including all patients diagnosed with an epithelial malignant liver tumor at our institution from 1998 to 2011. We identified those with rupture, reviewed the surgical and medical management, and compared the outcomes with those in the cohort without rupture. The analysis included descriptive statitistics and Fisher's test.

Results:
During the study period we identified 112 malignant pediatric epithelial tumors from the Pathology Department, however we had to exclude 25 due to lack of information in the medical records. Of the 87 patients included, 73 (87%) were hepatoblastomas, 11(12.5 %) were hepatocellular carcinomas, and 4 (4.5%) were transitional malignant liver tumors. Thirteen patients had a ruptured tumor, 11 were hepatoblastoma (84% in this group, and 15% of those with that histology), and 2 were transitional malignant liver tumors (15% of this group, and 50% of that histological type). Of the 13 patients with tumor rupture, in one the hemorrhage resolved spontaneously, and 12 underwent an operation, 4 had an upfront resection, and in 8 patients a damage control approach was used. Of those, 2 were resected in the first 48 hours, and 6 received neoadjuvant chemotherapy. The overall mortality of the ruptured hepatoblastomas was 36% (4/11), compared to 20% in the non ruptured in that group (13/62). Both patients with a ruptured transitional malignant tumor did not survive.

Conclusion:
Although the rupture a liver tumor can become a catastrophe, in our series a high proportion of patients could be rescued.

Poster Session I

Poster Session I

Basic Science, CDH, Critical Care
Sunday, May 15, 4:30 – 6:15 p.m.

P1

DOES THE *EX UTERO* INTRAPARTUM TREATMENT TO EXTRACORPOREAL MEMBRANE OXYGENATION PROCEDURE CHANGE MORBIDITY OUTCOMES FOR HIGH-RISK CONGENITAL DIAPHRAGMATIC HERNIA SURVIVORS?

Hester F. Shieh, MD, Jay M. Wilson, MD, Catherine A. Sheils, MD, C. Jason Smithers, MD, Virginia S. Kharasch, MD, Ronald E. Becker, MD, Mollie Studley, MS, Donna Morash, RN, Terry L. Buchmiller, MD.

Boston Children's Hospital, Boston, MA, USA.

Purpose:
In infants with high-risk CDH, significant barotrauma or death can occur before advanced therapies like ECMO can be initiated. We previously examined EXIT-to-ECMO in our most severe CDH patients, showing no survival advantage. We now report morbidity outcomes in the survivors in this high-risk cohort to determine whether EXIT-to-ECMO conferred any benefit.

Methods:
All CDH survivors with <15% predicted lung volume (PPLV) by fetal MRI from September 1999 to December 2010 were included. We recorded prenatal imaging, defect characteristics, and pulmonary, nutritional, cardiac, and neurodevelopmental outcomes.

Results:
17 survivors (8 EXIT-to-ECMO, 9 non-EXIT) had an average 11.7% PPLV. 8 of 9 non-EXIT received ECMO within 2 days. There were no significant defect differences between groups, mostly left-sided (13/17) and type D (12/17), with 2 type B and 3 type C. Average follow up was 6.7 years (0-13 years). Outcomes are summarized in the table, however with no statistically significant differences. EXIT tended to wean off supplemental oxygen and diuretics sooner. 1 non-EXIT had a tracheostomy until age 4 and 1 remains on oxygen at age 3. More EXIT received gastrostomies, but with no differences in 1 year weight-for-age Z scores. 2 non-EXIT with pulmonary hypertension require sildenafil at 3 years. Though the non-EXIT stroke rate was higher, no survivor was neurologically devastated. All had mild motor and/or speech delay, which improved in most.

Conclusions:
In this contemporaneous cohort of high-risk CDH survivors, there were no significant improvements in pulmonary, nutritional, cardiac or neurodevelopmental outcomes with EXIT-to-ECMO. Although a small cohort, it appears that EXIT-to-ECMO confers neither survival nor long-term morbidity benefit.

Poster Session I (cont.)

Morbidity Outcomes Stratified by EXIT and Non-EXIT Groups				
	EXIT (n=8)	**Non-EXIT (n=9)**	**Total (n=17)**	**Chi-Square P Value**
Supplemental Oxygen at Discharge; 1 Year	4 (50%); 0 (0%)	5 (56%); 2 (22%)	9 (53%); 2 (12%)	0.82; 0.16
Diuretics at Discharge; 1 Year	6 (75%); 3 (37.5%)	9 (100%); 6 (67%)	15 (88%); 9 (53%)	0.11; 0.23
Gastrostomy at Discharge; 1 Year	7 (87.5%); 6 (75%)	4 (44%); 4 (44%)	11 (65%); 10 (59%)	0.06; 0.20
Fundoplication	5 (62.5%)	2 (22%)	7 (41%)	0.09
Pulmonary Hypertension	0 (0%)	2 (22%)	2 (12%)	0.16
Stroke	2 (25%)	4 (44%)	6 (35%)	0.40
Intracranial Hemorrhage	1 (12.5%)	0 (0%)	1 (6%)	0.27
CDH Recurrence and Reoperation	1 (12.5%)	2 (22%)	3 (18%)	0.60

Poster Session I (cont.)

P2

PREVALENCE AND PATIENT-RELATED RISK FACTORS ASSOCIATED WITH AUTISM IN CONGENITAL DIAPHRAGMATIC HERNIA

Enrico Danzer, MD, Casey Hoffman, PhD, Jo Ann D'Agostino, DNP, CRNP, Antiel Ryan, MS, Antiel M. Ryan, MS, Marsha Gerdes, PhD, Judy Bernbaum, MD, Natalie E. Rintoul, MS, Lisa M. Herkert, CRNP, William H. Peranteau, MD, Alan W. Flake, MD, N. Scott Adzick, MD, Holly L. Hedrick, MD.

CHOP, Philadelphia, PA, USA.

Purpose:
To determine the prevalence of autism in CDH survivors and potential patient-related risk factors.

Methods:
The study cohort consists of 110 CDH survivors enrolled in our prospective, follow-up program between June 2004 and September 2015. All patients underwent neurodevelopmental (ND) assessments at 2 years of age or older. Depending upon age and timing of evaluation, ND outcomes were assessed by either the Bayley Scales of Infant Development II (prior 2006, n=3) or III (after 2006, n=69), or the Wechsler Preschool and Primary Scale of Intelligence (children older than 4 years, n=38). Autism diagnosis was made based on the Diagnostic and Statistical Manual of Mental Disorders criteria.

Results:
Mean age at follow up was 38±17 months. The prevalence of autism in CDH children was 9 times higher than the general population (13.6 vs. 1.5%, P=0.0002). Once CDH patients with ND deficits were excluded, the prevalence of autism remained significantly elevated (RR 3.8, P<0.01). By univariate analysis, RCDH (P=0.01), preterm delivery (P=0.002), need for prolonged period of resuscitation prior to repair (P<0.001), prolonged ventilatory support (P=0.001), prolonged NICU stay (P<0.01), presence of major associated malformations/syndromes (P=0.004), and inadequate PO intake supplemented by enteral feeding access (P<0.001) were associated with autism. The presence of ND delays (OR 6.6, 95%CI: 2.75-15.87, P=0.0001), and impairments during infancy (OR 3.07, 95%CI: 0.93-10.19, P=0.001) were also predictive. By multivariate analysis, ongoing poor ND performance remained significant (P=0.05), short-term delays approached significance (P=0.06), while other clinical parameters were no longer predictive of autism.

Conclusions:
There is a striking prevalence of autism in CDH survivors. Disease severity, feeding difficulties, prematurity and the presence of major associated malformations/syndromes are important risk factors. Short-term and long-term ND delays are the strongest predictors of autism in CDH children.

Poster Session I (cont.)

P3

THE PEDIATRIC SURGEON-SCIENTIST: SUCCEEDING IN TODAY'S ACADEMIC ENVIRONMENT

Chad M. Moles, BSPH[1], Allan M. Goldstein, MD[2], Michael J. Morowitz, MD[3], **Sundeep G. Keswani, MD**[1].

[1]Texas Children's Hospital, Houston, TX, USA, [2]MassGeneral Hospital for Children, Boston, MA, USA, [3]Children's Hospital of Pittsburgh, Pittsburgh, PA, USA.

Purpose:
Significant changes in academic surgery are impacting basic science research. The purpose of this study is to compare pediatric surgeons' academic success and perceptions about basic science research to other surgical specialties.

Methods:
An online survey was conducted of all members of the Association for Academic Surgery and Society of University Surgeons during January-April, 2015. A total of 1033 (41%) members and 137 (5.4%) pediatric surgeons (Fig. 1A) responded. Trainees were excluded, and comparisons made between top 5 most represented surgical specialties. Data presented as reporting percentage and statistical analysis by t-test.

Results:
Pediatric surgeons are most likely to believe that surgeons can succeed in basic science in today's hospital environment (Fig. 1B). Compared to the other specialties, pediatric surgeons are more likely to conduct basic science research during training ($p<.05$). 80% stated their motivation to participate in research was to enhance their fellowship opportunities. 38.4% of pediatric surgeons indicated they started their own lab following their training, which is significantly higher compared to other surgical specialties. Moreover, they more frequently chose a field of study similar to the research they conducted as a trainee. Pediatric surgeons feel significantly less pressure to be clinically productive compared to other surgeons (39.8% vs. 54.4%; $p<.01$). Pediatric surgery has similar funding levels as the sample population (40.44% vs. 40.38%; p=ns), but a significantly higher proportion of NIH funding (Fig. 1C).

Conclusion:
Pediatric surgeons have a more positive outlook on the state of academic surgery, and exhibit an enhanced ability as basic researchers to overcome the challenges that face surgeon-scientists. The "mandated" experience of basic science training has yielded a significantly greater number of NIH funded pediatric surgeon-scientists compared to other specialties. Pediatric surgery may be a model for succeeding in basic science in today's competitive funding environment and developing successful surgeon-scientist careers.

Poster Session I (cont.)

Poster Session I (cont.)

P4

CLOT DISSOLUTION FOR CRITICAL SMALL BOWEL ISCHAEMIA

Kate Cross, BMed, Hons, Alexander Cho, MBBS, BSc, Simon Blackburn, BSc, MBBS, MEd, Joanna Stanwell, MA, MBBChir, Paula Lister, MB, BCh, MRCPCH, Edward M. Kiely, MD, Joseph Curry, MBBS, Paolo De Coppi, MD, PhD.

Great Ormond Street Hospital, London, United Kingdom.

Tweet about it! Come and learn about a novel management for critical small bowel ischaemia - Poster 4 #eAPSA2016 #MassageAndTPA

Purpose:
Our unit previously described the successful combination of massage of the superior mesenteric vessels and systemic-infusion of tissue-type plasminogen activator (tPA) in 2 neonates with severe intestinal ischaemic due to volvulus. Subsequently the technique has been adopted by other centres and has shown to be effective on bowel recovery. We reviewed our cumulative experience.

Methods:
Technique: After de-rotation, the bowel was exposed and digital massage of the superior mesenteric vessels was undertaken intermittently for 10-minutes in total. Post-operatively, intravenous tPA (alteplase) was given as per protocol for 18 to 24 hours. A second-look laparotomy was undertaken at around 48-hours. Patient data retrospectively analysed.

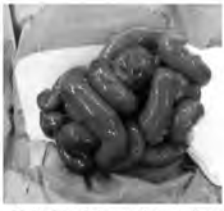
Results:
7 patients since 2009 are reported. Mean-age: 2-months (Range: 6-days-old at 29/40 to 4-months). 6 patients had midgut volvulus; one patient had an adhesional band causing intestinal vascular compromise. The entire small-bowel appeared infarcted in 5 cases with no or minimal improvement in sections after mesenteric massage. In 2 patients, the proximal ileum was less compromised but distal ileum and jejunum were severely ischaemic. Two patients died <24hrs after primary-surgery due to multi-organ-failure and did not complete treatment. Remaining 5 patients had normal cranial ultrasound-scans before and after tPA treatment. One patient had tPA postponed till after the 2nd-look laparotomy due to initial improvement after massage only at initial surgery. 3 patients had no bowel resection (average in-patient stay: 22-days). 2 patients underwent resection of strictured small-bowel and primary-anastomosis at 6 weeks and have been discharged. These patients are fully enteral feed and remain well with average follow-up 14-months (1-48 months).

Conclusions:
This combined treatment has resulted in dramatic improvement in intestinal perfusion in 5 of 7 patients and may help in recovering severely ischaemic bowel. However, it may not be efficacious in late presenting patients who are already severely compromised.

Poster Session I (cont.)

Immediately after derotation

After mesenteric vascular tree massage



At 2nd-look laparotomy after tPA treatment

Poster Session I (cont.)

P5

EXTRACORPOREAL LIFE SUPPORT USE IN PEDIATRIC TRAUMA: A REPORT FROM THE NATIONAL TRAUMA DATA BANK

Joshua Watson, MD, Brian Englum, MD, Jina Kim, MD, Obinna Adibe, MD, Henry Rice, MD, Mark Shapiro, MD, Mani Daneshmand, MD, Elisabeth Tracy, MD.
Duke University, Durham, NC, USA.

Purpose:
The role of extracorporeal membrane oxygenation (ECMO) in pediatric trauma patients continues to evolve, with small institutional series suggesting survival benefit in select patients. To further define the role of ECMO in pediatric trauma, we examined indications and outcomes using a large national database.

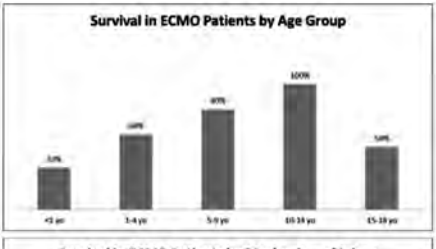
Methods:
Trauma patients ≤ 18 years old were identified from the 2007-2011 National Trauma Data Bank. Patients were compared by use of ECMO. A 3:1 propensity matched subanalysis compared patients with similar injury patterns.

Results:
Of 589,895 pediatric trauma patients identified, 36 patients were cannulated to ECMO. Within the ECMO cohort, 21/36 (58%) survived, and 10/36 (28%) were discharged home. Most ECMO patients were between 15-18 years (20/36, 56%), and 3/36 (8%) were infants. Mechanisms of injury resulting in ECMO cannulation included: motor vehicle collision (16/36, 44%), gunshot wound (6/36, 17%), burns (6/36, 17%), and drowning/suffocation (5/36, 14%). Survival varied by age (Figure A) and mechanism of injury (Figure B). As expected, injury severity was significantly higher among ECMO patients, and they underwent more resource intensive care, with longer ICU and hospital LOS (Table). In propensity analysis, survival for ECMO and non-ECMO patients was similar (58% vs. 65%, p=0.62)

Conclusions:
In the largest study of pediatric trauma patients cannulated on ECMO to date, we found that most ECMO use occurred in MVC, GSW, burn victims. Despite high injury severity and prolonged hospital course, most pediatric trauma patients cannulated to ECMO survived to discharge, with similar survival to non-ECMO patients with matched injury patterns. ECMO may be considered in the most severely injured children and adolescents with a variety of injury mechanisms.

Poster Session I (cont.)

Injury Characteristics and Outcomes Comparing ECMO Patients to the General Trauma Population		
Injury Severity	**All Pediatric Patients (N=589,895)**	**ECMO Cannulation (N=36)**
Mild (ISS≤8)	322,504 (57.7%)	2 (6.2%)
Moderate (ISS 9-14)	151,917 (27.2%)	4 (12.5%)
Severe (ISS 15-24)	52,152 (9.3%)	8 (25%)
Extremely Severe (ISS≥25)	32,567 (5.8%)	18 (56.2%)
Outcomes		
Hospital LOS, days	2 (1, 3)	23.5 (9, 36.8)
ICU LOS, days	2 (1, 4)	15 (11, 33)
Ventilator days	2 (1, 5)	13 (6, 28)
Mortality	11,266 (1.9%)	15 (41.7%)



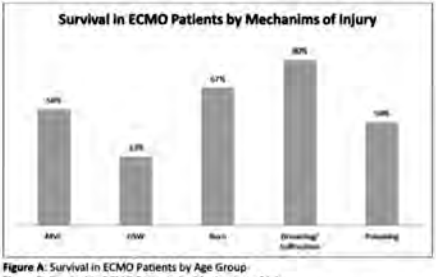


Figure A: Survival in ECMO Patients by Age Group
Figure B: Survival in ECMO Patients by Mechanism of Injury
Note: None of these age groups or mechanisms of injury showed a statistically significant difference, although this is likely due to small size.

Poster Session I (cont.)

P6

EPITHELIAL DEVELOPMENT IN 3D HUMAN LUNG ORGANOIDS FROM NEONATES WITH CONGENITAL DIAPHRAGMATIC HERNIA

Guihua Jiang, MS, Kendal A. Walker, BS, Julie Di Bernardo, PhD, Briana R. Dye, BS, Jason R. Spence, PhD, Shaun M. Kunisaki, MD, MSc.
University of Michigan, Ann Arbor, MI, USA.

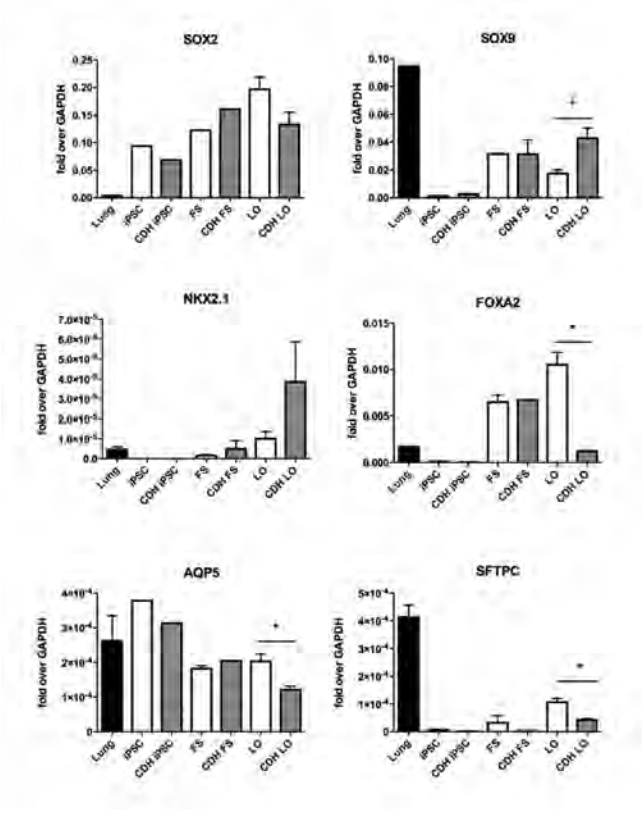
Purpose:
We have previously shown that 3D lung-like structures, known as lung organoids, can be generated from induced pluripotent stem cells (iPSCs) derived from congenital diaphragmatic hernia (CDH) patients. We hypothesize that lung organoid technology can recapitulate the aberrant developmental pulmonary defects seen in CDH. The purpose of this study was to examine epithelial cell development within CDH lung organoids compared to those derived from normal lung controls.

Methods:
After IRB approval, human dermal fibroblasts from CDH (n=2) and normal (n=2) neonates were reprogrammed into iPSCs. The cells were then differentiated into ventral-anterior foregut spheroids and subsequently into lung organoids. All micro-tissues were evaluated by phase microscopy, histology, immunofluorescence, and quantitative gene expression with human fetal lungs as controls. Statistical analyses were performed by the t-test, as appropriate ($p<0.05$).

Results:
In both groups, foregut spheroids were successfully generated as shown morphologically and by reduced expression in pluripotency markers, including NANOG and OCT4. Histological analyses showed well-organized, multi-septated structures reminiscent of immature alveolar-like tissue in both groups. Among CDH lung organoids, there was downregulation in the proximal SOX2+ domain and upregulation in the distal SOX9+ domain, consistent with impaired branching morphogenesis (Figure). CDH lung organoids were associated with significant differences in the expression of NKX2.1 and FOXA2, two transcription factors critical for alveolar development. Differentiation into type I and II pneumocytes was impaired in CDH lung organoids as shown by the significant downregulation in the expression of aquaporin-5 and surfactant protein-C, respectively (Figure).

Conclusions:
We conclude that lung organoids derived from congenital diaphragmatic hernia infants are associated with derangements in pulmonary development related to proximal-distal patterning and distal epithelial cell development. Subsequent work utilizing this “disease-in-a-dish” approach, either in the presence or absence of external compression, may serve as a novel *in vitro* platform for patient-specific disease modeling in congenital diaphragmatic hernia.

Poster Session I (cont.)



Poster Session I (cont.)

P7

CERVICAL SPINE CLEARANCE IN PEDIATRIC TRAUMA: A SINGLE INSTITUTION'S EXPERIENCE

Mary Arbuthnot, DO, David Mooney, MD, MPH.
Boston Children's Hospital, Boston, MA, USA.

Purpose:
Cervical spine injury (CSI) occurs in 1-2% of pediatric trauma patients. It is crucial to identify CSI's while minimizing ionizing radiation. This study analyzes the efficacy of a cervical spine clearance algorithm at a level 1 pediatric trauma center over a 10 year period.

Methods:
After IRB approval, data on age, gender, scene versus transfer, imaging studies and cervical spine diagnoses for admitted patients <21 years old were extracted from the trauma registry. Descriptive statistics were used.

Results:
Of approximately 125,000 children evaluated in the Emergency Department for an injury from January 2005 - August 2015, 11,331 were admitted. 63.5% were male with a mean age of 8.5 years. 3,151 (27.8%) were admitted from the scene and 8,180 (72.2%) after transfer. Of the transferred patients, 1,234 (15.1%) had undergone advanced cervical spine imaging (CT or MRI). 6,946 (84.9%) of transferred patients had plain radiographs or no cervical spine films and, combined with the 3,151 scene patients, resulted in 10,097 admitted trauma patients who were evaluated using the cervical spine clearance algorithm. Of these, 86.1% were cleared with no imaging, 11% underwent plain films and 3% underwent advanced cervical spine imaging (2.1% CT and 0.9% MRI). There was one missed injury (0.01%): a C7 spinous process tip fracture diagnosed in follow-up clinic in a child maintained in a cervical collar for tenderness. Re-review of initial radiographs identified the injury. The sensitivity of our algorithm was 97.1% and the negative predictive value was 99.9%.

Conclusions:
A pediatric cervical spine clearance algorithm allows efficient evaluation of cervical spine trauma. Our algorithm was associated with a 0.01% missed injury rate and a 2.1% CT utilization rate, avoiding missed injuries while saving children the risk of unnecessary ionizing radiation.

Poster Session I (cont.)

P8

3D MICROGRAVITY ASSAY OF CHD5 EFFECT ON NEUROBLASTOMA CELL LINES

Robert Redden, MSc, Alexis Lukach, BS, Morgan Reed, BS, Garrett Brodeur, MD, **Edward J. Doolin, MD**.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

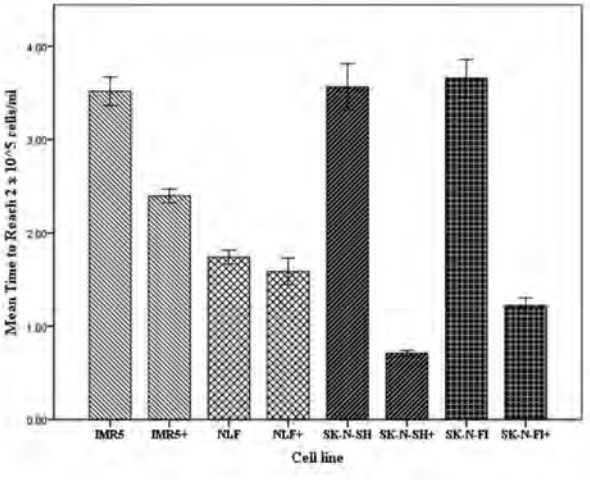
Purpose:
Chromodomain helicase DNA binding protein 5 (CHD5) is a tumor suppressor gene located in a hemizygously-deleted region of chromosome 1p that reduces the clinical impact in neuroblastoma. Microgravity has been used to delineate biologic mechanisms in many cancers including neuroblastoma. We used this system to observe the effect of CHD5 expression on the cell-cell aggregation of neuroblastoma cell lines.

Methods:
Neuroblastoma cell lines with no detectable CHD5 protein expression (NLF, IMR5, SK-N-SH, and SK-N-FI) were transfected to express CHD5 and were cultured in the bioreactor (Synthecon, Inc). The neuroblastoma cell line NBLS, expressing endogenous CHD5, was cultured with and without a microRNA 211 mimic, targeting CHD5. We quantified cell-cell aggregation kinetics by counting the number of single viable cells in the supernatant over time, the time required for the number to reduce from 5 x 105 cells/ml to 2 x 105 cells/ml.

Results:
In three of the cell lines (IMR5, SK-N-SH, SK-N-FI) the CHD5 transfectants aggregated significantly faster (see Figure, $p < 0.001$ for all). The effect of CHD5 expression was more dramatic in the two CHD5-positive cell lines without 1p deletion (SK-N-SH+, SK-N-FI+). Finally, the addition of the miR211 mimic decreased the aggregation after one hour of culture (1.3 x 105 vs 0.7 x 105 single cells/mL).

Conclusion:
CHD5 has a demonstrable effect on the aggregation of neuroblastoma cells in vitro, and this is inhibited by CHD5 knockdown using miRNA211. This assay provides valuable insights into the effects of single genes on tumor cell behavior, and promises to be helpful in evaluating therapeutic approaches to this devastating disease.

Poster Session I (cont.)



Poster Session I (cont.)

P9

MILK FAT GLOBULE-EGF FACTOR VIII DEFICIENCY INCREASES LUNG INFLAMMATION AND MORTALITY IN NEONATAL SEPSIS

Laura W. Hansen, MD[1], Adam Khader, MD, PhD[1], Weng-Lang Yang, PhD[2], Jeffrey M. Nicastro, MD[1], Gene Coppa, MD[1], Ping Wang, MD[2], Jose M. Prince, MD[3].

[1]Hofstra North Shore-LIJ School of Medicine, Manhasset, NY, USA, [2]The Feinstein Institute for Medical Research, Manhasset, NY, USA, [3]Cohen Children's Medical Center, New Hyde Park, NY, USA.

Purpose:
Sepsis among neonates remains a leading cause of death. Milk fat globule-EGF factor VIII (MFG-E8) is a secretory breastmilk protein that enhances phagocytosis and has anti-inflammatory activity. We hypothesized that MFG-E8 has a protective effect in neonatal sepsis.

Methods:
Sepsis was induced in neonatal C57BL6 (WT) and MFG-E8 knockout (KO) mice (n=5-8/group), age 5-7 days, by intraperitoneal injection of a cecal slurry (CS) from adult WT mice (0.9 mg/g body weight). After 10 hours, neonates were sacrificed for blood and lung tissue. Statistcal comparisons were made by one-way ANOVA, with $p<0.05$ considered significant. A survival study was performed with a reduced dose of CS (0.75mg/g) over 7 days.

Results:
At 10h after CS injection, serum pro-inflammatory cytokines TNF-α and IL-6 were increased 2- and 1.6-fold, respectively, in MFG-E8 KO mice compared to WT. Additionally, mRNA levels of IL-6 and IL-1β were increased in lung tissue of MFG-E8 KO mice compared to WT 3.5- and 3.4-fold, respectively. The neutrophil chemoattractant MIP-2 mRNA was elevated 2.8-fold in the lungs of MFG-E8 KO mice, which was corroborated by a 1.95-fold increase in myeloperoxidase (MPO) activity in MFG-E8 KO mouse lung tissue, suggestive of increased neutrophil infiltration. Caspase 3 activity, a marker of apoptosis, was increased 4.3-fold in lung tissue of MFG-E8 KO mice compared to WT. Over 7 days, WT mice had 73% survival, while MFG-E8 KO pups had 100% mortality within 2 d.

Conclusions:
MFG-E8 plays an important protective role in neonatal sepsis by inhibiting the production of inflammatory cytokines, lowering lung neutrophil infiltration and reducing lung apoptosis, thereby improving survival. MFG-E8 has promising therapeutic potential in treating neonatal sepsis.

Poster Session I (cont.)

Mean ± SEM, *p<0.05 vs. Respective Control; #p<0.05 vs. WT Sepsis.				
	WT Control	**WT Sepsis**	**KO Control**	**KO Sepsis**
Serum TNF-α (pg/ml)	N.D.	364 ± 122	N.D.	746 ± 84$^{\#}$
Serum IL-6 (ng/ml)	0.7 ± 0.1	26.1 ± 4.9*	0.7 ± 0.1	40.8 ± 6.4$^{*\#}$
Lung IL-6 mRNA (fold)	1.0 ± 0.1	10.5 ± 1.8	0.7 ± 0.1	35.4 ± 13.7$^{*\#}$
Lung IL-1β mRNA (fold)	0.5 ± 0.1	5.9 ± 0.8	1.0 ± 0.4	20.2 ± 3.9$^{*\#}$
Lung MIP-2 mRNA (fold)	1.0 ± 0.3	67 ± 11*	0.6 ± 0.1	187 ± 25$^{*\#}$
Lung MPO activity (U/mg)	22.0 ± 2.7	21.2 ± 2.8	21.1 ± 1.1	41.4 ± 5.4$^{*\#}$
Lung caspase 3 activity (fold)	1.0 ± 0.2	1.5 ± 0.2	1.1 ± 0.2	6.4 ± 1.0$^{*\#}$

Poster Session I (cont.)

P10

EX VIVO COMPARISON OF EXTRACORPOREAL MEMBRANE OXYGENATION CIRCUITS AND CANNULAE TO EVALUATE SOURCES OF HEMOLYSIS

Julie Monteagudo, MD, Ciaran O'Brien, BA, Christine A. Schad, MD, Francesca Rapido, MD, Kenmond Fung, CCP, Michael Brewer, CCP, David A. Bateman, MD, MS, William Middlesworth, MD.

Columbia University Medical Center, New York, NY, USA.

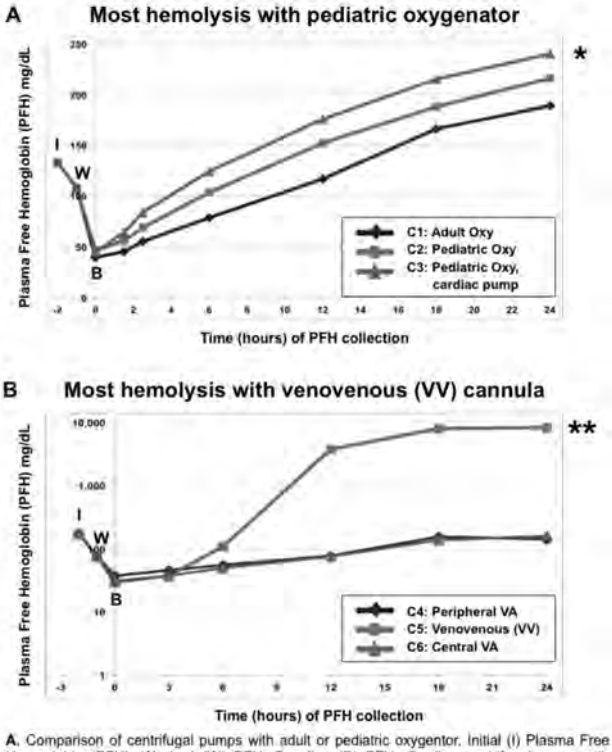
Purpose:
Hemolysis, as measured by plasma free hemoglobin (PFH), is a significant problem in neonates requiring ECMO that can result in pigment nephropathy, neurologic disability, and end organ dysfunction. Limited information exists about which components of the ECMO circuit cause the most hemolysis. The purpose of the study was to examine the effects of oxygenators and neonatal ECMO cannulae in an *ex vivo* centrifugal pump model.

Methods:
Experiment 1: centrifugal pump with adult oxygenator and shunt (C1), a centrifugal pump with pediatric oxygenator (C2), and a centrifugal pump for cardiac ECMO with pediatric oxygenator (C3). Experiment 2: centrifugal pump with venous and arterial cannulae used in peripheral cannulation (C4), centrifugal pump with dual lumen venovenous cannula (C5) and centrifugal pump for transport with venous and arterial cannulae used in central cannulation (C6). Whole blood was reconstituted and washed before dividing between the experimental circuits. RPMs were titrated to a flow of 450mL/min to simulate flows for a 3kg neonate. PFH was assessed at regular intervals over 24 hours. Rate of hemolysis for each circuit configuration was statistically analyzed.

Results:
Washing of pooled blood reduced the PFH from 154mg/dL to 90mg/dL. PFH was similar for all six configurations at the initial time point (43.4mg/dL). In Experiment 1, the circuit with the adult oxygenator and shunt produced the least hemolysis, significant by multiple linear regression analysis ($p<0.01$) (Figure A). In Experiment 2, single lumen venoarterial cannulae for peripheral or central cannulation were not significantly different ($p=0.8$), however, hemolysis was accelerated through the dual lumen venovenous cannula compared to either single lumen configuration ($p<0.005$) (Figure B).

Conclusions:
Adult oxygenators produced less hemolysis than pediatric oxygenators. The dual lumen venovenous cannula produced more hemolysis than single lumen cannulae for peripheral or central cannulation. Further experiments and analysis of ELSO registry data are planned.

Poster Session I (cont.)



A. Comparison of centrifugal pumps with adult or pediatric oxygentor. Initial (I) Plasma Free Hemoglobin (PFH); Washed (W) PFH, Baseline (B) PFH. Cardiac centrifugal pump with pediatric oxygenator produced the most hemolysis (C3) ($p<0.01$, *).

B. Comparison of peripheral VA cannula (C4), dual lumen venovenous (VV) cannula (C5), and central VA cannulae (C6). Circuit with VV cannula (C5) produced the most hemolysis ($p<0.005$, **).

Poster Session I (cont.)

P11

THE EFFECT OF GLUCAGON-LIKE PEPTIDE-2 THERAPY IN A PRECLINICAL MODEL OF NEONATAL SHORT BOWEL SYNDROME WITH DISTAL INTESTINAL RESECTION

David W. Lim, MDCM, MEd[1], Justine M. Turner, MBBS, PhD[1], Patricia L. Brubaker, PhD[2], Donna F. Vine, PhD[1], Patrick N. Nation, PhD[1], Pamela R. Wizzard, BSc, RAHT[1], David L. Sigalet, MD, PhD[3], David L. Bigam, MD, MSc[1], Paul W. Wales, MD, MSc[4].

[1]University of Alberta, Edmonton, AB, Canada, [2]University of Toronto, Toronto, ON, Canada, [3]University of Calgary, Calgary, AB, Canada, [4]University of Toronto & Hospital for Sick Children, Toronto, ON, Canada.

Tweet about it! Come see the latest in potential novel therapies for infants with short bowel syndrome #TreatSBS – Poster 11 #eAPSA2016

Purpose:
In neonatal short bowel syndrome, the distal intestine (including ileum) is most commonly absent. Glucagon-like peptide-2 is an ileum-derived trophic hormone that may therefore be a limiting factor for neonates with SBS. We aim to study the effect of glucagon-like peptide-2 administration in a novel preclinical model of neonatal short bowel syndrome with distal intestinal resection.

Methods:
Neonatal piglets (n=20) were block randomized to either sham control or a 75% distal intestinal resection with jejunocolic anastomosis, and either saline control or glucagon-like peptide-2 treatment (11 nmol/kg/day). Piglets were pair-fed for 7 days prior to terminal laparotomy. Structural adaptation was assessed by the change in intestinal length, weight and histopathology. Functional adaptation was assessed via Üssing techniques. Semiquantitative RT-PCR was performed on jejunum to assess the gene expression of the glucagon-like peptide-2 receptor and the insulin-like growth factor-1 system. Data are analyzed by two-way ANOVA, with a level of significance set at $p < 0.05$.

Results:
There was no difference in the change in intestinal length. Glucagon-like peptide-2 therapy augmented normalized intestinal weight and mucosal weight over saline control ($p<0.01$). Glucagon-like peptide-2 treatment increased jejunum villus height over saline control ($p<0.001$). The permeability of both mannitol and polyethylene glycol were decreased with glucagon-like peptide-2 therapy ($p<0.05$). Finally, glucagon-like peptide-2 treatment decreased insulin-like growth factor 1 expression in the resection group ($p<0.03$) and did not affect expression of the insulin-like growth factor 1 receptor or glucagon-like peptide-2 receptor.

