APSA 44th ANNUAL MEETING

May 2–5, 2013

Marco Island Marriott Beach Resort, Golf Club & Spa, Marco Island, FL

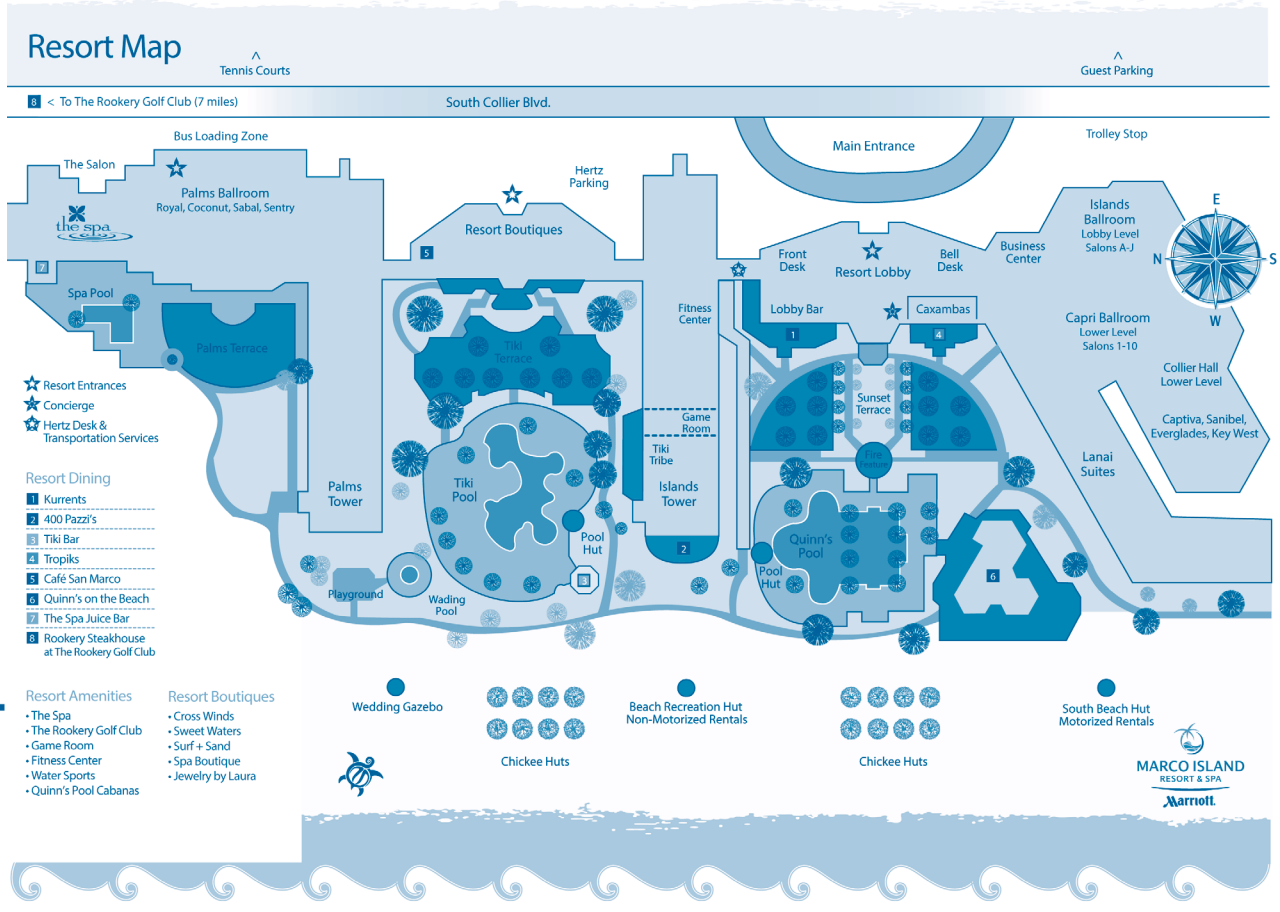
Final Program

AMERICAN PEDIATRIC SURGICAL ASSOCIATION

www.eapsa.org

Hotel Floorplans

Resort Map



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 to making certain that it is sustained by economic health

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Table of Contents

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“GOVERNANCE”

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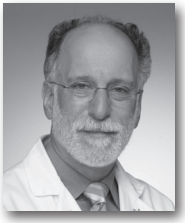
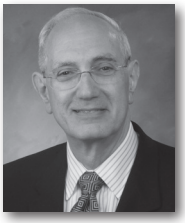
+1-650-498-4292
tkrummel@stanford.edu



Charles J. Stolar
Treasurer 2011-2014
+1-805-563-6560
cjs3@columbia.edu



Michael D. Klein
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mdkleinmd1@me.com

Kevin P. Lally
Governor 2011-2014
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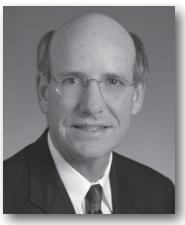

Keith T. Oldham
Immediate Past
President 2013-2014
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koldham@mcw.edu

Erik D. Skarsgard
Governor 2012-2015
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Mary L. Brandt
Secretary 2012-2015
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APSA Thanks Departing Board Members

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Brad W. Warner
Governor 2010-2013
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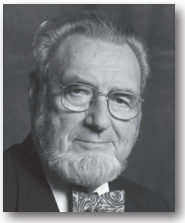
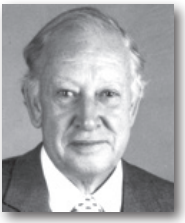
Past Presidents

Robert E. Gross
1970-1971

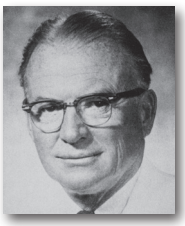
Orvar Swenson
1973-1974



C. Everett Koop
1971-1972



Harvey E. Beardmore
1974-1975



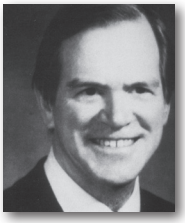
H. William Clatworthy, Jr.
1972-1973

Thomas M. Holder
1975-1976

Past Presidents (cont.)

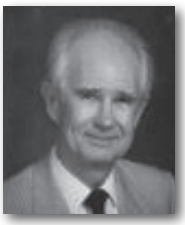
Alexander H. Bill
1976-1977

William B. Kiesewetter
1981

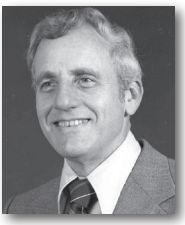


E. Thomas Boles, Jr.
1977-1978

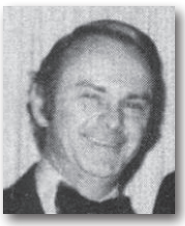
W. Hardy Hendren
1981-1983



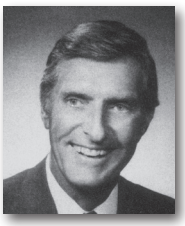
Morton M. Woolley
1978-1979



Lester W. Martin
1983-1984



Robert G. Allen
1979-1980



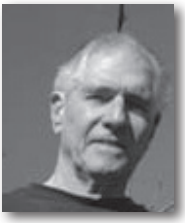
Judson G. Randolph
1984-1985

Thomas V. Santulli
1980-1981

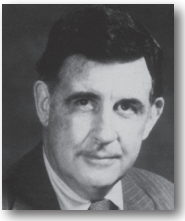
Dale G. Johnson
1985-1986

Past Presidents (cont.)

J. Alex Haller, Jr.
1986-1987

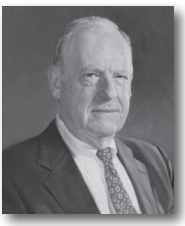


Alfred A. deLorimier
1991-1992

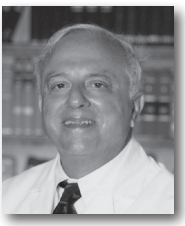


Robert J. Izant, Jr.
1987-1988

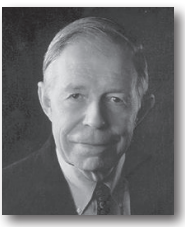
Dick G. Ellis
1992-1993



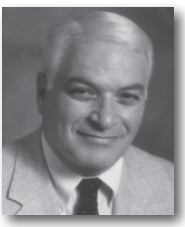
James A. O'Neill, Jr.
1988-1989



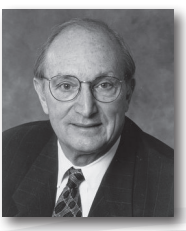
Raymond A. Amoury
1993-1994



Eric W. Fonkalsrud
1989-1990



Jay L. Grosfeld
1994-1995



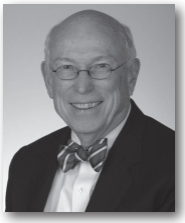
Robert M. Filler
1990-1991

Arvin I. Philippart
1995-1996

Past Presidents (cont.)

Keith W. Ashcraft
1996-1997

Arnold G. Coran
2001-2002



H. Biemann Othersen, Jr.
1997-1998

R. Peter Altman
2002-2003

Marc I. Rowe
1998-1999

Bradley M. Rodgers
2003-2004

Kathryn D. Anderson
1999-2000

Robert J. Touloukian
2004-2005

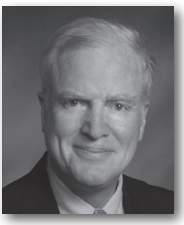
David Tapper
2000-2001

M. Judah Folkman
2005-2006

Past Presidents (cont.)

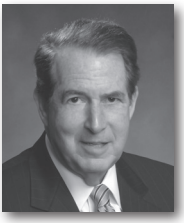
Patricia K. Donahoe
2006-2007

Moritz M. Ziegler
2007-2008



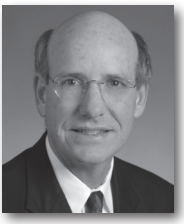
Michael R. Harrison
2008-2009

Keith E. Georgeson
2009-2010



Marshall Z. Schwartz
2010-2011

Robert C. Shamberger
2011-2012



Keith T. Oldham
2012-2013

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

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

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

Past Officers (cont.)

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
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

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Surgery Residency Review Committee
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Marshall Z. Schwartz

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American Academy of Orthopaedic Surgeons

Fizan Abdullah

American Academy of Pediatrics

Commission on Cancer
Jed G. Nuchtern

Committee on Coding and Nomenclature
Samuel D. Smith

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Mary L. Brandt
Henri R. Ford
Dennis P. Lund
Charles J. Stolar
Steven Stylianos, Consultant

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Henry E. Rice

American College of Surgeons

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Max L. Ramenofsky

Ad Hoc Committee on Prevention – Trauma
Barbara A. Barlow

Advanced Trauma Life Support – Trauma
Max L. Ramenofsky

Advisory Committee on SESAP
Mary E. Fallat

Advisory Council for Pediatric Surgery
Mary E. Fallat, Chair
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Ronald B. Hirschl
Kevin P. Lally
Dennis P. Lund
Mehul V. Raval
Marleta Reynolds
Jacqueline M. Saito
Marshall Z. Schwartz
Robert C. Shamberger
Erik D. Skarsgard
Jeffrey S. Upperman

Advisory Council Program Representatives
Elizabeth A. Beierle

Advisory Council to Board of Regents
Kathryn D. Anderson

Advisory Council for Rural Surgery
Don K. Nakayama

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Harsh Grewal

AEI Research and Development Committee
Thomas M. Krummel

Allied Health Professionals Committee
Edward M. Barksdale, Jr.

ATLS
R. Todd Maxson

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American College of Surgeons (cont.)

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Andrea A. Hayes-Jordan
Diana L. Farmer
Don K. Nakayama
Robert C. Shamberger
Joseph J. Tepas, III
Brad W. Warner

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Mary E. Fallat
Robert C. Shamberger

Board of Governors Committee on Fiscal Affairs
Don K. Nakayama

Board of Governors Nominating Committee
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Marshall Z. Schwartz

Canadian Regents and Governors
Guy F. Brisseau

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Joseph J. Tepas, III

Coding and Reimbursement Committee
Samuel D. Smith

Commission on Cancer
Elizabeth A. Beierle
Jed G. Nuchtern

Commission on Cancer Accreditation Committee
Elizabeth A. Beierle

Commission on Cancer Member Organization
Elizabeth A. Beierle
Jed G. Nuchtern

Commission on Cancer Quality Integration Committee
Jed G. Nuchtern

Committee for the ACS Transition to Practice Fellowship in General Surgery
Don K. Nakayama

Committee on Informatics
Gretchen Jackson

Committee on Trauma
Randall S. Burd
Charles S. Cox, Jr.
Barbara A. Gaines
Martin S. Keller
R. Todd Maxson
Michael L. Nance
Kennith H. Sartorelli
Steven Stylianos

Executive Committee on Trauma
Max L. Ramenofsky

Committee on Trauma Regional State Committees
Guy F. Brisseau

Committee on Women in Surgery
Stacey D. Moore-Olufemi

Comprehensive Communications Committee
Marshall Z. Schwartz, Chair
Philip L. Glick
Kimberly A. Ruscher

APSA Representatives (cont.)

American College of Surgeons (cont.)

Continuous Professional Development, Committee on
Adam B. Goldin

COT Regional State Committees
Guy F. Brisseau

Division of Research and Optimal Patient Care Committee
Henri R. Ford

Editors: ACS Portal for Pediatric Surgery
Richard G. Azizkhan
Marshall Z. Schwartz

Education Committee
Thomas M. Krummel

Emergency Service – Hospital –Trauma
J. Alex Haller, Jr.

Emerging Surgical Technology and Education Committee
Thomas M. Krummel

Ethics, Committee on
Henri R. Ford

Executive Committee on Trauma
Max L. Rumenofsky

Finance Committee
Marshall Z. Schwartz

Forum on Fundamental Surgical Problems, Committee for the
Jeffrey S. Upperman

Governors' Committee on Chapter Relations
Kevin P. Lally

Health Policy Advisory Council
Brendan T. Campbell
Arthur Copper
Charles V. Coren
Peter T. Masiakos

Health Policy Advisory Group
Marshall Z. Schwartz
Joseph J. Tepas, III

Information Technology – Trauma
Charles S. Cox, Jr.

Informatics, Committee on
Gretchen Purcell Jackson
Samuel M. Mahaffey
Daniel S. Walsh

Membership – Trauma
David W. Tuggle

National Surgical Quality Improvement Program – Steering Committee
Keith T. Oldham, Chair
Charles D. Vinocur, Co-Chair
Peter W. Dillon
R. Lawrence Moss
Moritz M. Ziegler

National Surgical Quality Improvement Program – DDC Committee
Deborah F. Billmire, Co-Chair
Kurt F. Heiss, Co-Chair

National Surgical Quality Improvement Program – M & E Committee
Douglas C. Barnhart

Organization – Board of Regents
Kathryn D. Anderson

Patient Education Committee
Marshall Z. Schwartz

APSA Representatives (cont.)

American College of Surgeons (cont.)

Performance Improvement – Trauma
Victor F. Garcia

Program Committee
Elizabeth A. Beierle
Henri R. Ford

Public Profile and Communications Steering Committee
Kimberly A. Ruscher
Marshall Z. Schwartz

Research and Optiomal Patient Care
Henri R. Ford

Resident and Associate Society
Mehul V. Raval

Resident Education
Aaron R. Jensen

Resources – Trauma
Barbara A. Barlow
David P. Mooney
David W. Tuggle

Subcommittee on Resident Education
Diana L. Farmer

Surgical Forum Representative
Jeffrey S. Upperman

Surgical Quality Alliance
Joseph J. Tepas, III

Surgical Research Committee
Gail E. Besner
Thomas M. Krummel

Verification/Consultation – Trauma
David W. Tuggle

Verification Review Committee
R. Todd Maxson

Video Based Education Committee
Timothy D. Kane
Todd A. Ponsky

American Medical Association

Relative Value Update Committee
Mustafa H. Kabeer
Samuel D. Smith

Association of Pediatric Surgery Training Program Directors

Max R. Langham, Jr., President
John H.T. Waldhausen, Secretary/Treasurer

Emergency Medical Services for Children Partnership for Children Stakeholder Group

Arthur Cooper

Trauma Center Association of America

Pediatric Committee
Michael L. Nance

World Federation of Association of Pediatric Surgeons

Richard G. Azizkhan, President
David L. Sigalet, Vice President
George W. Holcomb III, Executive Member
Marshall Z. Schwartz

APSA Committees 2012-2013

Audit

Moritz M. Ziegler, Chair, 2010–2013
mmzieglermd@aol.com
Michael D. Klein, 2010–2013
Dennis P. Lund, 2011–2014
Neil J. Sherman, 2010–2013

Cancer

Peter Mattei, Chair, 2011–2013
mattei@email.chop.edu
Andrea A. Hayes-Jordan, Vice Chair, 2011–2013 *ahJordan@mdanderson.org*
Jennifer Aldrink, 2011–2014
L. Grier Arthur, 2010–2013
Jae-O Bae, 2012–2015
Roshni Dasgupta, 2012–2015
Andrew M. Davidoff, 2003–2014
Peter F. Ehrlich, 2010–2013
Mary Beth Madonna, 2011–2014
Christopher B. Weldon, 2010–2013
Michael P. LaQuaglia, *Ex Officio* (American Cancer Society)

Childhood Obesity

Carroll M. Harmon, Chair, 2012–2014
mac.harmon@childrensal.org
Jeffrey Zitsman, Vice Chair, 2012–2014
jlz2@columbia.edu
Daniel De Ugarte, 2011–2014
J. Craig Egan, 2012–2015
Christine M. Finck, 2010–2013
Sarah A. Jones, 2012–2015
Bradley C. Linden, 2011–2014
Michael A. Helmrath, 2010–2013
Mark J. Holterman, 2008–2014
Thomas H. Inge, 2012–2015
Marc P. Michalsky, 2010–2013
Mark L. Wulkan, 2011–2014

Critical Care Task Force

Brian Kenney, Chair
brian.kenney@nationwidechildrens.org
Marjorie J. Arca
David W. Bliss
Anthony Chin
Samir K. Gadepalli
Raquel Gonzalez
Chad E. Hamner
Ronald B. Hirschl
David Juang
Kelly M. Austin
Peter C. Minneci
Daniel J. Ostlie
Pramod S. Puligandla
Faisal G. Qureshi
Christopher B. Weldon
Jill M. Zalieckas

Education

Kurt F. Heiss, Chair, 2012–2015
kurt.heiss@choa.org
Marjorie J. Arca, Vice Chair, 2012–2015
marca@chw.org
Clinton Cavett, 2012–2015
Mike K. Chen, 2010–2013
Georges Azzie, 2012–2015
Joanne E. Baerg, 2012–2015
John C. Bleacher, 2012–2015
J. Craig Egan, 2012–2015
Scott A. Engum, 2008–2014
Kenneth W. Gow, 2011–2014
Harsh Grewal, 2010–2013
Joseph A. Iocono, 2008–2014
Michael B. Ishitani, 2011–2014
Aviva L. Katz, 2012–2015
Kenneth W. Liechty, 2012–2015
Grace Mak, 2012–2015
Gene D. McGahren, 2008–2014
John H.T. Waldhausen, 2009–2014
David M. Powell, *Ex Officio*
Romeo C. Ignacio, Jr., *Friend of Committee*
Brian Kenney, *Friend of Committee*
Patricia Lange, *Friend of Committee*

APSA Committees 2012-2013 (cont.)

CME Subcommittee
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Foong-Yen Lim, 2012–2015
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Monica E. Lopez, 2012–2015
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Shawn J. Rangel, 2010–2013
Shawn St. Peter, 2009–2014
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Kevin P. Moriarty, 2011–2014
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Michael A. Helmrath, 2012–2015
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Eugene S. Kim, 2011–2014
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Mary L. Hilfiker, 2010–2013
Saleem Islam, 2010–2013
Brian Kenney, 2009–2012
Allen L. Milewicz, 2012–2015
R. Lawrence Moss, 2007–2013
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Saad A. Saad, 2010–2013
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Articles of Incorporation of the American Pediatric Surgical Association

First: The name of the corporation is The American Pediatric Surgical Association (hereinafter the "Corporation").

Second: The place in this state where the principal office of the Corporation is to be located is in the City of Cleveland, Cuyahoga County, Ohio.

Third: The purposes for which the Corporation is formed are: To encourage specialization in the field of pediatric surgery and in other ways to make available to more people 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 and children; to provide a forum for the dissemination of information with regard to pediatric surgery; and to present the common interests of pediatric surgeons in the area of socioeconomic policy development. To accept, receive and acquire by deed, gift, bequest, devise, purchase, lease, or otherwise, property of any sort or nature, without limitation as to amount or value, and to hold, invest, reinvest, manage, use, apply, employ, expand, disburse, or donate the same, whether income or principal or proceeds of sale, exclusively for the purposes hereinabove set forth. To do such other things as are incidental or appropriate in accomplishing the foregoing purposes.

Fourth: The Corporation is organized as a nonprofit corporation under Chapter 1702 of the Ohio Revised Code and shall at all times be operated as a business league within the meaning of Section 501(c)(6) of the Internal Revenue Code of 1986, as amended (the "Code") and, notwithstanding any other provision of these Articles of Incorporation, the Corporation shall not carry on any activities not permitted to be carried on by a corporation exempt from federal income tax under Section 501(a) of the Code by reason of being described in Code Section 501(c)(6).

Fifth: The Corporation shall not make any purchase of property for more than adequate consideration in money or money's worth, shall not sell any of its property for less than an adequate consideration in money or money's worth, and shall not pay compensation in excess of a reasonable allowance for personal services actually rendered. The Corporation shall not lend its property or income, without the receipt of adequate security and a reasonable rate of interest, nor make its services available on a preferential basis. The Corporation shall not engage in any transaction which results in a diversion of its property or income from its purposes as set forth in Article Third. No part of the net earnings of the Corporation shall inure to the benefit of any person except as a proper beneficiary of its said purposes.

Sixth: The Corporation shall not accumulate income to an extent which is unreasonable either in amount or duration in carrying out its purposes set forth in Article Third, shall not use such accumulations for purposes other than such purposes, and shall not invest its funds in any manner as to jeopardize the carrying out of its said purposes.

Seventh: Upon dissolution of the Corporation, or any partial or entire liquidation of its property or assets, all of the Corporation's property of every nature and description shall, after making provision for discharge of all of the liabilities of the Corporation, be paid over and transferred to such one or more organizations or institutions which are then exempt from federal income tax under Section 501(a) of the Code by reason of being described in either Section 501(c)(3) or Section 501(c)(6) of the

Articles of Incorporation of the American Pediatric Surgical Association (cont.)

Code, as shall be selected by a majority of persons who are then members of the Board of Governors of the Corporation.

Eighth: No member of the Board of Governors, officer, or employee of the Corporation, or any other person, shall receive any profit from the operations or liquidation of the Corporation, except as reasonable compensation for services actually rendered to the Corporation.

Ninth: Each reference in these Amended Articles of Incorporation to a section of the Code or the Ohio Revised Code shall include the corresponding provisions of any future Internal Revenue or Ohio laws, respectively.

Tenth: These Amended Articles of Incorporation supersede and take the place of existing Articles of Incorporation of the Corporation as the same may have been amended heretofore.

Bylaws of the American Pediatric Surgical Association

PREAMBLE

PRINCIPLES OF MEDICAL ETHICS

Members:

1. Shall strive to provide competent medical care to patients with compassion and consideration for their feelings and dignity.
2. Shall strive to maintain existing skills and to develop or acquire new medical and surgical knowledge through continuing practice in order to benefit patients.
3. Shall avoid performing procedures which are beyond their capacity, training or experience.
4. Shall practice medicine with honesty and fairness toward patients, colleagues and all others.
5. Shall seek consultation, assistance or additional talents of other professionals where such might be of value in the care of the patient or where requested by the patient or a concerned representative.
6. Shall choose from equally efficacious treatments and diagnostic procedures those which are the least intrusive, the least painful and the least expensive.
7. Shall recognize a responsibility to participate in activities benefiting the community.

Article I: MEMBERSHIP

Section 1. Regular Membership

1.1. A regular member must be licensed to practice surgery in the United States or Canada.

1.2. All regular members must be certified by the American Board of Surgery or by the Royal College of Surgeons of Canada. After June 30, 1977, all new members must obtain a Certification of Special Qualifications in Pediatric Surgery by the American Board of Surgery or the Royal College of Surgeons of Canada.

1.3. A regular member must have completed his/her training in an Accreditation Council for Graduate Medical Education-approved training program and must have held the ACGME-approved residency position or equivalent Royal College of Surgeons of Canada approved program.

1.4. An applicant must have a practice devoted entirely to pediatric surgery, except as may be required by emergency care or special circumstance.

1.5. An applicant may not be elected to membership until he or she has practiced pediatric surgery for one year after completion of the required surgical training.

1.6. Any exception to the above criteria for membership must be made by a recommendation from the membership and credentials committee to the board of governors. Subsequent majority approval of the board of governors and an affirmative vote by two-thirds of the voting membership at an annual meeting business meeting is necessary for election.

1.7. The regular member pledges to abide by the obligations and objectives and core values of the association as set forth in the articles of incorporation and the principles of medical ethics as stated in the preamble to the bylaws.

Bylaws (cont.)

Section 2. Candidate Members

2.1. A candidate member must be currently licensed to practice surgery in the United States or Canada.

2.2. Candidate members must have successfully completed the examination in general surgery given by the American Board of Surgery or by the Royal College of Surgeons of Canada or, they must be eligible for examination by those respective boards.

2.3. Only residents in ACGME-approved pediatric surgical residency programs are eligible for candidate membership.

2.4. An individual may remain a candidate member for five years following completion of an approved pediatric surgical residency program at which time the candidate membership will expire. This five-year period is in addition to the time spent as a candidate member during pediatric surgery residency.

If candidate membership expires, one may still apply for regular membership at any time in the future. Candidate membership is not mandatory in order to qualify for regular membership.

2.5. A candidate member who has completed his/her training in an ACGME-approved pediatric surgery residency position or equivalent Royal College of Surgeons of Canada approved program must practice pediatric surgery exclusively as stipulated in section 1.4. for regular membership.

2.6. Candidate members are not eligible for appointment with voting privileges on standing or ad hoc committees, but may be appointed by the president as consultant members for a period not to exceed two years.

2.7. Candidate members will have the same meeting attendance requirements as regular members, but will not have voting privileges. Candidate members are not eligible to hold office. Candidate members will be subject to 20% of the current regular membership dues and will be governed by all other bylaws applicable to regular membership.

2.8. A candidate member will require sponsorship by a regular member for abstracts submitted for presentation to the annual APSA scientific meeting.

Section 3. Charter Membership

3.1. A charter membership shall be extended to a person actively engaged in the practice of pediatric surgery, who has already amply demonstrated excellence and fitness as a trained specialist in pediatric surgery, who has devoted his practice to pediatric surgery and who is certified by the American Board of Surgery or by the Royal College of Surgeons of Canada.

3.2. A list of charter membership was established and then closed on April 15, 1970.

Section 4. Honorary Membership

4.1. Honorary membership may be conferred upon a physician for outstanding contributions to pediatric surgery by unanimous vote of the board of governors. Honorary membership will be announced to the membership attending the annual business meeting.

4.2. Honorary members will be governed by the bylaws as regular members but will not be subject to dues or the meeting attendance requirement and will not be eligible to hold office.

Bylaws (cont.)

Section 5. International Membership

5.1. A physician who does not live or practice surgery within the Territory of the United States or Canada and who does not otherwise meet criteria for regular membership, may apply to the American Pediatric Surgical Association as an international member. Such applicants must provide documentation that they have successfully completed the established training curriculum in pediatric surgery as required by their respective national or regional agencies. Such applicants must meet the same practice criteria as required of regular members. Letters of recommendation from three APSA members as well as a letter from one local reference must accompany his/her application.

5.2. Applicants for international membership must have attended one annual meeting before they are eligible to apply.

5.3. International members will pay dues and be governed by the bylaws as regular members, but will not be eligible to vote or hold office.

Section 6. Associate Members

6.1. Associate membership shall be extended to a person who has been exclusively engaged in the practice of pediatric surgery for five years, except as may be required by emergency care or special circumstances.

6.2. An associate member requires written endorsement by a regular member sponsor as well as two other members at the time of application.

6.3. Associate member applicants must provide a comprehensive current two-year case log as well as a letter from the chief of surgery at each hospital where he/she practices confirming the validity of the case log and indicating that the applicant is a member of the hospital staff in good standing.

6.4. Associate members shall have all of the rights, privileges and obligations as regular members but may not hold elected office.

6.5. Applications for associate membership will be submitted for consideration to the membership and credentials committee for review and recommendation to the board of governors and membership-at-large. The procedure for election to membership shall be identical as for regular members.

Section 7. Resident Members

7.1. A resident member must be a general surgery resident in good standing in an ACGME-approved residency program or Royal College of Surgeons equivalent or in a training position during or after completion of the residency but not yet a resident/fellow in an ACGME approved training program in pediatric surgery.

7.2. Two reference letters are required: One from the general surgery chair or program director and one from an APSA member in good standing.

7.3. The term of membership will be for one year and will automatically expire after one year unless a written request for extension is submitted to and approved by the membership and credentials committee.

7.4. The membership and credentials committee will be solely responsible for all decisions regarding acceptance into the resident group.

Bylaws (cont.)

Section 8. Application Procedures

8.1. New applications for regular, associate or international membership will be initiated by the prospective member. For regular membership, the procedure may begin prior to the completion of the required one year of pediatric surgery practice. See Article 1, Section 1.5. The application will need supporting letters from three members in good standing. One of these three letters must be from the training director of the prospective member. At least one sponsor must attest that the applicant exemplifies a high standard of ethical behavior as set forth in the principles of medical ethics in the preamble to the bylaws.

Applicants for international membership will require one additional letter of recommendation from a physician who is acquainted with the individual's professional competence and ethics in his/her own practice community.

8.2. Completed applications for membership may be submitted to the membership and credentials committee at any time throughout the year. Applications will be reviewed quarterly by the membership and credentials committee and presented quarterly to the board of governors for approval.

8.3. Upon the recommendation of the membership and credentials committee and approval of the board of governors, the list of applicants shall be circulated to the membership-at-large twice per year for voting. Following the vote of the APSA membership, approved applicants will immediately become members of APSA in their respective categories. Approved applicants will receive their certificates of membership in a ceremony at the subsequent annual meeting.

8.4. All applications for candidate membership will be initiated by the chair of the applicant's pediatric surgery training program, who must also be a regular member in good standing. The sponsoring member will be responsible for completing the candidate member's application form. The completed application will be sent to the chair of the membership and credentials committee. The committee will evaluate the applicant's credentials and make a recommendation concerning membership to the board of governors. Applications for candidate membership will be accepted as outlined in Section 8.2.

8.5. The membership applicant and the sponsor will be notified by mail of the results of the application process.

8.6. The rejection of the membership application by the membership and credentials committee or the board of governors or by the membership of APSA may be appealed within one year of notification of the applicant, if he/she so desires.

8.7. The appeal process is initiated by the membership applicant. He/She can, by written inquiry to the secretary of the board, request an appeal hearing before the board of governors. This hearing will be granted at the time of the next regularly scheduled biannual board of governors meeting, provided the request is received at least three months prior to the next regularly scheduled meeting. This appeals meeting must be attended by the sponsor and a maximum of one other member of the organization. The board of governors may invite other interested parties at their discretion. The membership applicant may attend only upon request of the board of governors.

Bylaws (cont.)

Section 9. Application Form

9.1. The application shall include:

9.1.1. Curriculum vitae

9.1.2. Bibliography

9.1.3. Applicants for regular or international membership must submit a tabulation, by case, of the operative experience of the applicant during the 12-month period immediately preceding his/her application. Applicants for associate membership must submit a tabulated operative experience covering the 24-month period immediately preceding his/her application. All operative reports must be signed by the chief(s) of surgery where the applicant works. The report should indicate whether the applicant was surgeon, first or teaching assistant.

9.2. The candidate membership application shall include:

9.2.1. Curriculum vitae

9.2.2. Bibliography

9.2.3. A letter from the chief of the applicant's pediatric surgery training program which attests to his/her satisfactory completion of one or more years of training and suitability for candidate membership. This letter should also confirm that the applicant for candidate membership held the ACGME-approved residency position within the training program (for U.S. trainees or equivalent Royal College of Surgeons of Canada approved program).

Section 10. Resignation

10.1. Any member may submit his/her resignation at any time in writing to the president to be effective on the date of submission.

Section 11. Fiscal Year

11.1. The fiscal year shall be from January 1 to December 31.

Section 12. Dues

12.1. Dues shall be set by the board of governors and approved by the membership at the annual meeting. Dues will be announced by letter by the first day of October and must be paid by the first day of December.

12.2. No annual dues shall be required of a member following his/her 70th birthday or upon retirement, whichever is sooner. (The member will be termed a "Senior Member.") Members are requested to notify APSA when they turn 70 or retire. No annual dues shall be required of any member during any year that person is disabled and unable to practice for six months or more.

PROVISO: This change would go into effect beginning with the 2013 billing cycle, starting October 1, 2012. Members currently designated as Senior Members (with a paid-through date of December 31, 2012) will not be required to pay dues or back dues.

12.3. Under special circumstances and by approval of the board of governors, dues may be waived for any member for one calendar year.

12.4. An initiation fee equal to one-half of the annual dues will be levied on all new members at the time of their induction into membership in the organization. This fee must be paid prior to issuing a certificate of membership.

Bylaws (cont.)

Section 13. Certificate of Membership

13.1. A certificate of membership will be designed and issued to each member, signed by the president and the secretary.

Section 14. Loss of Membership

14.1. A member may be dropped from membership for:

14.1.1. Missing three consecutive meetings without written excuse, submitted to the secretary and considered justifiable by the board of governors. Members over 60 years of age, honorary, international and senior members will be excused from this requirement.

14.1.2. Failure to adhere to the obligations and objectives of the Association set forth in the articles of incorporation and in the bylaws.

14.1.3. Failure to remit dues within six months of the announced date will result in loss of membership in the Association. Members in arrears will receive a registered letter at least one month prior to the date of loss of membership outlining this action. Reinstatement of membership may be obtained by petitioning the board of governors. Payment of past dues owed as well as a reinstatement fee equal to the initiation fee for the organization will be required to resume membership.

14.2. The board of governors shall act by two-thirds vote to implement Article I, Section 14.1. with due process as specified by Article I, Section 14.3.3. and Article I, Section 14.3.3.7.

14.3. Discipline.

14.3.1. The board of governors may expel, call for the resignation of or otherwise discipline a member if three-quarters of all the members of the board of governors find that the conduct of the member has been injurious to the purposes of the Association as outlined in the bylaws and the preamble entitled principles of medical ethics.

14.3.2. Without limiting the foregoing, the following shall be considered to be conduct or conclusive evidence of conduct injurious to the purposes of the Association:

14.3.2.1. Conviction of a felony or of any crime relating to or arising out of the practice of medicine and involving moral turpitude.

14.3.2.2. Limitation or termination of any right associated with the practice of medicine in any state, province or country.

14.3.2.3. Grossly immoral, dishonorable or unprofessional conduct.

14.3.3. Due process.

14.3.3.1. Questions of discipline shall be investigated by an ad hoc committee, appointed by the president of the APSA.

14.3.3.1.1. The ad hoc committee shall consist of two members-at-large and one member of the board of governors.

14.3.3.1.2. The chair of the ad hoc committee shall be one of the specified members-at-large and shall be designated by the president of APSA.

14.3.3.1.3. The ad hoc committee shall convene for the purpose of investigating the charges within six months of time of its appointment and shall report its recommendation(s) to the board of governors in writing within nine months of the committee's appointment.

Bylaws (cont.)

14.3.3.1.4. The term of the ad hoc committee includes but does not extend beyond the time of submission of their report.

14.3.3.2. A statement of charges shall be sent by the secretary of APSA for the ad hoc committee. The statement shall be sent to the member's last recorded address, by certified or registered mail, at least thirty days before the designated meeting date for the committee's consideration of the matter.

14.3.3.2.1. The time and place of the meeting shall be indicated.

14.3.3.2.2. The member shall be informed that he/she may appear at the meeting in person and with counsel, if he/she so elects, so as to state his/her response to the charges.

14.3.3.3. The board of governors shall consider the recommendation(s) of the ad hoc committee at its next regular meeting or upon extraordinary session, but no earlier than thirty days from time of the member's notification.

14.3.3.3.1. A statement of the recommendation(s) of the ad hoc committee shall be sent by the secretary to the last recorded address of the member in question, by certified or registered mail, at least thirty days before the date of the meeting when the board of governors shall consider the matter.

14.3.3.3.1.1. The time and place of the meeting shall be indicated.

14.3.3.3.1.2. The member shall be informed that he/she may appear at the meeting in person and with counsel, if he/she so elects, so as to state his/her response to the charges.

14.3.3.4. The board of governors may temporarily suspend any member and defer consideration of disciplinary action during the pending of appeal from a judicial or other governmental decision which forms the basis for disciplinary action as stated in Article I, Section 14.3.2. or during anytime in which he/she is prevented from appearing at a hearing by reasons of health. Upon completion of the exception, the board of governors shall implement Article I, Section 14.3.3.

14.3.3.5. Following consideration by the board of governors, the member shall be informed by the secretary of the result of the deliberations by certified or registered mail to the last recorded address of the member.

14.3.3.6. The result of the deliberations of the board of governors shall be considered final unless the secretary receives in writing within thirty days from the time of issuance of the notification, as stated in Article I, Section 14.3.3.5. a request for appeal to the membership-at-large of the action of the board of governors.

14.3.3.7. Upon request for appeal, the membership shall be presented at the next annual meeting the recommendations of the board of governors. The member may elect, if he/she so desires to personally present his/her argument for the appeal. The membership present shall confirm or refute the recommendation of the board of governors by simple written majority vote. This vote shall be considered binding and final.

14.4. Upon loss of membership, the certificate of membership shall be returned to the secretary.

Bylaws (cont.)

Article II : OFFICERS

Section 1. The Officers

1.1. The officers shall be a president, a president-elect, a secretary and a treasurer.

1.2. The officers shall be elected by written or electronic ballot distributed by the nominating committee to the membership three months prior to the annual meeting.

1.3. The nominee for each office obtaining the majority vote by the deadline posted shall be elected.

Section 2. Term of Office

2.1. The terms of each above office shall be:

President	1 year
President-Elect	1 year
Secretary	3 years
Treasurer	3 years

Article III: BOARD OF GOVERNORS

Section 1. Membership of the Board of Governors

1.1. The membership of the board of governors shall consist of the president, the president-elect, the secretary, the treasurer, the immediate past president and three elected members-at-large.

1.2. The three at-large members, for the first year of this amendment, shall be elected to serve for one, two and three years respectively. Thereafter, a new member shall be elected for a three-year term each year.

1.3. Election shall be conducted in the same manner as for the officers. See Article II, Sections 1.2. and 1.3.

Section 2. Chair of the Board of Governors

2.1. The president shall be the chair of the board of governors.

Section 3. Functions of the Board of Governors

3.1. It shall generally oversee the activities of the Association and make certain that the spirit and the letter of the articles of incorporation and the bylaws are carried out.