Conclusion:
Exogenous glucagon-like peptide-2 administration in a translational model of neonatal short bowel syndrome results in both structural and functional adaptation. There is a beneficial increase in absorptive surface area and decrease in intestinal permeability. Our findings have implications for neonates with short bowel syndrome, who similarly most commonly lack ileum and distal intestine.

Poster Session I (cont.)

P12

A NOVEL INFLAMMATORY MEDIATOR CAUSES LUNG INJURY IN SEPSIS

Alexandra C. Bolognese, MD[1], Weng-Lang Yang, PhD[2], Zhimin Wang, MD[2], Jeffrey Nicastro, MD[1], Gene F. Coppa, MD[1], Ping Wang, MD[2].

[1]Hofstra Northwell School of Medicine, Manhasset, NY, USA, [2]The Feinstein Institute for Medical Research, Manhasset, NY, USA.

Purpose:
Sepsis is a major risk factor for acute lung injury (ALI) in the pediatric population. The pathophysiology of ALI involves damage to the vascular endothelium and loss of alveolar-capillary membrane integrity. Cold-inducible RNA-binding protein (CIRP) is a novel inflammatory mediator that is released into the circulation during sepsis and stimulates the release of proinflammatory cytokines from macrophages. We hypothesized that extracellular CIRP contributes to acute lung injury in sepsis through endothelial cell (EC) activation.

Methods:
C57BL/6 mice (n=3-5/group) were subjected to sepsis by cecal ligation and puncture (CLP) or sham operation. Another set of mice received intravenous injection of recombinant murine CIRP (rmCIRP, 5 mg/kg BW) or PBS (Vehicle). At 5 h after CLP or injection, lungs were harvested for analysis. Student's t test was used to compare means and differences were considered significant for $p<0.05$.

Results:
Protein levels of CIRP in the lungs were increased 2-fold at 5 h after CLP. After rmCIRP injection, lungs extravasated significantly more Evans Blue dye (EBD) compared to Vehicle (Table). In addition, the lungs of rmCIRP-treated mice had higher levels of the EC activation marker ICAM-1. Levels of proinflammatory cytokines TNF-α and IL-1β were also increased in the lungs of rmCIRP-treated mice. On lung histology, rmCIRP-treated mice displayed edema and neutrophil infiltration. Likewise, qPCR revealed increased levels of the chemokine KC in rmCIRP-treated mice.

Conclusions:
CIRP plays an important role in contributing to ALI during sepsis via EC activation leading to increased vascular permeability, as well as neutrophil infiltration and proinflammatory cytokine expression. Targeting CIRP appears to be a promising therapeutic approach for the management of sepsis-induced ALI.

Poster Session I (cont.)

Table (n=3-5 mice/group, *p < 0.05 vs. Vehicle).		
	Vehicle	**CIRP**
EBD extravasation (ng dye/mg lung)	77.3 ± 9.9	151.8 ± 20.7*
ICAM-1 mRNA (fold)	1.01 ± 0.12	2.62 ± 0.21*
TNF-α mRNA (fold)	1.00 ± 0.34	16.30 ± 2.48*
IL-1β mRNA (fold)	1.01 ± 0.10	3.05 ± 0.62*
KC mRNA (fold)	1.00 ± 0.04	1.33 ± 0.03*

Poster Session I (cont.)

P13

INCREASED INTESTINAL MUCOSAL GROWTH IN GNOTOBIOTIC MICE

Chasen Greig, MD, Arik Alper, MD, Andrew Goodman, PhD, Neeru Gandotra, PhD, Robert A. Cowles, MD.

Yale University School of Medicine, New Haven, CT, USA.

Purpose:
The microbiome of the gastrointestinal tract is a vast collection of microorganisms implicated in numerous aspects of physiology and pathogenesis. The use of gnotobiotic mouse models, with single or specific collections of microbes comprising the microbiome, can enhance our understanding of the microbiome-host relationship. We hypothesized that gnotobiotic mice would exhibit differences in mucosal homeostasis compared to mice with conventional flora (CF).

Methods:
Single-microorganism gnotobiotic mice were generated containing Escherichia coli MG1655, Akkermansia muciniphila, Bacteroides eggerthii, and Clostridium symbiosum. 8-week-old mice were used and paraffin-embedded sections of ileum were created from each group. Villus height (VH) and crypt depth (CD) were assessed by H&E staining and at least ten villi/crypts per group were measured. Crypt proliferation index (CPI) was calculated by dividing Ki67-positive crypt cells by total crypt cells for at least 5 crypts per group. Statistical analysis performed with t-test.

Results:
The ileum of gnotobiotic mice showed increased epithelial growth with taller villi, deeper crypts and increased CPI compared to CF mice. Additionally, significant differences in VH and CD were seen amongst groups except VH between A. muciniphila/C. symbiosum and CD between A. muciniphila/B. eggerthii and C. symbiosum/E. coli (see table).

Conclusions:
Single organism gnotobiotic mice show evidence of increased intestinal mucosal growth compared to mice with conventional flora and show differences in growth patterns amongst species. These findings suggest unique interactions between these individual bacteria and the host animal which hold potential for therapeutic strategies in the future. The mechanisms involved in this process warrant further study.

Poster Session I (cont.)

Mean values +/- SEM for villus height, crypt depth and crypt proliferation index			
	VH (um)	**CD (um)**	**CPI**
Conventional Flora	206±3.12	57±1.00	32±2.24
E. coli MG1655	279±7.00	78±1.37	55±3.48
A. muciniphila	315±6.77	70±1.59	54±3.32
B. eggerthii	246±4.22	68±1.74	55±2.24
C. symbiosum	309±7.54	79±2.07	57±2.31

Poster Session I (cont.)

P14

AGGRESSIVE SURGICAL MANAGEMENT OF CONGENITAL DIAPHRAGMATIC HERNIA - WORTH THE EFFORT?

Matthew T. Harting, MD, MS[1], Laura Hollinger, MD[1], Kuojen Tsao, MD[1], Jay M. Wilson, MD[2], Luke R. Putnam, MD, MS[1], Pam A. Lally, MD[1], Charles C. Miller, PhD[1], Kevin P. Lally, MD, MS[1].

[1]University of Texas Medical School at Houston, Houston, TX, USA, [2]Children's Hospital Boston, Boston, MA, USA.

Tweet about it! CDH-aggressive mgmt - Poster 14 #eAPSA2016

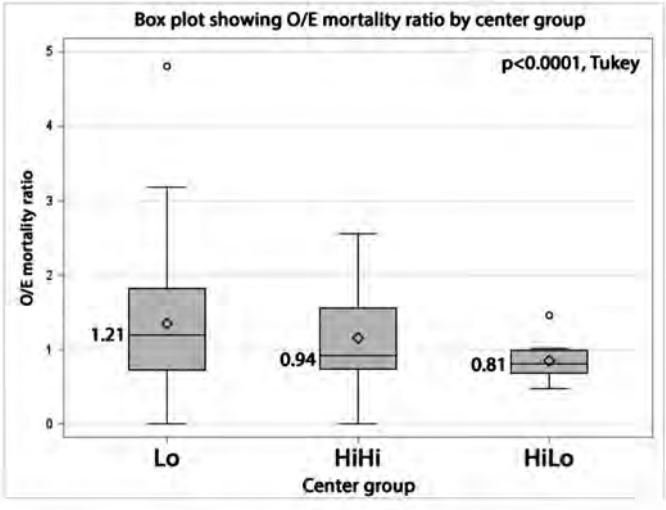
Purpose:
Nearly 20% of congenital diaphragmatic hernia (CDH) patients go unrepaired and the threshold to offer surgical repair is variable. The objectives of this study were to evaluate infants with CDH that did not undergo repair, to identify non-repair rate by institution, and to compare institutional outcomes based on rate of non-repair.

Methods:
Data were abstracted from a multicenter, prospectively collected database. Standard clinical variables, operative repair (or non-repair), predefined reasons for non-repair, and outcome were analyzed. Institutions were grouped based on volume and rate of non-repair. Preoperative mortality predictors were identified using logistic regression, expected mortality for each center was calculated, observed /expected (O/E) ratios were computed for center groups, and compared by Kruskal-Wallis ANOVA.

Results:
3965 live-born infants with CDH were identified over 10 years. 691 infants (17.5%) were not repaired. Non-repaired patients had lower Apgar scores ($p<0.05$) and increased incidence of anomalies ($p<0.0001$). Common reasons for non-repair included inability to stabilize (32.2%) and non-survivable/not ECMO candidate (35.5%). Low-volume centers (n=44 total, <10 CDH pts/yr) and high-volume centers (n=21) had median non-repair rates of 19.8% (range 0%-66.7%) and 16.7% (5.1% - 38.5%), respectively. High-volume centers were further dichotomized by rate of non-repair (5.1-16.7% and 17.6-38.5%), leaving 3 groups: High volume/low rate of non-repair (HiLo), High volume/high rate of non-repair (HiHi), and Low volume (Lo). Significant predictors of mortality were lower birth weight, lower APGAR scores, prenatal diagnosis, and presence of congenital anomalies. O/E ratios for mortality in the HiLo, HiHi and Lo groups were 0.81, 0.94 and 1.21, respectively ($p<0.0001$, Figure). For every 100 CDH patients, HiLo centers have 2.73 (2.4-3.1, 95% CI) survivors beyond expectation.

Conclusions:
There are significant differences between repaired and non-repaired CDH infants and significant center variation in rate of non-repair exists. Aggressive surgical management, leading to a low rate of non-repair, is associated with improved risk-adjusted mortality.

Poster Session I (cont.)



Poster Session I (cont.)

P15

DEFECT SIZE PREDICTS MORBIDITY AT DISCHARGE FOR INFANTS WITH CONGENITAL DIAPHRAGMATIC HERNIA

Luke R. Putnam, MD, MS[1], Matthew T. Harting, MD, MS[1], KuoJen Tsao, MD[1], Francesco Morini, MD[2], Pamela A. Lally, MD[1], Kevin P. Lally, MD, MS[1].

[1]University of Texas Health Science Center at Houston, Houston, TX, USA, [2]Ospedale Pediatrico Bambino Gesù, Rome, Italy.

Purpose:
Approximately two-thirds of infants with congenital diaphragmatic hernia (CDH) survive to hospital discharge. While CDH defect size is correlated with mortality, the association between defect size and morbidity has not been reported. The objective of this study was to evaluate the association between standardized defect size and morbidity at hospital discharge.

Methods:
An international, multicenter prospective cohort study was performed. Patient demographics, intraoperative defect size (A-D), and clinical outcomes were reviewed. The primary outcome was morbidity at the time of discharge, defined by supplemental oxygen requirement, abnormal neurologic clinical/radiographic findings, gastroesophageal reflux, supplemental nutrition, or pulmonary-, neurologic- or gastrointestinal-related medications. Chi-squared, Kruskal-Wallis, and logistic regression analyses were performed.

Results:
From 2007-2015, 3148 patients underwent CDH repair (by size, A:432, 14% ; B:1257, 40%; C:1017, 32%; D:425, 14%; not recorded:17, <1%). Larger defect sizes were associated with higher pulmonary, neurologic, and gastrointestinal morbidity rates at discharge (Figure, all $p<0.001$). Supplemental oxygen requirement (range, A:6% to D:54%), abnormal neurologic exams (12-45%), gastroesophageal reflux (47-76%) and need for supplemental tube feedings (13-69%) significantly increased with larger defect sizes (all $p<0.001$). Length of ventilation and hospital stay were also significantly associated with defect size (both $p<0.001$). On multivariable regression, larger defects were significantly associated with pulmonary morbidity (size C: odds ratio (OR) 4.6; size D: OR 7.8), neurologic morbidity (C: OR 2.7; D: OR 5.1), gastrointestinal morbidity (C: OR 2.2; D: OR 4.3), and defect size was the strongest predictor of overall morbidity (C: OR 2.5; D: OR 5.7, all $p<0.001$).

Conclusion:
Multisystem morbidities are commonly present among infants with congenital diaphragmatic hernia at discharge. Infants with the largest defects almost uniformly have morbidity of some type, often multiple. In such patients, long term follow-up is critical. Further studies are needed to explore if a cause and effect relationship exists between defect size and morbidity.

Poster Session I (cont.)

P16

THE RISK OF MIDGUT VOLVULUS IN PATIENTS WITH ABDOMINAL WALL DEFECTS: A MULTIINSTITUTIONAL STUDY

Jason Fawley, MD[1], Abdelhafeez Abdelhafeez, MD[2], Jessica Schultz, BSN[1], Allison Ertl, MS[3], Laura Cassidy, PhD[3], Susan Sharp, PhD[4], Shawn St. Peter, MD[4], Amy Wagner, MD[1].

[1]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]The Children's University Hospital, Dublin, Ireland, [3]Medical College of Wisconsin, Milwaukee, WI, USA, [4]Children's Mercy Hospital, Kansas City, MO, USA.

Purpose:
The association between abdominal wall defects and malrotation is well established. Therefore, patients with abdominal wall defects are at risk of developing midgut volvulus. However, a Ladd procedure is not routine in these patients. Factors that may protect from midgut volvulus, including peritoneal violation and adhesions, are not equal across abdominal wall defects. We evaluate the risk of volvulus in patients with gastroschsis and omphalocele.

Methods:
An IRB-approved multi-institutional retrospective study included all patients with a diagnosis of gastroschisis or omphalocele born between 1/1/2000 to 12/31/2008. Patient charts were reviewed through 12/31/2012. The primary outcome was the occurrence of midgut volvulus. Secondary outcomes included need for second unplanned laparotomy or death. Rate of midgut volvulus was compared between gastroschisis and omphalocele using a Fischer's exact test. P-values <0.05 were considered statistically significant.

Results:
We identified 414 patients with abdominal wall defects, 299 patients (72%) had gastroschisis and 115 patients (28%) had omphalocele. There were a total of 8 (1.9%) cases of midgut volvulus. Three (1.0%) of the patients with gastroschisis developed midgut volvulus and 5 patients (4.4%) with omphalocele developed midgut volvulus ($p=0.04$). There was an equal rate of unplanned laparotomy between gastroschisis and omphaloceles (14.0% vs 13.0%; $p=0.87$). Omphaloceles had equal incidence of volvulus and adhesive SBO (4.3% vs 4.3%). In gastroschsis, adhesive SBO was six times more frequent (6.7% vs 1.0%, $p=0.49$).

Conclusion:
Patients with omphaloceles have a greater risk of developing midgut volvulus, which may suggest a role for a Ladd procedure at definitive repair.

Poster Session II

Poster Session II

Clinical Surgery
Sunday, May 15, 4:30 – 6:15 p.m.

P17

A RANDOMIZED-CONTROLLED TRIAL TO ASSESS ADVANCEMENT OF ENTERAL FEEDINGS FOLLOWING SURGERY FOR HYPERTROPHIC PYLORIC STENOSIS

Troy A. Markel, MD, Melissa R. Scott, BSN, RN, Alan P. Ladd, MD.
Indiana University School of Medicine, Indianapolis, IN, USA.

Purpose:
Pyloric stenosis is a condition well known to pediatric surgeons. Length of hospital stay remains a target for reduction in hospital costs, which are directly affected by the ability to advance postoperative nutrition. We hypothesized that: 1) Ad-libitum feeding would allow infants to achieve postoperative enteral feeding goals more quickly, 2) Pre-operative dehydration would impair the ability to advance feedings.

Methods:
A prospective, randomized-controlled trial compared two different post-operative feeding methods. The primary outcome was the length of time to tolerate two consecutive Goal Feeds of 12.5ml/kg/feeding without emesis. Infants were randomized into the Incremental arm (N=68), in which infants were gradually advanced on enteral formula by a defined schedule, or the Ad-libitum arm (N=66), in which infants were allowed to consume up to goal volume immediately. Preoperative serum chemistry levels, ultrasound results, length of time to goal feeds, length of stay, and parental satisfaction were recorded. Time-to-event analyses were constructed using Kaplan-Meier survival curves. Parental satisfaction scores were compared by student's t-test. A p value less than 0.05 was significant.

Results:
Patient demographics, pyloric ultrasound measurements, and postoperative emesis were similar between groups. Infants in the Ad-libitum arm reached Goal Feeds more quickly than those in the Incremental arm (19.1+/-6 hours vs. 26.3+/-9.8 hours $p<0.001$, Figure 1) and had a shorter length of stay (43.9+/-19 hours vs. 52.6+/-27.9, $p<0.05$). Parental satisfaction scores were not impacted by the feeding regiment. Infants with preoperative serum chloride levels less than 100 and bicarbonate levels over 30 reached Goal Feeds more slowly independent of the feeding regimen ($p<0.001$).

Conclusion:
Following surgery for PS, infants can safely be started on ad-lib feedings, which may allow infants to reach feeding goals more quickly, thereby facilitating more efficient discharges and reduced hospital costs.

Poster Session II (cont.)

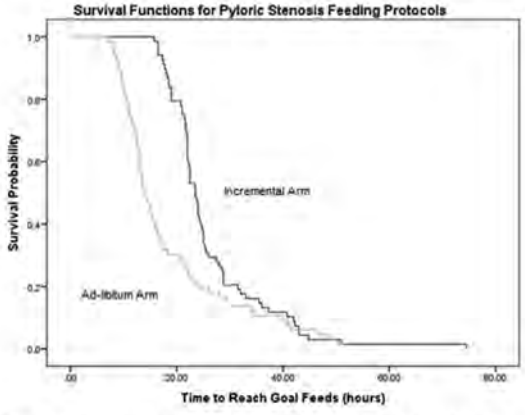


Figure 1. Infants on Ad-libitum feedings following surgery for hypertrophic pyloric stenosis reached goal feedings significantly more quickly than infants on a standardized, incremental feeding protocol.

Poster Session II (cont.)

P18

IS SURGICAL RESECTION NECESSARY FOR INFANTILE HEMANGIOMAS? A COMPARISON BETWEEN PROPRANOLOL AND CORTICOSTEROIDS

Carlos R. Alvarez-Allende, MD, Thomas Crafton, BS, Miho Watanabe, MD, Carol Chute, RN, CNP, Adrienne Hammill, MD, PhD, Belinda Dickie, MD, PhD, Denise Adams, MD, Mekibib Altaye, PhD, Roshni Dasgupta, MD, MPH.

Cincinnati Children's Hospital, Cincinnati, OH, USA.

Purpose:
To determine if the incidence of surgical resection has changed with the transition of treatment for infantile hemangiomas from corticosteroids to propranolol.

Methods:
A single center IRB approved retrospective chart review of all medically treated hemangioma patients between 2005-2014. Inclusion criteria included all patients diagnosed with a cutaneous hemangioma treated with either steroids or beta-blockers. Patients who received both treatments or topical beta-blockers were excluded from the analysis. Demographic data and indications for surgical intervention were reviewed for all patients. Both univariate and multivariate analyses were performed.

Results:
652 patients were medically treated for hemangiomas during this time period. 55 patients completed a corticosteroid treatment course, 194 patients were treated with oral propranolol. 15/55 (27.27%) of corticosteroid patients underwent surgical intervention, 16/194 (8.29%) of propranolol patients required surgical resection ($p=0.0004$, odds ratio 4.2). The result of a multivariate analysis accounting for gender, race, age at treatment, insurance, and numbers/location of hemangioma resulted in an adjusted odds ratio of 6.6. Prematurity (<37 weeks) was noted to be an independent risk factor with a 4.3 times increased risk of requiring surgery compared to term infants. There were no surgical complications noted.

Conclusions:
Patients treated with oral beta-blockers required significantly fewer surgical interventions than those treated with corticosteroids implying a more efficacious treatment paradigm. This was unrelated to differences in gender, race, age at treatment, insurance, or numbers/location of hemangioma. However, prematurity increases the need for surgical intervention of surgery regardless of the modality of medical treatment.

Poster Session II (cont.)

P19

DOES YOUR APPENDECTOMY COST MORE THAN MINE? AN ANALYSIS OF COSTS ASSOCIATED WITH PRACTICE PATTERN VARIATION

Simone Langness, MD[1], Jonathan Halbach, DO[2], Erin Ward, MD[1], Katherine Davenport, MD[3], Stephen Bickler, MD[3], Karen Kling, MD[3], Timothy Fairbanks, MD[3].

[1]UC San Diego, San Diego, CA, USA, [2]Naval Medical Center, San Diego, CA, USA, [3]Rady Children's Hospital, San Diego, CA, USA.

Purpose:
Surgeon-to-surgeon variation in care, or practice pattern variation (PPV), occurs despite similar patient and disease characteristics. PPV includes choice of diagnostic studies, surgical equipment preferences and post-operative management. The costs associated with PPV are unknown. We aimed to characterize PPV-related costs at our institution and model cost savings strategies by limiting PPV.

Methods:
We retrospectively reviewed 10 consecutive cases of uncomplicated appendicitis for each surgeon at our academic pediatric surgery practice. Patient and disease characteristics were analyzed for similarity. Costs associated with PPV were calculated based on universal billing charges for each variable. Surgeons with the lowest variable cost were used to generate "best practice" cost savings strategies (BP). Total savings equaled average savings per patients multiplied by surgeon annual operative volume.

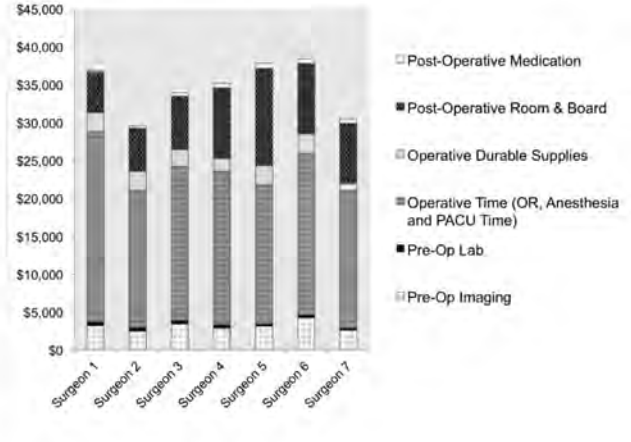
Results:
There were no significant differences in patient characteristics. The average charge for uncomplicated appendicitis was $34,580, ranging from $29,546 to $38,330. Costs associated with PPV are summarized in Figure 1. Operative time and length of stay represented the greatest discrepancy of charges amongst surgeons. Average savings/patient and total annual savings from various BP strategies are summarized in Table 1. Early discharge yielded the greatest cost savings potential, with an average savings of $2,906 per patient (8.1% of total charges) and annual savings of $1,597,580.

Conclusions:
PPV is responsible for as much as a 15% difference in total charges to patients. Comparing PPV within a single institution or geographic region may highlight cost savings opportunities among individual surgeons. While PPV may only produce modest savings per patient, these savings can become substantial when extrapolated over a year in high volume centers.

Poster Session II (cont.)

Financial Impact of Cost Savings Strategies			
Cost Savings Strategy	**Average Savings / Patient**	**Percent of Total Charges**	**Average Savings / Year**
Decrease Use of Preoperative Imaging	$668.11	1.8%	$256,150.34
Increase Use of Preoperative Ultrasound	$1,285.46	3.6%	$679,142.91
Decrease OR Time	$2,005.93	4.9%	$927,645.63
Decrease Use of Durable Equipment (1 Endoloop, No Specimen Retrieval Bag, No Wound Adhesive Glue)	$927.43	2.7%	$513,770.75
Early Discharge	$2,905.89	8.1%	$1,597,580.16
Limit Postoperative Antibiotics	$140.00	0.4%	$74,403.84
Limit Postoperative Scheduled Pain Medications	$94.64	0.3%	$49,441.79
Total	**$8,027.45**	**21.70%**	**$4,098,135.43**

Figure 1. Average Appendectomy Charges per Surgeon



Poster Session II (cont.)

P20

NEPHROBLASTOMA TREATMENT MEASURES AND OUTCOMES ASSOCIATED WITH HIGH AND LOW VOLUME CENTERS

Morgan K. Richards, MD, MPH[1], Adam B. Goldin, MD, MPH[2], Alexandra Savinkina, BA[3], John Doski, MD[4], Melanie Goldfarb, MD[5], Jed Nuchtern, MD[6], Monica Langer, MD[7], Elizabeth A. Beierle, MD[8], Sanjeev Vasudevan, MD[6], Kenneth W. Gow, MD[2], Mehul V. Raval, MD[3].

[1]University of Washington, Seattle, WA, USA, [2]Seattle Childnen's Hospital, Seattle, WA, USA, [3]Emory University School of Medicine, Atlanta, GA, USA, [4]Methodist Children's Hospital of South Texas, San Antonio, TX, USA, [5]John Wayne Cancer Institute, Santa Monica, CA, USA, [6]Baylor College of Medicine, Houston, TX, USA, [7]Maine Children's Cancer Program, Portland, ME, USA, [8]University of Alabama, Birmingham, Birmingham, AL, USA.

Purpose:
Previous studies examining differences in high versus low volume centers in the treatment of nephroblastoma may have been underpowered. The purpose of this study was to compare treatment-specific factors for pediatric patients with nephroblastoma at high and low volume centers.

Methods:
We performed a retrospective cohort study using the National Cancer Data Base from 1998-2012 that included patients ≤18 years with unilateral nephroblastoma who underwent operative resection. Center volume was divided into quartiles. Treatment outcomes included nodal sampling, positive margin status, time to chemotherapy and time to radiation. Additionally, 5-year overall survival was compared. Univariate analysis consisted of ^{2} and t-tests for categorical and continuous variables. Multivariable analysis used generalized linear models and Cox regression ($p<0.05$). Sensitivity analysis was used to compare outcomes with hospital volumes defined by deciles.

Results:
A total of 4,137 patients with unilateral nephroblastoma underwent nephrectomy over the study period. The highest volume centers (HVC) performed from 48-98 nephrectomies while the lowest volume centers (LVC) performed from 1-15 nephrectomies. Patients treated at HVCs were more frequently white (HVC: 722 (71.7%); LVC: 694 (64.3%); $p<0.001$) and lived in large metropolitan areas (HVC: 567 (56.2%); LVC: 419 (39.9%); $p<0.001$). On multivariable analysis relative to LVCs the HVCs were were 14% more likely to perform nodal sampling (RR 1.14, 95% CI 1.08-1.19) and had over 25% fewer days to chemotherapy (RR 0.73, 95% CI 0.65-0.83). Treatment at the HVCs was associated with higher risk of positive margin status at resection (RR: 1.28, 95% CI 1.02-1.60). There was no difference in days to radiation ($p=0.2$), or survival ($p=0.8$). Sensitivity analyses revealed similar findings.

Conclusion:
HVCs were more likely to follow guidelines regarding nodal sampling and had fewer days to chemotherapy with a higher positive margin status; however, there was no difference in days to radiation or survival between centers.

Poster Session II (cont.)

P21

LAPAROSCOPIC VERSUS OPEN PEDIATRIC GASTROSTOMY TUBE PLACEMENT: A PEDIATRIC NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM (PNSQIP) ANALYSIS

Inna N. Lobeck, MD, Rebekah Karns, PhD, Phylicia Dupree, MD, Roshni Dasgupta, MD.
Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA.

Purpose:
The optimal technique for gastrostomy tube placement for long-term enteral nutrition in the pediatric population has only been evaluated in small series and meta-analyses of previous studies. In this study, we investigated outcomes of two techniques, laparoscopic and open gastrostomy tube placement, utilizing the pediatric NSQIP database.

Methods:
We accessed the 2013 Pediatric National Surgical Quality Improvement Program utilizing the CPT codes, 43653 (laparoscopic gastrostomy tube), 43830 and 43831 (open gastrostomy tube). Variables taken into account included age, ventilator dependence and history of congenital lung disease (hxCLD), and other clinical indicators. Outcome measures included presence in hospital 30 days post-surgery, sepsis, surgical site infections, postoperative length of stay, bleeding and requirement for transfusion. Backwards elimination, multiple regression and odds ratios were utilized for analysis. $p<0.05$ was considered significant.

Results:
1133 patients were found to have had laparoscopic gastrostomy tube placement and 375 had open. Pairwise correlation analysis showed that patients with open gastrostomy tube placement were more likely to remain in-hospital 30 days postoperatively ($p=0.0001$, OR=1.94), require reintubation ($p=0.0549$, OR=2.15), develop sepsis ($p=0.0089$, OR=3.03), bleeding ($p=0.0006$, OR=3.51), and superficial skin infection (SSI) ($p=0.0128$, OR=2.2). Regression analysis revealed that laparoscopic gastrostomy tube placement had half the risk of open tube placement for remaining in-hospital 30 days postoperatively (OR=0.482, $p=0.0017$) even when taking into account significant covariates (patient hxCLD $p=0.005$ and ventilator status $p<0.0001$). Similarly, postoperative length of stay was determined by CPT code (longer for open tube placement; $p<0.0001$) after consideration of covariates (race $p=0.0002$, patient height $p<0.0001$, ventilator status $p<0.0001$, SSI $p=0.019$, hxCLD $p=0.002$, tracheostomy $p=0.012$, and bleeding $p<0.001$).

Conclusion:
Placement of laparoscopic gastrostomy tubes in the pediatric population is safer and provides more favorable outcomes as compared to open gastrostomy tube placement.

Poster Session II (cont.)

P22

LAPAROSCOPIC PEDIATRIC INGUINAL HERNIA REPAIR: A PILOT STUDY IN A NOVEL GUINEA PIG ANIMAL MODEL

Maria Carmen Mora, MD[1], Katharine R. Bittner, MD[1], Kaitlyn E. Wong, MD[1], Kevin P. Moriarty, MD[2], David B. Tashjian, MD[2], Michael V. Tirabassi, MD[2].

[1]Baystate Medical Center, Tufts University School of Medicine, Springfield, MA, USA, [2]Baystate Children's Hospital, Tufts University School of Medicine, Springfield, MA, USA.

Purpose:
The purpose of this study was to compare different techniques for pediatric laparoscopic inguinal hernia repair. We hypothesize that the amount of dissection, with or without division of the peritoneum, performed at the internal ring will impact healing and thus the long term success of the repair. We chose to test this hypothesis in a novel guinea pig model.

Methods:
Following IACUC approval (708024-4), a total of 20 Hartley guinea pigs underwent laparoscopic repair of their natural open internal rings. The guinea pigs were divided equally into 4 surgical groups: intracorporeal suture repair (IS), hernia dissection and division with intracorporeal suture repair (DDIS), subcutaneous endoscopic assisted ligation (SEAL), and Yueng (HOOK) repair. All repairs were conducted with Prolene suture. After repair, the animals were survived for 6 weeks. A necropsy was then performed; repairs were evaluated and tested under pressures up to 30 mmHg. The suture was then removed to assess primary healing. Experimental data was analyzed using chi-square test.

Results:
At necropsy there were no surgical complications. On initial evaluation, prior to suture removal repair integrity was; 5/10 IS, 10/10 DDIS, 7/10 SEAL, and 7/10 HOOK (p=0.09). After suture removal repair integrity was; 3/10 IS, 10/10 DDIS, 5/10 SEAL, and 6/10 HOOK (p=0.01).

Conclusions:
Overall, dissecting and dividing the sac with intracorporeal suture closure (DDIS) had the best outcome. Dissection of the peritoneum using the hook in the extraperitoneal space without division of the sac does not appear to be adequate in this animal model. All DDIS repairs in this group remained intact under pressure testing, even after removal of the Prolene suture. This method appears to best mimic standard open high ligation, and may be the best method as a candidate for the use of absorbable suture in future studies.

Poster Session II (cont.)

P23

IMPACT OF CHILDHOOD OBESITY ON OUTCOMES FOLLOWING APPENDECTOMY

Cordelie Witt, MD, Adam Goldin, MD, Monica Vavilala, MD, Frederick Rivara, MD, MPH.
University of Washington, Seattle, WA, USA.

Purpose:
Pediatric obesity is a leading public health concern, yet literature regarding perioperative risk is sparse. Appendicitis is one of the most common pediatric surgical diseases in otherwise-healthy children. We performed a nationwide, retrospective study to evaluate whether increasing body mass index (BMI) is associated with greater risk of complications following appendectomy.

Methods:
Patients aged 2-18 years who underwent appendectomy were identified in the 2012-2013 Pediatric National Surgical Quality Improvement Program (NSQIP) datasets. After exclusion of patients without anthropomorphic data, age and gender-specific BMI percentiles were calculated via the 2000 Center for Disease Control's publically-available algorithms. Underweight patients (BMI <5th percentile) were excluded, leaving 9,606 patients. BMI categories were defined as normal ≤5-<85th, overweight ≤85-99th percentile. Multivariate analysis was performed using logistic and linear regression; the square of BMI percentile was used given improved fit on polynomial model comparisons. P values <0.05 were considered statistically significant.

Results:
Mean age was 11.21 years (SD=3.66), and mean BMI percentile was 68.11 (SD=28.01). 90% of appendectomies were laparoscopic. The overall unadjusted 30-day complication rate was 4.96%, increasing from 4.47% in normal-weight patients to 5.27% in overweight, 5.73% in obese, and 7.26% in morbidly obese patients (p=0.014). In univariate and multivariate analysis, rising BMI was associated with a higher rate of superficial incisional infection, unplanned intubation, and longer operative time (table). There was no difference in 30-day mortality, hospital length of stay, readmission or reoperation rate.

Conclusion:
In this large-scale, nationwide sample, increasing body mass index was an independent predictor of 30-day complication after appendectomy and was associated with longer operative duration.

Poster Session II (cont.)

P24

CHAAMPS BOWEL MANAGEMENT CAMP: MOVING BEYOND DICHOTOMOUS CLASSIFICATION SCHEMES FOR THE TREATMENT OF FECAL INCONTINENCE

Ferdynand Hebal, MD, Katherine A. Barsness, MD, MS, Elizabeth Nanney, BSN, APN, Hayley Sparks, BS, Karen Rychlik, MS, Mary Beth Madonna, MD.

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

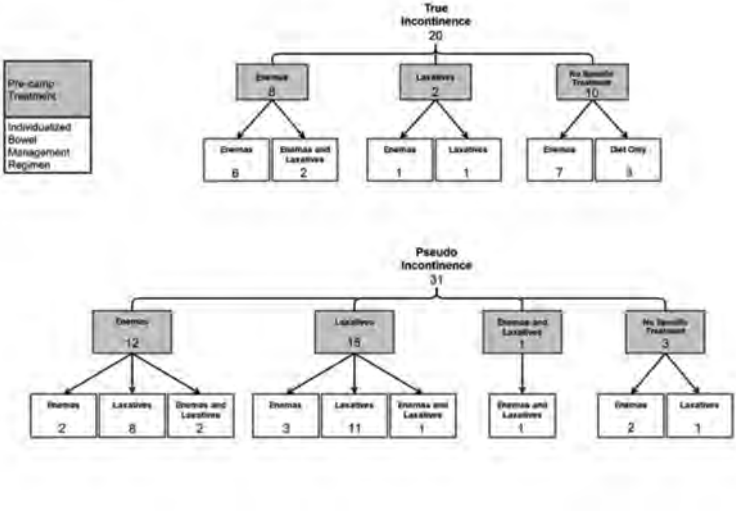
Purpose:
Traditional bowel management programs (BMP) assign treatment algorithms based on patient classification as true- versus pseudo-incontinence. Yet, a variety of socioeconomic and patient-specific factors may render treatment compliance improbable. Purposes of this study are to 1) determine immediate and 6-month fecal continence results, and 2) identify predictors of success among a diverse population of children with fecal incontinence attending a modified bowel management program (CHAAMPS).

Methods:
We conducted an IRB approved (IRB#2013-15390) retrospective review of children with fecal incontinence (N=51) treated in weeklong CHAAMPS camps from 01/2007 - 08/2014. Diagnoses included anorectal malformations (N=27), neurologic etiology (N=12), Hirschsprung's disease (N=8), and unknown etiology (N=4). Sixty-four unique variables were collected. Success was defined as maintenance of continence (new regimen), or improved continence. Chi-squared and Fishers exact test were used for analysis ($P<0.05$ significant).