3.2. It shall pass recommendations on candidates for membership to the entire membership.

3.3. It shall approve the meeting place of the annual meeting business meeting at least one year in advance.

3.4. It shall review the report of the membership and credentials committee.

3.5. It shall meet at least once a year or more times, as is appropriate, sufficiently prior (at least four months) to the annual meeting business meeting to allow time for proper action.

3.6. A quorum for official business at a board of governors meeting shall be four.

3.8. Vacancies on the board of governors, other than the presidency, shall be filled by appointment by the president until the next annual meeting business meeting, when a special election will be held.

Bylaws (cont.)

Article IV: DUTIES OF OFFICERS

Section 1. The President

1.1. Shall preside at the annual meeting and at all meetings of the board of governors.

1.2. Shall enforce all rules and regulations of the Association.

1.3. Shall sign all official documents.

1.4. Shall make appropriate committee appointments.

1.5. Shall be an ex-officio member of all committees except the nominating committee.

Section 2. The President-Elect

2.1. Shall preside at the annual meeting in the absence of the president.

2.2. Shall preside at other meetings in the president's absence.

2.3. In the event of the disability or death of the president, shall assume the president's responsibilities.

2.4. Shall become president the next year.

Section 3. The Secretary

3.1. Shall record the proceedings at all meetings.

3.2. Shall notify the membership of all meetings and publish and distribute the agenda of the annual meeting business meeting.

3.3. Shall maintain a registry of membership.

3.4. Shall conduct appropriate correspondence and maintain a file of such.

3.5. Shall submit a report of the minutes of the previous annual business meeting.

3.6. Upon the disability of the president and then the president-elect, shall assume the office of the president automatically—to serve only until the next annual meeting.

Section 4. The Treasurer

4.1. Shall bill to and collect from members all dues and fees pertaining to the Association.

4.2. Shall render disbursements for authorized official expenses.

4.3. Shall maintain a financial ledger.

4.4. Shall maintain records, which shall be available for an annual audit by an appropriate auditing committee of members appointed by the president or by an outside accounting firm.

4.5. Shall present a report to the membership at the business session of the annual meeting.

4.6. Shall maintain at the expense of the Association a surety bond for the treasurer and all others handling Association funds.

4.8. The first treasurer shall be elected for a two-year term.

Bylaws (cont.)

Article V: MEETINGS

Section 1. Annual Meeting

1.1. There shall be an annual meeting, the time and place of which shall be established by the board of governors at least a year in advance.

1.2. There shall be a scientific meeting incorporated into the annual meeting.

1.3. There shall be a business meeting incorporated into the annual meeting, which will be open only to members in good standing and at which official business shall be transacted.

1.4. All meetings shall be guided by the current edition of Robert's Rules of Order.

Section 2. Guests and the Annual Meeting

2.1. The scientific sessions of the annual meeting shall be open to all interested physicians who register for the meeting.

2.2. Interested paramedical professionals may be invited by any member in good standing.

2.3. A registration fee may be required of non-members and guests at the discretion of the program committee.

2.4. The privilege of the floor at the scientific sessions will be restricted to the membership and to others who have been given official designation by letter from the secretary.

Section 3. Quorum

3.1. The members present shall constitute a quorum for business at the annual meeting business meeting and other official committee meetings unless the number is otherwise specifically stated.

Article VI: BYLAWS

Section 1. Time of Effect

1.1. The bylaws shall take effect immediately from the time of adoption.

Section 2. Amendments of the Bylaws

2.1. The bylaws may be changed or amended by submitting a written resolution to the board of governors who, in turn, will present the change or amendment to the Membership at least one month prior to the next annual meeting.

2.2. A two-thirds vote of the membership voting at the annual meeting will be necessary for adoption of a change or amendment of the bylaws of the Association.

Article VII: PERMANENT COMMITTEES

Section 1. Permanent Committees

1.1. The board of governors shall establish permanent committees to conduct the business and educational affairs of the Association. These permanent committees shall be defined and their duties described in the Association's policies and procedures. Creation, dissolution and modification to the number and duties of the permanent committees shall be by majority vote of the board of governors. Any changes in committees shall be submitted to and ratified by the members of the American Pediatric Surgical Association at the yearly meeting.

Bylaws (cont.)

Article VIII: AD HOC COMMITTEES

Section 1. Membership

1.1. From time to time, the president may establish an ad hoc committee and appoint its membership.

Article IX: REPRESENTATION TO OTHER SOCIETIES

The president may appoint liaison representatives to other organizations, societies or associations as seems appropriate.

Article X: HISTORIAN

An historian shall be appointed by the president.

Article XI: OFFICIAL SEAL

A seal shall be designated and affixed to all official stationery and documents.

Article XII: INDEMNIFICATION AND INSURANCE

Section 1. Indemnification

1.1. As provided herein, the Association may, but shall not be required or obligated to, indemnify any governor or officer or any former governor or officer of the Association (and his or her heirs, executors or other personal representatives) against expenses, including attorney's fees, judgments, fines and amounts paid in settlement which are actually and reasonably incurred by such person by reason of the fact that such person is or was a governor or officer in connection with any threatened, pending or completed action, suit or proceedings, whether civil, criminal, administrative or investigative, to the extent and according to the procedures and requirements set forth in the Ohio Non-Profit Corporation law. The decision of whether to indemnify is reserved to the board of governors to be decided by the majority vote of governors who are not involved in or parties to the same or substantially the same claim, action, suit or proceeding. Where a quorum cannot be obtained or the board of governors cannot reach a decision, an independent legal counsel shall be appointed pursuant to Ohio Non-Profit Corporation law to make such decision. The indemnification provided for herein shall not be deemed to restrict the right of the Association to indemnify employees, agents and others as permitted by law.

Section 2. Insurance

2.1. The board of governors may, at its option, purchase and maintain such insurance on behalf of the Association and its governors, officers, employees, agents and others as the board of governors deem appropriate and necessary.

Approved May 23, 2006
Approved May 30, 2009
Approved May 22, 2012

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APSA
FOUNDATION

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APSA Foundation History

In 1991, a small group of APSA members discussed establishing a foundation for APSA which would foster support for scientific investigation in the field of children's surgery by providing an Annual Enrichment Grant to qualified applicants.

The group led by Dr. Albert H. Wilkinson, Jr., of Jacksonville, FL, included former presidents Kathryn Anderson, James A. O'Neill, Jr., the late Alfred A. de Lorimier, then current President Dick Ellis, the APSA Treasurer Bradley Rodgers and the APSA Secretary Keith Ashcraft. Dr. Wilkinson was the driving force, and with the aid of a Jacksonville law firm, developed the Bylaws and Articles of Incorporation which took effect on October 7, 1992. The Articles of Incorporation of the APSA Foundation were filed with the Secretary of State of Florida on February 2, 1993. Certification followed on March 19, 1993. The initial officers of the Foundation were President, Dick Ellis, Secretary, Keith Ashcraft, and Treasurer, Bradley Rodgers, with Dr. Wilkinson serving as the Foundation Agent in the State of Florida. On May 3, 1994, an application for a 501(c)(3) tax-exempt charitable corporation was filed with the Internal Revenue Service and was approved by the U.S. Department of Treasury, Internal Revenue Service on March 15, 1995. At the time, the Foundation Board was led by Jay Grosfeld, APSA President, the late Donald R. Cooney, Treasurer and Howard Filston, Secretary.

Initially, only 2% 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. In 1997, the Foundation bylaws were amended and the Board of Directors' membership revised to include (1) the four past presidents of APSA, (2) the APSA secretary, (3) the APSA treasurer and (4) one at-large member, elected to a three-year term by the general membership at the Annual Business Meeting. A formal grant application process with stringent peer review was established as the method for selecting each annual Enrichment Grant recipient.

By its third year, contributors to the APSAF had increased to 7% of the total APSA membership. In 1998, efforts to encourage donor participation were enhanced by further formalization of the donation process. Dr. Grosfeld was asked to continue as Chairman of the Board of Directors, serving indefinitely at the discretion of the Board. In 2003, Dr. Wilkinson stepped down as Foundation Agent and was replaced by Dr. John Noseworthy. Gift level categories were established including Donor (up to $1,000), Gold Donor ($1,000 or more), Robert E. Gross benefactor ($5,000) and more recently, the William E. Ladd Society level of giving ($10,000) was added. The latter three levels can be achieved by cumulative annual gifts. The active APSA president was considered an *ex officio* member of the Foundation Board, and in 2007, a second at-large member was added to the Board. In 2012, Dr. Noseworthy retired and Dr. Daniel Robie was selected as the new Foundation agent.

APSA Foundation History (cont.)

The corpus of the Foundation has at times exceeded $500,000 despite the fact that less than 20% of the membership have contributed to the Fund. The stipend for each grant has gradually increased, at first to $10,000, and in the past five years to $25,000. Eventually, two grants were awarded annually and in 2013 three grants will be available. Since its inception, the APSA Foundation has provided more than $385,000 in grant support for our young pediatric surgeon-scientists (see list below). The return on investment has been extraordinary!

Most of the recipients have used their Enrichment Grants from the APSA Foundation as a springboard from which to acquire significant external funding from the National Institutes of Health (NIH) and other sources.

APSA Foundation Board of Directors

Chairman
Jay L. Grosfeld
Indianapolis, IN

Secretary
Mary L. Brandt
Houston, TX

Treasurer
Charles J. Stolar
Santa Barbara, CA

Members
Gail E. Besner, Columbus, OH
Keith E. Georgeson, Spokane, WA
Jacob C. Langer, Toronto, ON Canada
Marshall Z. Schwartz, Philadelphia, PA
Robert C. Shamberger, Boston, MA

Foundation Agent
Daniel K. Robie
Jacksonville, FL

***Ex Officio* Member**
Keith T. Oldham, Milwaukee, WI
APSA President

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.

2012
Harold N. Lovvorn, III, MD
Induced Pluripotent Stem Cells for the Study of Wilms' Tumorigenesis

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

2011
Shaun M. Kunisaki, MD
Mesenchymal Stem Cell Regulation of Fetal Lung Development in Diaphragmatic Hernia

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

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

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

2009
Tippi C. MacKenzie, MD
Maternal Immune Response *in Utero* Hematopoietic Stem Cell Transplantation

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

2008
Douglas N. Miniati, MD
Role of Notch4 signaling in Aberrant Pulmonary Vascular Development

2007
Alan M. Goldstein, MD
Role of Sonic Hedgehog in Enteric Nervous System Development

APSA Foundation Grant Recipients (cont.)

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

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

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

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

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

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

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

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

2000
Edward M. Barksdale, Jr., MD
The Therapy of Neuroblastoma-Induced Disorders of Dendropoiesis of Dendritic Cell Development

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

APSA Foundation Grant Recipients (cont.)

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

1997
Charles N. Paidas, MD
Septation of the Cloaca

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

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*Donations received as of April 1, 2013.

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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 Surgeons Training Program Directors M. Judah Folkman Memorial Award Recipients

Best Poster Presentation

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

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

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

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

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

Award Recipients (cont.)

Best Podium Presentation

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

APSA Posters of Distinction

Basic Science
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

Award Recipients (cont.)

Clinical
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 winning presentation is selected by a special committee.

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 sponsored by the Sheikh Zayed Institute for Pediatric Surgical Innovation at Children's National Medical Center, Washington, DC

Award Recipients (cont.)

Travel Fellowship

The Travel Fellowship, supported by APSA and the APSA Foundation, is an annual award for one young surgeon 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.

2012
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 2012-2013

The APSA Board of Governors and Membership Congratulates Our Newest Members

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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.

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Longino, Luther A 1996
Welch, Kenneth J. 1996
Baffes, Thomas G. 1997
Bettex, Marcel 1997
Salzberg, Arnold M. 1997
Santulli, Thomas V. 1997
Brennan, L. Patrick 1998
Brooks, Benjy F. 1998
Carson, James A. 1998
Hamilton, James P. 1998
Stanley-Brown, Edward G. 1998
Knutrud, Ola 1999
Warden, M. James. 1999
Winslow, Paul 1999
Zachary, R.B 1999
Linkner, Laurance M. 2000
Meeker, Irving A. Jr. 2000
Chisholm, Tague C. 2000
McAteer, Jerry 2001
Clatworthy, William 2001
Allen, James E. 2001
Lizarralde, A. Eduardo. 2001
Weitzman, Jordan J. 2001
Campbell, David P. 2001
Carcassone, Michel 2002
Cohn, Bertram D. 2002
Colodny, Arnold H. 2002
Eraklis, Angelo J. 2002
Smith, Willard D. 2002
So, Henry B. 2002
Tapper, David 2002
Zwiren, Gerald T. 2002
Abrams, Martin W. 2003
Harberg, Franklin J. (Jim) 2003
Lynch, Frank P. III 2003
Smith, E. Ide 2003
Rickham, Peter P. 2003
Huseby, Thomas L. 2004
Izant, Robert 2004
Pickett, Lawrence K. 2004
Bronsther, Burton 2004
Stahl, Nicholas M. 2004
Phillipart, Arlvin I. III 2004
McAlpin, Columbus D. 2004
Lloyd, James R. 2004
Moore, Thomas C. 2004
Rathauser, Frank 2005

In Memoriam (cont.)

Fitzpatrick, John 2005
Able, Luke W. 2006
Andrews, Gibb. 2006
Jewett, Theodore C. 2006
Rothmann, Bruce F. 2006
Wiener, Eugene S. 2006
Beardmore, Harvey E. 2007
Black, Preston R. 2007
Cox, Joseph A. 2007
Exelby, Philip R. 2007
Mollitt, Daniel L. 2007
Ratner, Irving A. 2007
McClenathan, James E. 2007
Pitts, R. Marshall 2007
Wolfson, Philip J. 2007
Folkman, M. Judah 2007
Smith, Melvin D. 2007
McGovern, Bruce 2008
MacDonald, James S. 2008
Campbell, Timothy J. 2008
Votteler, Theodore P. 2008
Cooney, Donald R. 2008
Cooke, Ronald W. 2009
Anderson, Alan E. 2009
de Lorimier, Alfred A. 2009
Fisher, John H. 2009
Mercer, Stanley 2010
Schultz, Lloyd R. 2010
Hayes, Lawrence E. 2010
Besser, Arthur S. 2010
Verhagan, Arie D. 2010
Cloud, Daniel T. 2010
Altman, R. Peter 2011
DeLuca, Frank G. 2011
Schnaufer, Louise 2011
Stephens, Frank D. 2011
Roback, Stacy A. 2011
Swenson, Orvar. 2012
Bailey, William C. 2012
Liu, Donald C. 2012
Graivier, Leonard 2012
Soper, Robert T. 2012
Slim, Michael S. 2013
Koop, C. Everett 2013

Founding Members

Fred Arcari, Royal Oak, MI
E. Thomas Boles, Columbus, OH
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, Rutledge, TN
Peter K. Kottmeier, Salt Lake City, UT
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

Charter Members (cont.)

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, Woodstock, IL
Kenneth Kenigsberg, Glen Cove, NY
William N. Kincannon, Santa Barbara, CA
Murray R. Kliman, Vancouver, BC, Canada
Charles H. Klippel, Paxton, MA
Irwin H. Krasna, Forest Hills, NY
Dennis J. Lafer, Jacksonville, FL
J. Eugene Lewis, St. Louis, MO
Peter S. Liebert, White Plains, NY
Hugh B. Lynn, Winchester, VA
Enrique Marquez, San Juan, PR
Lester W. Martin, Bellbrook, OH
R. W. Paul Mellish, Dhahran, Saudi Arabia
Ascher L. Mestel, Brooklyn, NY
Richard C. Miller, Jackson, MS
David R. Murphy, Kingston, ON Canada
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

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SCHEDULE AND PROGRAM

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Schedule-at-a-Glance

Wednesday, May 1

8:00 a.m. – 2:00 p.m.	APSA Board of Governors Meeting	*Sentry 2-4*
2:00 p.m. – 6:00 p.m.	Registration Open	*Islands Foyer*
2:00 p.m. – 6:00 p.m.	Speaker Ready Room Open	*Caxambus 2*
3:00 p.m. – 6:30 p.m.	Pediatric Surgery Training Program Directors Meeting	*Capri 7-10*
6:30 p.m. – 10:00 p.m.	Publications Committee Meeting	*Key West*

Thursday, May 2

EDUCATION DAY

6:00 a.m. – 8:00 a.m.	Committee Meetings See Page 73 for Ancillary Meeting Schedule	
6:30 a.m. – 5:00 p.m.	Registration Open	*Islands Foyer*
6:30 a.m. – 5:00 p.m.	Speaker Ready Room Open	*Caxambus 2*
6:30 a.m. – 5:30 p.m.	Internet Cafe/Twitter Fall Open	*Islands G-J*
7:15 a.m. – 7:45 a.m.	Continental Breakfast	*Islands G-J*
7:45 a.m. – 8:00 a.m.	President's Welcome	*Islands A-F*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Room Open for Registered Companions	*Terrace Penthouse, Suite #1106, Islands Tower*
8:00 a.m. – 11:00 a.m.	**Education Session I** Palliative Care and Pain management	*Islands A-F*
11:00 a.m. – 11:15 a.m.	Refreshment Break	*Islands G-J*
11:15 a.m. – 12:15 p.m.	**Jay and Margie Grosfeld Lecture** Jessica J . Kandel, MD Serendipity: Translational Research, High Quality Care and the Children's Hospital	*Islands A-F*
11:15 a.m. – 3:00 p.m.	Exhibitors Set Up	*Islands G-J*
12:15 p.m. – 12:30 p.m.	Box Lunch Pick Up	*Islands Foyer*
12:30 p.m. – 1:30 p.m.	**Outcomes and Clinical Trials Committee** Systematic Reviews on Bowel Prep for GI Surgery and Optimization of Resources for the Surgical Care of Children: • A critical analysis of interventions designed to reduce complications following elective colorectal surgery: An American Pediatric Surgical Association Outcomes and Clinical Trials Systematic Review • A systematic review of existing evidence regarding resource requirements in children's surgery	*Islands A-F*
1:30 p.m. – 2:15 p.m.	**APSA Foundation Scholars** Harold Lovvorn, MD Induced Pluripotent Stem Cells for the Study of Wilms' Tumorigenesis Kuo-Jen Tsao, MD Errors and Adverse Events in the Setting of the neonatal Surgery Performed in the NICU Peter F. Nichol, MD Using a Genetic Model of Duodenal Atresia to Understand Regenerative Mechanisms within the Intestine	*Islands A-F*
2:15 p.m. – 4:15 p.m.	**Education Session II** To Tweet or Become Extinct: Why Pediatric Surgeons Need to Understand Social Networking	*Islands A-F*

Schedule-at-a-Glance (cont.)

Thursday, May 2 (cont.)

2:15 p.m. – 4:15 p.m.	**Education Session III** What Every Pediatric Surgeon Should Know About Prenatal Diagnosis and Counseling	*Capri*
3:00 p.m. – 5:30 p.m.	Exhibits Open	*Islands G-J*
4:15 p.m. – 5:15 p.m.	Wine and Cheese Reception with Exhibitors	*Islands G-J*
4:30 p.m. – 6:15 p.m.	Concurrent Sessions: **Poster Session I** Basic Science **Poster Session II** Clinical	*Islands A-F* *Capri*
6:30 p.m. – 8:30 p.m.	Welcome Reception	*Beach*

Friday, May 3

6:00 a.m. – 7:00 a.m.	5K Fun Run (*Pre-Registration Required)*	*North Beach*
6:00 a.m. – 7:30 a.m.	Committee Meetings See Page 73 for Ancillary Meeting Schedule	
6:15 a.m. – 7:30 a.m.	APSA Foundation Board Meeting	*Capri 1*
6:30 a.m. – 10:00 a.m.	Poster Set Up	*Collier Hall*
6:30 a.m. – 1:00 p.m.	Registration Open	*Islands Foyer*
6:30 a.m. – 1:00 p.m.	Internet Café/Twitter Fall Open	*Island G-J*
6:30 a.m. – 1:00 p.m.	Exhibits Open	*Island G-J*
6:30 a.m. – 2:00 p.m.	Speaker Ready Room Open	*Caxambus 2*
6:45 a.m. – 7:30 a.m.	Continental Breakfast	*Island G-J*
7:30 a.m. – 9:00 a.m.	**Scientific Session I** Oncology and Trauma	*Islands A-F*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Room Open for Registered Companions	*Korals Lobby Bar*
8:30 a.m. – 12:30 p.m.	Naples Shopping Tour *(Pre-Registration Required)*	*Palms Ballroom/ Spa Entrance*
9:00 a.m. – 10:00 a.m.	**Robert E. Gross Lecture** Jorge D . Reyes, MD	*Islands A-F*
10:00 a.m. – 10:30 a.m.	Refreshment Break	*Islands G-J*
10:00 a.m. – 1:00 p.m.	Posters Open for Viewing	*Collier Hall*
10:30 a.m. – 10:45 a.m.	**Travel Fellow Presentation** Omolara Williams, MD Practicing in a Resource Constrained Environment: Stumbling Blocks and Stepping Stones	*Islands A-F*
10:45 a.m. – Noon	**Scientific Session II** Fetal and Newborn Critical Care Science	*Islands A-F*
Noon – 1:00 p.m.	**International Guest Lecture** Agostino Pierro, MD Across the Ocean: Perspectives for Clinical Care, Training and Research	*Islands A-F*
1:00 p.m. – 2:30 p.m.	Benjy Brooks Meeting and Luncheon *(Pre-Registration Required)*	*Capri 1*

Schedule-at-a-Glance (cont.)

Friday, May 3 (cont.)

1:00 p.m.	Leisure Time	
1:00 p.m. – 5:00 p.m.	Day at the Beach *(Pre-Registration Required)*	*Beach*
1:30 p.m. – 6:00 p.m.	Golf Tournament *(Pre-Registration Required)*	*Rookery Golf Course* *Golfers meet at hotel's front drive at 1:30 p.m.*
2:00 p.m. – 5:00 p.m.	Tennis Tournament *(Pre-Registration Required)*	*Marriott Tennis Courts*
2:00 p.m. – 5:00 p.m.	**Simulation Courses** *(Pre-Registration Required)* • Endosurgical Simulation Course CME not offered • High-fidelity Endosurgical Simulation Course CME not offered	*Sabal/Coconut*
5:00 p.m. – 6:30 p.m.	***Journal of Pediatric Surgery* Reception** *By Invitation*	*Tiki Terrace*
6:00 p.m. – 6:30 p.m.	Rehearsal for New Member Induction Ceremony *By Invitation*	*Islands A-F*
6:30 p.m. – 7:30 p.m.	New Member Reception *By Invitation*	*Terrace Penthouse, Suite #1106, Islands Tower*

Saturday, May 4

6:15 a.m. – 8:00 a.m.	Member Business Meeting with Breakfast Regular Members Only	*Islands A-F*
6:30 a.m. – 1:30 p.m.	Exhibits Open	*Islands G-J*
6:30 a.m. – 3:30 p.m.	Registration Open	*Islands Foyer*
6:30 a.m. – 3:30 p.m.	Speaker Ready Room Open	*Caxambus 2*
6:30 a.m. – 3:30 p.m.	Internet Café/Twitter Fall Open	*Islands G-J*
6:30 a.m. – 3:30 p.m.	Posters Open for Viewing	*Collier Hall*
7:00 a.m. – 8:00 a.m.	Continental Breakfast for Non-members	*Islands G-J*
8:00 a.m. – 9:00 a.m.	***Journal of Pediatric Surgery* Lecture** David B . Hoyt, MD	*Islands A-F*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Room Open for Registered Companions	*Korals Lobby Bar*
9:00 a.m. – 10:30 a.m.	**Scientific Session III** Gastrointestinal Science and Surgery	*Islands A-F*
10:30 a.m. – 11:00 a.m.	Refreshment Break	*Islands G-J*
11:00 a.m. – Noon	**Scientific Session IV** Databases and Randomized Trials for Optimization and Regionalization of Surgical Care	*Islands A-F*
Noon – 12:15 p.m.	Introduction of New Members	*Islands A-F*
12:15 p.m. – 1:15 p.m.	**Presidential Address** Keith T . Oldham, MD	*Islands A-F*
1:15 p.m. – 1:30 p.m.	Box Lunch Pick Up	*Islands G-J*
1:30 p.m.	Exhibits Dismantle	*Islands G-J*
1:30 p.m. – 2:30 p.m.	**Innovation Session**	*Islands A-F*
2:30 p.m. – 3:30 p.m.	**Video Session**	*Islands A-F*
3:30 p.m. – 5:30 p.m.	Poster Dismantle	*Collier Hall*
3:30 p.m. – 6:45 p.m.	Leisure Time	
6:45 p.m. – 7:30 p.m.	President's Reception	*Sunset Terrace*
7:30 p.m. – 10:00 p.m.	President's Banquet	*Islands A-J*

Schedule-at-a-Glance (cont.)

Sunday, May 5

6:00 a.m. – 8:00 a.m.	Committee Meetings See Page 73 for Ancillary Meeting Schedule	
7:00 a.m. – 8:00 a.m.	Continental Breakfast	*Islands Foyer*
7:00 a.m. – 10:30 a.m.	Speaker Ready Room Open	*Caxambus 2*
7:00 a.m. – 11:30 a.m.	Registration Open	*Islands Foyer*
7:00 a.m. – 11:30 a.m.	Internet Café/Twitter Fall Open	*Islands G-J*
8:00 a.m. – 9:15 a.m.	**Scientific Session V** Rare and Miscellaneous Surgical Issues	*Islands A-D*
9:15 a.m. – 10:15 a.m.	**COG Surgeon Update** Rare Tumors – The Key Concepts We Need to Know: Melanoma, Pleuropulmonary Blastoma and Hepatic Tumor Resection	*Islands A-D*
10:15 a.m. – 10:30 a.m.	Refreshment Break	*Islands G-J*
10:30 a.m. – Noon	**Pediatric Surgery Case Debates and Controversies**	*Islands A-D*
Noon	Annual Meeting Concludes	

Ancillary Meetings by Group

Committee	Date/Time	Room
AAP SOS Committee on the Delivery of Surgical Care	Friday, May 3, 6:30 a.m. – 7:30 .am.	*Capri 4*
ACGME – Pediatric Surgery Milestones Working Group	Tuesday, April 30, 8:00 a.m. – 5:00 p.m. & Wednesday, May 1, 8:00 a.m. – Noon	*Everglades*
APSA Board of Governors Board Meeting	Wednesday, May 1, 8:00 a.m. – 2:00 p.m.	*Sentry 2-4*
APSA Foundation Board Meeting	Friday, May 3, 6:15 a.m. – 7:30 a.m.	*Capri 1*
Association of Pediatric Surgery Training Program Directors	Wednesday, May 1, 3:00 p.m. – 6:30 p.m.	*Capri 7-10*
Cancer Committee	Sunday, May 5, 7:00 a.m. – 8:00 a.m.	*Capri 9*
Childhood Obesity Committee	Thursday, May 2, 7:00 a.m. – 8:00 a.m.	*Capri 2*
CME Subcommittee	Sunday, May 5, 7:00 a.m. – 8:00 a.m.	*Capri 4*
Companion Roundtable	Saturday, May 4, 9:30 a.m. – 10:30 a.m.	*Korals Lobby Bar*
Education Committee	Friday, May 3, 6:00 a.m. – 7:30 a.m.	*Capri 8*
Ethics and Advocacy Committee	Thursday, May 2, 7:00 a.m. – 8 :00 a.m.	*Capri 10*
Fetal Diagnosis & Treatment Committee	Thursday, May 2, 6:00 a.m. – 7:00 a.m.	*Capri 3*
Hirschsprung Disease Research Collaborative (HDRC)	Thursday, May 2, 7:00 a.m. – 8:00 a.m.	*Capri 9*
Industry Advisory Committee	Sunday, May 5, 7:00 a.m. – 8:00 a.m.	*Capri 8*
Informatics and Telemedicine Committee	Thursday, May 2, 6:00 a.m. – 7:00 a.m.	*Capri 4*
International Relations Committee	Friday, May 3, 6:00 a.m. – 7:30 a.m.	*Capri 9*
JPS Reception	Friday, May 3, 5:00 p.m. – 6:30 p.m.	*Tiki Terrace (Inclement Weather Plan – Sentry 1-2)*
Membership & Credentials Committee	Thursday, May 2, 7:00 a.m. – 8:00 a.m.	*Capri 1*
NEST - Neonatal Research Network	Friday, May 3, 2:00 p.m. – 3:30 p.m.	*Capri 8-9*
New Technology Committee	Thursday, May 2, 7:00 a.m. – 8:00 a.m.	*Capri 3*
NSQIP Pediatric Steering Committee	Friday, May 3, 1:00 p.m. – 3:00 p.m.	*Capri 6*

Ancillary Meetings by Group

Committee	Date/Time	Room
Outcomes & Clinical Trials Committee	Thursday, May 2, 6:00 a.m. – 7:00 a.m.	*Capri 8*
Patient/Family Subcommittee	Sunday, May 5, 7:00 a.m. – 8:00 a.m.	*Capri 10*
Pediatric Surgery Research Collaborative	Friday, May 3, 4:00 p.m. – 5:30 p.m.	*Capri 8-9*
Practice Committee	Thursday, May 2, 6:00 a.m. – 7:00 a.m.	*Capri 9*
Program Committee	Thursday, May 2, 7:00 a.m. – 8:00 a.m.	*Capri 4*
Publications Committee	Wednesday, May 1, 6:30 p.m. – 10:00 p.m.	*Key West*
Quality & Safety: SURPris	Wednesday, May 1, 8:00 a.m. – 5:00 p.m.	*Sanibel*
Simulation Subcommittee	Sunday, May 5, 7:00 a.m. – 8:00 a.m.	*Capri 2*
Student/Resident Subcommittee	Sunday, May 5, 7:00 a.m. – 8:00 a.m.	*Capri 3*
Surgery Committee of the Childhood Liver Disease Research and Education Network	Sunday, May 5, 7:00 a.m. – 8:00 a.m.	*Capri 1*
Surgical Critical Care Task Force	Thursday, May 2, 6:00 a.m. – 7:00 a.m.	*Capri 10*
Surgical Quality & Safety Committee	Thursday, May 2, 7:00 a.m. – 8:00 a.m.	*Capri 8*
Trauma Committee	Friday, May 3, 6:00 a.m. – 7:30 a.m.	*Capri 3*
Workforce Committee	Thursday, May 2, 6:00 a.m. – 7:00 a.m.	*Capri 1*

Ancillary Meetings by Day

Committee	Date/Time	Room
Tuesday, April 30		
ACGME – Pediatric Surgery Milestones Working Group	8:00 a.m. – 5:00 p.m.	*Everglades*
Wednesday, May 1		
ACGME – Pediatric Surgery Milestones Working Group	8:00 a.m. – Noon	*Everglades*
APSA Board of Governors Board Meeting	8:00 a.m. – 2:00 p.m.	*Sentry 2-4*
Association of Pediatric Surgery Training Program Directors	3:00 p.m. – 6:30 p.m.	*Capri 7-10*
Publications Committee	6:30 p.m. – 10:00 p.m.	*Key West*
Quality & Safety: PHIS	8:00 a.m. – 5:00 p.m.	*Sanibel*
Thursday, May 2		
Fetal Diagnosis & Treatment Committee	6:00 a.m. – 7:00 a.m.	*Capri 3*
Informatics and Telemedicine Committee	6:00 a.m. – 7:00 a.m.	*Capri 4*
Outcomes & Clinical Trials Committee	6:00 a.m. – 7:00 a.m.	*Capri 8*
Practice Committee	6:00 a.m. – 7:00 a.m.	*Capri 9*
Surgical Critical Care Task Force	6:00 a.m. – 7:00 a.m.	*Capri 10*
Workforce Committee	6:00 a.m. - 7:00 a.m.	*Capri 1*
Childhood Obesity Committee	7:00 a.m. – 8:00 a.m.	*Capri 2*
Ethics and Advocacy Committee	7:00 a.m. - 8:00 a.m.	*Capri 10*
Membership & Credentials Committee	7:00 a.m. – 8:00 a.m.	*Capri 1*
New Technology Committee	7:00 a.m. – 8:00 a.m.	*Capri 3*
Program Committee	7:00 a.m. – 8:00 a.m.	*Capri 4*
Surgical Quality & Safety Committee	7:00 a.m. – 8:00 a.m.	*Capri 8*
Hirschsprung Disease Research Collaborative (HDRC)	7:00 a.m. – 8:00 a.m.	*Capri 9*

Ancillary Meetings by Day

Committee	Date/Time	Room
Friday, May 2		
APSA Foundation Board Meeting	6:15 a.m. – 7:30 a.m.	*Capri 1*
Education Committee	6:00 a.m. – 7:30 a.m.	*Capri 8*
International Relations Committee	6:00 a.m. – 7:30 a.m.	*Capri 9*
Trauma Committee	6:00 a.m. – 7:30 a.m.	*Capri 3*
AAP SOS Committee on the Delivery of Surgical Care	6:30 a.m. – 7:30 .am.	*Capri 4*
NEST - Neonatal Research Network	2:00 p.m. – 3:30 p.m.	*Capri 8-9*
NSQIP Pediatric Steering Committee	1:00 p.m. – 3:00 p.m.	*Capri 6*
Pediatric Surgery Research Collaborative	4:00 p.m. – 5:30 p.m.	*Capri 8-9*
JPS Reception	5:00 p.m. – 6:30 p.m.	*Tiki Terrace (Inclement Weather Plan – Sentry 1-2)*
Saturday, May 1		
Companion Roundtable	9:30 a.m. – 10:30 a.m.	*Korals Lobby Bar*
Sunday, May 1		
Cancer Committee	7:00 a.m. – 8:00 a.m.	*Capri 9*
CME Subcommittee	7:00 a.m. – 8:00 a.m.	*Capri 4*
Industry Advisory Committee	7:00 a.m. – 8:00 a.m.	*Capri 8*
Patient/Family Subcommittee	7:00 a.m. – 8:00 a.m.	*Capri 10*
Simulation Subcommittee	7:00 a.m. – 8:00 a.m.	*Capri 2*
Student/Resident Subcommittee	7:00 a.m. – 8:00 a.m.	*Capri 3*
Surgery Committee of the Childhood Liver Disease Research and Education Network	7:00 a.m. – 8:00 a.m.	*Capri 1*

EDUCATIONAL 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. Education Day will feature sessions on palliative care and pain management, fetal diagnosis, social media, as well as two poster sessions. There will be five scientific sessions with abstract presentations, a video session, an innovation session, a COG update session, case debates and controversies, and a session on outcomes and clinical trials. As is customary, there will be four invited lecturers, the presidential address and three APSA Foundation scholar presentations.

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 (APSA) 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).

DISCLOSURES

APSA designates this live activity for a maximum of 23.75 *AMA PRA Category 1 Credits™* . Physicians should claim only the credit commensurate with the extent of their participation in the activity .

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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

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.

Bettie Steinberg	Grant/Research Support; Active NIH grant to study celecoxib in a clinical trial
Christopher Breuer	Grant/Research Support; Gunze Limited
Tashiharu Shinoka	Grant/Research Support; Gunze Corporation

DISCLOSURES

Committees

Disclosure forms were provided to and signed by all APSA 2012-2013 committee members. 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.

Abigail Martin	Salary - Carolina Donor Services
Casey Calkins	Grant/Research Support: Athesys Inc.; Celgene; Emit, Inc. Ownership Interest (stock holder): Emit, Inc. Speaker Bureau: CBR, Inc.
Christopher Breuer	Grant/Research Support; Other Financial/Material Interest
Danielle Walsh	Speakers Bureau: Instructor for SAGES resident MIS course hosted by Ethicon Endosurgery
David Notrica	Financial/Material Interest: patent pending on a Nuss bar fixation device for excavatum bar fixation
Charles Cox	Grant/Research Support: Athesys Inc.; Celgene; Emit, Inc. Ownership Interest (stock holder): Emit, Inc. Speaker Bureau: CBR, Inc.
Elizabeth Beierle	Grant/Research Support
J. Duncan Phillips	Speakers Bureau: Fresenius Medical
John Wesley	Consultant:
Mark Lessin	Consultant: Medical Reviews; Speakers Bureau: Lecture for Osler General Surgery Board Review
Stephanie Kapfer	Ownership Interest: Intuitive Surgical
Steven Rothenberg	Consultant: Stora Endoscopy
Thomas Krummel	Ownership Interest: California Water Services; Cantimer; eMed; Intervene; Miret Surgical; PuraCath; Relign; Procept Biorobotics; Vantage Surgical; Visible Productions; Wing-Tec; Zipline Medical.
Todd Ponsky	Consultant: Teleflex; Part owner - GlobalCastMD

Jay & Margie Grosfeld Lecture

Thursday, May 2, 11:15 a.m. – 12:15 p.m.
Jessica J. Kandel, MD
R. Peter Altman, Professor of Surgery
Columbia University, New York, NY USA

Serendipity: Translational Research, High Quality Care, and the Children's Hospital

Dr. Kandel received her undergraduate degree in Medieval Studies at Yale University, and completed medical school at the College of Physicians & Surgeons of Columbia University. She subsequently spent one year as a volunteer physician in Papua New Guinea. She was trained in General Surgery at Massachusetts General Hospital, during which she spent two years as a Surgical Research Fellow in the laboratory of Dr. Judah Folkman at Boston Children's Hospital. Kandel went on to complete her Pediatric Surgery fellowship at Johns Hopkins. She joined the faculty at Columbia University in 1995, and is currently the R. Peter Altman Professor of Surgery and Pediatrics (in the Institute for Cancer Genetics).

Kandel's research focus in pediatric angiogenesis has included studies of the basic mechanisms underlying vessel development and remodeling in experimental neoplasms. Her laboratory has also been involved in the translation of anti-angiogenic treatments for clinical use in children with refractory solid tumors. Her clinical interests include the care of children with solid tumors and with vascular anomalies.

Kandel has served on multiple committees of the American Pediatric Surgical Association, the Surgical Section of the American Academy of Pediatrics and the American College of Surgeons. Kandel has also served on the Pediatric Board of the American Board of Surgery, the Pediatric Central IRB and as a Permanent Member of the NCI-I Subcommittee.

Learning Objectives:
At the conclusion of this lecture, participants will be able to:
- Identify three areas where translational research could advance care objectives
- Understand how the different information streams guided by basic science and the clinic can intersect
- Understand the role of serendipity and why it is a vital element in discovery

Robert E. Gross Lecture

Friday, May 3, 9:00 – 10:00 a.m.
Jorge D. Reyes, MD
Chief, Division of Transplant Surgery, Department of Surgery
University of Washington, Seattle, WA USA

Intestinal Transplantation: An Unexpected Journey

Dr. Reyes is a University of Washington professor of surgery and chief of transplant surgery at UW Medical Center. He also serves as medical director for Life Center Northwest, the local organ procurement organization. In 2012, he was appointed the inaugural holder of the Roger K. Giesecke Distinguished Professorship in Transplant Surgery at UW. Reyes received an MD from the Universidade Federal de Minas Gerais in Brazil, and he studied transplantation with Dr. Thomas Starzl at the University of Pittsburgh.