Results:
Nine continent children changed treatment regimens. Forty-two children had fecal incontinence. Twenty children (39%) had true incontinence, and 31(61%) had pseudoincontinence. Initial and final treatment regimens for children with true versus pseudo-incontinence are illustrated in Figure 1. Twenty-five percent (4/20) of patients with true incontinence were able to discontinue enemas. Forty-two percent (13/31) of patients with pseudoincontinence improved with the addition of daily enema. Incontinence improved (or was maintained in continent children) in 90% (46/51) of participants, and sustained success was achieved in 88% (28/32) of participants with 6-month follow-up data.

Conclusions:
Patient-specific modifications to traditional dichotomous BMP classification regimens resulted in sustained continence success rates in 88% of patients, similar to other published bowel management series. Unique to CHAAMPS, modifications to traditional BMP occurred in 25-42% of children. In addition, younger age was a predictor of both immediate and sustained success. A prospective study is ongoing, to better evaluate CHAAMPS, and our BMP continuity program, to further improve our ability to effectively treat this patient population.

Poster Session II (cont.)



Poster Session II (cont.)

P25

CLINICAL VALIDITY AND RELEVANCE OF ACCIDENTAL PUNCTURE OR LACERATION AS A PATIENT SAFETY INDICATOR FOR CHILDREN

Heather L. Short, MD, Kurt Heiss, MD, Mark Wulkan, MD, Mehul Raval, MD, MS.
Emory University, Atlanta, GA, USA.

Purpose:
The Agency for Healthcare Research and Quality has endorsed accidental puncture or laceration (APL) as a patient safety indicator, and APL is now being used to compare hospital performance and for reimbursement. We sought to determine the validity of APL as a quality metric in a pediatric surgical population.

Methods:
We performed a retrospective review of all cases that met APL administrative coding criteria over 5 years in a quaternary pediatric hospital system. APL events were categorized as false positive (FP) or true positive (TP) depending on whether APL was identified. TP cases were further categorized as clinically consequential or inconsequential. The validity of APL as a patient safety indicator was determined and descriptive analyses were performed using a z-test to provide 95% confidence intervals.

Results:
Descriptions of the surgeries/injuries for the 238 cases identified by APL codes are provided in Table 1. Of those cases, 204 were categorized as TP (86%; 95%CI:80-90%). Thirty-four of these events (17%) involved injuries that were considered inconsequential. This was most apparent when assessing abdominal/pelvic procedures (n=23, 68%). True events that required intervention for repair were identified as potentially consequential (n=170). Thus, the validity of APL was 71% (95%CI:65-77%). Extenuating factors such as adhesive disease, scar tissue or abnormal anatomy were present in 38% of true APL cases (95%CI:31%-45%). Thirty-four cases (14%) were categorized as false positives because no injury was apparent from chart abstraction.

Conclusions:
A large proportion of cases identified as having accidental puncture and laceration are either false or clinically irrelevant, thus questioning its validity as a patient safety indicator for children undergoing surgery.

Poster Session II (cont.)

TABLE 1. Types of Surgical Procedures Performed and Corresponding APL Categorization.

Surgical Procedure Type	**Total N=238**	**False Positive N=24 (14%)**	**True Positive N=204 (86%)**	
			Potentially Consequential N=170 (83%)	Inconsequential N=34 (17%)
Head	27(11)	9(26)	15(9)	3(9)
Neck	8(3)	2(6)	6(4)	0(0)
Chest	48(20)	5(15)	40(24)	3(9)
Abdomen/pelvis	127(53)	12(35)	92(54)	23(68)
Spine	13(5)	1(3)	12(7)	0(0)
Upper Extremity	2(1)	1(3)	0(0)	1(3)
Lower Extremity	13(5)	4(12)	4(2)	4(11)

Poster Session II (cont.)

P26

THYROID HURTHLE CELL CARCINOMA IN CHILDREN: A RARE AND INDOLENT MALIGNANCY

T.K. Pandian, MD, MPH, Zahraa Al-Hilli, MBBCh, Amy E. Glasgow, MHA, Elizabeth B. Habermann, PhD, MPH, Geoffrey B. Thompson, MD, Christopher R. Moir, MD.
Mayo Clinic, Rochester, Rochester, MN, USA.

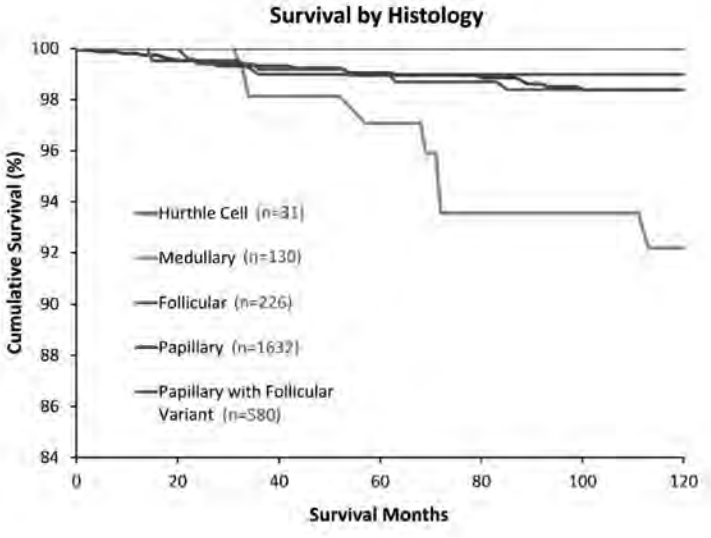
Purpose:
Data regarding pediatric Hurthle cell carcinoma of the thyroid are sparse. We aimed to determine the incidence of children with this diagnosis and compare their survival to other pediatric thyroid cancers.

Methods:
All cases of pediatric (age ≤18) thyroid malignancies were extracted from Surveillance, Epidemiology, and End Results (SEER) data from 1973-2012. Hurthle cell carcinoma patient, tumor, and treatment characteristics were assessed and contrasted to other common pediatric thyroid cancers. Survival was compared with Kaplan-Meier analysis.

Results:
In total, 31 cases of Hurthle cell carcinoma were identified (total thyroid malignancies = 2,681). Mean age was 15.6 years and most (n=24, 77.4%) were female. Incidence was low, ranging from 0 to 0.21 cases per 1 million over the study years. Tumor size was >1cm in 64.5% (n=20) of patients. Surgical procedures performed were total thyroidectomy (20), sub- or near-total thyroidectomy (4), lobectomy only (4), unknown (2), and 1 patient underwent no surgical resection. Adjuvant radioiodine therapy was given to 20 patients. Among Hurthle cell carcinoma surgical patients, 15 (48.4%) had lymph nodes examined at the time of surgery and 6 patients in this subset (40%) had positive nodal involvement. In contrast, 62% (1012 of 1632) of children with papillary thyroid carcinoma in SEER had positive nodes at the time of surgery ($p<0.0001$). Median follow-up in the Hurthle cell cohort was 80 months. There were no deaths in the Hurthle cell carcinoma group, and thus, survival was 100%. The Figure illustrates a comparison of overall survival.

Conclusion:
Pediatric Hurthle cell carcinoma is a rare malignancy with favorable prognosis. A significantly smaller proportion of these patients have positive nodal involvement than children with papillary thyroid carcinoma ($p<0.0001$) but overall survival is comparable ($p=0.45$). Additional data are necessary to identify risks for recurrence and balance the benefits of intervention with potential surgical morbidity.

Poster Session II (cont.)



Poster Session II (cont.)

P27

GENERAL ENDOTRACHEAL GE VS. NON-ENDOTRACHEAL REGIONAL ANESTHESIA RA FOR ELECTIVE INGUINAL HERNIA SURGERY IN VERY PRETERM NEONATES- A SINGLE INSTITUTION EXPERIENCE

Juan Gurria, MD, Philip Kuo, BS, Luisa Christensen, MD, Ai-Xuan Holterman, MD.
University of Illinois, Peoria, IL, USA.

Background:
Very pre-term infants (VP) at <32wks post menstrual age PMA have a high incidence of bronchopulmonary dysplasia BPD with risks for pulmonary-related perioperative complications from general endotracheal anesthesia GE during elective inguinal hernia repair.

Methods/Objectives:
A retrospective cohort study between 1/2011 and 5/2015 of 111 VP undergoing non-emergent inguinal repair prior to NICU discharge under GE vs regional anesthesia RA, with/without concurrent circumcision, orchiopexy, umbilical, contralateral hernia. Outcome variables: % intubation >4 hours postop, full feed ≤48 hours, postop bradycardia/desaturation and surgical complications. One subject with failed RA, and 15 with hernia incarceration/recurrence and/or concurrent major procedures were excluded. We performed Wilcoxon-rank-sum, Fisher exact tests, and multivariate regression analysis using STATA. Two-tailed p values were calculated for all tests and $p<0.05$ is statistically significant.

Results:
RA (n=37) and GE (n=58) had comparable median PMA at birth (RA vs GE 27 wks), PMA at surgery (RA vs GE, 37 wks); weight at surgery (RA 2.2/ GE 2.3 Kg); % with BDP, bilateral hernia, additional procedures at surgery; medical and surgical comorbidities, intraoperative complications; except for sac laparoscopy (GE/36%) and post GE caudal (GE 21%). Anesthesia time was RA 74+/-3 vs GE/99+/-4 minutes ($p<0.001$). GE 17%/ RA 0% remained intubated post op ($p=0.006$); full feeding resumed in 87% RA vs 60% GE ($p=0.009$) by 24 hours postop; 97% RA vs 72% GE ($p=0.002$) by 48 hours postop. The statistical differences held after regression analysis controlling for sac laparoscopy, post GE caudal and procedure time. No difference in post-op desaturation/bradycardia, wound or intraoperative complications, and hernia reoperation was seen at median 10m RA and 14m GE follow up.

Conclusion:
RA safety, shorter anesthesia time, early resumption of full feed and avoidance of prolonged mechanical intubation provide the justification for a RCT comparing the safety/efficacy of GE vs RA in VP infants undergoing NICU elective inguinal hernia repair.

Poster Session II (cont.)

P28

MULTI-MODAL PEDIATRIC PAIN MANAGEMENT WITH HOME-GOING CONTINUOUS PARAVERTEBRAL BLOCK FOR NUSS PROCEDURE

Natalie M. Dean, MD, Dawit T. Haile, MD, Christopher R. Moir, MD, D Dean Potter, MD.
Mayo Clinic, Rochester, MN, USA.

Tweet about it! Paravertebral catheters for Nuss procedure – Poster 28 #eAPSA2016

Purpose:
Postoperative pain management following minimally invasive pectus excavatum repair (MIPER) remains a challenge. Level 1 evidence suggests that pain control using thoracic epidural catheters is equivalent to patient controlled analgesia, thus alternative regional and multi-modal pain management strategies have been described to enhance postoperative recovery. We developed a pediatric postoperative pain management strategy for MIPER that includes bilateral paravertebral catheters. Our goal was to optimize pain control while limiting opioid administration and facilitate early hospital discharge by means of a home-going paravertebral catheter infusion system. The purpose of this study was to evaluate the outcomes of this multi-modal pain management strategy.

Methods:
We reviewed a prospective cohort of 96 pediatric patients who underwent bilateral paravertebral catheters placed for MIPER. Catheters were placed with ultrasound guidance after induction of general anesthesia. Home-going infusions were maintained in all patients. Analgesia was supplemented with opioid and NSAID. Data analyzed includes average pain score, amount of opioid administered, and length of hospital stay. These data were compared to historical controls that were treated with thoracic epidural catheters or single injection intercostal nerve blockade.

Results:
Patients undergoing MIPER who received bilateral paravertebral catheters reported low average pain scores, required limited opioid administration, and accomplished hospital stays that met institution goals (Table 1).

Conclusions:
Continuous bilateral paravertebral catheters with home-going infusion systems provide effective analgesia and result in satisfactory patient outcomes following minimally invasive pectus excavatum repair. These data support a prospective randomized trial to determine the true benefit of this management strategy.

Poster Session II (cont.)

Outcomes of Patients Undergoing Nuss Procedure			
	Paravertebral catheter (n=96)	Epidural (n=5)	Intercostal, single shot (n=15)
Morphine equivalence (mg)	44 (41, 66)	80 (64, 118)	83 (78, 129)
Pain score (VAS-ave)	3.4+-1.0	4.4+-1.3	N/A
Length of stay (days)	3.3+-0.7	4+-0.5	5.1+-1.7
Nausea & vomiting	++	+++	+++

Poster Session II (cont.)

P29

OUTCOMES AFTER TOTAL THYROIDECTOMY IN CHILDREN AT A PEDIATRIC GENERAL SURGERY CENTER

Jennifer L. Carpenter, MD[1], Sarah C. Fallon, MD[1], Yangyang R. Yu, MD[1], Ionna D. Athanassaki, MD[2], Mary L. Brandt, MD[2], David E. Wesson, MD[2], Monica E. Lopez, MD[2].
[1]Baylor College of Medicine, Houston, TX, USA, [2]Texas Childrens Hospital, Houston, TX, USA.

Purpose:
The American Thyroid Association (ATA) recently published management guidelines for pediatric thyroid disease that included complication rates reported following total thyroidectomy by experts in endocrine surgery. Our purpose was to evaluate the results of total thyroidectomy performed by pediatric surgeons in a children's hospital and to compare these results to those published in the ATA Guidelines.

Methods:
We retrospectively reviewed all patients who underwent total thyroidectomy from March 2002-July 2015. We did not use recurrent laryngeal nerve (RLN) monitoring in any case. Outcomes included transient hypocalcemia (total calcium<8.0), need for IV calcium, RLN injury, re-operation rate and permanent hypoparathyroidism. We compared our outcomes to the published outcomes referenced in the ATA Guidelines: transient or permanent RLN injury 1-6%, transient hypocalcemia 5-15%, and permanent hypoparathyroidism <2.5%.

Results:
Eighty-six patients underwent total thyroidectomy: 77% female, average age 14±4.5 years. Thirty-six (42%) cases had benign disease. Malignant cases included 41 (82%) papillary carcinoma, 6 (12%) medullary carcinoma, and 2 (4%) follicular carcinoma. Simultaneous therapeutic lymphadenectomy was performed in 31 (36%) cases. Two patients had re-implantation of parathyroid tissue. Parathyroid tissue was identified in 22 (26%) pathology specimens. Incidental parathyroid resection was associated with formal lymphadenectomy (64% versus 27%, p=0.002). One RLN was deliberately sacrificed in one patient because it was encased in tumor. One patient required re-operation for hematoma evacuation. Transient hypocalcemia occurred in 33% of cases (n=28); 14% (n=12) required IV calcium for symptomatic hypocalcemia. There was no case of permanent hypoparathyroidism.

Conclusions:
Our outcomes following total thyroidectomy are comparable to those reported by the ATA guidelines. Pediatric surgery centers can achieve outcomes equal to high-volume endocrine surgery programs.

Poster Session II (cont.)

P30

LYMPHOCYTE DEPRESSION AND POSTOPERATIVE ABSCESS AFTER APPENDECTOMY IN CHILDREN

Daniel L. Lodwick, MD, MS, Jennifer N. Cooper, MS, PhD, Katherine J. Deans, MD, MHSc, Peter C. Minneci, MD, MHSc, Rajan K. Thakkar, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Purpose: To evaluate the efficacy of lymphopenia to diagnose post-appendectomy abscess in pediatric complex appendicitis.

Methods: This single-center retrospective cohort study included patients who underwent appendectomy for complex appendicitis from 4/2012-10/2014. Postoperative abscess was diagnosed with ultrasound and/or computed tomography. For equivocal imaging results, patients were deemed to have an abscess if they underwent drainage procedure. For abscess patients, labs were obtained from the day of imaging, or the closest pre-imaging day. For non-abscess patients, labs were obtained from the day closest to discharge. Patients with and without postoperative abscess were compared in regards to demographics, WBC count, percent neutrophils, and percent lymphocytes. Odds ratios for abscess were examined for lab values using logistic regression models.

Results: There were 611 patients included, with 573 (93.8%) having WBC count, 556 (91%) having the differential, and 551 (90%) had both. Abscesses were identified in 79 (12.9%) patients. There were no demographic differences between the abscess and non-abscess cohorts ($p>0.10$ for all). The WBC count was higher in the abscess group (median (IQR) 11.9 (9.9-10.3) versus 8.5 (6.8-10.3) K/dl, $p<0.001$). The median percent neutrophils were 69% (IQR 64-76) versus 57% (IQR 49-65) and lymphocytes 18% (IQR 14-24) versus 30% (IQR 23-39) for the abscess and non-abscess groups, respectively (p 12 K/dl (OR 3.65 (95% 2.06-6.45), $p<0.001$) and lymphopenia, defined as lymphocytes below normal for age (OR 4.46 (95% CI 2.23-8.93), $p<0.001$). Patients with leukocytosis and lymphopenia had a the highest rate of abscess formation (36%) and those with a normal WBC and normal lymphocyte had the lowest (3%) ($p<0.001$, see Figure).

Conclusions: Assessment of lymphocyte depression may be a useful adjunct to identify the risk of a post-operative abscess in patients with complicated appendicitis.

Poster Session II (cont.)

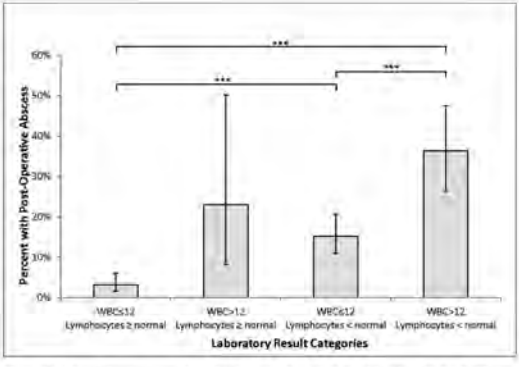


Figure: Probability of postoperative abscess development for patients based on white blood cell (WBC) and lymphocyte counts. Bars are shown with 95% confidence intervals. *** denotes p<0.001.

Poster Session II (cont.)

P31

LAPAROSCOPIC SLEEVE GASTRECTOMY AS FIRST-LINE SURGICAL TREATMENT FOR MORBID OBESITY IN ADOLESCENTS

Aslam Ejaz, MD, MPH[1], Pankti Patel, MD[1], Raquel Gonzalez-Heredia, MD, PhD[1], Enrique Elli, MD[1], Mark Holterman, MD, PhD[2], Robert Kanard, MD[1].

[1]University of Illinois at Chicago, Chicago, IL, USA, [2]University of Illinois at Peoria, Peoria, IL, USA.

Tweet about it! Lap sleeve gastrectomy works in kids with few complications! Poster 31 #eAPSA2016

Purpose:
The increasing prevalence of adolescent obesity has necessitated the increasing use of bariatric surgery in the adolescent population. Outcomes following laparoscopic sleeve gastrectomy in the pediatric population, however, have not been well studied. The aim of this study was to examine percent excess weight loss and perioperative and postoperative outcomes following laparoscopic sleeve gastrectomy in adolescent patients.

Methods:
All patients who underwent laparoscopic sleeve gastrectomy as a primary surgical option for morbid obesity were identified at our institution between 2006 and 2014. Patient demographics, pre-surgical comorbidities, perioperative outcomes, post-operative complications, operating time, length of hospitalization, and percent excess weight loss (% EWL) were recorded.

Results:
We identified 18 patients (13 females, 5 males) who underwent laparoscopic sleeve gastrectomy. Mean patient age at laparoscopic sleeve gastrectomy was 17.8 ± 1.7 years. Mean body mass index among all patients was 48.6 ± 7.2 kg/m2 and did not differ by gender (P=0.68). One patient (5.6%) experienced a 30-day perioperative complication (pulmonary embolism). Median LOS following laparoscopic sleeve gastrectomy was 3 days (IQR: 2, 3). Two patients (11.1%) were readmitted within 30-days due to feeding intolerance. At a median follow-up of 9.5 (range: 0-38) months, percent excess weight loss (%EWL) among all patients was 34.1%. Among patients with at least 2 years follow-up (n=3), %EWL was 50.2%.

Conclusions:
Laparoscopic sleeve gastrectomy in morbidly obese adolescents is a safe and feasible option. Short- and long-term weight loss appears to be successful following laparoscopic sleeve gastrectomy. As such, laparoscopic sleeve gastrectomy should be strongly considered as a primary surgical treatment option for all morbidly obese adolescents.

Poster Session II (cont.)

P32

ULTRASOUND-GUIDED INTERNAL ANAL SPHINCTER BOTULINUM TOXIN INJECTION FOR TREATMENT OF OBSTRUCTIVE DEFECATION DUE TO HIRSCHSPRUNG'S DISEASE AND INTERNAL ANAL SPHINCTER ACHALASIA

Joseph T. Church, MD, Daniel H. Teitelbaum, MD, Marcus D. Jarboe, MD.
University of Michigan Health System, Ann Arbor, MI, USA.

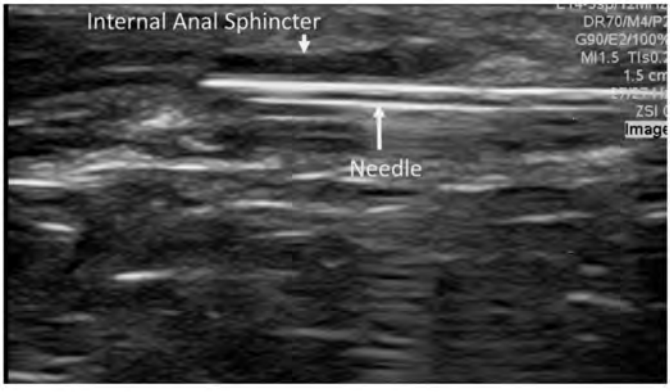
Purpose:
Chronic functional anal outlet obstruction can occur in patients with Hirschsprung's Disease (HD) and internal anal sphincter (IAS) achalasia (IASA). Injection of Botulinum Toxin (BoTox) into the IAS can temporarily relieve obstructive defecation, but can be challenging when performed by tactile sense alone. This study compared results of BoTox injections with and without ultrasound (US)-guidance.

Methods:
We retrospectively reviewed all IAS BoTox injections over the last 5 years. Primary outcome was short-term improvement, defined as resolution of enterocolitis, new ability to spontaneously defecate, and/or normalization of bowel movement frequency 2-3 weeks post-operatively. Secondary outcome was time interval until a subsequent procedure (repeat BoTox, sphincter myomectomy, colectomy, and/or anal dilation) was required for similar symptoms, or to present day if no subsequent procedure was required.

Results:
Twenty procedures were performed on 9 children without US-guidance; 10 were performed on 7 patients with US-guidance. Seventeen of 20 procedures (85%) without US and 2 of 10 procedures (20%) with US were performed in patients with HD; the remaining were in IASA patients. Thirteen of 20 (65%) non-US-guided procedures resulted in short-term improvement. All 20 procedures were followed by a repeat treatment (mean time interval 20.5±22.3 (SD) weeks). Seven of 10 (70%) US-guided procedures resulted in short-term improvement, while mean time interval to subsequent procedure was 37.7±42.2 weeks (p=0.26, t-test). Three patients in the US group did not require a subsequent procedure. There were no operative complications in either group. Myomectomy, colectomy, or dilation were performed in 6/9 (67%) non-US-guided and 3/7 (43%) US-guided patients.

Conclusions:
US-guided BoTox injection is safe and effective for obstructive defecation due to HD or IASA. Though preliminary, the longer symptom-free duration suggests this may be a superior approach. Clearly, a larger sample will be required to define the true clinical benefit of US-guided IAS BoTox injections.

Poster Session II (cont.)



Poster Session II (cont.)

P33

SACRAL NERVE STIMULATION: PRELIMINARY OUTCOMES IN CONSTIPATION AND INCONTINENCE

Meredith Barrett, MD, Laurie C. Wilde, NP, Daniel H. Teitelbaum, MD, Peter F. Ehrlich, MD.
Mott Children's Hospital, Ann Arbor, MI, USA.

Tweet about it! Sacral nerve stimulation: preliminary outcomes in constipation and incontinence @sparklyscalpel – Poster 33 #eAPSA2016

Purpose:
Constipation and incontinence are embarrassing problems. When medical management fails, surgical interventions, including appendicostomy and colon resection, are considered. These invasive approaches have had mixed success. Recently we began utilizing sacral nerve stimulation (SNS) as a treatment for both anal incontinence (AI) and medically-refractory constipation (MRC). The purpose of this study is to report our initial outcomes.

Methods:
From May, 2014 to June, 2015 10 children underwent Stage I SNS placement. Performance of Stage II procedure was delayed for analysis of symptomatic improvement prior to permanent implantation. Parents kept stool diaries for two weeks prior to and after implantation. A retrospective review was performed with medication/antegrade enema cessation, spontaneous bowel movements, and appendicostomy avoidance being deemed therapeutic successes.

Results:
4 females and 6 males underwent SNS placement, mean age: 8.0 years (range, 4.2-18.8 years). Patients' primary diagnosis was classified as either MRC (80%) or AI (20%; 1 child due to Hirschsprung post-pullthrough and 1 with imperforate anus). 8 children underwent permanent SNS placement (Stage II). Mean time between Stages was 17.1 days (range, 12-24 days). Overall complication rate was 50%, but 4 of 5 complications were neurologic (extremity burning or numbness) and resolved with stimulator setting adjustment. One child required explantation secondary to trauma-induced wound dehiscence. 60% of children had symptomatic improvement with SNS; with 30% of patients stopping medications and or appendicostomy flushes, 20% avoiding placement of appendicostomy, and 30% had spontaneous stooling. 3 of 4 patients without improvement underwent further operative interventions (appendicostomy or colon resection) for refractory symptoms.

Conclusions:
Preliminary single institution results suggest that SNS is safe and a promising approach to MRC and AI. Future prospective study and longer follow up will allow focus on predictors of SNS success as well as impact on quality of life.

Plenary Session I

Plenary Session I

Monday, May 16, 7:30 – 9:00 a.m.

1

INADEQUATE PROTEIN AND ENERGY DELIVERY IN PEDIATRIC SURGICAL CRITICAL CARE

Cristine S. Velazco, MD, MS, David Zurakowski, PhD, Brenna S. Fullerton, MD, Lori J. Bechard, PhD, MEd, RD, Tom Jaksic, MD, PhD, Nilesh M. Mehta, MD.

Boston Children's Hospital, Boston, MA, USA.

Purpose:
Based on recently reported associations between inadequate nutrient (particularly enteral protein) intake and poor clinical outcomes in critically ill children, we aimed to describe macronutrient delivery in surgical patients admitted to the pediatric intensive care unit (PICU).

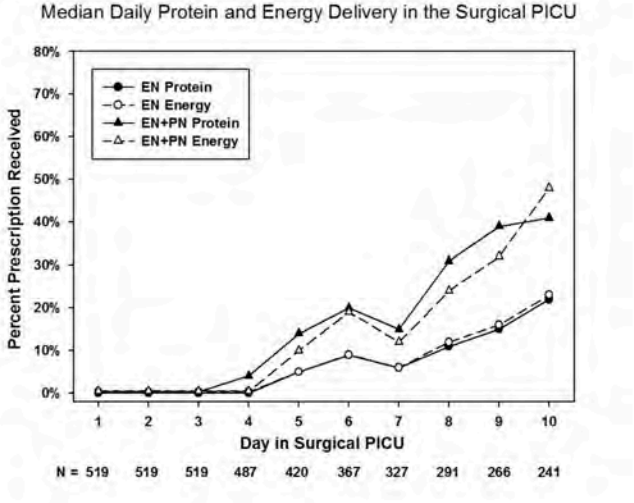
Methods:
This prospective multicenter cohort study included 57 PICUs in 15 countries, and we enrolled consecutive children (one month to 18 years) requiring mechanical ventilation for ≥48 hours. Daily enteral and parenteral nutrient intake was recorded and cumulative percent adequacy of energy and protein delivery (delivered/prescribed x 100) was calculated. Delivery of >60% goal was categorized as adequate. Data are reported as median (IQR), compared using the Mann-Whitney *U*-test, or n (%).

Results:
We enrolled 519 subjects (45% female), age 2y (0.5, 8), BMI (Z-score) of -0.26, (-1.5, 0.9), PICU length of stay of 9 (5, 18) days, and a 60-day mortality of 30 (5.8%). Table 1 and Figure 1 describe details of nutrient delivery. 341 (66%) patients received any enteral nutrition (EN); it was initiated by day 2 (2, 4) in the PICU and delivery was interrupted in 232 (68%) patients for 9 hours (5.5, 13). Two-thirds of the cohort received inadequate enteral protein intake during PICU stay, and had significantly longer time to EN initiation, [3 (2, 4) vs. 2 (1, 2) days; ($p<0.001$)] and total duration of EN interruptions [10, (6, 14.4) vs. 5, (0.8-7); $p<0.001$].

Conclusion:
Critically ill pediatric surgical patients receive inadequate nutrition, with a median delivery of <15% of prescribed macronutrients by Day 7. Delayed initiation and prolonged interruptions to enteral nutrition were associated with inadequate enteral protein delivery.

Plenary Session I (cont.)

Table 1. Nutrient Delivery in Surgical Patients in the PICU (N=519)	
Nutrition Delivery	Value
Enteral Nutrition only, n (%)	213 (41)
Parenteral Nutrition only, n (%)	68 (13)
Enteral and Parenteral Nutrition, n (%)	128 (25)
Patients who received any EN (N=341):	
Days to Enteral Nutrition initiation (days), (IQR)	2 (2,4)
Patients with Enteral Nutrition delivery interruptions, n (%)	232 (45)
Number of interruptions per patient, median (IQR)	1 (0, 3)
Total duration of interruptions, hours, median (IQR)	9 (5.5, 13)



Plenary Session I (cont.)

2

THE EFFECT OF A COMPREHENSIVE DONOR BREAST MILK PROGRAM ON THE INCIDENCE AND SEVERITY OF SURGICAL NECROTIZING ENTEROCOLITIS IN PREMATURE INFANTS

Tiffany Zens, MD[1], Andrew Rogers, MD[1], Sally Norlin, RD[2], Peter Nichol, MD, PhD[1], Daniel Ostlie, MD[1], Charles Leys, MD, MSCI[1].

[1]University of Wisconsin, Madison, WI, USA, [2]Division of Clinical Nutrition, Meriter Unity Point Hospital, Madison, WI, USA.

Purpose:
Human breast milk is the optimal feeding for neonates given its immunologic, neurodevelopmental, and digestive benefits. For high-risk premature infants without sufficient breast milk from their mother, donor breast milk is a valuable option. We hypothesize adoption of a comprehensive donor breast milk program to supplement maternal milk will decrease the incidence and severity of surgical necrotizing enterocolitis (NEC) in neonates with <2000g birth weight.

Methods:
An IRB-approved retrospective chart review was performed. Two time periods were defined: prior to institution of a comprehensive donor breast milk program (1/1/11-6/24/13) and after (6/25/13-7/31/15). Infants diagnosed with NEC were identified by ICD9 codes. SPSS software was used to conduct Chi-squared, Fisher exact test and T-test analyses of the incidence and severity of NEC in terms of Bell's Stage, operative intervention, and amount of bowel resected.

Results:
A total of 683 neonates were admitted with a birth weight <2000g. There was a statistically significant decrease in the rate of NEC from 26 of 326 neonates to 8 of 357 neonates (8% vs. 2.2%, p=0.0006). While not reaching statistical significance, the number of infants with Bell's Stage 3 requiring operative intervention decreased from 10 to 2 infants, the mean amount of bowel resected trended down from 21.6 ± 18.63 cm to 1.00 ± 1.73 cm and overall mortality from NEC decreased from 26.9% to 12.5%.

Conclusion:
Implementation of a donor breast milk program to supplement maternal milk supply significantly decreased the incidence of NEC. Although disease severity and mortality show a clinically significant decreasing trend, they do not reach statistical significant due to the small sample size. A multi-institutional study is needed to increase the power of these findings and demonstrate reproducibility and generalizability across healthcare systems.

Plenary Session I (cont.)

3

CHALLENGING SURGICAL DOGMA IN THE MANAGEMENT OF ESOPHAGEAL ATRESIA WITH TRACHEOESOPHAGEAL FISTULA: OUTCOMES FROM THE MIDWEST PEDIATRIC SURGERY CONSORTIUM

Dave R. Lal, MD, MPH[1], Samir K. Gadepalli, MD, MBA[2], Cynthia D. Downard, MD, MMSc[3], Daniel J. Ostlie, MD[4], Ruth Swedler, MS[5], Tom Chelius, MS[5], Thomas T. Sato, MD[1], on behalf of the Midwest Pediatric Surgery Consortium[1].

[1]Medical College of Wisconsin/Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]University of Michigan/C.S. Mott Children's Hospital, Ann Arbor, MI, USA, [3]University of Louisville, Louisville, KY, USA, [4]University of Wisconsin, Madison, WI, USA, [5]Medical College of Wisconsin, Milwaukee, WI, USA.

Purpose:
Perioperative management of infants with esophageal atresia and tracheoesophageal fistula (EA/TEF) is frequently based on experience rather than evidence-based guidelines. This study examines whether perceived important aspects of practice affect outcome in a contemporary multi-institutional cohort of EA/TEF patients.

Methods:
The Midwest Pediatric Surgery Consortium conducted an IRB approved multicenter, retrospective study examining outcome data on infants diagnosed with EA/TEF over a 5-year period (2009-2013), including a minimum one-year follow up.

Results:
292 patients with primary repair of proximal EA and distal TEF were examined. The overall mortality was 5% and significantly associated with the presence of congenital heart disease (OR 4.82, p=0.005). Post-operative complications occurred in 182(62%) patients with 127(43%) anastomotic strictures requiring intervention, 54 (18%) anastomotic leaks, 15 (5%) recurrent fistulas, 14 (4.7%) vocal cord paralysis/paresis and 5 (1.7%) esophageal dehiscences. Stricture rate varied greatly between institutions (range: 25%-67%). Placement of a trans-anastomotic tube was associated with an increase in stricture formation (OR 2.07, p=0.02). Acid suppression was not associated with altered rates of leak, stricture or pneumonia. Placement of interposing prosthetic material between the esophageal and tracheal suture lines was associated with an increased leak rate (OR 5.2, p=0.0001) with no difference in the incidence of recurrent fistula. Empiric postoperative antibiotics for > 24 hours was used in 193 (66%) with no difference in rates of SSI, sepsis, shock, multisystem organ failure or death when compared to antibiotic use ≤ 24 hours.

Conclusion:
Morbidity after primary repair of proximal EA and distal TEF patients is substantial. Data from this large retrospective series do not support the use of prophylactic antibiotics beyond 24 hours and empiric acid suppression may not prevent complications. Use of a trans-anastomotic tube was associated with higher rates of stricture and interposition of prosthetic material was associated with higher leak rates.

Plenary Session I (cont.)

4

HUMAN ENTERIC NEURAL STEM CELLS SURVIVE AND DIFFERENTIATE FOLLOWING TRANSPLANTATION INTO EMBRYONIC AND POSTNATAL AGANGLIONIC INTESTINE

Lily S. Cheng, MD, Nandor Nagy, PhD, Ryo Hotta, MD, Hannah K. Graham, BS, Allan M. Goldstein, MD.

Massachusetts General Hospital, Boston, MA, USA.

Purpose:
Neural stem cell therapy offers an innovative approach to treating Hirschsprung disease and other enteric neuropathies. Enteric neural stem cells can be isolated and expanded from human intestine, but the ability of these cells to survive, migrate, and differentiate *in vivo* within an aganglionic environment has not been demonstrated.

Methods:
Enteric neural stem cells were isolated from the intestines of 17 patients undergoing bowel resections, including 5 patients with Hirschsprung disease. Cells were propagated in culture as neurospheres and transplanted into embryonic day 5 chick aneural hindgut, which was then cultured on the chorioallantoic membrane of a host chick for 9 days (n=5). Neurospheres were also transplanted adjacent to the vagal neural tube of embryonic day 2 chick embryos and followed for 12-48 hours (n=3). Finally, neurospheres were transplanted to the aganglionic colon of 2 week-old Ednrb-/- mice (n=3), a model of Hirschsprung disease. Mice were sacrificed at 3, 5, and 7 days post-transplant. All transplants were processed for immunohistochemistry.

Results:
Human gut-derived enteric neural stem cells transplanted into embryonic chick hindgut migrated in the intermyenteric layer, forming a well-developed myenteric plexus containing neurons and glia. Cells transplanted adjacent to the embryonic neural tube behaved like normal neural crest cells, migrating ventrally to the foregut and forming enteric neurons. Cells transplanted into aganglionic postnatal mouse hindgut survived and differentiated into neurons and glia *in vivo*.

Conclusions:
Enteric neural stem cells can be isolated from the intestine of children ages 0-16, including the ganglionic bowel of children with Hirschsprung disease. These cells can survive, migrate, and differentiate into neurons and glia following transplantation into embryonic aneural chick hindgut, embryonic neural crest, and postnatal aganglionic mouse colon. These results support the feasibility of cell-based therapy for future treatment of neurointestinal disease.

Plenary Session I (cont.)

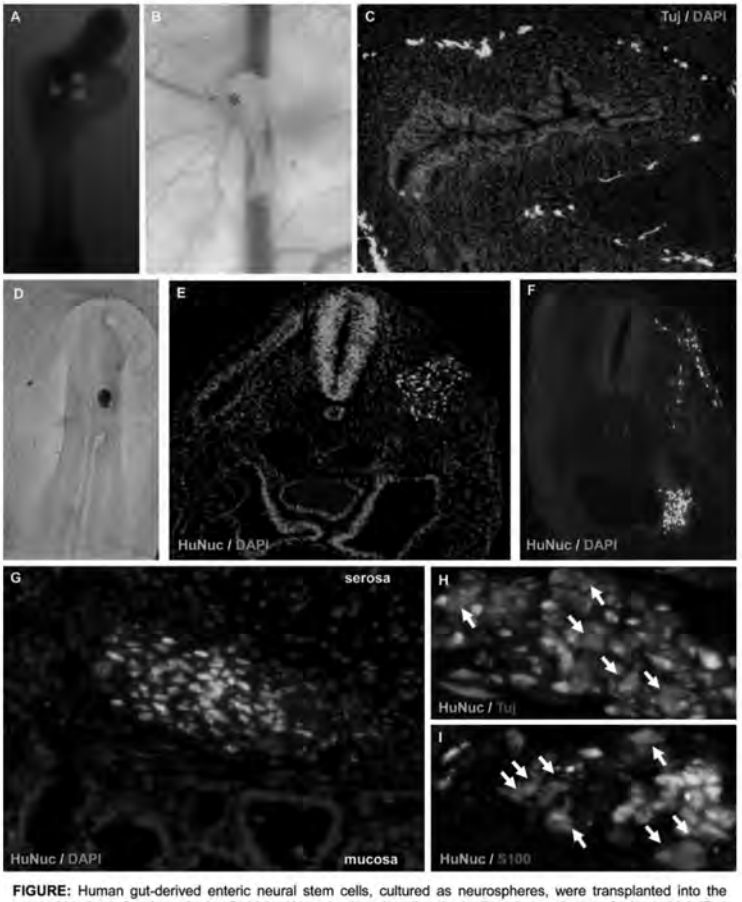


FIGURE: Human gut-derived enteric neural stem cells, cultured as neurospheres, were transplanted into the aneural hindgut of embryonic day 5 chicks (A) and cultured on the chorioallantoic membrane of a host chick (B, * marks transplant site). After 9 days, transplanted cells form a myenteric plexus and are immunoreactive for neuronal marker, Tuj (C). Neurospheres were also transplanted adjacent to the vagal neural tube of embryonic day 2 chicks (D and E). Immunostaining for anti-human nuclear antigen (HuNuc) was used to track transplanted cells. In 48 hours, transplanted cells follow the path of normal neural crest cells, migrating ventrally to the foregut (F , * marks transplant site). Finally, neurospheres were transplanted to the aganglionic colon of postnatal Ednrb-/- mice (G). After 7 days, these cells exhibit neuronal (G, arrows) and glial (H, arrows) differentiation *in vivo*.

Plenary Session I (cont.)

5

SUCCESS AND DURATION OF DYNAMIC BRACING FOR PECTUS CARINATUM: A FOUR-YEAR PROSPECTIVE STUDY

Sherif Emil, MD, CM[1], **Marika Sevigny, BS**[1], Robert Baird, MD, CM[1], Jean-Martin Laberge, MD[1], Kathleen Montpetit, MS[2], Jade Goyette, BS[2], Ian Finlay, BS[2].

[1]Montreal Children's Hospital; McGill University Health Centre & Shriners Hospital for Children Canada, Montreal, QC, Canada, [2]Shriners Hospital for Children Canada, Montreal, QC, Canada.

Background:
Bracing is increasingly used to correct pectus carinatum. Patients and parents typically want to know the likely duration and chances of successful bracing. This prospective study sought to establish factors that can prognosticate those outcomes.

Methods:
Prospective data were collected on all patients enrolled in a dynamic bracing program July 2011-July 2015. Pressure of correction (POC) was measured at initiation of treatment, and pressure of treatment (POT) was measured pre and post adjustment at every follow-up visit. When correction was achieved, the patient was switched from active (23 hours/day) to maintenance wear (overnight). Univariate and Cox regression analysis tested the following possible determinants of success and bracing duration: age, sex, symmetry, POC, and POT drop [(POTpre - POTpost) / (POTpre)] during the first two follow-up visits.

Results:
Of 119 patients who underwent bracing, 71 (60%) succeeded, 31 (26%) were still in active bracing, and 17 (14%) failed or were lost to follow-up. In patients who completed treatment, duration of active and maintenance bracing was 5.66 +/- 3.81, and 8.80 +/- 3.94 months, respectively. Asymmetry was significantly associated with failure (p=.04). Differences between short and long active bracing are shown in the table. Multivariable Cox proportional hazard analysis of time-to-maintenance (censored at the last treatment date if cases were still in active bracing) showed that asymmetry (p = 0.01) and smaller first drop in POT (p = 0.01) were associated with longer time to reach maintenance.

Conclusions:
Pressure of correction, a measure of chest wall rigidity, does not predict failure of bracing, but asymmetry and smaller first drip in pressure of treatment are associated with failure and longer bracing duration.

Plenary Session I (cont.)

Univariate Analysis of Active Bracing Duration			
VARIABLE	Active Bracing ≤ 6 months	Active Bracing > 6 months	P
Sex (% male)	91.9	96.3	.47
Age (years)	13.7 +/- 1.8	14.4 +/- 1.3	.08
Symmetry (%)	45.9	34.6	.37
POC (psi)	5.1 +/- 1.5	5.5 +/- 1.7	.30
1st POT drop (%)	84 +/- 28	72 +/- 30	.05
2nd POT drop (%)	69 +/- 53	65 +/- 40	.26

Plenary Session I (cont.)

6

FETAL OVINE REPAIR OF MYELOMENINGOCELE WITH PLACENTAL MESENCHYMAL STROMAL CELLS PRESERVES HIND LIMB MOTOR FUNCTION: ARE THESE IMPROVEMENTS IN MOTOR FUNCTION DURABLE?

Benjamin A. Keller, MD, James C. Becker, MD, Erin G. Brown, MD, Lee Lankford, MA, Christopher D. Pivetti, MS, Taryn M. Selby, MA, Zoe M. Saenz, BS, Aijun Wang, PhD, Diana L. Farmer, MD.

University of California, Davis, Sacramento, CA, USA.

Tweet about it! PMSCs may rescue motor function in the fetal ovine model. Are the improvements durable & what does this mean for human MMC repair? @bakeller

Purpose:
The *in utero* application of placental mesenchymal stromal cells (PMSCs) during MMC repair has been shown to rescue motor function in a fetal sheep model. The durability of this repair is unknown. The purpose of this study is to evaluate the long-term motor function durability in fetal lambs that undergo PMSC-augmented MMC repair.

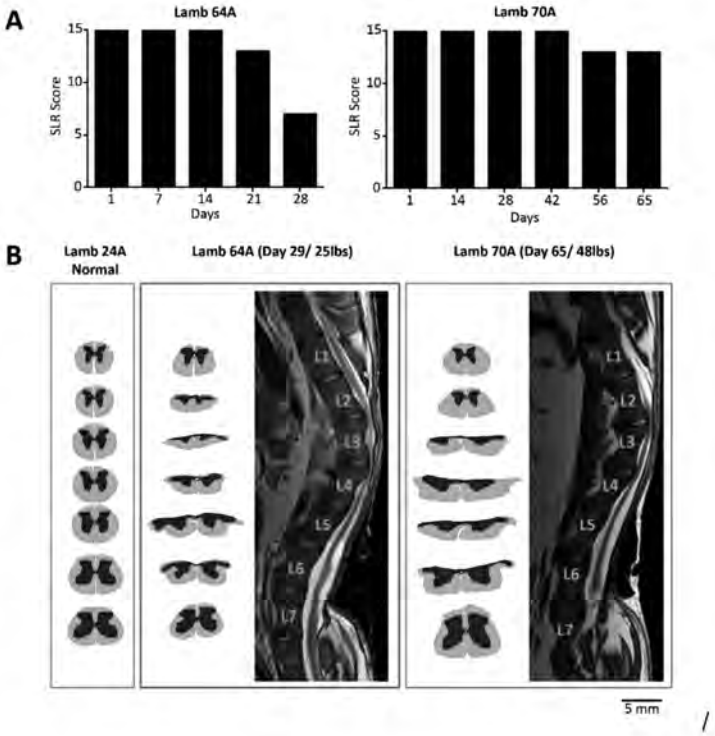
Methods:
Fetal lambs (n=14) underwent surgical MMC creation followed by repair. Eight lambs underwent repair with PMSCs, an extracellular matrix patch, and skin closure. Six control lambs underwent repair with an extracellular matrix patch and skin closure. Lambs were born at term and motor function was assessed using the sheep locomotor rating (SLR) scale. At 48 hours of life, all but two PMSC treated lambs were sacrificed for histology. These two lambs were survived for long-term locomotor assessments. After developing motor deficits, lambs were euthanized and underwent postmortem MRI.

Results:
PMSC treated lambs had preserved motor function and significantly higher SLR scores compared to control lambs (p=0.0033) at birth. The two long-term PMSC treated lambs had normal locomotor function (SLR=15) at birth but developed delayed deficits. One lamb had a decline in its SLR score to seven by one month of age and the other lamb declined to an SLR of thirteen by two months (Figure 1a). MRI analysis of both spinal cords demonstrated severe kyphosis and cord compression at L2-L4 (Figure 1b).

Conclusions:
While *in utero* PMSC-augmented repair rescues locomotor function in the fetal lamb model of MMC, the improvement appears to degrade over time. Based on MRI evaluation, this decline seems to be associated with acquired musculoskeletal deformities that develop in the lumbar spine. This unexpected finding has potentially profound implications for the long-term care of patients who undergo MMC repair and suggests a potential need for more substantive postnatal protection of the now preserved neonatal spinal cord.

Plenary Session I (cont.)

Figure 1



Plenary Session I (cont.)

7

GENOME-WIDE ASSOCIATION STUDY IDENTIFIES SUSCEPTIBILITY LOCI FOR ACUTE APPENDICITIS

Ekaterina Orlova, MS, MPH, Andrew Yeh, MD, Brian Firek, MS, M. Michael Barmada, PhD, Robert E. Ferrell, PhD, David N. Finegold, MD, Candace M. Kammerer, PhD, John R. Shaffer, PhD, David C. Whitcomb, MD, PhD, Sarangarajan Ranganathan, MD, David A. Hinds, PhD, Michael J. Morowitz, MD.

University of Pittsburgh, Pittsburgh, PA, USA.

Tweet about it! GWAS of Acute Appendicitis with @23andMe Identifies Susceptibility Locus @morowitzmj – Abstract 7 #eAPSA2016

Among children, appendicitis is the fifth most common indication for hospitalization and appendectomy is the second most common inpatient surgical procedure. Although several possible etiologies of appendicitis have been hypothesized, a definitive mechanism has not yet been established. A critical review of the literature does not support the commonly-held belief that fecaliths or lymphoid hyperplasia play a primary role in appendicitis etiology. It has been demonstrated that heritability contributes to an individual's risk of developing appendicitis, but the genetics of the disease have not been well studied. Therefore, we collaborated with [blinded-to-reviewers], a personal genetics company, to identify genetic determinants of susceptibility to acute appendicitis. We performed a genome-wide association study (GWAS) of 18,773 self-reported appendectomy cases and 114,907 controls, and identified 1 locus with genome-wide significance (p-value 8.8 X 10-14), and 8 loci approaching significance (p-value <5 X 10-5). We have annotated these loci and their surrounding regions by reviewing the scientific literature and with bioinformatic analysis using RegulomeDB. These analyses identified 75 candidate genes with a role in appendicitis etiology. Of particular interest, the gene PITX2 is located adjacent to the genome-wide significant locus (rs2129979), and this locus is associated with a protective effect from appendicitis. PITX2 is highly expressed in the appendix, plays a role in mediation of inflammation and morphology of the intestines, and has previously been associated with atrial fibrillation. We designed a customized gene expression assay (Nanostring Technologies) and demonstrated that 21 of the 75 candidate genes including PITX2 were differentially expressed in appendiceal tissue from children with and without appendicitis. Ongoing work includes a validation GWAS study in a novel multi-center cohort of children with appendicitis. These studies may elucidate the pathogenesis of acute appendicitis, and thereby provide opportunities to improve the diagnosis, treatment, and prevention of this very common disease.

Plenary Session I (cont.)

8

CHROMOSOMAL VARIANTS OF UNKNOWN SIGNIFICANCE(VUS): A NOT SO INSIGNIFICANT FINDING IN NEONATES WITH CONGENITAL DIAPHRAGMATIC HERNIA

Stephanie M. Cruz, MD, Adesola C. Akinkuotu, MD, Darrell L. Cass, MD, Timothy C. Lee, MD, Rodrigo R. Ruano, MD, PhD, Stephen E. Welty, MD, Ignatia B. Van den Veyver, MD, Oluyinka O. Olutoye, MD, PhD.

Baylor College of Medicine/ Texas Children's Hospital, Houston, TX, USA.

Purpose:
The aim of this study was to evaluate the clinical outcomes of congenital diaphragmatic hernia (CDH) patients with genetic anomalies associated with known syndrome in comparison to those with chromosomal variants of unknown significance (VUS).

Methods:
A retrospective review was performed on all patients evaluated for CDH at a Fetal Center from Jan 2004-Jan 2015. We compared CDH patients with genetic anomalies associated with known syndromes to those with VUS. Anomalies were identified based on chromosomal microarray analysis(CMA), Fluorescent *in-situ* hybridization(FISH), karyotype, whole exome sequencing (WES) and serum based non-invasive prenatal testing(NIPT).

Results:
Of 214 CDH patients, genetic testing was conducted prenatally in 62 patients (29%), and postnatally in 109 (51%). Fifty-eight (27%) were confirmed to have either a genetic syndrome (n=21) or VUS (n=37). Genetic testing failed to detect an anomaly in 20 (34%) of 58 cases. Twenty-seven patients (13%) had both prenatal and postnatal genetic testing. A genetic anomaly was found postnatally when prenatal testing was normal in 16 of the 27 cases (60%). Patients with a VUS had higher mortality and pulmonary morbidity compared to those with a known genetic syndrome (Table1).

Conclusion:
CDH patients diagnosed with a VUS have a poorer prognosis and outcome in comparison to those patients diagnosed with a known genetic syndrome. This information suggests that CMA identifies some chromosomal aberrations that may play a larger role in the long-term outcomes of CDH than is expected. This will improve prenatal counseling and management of these patients. Our data also support that this will result in better selection of those who would benefit most from fetal interventions.

Plenary Session I (cont.)

Outcomes of CDH patients with genetic anomaly associated with a known syndrome vs. those with VUS				
Variable	**Isolated CDH (n=112)**	**Genetic Anomaly Associated with Known Syndrome (n=21)**	**Genetic VUS (n=37)**	**P-value**
O/E TFLV, %mean +/- SD	36.1 +/- 14.7	49.0+/-20.7	27.8 +/- 11.1	0.001
Lung-to-head ratio (LHR)	1.65 +/- 0.69	2.0 +/- 0.97	1.44 +/- 0.62	0.08
Length of intubation, days	24.1 +/- 44.4	12.3 +/- 7.8	27.1 +/- 26.5	0.48
Need for ECMO	29%	14%	43%	0.07
6 month Mortality Rate	16%	14%	36%	0.02
Supplemental Oxygen at 1 year, %	11%	17%	33%	0.05

Plenary Session I (cont.)

9

TAKING A STEP BACK: ASSESSING THE OUTCOMES OF MULTIPLE STEP PROCEDURES

Meredith Barrett, MD[1], Farokh R. Demehri, MD[1], Graham C. Ives, BS[1], Kristen Schaedig, BS[2], Adina B. Robinson, BS[2], Meghan A. Arnold, MD[1], Pamela I. Brown, MD[1], Daniel H. Teitelbaum, MD[1].

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

Tweet about it! Taking a step back – assessing the outcomes of multiple STEP procedures @sparklyscalpel – Abstract 9 #eAPSA2016

Purpose:
Short Bowel Syndrome (SBS) is a highly morbid condition. Bowel lengthening via serial transverse enteroplasty (STEP) has become standard of care. While initial STEPs have resulted in weaning from parenteral nutrition (PN), outcomes of repeated STEPs are not well described. This study evaluated STEP procedures at our institution; the primary outcome measure was weaning from PN postoperatively. We also investigated outcomes comparing initial (STEP1) to subsequent procedures (ReSTEP).

Methods:
Retrospective, single institution review of STEPs from 2003-2014 included 17 children totaling 24 procedures (17 STEP1; 7 ReSTEPs). Demographics, complications, readmission, postoperative costs (inflation-adjusted to 2015 dollars) and PN weaning were analyzed using Wilcoxon-Rank Sum, chi-square and Student's t-test.

Results:
17 children with a mean age at STEP1 of 29.0 months (range=0-170.8) were followed for a mean of 35.9 months (range=4.4-119.7). Primary diagnosis, sex, birthweight, and age were not predictive of requiring ReSTEP. Mean cost of STEP1 hospital admissions was $69,417{±$55,634(SD)}; costs after reimbursement resulted in overall hospital losses {Mean= -$23,481±38,360(SD)}. ReSTEP admissions were more expensive {Mean=$87,859±$159,092(SD)} yet with smaller hospital losses {Mean= -$2,073±$30,638(SD)}. Thirty-day readmission was higher after ReSTEP (STEP1=45%, ReSTEP= 71%; p=0.37). PN weaning was more likely one year following STEP1 vs ReSTEP (STEP1=18%, ReSTEP=0%; p=0.46); no children after ReSTEPs weaned during follow-up (STEP1=37%, ReSTEP=0%, p=0.19). Enteral nutrition (EN) increases were nearly identical after STEP1 when comparing children with one lifetime STEP with those requiring ReSTEP (Fig1a), but analysis of STEP1 vs. second (STEP2) (Fig1b), EN increases following the second procedure (STEP2) were significantly less (p=0.03) suggesting decreased therapeutic benefit of ReSTEPs.

Conclusions:
ReSTEPs failed to result in significant additional PN weaning. Given higher costs, readmissions, and reduced EN gains, surgeons should carefully consider performing ReSTEPs. Further study of multiple STEPs is warranted to assess benefit in this population.

Plenary Session I (cont.)

10

LOW D-DIMER PREDICTS THE ABSENCE OF INTRACRANIAL HEMORRHAGE IN PEDIATRIC BLUNT HEAD TRAUMA

Simone Langness, MD[1], Jonathan Halbach, DO[2], Erin Ward, MD[1], Julie Robles, BS[1], Katherine Davenport, MD[3], Stephen Bickler, MD[3], Karen Kling, MD[3], Julia Grabowski, MD[4], Timothy Fairbanks, MD[3].

[1]UC San Diego, San Diego, CA, USA, [2]Naval Medical Center, San Diego, CA, USA, [3]Rady Children's Hospital, San Diego, CA, USA, [4]Lurie Children's Hospital, Chicago, IL, USA.

Purpose:
Pediatric blunt head trauma (BHT) accounts for nearly 600,000 emergency room visits annually and rapid evaluation for intracranial hemorrhage (ICH) is essential. Head computer tomography (CTH) remains the gold standard for ICH workup yet judicious use must be exercised to avoid excessive radiation exposure. Current screening algorithms rely on subjective data and an objective element may prove an important addition. We aimed to determine if quantitative D-dimer could aid in the detection of ICH following BHT and thus limit unnecessary CTHs.

Methods:
We performed a retrospective review of all patients presenting within 6 hours of BHT to our Level I pediatric trauma center from 2011-2013. Patient who underwent evaluation with both CTH and plasma D-dimer level were included. Clinically relevant ICH (cICH) was defined as ICH requiring neurosurgical intervention, prolonged intubation/ hospitalization or causing death.

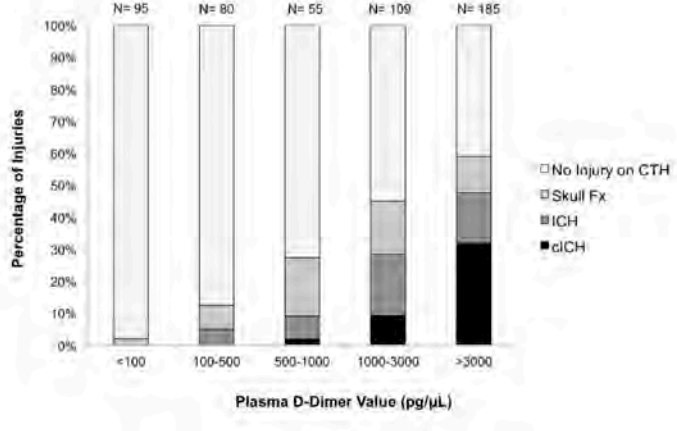
Results:
Of the 526 patients evaluated, ICH was identified in 24% with cICH comprising half. D-dimer correlated with injury severity. Average D-dimer value was significantly higher in the cICH group (4077 pg/μL) compared to ICH, skull fracture or non-injury groups (3557, 2458 and 1489 pg/μL respectively, $p<0.0001$). At low D-dimer values, the likelihood of ICH and cICH were greatly diminished (Figure 1) and no patient with cICH had a D-dimer <750 pg/μL. Table 1 illustrates the negative predictive value (NPV) and CTHs avoided if D-dimer were incorporated into a screening algorithm.

Conclusion:
In this study, a low plasma D-dimer value accurately predicted the absence of intracranial hemorrhage for pediatric patient with blunt head trauma. Incorporating D-dimer into current diagnostic algorithms may significantly limit the number of unnecessary head CTs performed in this population.

Plenary Session I (cont.)

Negative Predictive Value of D-Dimer for Evaluation of IHC						
ALL Glasgow Coma Scale Scores	**ICH (N)**	**ICH NPV**	**cICH (N)**	**cICH NPV**	**Avoided CTH (N)**	**Percentage of BHT Patients**
D-Dimer <100	0	100%	0	100%	97	18.4%
Dimer <500	4	97.8%	0	100%	177	33.7%
Dimer <750	6	97.2%	0	100%	209	39.7%
Dimer <1000	8	96.2%	1	99.6%	232	44.1%
Glasgow Coma Scale Score 14-15	ICH (N)	ICH NPV	cICH (N)	cICH NPV	Avoided CTH (N)	Percentage of BHT Patients
D-Dimer <100	0	100%	0	100%	82	17.8%
Dimer <500	4	97.8%	0	100%	158	34.2%
Dimer <750	6	97.2%	0	100%	189	40.9%
Dimer <1000	8	96.2%	0	100%	211	45.7%

Figure 1



Scientific Session II

Scientific Session I

Clinical Surgery I – CDH, Anorectal, IBD, General
Monday, May 16, 10:45 a.m. – 12:15 p.m.

11

IMPACT OF OBJECTIVE ECHOCARDIOGRAPHIC CRITERIA FOR TIMING OF CONGENITAL DIAPHRAGMATIC HERNIA (CDH) REPAIR

Scott Deeney, MD, Lisa Howley, MD, Kenneth W. Liechty, MD, Ahmed I. Marwan, MD, Jason Gien, MD, John Kinsella, MD, Timothy M. Crombleholme, MD.

University of Colorado School of Medicine, Aurora, CO, USA.

Purpose:
CDH repair can precipitate acute pulmonary hypertensive crisis. No objective criteria exist to guide timing of repair. We asked whether delaying CDH repair until echocardiogram-estimated pulmonary artery pressure (PAP) is less than 80% systemic blood pressure (SBP) could prevent postoperative decompensation and improve outcomes.

Methods:
Data from patients who had undergone CDH repair from 2008 through 2014 were retrospectively collected. In 2012, a protocol was implemented recommending CDH repair to occur after echocardiographic criteria of an estimated PAP/SBP ≤ 80% was met. Echocardiograms performed just prior to surgery were independently reviewed by a blinded cardiologist. Patients were divided into three groups: Group 1 (repaired prior to protocol implementation, n=25), Group 2 (repaired after protocol implementation and meeting criteria, n=19); and Group 3 (repaired after protocol implementation but not meeting criteria due to elevated (n=11) or indeterminate (n=5) PAP, n=16). The primary outcome was acute postoperative decompensation within the first 24 hours, defined as initiation of or increase in pulmonary vasodilators, paralytics, pressor or ventilator requirements, or placement on ECMO. The secondary outcomes were duration of ventilator support, support time on ECMO, length of stay, survival to discharge and survival to 30 days postoperatively. ANOVA, student's t-test and Fisher's exact test were used, with significant p values < 0.05.

Results:
The preoperative mean echocardiogram-estimated PAP/SBP between groups was statistically significant (p=0.0001): Group 1 (87±5%), Group 2 (58.8±3.6%), and Group 3 (106.8±3.9%). There was a significant reduction in acute decompensation in group 2 compared to Group 1 (10.5% vs 48%, p=0.02). Group 3 (18.75%) did not differ significantly from either group. There was no difference between the groups in baseline characteristics or secondary outcomes.

Conclusions:
Using echocardiographic-estimated pulmonary artery pressure as criteria for timing of CDH repair may reduce acute postoperative decompensation. Randomised prospective studies are needed.

Scientific Session I (cont.)

12

SHORT-TERM NEURODEVELOPMENTAL OUTCOME IN CONGENITAL DIAPHRAGMATIC HERNIA (CDH): THE IMPACT OF EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) AND TIMING OF CDH REPAIR

Enrico Danzer, MD, Casey Hoffman, PhD, Jo Ann D'Agostino, DNP, CRNP, James T. Connelly, BS, RRT-NPS, Marsha Gerdes, PhD, Judy Bernbaum, MD, Natalie E. Rintoul, MD, Lisa M. Herkert, CRNP, William H. Peranteau, MD, Alan W. Flake, MD, N. Scott Adzick, MD, Holly L. Hedrick, MD.

CHOP, Philadelphia, PA, USA.

Purpose:
The purpose of this study was to assess the need and timing of ECMO in relation to CDH repair as modifiers of short-term neurodevelopmental (ND) outcomes.

Methods:
We retrospectively reviewed the charts of all CDH survivors in our Pulmonary Hypoplasia Program from 2006 to 2015 who completed ND assessment using the Bayley Scales of Infant Development, 3rd Edition. Scores were grouped as average, mildly delayed, and severely delayed by standard deviation intervals. ECMO patients were stratified according to timing of CDH surgery: repair pre-ECMO, during ECMO, and post-ECMO.

Results:
A total of 183 CDH children completed ND assessment period. Mean follow-up age was 13±8 months. Thirty-seven (20%) patients required ECMO support. Of these 4 (11%) were repaired pre-ECMO, 16 (43%) were repaired during ECMO, and 17 (46%) were repaired post-ECMO. Compared to non-ECMO patients, ECMO-CDH children were more likely to have neurocognitive (P=0.0002) and neuromotor delays (P=0.0001). Language was similar between groups (P=0.74). Cognitive scores were mildly delayed for CDH children repaired on ECMO (79±12, P=0.02), compared to average for those repaired pre-ECMO (91±24) or post-ECMO (86±8). Similarly, repair on ECMO patients had mildly delayed language (84±17, P=0.06), while children repaired pre-ECMO or post-ECMO had average scores (94±27 and 90±11, respectively). Motor scores were consistently below average, irrespective of ECMO group. Compared to non-ECMO children, CDH patients repaired during ECMO were least likely to have average scores across all developmental domains (51% vs. 13%, P=0.001). Overall time on ECMO did not impact ND outcome.

Conclusions:
Need for ECMO in CDH survivors is associated with worse neurocognitive and neuromotor outcome. Need for CDH repair on ECMO is associated with ND deficits in all domains.

Scientific Session I (cont.)

13

WHAT IS THE IMPACT OF CEPHALAD VENOUS DRAINAGE ON COMPLICATIONS IN NEONATAL VENOVENOUS ECMO? IS ADDITIONAL DRAINAGE IN VENOVENOUS EXTRACORPOREAL MEMBRANE OXYGENATION ASSOCIATED WITH LESS COMPLICATIONS?

Gezzer Ortega, MD, MPH[1], Amit K. Vij, BS[2], Jose H. Salazar, MD[3], Gean Gilot, BS, MS[2], Peter Rycus, MPH[4], Ronald B. Hirschl, MD[5], Alana L. Beres, MDCM[6], Faisal G. Qureshi, MD[6].

[1]Outcomes Research Center, Department of Surgery, Howard University College of Medicine, Washington, DC, USA, [2]Howard University College of Medicine, Washington, DC, USA, [3]Department of Surgery, University of Maryland Medical Center, Baltimore, MD, USA, [4]Extracorporeal Life Support Organization, Ann Arbor, MI, USA, [5]Section of Pediatric Surgery, Department of Surgery, University of, Ann Arbor, MI, USA, [6]Department of Surgery, Division of Pediatric Surgery, University of Texas Southwestern, Dallas, TX, USA.

Purpose:
Extracorporeal Membrane Oxygenation (ECMO) can be a lifesaving mechanism in newborns with potentially reversible pulmonary failure. Two main ECMO modalities exist, venoarterial and venovenous (VV). VV ECMO can be initiated with a double lumen catheter in the internal jugular vein draining from and infusing into the heart (VVDL). It is sometimes supplemented with a catheter directed cephalad into the internal jugular vein providing additional drainage (VVDL+V) with the possibility of higher flows and reduced neurologic complications. The objective of this study was to evaluate and compare outcomes of VVDL+V versus VVDL use in neonates.

Methods:
The Extracorporeal Life Support Organization (ELSO) registry was used to identify neonates undergoing non-cardiac venovenous ECMO from 1990-2013. Demographic data, ECMO mode, and ECMO variables were collected. Outcomes included survival and ELSO categorized complications. Multivariate analysis adjusting for patient characteristics were conducted for the outcomes of interest.

Results:
Of 1,086 neonates, 54.4% underwent VVDL and 45.6% VVDL+V. The most common conditions requiring ECMO were meconium aspiration and pulmonary hypertension (53.3%), followed by diaphragmatic hernia (23.5%), and sepsis (9.3%). Neonates undergoing VVDL and VVDL+V weighed 3.45kg and 3.36 kg ($p=0.024$), had mean pH levels 7.39 and 7.29 ($p<0.01$), mean time on ECMO was 132.3hr and 154.3hr ($p=0.001$), and an in-hospital mortality of 16.2% and 20% ($p=0.11$). On adjusted analysis there was a decreased likelihood of mechanical (OR: 0.63 95%CI: 0.44-0.89) and metabolic (OR: 0.51 95% CI: 0.27-0.98) complications with VVDL+V. There was an increased likelihood of cardiovascular (OR: 2.84 95% CI: 1.98- 4.07) complications on VVDL+V.

Conclusions:
The results of this study suggest that VVDL+V had less mechanical and metabolic but more cardiovascular complications when compared to VVDL, but there was no difference in neurologic outcomes or mortality. Further investigation into the benefit of VVDL+V is needed before recommending its use.

Scientific Session I (cont.)

14

CONTEMPORARY SHORT- AND LONG-TERM OUTCOMES IN PATIENTS WITH UNREMITTING CONSTIPATION AND FECAL INCONTINENCE TREATED WITH A MALONE ANETGRADE CONTINENCE ENEMA (MACE) PROCEDURE

Scott C. Dolejs, MD[1], John K. Smith, BA[1], Justin Sheplock, BSE[1], Joseph M. Croffie, MD[2], Frederick J. Rescorla, MD[2].

[1]Indiana University Health, Indianapolis, IN, USA, [2]Riley Hospital for Children, Indianapolis, IN, USA.

Purpose:
The primary aim of this study is to determine the natural history of patients who undergo a MACE procedure including complications, functional results, and long-term outcomes.

Methods:
Patients aged 3-18 years who underwent a MACE procedure from 2008-2015 for unremitting constipation and fecal incontinence with at least thirty day follow-up were included. Patients were evaluated preoperatively with anorectal and colonic manometry. Patients with myelomeningocele or anorectal malformations were excluded. Normal bowel function after a MACE procedure was defined as no accidents, predictable bowel habits, and no pain with flush. Statistics below represent means with standard errors.

Results:
A total of 97 patients were included in the analysis with an average age of 9.6+/-0.34 years and follow-up of 28.9+/-2.3 months. Anorectal and colonic manometry studies were normal (63%), anismus(15%), colonic neuropathy(14%), anal achalasia(1%), and other diagnoses(7%). Overall morbidity was 56.7% mostly related to minor complications such as surgical site infection(15.5%), leaking stomas(17.5%), fecal impaction(17.5%), and painful flushes(17.5%). Avoiding appendicotomy until the appendix is delivered through the skin of the stoma site decreased the rate of infection from 30.6% (n=36) to 6.6% (n=61) P=0.0016. Serious complications included bowel obstruction(2%), perforation(1.0%), stenosis(6.2%), and prolapse(5.2%), which resulted in 13.4% of patients requiring an additional operation. The MACE procedure is rapidly effective with 99.0% of patients experiencing improvement at 1 month. At the end of the follow-up, 81.4% of patients had normal bowel function and 93.8% of patients noted improvement. Amongst patients with at least 24 months of follow-up(n=53), 41.5% of patients successfully stopped using their MACE at an average of 38.6+/-3.5 months.

Conclusion:
We conclude that the MACE procedure is very successful in the treatment of unremitting constipation with fecal incontinence in appropriately selected patients but is associated with a high rate of morbidity.

Scientific Session I (cont.)

15

EFFECTIVENESS OF SENNA VS POLYETHYLENE GLYCOL AS LAXATIVE THERAPY IN CHILDREN WITH CONSTIPATION AFTER ANORECTAL MALFORMATION CORRECTION

Karla A. Santos-Jasso, MD, MSc[1], José L. Arredondo, MD, MSc, PhD[1], Jorge E. Maza, MD, MSc[1], Pablo Lezama, MD, MSc[2].

[1]National Institute of Pediatrics, México Distrito Federal, Mexico, [2]Hospital Infantil de México, México Distrito Federal, Mexico.

Purpose:
To study the effectiveness of Senna vs polyethylene glycol for the treatment of constipation in children with anorectal malformation.

Methods:
A crossed controlled clinical trial study, including a wash period, was conducted, including children with anorectal malformations, who posses fecal control but have constipation. The sample size was calculated for proportions (n=28) according to available data for Senna. Effectiveness of laxative therapy was measured with a construct that included three variables: 1) daily bowel movement, 2) fecal soiling, 3) abdominal X-ray without residual stool in rectum and left colon. Data analysis included descriptive statistics and a Fisher's exact test for the outcome variable (effectiveness).

Results:
The study had an anticipated termination due to ethical considerations, since the interim analysis showed a clear benefit towards Senna (p 0.026). The sample showed a normal behavior regarding age and the presence of megarectum. The maximum daily dose of Senna was 842 (38.7) mg, and of 17g for polyethylene glycol. No adverse effects were identified for either medications.