Reyes specializes in liver transplantation, intestinal transplantation and hepatobiliary surgery in adults and children, as well as living donor liver transplantation and split liver transplantation. His research includes transplantation tolerance and techniques and strategies for enhancing organ availability and transplant outcomes.

Learning Objectives
At the conclusion of this lecture, participants will be able to:
- Review the historical milestones and development of strategies in the management of children with intestinal failure.
- Be knowledgeable as to the types of Intestinal Allografts, with their inherent indications, techniques, and managagement.
- Familiarize with the immunologic challenges of an intestinal allograft, and the present outcomes.
- Understand the present algorithms of care for the various pathologies resulting in intestinal failure, including nutritional care, surgery, transplantation, and intestinal rehabilitation center approaches.
- Connect our present standards of care and innovative approaches to intestinal failure with the future directions of research.

International Guest Lecture

Friday, May 3, Noon – 1:00 p.m.
Agostino Pierro, MD
Head of General and Thoracic Surgery, Hospital for Sick Children Toronto, Ontario, Canada

Across the Ocean: Perspectives for Clinical Care, Training and Research

Dr. Agostino Pierro has been recently appointed Head of General and Thoracic Surgery at the Hospital for Sick Children, Robert M. Filler Professor of Surgery at the University of Toronto and Senior investigator at The Research Institute, Toronto, Canada.

Most recently, Pierro served as the Nuffield Professor of Paediatric Surgery and Head of Surgery Unit at Great Ormond Street Hospital and UCL Institute of Child Health, London, UK. He and his collaborators have obtained research grants totalling more than £6m, and have published 271 papers in peer reviewed journals, 35 book chapters and two books. He has been visiting Professor to many leading Universities around the world and invited speaker to 185 national and international meetings. Numerous pediatric surgeons, who are now working in UK and abroad, have trained in his department both clinically and scientifically.

Since 2010, Dr. Pierro has been the chairman of the EUPSA Network office dedicated to collaborative multicentre research and clinical trials. His clinical interest is neonatal, pancreatic, minimally invasive and neuroblastoma surgery. The research is focused on necrotizing enterocolitis, minimally invasive surgery, regenerative medicine, metabolic response to surgery, parenteral nutrition and randomized controlled trials.

Learning Objectives:
At the conclusion of this lecture, participants will be able to:
- Acquire information about the provision of healthcare in Pediatric Surgery from a country based on national health system
- Assess the deterioration of training in UK as a consequence of the limitation of time dedicated to clinical training
- Establish the opportunities for research in UK and their impact on training and advancement of Pediatric Surgery

Journal of Pediatric Surgery Lecture

Saturday, May 4, 8:00 – 9:00 a.m.
David B. Hoyt, MD
Executive Director, American College of Surgeons
Chicago, IL USA

The American College of Surgeons Model for Quality Improvement

Dr. Hoyt received a BA degree with honors from Amherst College, followed by an MD degree from Case Western Reserve University in 1976. From 1976-1984, Dr. Hoyt was a Surgical Resident and Research Fellow at the University of California, San Diego (UCSD) and Scripps Immunology Institute. He joined the faculty at UCSD and immediately became involved in their Trauma Service where his role as Director lasted from 1989–2006. In 1995, he was appointed Professor of Surgery and was awarded The Monroe E. Trout Professorship in Surgery at UCSD (1996). In 2006, Dr. Hoyt was appointed to the position of Chairman for the Department of Surgery at the University of California, Irvine and the John E. Connolly Professor of Surgery. In 2008, Dr. Hoyt was also appointed Executive Vice Dean for the University of California, Irvine, School of Medicine. In January 2010, Dr. Hoyt was appointed Executive Director of the American College of Surgeons. He remains Emeritus Professor of Surgery at the University of California, Irvine.

Dr. Hoyt has distinguished himself within the Department of Surgery, having delivered numerous named lectures, received multiple significant awards from his colleagues as well as scientific organizations, while serving in positions of leadership. Dr. Hoyt continues to serve as an advisor for many graduate students.

He is a member of the American Surgical Association, Surgical Biology Club, Western Surgical Association, and Society of University Surgeons and holds membership in other prestigious surgical organizations. He is currently the immediate Past President of the American Association for the Surgery of Trauma, Past President of the Society of General Surgeons of San Diego, Past President of the Shock Society, Past Chairman of the American College of Surgeons Committee on Trauma, and Past Medical Director of Trauma at the American College of Surgeons. He has been a visiting professor at a large number of institutions nationally and internationally and is an Editorial Board Member of six journals. Dr. Hoyt consistently received significant public research funding, and continues to do so. He is the author of over 500 publications. He was recently awarded the American Heart Association Resuscitation Science Lifetime Research Achievement Award, the American College of Surgeons Distinguished Service Award and the Shock Society Scientific Achievement Award.

Learning Objectives:
At the conclusion of this lecture, participants will be able to:
- Describe the history of quality improvement
- Describe the principles derived from trauma and cancer accreditation
- Compare the principles of Accountable Care Organization

APSA 2012 Foundation Scholars

Thursday, May 2, 1:30 – 1:45 p.m.
Harold N. Lovvorn, III, MD
Assistant Professor of Surgery
Vanderbilt University/Vanderbilt Children's Hospital
Nashville, TN, USA

Induced Pluripotent Stem Cells for the Study of Wilms' Tumorigenesis

Thursday, May 2, 1:45 – 2:00 p.m.
Kuo-Jen Tsao, MD
Associate Professor
University of Texas Health Science Center
Houston, TX, USA

Errors and Adverse Events in the Setting of the Neonatal Surgery Performed in the NICU

Thursday, May 2, 2:00 – 2:15 p.m.
APSA 2011 Foundation Scholar
Peter F. Nichol, MD
Associate Professor of Surgery
University of Wisconsin School of Medicine and Public Heatlth
Madison, WI, USA

Partial Rescue of Duodenal Atresia and the Potential Degenerative Response in the Developing Intestine

APSA 2013 Travel Fellow

Friday, May 3, 10:30 a.m. – 10:45 a.m.
Omolara Williams, MD
Lagos State University Teaching Hospital, Lagos, Nigeria

Practicing in a Resource Constrained Environment: Stumbling Blocks and Stepping Stones

Dr. Omolara Williams is a lecturer and consultant pediatric surgeon in Lagos State University College of Medicine and Lagos State University Teaching Hospital, Ikeja, Lagos, Nigeria. Williams is pioneering the development and establishment of pediatric laparoscopy and is dedicated to continually improving services through training, research and evidence-based practices in spite of limited resources.

APSA 44th Annual Meeting Program in Detail

Program in Detail

Thursday, May 2, 2013

8:00 a.m. – 11:00 a.m. **Education Session I** *Islands A-F*

Palliative Care and Pain Management
Moderator:
A. Alfred Chahine, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Identify the basic principles of the pathophysiology of pain in the post-operative pediatric patient and utilize a mechanistic understanding of pain pathways to more effectively tailor treatment regimens for the individual patient
- Explain the latest developments in local and regional modalities of pain management as well as complementary and alternative pain therapies
- Describe the latest innovations in pediatric pain management research
- Discuss the multifaceted nature of palliative care medicine, recognize the services provided by a palliative care team and identify barriers to the involvement of the palliative care team

Basic Science of Pain
Andrea T. Badillo, MD

Local and Regional Pain Modalities
Shawn D. St. Peter, MD

Pain Medicine: An Update on Complementary and Alternative Pain Therapies
Sarah E. Rebstock, MS, MD, PhD

Innovations in Pain Management
Julia Finkel, MD

Palliative Care
Aviva L. Katz, MD

Panel Discussion

11:15 a.m. – 12:15 p.m. **Jay and Margie Grosfeld Lecture** *Islands A-F*
Jessica J. Kandel, MD
Serendipity: Translational Research, High Quality Care and the Children's Hospital

Program in Detail

12:15 p.m. – 12:30 p.m.	Box Lunch Pick Up	*Islands Foyer*
12:30 p.m. – 1:30 p.m.	**Outcomes and Clinical Trials Committee**	*Islands A-F*

Systematic Reviews on Bowel Prep for GI Surgery and Optimization of Resources for the Surgical Care of Children

Moderators:
Fizan Abdullah, MD; Saleem Islam, MD

A critical analysis of interventions designed to reduce complications following elective colorectal surgery: An American Pediatric Surgical Association Outcomes and Clinical Trials Systematic Review
Shawn J. Rangel, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Identify the different bowel preparation regimens commonly used at children's hospitals for elective colorectal procedures
- Describe the variation in care and on cost attributable to different bowel preparation strategies used at children's hospitals
- Cite the degree of clinical evidence in support of different bowel preparation strategies used for elective colorectal procedures

A systematic review of existing evidence regarding resource requirements in children's surgery
Roshni A. Dasgupta, MD; Adam Goldin, MD; Li Ern Chen, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Analyze available evidence as it relates to optimization of resources for the pediatric surgical care of children
- Evaluate evidence as it relates to the benefits of pediatric anesthesia and other subspecialists on the outcomes of children after surgery

1:30 p.m. – 2:15 p.m.	**APSA Foundation Scholars**	*Islands A-F*

Harold Lovvorn, MD
Vanderbilt University/Vanderbilt Children's Hospital, Nashville, TN, USA
Induced Pluripotent Stem Cells for the Study of Wilms' Tumorigenesis

Program in Detail

Kuo-Jen Tsao, MD
University of Texas Health Science at Houston, Houston, TX, USA
Errors and Adverse Events in the Setting of the Neonatal Surgery Performed in the NICU

Peter F. Nichol, MD
University of Wisconsin School of Medicine and Public Health, Madison, WI, USA
Partial Rescue of Duodenal Artesia and the Potential Degenerative Response in the Developing Intestine

2:15 p.m. – 4:15 p.m. **Education Session II** *Islands A-F*

Social Media
#eAPSA2013
@APSASurgeons

Moderators:
Philip l. Glick, MMD, MBA; Gretchen Jackson, MD, PhD

To Tweet or Become Extinct: Why Pediatric Surgeons Need to Understand Social Networking

Learning Objectives
At the conclusion of this session, participants will be able to:
- Choose social media that is meaningful for their personal and professional needs
- Calculate the risks, benefits and alternatives to this state-of-the-art technology for pediatric surgeons, their patients and their patients' families
- Identify how social networking can be used for graduate medical education, continuing medical education and patient education
- Assess the legal ramifications of a pediatric surgeon using social media for GME, CME and patient care

To Tweet or Become Extinct: Why Pediatric Surgeons Need to Understand Social Networking
Philip L. Glick, MD, MBA @glicklab

To Tweet or Die: The ABCs of Surgical Social Networking and the XYZs of Cyber Security
Zachary A. Glick, MS @z1g1

Program in Detail

Can Tweeting Make You Smarter or Dumber: Using Social Networking for GME, CME, and Patient Care?
Benedict C. Nwomeh, MD @bnwomeh

Oper@ting Safely on Social Networks: Legal Do's and Dont's v3.0
Rebekah A. Z. Monson, Esq. @razmonson

Meaningful Use: How Social Networking Can Make You A Better Surgeon — What Does the Data Show?
Brian S. McGowan, PhD @briansmcgowan

#MedEd: The Changing Face of Medical Education in the Era of Social Media
Mary L. Brandt, MD @drmlb

Concluding Remarks and Live/Online Panel Q and A via Twitter
Gretchen Purcell Jackson, MD, PHD gretchen.jackson@vanderbilt.edu, @pedssurgery, @gpurcelljackson

Live Social Media (Twitter) Ombudsperson
Danielle S. Walsh, MD @walshds

2:15 p.m. – 4:15 p.m. **Education Session III** *Capri*

Fetal Diagnosis
Moderator:
Oluyinka O. Olutoye, MD, PhD

What Every Pediatric Surgeon Should Know About Prenatal Diagnosis and Counseling

Learning Objectives:
At the conclusion of this session, participants will be able to:
- Define the role of the pediatric surgeon in prenatal counseling
- Identify resources available to pediatric surgeons for prenatal counseling
- Describe recent advances in fetal therapy
- Determine which patients will benefit from prenatal referral

Program in Detail

Why Should a Pediatric Surgeon be Involved in Prenatal Counseling?
Brad A. Feltis, MD, PhD

Prenatal Counseling, Guidelines on When to Refer and Indications for Intervention:

- Lung Masses
  Timothy M. Crombleholme, MD
- Congenital Diaphragmatic Hernia
  Terry L. Buchmiller, MD
- Sacrococcygeal Teratoma and Abdominal Wall Defects
  Oluyinka O. Olutoye, MD, PhD

What is a "Fetal Center"? What are the Resource Requirements for a Fetal Center?
Diana L. Farmer, MD

Report Card on Fetal Intervention for Congenital Anomalies
Shinjiro Hirose, MD

Fetal Myelomeningocele: Life After the MOMS Trial
N. Scott Adzick, MD, MMM

Guide to Available Resources for Prenatal Counseling
Christopher S. Muratore, MD

4:30 p.m. – 6:15 p.m.	**Concurrent Session** **Poster Session I:** **Basic, Fetal and Bench Science**	*Islands A-F*

Moderators:
Joel Shilyansky, MD; David J . Schmeling, MD

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

- Evaluate translational research and its relevance to pediatric surgery
- Identify the role of stem cells in modulating disease process
- Apply selected basic science research as a basis for advancing pediatric surgery therapy

Program in Detail

P1 **THE SEQUENTIALLY ESCALATING ETHANOL-LOCK ("SEE-LOCK"): A NOVEL TECHNIQUE TO ENHANCE THE SAFETY OF ETHANOL-LOCK ADMINISTRATION FOR PATIENTS WITH VASCULAR ACCESS DEVICES**

M. Pierce Ebaugh, MS[1], Nicholas S . Laconi, BS[1], Norma A . Alcantar, PhD[2], **Mark L. Kayton, MD[1] .**

[1]The University of South Florida Morsani College of Medicine, Tampa, FL, USA, [2]Department of Chemical & Biomedical Engineering, University of South Florida, Tampa, FL, USA.

P2 **HIGH FAT DIET ENHANCES *VILLUS* GROWTH AFTER INTESTINAL RESECTION INDEPENDENT OF BASELINE FAT MALABSORPTION**

Pamela M. Choi, MD, Jun Guo, PhD, Christopher R . Erwin, PhD, Sylvia Wandu, Brad W. Warner, MD .

St. Louis Children's Hospital, Washington University School of Medicine, St Louis, MO, USA.

P3 **A NOVEL RAT MODEL OF ESOPHAGEAL LENGTHENING: IS IT REALLY GROWING?**

Nora M . Fullington, MD, **Kristina M. Potanos, MD**, Ryan C . Cauley, MD, David Zurakowski, PhD, Steven J . Fishman, MD, Khashayar Vakili, MD, Heung Bae Kim, MD.

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

P4 **TISSUE EXPANDER STIMULATED LENGTHENING OF ARTERIES (TESLA) INDUCES EARLY CELLULAR PROLIFERATION IN A NOVEL RODENT MODEL**

Kristina Potanos, MD, **Nora Fullington, MD**, Ryan Cauley, MD, David Zurakowski, PhD, Steven Fishman, MD, Khashayar Vakili, MD, Heung Bae Kim, MD .

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

P5 **BIOMECHANICAL ANALYSIS OF SMALL DIAMETER TISSUE-ENGINEERED ARTERIAL GRAFTS FOLLOWING IMPLANTATION IN A MURINE MODEL**

Ramak Khosravi[1], Brooks Udelsman[1], Kevin Rocco[2], Kristin Miller, PhD[2], Tai Yi, MD[3], Jay Humphrey, PhD[2], Christopher K . Breuer, MD[4] .

[1]Yale University School of Medicine, New Haven, CT, USA, [2]Department of Biomedical Engineering, Yale School of Engineering and Applied Science, New Haven, CT, USA, [3]Interdepartmental Program in Vascular Biology and Therapeutics, Yale University, New Haven, CT, USA, [4]Division of Pediatric Surgery, Department of Surgery, Yale University School of Medicine, New Haven, CT, USA .

P6 **EFFICACY OF OSTEOPONTIN (OPN) SIGNALING BLOCKADE USING AN RNA APTAMER AND STABLE OPN EXPRESSION KNOCKDOWN ON PULMONARY METASTATIC POTENTIAL OF OSTEOSARCOMA (OS)**

Lindsay J. Talbot, MD[1], Zhiyong Mi, PhD[2], Syamal D. Bhattacharya, MD[1], Henry E. Rice, MD[1], Corinne M . Linardic, MD, PhD[1], Paul C . Kuo, MD, MBA[2] .

[1]Duke University, Durham, NC, USA, [2]Loyola University, Chicago, IL, USA.

Program in Detail

P7 **SUBEROYL BIS-HYDROXAMIC ACID TREATMENT AND NOTCH EXPRESSION IN NEUROBLASTOMA**

Jocelyn F. Burke, MD, Madhuchhanda Roy, MD, PhD, Muthusamy Kunnimalaiyaan, PhD .

University of Wisconsin, Madison, WI, USA.

P8 **IMPAIRED ANGIOGENESIS AND DECREASED HIGHLY PROLIFERATIVE ENDOTHELIAL CELLS IN AN OVINE MODEL OF CONGENITAL DIAPHRAGMATIC HERNIA**

Shannon Acker, MD, Gregory Seedorf, Jason Gien, MD, David Partrick, MD, Steven Abman, MD.

University of Colorado, Aurora, CO, USA.

P9 **PRENATAL MATERNALLY-ADMINISTERED PDE5 INHIBITORS INCREASE RELATIVE EXPRESSION OF CYCLIC GMP PATHWAY PROTEINS IN LUNGS OF FETAL LAMBS WITH DIAPHRAGMATIC HERNIA**

Eveline H. Shue, MD, Samuel C . Schecter, MBBS, Mozziyar Etemadi, MS, Jianfeng Wu, Peter Oishi, MD, Jeffrey Fineman, MD, Jeffrey Fineman, MD, Doug Miniati, MD.

University of California, San Francisco, San Francisco, CA, USA.

P10 **SPINAL CORD EXPRESSION OF VIRALLY DELIVERED MULLERIAN INHIBITING SUBSTANCE EXTENDS LIFE AND PROMOTES SURVIVAL OF MOTOR NEURONS IN TRANSGENIC SOD1 MUTANT MICE**

Leo Andrew O. Benedict[1], Dan Wang[2], Debra Cameron[3], David Pepin[1], Amanda Sosulski[1], Huapeng Li[2], Guangping Gao[2], Robert H. Brown[3], Patricia K . Donahoe[1].

[1]Pediatric Surgical Research Laboratories, Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA, [2]Gene Therapy Center, University of Massachusetts Medical School, Worcester, MA, USA, [3]Department of Neurology, University of Massachusetts Medical School, Worcester, MA, USA.

P11 **INTESTINAL *MUSCULARIS PROPRIA* INCREASES IN THICKNESS WITH CORRECTED GESTATIONAL AGE AND IS FOCALLY ATTENUATED IN PATIENTS WITH ISOLATED INTESTINAL PERFORATIONS**

Sarah W. Lai, MD, FRCSC[1], Weiming Yu, MD, FRCPC[2], Laurie E . Wallace, BSC[1], David L . Sigalet, MD, MSc, PhD FRCSC, FACS[1] .

[1]University of Calgary, Calgary, AB, Canada, [2]Alberta Children's Hospital, Calgary, AB, Canada.

P12 **FETAL DERMAL SCAR FORMATION IS CONVERTED TO SCARLESS REGENERATION WITH INTERLEUKIN-10 (IL-10) OVEREXPRESSION**

Michael W. Morris, MD[1], Benjamin J . Herdrich, MD[2], Myron Allukian III, MD[2], Robert C . Caskey, MD[2], Carlos Zgheib, PhD[3], Junwang Xu, MD[3], Kenneth W. Liechty, MD[3] .