Conclusion:
Children with repaired anorectal malformations have a borderline continence due to defective extramural innervation of the rectum, a decreased anorectal resistance depending on the density of muscle complex and external sphincter, and a decreased sensitivity to discriminate solid from liquid and gas. Constipation is present in 80% of children with anorectal malformations after adequate repair, usually associated to rectal dilation and hypomotility (deficiency of Cajal cells). Senna is a stimulant laxative that produces contractions improving colonic motility not affecting the stool consistency. In consequence, stimulant laxatives should be the first choice when treating patients with anorectal malformation and constipation.

Scientific Session I (cont.)

16

PEDIATRIC CROHN'S DISEASE SURGICAL EXPERIENCE OVER 15 YEARS IN A SINGLE INSTITUTION

Jose L. Diaz-Miron, MD, **Raphael C. Sun, MD**, Charles M. Samson, MD, Jacqueline M. Saito, MD, Robet J. Rothbaum, MD, Patrick A. Dillon, MD.
Washington University in St. Louis, St. Louis, MO, USA.

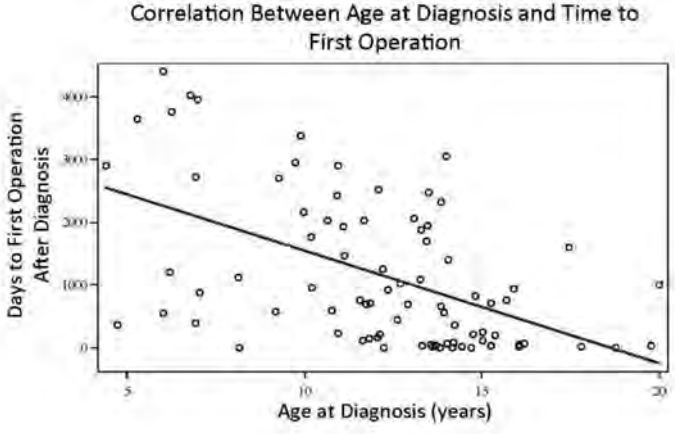
Purpose:
The inflammatory changes seen in the gastrointestinal tract caused by Crohn's Disease (CD) leads to extensive medical and surgical therapeutic interventions, with as many as two thirds of patients having surgery over their lifetime. Surgical intervention is often deferred until all medical therapies have failed. The objective of this study is to identify risk factors in patients with CD who are likely to fail medical management, and therefore require earlier surgical consideration.

Methods:
230 institutionally treated CD patients over a 15-year period were identified. Patient demographics, diagnosis methodology (radiographic, endoscopic, or both), select laboratory measures (hemoglobin, albumin, erythrocyte sedimentation rate, c-reactive protein [Crp]), and medical/surgical therapies were identified. Those that ultimately required operative interventions (n=83) underwent further multivariate analysis with Kaplan Meier survival curves and Wilcoxon tests. Perianal operations were excluded (n=13). P-values <0.05 were considered statistically significant.

Results:
Among continuous variables, older age ($p=0.0097$) and elevated Crp at time of diagnosis ($p=0.0096$) were significant with proportional hazard regression and indicative of earlier need for surgical intervention. However, Crp at the time of diagnosis was not included in the stepwise proportional hazard regression model due to small sample size, n=54 (Figure 1). Of those that underwent an operation, early intervention (<60 days from diagnosis) occurred in 25% (n=13) of the surgical cohort, all initially diagnosed with ileal disease ($p=0.0195$).

Conclusions:
Retrospective analysis at our institution supports consideration for early surgical treatments in patients diagnosed at older ages, those with initial diagnosis of ileal disease, and with higher measured levels of Crp. Further identification of additional clinical characteristics that would assist in determining optimal surgical intervention - immediate or delayed - would be beneficial to the caregivers involved with pediatric CD.

Scientific Session I (cont.)



Scientific Session I (cont.)

17

TRANS-ABDOMINAL REDO ILEAL POUCH SURGERY FOR PEDIATRIC PATIENTS

Olga A. Lavryk, MD, Erman Aytac, MD, Anthony L. DeRoss, MD, Jean H. Asnburn, MD, Feza H. Remzi, MD.

Cleveland Clinic, Cleveland, OH, USA.

Purpose:
The aim of the study was to present patient characteristics, operative and postoperative outcomes in pediatric population undergoing trans-abdominal salvage surgery for ileal pouch anal anastomosis (IPAA) failure.

Methods:
Since 1983, patient characteristics, short and long-term outcomes of trans-abdominal redo IPAA among the pediatric population (<21 years old) were evaluated. IPAA failure was defined as permanent diverting ileostomy or need to remove/repair the index pouch.

Results:
There were 68 (43 females, 63.2%) pediatric patients with a median age of 19 years, with diagnosis of inflammatory bowel disease (ulcerative colitis/Crohn's disease 72% /14.7%) and familial adenomatous polyposis (FAP) 13.2% . Median follow up was 15 months. Indications for redo surgery were chronic anastomotic leak (41.2%), pouch obstruction (29%), pouch dysfunction (17.6 %) chronic pelvic sepsis (10.3%) and chronic pouchitis (1.5%). Diversion was a first step before redo surgery in 80% of cases. A long rectal cuff and a twisted index pouch were identified in 19.1% and 4.4% of cases, respectively. Short and long-term outcomes are represented in table. 10 (17%) patients failed redo pouch surgery. Failure was associated with septic complications (n=6): pelvic sepsis (n=4), anastomotic leak/fistula (n= 1/1), pouchitis (n=2), pouch dysfunction (n=1) and anastomotic stricture (n=1). 2 patients with redo IPAA failure had subsequently undergone a second trans-abdominal salvage IPAA surgery.

Conclusions:
Trans-abdominal salvage is safe and feasible in pediatric patients with failed IPAA. Multidisciplinary approach, operative experience, careful patient selection and patient motivation are the key components of success in redo IPAA surgery.

Scientific Session I (cont.)

Perioperative characteristics		Short -term complications		Long-term complications	
BMI, kg/m^2	23	Pelvic sepsis	14 (20.6%)	Chronic pelvic sepsis	6 (9%)
Index pouch configuration (J, %)	85.2%	Perianal abscess	2 (3%)	Perianal abscess	2 (3%)
Referral (GI/Self/Surgeon)	37.3%, 17%,42.6%	Perineal fistula	1 (1.5%)	Perineal fistula	4 (6%)
Neo pouch configuration, (J, %)	80%	Postoperative ileus	8 (12%)	Pouch prolapse	1(1.5%)
EBL, ml	350	Pouchitis	4 (6%)	Fecal incontinence	2 (3%)
Operative time, min	300			Anal stricture	5 (7.3%)
LOS, days	7				

Scientific Session I (cont.)

18

INFLUENCE OF WEIGHT AT ENTEROSTOMY REVERSAL ON OUTCOMES IN INFANTS AFTER EMERGENT NEONATAL STOMA CREATION

Lindsay J. Talbot, MD[1], Robert D. Sinyard, BS[2], Kristy L. Rialon, MD[2], Brian R. Englum, MD[2], Elisabeth T. Tracy, MD[3], Henry E. Rice, MD[3], Obinna O. Adibe, MD, MHS[3].

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]Department of Surgery, Duke University, Durham, NC, USA, [3]Division of Pediatric Surgery, Duke University, Durham, NC, USA.

Purpose:
Neonates after emergent enterostomy creation frequently require reversal at low weight due to complications including TPN-related cholestasis, dumping, failure to thrive, and failure to achieve enteral independence. We investigated whether stoma reversal at low weight (< 2.5 kg) is associated with poor perioperative outcomes.

Methods:
We performed a single institution retrospective review of patients less than 6 months old who underwent enterostomy reversal from 2005 - 2013. Patients were identified in our institutional database by relevant CPT codes. Only patients who underwent emergent enterostomy creation (i.e. for NEC or spontaneous perforation) were included. Demographics, disease process, comorbidities, stoma type, reversal indication, operative details, and complications (including anastomotic leak, obstruction, hernia, prolapse, EC fistula, perforation, wound infection, sepsis, and death) were examined. Patients were categorized by weight at reversal of less than 2 kg, 2.01 - 2.5 kg, 2.51 - 3.5 kg, and more than 3.5 kg. Data were analyzed using univariable and multivariable regression with significance level of $p < 0.05$.

Results:
Eighty-nine patients met inclusion criteria (Table 1). Demographics (sex, ethnicity, surgical disease process, reversal indication, and ASA score) were similar. The lowest weight group had lower gestational age ($p < 0.001$) and birth weight ($p = 0.005$), and contained a higher proportion of jejunostomies to ileostomies ($p = 0.013$). On multivariable analysis controlling for gestational age and ASA, there was no significant difference in odds of major operative morbidity between groups.

Conclusions:
We conclude that enterostomy reversal at lower weight may not be associated with increased risk of perioperative complications. Early stoma reversal may be an acceptable option when required for progression of neonatal care.

Scientific Session I (cont.)

Table 1: Birth and Operative Weight, Stoma Type, and Outcomes of Infants Requiring Stoma Reversal

Variable	Overall	< 2 kg	2.01 - 2.5 kg	2.51 - 3.5 kg	> 3.5 kg	P
N	89	11 (12.4%)	24 (27%)	28 (31.5%)	26 (29.2%)	
Gestational age (wks)	26 (24, 31)	24 (24, 25)	25 (24, 26)	28 (25, 32)	30 (25, 36)	< 0.001
Birth Weight (g)	860 (692, 1480)	740 (678, 780)	780 (675, 910)	1115 (739, 1792)	1325 (680, 2565)	0.005
Age at Reversal (wks)	17 (13, 20)	14 (11, 16)	15 (13, 17)	17 (12, 21)	21 (17, 28)	0.001
% jejunostomies	27 (30.3%)	6 (54.5%)	2 (8.3%)	12 (42.9%)	7 (26.9%)	0.013
Major Operative Morbidity	29 (32.6%)	4 (36.4%)	5 (20.8%)	10 (35.7%)	10 (38.5%)	0.53
Mortality	4 (4.5%)	0 (0%)	2 (8.3%)	1 (3.6%)	1 (3.8%)	0.814

Scientific Session I (cont.)

19

THE RISK OF A SYMPTOMATIC INGUINAL HERNIA IN CHILDREN WITH ASYMPTOMATIC PATENT PROCESSUS VAGINALIS

[1]**Katrina L. Weaver, MD**, [2]Ashwini S. Poola, MD, [3]Joanna L. Gould, MD, [4]Susan W. Sharp, PhD, [5]Shawn D. St. Peter, MD, [6]George W. Holcomb III, MD, MBA.

Children's Mercy Hospital, Kansas City, MO, USA.

Purpose:
All children with a symptomatic indirect inguinal hernia have a patent processus vaginalis (PPV), but it is unknown how often the reverse is true since the natural history of PPV is unclear. At times, during non-hernia related laparoscopic surgery, an incidental PPV is seen. Currently, there are no good data regarding the incidence and time frame for developing a symptomatic hernia with a known asymptomatic PPV. Therefore we have conducted this long-term study.

Methods:
A retrospective chart review was conducted in all children who were evaluated for a PPV during non-hernia laparoscopic surgery by a single pediatric surgeon from 2000 to 2014. Those patients with intraoperative findings of PPV were followed up by chart review and phone inquiry. Signs, symptoms, and timing of hernia development, operative intervention, and need for urgent repair were analyzed using descriptive statistics.

Results:
1565 infants and children underwent a laparoscopic operation during the study period. 316 had an asymptomatic PPV, 72.5% of whom were male. Chart review found that 22 (7%) of these patients returned with a symptomatic hernia at a median age of 21 months (range 11-32.7), and a median of 11.4 months (range 4-27.7) after the initial laparoscopic operation. Eleven hernia repairs were unilateral and 11 bilateral. No episodes of incarceration were identified. Phone contact was successful in 125 of the remaining asymptomatic PPV patients at a median of 8.1 years (range 4.8-12.7) after the initial laparoscopic operation. None of these patients reported hernia symptoms or history of hernia repair at the time of contact.

Conclusions:
These data suggest the risk of development of a symptomatic hernia during childhood in the presence of a known PPV is relatively low.

Scientific Session II

Scientific Session II

Neonatal, Venolymphatic Malformations, Pancreaticobiliary
Monday, May 16, 10:45 a.m. – 12:15 p.m.

20

LIMITING VENTILATOR ASSOCIATED LUNG INJURY IN A PRE-TERM PORCINE NEONATAL MODEL

Michaela C. Kollisch-Singule, MD[1], Sumeet V. Jain, MD, MBA[1], Zhiyong Liu, MD[1], Penny L. Andrews, RN[2], Joshua Satalin, BS[1], Yan Zhou, MD[1], Guirong Wang, PhD[1], Andreas Meier, MD, MEd[1], Louis A. Gatto, PhD[3], Gary F. Nieman, BA[1], Nader M. Habashi, MD[2].

[1]SUNY Upstate Medical University, Syracuse, NY, USA, [2]R. Adams Cowley Shock Trauma Center, Baltimore, MD, USA, [3]SUNY Cortland, Cortland, NY, USA.

Purpose:
Pre-term infants are particularly prone to respiratory distress syndrome (RDS) with severe cases requiring mechanical ventilation for support. Mechanical ventilation can exacerbate the underlying lung injury, however there are no clear guidelines regarding the optimal ventilation strategy in pre-term infants. It has been shown that Airway Pressure Release Ventilation (APRV) is lung protective in adult respiratory distress syndrome and we hypothesized that APRV would mitigate the degree of lung injury in a pre-term porcine neonatal model of RDS.

Methods:
Preterm piglets were delivered on gestational day 98 (85% of 115 day term), instrumented and randomized to Volume Guarantee (VG; n=10) or APRV (n=10). Hemodynamics were continuously monitored and the animals supported with intravenous hydration, analgesia and parenteral nutrition. Initial ventilator settings in VG were: Vt 5.5cc/kg, PEEP 4cmH2O, RR 40breaths/min, FiO2 50%. Initial ventilator settings in APRV were: PHigh 18cmH2O, PLow 0cmH2O, THigh 1.30s, TLow 0.15s, FiO2 50%. Ventilator setting changes were made in response to clinical parameters in both groups. Animals were euthanized after 24 hours.

Results:
The mortality rates between the two groups were not significantly different. The VG group had relatively increased Oxygen requirements (FiO2 50±9%) compared with the APRV group (FiO2 28±5%; $p>0.05$) and a decrease in PaO2/FiO2 ratio (VG 162±33mmHg; APRV 251±45mmHg; $p>0.05$). The compliance of the VG group (0.43±0.05 L/cmH2O) was significantly less than the APRV group (0.61±0.06 L/cmH2O; $p<0.05$). The concentration of total protein ($p>0.05$) and phospholipid ($p<0.05$) in the bronchoalvolear lavage fluid was greater in VG as compared with APRV with an increase in cellularity in VG ($p<0.05$).

Conclusions: This study demonstrates that APRV improves oxygenation and compliance while limiting alveolar edema and epithelial injury as compared with VG. This preliminary work suggests further study into the clinical uses of APRV in the neonate is warranted.

Scientific Session II (cont.)

21

VARYING EFFECT OF ISOFLURANE EXPOSURE ON THE FETAL OVINE BRAIN AT DIFFERENT GESTATIONAL AGES: IMPLICATIONS FOR FETAL THERAPY

Stephanie M. Cruz, MD, Oluyinka O. Olutoye, MD, PhD, Adesola C. Akinkuotu, MD, Fariha Sheikh, MD, Irving J. Zamora, MD, Adekunle Adesina, MD, PhD, Olutoyin A. Olutoye, MD, MSc.

Baylor College of Medicine/ Texas Children's Hospital, Houston, TX, USA.

Purpose:
There is increasing concern for the long-term effects of anesthesia on the developing brain. The purpose of this study was to determine the effects of different isoflurane concentrations on neuroapoptosis in fetal sheep of different gestational ages (GA).

Methods:
At 70 days or 130 days gestation (G70 or G130, term=145 days), general anesthesia with isoflurane was administered to ewes at a concentration of 2% for 1 hour (2%Iso) or 4% for 3 hours (4%Iso) in order to simulate anesthetic exposure during in-utero fetal procedures. Following the anesthetic exposure, the animals were euthanized, and the fetal brains extracted and processed for histology. Neuroapoptosis was detected by immunohistochemistry using anti-caspase-3 antibodies. GA matched fetuses not exposed to anesthesia served as controls. Data were analyzed using ANOVA with post-hoc analysis as appropriate.

Results:
Thirty fetal lambs were studied. Mid-gestation control fetuses (G70) had baseline increased neuroapoptosis in portions of the hippocampus but not the frontal cortex (Fig 1A). No concentration-dependent increase in neuroapoptosis was noted at either gestational age. To control for inherent differences in the baseline neuroapoptosis at different gestations, a ratio of the neuroapoptosis between the treatment and control groups was calculated. Increases ratio of neuroapoptosis was noted in the frontal cortex of G70 animals at both isoflurane concentrations. In contrast, G130 had greater neuroapoptosis in the dentate gyrus at both concentrations and also in the pydramidal area with 2%Iso (Fig 1B).

Conclusion:
In the ovine model, in response to isoflurane, younger ovine fetuses have increased baseline neuroapoptosis. More neuroapoptosis occurs in the frontal cortex in mid-gestation and in the hippocampus closer to term. Long-term studies of human fetuses exposed to anesthesia are required to evaluate for potential deficits related to these areas.

Scientific Session II (cont.)

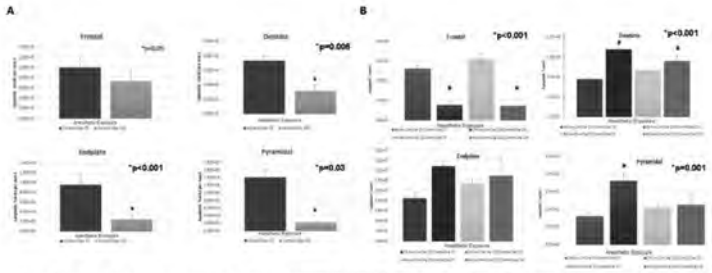


Figure 1: Apoptotic nuclei for varying concentrations of anesthetic exposures at 70 and 130 days gestation. (A) Control G70 vs control G130, (B) 2%iso/control 70 vs 2%iso/control 130 & 4%iso/control 70 vs 4%iso/control130.

Scientific Session II (cont.)

22

PRENATAL GROWTH CHARACTERISTICS OF LYMPHATIC MALFORMATIONS

William H. Peranteau, MD, Suzanne D. Iyoob, BA, Matthew M. Boelig, MD, Holly L. Hedrick, MD, Alan W. Flake, MD, Beverly G. Coleman, MD, N. Scott Adzick, MD.
The Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Purpose: The natural history of prenatally diagnosed lymphatic malformations (LM) remains unknown. The ability to predict growth of a lesion is important to prenatal counseling and any future prenatal intervention. We describe the prenatal growth patterns of LMs as they relate to gestational age, anatomical location, and postnatal management.

Methods: A retrospective review of patients prenatally diagnosed with a LM who were followed with serial ultrasounds from 2003 to 2014. The lesion volume ratio (LVR) was calculated by dividing the lesion volume by head circumference to account for growth of the lesion with respect to fetal growth.

Results: Thirty patients with LM had serial ultrasound measurements between 19 and 39 weeks gestation (Table). Overall, 53% of lesions demonstrated an increase in LVR (0.6 to 67 fold increase) from initial to final measurement indicating lesion growth relative to that of the fetus. The LVR decreased in 23% of patients (2 to 3 fold decrease) and remained stable in 23% of patients. Unlike other locations which demonstrated both positive and negative growth profiles, axillary lesions only demonstrated increased growth. Lesions with positive growth increased throughout gestation with the peak LVR reached at 35±3 weeks gestation. Eleven lesions demonstrated a greater than a five fold increase in LVR. The growth of these lesions stabilized by 33±3 weeks gestation. Twenty-four patients had postnatal interventions for LM management including surgical resection, sclerotherapy and surgery + sclerotherapy.

Conclusion: LMs have variable prenatal growth profiles. The majority of lesions, especially axillary LMs, will continue to grow throughout gestation and will not reach a growth plateau until the end of gestation.

Scientific Session II (cont.)

Location, Prenatal Growth Profiles and Postnatal Management of LMs						
Location	**# with positive growth**	**GA (weeks) @ peak LVR (+ growth patients)**	**# with negative growth**	**GA (weeks) @ peak LVR (- growth patients)**	**# with stable growth**	**postnatal management**
intraabdominal (n=3)	2	34 +/- 2	1	26	0	surgery (n=2) none (n=1)
mediastinal (n=4)	2	32 +/- 3	1	32.5	1	surgery (n=4)
lower extremity (n=1)	0		1	32.5	0	none (n=1)
axillary (n=7)	7	34 +/- 3	0		0	surgery (n=4) sclerotherapy (n=1) surgery + sclero (n=1) none (n=1)
cervical (n=15)	5	36 +/- 2	4	26 +/- 3	6	surgery (n=4) sclerotherapy (n=6) surgery + sclero (n=2) none (n=3)

Scientific Session II (cont.)

23

SUSTAINED ANTI-PROLIFERATIVE EFFECT OF SIROLIMUS ON LYMPHATIC MALFORMATION DERIVED CELLS AND INDUCTION OF PROGENITOR CELL DIFFERENTIATION

Christine A. Schad, MD[1], Julie Monteagudo, MD[1], Maria Gnarra, MD[2], June K. Wu, MD[1], Angela V. Kadenhe-Chiweshe, MD[1], Carrie J. Shawber, PhD[2].

[1]Morgan Stanley Children's Hospital of New York Presbyterian, Columbia University Medical Center, New York, NY, USA, [2]Columbia University Medical Center, New York, NY, USA.

Purpose:
Lymphatic malformations (LMs) are a type of vascular anomaly. LMs contain LM progenitor cells (LMPCs), which are pluripotent and express stem-like genes, and differentiated LM endothelial cells (LMECs), which express multiple lymphatic endothelial cell (LEC) genes. Sirolimus, an mTOR inhibitor, has demonstrated effectiveness in the treatment of severe, refractory LM cases, with lasting clinical response after drug discontinuation. We previously found that sirolimus inhibits proliferation of LMPCs and LMECs without affecting cell viability *in vitro.* Thus, we hypothesized that sirolimus alters the cellular characteristics of LMPCs and LMECs. We studied the effects of sirolimus treatment and subsequent withdrawal on LMPC and LMEC proliferation, as well as treatment effects on LEC gene expression.

Methods:
Rebound proliferation assay: LMPCs and LMECs from a macrocystic LM (IRB AAAA-9976) were treated with sirolimus (10pM, 10nM and 10μM) or vehicle (DMSO, control). After 48 hours, sirolimus treatment was withdrawn in half of the treatment cells and continued in the other half. Viable cell number was determined by WST-8 assay at 0 and 72 hours. Gene expression studies: Cells were treated with sirolimus (10pM and10μM) or vehicle for 48 hours and quantitative RT-PCR was performed for podoplanin, Prox1, LYVE1 and VEGFR-2/3. Statistical analysis was performed using a two-tailed Student's t-test.

Results:
Sirolimus inhibited growth of LMPCs and LMECs at all tested concentrations and cell number remained unchanged after sirolimus discontinuation (Figure 1). Sirolimus-treated LMPCs, but not LMECs, had increased expression of the LEC genes: podoplanin, Prox1, VEGFR-2 and VEGFR-3 (Figure 2).

Conclusions:
LMPCs and LMECs did not display rebound growth after sirolimus discontinuation, suggesting prolonged clinical effect. Increased LEC gene expression in LMPCs suggests that sirolimus promotes LMPC differentiation. Thus, sirolimus may function in LM patients to deplete the progenitor cell pool and inhibit proliferation of the abnormal lymphatic endothelium.

Scientific Session II (cont.)

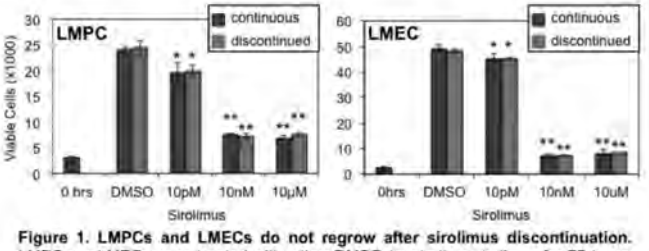


Figure 1. LMPCs and LMECs do not regrow after sirolimus discontinuation. LMPCs or LMECs were treated with either DMSO (control) or sirolimus for 72 hours (continuous) or 48 hours and drug withdrawn for 24 hours. Viable cell numbers were determined at 0 and 72 hours. *p<0.05, **p<0.0001. P value determined for each treatment relative to vehicle control. No significance was observed between continuous and discontinued groups at each dose.

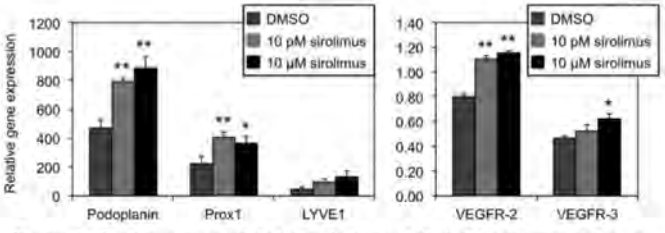


Figure 2. Sirolimus upregulated lymphatic endothelial gene expression in LMPCs. LMPCs were treated with either DMSO (control) or sirolimus for 48 hours and quantitative RT-PCR performed. Data presented as ± standard deviation. *p<0.05, **p<0.005.

Scientific Session II (cont.)

24

THE ROLE OF FREE FATTY ACID RECEPTOR GPR120 IN A MODEL OF PARENTERAL NUTRITION LIVER INJURY

Gillian L. Fell, MD, PhD[1], Prathima Nandivada, MD[2], Bennet S. Cho, BA[1], Lorenzo Anez-Bustillos, MD[1], Meredith A. Baker, MD[1], Duy Dao, MD[1], Amy Pan, BA[1], Kathleen M. Gura, PharmD[1], Mark Puder, MD, PhD[1].

[1]Boston Children's Hospital, Boston, MA, USA, [2]Beth Israel Deaconess Medical Center, Boston, MA, USA.

Purpose:
Fish oil (FO) based parenteral fat emulsions are important for reversing cholestasis in parenteral nutrition (PN)-associated liver disease. Mechanisms of FO-mediated hepatoprotection in PN dependence are unknown. GPR120 is a G-protein coupled receptor that binds long-chain fatty acids (FAs) such as the omega-3 FAs abundant in FO. GPR120 signaling inhibits NFκB-mediated inflammation and enhances insulin sensitivity. The purpose of this study is to investigate whether GPR120 is necessary for FO-mediated protection in a murine model of PN-induced liver injury.

Methods:
Using a previously established model, C57BL/6 mice (WT) and congenic GPR120 knockout mice (gpr120-/-) were fed standard chow or a liquid fat-free, high carbohydrate PN. Animals received 2.4g/kg/day of a FO fat emulsion (PN+FO) or saline (PN+saline) by tail vein injection. Animals were sacrificed after 19 days. Livers and serum were procured for histology, gene expression analysis by RT-PCR, and fatty acid profiling.

Results:
WT and gpr120-/- administered PN+saline developed hepatosteatosis. FO prevented steatosis in WT, but not in gpr120-/-. There was no difference in the effect of FO on triene:tetraene ratios in PN-fed WT or gpr120-/-. PN increased hepatic expression of genes important in de novo lipogenesis, including acetyl CoA carboxylases (ACC1, ACC2), peroxisome proliferator-activated receptor-γ (PPARγ), and fatty acid synthase (FAS) in WT and gpr120-/. While FO normalized expression of ACC1, ACC2, and FAS in WT and gpr120-/-, FO normalized PPARγ expression only in WT, not in gpr120-/-.

Conclusions:
The ability of FO to prevent PN-induced liver injury in a murine model requires functional GPR120. This effect of GPR120 signaling may be through modulation of PPARγ. These results suggest that suppression of *de novo* lipogenesis, through GPR120 signaling and PPARγ activity may represent one mechanism by which parenteral FO protects from PN-induced liver injury.

Scientific Session II (cont.)

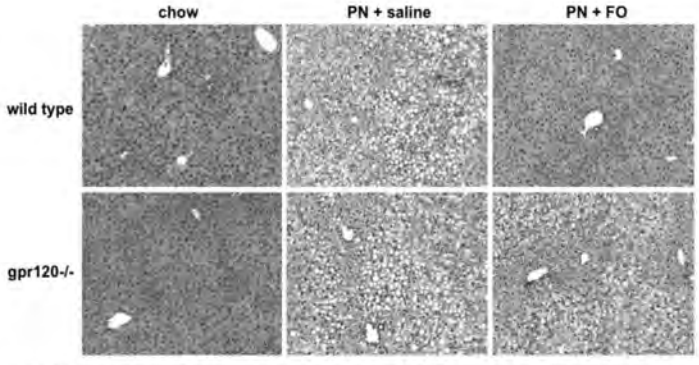


Figure 1: Genetic loss of GPR120 suppresses fish oil-mediated protection from PN-induced liver injury. Hemotoxylin and Eosin staining of liver sections from wild type (top row) and gpr120-/- (bottom row) mice administered a standard chow diet (left column), fat-free PN + IV saline (middle column), or fat-free PN + IV fish oil fat emulsion.

Scientific Session II (cont.)

25

TRANS-AMNIOTIC STEM CELL THERAPY (TRASCET) IN A LEPORINE MODEL OF GASTROSCHISIS

Christina Feng, MD, Christopher D. Graham, MD, Hester Shieh, MD, Joseph A. Brazzo, MS, John P. Connors, BS, Lucas Rohrer, N/A, Alexander Papadakis, N/A, David Zurakowski, PhD, Dario O. Fauza, MD, PhD.

Boston Children's Hospital, Boston, MA, USA.

Purpose:
Trans-amniotic stem cell therapy (TRASCET) with amniotic fluid-derived mesenchymal stem cells (afMSCs) has been shown to mitigate bowel damage in a rodent model of gastroschisis. The eventual clinical translation of this therapeutic concept depends on its efficacy in larger animal models. We sought to study TRASCET in a leporine model of gastroschisis.

Methods:
New Zealand rabbit fetuses (n=64) with surgically created gastroschisis at gestational day 23 (term 32-33 days) were divided evenly into three groups. One group (untreated) had no further manipulations. Two groups received volume-matched intra-amniotic injections of either saline or a suspension of $2x10^6$ cells/mL of afMSCs at the time of operation. Infused afMSCs consisted of heterologous rabbit afMSCs phenotyped by flow cytometry, labeled with cytoplasmic nanocrystals. Non-manipulated fetuses served as normal controls (NL; n=10). Comprehensive thickness measurements of intestinal wall layers - surrogates for bowel damage in gastroschisis - were obtained at term in 256 bowel loops by three blinded observers. Myeloperoxidase (MPO), malondialdehyde (MDA), and interferon-gamma (IFN-g) activities were also measured. Statistical comparisons were by ANOVA and the nonparametric Kruskal-Wallis test ($P<0.05$).

Results:
Overall survival was 62.5%. Statistically significant decreases in segmental and total intestinal wall thickness were observed in the afMSC group compared with the untreated and saline groups (all $P<0.001$), with no significant differences between untreated and saline groups ($P=0.24$ to 1.00, depending on layer). However, muscularis and serosal layers were significantly thicker in the afMSC group than NL ($P=0.045$ and $P<0.001$, respectively). There were no significant differences in MPO ($P=0.82$), MDA ($P=0.86$), and IFN-g ($P=0.17$) activities across the groups, including NL. Labeled cells were sparsely detected in the afMSC group.

Conclusions:
Concentrated intra-amniotic injection of amniotic mesenchymal stem cells lessens, yet does not prevent, intestinal damage in a leporine model of gastroschisis. Trans-amniotic stem cell therapy may become a valuable strategy in the management of gastroschisis.

Scientific Session II (cont.)

26

IMPLICATIONS OF ANTICIPATED NEONATAL SURGICAL INTERVENTION ON MATERNAL MILK CYTOKINE PRODUCTION IMPACTS NEONATAL OUTCOMES

Rebecca M. Rentea, MD[1], Amy J. Wagner, MD[2], David M. Gourlay, MD[2], Melissa Christensen, BS[2], Jennifer L. Liedel, MD[3].

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [3]Children's Hospital at Montefiore and Children's Hospital of Wisconsin, New York, NY, USA.

Purpose:
The role of maternal stress on infants admitted to the NICU is incompletely understood. We previously demonstrated breast milk derived cytokines remain biologically active in the neonatal intestine, suggesting a link between perinatal inflammation and infant outcome. There are no reports of immediate effects of maternal stress on neonatal outcome. We hypothesized that the need for neonatal surgical intervention would be stimulus leading to maternal cytokine production thus affecting neonatal outcome.

Methods:
Discarded breast milk (EBM) expressed in the first 3 weeks following delivery was analyzed for IL-23 and IL-10 by ELISA. Infants who received EBM for oral care and/or feeds and had a minimum of 3 samples analyzed were subdivided by several variables including: the need for a pediatric surgical procedure, the need for cardiac surgical procedure, no surgical interventions and survival. All values are expressed as mean +/- SEM. Statistical analysis utilized Student's t test.

Results:
EBM from mothers whose infants required any surgical procedure (n=19) revealed significant elevation in IL-10 (10.18pg/mL +/- 1.244 vs 6.452+/- 0.853, p=0.0197) but not IL-23 (66.74pg/mL +/- 6.575 vs 61.29+/- 6.928, p=ns) compared to nonsurgical EBM (n=18). Subdivided by procedure type, there was no difference between those undergoing a cardiac (n=9) versus pediatric surgical (n=10) procedure in both IL-10 and IL-23. The concentration of EBM IL-10 but not IL-23 was higher from mothers of infants who did not survive (n=11) to hospital discharge compared to those who did (n=8) (p=0.08).

Conclusions:
Mothers whose infants required surgical intervention in the first 3 weeks of life had elevation of IL-10. Milk from mothers of surgical infants who did not survive trended toward elevated IL-10. Results suggest maternal stress impacts the cytokine profile of breast milk. As milk-derived cytokines appear to be biologically active, this represents an area that deserves investigation and identification of coping strategies for parents.

Scientific Session II (cont.)

27

OUTCOMES OF TOTAL PANCREATECTOMY AND ISLET AUTOTRANSPLANTATION IN YOUNG CHILDREN

Megan Berger, MD, Melena Bellin, MD, Daniel A. Saltzman, MD, Gregory Forlenza, MD, Kaustav Majumdar, MBBS, Martin Freeman, MD, Gregory Beilman, MD, Ty Dunn, MD, Michael Murati, MD, Joshua Wilhelm, MS, David E.r. Sutherland, MD, PhD, Sarah Jane Schwarzenberg, MD, Srinath Chinnakotla, MD.

University of Minnesota, Minneapolis, MN, USA.

Purpose:
Total pancreatectomy and islet auto transplantation (TP-IAT) is increasingly used for treatment of childhood pancreatitis that fails medical, endoscopic, and surgical drainage/resection procedures. However, since most of the published case series are in teenagers, centers are often reluctant to offer surgery to younger children due to unknown outcomes. With ongoing pain, these children can become narcotic-dependent, miss school, and have poor quality of life. Some become TPN or tube-feed dependent to prevent precipitation of pancreatitis attacks. As a large center performing TP-IAT, we sought to determine the outcomes in younger children receiving TP-IAT.

Methods:
Among 106 pediatric TP-IAT recipients at our center, 17 children (9 female) met inclusion criteria of age <8 years at time of surgery. Procedures were performed from 2000-2014. Pancreatitis was attributed to genetic mutations in 14/17. TP-IAT recipients were followed prospectively with Quality of Life questionnaires including assessments of pain and narcotic use and laboratory evaluations including HbA1c and mixed-meal tolerance tests, both preoperatively and at regular intervals thereafter. Median follow up was 2.2 years (IQR 1.5 - 4.3).

Results:
There was no perioperative mortality. Surgical complications requiring reoperation occurred in 4 patients for bowel obstruction (n=2), intraabdominal abscess/wound dehiscence (n=1), and bile leak (n=1). All patients had pain relief and were off narcotics by 6 months post-surgery. Thirteen (76%) achieved insulin independence (versus 41% in older patients) (p=0.004). Median HbA1c after TP-IAT was 5.9% (IQR 5.6-6.3%). All patients reported improved Quality of Life, return to full-time school, and resumption of oral diet.

Conclusions:
Young children who undergo TP-IAT for chronic pancreatitis have successful outcomes and may even fare better than older patients. Though further studies are needed to confirm these findings, young age should not prevent early referral for TP-IAT in patients who would otherwise be enduring pain and poor quality of life.

Scientific Session II (cont.)

28

RECANALIZATION OF PROLONGED EXTRAHEPATIC PORTAL VEIN OBSTRUCTION IN PEDIATRIC PATIENTS

Sydne L. Muratore, MD, Siobhan Flanagan, MD, David Hunter, MD, Robert Acton, MD.
University of Minnesota, Minneapolis, MN, USA.

Purpose:
Extrahepatic portal vein obstruction is the most frequent cause of portal hypertension in children, with approximately 80% eventually presenting with GI bleeding. Reconstructive surgery to circumnavigate the obstruction has considerable risks and downstream consequences and only the mesoportal shunt restores physiologic flow. We aim to demonstrate the feasibility and safety of a hybrid approach for recanalization and stenting of the chronically occluded portal vein to restore physiologic blood flow as an alternative to reconstructive surgery.

Methods:
This single-center, prospective review included pediatric patients from 2013-2015 who underwent minilaparotomy with mesenteric vein access, portal venogram, and attempted recanalization of the occluded portal vein. Outcomes included portal patency, resolution of bleeding or varices, spleen size, and hematology.

Results:
Of 6 patients undergoing the procedure, 4 (67%) had successful recanalization of their portal vein with stenting. The median age was 9.9 years old (50% female). Median duration of portal vein occlusion was 7 years (1-18yrs). Etiologies of occlusion were liver transplantation (50%), idiopathic (33%), and umbilical vein catheterization (17%). Preoperative signs of portal hypertension included varices (100%), splenomegaly (100%), and GI bleeding (83%). Median follow-up for stented patients at 8.3 months (1-12months) demonstrated ultrasound evidence of portal vein patency and resolution of bleeding. Spleen size decreased a median of 20% (10-26%). Platelet count and hemoglobin improved from 50 to 128/μL and 10.4 to 13.5 g/dL respectively. Anticoagulation was continued for approximately 3 months. The 2 patients who were unable to achieve portal vein reopening had insufficient anatomy for meso-rex bypass and underwent splenorenal shunting.

Conclusions:
Recanalization and stenting of a prolonged occlusion of the portal vein is a feasible alternative to meso-rex bypass, splenorenal shunt, or medical therapy in selected patients. This may minimize potential growth pertubations, portosystemic encephalopathy, and surgical risks associated with shunt surgery for portal vein obstruction in pediatric patients.

Innovation Session

Innovation Session

Monday, May 16, 12:15 – 1:15 p.m.

i1

THE UTILITY OF ADDITIVE MANUFACTURING (3D PRINTING) AND SIMULATION FOR PREOPERATIVE PLANNING IN CONJOINED TWIN SEPARATION

T.K. Pandian, MD, MPH, Nimesh D. Naik, MD, Jane M. Matsumoto, MD, Christopher R. Moir, MD.

Mayo Clinic, Rochester, MN, USA.

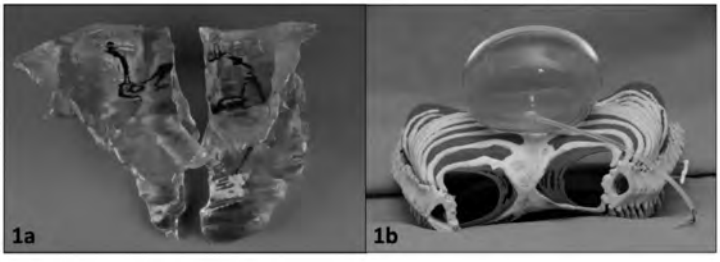
Purpose:
Despite the use of advanced imaging techniques in conjoined twin separation, enhanced preoperative planning is necessary for these complex cases. We report the use of simulation and 3-dimensional printing to improve team preparedness and patient care for surgery.

Methods:
A retrospective review of conjoined twin separation at our institution was conducted. Patient, preoperative, operative, and postoperative information was assessed.

Results:
Additive manufacturing and/or simulation was utilized for 3 sets of conjoined twins between the years 2006 and 2010. Twin sets 1 and 3 were thoraco-omphalopagus and shared biliary anatomy. Three-dimensional models of the liver were printed (Figure 1a), highlighting these complex structures. The models allowed our surgical team to identify a liver transection plane with the associated surface anatomy, prior to witnessing the liver in the operating room. In addition, the Multidisciplinary Simulation Center was employed to stage a mock operation for twin set 1. This resulted in improved preparation for a singular bile duct and duodenum, conjoined pancreata, and unexpected hurdles on the day of surgery. Twins from set 1 are now 10 years old and doing well. Twin 3a is healthy at age 6; unfortunately twin 3b passed away 1 month after separation due to severe pulmonary hypertension. Twin set 2 was also thoraco-omphalopagus and had near-complete fusion of their thoracic cages. A 3-dimensional model of this anomaly was printed (Figure 1b). The model permitted our surgical team to more accurately prepare for resection and reconstruction, utilizing tissue expanders and prostheses. Twins from set 2 are now 9 years old and flourishing in grade 2.

Conclusion:
We conclude that the use of 3-dimensional printing and simulation in conjoined twin separation offer opportunities for higher level anatomical understanding, full team engagement and thorough preoperative rehearsal. We suggest institutions performing separations consider these methods as a standard of care.

Innovation Session (cont.)



Innovation Session (cont.)

i2

A NOVEL TECHNIQUE TO MEASURE SEVERITY OF CHEST DEFECTS IN PATIENTS WITH PECTUS EXCAVATUM USING WHITE LIGHT SCANNING

Ferdynand Hebal, MD, Bryan Malas, MHPE, CO, **Marleta Reynolds, MD**.
Ann & Robert H. Lurie Children's Hospital, Chicago, IL, USA.

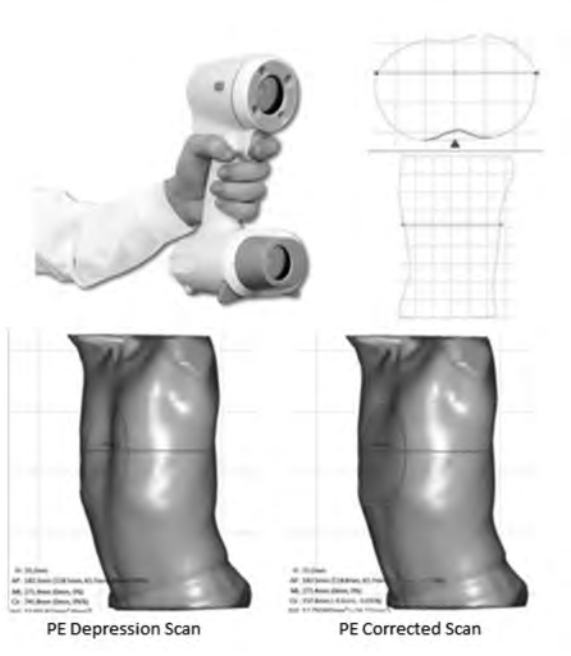
Background:
Computed tomography (CT) derived Haller Index (HI) remains the standard metric for quantifying severity of Pectus Excavatum (PE). Typically, HI is the primary reason for obtaining CT imaging. Although x-ray has demonstrated measures comparable to CT, optical scanning offers a potential alternative to ionizing radiation. Optical scanning devices described in available literature report optimistic results and new indices that correlation with HI. This study assessed the feasibility of using a handheld White Light Scanner (WLS) to obtain 3D measurements and new indices of PE deformity using white light illumination.

Methods:
From April-August 2015, scanning was conducted by trained orthotists during standard clinical visits. Inclusion criteria were a diagnosis of PE in children up to 18 years. IRB approval by expedited review was received. Patients were scanned using WLS currently used to capture precise 3D body contours to make custom orthoses. Patients were required to stand still with shoulders abducted to ~45 degrees for ~3 minutes. Data collected includes volumetric measurements, chest circumference, and diameters. To calculate PE depression volume (PEDV), scanned torso volume was subtracted from torso volume with corrected depression (Figure 1). Correlation assessed new severity indices to physician measured PE depression depth (PEDD) and HI.

Results:
Of forty participants, 29(72.5%) were scanned since enrollment. Of twenty-nine scanned participants, 19(67.5%) had PEDD measured. Mean age was 13(SD3.5). PEDV demonstrated moderate-to-high correlation with PEDD. Hebal-Malas Index demonstrated strong correlation with HI (Table 1).

Conclusions:
WLS demonstrated high feasibility of scanning PE. Newly derived severity indices correlate with HI. Yearly WLS will provide data on deformity progression and success of surgical therapy when indicated.

Innovation Session (cont.)



Correlation Results				
Correlation with physician measured PE Depression Depth (PEDD) in cm (n=19)	r	p-value	mean	SD
PE Depression Volume (PEDV) in mL	0.51	0.03	89.6mL	73.2
Hebal-Malas Index (Modified-Haller Index)	0.21	0.4	1.56	0.1
Correlation with Haller Index (n=3)	r	p-value	mean	SD
PE Depression Volume (PEDV) mL	0.58	0.61	88.44mL	70.91
Hebal-Malas Index (Modified Haller Index)	0.99	0.02	1.66	0.11

Innovation Session (cont.)

i3

AUTOMATED DATA EXTRACTION: MERGING CLINICAL CARE WITH REAL-TIME COHORT-SPECIFIC RESEARCH AND QUALITY IMPROVEMENT DATA

Ferdynand Hebal, MD, Michael L. Miller, MD, Elizabeth Nanney, BS, APN, George Lales, MS-MIS, Katherine A. Barsness, MD.

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

Background:
Although prohibitively labor intensive, manual data collection is the prevailing method used to obtain clinical research and quality improvement (QI) data. Increasingly accessible features of electronic health records (EHR), including standardized notes and automated data extraction (ADE), offer an alternative to manual data collection. The purposes of this study were to 1) assess the feasibility of ADE from provider-authored outpatient clinic documentation, and 2) evaluate the effectiveness of ADE compared to manual data extraction (MDE) in capturing clinically relevant, cohort-specific research/quality improvement data.

Methods:
An IRB-approved review of prospectively collected data was performed on 90 ADE-templated notes (N=71 patients) evaluated in bowel management clinic. ADE-template included 154 variables unique to fecal incontinence, and 131 additional variables. Data extracted from the EMR is loaded into a secure QI database. ADE captured data were compared to 59 MDE notes (N=51 patients) collected under an IRB-exempt review. Sixteen variables were directly comparable between ADE and MDE groups.

Results:
MDE for 59 clinic notes (27 unique variables) took 6 months to complete. ADE for 90 clinic notes (154 unique variables) took 5 minutes to run a research/QI report. Figure 1 compares ADE to MDE across 16 mandatory variables. Implementation of ADE included 2 weeks to create the EMR data dictionary, 4 weeks for EMR changes to occur, 2 weeks of pre-production testing, and ongoing minor edits to improve clinical workflow. Pre-implementation clinical documentation (5 minutes) was similar to post-implementation documentation (5-10 minutes), as compared to first use (20 minutes).

Conclusions:
ADE allows for a 5-fold increase in clinically relevant data that can be captured with each encounter. ADE also results in real-time data extraction to a QI database that is easily queried. The immediate availability of these data, in a research-formatted spreadsheet, allows for rapid collection, analyses, and interpretation of the data.

Innovation Session (cont.)

i4

CONTROLLED TISSUE EXPANSION FOR SHORT BOWEL SYNDROME TREATMENT USING OSMOTIC HYDROGEL: A FEASIBILITY STUDY

Riccardo Coletta, MD[1], Claudio Olivieri, MD[2], Valeria Solari, PhD[1], Basem A. Khalil, MD[1], Alessandro Inserra, PhD[2], Antonino Morabito, MD, Prof[1].

[1]Royal Manchester Children's Hospital, Manchester, United Kingdom, [2]Ospedale Pediatrico Bambino Gesù, Rome, Holy See (Vatican City State).

Purpose:
Intestinal expansion is essential for bowel lengthening in patients suffering from Short Bowel Syndrome. Previous studies have relied on endoluminal or extraluminal devices. We hypothesised the use of an endoluminal osmotic hydrogel expander as a novel approach for intestinal expansion.

Methods:
New Zealand rabbits (n = 5) with a body weight of 1.8 to 2.2 kg were used. After creating an isolated intestinal segment, an osmotic hydrogel (22x12mm) was introduced into the lumen. A similar intestinal segment with no device was prepared as a control. After four weeks, the segments have been retrieved for morphological and histological analysis. Weight, inflammatory markers and fluoroscopy were performed weekly.

Results:
Intestinal segments have been expanded successfully from 4.22 ± 0.83 cm to 9.03 ± 0.87 cm ($p = 0.03$). Increases in length were 116.1 ± 22.83% in segment with osmotic expander vs 18.08 ± 4.49% observed in the control group ($p = 0.02$). A significant increase in intestinal dilatation (160.30 ± 2.99% vs. 49.25 ± 4.91%, $p < 0.01$) was revealed. Immunohistochemistry analysis on the expanded segments revealed conservation of intestinal architecture with muscle hypertrophy and flattening of the villi may due to prolonged compression. No reduction of rabbit weight or raised inflammatory markers or liver damage was described.

Conclusions:
The data provided by this *in vivo* research show that osmotic hydrogel is able to produce safe intestinal expansion. This preliminary study may provide useful guidance for further studies in larger animals. We believe that this approach may allow development of clinically applicable technology to expand bowel in short bowel patients.

Innovation Session (cont.)

i5

A NOVEL METHOD FOR IDENTIFYING HIGH RADIATION BURDEN FROM COMPUTED TOMOGRAPHY

Daniel L. Lodwick, MD, MS, Jennifer N. Cooper, MS, PhD, Peter C. Minneci, MD, MHSc, Katherine J. Deans, MD, MHSc.

Nationwide Children's Hospital, Columbus, OH, USA.

Purpose:
Over 4 million pediatric CT scans are performed annually in the United States, potentially incurring 4,870 lifetime malignancies. Our objective was to develop an automated, accurate method to calculate and longitudinally track radiation exposure in patients. This will enable identification of cohorts of children at risk for high levels of radiation exposure.

Methods:
We developed a software tool (DoseWizard, patent pending) that: (1) leverages open source software to extract CT scan parameters from imaging files, (2) operationalizes protocols for clinical data extraction from the electronic health record, (3) merges data at the individual patient level, (4) performs rapid batched calculation of effective and organ specific radiation dosing using a National Cancer Institute supported system, and (5) stores these estimates and the clinical data to allow for cumulative calculations at both the patient and cohort level (Figure). We subsequently tested this tool on CT scans performed at our institution from 2013 to 2015 to identify patient factors associated with high cumulative effective radiation dose (top decile) using multivariable logistic regression.

Results:
An automated software tool was successfully developed, demonstrating the feasibility of implementation of a radiation dose tracking system. The 8,515 CT scans performed during the timeframe were all successfully processed by the tool. Manual validation of 50 scans of each body region (head, chest, and abdomen/pelvis) demonstrated 100% accuracy. High cumulative radiation effective dose was associated with having trauma-related diagnoses (OR=2.53, $p<0.001$), being younger at first CT scan (OR=0.98, $p=0.007$), and being overweight or obese (OR=2.06, $p<0.001$).

Discussion:
Our software tool can calculate and longitudinally track patient specific radiation dose from CT imaging. This tool can be used to identify cohorts of children with high radiation burden to target clinical interventions.

Innovation Session (cont.)

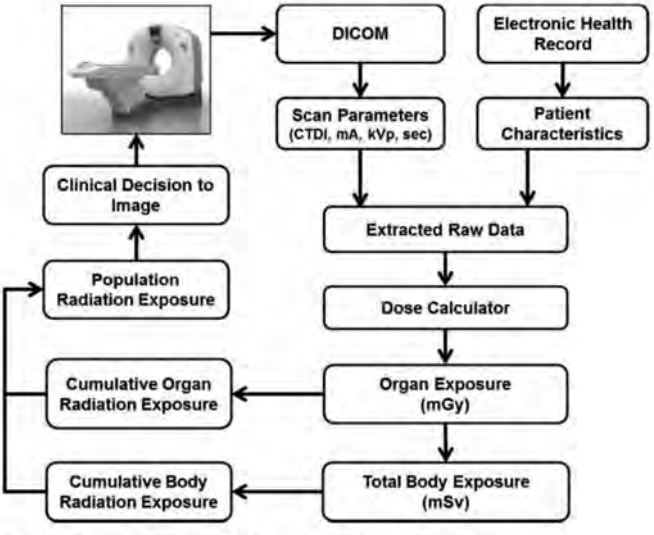


Figure: Schematic of automated radiation exposure measurement tool. DICOM = Digital Imaging and Communications in Medicine, CTDI = computed tomography dose index

Innovation Session (cont.)

i6

TOWARD PHYSIOLOGIC EXTRACORPOREAL SUPPORT OF THE PREMATURE INFANT: UMBILICAL CORD CANNULATION PROVIDES SUPERIOR OXYGENATOR FLOWS, OXYGEN DELIVERY AND HEMODYNAMIC STABILITY

Matthew A. Hornick, MD, Marcus G. Davey, PhD, Emily A. Partridge, MD, PhD, Aliza M. Olive, MD, Theodore R. Weiland 3rd, BS, Jenny Kim, BA, Orlando Castillo, BA, Jiancheng Han, MD, Kevin C. Dysart, MD, William H. Peranteau, MD, Alan W. Flake, MD.
Children's Hospital of Philadelphia, Philadelphia, PA, USA.

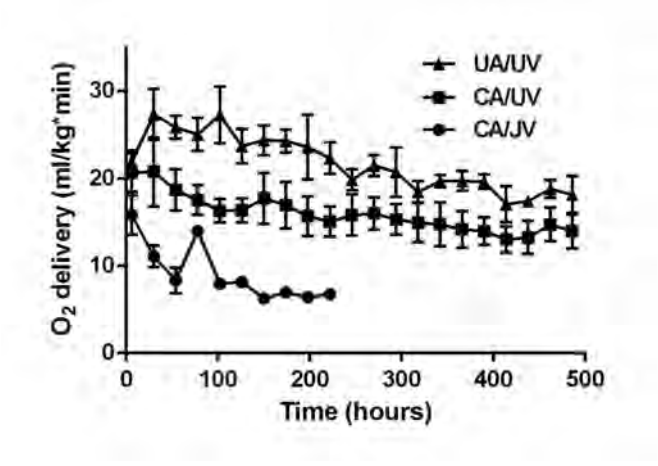
Purpose:
ESPI (Extracorporeal Support of the Premature Infant) is a novel system that promotes physiologic development by maintaining the fetus in a sterile fluid medium and providing gas exchange via pumpless arteriovenous ECMO. During the development of ESPI, different cannulation strategies have evolved with the aim to improve circuit flow. This study examined how cannulation strategy affects hemodynamic and oxygen parameters in fetal lambs on ESPI.

Methods:
12 preterm lambs were cannulated at gestational age 105-115 days and supported on ESPI for up to 4 weeks. Experimental groups were distinguished by cannulation strategy: (1) carotid artery outflow and jugular vein inflow (n=4); (2) carotid artery outflow and umbilical vein inflow (n=5); (3) double umbilical artery outflow and umbilical vein inflow (n=3). Circuit flows and pressures were measured continuously, with "flow interruption" defined as circuit flow less than half of mean flow for given hour. Oxygen delivery was calculated as the product of circuit flow and post-oxygenator blood oxygen content.

Results:
Mean length of run was 177±42 hours in Group 1, 477±50 hours in Group 2, and 634±23 hours in Group 3 ($p<0.001$). Mean circuit flows were 67±8 ml/kg*min in Group 1, 92±7 ml/kg*min in Group 2, and 175±11 ml/kg*min in Group 3 ($p<0.001$). Circuit flow to MAP ratio was 6.3±0.7 in Group 1, 8.1±0.9 in Group 2, and 11.3±0.7 in Group 3 ($p=0.01$). Flow interruptions comprised 1.0% of total flow in Group 1, 0.35% in Group 2, and 0.09% in Group 3 ($p=0.04$). Mean total oxygen delivery was 9.0±0.8 ml/kg*min in Group 1, 15.5±1.3 ml/kg*min in Group 2, and 20.7±1.4 ml/kg*min in Group 3 ($p<0.001$).

Conclusions:
We conclude that cannulating two umbilical arteries and one umbilical vein in fetal lambs on ESPI is superior to prior cannulation strategies, optimizing hemodynamic stability and providing circuit flows and oxygen delivery comparable to established *in utero* levels.

Innovation Session (cont.)



Innovation Session (cont.)

i7

XENOGENEIC DECELLULARIZED OESOPHAGEAL TRANSPLANTATION IS ACHIEVABLE IN A LARGE ANIMAL MODEL

Edward Hannon, MBChB, MRCS, Federico Scottoni, MBChB, Lizzie Maughan, MBBS, MRCS, Luca Urbani, PhD, Carlotta Camilli, MSc, Colin Butler, MBBS, MRCS, Rui Rachel Wong, BSc, Claire Crowley, MSc, Simon Eaton, PhD, **Paolo De Coppi, MD, PhD**.

Institute of Child Health / University College London, London, United Kingdom.

Purpose:
Decellularization of oesophagi for use as tissue engineering scaffolds is well described in several species, but successful implantation in animal models of oesophageal replacement has been more challenging. The purpose of this study was to discover whether decellularized porcine oesophageal scaffolds could be successfully implanted orthotopically in a rabbit model.

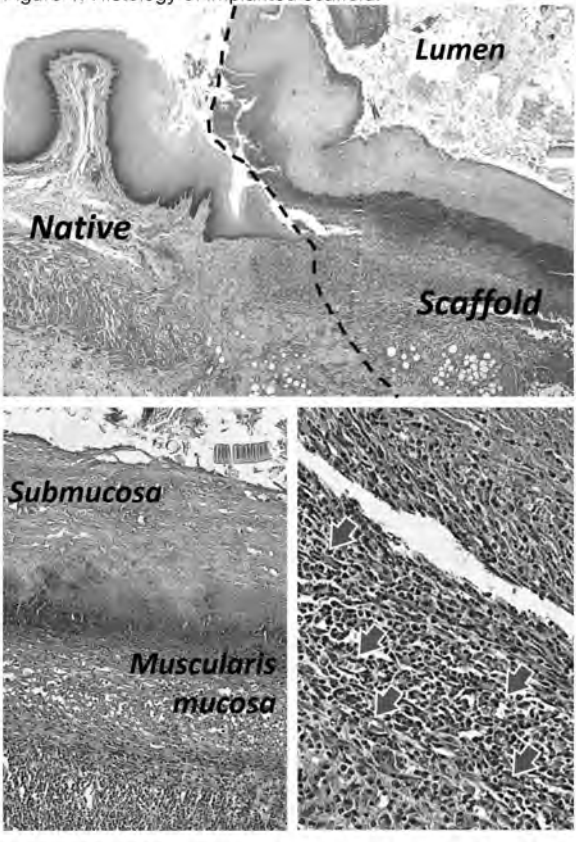
Methods:
Piglet oesophagi were harvested from new born piglets. Oesophagi were decellularised using detergent enzymatic treatment, to produce scaffolds with adequate DNA extraction whilst maintaining mechanical properties suitable for implantation. In New Zealand White rabbits, under general anaesthetic a 2 cm section of cervical oesophagus was resected. A 2 cm section of decellularised porcine scaffold was then implanted orthotopically and 2 anastomoses performed using 6.0 PDS®(Ethicon) over a 6F nasogastric tube (NGT). Bio absorbable PDS stent (4mm x 20mm) were used to avoid early collapse. Animals were fed via a stamm gastrostomy and then orally. Animals were sacrificed at humane end points.

Results:
Anaesthetic and surgery was well tolerated in all animals and gastrostomy insertion overcame initial problems with oral feeding and NGT maintenance. Stent usage led to improved oesophageal patency and allowed drinking orally from day 4. At sacrifice there was no evidence of anastomotic leak and good scaffold integration. Histology (fig 1) demonstrated no sign of rejection of the decellularized xeno-transplanted scaffold and good in growth of cells into the scaffold from the native oesophagus at the anastomoses.

Conclusions:
Implantation of decellularized porcine oesophageal scaffolds is possible in a rabbit model with encouraging early functional and histological outcomes and does not appear to trigger an immunogenic response. Use of decellularized xenogeneic material could considered for repair of newborn congenital malformations where autologous or decellularized human tissue cannot be obtained.

Innovation Session (cont.)

Figure 1. Histology of implanted scaffold.



Scientific Session III

Scientific Session III

Clinical Surgery II – Quality Improvement
Tuesday, May 17, 8:00 – 9:15 a.m.

29

SURGICAL SITE INFECTION REPORTING: MORE THAN MEETS THE AGAR

Luke R. Putnam, MD, MS[1], Tiffany G. Ostovar-Kermani, MD, MPH[1], Andrea Le Blanc, MPH[2], Kathryn T. Anderson, MD, MPH[1], Galit Holzmann-Pazgal, MD[1], Kevin P. Lally, MD, MS[1], KuoJen Tsao, MD[1].
[1]University of Texas Health Science Center at Houston, Houston, TX, USA, [2]Children's Memorial Hermann Hospital, Houston, TX, USA.

Purpose:
Surgical site infection (SSI) rate in pediatric appendicitis is a commonly used hospital quality metric. However, hospital-based SSI definitions are heterogeneous and oftentimes rely on microbiology cultures. We hypothesized that surveillance of organ-space SSI (OSI) using cultures alone would fail to capture many, clinically-important events.

Methods:
A prospective, multidisciplinary surveillance program between pediatric surgery and infection control recorded 30-day postoperative adverse events for all children (<18 years) undergoing appendectomy for perforated appendicitis from January 2012-July 2015 at a single institution. Perforation was defined as a gross hole in the appendix or the presence of intra-abdominal stool at the time of operation. All patients were treated under standardized appendicitis pathways and suspicious patients for OSI underwent additional imaging. All OSI were identified by postoperative computed tomography or ultrasound. Interventional radiology consults, microbiology results, and 30-day hospital length of stay (LOS) were recorded.

Results:
410 appendectomies were performed with 84 OSI (20%) diagnosed radiographically. 53 cultures (61%) were obtained: 41 were positive (77%) and 12 were negative (23%). Interventional radiology was consulted for 68 OSI (81%) of which 47 (69%) were aspirated/drained and cultures sent; 21 OSI (31%) were too small or too difficult to access. 4 additional cultures were obtained (3 at reoperation and 1 from an existing drain). Mean LOS for all patients was 6.5 ± 4.2 days; LOS for patients with OSI and positive cultures versus negative or no cultures was 13.7 ± 5.4 days and 10.4 ± 3.7 days, respectively (p=0.001). The overall OSI rate identified by positive cultures alone was 10%, whereas the clinically relevant OSI rate was 20%.

Conclusions:
Using positive cultures alone to capture OSI would have identified only half of clinically-important infections. A multidisciplinary approach improves SSI surveillance. Utilizing SSI as a quality metric requires agreed upon standards for diagnosis.

Scientific Session III (cont.)

30

INCREASED RISK OF SURGICAL SITE INFECTION IN OBESE AND OVERWEIGHT PEDIATRIC PATIENTS

Brian P. Blackwood, MD[1], Colin D. Gause, MD[1], Irene Helenowski, PhD[2], Timothy B. Lautz, MD[1], Julia Grabowski, MD[1], Catherine J. Hunter, MD[1].

[1]Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, [2]Northwestern University Feinberg School of Medicine, Chicago, IL, USA.

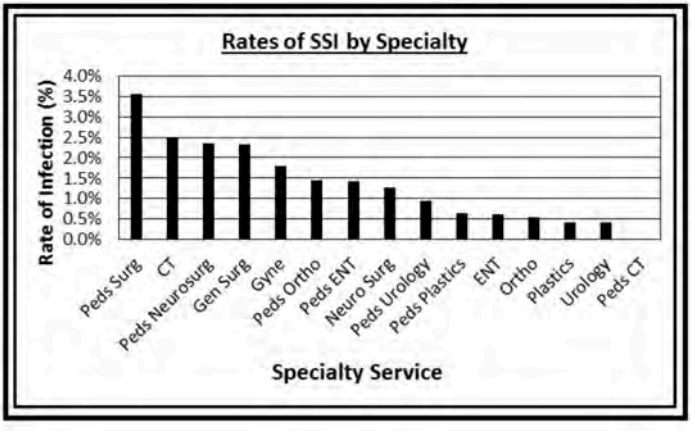
Purpose:
Surgical Site Infections (SSI) are common and costly complications affecting all surgical specialties. Though obesity is known to be a risk factor for SSI in the adult population, its significance in the pediatric population has yet to be determined. We hypothesized that being overweight or obese would be independent risk factors for pediatric patients developing SSI.

Methods:
The ACS NSQIP-Pediatric participant user files from 2012 - 2013 were utilized to identify patients 2 years - 18 years who underwent an operation and the number of cases complicated by postoperative infections (superficial incisional SSI, deep incisional SSI, and organ space SSI). Patients were classified as overweight or obese based on BMI percentiles, according to CDC pediatric growth charts. Comorbidities associated with wound infection, including operative wound classification, diabetes mellitus, immunosuppression, and sepsis were analyzed. Statistical analysis was completed and differences were considered significant at $p<0.05$.

Results:
We identified 66,671 operative patients during the study period, with a total of 1,380 SSI. There were 767 males and 613 females with an average age of 10.4 years. Multivariate analysis revealed that both overweight and obese pediatric patients had an increased risk of developing a SSI (OR 1.23 with 95% CI: 1.06, 1.43; OR 1.43 with 95% CI: 1.25, 1.63). The most common infection in both the overweight and obese cohorts was the superficial incisional SSI (46.4%, 53.5% respectively). Subspecialties with the highest rates of infection recorded were pediatric general surgery (3.6%) and cardiothoracic surgery (2.5%).

Conclusion:
Surgical site infections are a common complication of surgery that greatly add to overall healthcare costs. Herein we have shown elevated BMI to be an independent risk factor for developing a SSI in children. As the incidence of childhood obesity is increasing, this knowledge should be used in assessing and counselling preoperative pediatric surgical patients and their families.

Scientific Session III (cont.)



Scientific Session III (cont.)

31

PEDIATRIC SURGICAL READMISSIONS: ARE THEY TRULY PREVENTABLE?

Erin G. Brown, MD, Debra Burgess, RN, Richard J. Bold, MD, Diana L. Farmer, MD.
University of California, Davis, Sacramento, CA, USA.

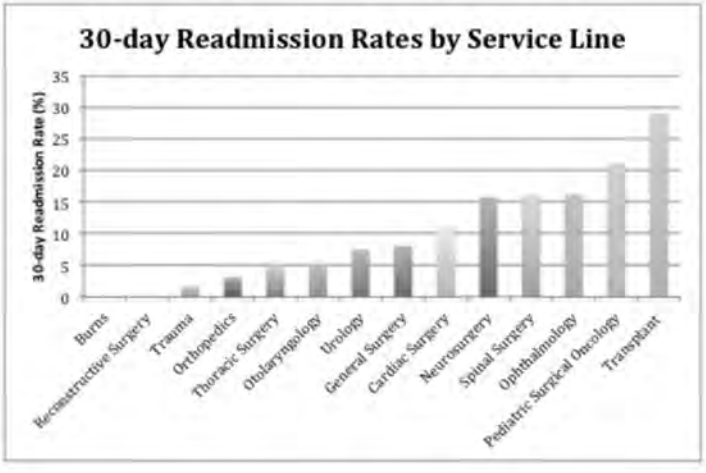
Purpose:
Reimbursement penalties for hospital readmissions in the adult population are driving health care systems to identify risk factors in order to reduce readmissions. These penalties may extend to the pediatric population; therefore, research to determine incidence and predictors is critical.

Methods:
Retrospective review of University HealthSystem Consortium database (N=258 hospitals; 2,723,621 patients) for pediatric patients (age 0-17 years) hospitalized from September 2011 to March 2015. Outcome measures were 7-, 14-, and 30-day all-cause readmission rates. Hospital, service, and patient characteristics were evaluated to identify predictors of readmission.

Results:
Readmission rates at 7, 14, and 30 days were 2.1%, 3.1%, and 4.4%, respectively. There were no significant differences in readmission rates for medical versus surgical services. Furthermore, an emergency index admission was not associated with higher readmission rates. For pediatric surgery patients (N = 260,042), neither length of stay (LOS) from the index hospitalization nor complication rate predicted higher readmissions. Evaluating institutional data (N=5,785), pediatric patients admitted for spine surgery, neurosurgery, transplant, or surgical oncology had higher readmission rates (Figure). The most common readmission diagnoses for surgical patients were infectious causes (35.6%) and nausea/vomiting/dehydration (48.9%); the most common procedure leading to readmission was appendectomy (28.9%). Patients with chronic medical conditions comprised 57.8% of surgery patients readmitted within 7 days of discharge, and 96.2% required multiple rehospitalizations.

Conclusion:
Readmission rates for pediatric patients are significantly lower than for adults. Furthermore, typical risk factors for readmission among adult patients (i.e. medical service, emergent admissions, LOS, or complication rates) do not predict readmission for pediatric patients. Readmission may be a misnomer for the pediatric surgical population as most are related to chronic medical conditions with only a minority for potentially preventable reasons (nausea, vomiting, dehydration).

Scientific Session III (cont.)



Scientific Session III (cont.)

32

INCREASED CAPTURE OF PEDIATRIC SURGICAL COMPLICATIONS UTILIZING A NOVEL CASE-LOG WEB APPLICATION

Jason C. Fisher, MD, Sandra S. Tomita, MD, Keith A. Kuenzler, MD, Howard B. Ginsburg, MD.

NYU Langone Medical Center, New York, NY, USA.

Tweet about it! Use informatics to capture complications. What's REALLY going on with your error rates? A tool that tracks complications @NYUPedSurgery

Purpose:
Documenting pediatric surgical complications is limited by reporting and recall biases, and is not reliably fostered in the electronic health record. Tracking complications is essential for quality improvement and required for board certification. Current national registry platforms do not facilitate meaningful complication reporting. We developed a novel web-application that improves accuracy and reduces barriers to documenting complications.

Methods:
We deployed a self-coded dynamic web application that provides a secure database for pediatric surgeons at our institution to maintain individual case logs. The program included a module that requires surgeons to input their complication data real-time. Active reminders to enter outcome data were programmatically triggered at key postoperative intervals to optimize recall of events. Between October 1, 2014 and March 31, 2015, frequencies of surgical complications as captured by the existing hospital reporting system were compared with data aggregated by our application.

Results:
780 cases were captured by the web application, compared with only 276 cases registered by the legacy system over the six month study period. We observed a substantial increase in the capture of procedure-related major complications when compared to the hospital administrative dataset (14 events vs. 4 events).

Conclusions:
Use of a novel web application by pediatric surgeons for case tracking successfully encouraged real-time reporting of surgical complications, with accuracy and reliability far exceeding current administrative datasets. We plan to leverage these data into highly-accurate surgical outcome reports that provide actionable information for quality improvement efforts. Strategic deployment of custom informatics solutions may help reduce barriers to self-reporting of adverse events, and subsequently improve the value of data that presently informs pediatric surgical quality initiatives.

Scientific Session III (cont.)

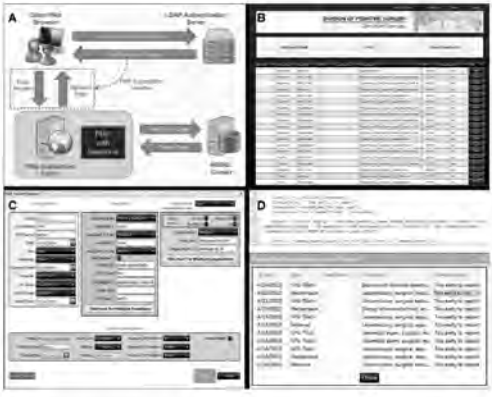


Figure Legend

(A) Web application high-level design and network schematic; (B) Front-end interface of application supports standard create-retreive-update-delete functionality, along with sort/filter/export functions; (C) Detail view for granular entry of complication data; (D) PHP script [top] that executes complication reveiw module [bottom] upon surgeon login.