[1]University of Mississippi Medical Center, Jackson, MS, USA, [2]Hospital of the University of Pennsylvania, Philadelphia, PA, USA, [3]Nemours Hospital, Orlando, FL, USA.

Program in Detail

P13 **GENERATION OF HUMAN, TRANSGENE-FREE NEURAL PROGENITOR CELLS FOR PERINATAL MYELOMENINGOCELE REPAIR**

Guihua Jiang, MS, Luis G . Villa-Diaz, PhD, Paul H . Krebsbach, DDS, PhD, K . Sue O'Shea, PhD, Shaun M. Kunisaki, MD, MSc.

University of Michigan, Ann Arbor, MI, USA.

P14 **A NOVEL ROLE FOR THE NEURAL CREST IN SPLENIC DEVELOPMENT**

Ismail Zaitoun, PhD, Christopher S . Erickson, BS, Joseph F . Pierre, BS, Aaron F . Heneghan, PhD, Amanda J . Barlow, PhD, Miles L . Epstein, PhD, **Ankush Gosain, MD, PhD** .

University of Wisconsin, Madison, WI, USA.

P15 **PRESSURE INDUCED LUNG INJURY IN A NOVEL *IN VITRO* MODEL OF THE ALVEOLAR INTERFACE: PROTECTIVE EFFECT OF DEXAMETHASONE**

Divya D. Nalayanda, PhD[1], William B . Fulton[1], Paul M . Colombani, MD, MBA[1], Tza-Huei Wang, PhD[2], Fizan Abdullah, MD, PhD[1] .

[1]Johns Hopkins University School of Medicine, Baltimore, MD, USA, [2]Johns Hopkins University, Baltimore, MD, USA.

4:30 p.m. – 6:15 p.m. **Poster Session II Clinical** *Capri*

Moderators:
Steven L. Lee, MD; Andre V. Hebra, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Define the predictors of long-term morbidity in congenital diaphragmatic hernia
- Discuss clinical presentation and management of pediatric hepatocellular carcinoma
- Apply the concept of radiation exposure in children during trauma evaluation

P16 **PULMONARY SUPPORT ON HOSPITAL DAY-30 AS A PREDICTOR OF LONG-TERM MORBIDITY IN CONGENITAL DIAPHRAGMATIC HERNIA SURVIVORS**

Ryan P. Cauley, MD, Nora M. Fullington, MD, Kristina Potanos, MD, Jonathan Finkelstein, MD, MPH, Dionne Graham, PhD, Ronald Becker, MD, Catherine Sheils, MD, Virginia Kharasch, MD, Charles J. Smithers, MD, MPH, Thomas Jaksic, MD, PhD, Terry Buchmiller, MD, Jay M. Wilson, MD.

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

Program in Detail

P17 **PREDICTORS OF FAILURE IN THE NON-OPERATIVE MANAGEMENT OF PEDIATRIC PERFORATED APPENDICITIS**

Lauren B. Nosanov, BA[1], Irene T. Ma, MD[2], **Kristina J. DeMaster, BS[1]**, Obi Okoye, MD[3], Allison L. Speer, MD[3], Jeffrey S. Upperman, MD[4], Henri R. Ford, MD, MHA[4], James R. Pierce, MD[4].

[1]University of Southern California Keck School of Medicine, Los Angeles, CA, USA, [2]Department of Surgery, Mayo Clinic, Scottsdale, AZ, USA, [3]Department of Surgery, Los Angeles County + University of Southern California, Los Angeles, CA, USA, [4]Department of Pediatric Surgery, Children's Hospital Los Angeles, Los Angeles, CA, USA.

P18 **NON-ENDOSCOPIC IMAGE-GUIDED HYDROSTATIC BALLOON ESOPHAGEAL DILATION IN *EPIDERMOLYSIS BULLOSA* PATIENTS IN A NATIONAL REFERRAL CENTER IN THE USA**

Beth Rymeski, DO, John Racadio, MD, Neil Johnson, MD, Michael Farrell, MD, Anne Lucky, MD, Richard Azizkhan, MD.

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

P19 **A MULTIVARIATE ANALYSIS OF CLINICAL CHARACTERISTICS AND STAGING SYSTEMS, INCLUDING POST-TEXT STAGING, AS PROGNOSTIC FACTORS IN HEPATOBLASTOMA**

Nelson Piché, MD, Eric J. Stanelle, MD, Maureen P. McEvoy, MD, Emily R. Christison-Lagay, MD, Sara J. Abramson, MD, Anita P. Price, MD, Michael P. La Quaglia, MD.

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

P20 **A REVIEW OF 218 PEDIATRIC CASES OF HEPATOCELLULAR CARCINOMA**

Bassan J. Allan, James S. Davis, MD, Eduardo A. Perez, MD, Holly L. Neville, MD, Juan E. Sola, MD.

University of Miami, Miami, FL, USA.

P21 **IS COMPLETE VACTERL EVALUATION NEEDED IN NEWBORNS WITH RECTOPERINEAL FISTULA?**

Michael Rollins[1], Katie Russell, MD[1], Kathy Schall, MD[1], Sarah Zobell, PNP[2], Eric Scaife, MD[1], Douglas Barnhart, MD[1].

[1]University of Utah, Primary Children's Medical Center, Salt Lake City, UT, USA, [2]Primary Children's Medical Center, Salt Lake City, UT, USA.

P22 **VESICOURETERAL REFLUX AND FEBRILE URINARY TRACT INFECTIONS IN ANORECTAL MALFORMATIONS: A RETROSPECTIVE REVIEW**

Sabrina Sanchez, Robert Ricca, Byron Joyner, John Waldhausen.

Seattle Children's Hospital, Seattle, WA, USA.

P23 **RATE OF LUNG GROWTH PREDICTS OUTCOME IN CONGENITAL DIAPHRAGMATIC HERNIA**

Alan Coleman, MD[1], Timothy Crombleholme, MD[2], Beth Kline-Fath, MD[1], Sundeep Keswani, MD[1], Jason Frischer, MD[1], Beth Haberman, MD[1], Paul Kingma, MD[1], Foong-Yen Lim, MD[1].

[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [2]Children's Hospital Colorado, Aurora, CO, USA.

Program in Detail

P24 **UROLOGIC AND GASTROINTESTINAL COMPLICATIONS OF SACROCOCCYGEAL TERATOMAS: PRENATAL AND POSTNATAL PREDICTORS**

Emily A. Partridge, Douglas Canning, William H. Peranteau, Holly L. Hedrick, N. Scott Adzick, Alan W. Flake.

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

P25 **MATERNAL MEDICAL AND BEHAVIORAL RISK FACTORS FOR CONGENITAL DIAPHRAGMATIC HERNIA**

Jarod P. McAteer, MD[1], Avram Hecht, MD, MPH[2], Anneclaire J. De Roos, PhD, MPH[3], Adam B. Goldin, MD, MPH[1].

[1]Seattle Children's Hospital, Seattle, WA, USA, [2]University of California, San Diego, San Diego, CA, USA, [3]University of Washington, Seattle, WA, USA.

P26 **INFANT CAR SAFETY SEAT DESIGN AND RISK OF HEAD INJURY**

Camille L. Stewart, MD[1], Megan A. Moscariello, MPH[1], Kristine W. Hansen[2], Steven L. Moulton, MD[2].

[1]University of Colorado, Denver, CO, USA, [2]Children's Hospital Colorado, Aurora, CO, USA.

P27 **VALIDATION OF THE TRAUMA MORTALITY PREDICTION MODEL IN PEDIATRIC PATIENTS**

Laura D. Cassidy, MS, PhD[1], Alan Cook, MD[2], David Gourlay, MD[1], Turner Osler, MD[3].

[1]Medical College of Wisconsin, Milwaukee, WI, USA, [2]Baylor University Medical Center, Baylor, TX, USA, [3]University of Vermont, Burlington, VT, USA.

P28 **ARE CT SCANS OBTAINED AT REFERRING INSTITUTIONS JUSTIFIED PRIOR TO TRANSFER TO A PEDIATRIC TRAUMA CENTER?**

Leo Andrew O. Benedict, MD[1], Jessica K. Paulus, ScD[2], Leslie Rideout, FNP, PhD[1], Walter J. Chwals, MD[1].

[1]Department of Pediatric Surgery, Floating Hospital for Children, Tufts Medical Center, Boston, MA, USA, [2]Tufts Clinical and Translational Science Institute, Boston, MA, USA.

P29 **IMPACT OF A CHECKLIST ON ATLS TASK PERFORMANCE DURING PEDIATRIC TRAUMA RESUSCITATION**

Deirdre C. Kelleher, Lauren J. Waterhouse, Samantha E. Parsons, Jennifer Fritzeen, Elizabeth A. Carter, Randall S. Burd.

Children's National Medical Center, Washington, DC, USA.

P30 **UTILITY OF REPEAT CRANIAL IMAGING IN HEAD INJURED CHILDREN**

Elizabeth M. Pontarelli[1], Kari M. Komlofske, FNP[2], Aaron R. Jensen, MD, MEd[1], David W. Bliss, MD[1].

[1]Children's Hospital Los Angeles, Los Angeles, CA, USA, [2]Randall Children's Hospital, Portland, OR, USA.

P31 **RADIATION EXPOSURE FROM COMPUTED TOMOGRAPHY FOR THE INITIAL EVALUATION OF TRAUMA AT NON-PEDIATRIC FACILITIES: A MATCHED COMPARATIVE STUDY**

Katherine J. Baeder, BSE, Barbara A. Gaines, MD.

Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA, USA.

Program in Detail

Friday, May 3

7:30 a.m. – 9:00 a.m. **Scientific Session I**
Oncology and Trauma *Islands A-F*

Moderators:
Eric R. Scaife, MD; Keith T. Oldham, MD

1 **QUALITY ASSURANCE OF THE REAL-TIME SURGICAL REVIEWS OF AREN03B2: A COG RENAL TUMOR COMMITTEE STUDY**

Thomas E. Hamilton, MD[1], Douglas Barnhart, MD[2], Kenneth Gow, MD[3], Fernando Ferrer, MD[4], Jessica Kandel, MD[5], Richard Glick, MD[6], Roshni Dasgupta, MD[7], Arlene Naranjo, PhD[8], Eric Gratias, MD[9], James Geller, MD[10], Elizabeth Mullen, MD[1], Peter Ehrlich[11].

[1]Dana Farber Cancer Institute, Boston Children's Hospital, Boston, MA, USA, [2]Primary Childrens Medical Center, Salt Lake, UT, USA, [3]Seattle Children's Hospital, Seattle, WA, USA, [4]Connecticut Children's Hospital, Hartford, CT, USA, [5]Columbia University Medical Center, New York, NY, USA, [6]Steven and Alexendra Cohen Medical Center of New York, New York, NY, USA, [7]Cinncinnati Children's Hospital, Cincinnati, OH, USA, [8]Children's Oncology Group, Gainesville, FL, USA, [9]T. C. Thompson Children's Hospital, Chattanooga, TN, USA, [10]Cincinnati Children's Hospital, Cincinnati Medical Center, MA, USA, [11]C.S. Mott Children's Hospital, University of Michigan, MI, USA.

2 **TISSUE INHIBITOR OF METALLOPROTEINASES-1 MEDIATES NEUROBLASTOMA LIVER METASTASIS**

Pritha Paul, MS, **Eric Long, MD**, Sora Lee, MS, Jingbo Qiao, PhD, Dai H. Chung, MD.

Vanderbilt University Medical Center, Nashville, TN, USA.

3 **REPEAT NEPHRON-SPARING SURGERY FOR CHILDREN WITH BILATERAL WILMS' TUMOR**

Kathleen Kieran, MD[1], Mark A. Williams, MD[2], Lisa M. McGregor, MD, PhD[3], Jeffrey S. Dome, MD[4], Matthew J. Krasin, MD[3], Andrew M. Davidoff, MD[3].

[1]University of Iowa Hospitals and Clinics, Iowa City, IA, USA, [2]University of Tennessee/LeBonheur Children's Hospital, Memphis, TN, USA, [3]St. Jude Children's Research Hospital, Memphis, TN, USA, [4]Children's National Medical Center, Washington, DC, USA.

4 **"TRAP-DOOR" AND "CLAMSHELL" SURGICAL APPROACHES FOR THE MANAGEMENT OF PEDIATRIC TUMORS OF THE CERVICOTHORACIC JUNCTION AND MEDIASTINUM**

Emily R. Christison-Lagay, MD, **David Darcy, MD**, Eric J. Stanelle, MD, Stacy DaSilva, BA, Michael P. La Quaglia, MD.

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

Program in Detail

5 **β-CATENIN MEDIATES CELLULAR INVASION AND METASTASES IN EWING'S SARCOMA**

Meade P. Barlow, MD[1], Anthony J. Hesketh, MD[1], Alexandra Lucs, PhD[2], Richard D. Glick, MD[1], Bettie M. Steinberg, PhD[2], Samuel Z. Soffer, MD[1].

[1]Cohen Children's Medical Center, New Hyde Park, NY, USA, [2]Feinstein Institue for Medical Research, Manhasset, NY, USA.

6 **TARGETING AURORA KINASE A DOWNREGULATES CELL PROLIFERATION AND ANGIOGENESIS IN NEUROBLASTOMA**

Pritha Paul, MD, **Carmelle Romain, MD**, Kwang W. Kim, PhD, Jingbo Qiao, PhD, Dai H. Chung, MD.

Vanderbilt University Medical Center, Nashville, TN, USA.

7 **DEVELOPMENT OF A HUMAN LYMPHATIC MALFORMATION MODEL FROM PLURIPOTENT LYMPHATIC ENDOTHELIAL CELLS IN IMMUNODEFICIENT MICE**

Arul S. Thirumoorthi, MD, Peter Liou, BA, John P. Andrews, BA, Chris Kitajewski, BA, Angela Kadenhe-Chiweshe, MD, June K. Wu, MD, Carrie J. Shawber, PhD, Jessica J. Kandel, MD.

Columbia University, New York, NY, USA.

8 **OPERATIVE VERSUS NON-OPERATIVE MANAGEMENT FOR BLUNT PANCREATIC TRANSECTION: MULTI-INSTITUTIONAL OUTCOMES**

Corey W. Iqbal, MD[1], Shauna M. Levy, MD[2], Kuojen Tsao, MD[2], Mikael Petrosyan, MD[3], Timothy D. Kane, MD[3], Elizabeth M. Pontarelli, MD[4], Jeffrey S. Upperman, MD[4], Sarah Hill, MD[5], Mark L. Wulkan, MD[5], Obinna O. Adibe, MD[6], Marcus Malek, MD[7], R. Cartland Burns, MD[7], Saleem Islam, MD[8], David M. Gourlay, MD[9], Melissa Christensen, BS, CCRC[9], Kathleen D. Graziano, MD[10], David M. Notrica, MD[10], Todd A. Ponsky, MD[11], Eloise Lemon, RN, BSN[11], Wendy T. Su, MD[12], Shawn D. St. Peter, MD[1].

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]University of Texas Health Science Center at Houston, Houston, TX, USA, [3]Children's National Medical Center, Washington D.C., DC, USA, [4]Children's Hospital of Los Angeles, Los Angeles, CA, USA, [5]Children's Healthcare of Atlanta at Egleston, Atlanta, GA, USA, [6]Duke University, Durham, NC, USA, [7]Children's Hospital of Pittsburgh, Pittsburgh, PA, USA, [8]University of Florida Gainesville, Gainesville, FL, USA, [9]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [10]Phoenix Children's Hospital, Phoenix, AZ, USA, [11]Akron Children's Hospital, Akron, OH, USA, [12]Oakland Children's Hospital, Oakland, CA, USA.

9 **EARLY OUTCOMES FROM A PROSPECTIVE OBSERVATIONAL STUDY WITH A LIMITED BEDREST PROTOCOL IN THE MANAGEMENT OF BLUNT RENAL INJURY IN CHILDREN**

Kathleen D. Graziano, MD[1], David Juang, MD[2], David Notrica, MD[1], Victoria L. Grandsoult[1], Juan Acosta, MD[1], Susan W. Sharp, PhD[2], J Patrick Murphy, MD[2], Shawn D. St. Peter[2].

[1]Phoenix Children's Hospital, Phoenix, AZ, USA, [2]Children's Mercy Hospital, Kansas City, MO, USA.

Program in Detail

10 **TRAUMA SURGEON BECOMES CONSULTANT: OUTCOMES AFTER IMPLEMENTATION OF A NEW PROTOCOL**

Sara C. Fallon, MD[1], David M. Delemos, MD[1], Daniel P. Christopher, RN[2], Mary H. Frost, RN[2], David E. Wesson, MD[1], Bindi Naik-Mathuria, MD[1].

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

9:00 a.m. – 10:00 a.m. **Robert E. Gross Lecture** *Islands A-F*
Jorge D. Reyes, MD
Intestinal Transplantation: An Unexpected Journey

Learning Objectives

At the completion of this lecture, the participant will be able to:

- Review the historical milestones and development of strategies in the management of children with intestinal failure.
- Be knowledgeable as to the types of Intestinal Allografts, with their inherent indications, techniques, and managagement.
- Familiarize with the immunologic challenges of an intestinal allograft, and the present outcomes.
- Understand the present algorithms of care for the various pathologies resulting in intestinal failure, including nutritional care, surgery, transplantation, and intestinal rehabilitation center approaches.
- Connect our present standards of care and innovative approaches to intestinal failure with the future directions of research.

10:30 a.m. – 10:45 a.m. **Travel Fellow Presentation** Islands A-F
Omolara Williams, MD
Practicing in a Resource Constrained Environment: Stumbling Blocks and Stepping Stones

10:45 a.m. – Noon **Scientific Session II** *Islands A-F*
Fetal and Newborn Critical Care Science

Moderators:
Terry L. Buchmiller, MD; Brad W. Warner, MD

11 **NEONATAL NECROTIZING ENTEROCOLITIS IS ASSOCIATED WITH A COMPROMISED ENTERIC NERVOUS SYSTEM**

Yu Zhou, MD, PhD, Yanwei Su, MD, Daniel Watkins, MD, Mika Matthews, MD, Laura Boomer, MD, **Gail E. Besner, MD**.

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

Program in Detail

12 **PLASMA PROTEOMICS REVEALS NOVEL INSIGHT TO THE PATHOPHYSIOLOGY OF NEC IN HUMAN INFANTS**

Ghuozhong Tao, PhD[1], Xuefeng Ling, PhD[1], Fizan Abdullah, MD[2], Mary Brandt, MD[3], Richard Ehrenkranz, MD[4], Mary Catherine Harris, MD[5], Tim Lee, MD[3], Corinna Bowers, MS[6], R. Lawrence Moss, MD[6], **Karl G. Sylvester, MD[1]**.

[1]Stanford University & Lucile Packard Children's Hospital, Stanford, CA, USA, [2]John Hokins University School of Medicine, Baltimore, MD, USA, [3]Texas Children's Hospital, Baylor, Houston, TX, USA, [4]Yale University School of Medicine, New Haven, CT, USA, [5]Children's Hospital of Philadelphia, Philadelphia, PA, USA, [6]Nationwide Children's Hospital, Ohio, State University, Columbus, OH, USA.

13 **THE EFFECT OF GLUTAMINE SUPPLEMENTATION ON MICROBIAL INVASION IN SURGICAL INFANTS REQUIRING PARENTERAL NUTRITION — RESULTS OF A RANDOMISED CONTROLLED TRIAL**

Mark Bishay[1], Kathryn Harris[2], Venetia Horn[2], Danielle Hesketh[2], Marlene Ellmer[2], Sarah Macdonald[1], Jane Hawdon[3], Elizabeth Erasmus[3], Kate MK Cross[2], David P. Drake[2], Joseph I. Curry[2], Edward M. Kiely[2], Paolo De Coppi[1], Nigel Klein[1], Simon Eaton[4], Agostino Pierro[1].

[1]UCL Institute of Child Health & Great Ormond Street Hospital for Children, London, United Kingdom, [2]Great Ormond Street Hospital for Children, London, United Kingdom, [3]University College London Hospitals, London, United Kingdom, [4]UCL Institute of Child Health, London, United Kingdom.

14 ***IN UTERO* REPAIR OF FETAL MYELOMENINGOCELE WITH AUTOLOGOUS AMNIOTIC MEMBRANE IN THE FETAL LAMB MODEL**

Erin G. Brown[2], Payam Saadai[1], Chris Pivetti[2], Michael S. Beattie[1], Jacqueline C. Bresnahan[1], Aijun Wang[2], Diana Farmer[2].

[1]University of California, San Francisco, San Francisco, CA, USA, [2]University of California, Davis, Sacramento, CA, USA.

15 **AMNIOTIC FLUID STEM CELLS IN A BIOENGINEERED SCAFFOLD: A NEW FRONTIER IN PATIENT SPECIFIC THERAPY FOR PREMATURE LUNG DISEASE**

Eric D. Girard, MD[1], Camilo A. Moncada, PhD[2], Todd Jensen, MSc[2], Fan Zhang, MSc[2], Stephanie R. Davis, MS[2], Christine M. Finck, MD[1].

[1]Connecticut Children's Medical Center, Hartford, CT, USA, [2]University of Connecticut Health Center, Farmington, CT, USA.

16 **TUBE THORACOSTOMY IN CHILDREN DURING EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)**

Shannon Longshore, MD[1], Jake Feldman, BS[1], Katie Zirschky[1], Hope Jackson, MD[2], Cynthia Gingalewski, MD[2], Gerald Gollin, MD[1].

[1]Loma Linda University School of Medicine, Loma Linda, CA, USA, [2]Children's National Medical Center, Washington, DC, USA.

Program in Detail

17 **CARDIOVASCULAR PERFORATION DURING ECMO: ARE ALL CANNULAS THE SAME?**

Sidney M. Johnson, MD[1], Nathan Itoga[2], **Gwendolyn M. Garnett, MD[3]**, Melody Kilcommons, RNC, BSN[1], Devin P. Puapong, MD[1], Russell K. Woo, MD[1].

[1]Kapiolani Medical Center for Women and Children, Honolulu, HI, USA, [2]University of Hawaii, John A. Burns School of Medicine, Honolulu, HI, USA, [3]Children's Hospital Boston, Boston, MA, USA.

18 **THORACOSCOPIC SEGMENTECTOMY FOR CONGENITAL AND ACQUIRED PULMONARY DISEASE: A CASE FOR LUNG SPARING SURGERY**

Steven S. Rothenberg, MD[1], Arul Thirumoorthi, MD[2], Angela Kadenhe-Chiweshe, MD[2], Piotr Czauderna, MD[3], Kristin Shipman, MD[1].

[1]The Rocky Mountain Hospital For Children, Denver, CO, USA, [2]Columbia University College of Physicians and Surgeons, New York, NY, USA, [3] Medical University of Gdansk, Gdansk, Poland.

Noon – 1:00 p.m. **International Guest Lecture** *Islands A-F*
Agostino Pierro, MD
Across the Ocean: Perspectives for Clinical Care, Training and Research

Learning Objectives

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

- Acquire information about the provision of healthcare in Pediatric Surgery from a country based on national health system
- Assess the deterioration of training in UK as a consequence of the limitation of time dedicated to clinical training
- Establish the opportunities for research in UK and their impact on training and advancement of Pediatric Surgery

2:00 p.m. – 5:00 p.m. **Simulation Courses** *Sabal/Coconut*
Confirmed Participants Only
CME Not Offered

Endosurgical Simulation Course: A hands-on course designed to teach beginning and advanced endosurgical techniques to learners of all levels. The course will cover a wide variety of techniques and/or procedures, including basic and advanced laparoscopic suturing techniques, ultrasound for surgeons, laparoscopic pyloromyotomy, laparoscopic gastrostomy tube placement, single incision laparoscopy, thoracoscopic lobectomy and robotic stations.

Program in Detail

High-fidelity Endosurgical Simulation Course: A hands-on course designed for advanced learners, focusing on thoracoscopic neonatal esophageal atresia/tracheoesophageal fistula repair, thoracoscopic congenital diaphragmatic hernia repair, laparoscopic sleeve gastrectomy and gastrojejunostomy, and advanced suturing for intraoperative bleeding complications encountered during laparoscopy. All participants will be taught one-on-one by experts in advanced minimally invasive techniques for pediatric surgery.

Learning Objectives
At the conclusion of this lecture, the participants will be able to:
- Participants will practice basic and advanced suturing skills
- Participants will learn and practice how to perform complex procedures laparoscopically (SILS, lobectomy, sleeve gastrectomy, TEF, diaphragmatic hernia repair, gastrostomy placement)
- Participants will learn complication avoidance and recovery

Saturday, May 4

8:00 a.m. – 9:00 a.m. | ***Journal of Pediatric Surgery* Lecture** | *Islands A-F*
David B . Hoyt, MD
The American College of Surgeons Model for Quality Improvement

Learning Objectives
At the conclusion of this lecture, the participants will be able to:
- Describe the history of quality improvement
- Describe the principles derived from trauma and cancer accreditation
- Compare the principles of Accountable Care Organization

9:00 a.m. – 10:30 a.m. | **Scientific Session III** | *Islands A-F*
Gastrointestinal Science and Surgery

Moderators:
Casey M. Calkins, MD; Mary L. Brandt, MD

19 **SHORT-TERM THERAPY OF INSULIN-LIKE GROWTH FACTOR I (IGF-I) REVERSES UNDERWEIGHT GROWTH IN A MALNOURISHED MURINE ANIMAL MODEL**

Kavita Deonarine, MD[1], James S. Lin[1], Jennifer A. Hawkins, MS[1], Sean Moore, MD[1], Nambirajan Sundaram, PhD[1], Thomas Blom, MS[2], Michael A. Helmrath, MD, MS[1].

[1]Cincinnati's Children Medical Center, Cincinnati, OH, USA, [2]University of Cincinnati, Cincinnati, OH, USA.

Program in Detail

20 **FIRST STEPS: SERIAL TRANSVERSE ENTEROPLASTY AS A PRIMARY PROCEDURE IN NEONATES WITH CONGENITAL SHORT BOWEL**

Gwendolyn M. Garnett, MD[1], Kuang H. Kang, MD[1], Tom Jaksic, MD[1], Russell K. Woo, MD[2], Devin P. Puapong, MD[2], Heung B. Kim, MD[1], Sidney M. Johnson, MD[2].

[1]Children's Hospital Boston, Boston, MA, USA, [2]Kapiolani Medical Center for Women and Children, Honolulu, HI, USA.

21 **EXPERIENCE WITH REDO-PULLTHROUGHS FOR HIRSCHSPRUNG DISEASE**

Matthew W. Ralls, MD, Jennifer L. Freeman, MD, Arnold G. Coran, MD, Raja Rabah, MD, Peter F. Ehrlich, Daniel H. Teitelbaum, MD.

University of Michigan, Ann Arbor, MI, USA.

22 **PREDICTORS OF SUCCESSFUL OVARIAN PRESERVATION AND THE ROLE OF LAPAROSCOPY IN GIRLS WITH OVARIAN TUMORS**

Jonathan C. Papic, MD, Frederick J. Rescorla, MD, Deborah F. Billmire, MD, S. Maria E. Finnell, MD, Charles M. Leys, MD.

Riley Children's Hospital, Indianapolis, IN, USA.

23 **FAST TRACK MANAGEMENT IS SAFE AND EFFECTIVE AFTER BOWEL RESECTION IN CHILDREN WITH CROHN'S DISEASE**

Jesse D. Vrecenak, MD, Peter Mattei, MD, FACS, FAAP.

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

24 **THE NATURAL HISTORY OF FAMILIAL ADENOMATOUS POLYPOSIS SYNDROME: A 24 YEAR REVIEW OF A SINGLE CENTER EXPERIENCE IN SCREENING, DIAGNOSIS, TREATMENT AND OUTCOMES**

Raelene D. Kennedy, MD, D. Dean Potter, MD, Christopher R. Moir, MD, Mounif El-Youssef, MD.

Mayo Clinic, Rochester, Rochester, MN, USA.

25 **OPERATIVE MANAGEMENT OF ACQUIRED JEUNE'S SYNDROME**

Maria Grazia Sacco Casamassima, MD, Seth D. Goldstein, MD, Dominic Papandria, MD, Jose H. Salazar-Osuna, MD, Kimberly H. McIltrot, CRNP, Fizan Abdullah, MD, PhD, Paul M. Colombani, MD, MBA.

Division of Pediatric Surgery, Johns Hopkins Hospital, Baltimore, MD, USA.

26 **HIGH RATES OF METAL ALLERGY AMONGST NUSS PROCEDURE PATIENTS DICTATE THE NEED FOR BROADER PRE-OPERATIVE TESTING**

Bhairav Shah, MD, PharmD[1], Amy Haldeman[2], Frazier Frantz, MD[2], Robert E. Kelly, MD[2], Marcia A. Kuhn, MD[2], Michele Lombardo, MD[2], Robert Obermeyer, MD[2], Michael Goretsky, MD[2].

[1]EVMS, Norfolk, VA, USA, [2]Children's Hospital of the Kings and Daughters, Norfolk, VA, USA.

Program in Detail

27 **RISK FACTORS FOR MORTALITY IN PATIENTS WITH MULTIFOCAL AND DIFFUSE HEPATIC HEMANGIOMAS**

Kristy L. Rialon, MD, Rudy Murillo, MD, Rebecca D. Fevurly, MD, Ann M. Kulungowski, MD, Emily R. Christison-Lagay, MD, David Zurakowski, PhD, Harry PW Kozakewich, MD, Ahmad I. Alomari, MD, Steven J. Fishman, MD.

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

28 **PATIENT AND PARENTAL SCAR ASSESSMENT AFTER SINGLE INCISION VERSUS STANDARD 3-PORT LAPAROSCOPIC APPENDECTOMY: LONG TERM FOLLOW-UP FROM A PROSPECTIVE RANDOMIZED TRIAL**

Shawn D. St. Peter, E Marty Knott, DO, PhD, **Alessandra C. Gasior, DO**, George W. Holcomb III, MD, MBA, Daniel J. Ostlie, MD.

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

11:00 a.m. – Noon **Scientific Session IV Databases and Randomized Trials for Optimization and Regionalization of Surgical Care** *Islands A-F*

Moderators:
David A. Rodeberg, MD; Charles J. Stolar, MD

29 **HIGHER COSTS, CHARGES AND RESOURCE UTILIZATION DO NOT AFFECT SURVIVAL IN CONGENITAL DIAPHRAGMATIC HERNIA**

Ryan P. Cauley, Kristina Potanos, MD, Nora Fullington, MD, Jonathan Finkelstein, MD MPH, Dionne Graham, PhD, Jay M. Wilson, MD.

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

30 **LIMITATIONS OF AN ADMINISTRATIVE DATABASE COMPARED TO A RESEARCH DATABASE IN THE EVALUATION OF OUTCOMES IN NEWBORNS WITH CONGENITAL DIAPHRAGM HERNIA**

Sara C. Fallon[1], Pamela A. Lally, MD[2], Kevin P. Lally, MD, MS[2], Mary T. Austin, MD, MPH[2], Timothy C. Lee, MD[1], Lillian S. Kao, MD, MS[2], Monica E. Lopez, MD[1], Kuojen Tsao, MD[2].

[1]Division of Pediatric Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX, USA, [2]Center for Surgical Trials/ Evidence-Based Practice, Department of Pediatric Surgery, University of Texas School of Medicine at Houston, Houston, TX, USA.

31 **ENHANCING NSQIP-PEDS THROUGH INTEGRATION WITH THE PEDIATRIC HEALTH INFORMATION SYSTEM**

Katherine J. Deans, MD[1], Peter C. Minneci[1], Jennifer N. Cooper, PhD[1], Mehul V. Raval, MD[1], Shawn J. Rangel, MD[2], R. Lawrence Moss, MD[1].

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]Children's Hospital Boston, Boston, MA, USA.

Program in Detail

32 **SIMPLIFYING SIMPLE APPENDICITIS: IMPLEMENTATION OF A SAME DAY DISCHARGE PROTOCOL**

Laura A. Boomer, Kelli Kurtovic, BS, Katherine J. Deans, MD, Peter C. Minneci, MD, Jennifer Aldrink, MD, Benedict Nwomeh, MD, Karen Diefenbach, MD, Brian Kenney, MD.

Nationwide Children's Hospital and the Ohio State University College of Medicine, Columbus, OH, USA.

33 **SHIFTS TOWARDS CHILDREN'S HOSPITALS IN THE TREATMENT OF COMMON PEDIATRIC SURGICAL CONDITIONS: TRENDS AND OUTCOMES**

Jarod P. McAteer, MD[1], Cabrini A. LaRiviere, MD, MPH[2], Keith T. Oldham, MD[3], Adam B. Goldin, MD, MPH[1].

[1]Seattle Children's Hospital, Seattle, WA, USA, [2]Louisiana State University, New Orleans, LA, USA, [3]Children's Hospital of Wisconsin, Milwaukee, WI, USA.

34 **REPORT OF A PROSPECTIVE, RANDOMIZED, DUAL-CENTER, SINGLE BLINDED TRIAL OF LAPAROSCOPIC VERSUS OPEN APPENDECTOMY IN CHILDREN**

David W. Bliss, MD, FACS, FAAP[1], David Cho, MD[2], Julie Mckee, PNP[2], Sanjay Krishnaswami[2], Garret Zallen, MD, FACS, FAAP[2], Mark Silen, MD, FACS, FAAP[2], Marvin Harrison, MD, FACS, FAAP[2].

[1]Children's Hospital Los Angeles, Los Angeles, CA, USA, [2]Oregon Health and Science University, Portland, OR, USA.

35 **PROTOCOL VERSUS *AD LIB* FEEDS AFTER LAPAROSCOPIC PYLOROMYOTOMY: A PROSPECTIVE RANDOMIZED TRIAL**

Obinna O. Adibe, MD, Corey W. Iqbal, MD, David Juang, MD, Susan W. Sharp, PhD, Charles L. Snyder, MD, George W. Holcomb III, MD, MBA, Daniel J. Ostlie, MD, Shawn D. St. Peter.

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

36 **OPERATIONALIZING QUALITY IMPROVEMENT IN A PEDIATRIC SURGICAL PRACTICE**

Marjorie J. Arca, MD[1], Jessica A. Enters, BA, BSN[1], Melissa Christensen, BS, CCRC[1], Thomas T. Sato, MD[1], Robert Thielke, PhD[2], Keith T. Oldham, MD[1].

[1]Medical College of Wisconsin/Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]Children's Hospital of Wisconsin, Milwaukee, WI, USA.

12:15 p.m. – 1:15 p.m. **Presidential Address** *Islands A-F*
Keith T . Oldham, MD
The Right Stuff

Learning Objectives

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

- Identify the rationale for prospectively defining optimal resources for children's surgical care

Program in Detail

- Discuss specific data which support a specialized care environment for childhood anesthesia, surgical neonatal care and other relevant examples
- Summarize a current policy initiative operationalizing this concept in the U.S. healthcare system

1:30 p.m. – 2:30 p.m. **Innovation Session** *Islands A-F*
Abstracts on New and Innovative Techniques and Procedures

Moderators:
Todd A. Ponsky, MD; Erik D. Skarsgard, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Assess novel approaches for ECMO cannulation
- Evaluate innovative approaches to intestinal lengthening
- Discuss validation of pediatric surgical simulator

i1 **THE DEVELOPMENT OF A MURINE MODEL FOR INVESTIGATING THE USE OF A TISSUE ENGINEERED VASCULAR GRAFT IN THE PORTAL CIRCULATION**

Mark W. Maxfield, MD[1], Hirotsugu Kurobe, MD, PhD[2], Tai Yi, MD[2], Zhen W. Zhuang, MD[1], Kevin A. Rocco, BS[3], Paul Bagi, BS[1], Shuhei Tara, MD, PhD[2], Muriel Cleary, MD[1], Daniel Solomon, MD[1], Albert J. Sinusas, MD[1], Toshiharu Shinoka, MD, PhD[2], Christopher K. Breuer, MD[2].

[1]Yale University School of Medicine, New Haven, CT, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA, [3]Yale University, New Haven, CT, USA.

i2 **A NOVEL NEONATAL POSITIONING SYSTEM FOR ECMO CANNULATION AND THERAPY**

Miramar Lee Choy, BS[1], Zachary Trimble, PhD[1], Joel Hijirida, BS[1], Brandon Neill, BS[1], Sonya Ling, BS[1], My Van Vo, BS[1], Scott Miller, PhD[1], **Russell K. Woo, MD[2]**.

[1]University of Hawaii, Department of Mechanical Engineering, Honolulu, HI, USA, [2]University of Hawaii, Department of Surgery, Honolulu, HI, USA.

i3 **A NOVEL BIODEGRADABLE DEVICE FOR INTESTINAL LENGTHENING**

Veronica F. Sullins, Justin P. Wagner, Elvin K. Chiang, Arnold Suwarnasarn, Steven L. Lee, Benjamin M. Wu, James CY Dunn.

UCLA, Los Angeles, CA, USA.

i4 **DEVELOPMENT AND PROTOTYPING OF A DETACHABLE, ADJUSTABLE, MAGNETICALLY ANCHORED GRASPER FOR MINIMALLY INVASIVE SURGERY IN CHILDREN**

Keiko Amano, MS, Matthew Sander, MS, Yang Zhao, MS, Dillon A. Kwiat, BS, Michael R. Harrison, MD.

University of California, San Francisco, San Francisco, CA, USA.

Program in Detail

i5 **VALIDATION OF A NOVEL THORACOSCOPIC ESOPHAGEAL ATRESIA/ TRACHEOESOPHAGEAL FISTULA REPAIR SIMULATOR**

Katherine A. Barsness, MD[1], Deborah M. Rooney, PhD[2], Lauren M. Davis, BA[3], Anthony C. Chin, MD[1].

[1]*Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA,* [2]*University of Michigan Medical School, Ann Arbor, MI, USA,* [3]*Northwestern University Feinberg School of Medicine, Chicago, IL, USA.*

i6 **ENDOSCOPIC SUBMUCOSAL DISSECTION FOR THE TREATMENT OF A LARGE GASTRIC HAMARTOMA IN PEUTZ-JAGHER SYNDROME**

James Wall, MD, MSE, William Burquist, MD, Craig Albanese, MD, MBA.

Stanford University, Palo Alto, CA, USA.

2:30 p.m. – 3:30 p.m. **Video Session** *Islands A-F*

Moderators:
J. Ted Gerstle, MD; Kevin P. Lally, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- Evaluate approaches to the repair of complex anorectal and urogenital malformations
- Explain how bronchoscopes can be used in thoracic surgery
- Formulate a laparoscopic approach to resection of a sacrococcygeal teratoma

V1 **THE TRANSPUBIC APPROACH FOR THE REPAIR OF COMPLEX ANORECTAL AND UROGENITAL MALFORMATIONS**

Andrea Bischoff, Marc A. Levitt, MD, Alberto Peña.

Cincinnati Children Hospital, Cincinnati, OH, USA.