Scientific Session III (cont.)

33

THE FINANCIAL IMPACT OF FLIPPING THE COIN

Katherine W. Gonzalez, MD, Shiva R. Reddy, BLA, Angela A. Mundakkal, BLA, Shawn D. St. Peter, MD.

Children's Mercy Hospital, Kansas City, MO, USA.

Purpose:
Esophageal foreign bodies warrant prompt retrieval. Traditionally, retrieval has been performed by rigid esophagoscopy with recent transition to flexible esophagoscopy. Despite previous evidence supporting the efficacy and safety of balloon extraction, it is rarely performed. We sought to establish the financial benefits of this minimally invasive option.

Methods:
A retrospective review was conducted in 241 pediatric patients with coins lodged within the esophagus between 2011-2013. Coins were removed via endoscopy or fluoroscopic guided balloon retrieval. Success was defined as extraction or advancement into the stomach. Time of ingestion, symptoms, location, facility cost and patient charges of retrieval and hospital stay were analyzed between these two groups. Food and battery ingestion were excluded. Comparisons using intent-to-treat analysis were performed with Mann Whitney U, Fishers exact, and Chi-square tests.

Results:
Two hundred patients had attempted balloon retrieval with an 80% success rate while 41 patients went directly to operative removal. Median age was 2.7 years (range 0.3-14.1 years). Patients with respiratory difficulty ($p=0.05$), wheezing ($p<0.01$) and fever ($p=0.03$) were more often taken directly for endoscopic retrieval. The cost and charges of the emergency department (ED) were not significantly different between groups ($p=0.85$, $p=0.84$). The median cost and charges for attempted balloon extraction were $484 and $1647. The median operative cost and charges for primary endoscopy were $1834 and $6746. Patients who underwent attempted balloon retrieval were admitted prior to removal in 17% of cases compared to 76% who underwent primary endoscopy ($p<0.001$). The median total cost and charges of attempted balloon extraction including ED, OR, transport, overnight stay, and balloon retrieval were $1231 and $3539 versus $3615 and $12204 in the primary endoscopy group ($p<0.001$, $p<0.001$).

Conclusion:
Fluoroscopic guided balloon extraction of esophageal coins is a financially prudent choice which shortens hospital stay for most patients and should be considered as a reasonable treatment option.

Scientific Session III (cont.)

34

A MULTI-INSTITUTIONAL EVALUATION OF PARENTAL PERCEPTION REGARDING THE NECESSITY OF AN IN-PERSON POSTOPERATIVE VISIT FOR ROUTINE PEDIATRIC SURGERY

Erol M. Knott, DO, PhD[1], Terri-Ann Wattsman, MD[2], Shawn D. St. Peter, MD[1], Charles L. Snyder, MD[1], Sanghee Suh, BS[2], John P. Murphy, MD[1], Walter S. Andrews, MD[1], George W. Holcomb, III, MD[1], Ashley K. Sherman, MA[1], Pablo Aguayo, MD[1], David Juang, MD[1], Corey W. Iqbal, MD[1], Richard J. Hendrickson, MD[1], **Sohail R. Shah, MD, MSHA[1]**.

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]Carilion Clinic, Roanoke, VA, USA.

Tweet about it! #clinicfollowup Find out what parents really think of their follow up appointment – Abstract 34 #eAPSA2016

Purpose:
We have previously reported only 54% of patients present for a postoperative visit after routine pediatric surgery, and 94% have no intervention at the visit. Many pediatric surgeons have moved to phone follow-up for these procedures. In this study, we evaluated parental perception about the necessity of a postoperative visit after routine pediatric surgery.

Methods:
A multi-center survey was conducted from September 2014 - August 2015 of all parents that returned for a postoperative visit following herniorrhaphy (inguinal, umbilical, and epigastric), nonperforated appendectomy, circumcision, or pyloromyotomy. Data variables collected are shown in Table 1. Chi-square or Fisher's exact tests were used to evaluate relationships between collected variables and outcomes. Logistic regression was used to control for confounders.

Results:
Parents completed 537 surveys for the following: 36.1% hernia repair, 36.1% appendectomy, 21.4% circumcision, and 6.3% pyloromyotomy. Prior to the visit 77.7% of parents felt a follow-up visit was necessary. After the visit 62.4% felt it was necessary. Only 27.9% of parents stated that a phone call would be adequate follow-up. After controlling for confounders, a phone call was never the preference and was less likely to be adequate if the parents had any concerns prior to the visit (OR=0.23 [0.01, 0.54], p<0.01) or saw the surgeon at the visit (OR=0.46 [0.24, 0.89], p=0.02). The visit was more likely to be deemed necessary as time spent with the surgical team increased (OR=1.7 [1.1, 2.6], p=0.01). However, 94.7% of parents indicated that no change in their care was made at the postoperative visit.

Conclusions:
Based on these data, we conclude that in a select group of patients the postoperative visit after routine pediatric surgery is perceived by parents to be an important part of their care.

Scientific Session III (cont.)

Table 1. Data variables collected through survey.

Age
Procedure type
Seen by surgeon vs. resident or nurse practitioner
Time spent waiting for surgical team
Time spent with surgical team at office visit
Total time spent for office visit (including travel)
Method of transportation to office visit
Any work missed
Any difficulties in keeping the appointment
Any school missed
Any changes made at the office visit
Any concerns prior to the office visit
Any postoperative complications

Scientific Session III (cont.)

35

IMPROVING OUTCOMES IN CORRECTION OF PECTUS EXCAVATUM WITH A GOAL-DIRECTED PRE-OPERATIVE PHYSICAL THERAPY PROGRAM

Robert L. Gates, MD, Susan Denninger, DPT, James Green, MD, Brianna Knott, BS, Dawn Blackhurst, PhD.

Greenville Hospital System, Greenville, SC, USA.

Purpose:
The purpose of this study was to determine the effect of a goal-directed physical therapy (PT) program on the post-operative recovery of patients who underwent minimally invasive placement of a pectus bar for correction of pectus excavatum deformity.

Methods:
Following IRB approval, a retrospective chart review of patients who had pectus bar placement was performed to compare those who underwent a regimented, goal-directed pre-operative PT program with those who did not. PT intervention consisted of aerobic exercise, manual therapy, and strengthening and flexibility exercises. Therapists also provided extensive patient education on post-operative movement precautions and mobility expectations. Outcome measures used were post-operative length of stay, pain scores, and ability to transfer and ambulate without assistance.

Results:
This was a single institution, 15 year study involving four surgeons. There were 83 patients in the PT program (group A) and 90 who did not have pre-operative PT (group B). Both groups were comparable with respect to patient age (15.3 versus 15.1 years), gender, race, and Haller index. Patients in group A had shorter hospital length of stay (3.58 days versus 5.72 days, $p<0.001$). Group A patients also had more rapid return to activity based upon their ability to ambulate without assistance (2.77 days versus 4.35 days, $p<0.001$) and to move from supine to sit without assistance ($p=0.04$). Notably, although no patients in group A had epidural catheters, they had equivalent pain scores on days one through three when compared to group B who had epidural catheters.

Conclusions:
We recommend a goal-directed PT program for patients with pectus excavatum in whom surgical correction is planned. The resultant increased chest wall flexibility, strength, and endurance facilitates the surgical correction and this obviates the need for an epidural catheter, decreases hospital stay, and hastens the time of return to activity.

Scientific Session III (cont.)

36

UTILITY OF ROUTINE PELVIC X-RAY IMAGING IN PEDIATRIC BLUNT TRAUMA

Robert M. Dorman, MD[1], Hibbut-ur-Rauf Naseem, MD[1], Arianne T. Train, DO[1], Kunal Chadha, MD[2], Frank Carnevale, MD[2], Kathryn D. Bass, MD[3], David H. Rothstein, MD, MS[3].

[1]Department of Pediatric Surgery, Women & Children's Hospital of Buffalo, Buffalo, NY, USA, [2]Department of Emergency Medicine, Women & Children's Hospital of Buffalo, Buffalo, NY, USA, [3]Department of Surgery, Women & Children's Hospital of Buffalo, Buffalo, NY, USA.

Purpose:
To determine the utility of routine pelvic x-ray imaging in the initial evaluation of pediatric blunt trauma.

Methods:
We conducted a retrospective chart review of patients less than 18 years old with traumatic pelvic fractures at a Level 1 pediatric trauma center (2000-2015). A clinical predictive rule (CPR) was constructed consisting of Glasgow Coma Score less than 14, systolic hypotension, gross lower extremity deformity, abnormal exam of the pelvis (compression, range of motion, or visible trauma), microhematuria on urinalysis when performed, or hematocrit less than 30 percent. Outcomes of interest were 1) any pelvic fracture and 2) clinically important pelvic fracture (defined as any fracture requiring an operation or casting, or intentional restriction of physical activity).

Results:
One hundred forty five patients were included for analysis. Of these, 124 had pelvic x-rays performed at presentation (92.5%). The CPR had a sensitivity of 88.8% for any pelvic fracture, and 90.4% for a clinically important pelvic fracture. Pelvic x-ray alone had a significantly lower sensitivity: 73.8% for any pelvic fracture ($p=0.002$), and 77.7% for a clinically significant pelvic fracture ($p=0.029$). Fifteen patients had fractures missed by the CPR. Fourteen were detected by pelvic x-ray and one by computer tomography. A combination of the CPR and pelvic x-ray was significantly more sensitive (96.2%) for any fracture than either CPR ($p=0.034$) or pelvic x-ray ($p<0.001$) alone. This combination was not superior to the CPR for clinically important fractures ($p=0.126$).

Conclusions:
In pediatric blunt trauma, clinically important pelvic fractures may be better diagnosed by a clinical predictive rule than by routine pelvic x-rays. Further work is needed to refine the role for pelvic x-ray imaging in blunt pediatric trauma workup. Routine use of such imaging may be neither sensitive nor cost effective, and may expose children to unnecessary pelvic irradiation.

Scientific Session IV

Scientific Session IV

Basic Science II – NEC/Intestinal Ischemia, Short Gut/Tissue Engineering
Tuesday, May 17, 8:00 – 9:15 a.m.

37

STROMAL CELL SOURCE DOES NOT IMPACT SURVIVAL OR MESENTERIC PERFUSION FOLLOWING INTESTINAL ISCHEMIA

Amanda R. Jensen, MD, Morenci M. Manning, MS, Sina Khaneki, MD, Troy A. Markel, MD.

Indiana University School of Medicine, Indianapolis, IN, USA.

Purpose:
Transplantation of mesenchymal stromal cells (MSCs) may be a novel treatment for intestinal ischemia. The optimal stromal cell source that could yield maximal protection following injury, however, has not been identified. We hypothesized that: (1) MSCs would increase seven day survival and post-ischemic mesenteric perfusion compared to differentiated keratinocyte controls following intestinal ischemia, and 2) differences in MSC source tissue would not impact survival or mesenteric perfusion following injury.

Methods:
Adult male C57Bl6J mice were anesthetized and a midline laparotomy performed. The intestines were eviscerated, the small bowel mesenteric root identified, and baseline intestinal perfusion determined using Laser Doppler Imaging. Intestinal ischemia was established by temporarily occluding the superior mesenteric artery for 60 minutes with a non-crushing clamp. Following ischemia, the clamp was removed and the intestines were allowed to recover. Prior to abdominal closure, two million human umbilical (hUSCs), adipose (hASCs), or bone-marrow (hBMSCs) MSCs, or keratinocytes in 250ul of PBS vehicle were injected into the peritoneum. Animals were allowed to recover for 12 or 24 hours (perfusion studies), or 7 days (survival studies). Survival data was analyzed using Mantel-Cox and Gehan-Breslow-Wilcoxon tests. Perfusion was expressed as percentage of baseline and compared with two way ANOVA and student's t-test. P less than 0.05 was significant.

Results:
All MSC lines increased seven day survival following intestinal ischemia and were superior to vehicle or keratinocytes (Figure 1A,$P<0.05$). MSCs also increased mesenteric perfusion above vehicle at 12 and 24 hours following injury ($P<0.05$). All MSCs provided superior perfusion compared to keratinocytes at 24 hours post-injury (Figure 1B). There were no significant survival or perfusion differences observed between MSC lines.

Conclusion:
Transplantation of MSCs following intestinal ischemia increases survival and mesenteric perfusion irrespective of stromal cell source. Further studies are needed to identify the mechanism that these cells utilize to promote improved outcomes following injury.

Scientific Session IV (cont.)

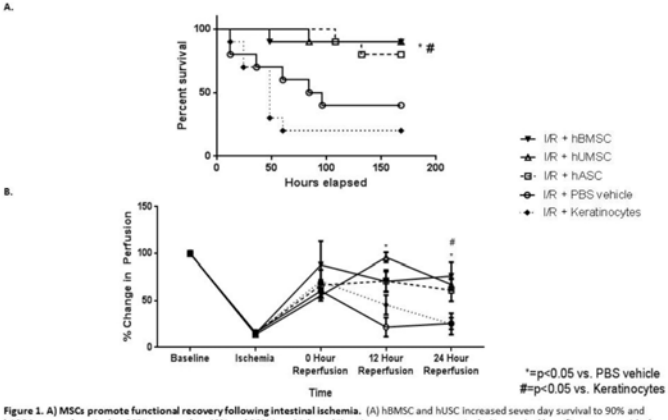


Figure 1. A) MSCs promote functional recovery following intestinal ischemia. (A) hBMSC and hUSC increased seven day survival to 90% and hASC increased survival to 80% compared to 40% and 20% in vehicle and Keratinocyte groups respectively. No survival benefit was seen with the use of keratinocytes (differentiated cell control). (B) The use of hBMSC, hUMSC or hASC all significantly increased mesenteric perfusion above vehicle at both 12 and 24 hours, and above keratinocytes at 24 hours following injury. There was no statistical significance between mesenchymal stem cell lines with regard to survival or mesenteric perfusion.

Scientific Session IV (cont.)

38

EPIGENETIC REGULATION OF INTESTINAL STEM CELL POPULATION DURING EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Bo Li, PhD, **Raffaello Bonacchi, MD**, Adam Minich, MD, Carol Lee, MSc, Elke Zani-Ruttenstock, MD, Augusto Zani, MD, PhD, Agostino Pierro, MD.
The Hospital for Sick Children, Toronto, ON, Canada.

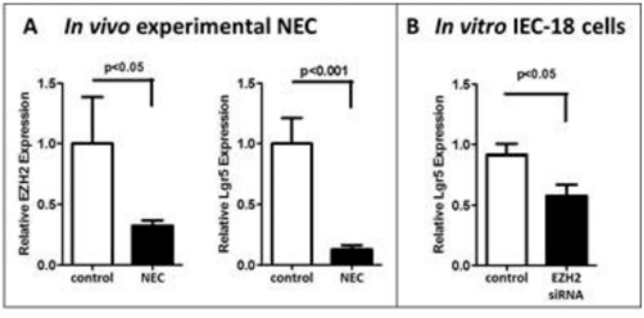
Purpose:
Lgr5+ intestinal epithelial stem cells (ISCs) are crucial for intestinal epithelial homeostasis. Modulating ISCs might be useful for the treatment of neonatal intestinal diseases such as necrotizing enterocolitis (NEC). Enhancer of zeste homolog 2 (EZH2) plays an important role in epigenetic regulation of gene expression. The aim of this study was to investigate the role of EZH2 in regulating Lgr5 expression in neonatal mice with experimental NEC.

Methods:
In vivo: following ethical approval (n.32238) we studied neonatal mice with NEC (gavage feeding with hyperosmolar formula, hypoxia and oral lipopolysaccharide). The Ileum was harvested and analyzed by RT-PCR for Lgr5 (ISC marker) and Ezh2 expression and by immunofluorescence staining for LGR5, EZH2 and H3K27Me3 (histone targeted by EZH2). *In vitro*: to explore the correlation between Ezh2 and Lgr5, Ezh2 was silenced by RNA interference in IEC-18 cells. Silencing was confirmed by EZH2 protein expression (Western blot) and H3K27Me3 immunofluorescence. Lgr5 expression was analyzed by RT-PCR. Data were compared using Mann-Whitney U test.

Results:
In vivo: compared to control, induction of experimental NEC was associated with decreased Lgr5 ($p<0.001$) and EZH2 ($p<0.001$) RNA expression (Figure A). These results were confirmed by immunofluorescence demonstrating concomitant low expression of LGR5, EZH2 and H3K27Me3 in the villi. *In vitro*: in IEC-18 cells, we demonstrated that EZH2 blockage resulted in decreased Lgr5 expression compared to control cells ($p<0.05$) (Figure B).

Conclusion:
During experimental NEC, EZH2 and Lgr5 expression levels decrease. Silencing Ezh2 expression *in vitro* results in decreased Lgr5 levels. We propose that a decreased activity of Ezh2 can be responsible for the low expression of Lgr5+ ISCs observed in NEC. These data provide new insights on the pathophysiology of NEC and open new avenues for a novel treatment of NEC based on epigenetic regulation of Lgr5+ ISCs.

Scientific Session IV (cont.)



Scientific Session IV (cont.)

39

INTESTINAL STEM CELL ACTIVITY IS REDUCED DURING EXPERIMENTAL NECROTIZING ENTEROCOLITIS BUT IS RECOVERED BY ADMINISTRATION OF AMNIOTIC FLUID STEM CELLS

Elke Zani-Ruttenstock, MD[1], Augusto Zani, MD, PhD[1], Bo Li, PhD[1], Paolo De Coppi, MD, PhD[2], Carol Lee, MSc[1], Agostino Pierro, MD[1].

[1]The Hospital for Sick Children, Toronto, ON, Canada, [2]University College London Institute of Child Health, London, United Kingdom.

Tweet about it! Stem cell therapy could be a novel treatment strategy for babies with NEC – Abstract 39 #eAPSA2016

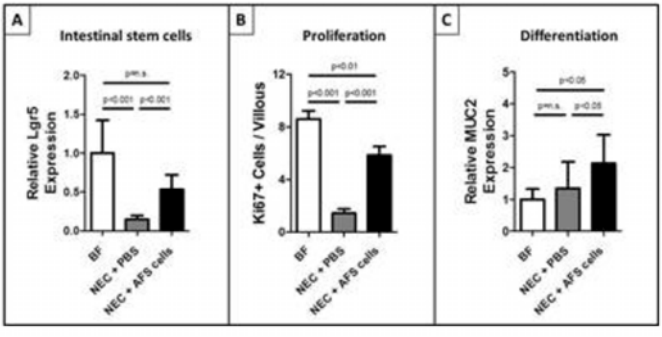
Purpose:
Amniotic fluid stem (AFS) cells have been reported to be beneficial in experimental necrotizing enterocolitis (NEC). The role of resident intestinal stem cells (ISC) during NEC is unknown. We aimed to evaluate whether ISC are affected by experimental NEC and whether administration of AFS cells improves intestinal damage via activation of ISC.

Methods:
Following ethical approval (n.32238), NEC was induced in 5-days old neonatal C57BL/6 mice (n= 20) using gavage feeding of hyperosmolar formula, hypoxia and oral lipopolysaccharide (4mg/kg). On day 6 and 7, mice received intraperitoneal injection of phosphate buffered saline (NEC+PBS) or 2x106 AFS cells (NEC+AFSC). Breastfed mice (BF, n= 10) served as control. After sacrifice on day 9, the ileum was harvested. Groups were compared for bowel damage (hematoxylin/eosin) by three blinded investigators, inflammation (quantitative PCR for interleukin-6), intestinal stem cell populations (Lgr5 for mitotically active ISC, Bmi1 for quiescent ISC), enterocyte proliferation (Ki67) and differentiation (Muc2). Data were compared using one-way ANOVA with Bonferroni post-test.

Results:
Bowel damage was more severe in NEC+PBS compared to BF mice ($p<0.01$) and improved after treatment with AFS cells ($p<0.05$). Interleukin-6 expression was higher in NEC+PBS compared to control ($p<0.001$), and was reduced by AFS cells ($p<0.001$). Lgr5 ISC were impaired in NEC+PBS compared to control ($p<0.001$) but recovered after AFS cells administration ($p<0.001$, Figure A). Conversely, quiescent ISC were not affected by experimental NEC or AFS cell administration. AFS cell injection promoted intestinal epithelial proliferation at the bottom of crypts (Figure B) and differentiation into intestinal epithelium cells ($p<0.01$ to NEC+PBS, Figure C).

Conclusion:
Resident ISC are reduced during experimental NEC. AFS cell administration activates Lgr5 ISC, promotes intestinal epithelial proliferation and differentiation and reduces intestinal damage. This study highlights the potential of stem cell therapy as a novel treatment for NEC.

Scientific Session IV (cont.)



Scientific Session IV (cont.)

40

METABOLIC DYSFUNCTION IN PREMATURE INFANTS IS ASSOCIATED WITH NECROTIZING ENTEROCOLITIS

Tiffany J. Sinclair, MD[1], Zachary J. Kastenberg, MD, MS[1], R. Larry Moss, MD[2], Gregory M. Enns, MB, ChB[1], Tina M. Cowan, PhD[3], Gary M. Shaw, Dr.PH.[1], David K. Stevenson, MD[1], Robert J. Currier, PhD[4], Curt Scharfe, PhD[5], Kelli K. Ryckman, PhD[6], Laura L. Jelliffe-Pawlowski, PhD[7], Karl G. Sylvester, MD[1].

[1]Lucile Packard Children's Hospital, Stanford University School of Medicine, Stanford, CA, USA, [2]Nationwide Children's Hospital, Ohio State University, Columbus, OH, USA, [3]Stanford Health Care, Stanford University School of Medicine, Stanford, CA, USA, [4]California Department of Public Health, Richmond, CA, USA, [5]Stanford University, Stanford, CA, USA, [6]University of Iowa, College of Public Health, Iowa City, IA, USA, [7]University of California San Francisco School of Medicine, San Francisco, CA, USA.

Purpose:
Necrotizing Enterocolitis (NEC) occurs predominantly in preterm infants and has been associated with enteral feedings and administration of total parenteral nutrition. We hypothesized that premature newborns that develop NEC have metabolic abnormalities that are exacerbated by clinical practice.

Methods:
This study had two arms. A retrospective cohort study was conducted of all preterm NICU admissions in California from 2005 to 2008 and included 94,110 infants with linked acylcarnitine (AC) and AC ratio results measured as part of routine newborn screening (NBS) by the California Genetic Disease Screening Program within the California Department of Public Health. AC levels were also measured in the plasma of a prospectively followed cohort of preterm newborns with Bells Stage II-III NEC (n=25) and non-infected controls (n=16). Odds ratios (OR) and 95% confidence intervals were calculated to determine the relationship between acylcarnitine levels and the risk of NEC in both cohorts.

Results:
NBS revealed fourteen ACs and AC ratios that were associated with the risk of developing NEC. Each log unit increase in C-5 and FC/(C-16+C-18:1) was associated with a 78% and a 76% increased risk for developing NEC in the , respective sample (OR 1.78, 95% CI 1.53 - 2.02, and OR 1.76, 95% CI 1.51 - 2.06). ACs consistently associated with risk in both the retrospective and prospective cohorts included C-10 (retrospective OR O.82 CI 0.73-0.93; prospective OR 1.013 CI 0.801-1.148) C-12 (retrospective OR 0.69: CI 0.60-0.78; prospective OR 32.24:CI 13.7-42.5) and C-16 (retrospective OR 0.61 CI 0.52-0.73; prospective OR 18.53: CI 10.47-23.27).

Conclusion:
Many premature infants manifest metabolic abnormalities within the first week of life that are associated with the subsequent development of necrotizing enterocolitis. These abnormalities are related to fatty acid metabolism and the production of organic acids. Together, these findings suggest metabolic differences present very early in life contribute to this devastating disease.

Scientific Session IV (cont.)

41

INTESTINAL EPITHELIAL INJURY FOLLOWING MATERNAL SEPARATION IS RESCUED BY HYDROGEN SULFIDE

Bo Li, PhD, **Augusto Zani, MD, PhD**, Zechariah Martin, MD, Carol Lee, MSc, Elke Zani-Ruttenstock, MD, Agostino Pierro, MD.

The Hospital for Sick Children, Toronto, ON, Canada.

Tweet about it! H2S protects the colon from the epithelial damage, oxidative stress and inflammation – Abstract 41 #eAPSA2016

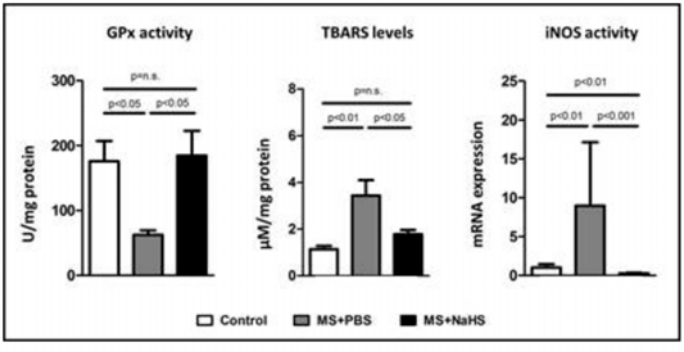
Purpose:
Oxidative stress has been implicated in the pathogenesis of neonatal diseases, and may contribute to the disruption of intestinal epithelium. Hydrogen sulfide (H2S) has been reported to have a protective function against oxidative stress in the gut. We hypothesize that in neonatal mice administration of H2S can decrease intestinal epithelial injury induced by maternal separation (MS).

Methods:
Five-day-old C57BL/6 mice received an intraperitoneal injection of phosphate buffered saline (MS+PBS; n=10) or sodium hydrosulfide (MS+NaHS, a H2S donor, 1mg/kg/day; n=10). After treatment, mice were separated from their mothers for 3 hours daily between P5 and P9. Untreated neonatal mice served as control (n=10 per group). The proximal colon was harvested on P9 and analyzed for goblet cell number per crypt and crypt length (Alcian blue, hematoxylin/eosin), oxidative stress (glutathione peroxidase - GPx, thiobarbituric acid reactive substances - TBARS, inducible nitric oxide synthase - iNOS) and inflammation (myeloperoxidase - MPO, Interleukin 6 - IL6, tumor necrosis factor alpha - TNFα). Groups were compared using one-way ANOVA with Bonferroni post-test.

Results:
Morphology: compared to control, MS+PBS mice had fewer goblet cells per crypt ($p<0.001$) and shorter crypt length ($p<0.001$). NaHS treatment rescued goblet cell number ($p<0.05$) and crypt length ($p<0.001$). Oxidative stress (Figure): compared to control, MS+PBS mice had lower GPx activity ($p<0.05$), and higher TBARS levels ($p<0.01$) and iNOS activity ($p<0.001$). NaHS treatment increased GPX activity ($p<0.05$), and decreased TBARS ($p<0.05$) and iNOS ($p<0.001$) levels. Inflammation: MPO, IL-6, TNFα expression levels were increased in MS+PBS mice compared to control ($p<0.001$), but were rescued after NaHS administration ($p<0.01$).

Conclusions:
H2S protects the colon from the epithelial damage, oxidative stress and inflammation caused by maternal separation. This study provides insights on the pathogenesis of neonatal bowel diseases and indicates the potential for a pharmacological intervention to rescue the intestinal epithelium during oxidative stress.

Scientific Session IV (cont.)



Scientific Session IV (cont.)

42

CHANGES IN THE INTESTINAL MICROBIOTA IN CHILDREN WITH SHORT BOWEL SYNDROME UNDERGOING TREATMENT FOR BACTERIAL OVERGROWTH

Hannah G. Piper, MD, Lorrie Burkhalter, CCRC, Barbara Drews, APNP, Nandini Channabasappa, MD, Andrew Y. Koh, MD.

University of Texas Southwestern Medical Center, Dallas, TX, USA.

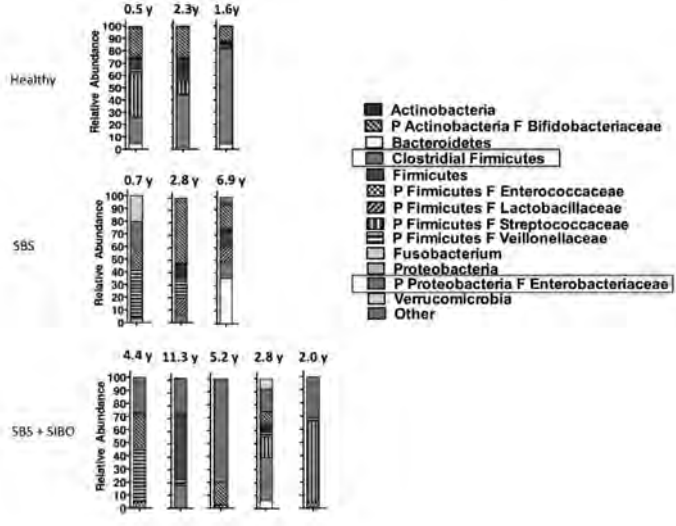
Purpose:
Predicting enteral independence in children with short bowel syndrome (SBS) can be difficult. Disturbances in the intestinal microbiota, including small intestinal bacterial overgrowth (SIBO) may contribute to intestinal dysfunction. In this study next generation sequencing is used to characterize the microbiota in children with SBS and SBS+SIBO.

Methods:
Stool was collected over 3 months from healthy children, children with SBS and children with SBS+SIBO. SBS was defined as dependence on parenteral nutrition for > 3 months after intestinal loss. SIBO was defined as flatulence, abdominal distension and/or pain in patients receiving cycled antibiotics. Fecal microbiota were characterized using 16S rRNA and metagenomic sequencing. Findings were compared among groups and correlated with clinical and nutritional parameters using t-test, Mann-Whitney-Wilcoxon and ANOVA, with $p < 0.05$ considered significant.

Results:
Fecal samples (n=41) were collected from 3 healthy children, 3 with SBS and 5 with SBS+SIBO. Demographics and intestinal anatomy did not differ significantly between SBS and SBS+SIBO patients. SBS+SIBO patients had poor growth (mean gain of 0.8g/d and 0.012cm/d) compared to SBS patients (9.7g/d and 0.041cm/d, p=0.08). The microbiota of healthy children consisted of 47% anti-inflammatory Clostridia (AIC) compared to 7% and 10% in SBS and SBS+SIBO patients respectively (p=0.025). Children with SBS+SIBO had 37% pro-inflammatory Proteobacteria Enterobacteriaceae (ENTERO) compared to 7% in SBS and 1% in healthy children (p=0.038) (Figure 1). The microbiota in SBS+SIBO were compared before and after 7 days of Metronidazole. AIC abundance was reduced after antibiotics (28% vs. 7%, p=0.04) and the abundance of ENTERO was increased, although not significantly (5% vs. 16%, p=0.062).

Conclusion:
Children with SBS have alterations in their intestinal microbiota compared to healthy children. Symptoms associated with SIBO may be due to increased pro-inflammatory Enterobacteriacae, making adequate growth difficult. Treatment with antibiotics will change the microbiota but may not target pathogens.

Scientific Session IV (cont.)



Scientific Session IV (cont.)

43

COMBINATION TROPHIC PEPTIDE THERAPY FOR NEONATAL SHORT BOWEL SYNDROME

David W. Lim, MDCM, MEd[1], Crystal Lévesque, PhD[2], Donna F. Vine, PhD[1], Mitsuru Muto, MD, PhD[1], Patrick N. Nation, PhD[1], Pamela R. Wizzard, BSc, RAHT[1], Julang Li, PhD[3], David L. Sigalet, MD, PhD[4], David L. Bigam, MD, MSc[1], Justine M. Turner, MBBS, PhD[1], Paul W. Wales, MD, MSc[5].

[1]University of Alberta, Edmonton, AB, Canada, [2]South Dakota State University, Brookings, SD, USA, [3]University of Guelph, Guelph, ON, Canada, [4]University of Calgary, Calgary, AB, Canada, [5]University of Toronto & Hospital for Sick Children, Toronto, ON, Canada.

Tweet about it! Come see the latest in potential novel therapies for infants with short bowel syndrome #TreatSBS – Abstract 43 #eAPSA2016

Purpose:
The glucagon-like peptide-2 and epidermal growth factor pathways are potentially synergistic in intestinotrophic action. Our purpose is to determine if combined glucagon-like peptide-2 and epidermal growth factor administration translates to improved intestinal adaptation in neonatal short bowel syndrome.

Methods:
Neonatal piglets (n=38) were block randomized to either saline control, glucagon-like peptide-2 (11 nmol/kg/day) alone, epidermal growth factor (80 ug/kg/day) alone, or combined glucagon-like peptide-2 and epidermal growth factor for seven days following a 75% distal intestinal resection (removing all ileum) or no resection (sham control). Piglets were maintained on 80% parenteral nutrition (via intravenous catheter) and 20% paired enteral feeding (via gastrostomy tube). Structural adaptation was assessed by gross intestinal morphology and histology. Functional adaptation was assessed by intestinal permeability (via Üssing flux chamber analysis) and fat absorption. Data was analyzed by 2-way ANOVA, with a level of significance set at $p < 0.05$.

Results:
Combination therapy increased remnant intestinal length compared to saline control ($p=0.01$) while mono-therapy did not. Glucagon-like peptide-2 increased intestinal mucosal weight in comparison to epidermal growth factor alone ($p=0.04$). Both glucagon-like peptide-2 and combination therapy increased jejunal villus height ($p<0.01$). Epidermal growth factor alone reduced crypt depth compared to saline ($p<0.01$). Combination therapy reduced intestinal permeability to mannitol ($p=0.04$) and polyethylene glycol ($p<0.01$). Enteral fat absorption was not affected by treatment.

Conclusion:
Glucagon-like peptide-2 monotherapy had superior benefits on histological structural adaptation, but when combined with epidermal growth factor, intestinal lengthening was observed and intestinal permeability was reduced. In this preclinical model of neonatal short bowel syndrome, combination trophic peptide therapy differentially impacts structural and functional adaptation.

Scientific Session IV (cont.)

44

THE EFFECT OF ENTEROID SEEDING DENSITY ON THE PRODUCTION OF TISSUE ENGINEERED INTESTINE (TEI)

Barrett P. Cromeens, DO, PhD, Yanchun Liu, MD, Johnathan Stathopolous, BS, Natalie Huibregtse, BS candidate, Gail E. Besner, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Purpose:
The production of TEI to treat patients with short bowel syndrome (SBS) may be limited by the amount of donor intestine available for cell seeding of scaffolds. We have previously shown that TEI can be produced from enteroids cultured and expanded *ex vivo*. Our current goal was to determine the optimal enteroid seeding density for maximizing TEI production.

Methods:
Jejunal crypts were harvested from LGR5-EGFP transgenic mice and used to establish enteroid cultures. LGR5-EGFP mice express green fluorescent protein in the intestinal stem cells (ISC) of the crypts, allowing easy ISC identification. After 11-14 days in culture, enteroids were seeded onto polyglycolic acid (PGA) scaffolds at ten (n=8), twenty (n=10), or thirty (n=12) enteroids/mm3 of PGA. Seeded scaffolds were implanted into the peritoneal cavity of NOD/SCID mice for 4 weeks. TEI architecture was characterized with Periodic Acid Schiff (PAS) staining of tissue sections. Neomucosa was quantified using ImageJ software. Epithelial components were identified with both PAS staining and immunofluorescence (IF).

Results:
Enteroids seeded at ten, twenty, and thirty enteroids/mm3 of PGA produced TEI in 87.5%, 100%, and 58.3% of attempts, respectively. Seeding with twenty enteroids/mm3 of PGA produced significantly more neomucosa (18,918 μm) compared to either ten (6211 μm) or thirty (1694 μm) enteroids/mm3 of PGA ($p \leq 0.05$). PAS staining and IF confirmed the presence of goblet cells, Paneth cells, enterochromaffin cells, and LGR5-positive ISC in the TEI produced.

Conclusions:
Seeding with 20 enteroids/mm3 of PGA maximizes the quantity of TEI produced. This improvement is vital to the advancement of enteroid cultures as a novel solution to the production of TEI in the face of limited donor cell availability. Future experiments will continue to refine the use of cultured enteroids as a source of TEI production for patients with SBS.

Plenary Session II

Plenary Session II

Tuesday, May 17, 11:00 a.m. – Noon

45

ARE WE USING THE RIGHT DATA TO OPTIMIZE THE FUTURE PEDIATRIC SURGERY WORKFORCE IN THE UNITED STATES?

Lori A. Gurien, MD, MPH, Melvin S. Dassinger, MD, Jeffrey M. Burford, MD, Samuel D. Smith, MD.

Arkansas Children's Hospital, Little Rock, AR, USA.

Purpose:
Pediatric surgery is characterized by the age of patients we provide surgical care, ranging from newborns to young adults. Recent recommendations from pediatric surgery leadership to reduce fellowship positions are based exclusively on decreases in birth rate and operative experience with congenital anomalies and malignancies. We examined growth of different fellowship positions and various pediatric procedures to determine if other pediatric procedural specialties share this view.

Methods:
After IRB approval, data was extracted from the National Residency Match Program and the American Medical Association annual program director survey to calculate growth in specialty training positions. Performing PubMed searches, we determined changes in prevalence of common pediatric surgical procedures.

Results:
From 2008 to 2014, pediatric surgery training positions sustained the lowest growth (11.8%) compared to other procedural specialties, while pediatric otolaryngology had the largest growth (420%) (Table). The growing prevalence of common, childhood surgical interventions has surpassed the growth rate of congenital anomalies and tumors in the United States, although abdominal wall closures for gastroschisis almost doubled between 1995 and 2005. Esophagogastroduodenoscopies increased 12-fold from 1985 to 2005 while endoscopic retrograde cholangiopancreatographies (1993-1999 to 2006-2011) and peripherally inserted central catheters (2001 to 2012) tripled in recent years.

Conclusion:
Pediatric surgical interventions have increased substantially. Other specialties have focused efforts on broadening their practice scope and increasing training positions. Limiting pediatric surgery to rare congenital and malignant cases gives other fields the opportunity to infringe on our domain. Instead, pediatric surgery must rethink its future workforce and find innovative ways to expand the breadth and variety of conditions we treat to continue as the primary providers of pediatric surgical care.

Plenary Session II (cont.)

Growth of specialty training positions filled						
Specialty	**2008**	**2010**	**2012**	**2013**	**2014**	**% change**
Pediatric Surgery	34	34	39	45	38	11.8%
Pediatric Gastroenterology	52	56	73	68	78	50.0%
Interventional Radiology	89	146	201	208	219	146.1%
Pediatric Otolaryngology	5	12	21	26	Not available	420.0%
All Fellowships	4371	5348	6138	6551	7246	65.8%

Plenary Session II (cont.)

46

PREDICTING THE FUTURE POPULATION OF PEDIATRIC SURGEONS

Tate R. Nice, MD, MSPH, Mike Chen, MD.
Children's of Alabama, Birmingham, AL, USA.

Purpose:
Debate about the ideal number of pediatric surgeon trainees has arisen. This study examines how changes in pediatric surgery trainee numbers affect the future population of pediatric surgeons.

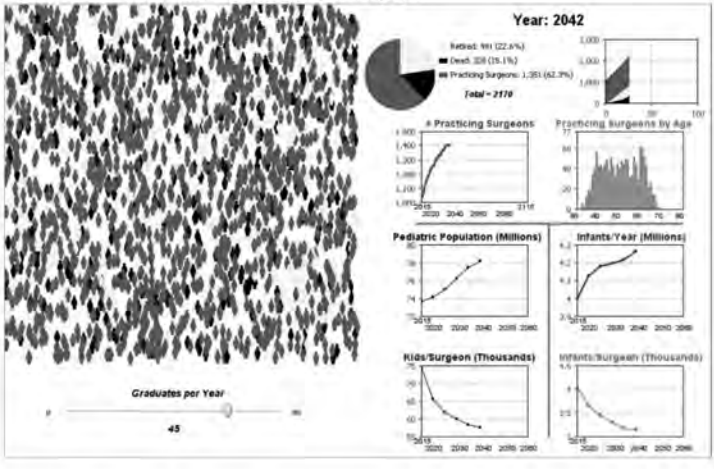
Methods:
An agent-based computer model was created using Anylogic to simulate the population of pediatric surgeons in the US. Current American Pediatric Surgical Association membership, US census predictions, and US age-adjusted mortality rates were used for model assumptions. Models were followed out to 2060. Monte Carlo techniques were utilized to help account for uncertainties in the model. A screenshot from a single model can be seen in Figure 1.

Results:
6100 models were created, 100 repetitions for each number of trainees from 0 to 60. A new steady state of practicing surgeons is not reached until 30 years after each change in the number of trainees. For each additional trainee per year, the future population of surgeons increases by 30. In 2015, an estimated 1000 practicing pediatric surgeons represents 3,999 infants/surgeon. With 35 trainees per year, there will be approximately 1037 practicing surgeons in 2060. Infants/surgeon ratio will initially decrease to 3,760 around 2029 and then increase to 4,360 in 2060. However at 50 trainees per year, there will be 1482 practicing surgeons in 2060, resulting in a 50% increase in surgeons and 25% decrease in infants/surgeon (3,050). Children [age 0-17] /surgeon ratios change similarly to infants/surgeon.

Conclusion:
Changes in the number of pediatric surgery trainees have lasting effects on the population of pediatric surgeons. This information can be used to help determine the ideal number of trainees based on current and future population needs. At current trainee levels around 50 per year, there may be a 50% increase in pediatric surgeons and a 25% decrease in infants per surgeon.

Plenary Session II (cont.)

Figure 1: Example screenshot from a model with 45 graduates per year



Plenary Session II (cont.)

47

TISSUE-ENGINEERED LIVER RESCUES HEPATIC FAILURE IN AN ARGINASE-1 KNOCKOUT MODEL

Andrew Trecartin, MD[1], Nirmala Mavila, PhD[1], Ryan Spurrier, MD[1], Gloria Cantero, PhD[2], Kasper Wang, MD[1], Gerald S. Lipshutz, MD[2], Tracy Grikscheit, MD[1].

[1]Children's Hospital Los Angeles, Los Angeles, CA, USA, [2]UCLA Department of Surgery, Los Angeles, CA, USA.

Tweet about it! This demonstrates tissue-engineered liver can replace hepatic metabolic function – Abstract 47 #eAPSA2016

Purpose:
Treatment of liver failure is limited by donor organ supply and associated with severe complications. Tissue engineering the liver could overcome these challenges. Our lab has successfully tissue engineered intestine and therefore we hypothesized that a similar approach would also generate tissue-engineered liver capable of replacing hepatic function. Analogous to some human urea cycle disorders, arginase-1 deficiency in the mouse causes hyperammonemia and is uniformly fatal in female mice in particular by twenty-three days after ARG1 knockout. We hypothesized that our tissue-engineered liver (TELi) would prevent development of hyperammonemia and death in this model.

Methods:
Liver tissue from two-week-old C57BL/Ka-β-actin-EGFP mice was prepared similar to our published protocol for intestine and loaded onto polyglycolic acid and poly-L lactic acid scaffold followed by subcutaneous implantation in female $Fah^{-/-}Rag2^{-/-}Il2rgamma^{-/-}Arg^{flox/flox}$ UBC-cre/ERT2 murine hosts (n=10). Three to six weeks after implantation, hosts received tamoxifen to induce ARG1 knockout. Blood sampling was performed upon completion of tamoxifen induction and weekly thereafter. Harvest occured at least two weeks later than previously published controls (n=10) uniformly die with hyperammonemia. Implants from all survivors were evaluated with H&E (n=10) and immunofluorescence (n=3). Serum ammonia levels were quantified (n=6).

Results:
Ninety-percent (9/10) of mice with TELi survived at least 2 weeks longer than those without implants and appeared healthy at the time of harvest. All nine survivors demonstrated cells and structures consistent with hepatocytes and bile ducts. All host samples examined with immunofluorescence demonstrated numerous E-cadherin and GFP-positive donor cells. Measured serum ammonia levels decreased in TELi survivors indicating transplanted cellular function.

Conclusion:
Tissue-engineered liver successfully replaced hepatic metabolic function in mouse arginase-1 deficiency that is uniformly fatal in female mice, preventing hyperammonemia and death. This represents a foundational step toward developing tissue-engineered liver for human therapy.

Plenary Session II (cont.)

48

MEASURING THE VALUE OF A CLINICAL PRACTICE GUIDELINE FOR CHILDREN WITH PERFORATED APPENDICITIS

Jamie R. Robinson, MD[1], Elenir B.C. Avitscher, MD, PhD, MBA[2], James C. Gay, MD, MMHC[2], Zachary I. Willis, MD[1], Luke R. Putnam, MD, MS[2], Andrew Anglemeyer MMHC[1], Jon E. Tyson, MD, MPH[2], Martin L. Blakely, MD, MS[1].

[1]Vanderbilt University Medical Center, Nashville, TN, USA, [2]Vanderbilt Children's Hospital, Nashville, TN, USA.

Tweet about it! Clinical Practice Guidelines for perforated appendicitis improve outcomes and decrease costs. #CPGImprovesValue @jamie_robMD #eAPSA2016

Purpose:
Value-based surgical care (outcomes/cost) is frequently discussed, but rarely measured. Our goal was to prospectively measure patient-centered outcomes and hospital costs associated with the treatment of children with perforated appendicitis directed by a clinical practice guideline (CPG) compared to treatment by surgeon preference. A secondary goal was to compare cost analyses using hospital accounting system data versus data available in the Pediatric Health Information System (PHIS).

Methods:
An evidence-based CPG directed care of 122 children with perforated appendicitis over an 18-month period at a tertiary-referral children's hospital. Demographic data, presenting characteristics, treatments utilized, and outcomes were prospectively measured. The same data were collected for all children with perforated appendicitis in the 30 months prior to CPG implementation (n=191). Clinical outcomes and financial metrics were compared between the two cohorts. PHIS financial data were obtained and compared to the hospital cost accounting data. Categorical outcomes were compared using chi-square analysis and continuous variables with t-tests; $p < 0.05$ was considered significant.

Results:
Major morbidities, resource utilization, and financial outcomes using hospital cost accounting data were all improved with CPG-directed care (table). PHIS financial data demonstrated a 29% reduction in overall hospital costs ($5573/patient, $p < 0.0001$) in the CPG cohort.

Conclusions:
An evidence-based clinical practice guideline increases the value of surgical care for children with perforated appendicitis (improves outcomes *and* lowers costs). Hospital cost accounting data are difficult to acquire, but allows assessment of hospital margin. PHIS financial data provide similar findings as the hospital cost accounting system regarding hospital costs and are easier to obtain.

Plenary Session II (cont.)

Outcomes of a Clinical Practice Guideline for Perforated Appendicitis (*p<0.05)		
	Usual Practice (n = 191)	CPG-driven Practice (n = 122)
Length of hospital stay	5.1 days	4.6 days*
Post-op intra-abdominal abscess	24%	9.8%*
Unplanned readmission	16.2%	11.5%
PICC or other CVL	30.4%	2.5%*
Revenue (Average/patient)	$16,950	$15,598
Direct hospital costs	$9,914	$6,240*
Contribution margin	$7,036	$9,358
Total costs	$16,487	$10,978*
Net income (profit)	$464	$4,620*

Plenary Session II (cont.)

49

ENHANCING THE ABILITY OF *LACTOBACILLUS REUTERI* TO PROTECT INTESTINES FROM EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Jacob K. Olson, MD, Christopher J. McCulloh, MD, Jason B. Navarro, BS, Lauren Mashburn-Warren, PhD, Natalie Huibregtse, BS candidate, Steven D. Goodman, PhD, Gail E. Besner, MD.

Research Institute at Nationwide Children's Hospital, Columbus, OH, USA.

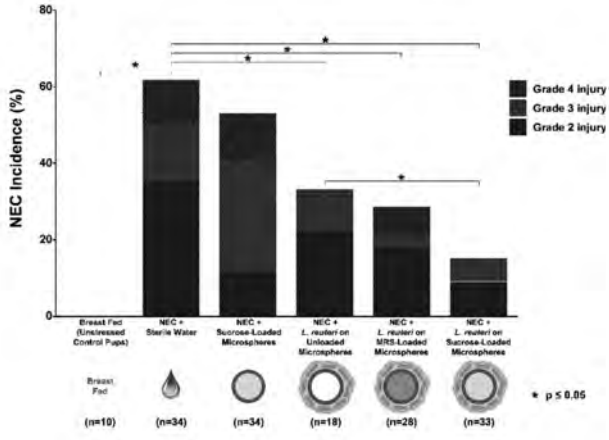
Purpose:
We have previously described a novel probiotic delivery system in which a single dose of *Lactobacillus reuteri* grown as a biofilm on biocompatible microspheres protects rat pups from necrotizing enterocolitis (NEC), whereas a single dose of free-living *L. reuteri* had no effect. The goal of the current study was to determine whether probiotic efficacy could be further enhanced by preloading microspheres with prebiotics such as MRS-broth, a *Lactobacillus* growth medium, or sucrose, a *Lactobacillus* substrate that enhances biofilm formation.

Methods:
Following cesarean delivery, neonatal rats were subjected to experimental NEC via repeated episodes of stress (hypoxia/hypothermia/hypertonic feeds). On day 1, pups received a single enteral dose of: (1) vehicle only (100μL sterile water) (N=34); (2) sucrose-loaded microspheres only (N=34); (3) *L. reuteri* grown on unloaded microspheres (N=18); (4) *L. reuteri* grown on MRS-loaded microspheres (N=28) or (5) *L. reuteri* grown on sucrose-loaded microspheres (N=33). Control pups were placed with surrogate dams and were unstressed (N=10). Pups were sacrificed when clinical signs of NEC developed or after 96h. A verified NEC injury grading system was used to measure NEC incidence and severity. Results were compared using a two-tailed Student's t-test.

Results:
Sixty-two percent of untreated, stressed pups developed NEC (see Figure). The incidence of NEC decreased to 33% when pups were treated with *L. reuteri* grown on unloaded microspheres (p=0.020). Compared to unloaded microspheres, loading microspheres with MRS led to no further decrease in NEC incidence (p=0.119). However, NEC incidence decreased to only 15% when pups were treated with *L. reuteri* grown on sucrose-loaded microspheres (p=0.038).

Conclusions:
A single dose of *Lactobacillus* grown as a biofilm on biocompatible microspheres significantly reduces the incidence and severity of NEC. Loading of microspheres with sucrose further enhances probiotic delivery. This novel probiotic delivery system may be beneficial in the prevention of clinical NEC in the future.

Plenary Session II (cont.)



Plenary Session II (cont.)

50

A CALL FOR A STANDARD EVIDENCE-BASED DEFINITION OF PERFORATED APPENDICITIS

Andrew P. Rogers, MD, Tiffany Zens, MD, Charles M. Leys, MD, MSCI, Peter F. Nichol, MD, PhD, Daniel J. Ostlie, MD.
University of Wisconsin, Madison, WI, USA.

Tweet about it! Quality control in quality control data: evaluating NSQIP - Pediatric accuracy in assessing wound infections – Abstract 50 #eAPSA2016

Background:
Post-operative abscess is a common complication of perforated appendicitis (PA). Abscess rates are reported as low as 1% and as high as 50%; this large range may be due to a lack of universal definition for perforation. A consistent, evidence-based definition (EBD) is crucial for accurate wound classification, risk-stratification, and quality control. The most recent NSQIP - Pediatric reports do not specify an EBD of PA. We hypothesize the reported rate of post-operative abscess underrepresents true incidence, as non-EBDs may result in low-risk cases being included in NSQIP - Pediatric calculations.

Methods:
Perforated appendicitis was defined as either a hole in the appendix or intra-abdominal fecalith. We reviewed institutionally-submitted NSQIP data, collaborated with chart review to verify post-operative abscess rates. We used the NSQIP participant use file to determine aggregate post-operative abscess rates. We then performed a Pubmed literature review for prospective controlled trials reporting abscess rates following PA. Reported abscess rates and PA definitions were noted.

Results:
Using a strict EBD, our postoperative abscess rate was 20.93% (n=86). Our institutional NSQIP-sampled data over the same time period was 20.7% (n=53). The NSQIP - Pediatric collective abscess rate was 7.61% (n=1081). Twenty-one publications were reviewed in final analysis. Average abscess rate was 14.49%, higher than the rate reported in NSQIP - Pediatric ($p< 0.001$). In trials explicitly employing the EBD, the average was 19.05%, higher than the NSQIP - Pediatric ($p<0.001$) and non-EBD rates ($p<0.001$).

Conclusions:
NSQIP-Pediatric postoperative abscess rates do not reflect rates published in prospective trials. The EBD of PA yields a higher and more accurate assessment of post-operative abscess rates. NSQIP - Pediatric estimates are likely lowered by the inclusion of cases that do not match the EBD. Since NSQIP-Pediatric is used to compare participating institutions, we suggest universal adoption of the EBD as a standard for participating institutions.

Plenary Session II (cont.)

51

CURRENT USE AND OUTCOMES OF HELICOPTER TRANSPORT IN PEDIATRIC TRAUMA: A REVIEW OF 18, 291 TRANSPORTS

Brian R. Englum, MD[1], Kristy L. Rialon, MD[1], Jina Kim, MD[1], Mark L. Shapiro, MD[1], John E. Scarborough, MD[2], Henry E. Rice, MD[1], Obinna O. Adibe, MD, MHS[1], Elisabeth T. Tracy, MD[1].

[1]Duke University Medical Center, Durham, NC, USA, [2]University of Wisconsin School of Medicine and Public Health, Madison, WI, USA.

Purpose:
Helicopter transport (HT) in trauma costs approximately 5-10 fold more than ground ambulance transportation (GT). The role of HT in pediatric trauma remains controversial, with mixed results regarding its impact on clinical outcomes. We examined the use of HT in pediatric trauma and its effectiveness in children with moderate to severe injuries.

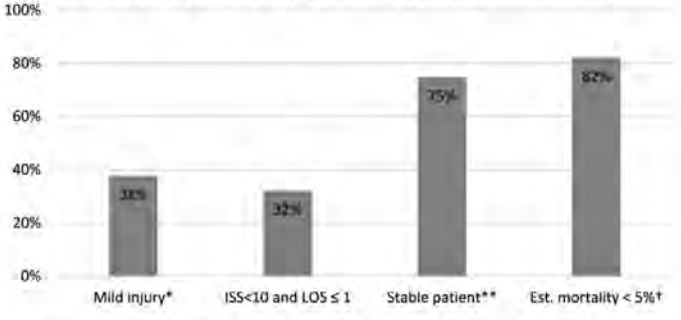
Methods:
All patients ≤ 18 years old with blunt or penetrating trauma in the National Trauma Data Bank from 2007-2011 were evaluated for use of HT. Appropriateness for HT was assessed using established criteria for over/underuse. In comparative effectiveness subanalysis, only patients treated at Level I or II pediatric centers with injury severity score (ISS) ≥ 9 were included. Unadjusted, multivariable logistic regression, and propensity analysis results compared survival in HT vs. GT.

Results:
Of 127,489 included patients, 18,291 (14%) arrived via HT, compared to 56% by GT and 29% by private vehicle/walk-in. The HT group included significant numbers of stable patients with minor injuries (Figure A). Among GT and HT patients with moderate/severe injuries, 28% were transported by helicopter. HT patients had more extremely severe injuries (ISS ≥ 25; 28% vs. 14%), altered mental status (GCS ≤ 8; 29% vs. 11%), and blunt trauma (96% vs. 89%). In unadjusted analysis, HT was associated with increased mortality (OR: 1.6; 95% CI: 1.4-1.7); however, HT was associated with decreased mortality by multivariable regression (0.5; 0.4-0.6) and propensity analysis (0.7; 0.6-0.8) to adjust for known confounders (Figure B).

Conclusion:
We found multiple indicators for overuse of HT, with nearly 40% of transported children having only minor injuries. For those with moderate/severe injuries, HT is associated with decreased mortality, potentially saving one life for every 45 patients transported. Further research is needed to determine appropriate criteria for helicopter use in pediatric trauma.

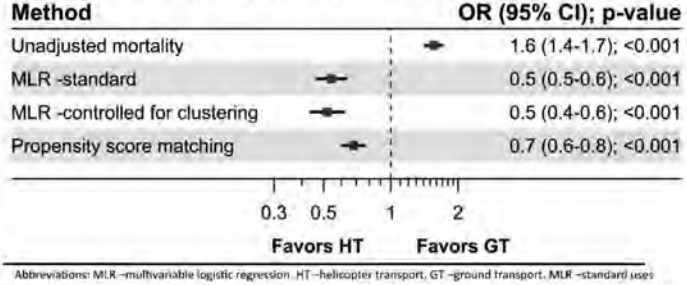
Plenary Session II (cont.)

A. Markers of overtriage among helicopter transport for pediatric trauma



* ISS ≤ 8. **HR ≤ 160; GCS ≥ 12. †Estimated mortality by TRISS (Trauma and injury severity score).

B. Odds ratio for mortality by various estimation methods



Abbreviations: MLR –multivariable logistic regression. HT –helicopter transport, GT –ground transport. MLR –standard uses generalized linear models for estimations. MLR –controlled for clustering uses generalized estimating equations to account for clustering by trauma center. Adjustment methods controlled for the following variables: 1) age, 2) race, 3) gender, 4) penetrating vs. blunt, 5) TRISS (Trauma and injury severity score), 6) level of pediatric trauma center (I vs. II).

Video Session

Video Session

Tuesday, May 17, 3:15 – 4:15 p.m.

V1

LAPAROSCOPIC ASSISTED GASTRIC PULL-UP FOR LONG-GAP ESOPHAGEAL ATRESIA - TECHNICAL ASPECTS

Hans Joachim Kirschner, MD, Joerg Fuchs, MD.

University Children's Hospital Tuebingen, Tuebingen, Germany.

Purpose:
We present the case of a four-month-old boy undergoing laparoscopic assisted gastric pull-up for long-gap esophageal atresia without fistula. The patient was an extremely low weight birth infant with a birth weight of 670 gr (gestational age 24 6/7 weeks). Sump suction drainage of the upper pouch and gastrostomy were performed initially. The esophageus showed no sufficient length after 4 months. Therefore, decision was taken to perform a laparoscopic assisted gastric pull-up.

Methods:
A three port technique was used for the minimal invasive approach. After abdominal dissection of the stomach, the midline tunnel was created laparoscopically through the hiatus window. The stomach was transferred through the extended subumbilical port incision and was prepared for the pull-up extracorporeally. A dilatation balloon catheter was inserted through the site of the gastrostomy for controlled dilatation of the pyloric muscle to avoid pyloroplasty. The upper esophageal pouch was dissected and the gastric pull-up and the anastomosis were performed through a cervical incision.

Results:
The postoperative course was uneventful. X-Ray contrast study and repeated esophagogastroscopy showed an adequate opening of the pylorus and absence of anastomosis stricture postoperatively. Oral feeding was uneventful after successful physiotherapy for swallowing

Conclusion:
Laparoscopic assisted gastric pull-up can be carried out safely in small infants. This video highlights the essential steps of the procedure.

Video Session (cont.)

V2

THORACOSCOPIC REPAIR OF A SYMPTOMATIC CONGENITAL CERVICAL LUNG HERNIATION

Stephen J. Fenton, MD, Justin H. Lee, MD.
University of Utah School of Medicine, Salt Lake City, UT, USA.

Purpose:
Congenital cervical lung herniation is an extremely rare cause of stridor and dysphagia. It more often occurs on the right and results from the disruption of Sibson's fascia that allows for apical lung parenchyma to herniate into the neck. There is a known association with Vitamin E deficiency, cleft lip and palate, and Cri-du chat syndrome. Surgical intervention is rarely required for spontaneous pneumothorax, stridor, dysphagia, or cosmetic issues due to the incarcerated lung tissue.

Methods:
We report the thoracoscopic treatment of an infant with symptomatic congenital cervical lung herniation.

Results:
A previously healthy 9 month-old girl was evaluated with a several week history of progressive stridor and dysphagia. The stridor was more pronounced with crying and especially noted with crawling. The parents stated that she could not crawl for prolonged distances due to increased work of breathing. She was also noted to have dysphagia and would choke while feeding unless held upright. The child appeared healthy with normal vital signs and was noted to have stridor on exam. Plain films of the neck demonstrated herniation of the right lung apex into the thoracic inlet with significant displacement of the trachea. The child underwent an elective thoracoscopic repair. An opening below the Azygous vein was identified that allowed for herniation of an apical lobe into the neck. Inflation of this trapped lobe caused displacement of the esophagus and trachea to the contralateral side resulting in her symptoms. The hernia was opened by division of the Azygous vein and Sibson's fascia. The apical lobe was resected and the area reinforced with placement of biologic mesh. She had an unremarkable post-operative course with resolution of her dysphagia and significant improvement in her stridor allowing for normal activity.

Conclusions:
A thoracoscopic approach to repair symptomatic congenital cervical lung herniation is feasible.

Video Session (cont.)

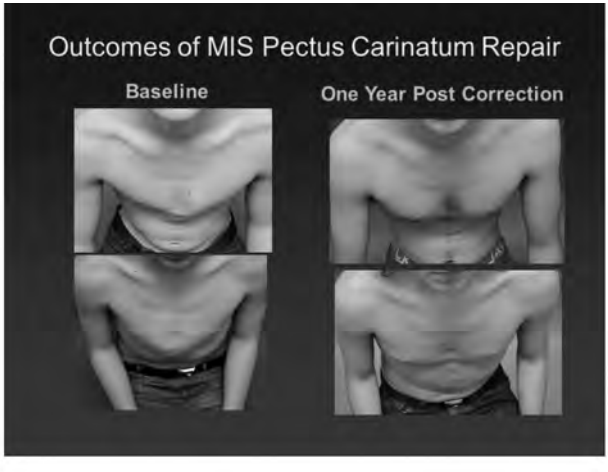
V3

MINIMALLY INVASIVE REPAIR OF PECTUS CARINATUM

Robert Kelly, MD[1], **Sherif Emil, MD, CM**[2].

[1]Children's Hospital of the King's Daughters; East Virginia Medical School, Norfolk, VA, USA, [2]Montreal Children's Hospital; McGill University Health Centre, Montreal, QC, Canada.

Pectus carinatum is a chest wall anomaly amenable to correction by a number of surgical and non-surgical techniques. Minimally invasive repair of pectus carinatum, also unknown as the Abramson or reverse Nuss procedure, is an innovative technique that can achieve correction without major cartilage resection, large incisions, or prolonged bracing. Like other innovative techniques, the operation has gone through several technical problem-solving stages, and has yet to be adopted widely. We present a high fidelity video that illustrates the required equipment and surgical maneuvers necessary to optimize safety and outcome of this new technique. The results in two teen-age boys are demonstrated.



Video Session (cont.)

V4

FORCED STERNAL ELEVATION AS AN ADJUNCT TO THE NUSS PROCEDURE FOR PECTUS EXCAVATUM

Barry LoSasso, MD, Gerald Gollin, MD.

Rady Children's Hospital and Sharp Memorial Medical Center, San Diego, CA, USA.

Purpose:
During most Nuss procedures, the dissector can be passed deep to the sternum in a manner that is safe and that allows for the tip of the instrument to exit the chest wall within 2 centimeters of the sternum. In some cases, proper passage of the dissector is prohibitively difficult and forced sternal elevation has been described as an adjunct. We present a video that demonstrates forced sternal elevation using the Ruhltract retractor.

Procedure:
The case presented in this video is that of an adult male, but the mechanical challenges are similar to older teenagers in whom we have used forced sternal elevation. In this patient, the Haller index was 5.2 and the excavatum defect was very asymmetric. Thoracoscopy demonstated a deep and sharply angulated sternal defect that precluded safe and effective substernal dissection. A tenaculum was carefully placed by assuring deep entry of each side into the lateral sternum. The tenaculum was slowly clamped and connected to a wire loop and then to the snap clip of the Ruhltract. The Ruhltract rachet was then slowly turned to gradually retract the sternum anteriorly. Thoracoscopy after sternal retraction demonstrated a substantial correction of the pectus deformity which allowed for wide dissection between the sternum and pericardium. The dissector was then easily passed under the sternum and pushed through the corresponding left intercostal space one centimeter from the edge of the sternum. The pectus bar was then passed through the mediastinum.

Conclusions:
Use of forced sternal elevation can be a useful adjunct to Nuss repair in adult patients, in adolescents with particularly deep and asymmetric defects, and in re-do cases. In addition, as a surgeon gains experience with the Nuss operation, sternal elevation can offer an extra margin of safety during substernal dissection and passage of the dissector and bar.

Video Session (cont.)

V5

INTERCOSTAL CRYOABLATION: A NOVEL METHOD OF PAIN MANAGEMENT FOR THE NUSS PROCEDURE

Y. Julia Chen, MD, Benjamin Keller, MD, Jacob Stephenson, MD, Amy Rahm, MD, Rebecca Stark, MD, Shinjiro Hirose, MD, Gary Raff, MD.

University of California, Davis Medical Center, Sacramento, CA, USA.

Purpose:
Achieving adequate analgesia in patients undergoing the Nuss Procedure for pectus excavatum is a significant determinant of postoperative recovery. Pain management strategies have evolved throughout the last decade, however there is no consensus on the optimal regimen. Practice varies according to institution and surgeon. Intercostal cyroanalgesia has been described in the literature for long-term management of post thoracotomy pain syndrome and has been established as safe and feasible in the adult population. The aim of this video is to introduce the usage of intercostal cryoablation as a novel method of pain control in children undergoing the Nuss Procedure for pectus excavatum.

Methods/Results:
We demonstrate operative footage and describe the technique of intraoperative intercostal nerve ablation during the Nuss Procedure. Using the cyroanalgesia probe T3-T6 are ablated bilaterally under direct visualization with the thoracoscope prior to insertion of the Nuss bar. This provides immediate and durable postoperative analgesia. Using this method, the need for thoracic epidural has been eliminated from our practice and patients are fast-tracked with decreased length of stay. There have been no complications reported related to cryoablation in the 6 months that we have used this technique.

Conclusions:
Intraoperative bilateral intercostal cryoablation is a safe and feasible method of pain control in children with pectus excavatum undergoing the Nuss Procedure.

Video Session (cont.)

V6

ENDOSCOPIC MANAGEMENT OF A DUODENAL WEB

Lauren Wood, BS[1], Zach Kastenberg, MD[2], Tiffany Sinclair, MD[2], Stephanie Chao, MD[2], **James Wall, MD**[2].

[1]Stanford School of Medicine, Palo Alto, CA, USA, [2]Lucile Packard Children's Hospital Stanford, Palo Alto, CA, USA.

Tweet about it! Endoscopic Management of a Duodenal Web @jameswallmd – Video 6 #eAPSA2016

Introduction:
Surgical intervention for duodenal atresia most commonly entails duodenoduodenostomy in the neonatal period. Occasionally, type I duodenal atresia with incomplete obstruction may go undiagnosed until later in life. Endoscopic approach to dividing intestinal webs has been reported in rare select cases.

Methods:
A two-year old female with a history of trisomy 21 and tetralogy of Fallot underwent laparoscopic and endoscopic exploration of intestinal obstruction as visualized on upper gastrointestinal series for symptoms of recurrent emesis and weight loss. After laparoscopy confirmed a duodenal web as the cause of intestinal obstruction, endoscopic division of the membrane was carried out with a triangle tip electrocautery knife followed by dilation with a 15 mm balloon.

Results:
The procedure took 210 minutes and the patient tolerated it well. Post-op Upper GI showed rapid passage of contents without leak and a diet was started. The patient was discharged on post-operative day 2 without narcotics. The patient had gained 2 pounds at 4 week follow-up and remains asymptomatic six months after the procedure.

Conclusions:
Endoscopic management of a duodenal web is feasible in children. Pediatric surgeons are ideally suited to offer the hybrid approach including laparoscopy to confirm no extraluminal obstructive process or complication from endoscopy. Endoscopy enables minimal recovery time and should be embraced as another tool in the minimally invasive toolbox of pediatric surgeons.

Video Session (cont.)

V7

OPERATIVE VIDEO: ANORECTAL MALFORMATION. RECTOPERINEAL FISTULA WITH VAGINAL AGENESIS

Victoria A. Lane, MBChB, Richard J. Wood, MD, Carlos Reck, MD, Geri Hewitt, MD, Marc A. Levitt, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Purpose:
We present the operative video of a female infant with a rectoperineal fistula with associated vaginal agenesis, who underwent reconstruction of the anorectal malformation and vaginal replacement.

Methods:
The case of a 6 month old female with a rectoperineal fistula and associated vaginal agenesis is presented. VACTERL screening identified an ASD and a dysplastic thumb. No spinal or renal anomalies were found and her sacrum was normal (Sacral ratio 1.0). At 7 months she underwent operative repair of the rectoperineal fistula and sigmoid colon vaginal replacement. The video demonstrates the initial examination findings of a vestibular fistula, with a normal vaginal introitus, however on closer inspection the vagina was found to be atretic. Standard mobilization of the rectum was performed in the prone position, followed by a lower midline laparotomy in order to examine the internal gynecological structures. A uterus and cervix were identified, but there was agenesis of the distal vagina. The operative technique for rectal pullthrough and simultaneous vaginal replacement, completion of the neo-vaginoplasty, and anoplasty is shown in the operative video.

Results:
One month after surgery the patient underwent an examination under anesthesia and vaginoscopy. The vaginal replacement was found to be healthy and a cervical dimple was seen. The anoplasty had healed well.

Conclusions:
Vaginal atresia is thought to occur in 5-10% of female patients with a rectoperineal/vestibular fistula. These patients require careful inspection of the perineum as the anomaly can be easily missed. The optimal timing of vaginal replacement has not been clearly established, but when rectal mobilization is required, there is a potential technical advantage to simultaneously completing the vaginal pullthrough.

Exhibits and Support

APSA THANKS THE FOLLOWING EXHIBITORS FOR THEIR CONTRIBUTIONS TO THE APSA 2016 ANNUAL MEETING

Gold Exhibitor
Halyard Health

Silver Exhibitors
Banner Health
BayCare Medical Group
Karl Storz Endoscopy-America, Inc.

Traditional Exhibitors
American College of Surgeons
American Pediatric Surgical Association Foundation (APSAF)
Applied Medical Technology, Inc. (AMT)
Cardica, Inc.
CHERUBS - The Association of Congenital Diaphragmatic Hernia Research, Awareness and Support
Cincinnati Children's Hospital
CORPAK MedSystems
DGMR | Global Intercepts
Eastern Maine Medical Center
First Capital Benefit Advisors, Inc.
GENICON
Hospital Corporation of America (HCA)
Huntsville Hospital Health System
Johns Hopkins Children's Center
JustRight Surgical
LocumTenens.com
Pediatric Search Partners
Mercy Children's Hospital
Pediatrix Medical Group
Presbyterian Healthcare
Providence Health & Services
Sanford Health
Specialty Surgical Products
UBS Financial Services
Weatherby Healthcare
WOFAPS2016

THANK YOU!

APSA THANKS THE FOLLOWING ORGANIZATIONS FOR THEIR CONTRIBUTIONS

EDUCATIONAL GRANTS

Elsevier

The Sheikh Zayed Institute for Pediatric Surgical Innovation at Children's National Medical Center

Sidra Medical and Research Center

ULTRASOUND FOR PEDIATRIC SURGEONS SUPPORTERS

Kyoto Kagaku America, Inc.

Blue Phantom/CAE Healthcare

Sidra Medical and Research Center

American Pediatric Surgical Association
Future Meetings

APSA 2017
May 4 –7, 2017
The Westin Diplomat Resort & Spa Hollywood, FL, USA

APSA 2018
May 3 – 6, 2018
JW Marriott Desert Springs Resort & Spa
Palm Desert, CA, USA

AMERICAN PEDIATRIC SURGICAL ASSOCIATION

www.eapsa.org