V2 **THORACOSCOPIC DIVISION OF A DOUBLE AORTIC ARCH AND TEF REPAIR THROUGH THE LEFT CHEST IN A PATIENT WITH A DOMINANT RIGHT ARCH**

Steven S. Rothenberg, Saundra M. Kay, MD.

The Rocky Mountain Hospital For Children, Denver, CO, USA.

V3 **BRONCHOSCOPIC ASSISTED CLOSURE OF AN AIRWAY DEFECT TO PREVENT NARROWING DURING BRONCHOGENIC CYST RESECTION**

James Wall, MD, MSE, Marilyn Butler, MD, Matias Bruzoni, MD.

Stanford University, Palo Alto, CA, USA.

V4 **LAPAROSCOPIC ASSISTED RESECTION OF A TYPE IV SACROCOCCYGEAL TERATOMA IN A 6-MONTH-OLD GIRL**

Hans Joachim Kirschner, Guido Seitz, Juergen Schaefer, Joerg Fuchs.

University Children's Hospital Tuebingen, Tuebingen, Germany.

Program in Detail

V5 **TECHNICAL REAPPRAISAL OF LAPAROSCOPIC KASAI FOR UNCORRECTABLE BILIARY ATRESIA**

Atsuyuki Yamataka, Hiroki Nakamura, Abudebieke Halibieke, Hiroyuki Koga, Go Miyano, Manabu Okawada, Geoffrey J. Lane, Tadaharu Okazaki.

Juntendo University School of Medicine, Tokyo, Japan.

V6 **LAPAROSCOPIC REPAIR OF BILATERAL FEMORAL HERNIAS IN A CHILD**

Curt S. Koontz, **Robert J. Vandewalle, MD**, Michael G. Carr, MD.

University of Tennessee College of Medicine, Chattanooga, TN, USA.

Sunday, May 5

8:00 a.m. – 9:15 a.m. **Scientific Session V** *Islands A-D*
Rare and Miscellaneous Surgical Issues

Moderators:
Daniel J. Ostlie, MD; Thomas M. Krummel, MD

37 **REPORT OF THE 2012 APSA WORKFORCE COMMITTEE MEMBERSHIP SURVEY**

Wolfgang Stehr[1], Aviva Katz, MD[2], Richard G. Weiss, MD[3], Daniel A. Saltzman, MD, PhD[4], Don K. Nakayama, MD, MBA[5], 2012 Members of the APSA Workforce Committe[6].

[1]Children's Hospital and Research Center Oakland, Oakland, CA, USA, [2]Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA, USA, [3]Connecticut Children's Medical Center; University of Connecticut School of Medicine, Hartford, CT, USA, [4]University of Minnesota Amplatz Children's Hospital, Minneapolis, MN, USA, [5]Mercer University School of Medicine, Macon, GA, USA, [6]American Pediatric Surgical Association, Deerfield, IL, USA.

38 **RANDOMIZED CONTROLLED TRIAL OF MECHANICAL BOWEL PREPARATION FOR CHILDREN UNDERGOING ELECTIVE COLORECTAL SURGERY**

Jennifer H. Aldrink, MD, Cindy McManaway, CFNP, Wei Wang, MS, Benedict C. Nwomeh, MD.

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

39 **LOOP VERSUS DIVIDED COLOSTOMY FOR THE MANAGEMENT OF ANORECTAL MALFORMATIONS**

Omar Odah, MD, Dafydd A. Davies, MD, MPhil, Kimberly Colapinto, RN(EC), Justin T. Gerstle, MD.

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

Program in Detail

40 **THE PROBLEMATIC SOAVE CUFF IN HIRSCHSPRUNG DISEASE: MANIFESTATIONS AND TREATMENT**

Belinda H. Dickie, MD, PhD, Keith M. Webb, MD, **John G. Schneider, MD**, Balgopal Eradi, MD, Marc A. Levitt, MD.

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

41 **NITROUS OXIDE PROCEDURAL SEDATION IN NON-FASTING PEDIATRIC PATIENTS UNDERGOING MINOR SURGERY: A 12-YEAR EXPERIENCE**

Raquel Pasaron, DNP, ARNP, FNP-BC, Jeannette A. Zerpa, MSN, ARNP, PNP-BC, Leopoldo Malvezzi, MD, Colin G. Knight, MD, Carmen T. Ramos-Irizarry, MD, Tina Shapiro, PhD, ARNP, PCNS-BC, Joanne Mora, PA-C, Cathy A. Burnweit, MD.

Miami Children's Hospital, Miami, FL, USA.

42 **EVALUATION OF LAPAROSCOPIC MANAGEMENT OF RECURRENT GASTROESOPHAGEAL REFLUX DISEASE AND HIATAL HERNIA, LONG-TERM RESULTS AND EVALUATION OF CHANGING TRENDS**

Steven S. Rothenberg, Sami Bansai, MD.

The Rocky Mountain Hospital For Children, Denver, CO, USA.

43 **AORTOPEXY FOR SEVERE TRACHEOMALACIA**

Russell Jennings, MD[1], Thomas E. Hamilton, MD[1], C. Jason Smithers, MD[1], **Monawat Ngerncham, MD, MSPH**[2], John Foker, MD, PhD[1].

[1]Boston Childrens Hospital/Harvard Medical School, Boston, MA, USA, [2]Faculty of Medicine Siriraj Hospital, Bangkok, Thailand.

9:15 a.m. – 10:15 a.m. **COG Surgeon Update Rare Tumors – The Key Concepts We Need to Know: Melanoma, Pleuropulmonary Blastoma and Hepatic Tumor Resection** *Islands A-D*

Moderators:
Peter F. Ehrlich, MD; Michael P. LaQuaglia, MD

Learning Objectives
At the conclusion of this session, participants will be able to:
- List the key surgical concepts for treated children with nevi
- Discuss clinical presentation and management of pulmonary pleuroblastoma
- Employ novel concepts to pediatric hepatic tumor resections

Program in Detail

Melanoma
James D. Geiger, MD

Pulmonary Pleuropulmonary Blastoma
Douglas N. Miniati, MD

Hepatic Tumor Resections
Gregory M. Tiao, MD; Eugene D. MacGharen, III, MD

10:30 a.m. – Noon	**Pediatric Surgery Case Debates and Controversies**	*Islands A-D*

Moderator:
Carroll M. Harmon, MD

Learning Objective
Participants in this session will debate treatment options for difficult pediatric surgical cases.

Noon	Annual Meeting Concludes

Poster Session I

Poster Session I
Basic, Fetal and Bench Science
Thursday, May 2, 4:30 p.m. – 6:15 p.m.

P1

THE SEQUENTIALLY ESCALATING ETHANOL-LOCK ("SEE-LOCK"): A NOVEL TECHNIQUE TO ENHANCE THE SAFETY OF ETHANOL-LOCK ADMINISTRATION FOR PATIENTS WITH VASCULAR ACCESS DEVICES

M. Pierce Ebaugh, MS[1], Nicholas S. Laconi, BS[1], Norma A. Alcantar, PhD[2], **Mark L. Kayton, MD**[1].

[1]The University of South Florida Morsani College of Medicine, Tampa, FL, USA, [2]Department of Chemical & Biomedical Engineering, University of South Florida, Tampa, FL, USA.

Purpose:
To improve the safety of administering 70% ethanol-locks into silicone mediport or Broviac catheters, we devised a readily-available method to elute catheter-bound heparin off of silicone. Ethanol-locking of vascular access devices, particularly of mediports, has been associated with serious catheter occlusions, which may be related to precipitation of retained heparin with ethanol. We hypothesized that if catheter-bound heparin were to be extracted first, 70% ethanol would induce less precipitation.

Methods:
The "SEE-Lock", or Sequentially Escalating Ethanol-Lock strategy, elutes off silicone-bound heparin by sequential delivery of 30% then 50% ethanol prior to exposure of a catheter to 70% ethanol. To simulate heparin adsorption onto a catheter, FDA-grade silicone (n=12 samples per condition) was incubated in 100 units/mL heparin overnight. Heparin-adsorbed silicone was then exposed to 70% ethanol either immediately, or following two saline flushes, or following delivery of the SEE-Lock strategy. Precipitation of heparin was measured in nephelometric turbidity units (NTU's) using a benchtop turbidimeter. Groupwise comparisons were performed by ANOVA with post-hoc T-testing and Bonferroni correction, and $p<0.05$ considered significant.

Results:
The SEE-Lock strategy significantly reduced precipitate formation when heparin-adsorbed silicone was exposed to 70% ethanol. Turbidity using the SEE-Lock was 3.56 ± 0.69 NTU's, which is more than a twofold reduction than when 70% ethanol was administered without the SEE-Lock strategy (8.53 ± 0.58 NTU's, $p<0.05$), and significantly lower than when heparin-adsorbed silicone was flushed twice with saline prior to delivery of 70% ethanol (6.36 ± 0.53 NTU's, $p<0.05$).

Conclusions:
By capitalizing on the known ability of ethanol to elute heparin, the "SEE-Lock,"

Poster Session I (cont.)

or Sequentially Escalating Ethanol-Lock, initially employs low concentrations of ethanol to remove silicone-bound heparin. Upon subsequent delivery of a 70% ethanol locking solution, significantly less precipitation of heparin occurs. Use of this strategy may reduce complications among children undergoing ethanol-lock treatment of silicone Broviac and mediport catheters.

NOTES:

Poster Session I (cont.)

P2

HIGH FAT DIET ENHANCES *VILLUS* GROWTH AFTER INTESTINAL RESECTION INDEPENDENT OF BASELINE FAT MALABSORPTION

Pamela M. Choi, MD, Jun Guo, PhD, Christopher R. Erwin, PhD, Sylvia Wandu, Brad W. Warner, MD.

St. Louis Children's Hospital, Washington University School of Medicine, St Louis, MO, USA.

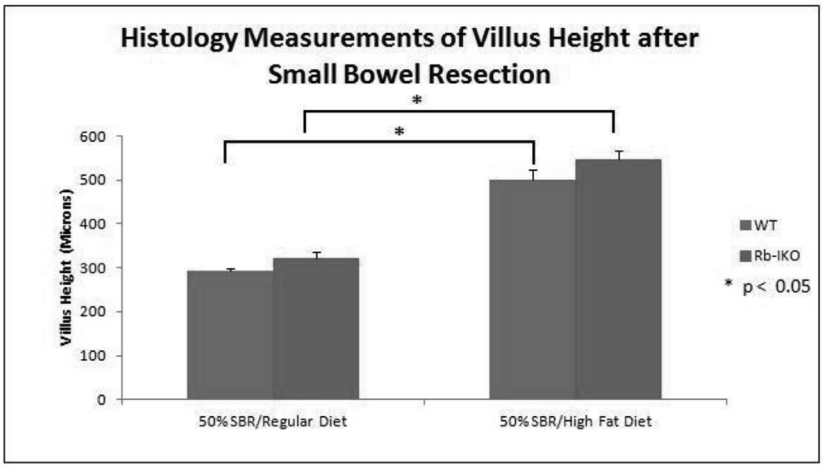
Purpose:
We have previously demonstrated that genetically disrupting Retinoblastoma protein (Rb) expression within the intestinal epithelium (Rb-IKO mice) results in mucosal hyperplasia and significantly impaired enteral fat absorption. Since enteral fat may be a preferred substrate to enhance adaptation following massive small bowel resection (SBR), we sought to determine the influence of a high fat diet (HFD) on resection-induced adaptation and metabolic responses in the context of a pre-existing diminished capacity for fat absorption.

Methods:
Villin-Cre mice were bred with Rb(flox/flox) mice to generate offspring with disrupted intestinal epithelial Rb expression (Rb-IKO; n = 10). Rb-IKO and wild-type (WT; n = 8) littermates were subjected to 50% SBR and then placed on a HFD (42% kcal/fat). Mice were weighed weekly, and fat absorption determined at postoperative week (POW) 3 and 10. Indirect calorimetry was used to measure 24hr energy expenditure (EE), and magnetic resonance spectroscopy employed to determine body composition (BC) analysis after POW 4. The remnant bowel was harvested after POW 15.

Results:
Although fat absorption was impaired in Rb-IKO mice at early time points, differences between Rb-IKO and WT mice were indistinguishable by POW 10. SBR did not affect EE, but resulted in significant and similar reductions in % body fat and increases in lean body mass in both groups. While Rb-IKO mice (baseline expanded mucosal surface area) on regular chow had not previously shown adaptive growth after SBR, both Rb-IKO and WT mice demonstrated significant increases in villus height in response to HFD.

Conclusions:
Despite defective absorption of enteral fat in Rb-deficient mice, provision of a HFD resulted in normal metabolic responses to SBR and restored the capacity for resection-induced mucosal growth. These findings highlight the significance of enteral fat as a key factor in driving villus growth and mucosal surface area - irrespective of baseline steatorrhea.

Poster Session I (cont.)



NOTES:

Poster Session I (cont.)

P3

A NOVEL RAT MODEL OF ESOPHAGEAL LENGTHENING: IS IT REALLY GROWING?

Nora M. Fullington, MD, **Kristina M. Potanos, MD,** Ryan C. Cauley, MD, David Zurakowski, PhD, Steven J. Fishman, MD, Khashayar Vakili, M., Heung Bae Kim, MD.

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

Purpose:
Esophageal stretch has been shown to increase esophageal length but the contribution of tissue hyperplasia to this growth is unknown. We used a novel model of esophageal stretch to determine the cellular response to the stretch stimulus.

Methods:
Male Sprague-Dawley rats (n=21) underwent transection of the distal esophagus. The distal stump was ligated and stretched over a 10F silicone tube. The proximal esophageal stump was anastomosed to the stomach to restore continuity. After two, four, or seven days, the silicone tube was removed and the esophageal segment was measured and compared to its initial length. Sham animals (n=14) had only a thin piece of silicone tubing placed. Standardized histologic sections were evaluated for wall thickness. Immunofluorescence with Ki-67 antibody was used to assess proliferation and nuclear density.

Results:
Experimental animals demonstrated a significant increase in esophageal length compared to sham controls at four and seven days with no difference at two days. There was also significant lengthening between four and seven days among the experimental animals (Figure 1A). There was no change in wall thickness between experimental and sham animals at any time point (data not shown). However, proliferation indices were significantly increased relative to sham controls at all time points (Figure 1B) with localization to skeletal muscle progenitor, smooth muscle and endothelial cells by immunofluorescence. In addition to increased proliferation, there was an increase in nuclear density at all time points, although this only reached significance at day four (Figure 1C).

Conclusion:
In this novel rat model of esophageal stretch, esophageal lengthening is associated with stable esophageal wall thickness, increased cellular proliferation and increased nuclear density. This data suggests that true tissue hyperplasia may contribute to the increased length seen after esophageal stretch, although the relative contribution of elastic growth remains unclear.

Poster Session I (cont.)

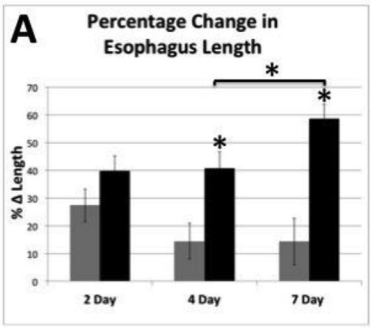
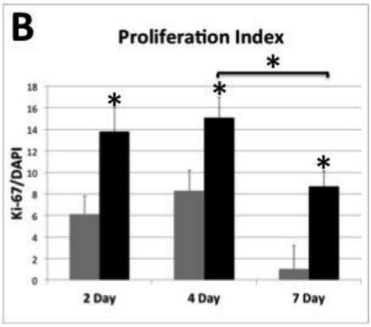
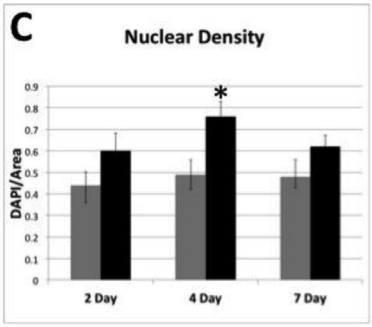


Figure 1

Sham
Experimental
* $p \leq 0.05$





NOTES:

Poster Session I (cont.)

P4

TISSUE EXPANDER STIMULATED LENGTHENING OF ARTERIES (TESLA) INDUCES EARLY CELLULAR PROLIFERATION IN A NOVEL RODENT MODEL

Kristina Potanos, MD, **Nora Fullington, MD**, Ryan Cauley, MD, David Zurakowski, PhD, Steven Fishman, MD, Khashayar Vakili, MD, Heung Bae Kim, MD.
Children's Hospital Boston, Boston, MA, USA.

Purpose:
TESLA has been described as a novel surgical approach for the treatment of mid-aortic syndrome in children. This method utilizes the principle of strain-induced tissue growth to lengthen a native vessel, obviating the need for a synthetic bypass graft. We aimed to investigate the vascular cellular response of the aorta to the longitudinal strain stimulus in a novel rodent model of TESLA.

Methods:
Adult male Sprague-Dawley rats underwent placement of a retroaortic tissue expander and inflation to 4mL or sham surgery with an equivalent strip of expander material. After 2, 4, or 7 days, the aortic segment overlying the expander was measured to assess for linear growth and histologic sections were taken to assess for microscopic evidence of arterial wall injury. Ki-67 fluorescence immunohistochemistry was used to assess endothelial, smooth muscle, and total cellular proliferation. Adobe Photoshop and MediaCybernetics Image Pro Software were used for wall thickness measurements and cell counting. Data were compared using two-way ANOVA with Fisher post-hoc comparisons (two-tailed $p<0.05$ considered significant).

Results:
Aortic length was significantly increased in all experimental groups compared to sham controls. Wall thickness was significantly increased in experimental animals at 7 days. There was no difference in total nuclei per area. Proliferation index was increased in the experimental group as compared with sham animals on day 2; no group differences were detected at day 4 or day 7 (Figure1). Ki-positive cells were primarily localized to the endothelium.

Conclusions:
In this novel rodent model of TESLA, aortic lengthening was achieved within two days and was associated with endothelial proliferation and preservation of normal histologic architecture. This finding supports the hypothesis that longitudinal strain results in not only acute elastic stretch, but also early cellular proliferation that may contribute to somatic growth of the artery.

Poster Session I (cont.)

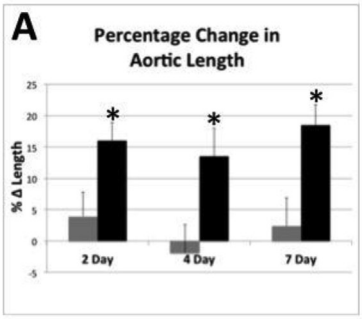
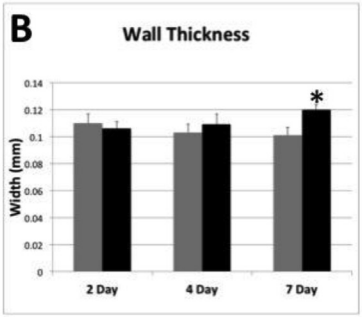
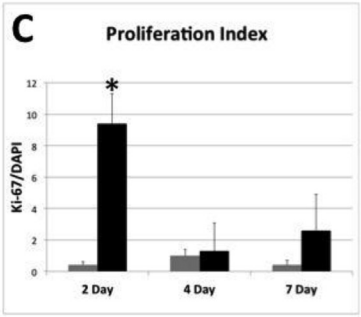


Figure 1

Sham
Experimental
* $p \leq 0.05$





NOTES:

Poster Session I (cont.)

P5

BIOMECHANICAL ANALYSIS OF SMALL DIAMETER TISSUE-ENGINEERED ARTERIAL GRAFTS FOLLOWING IMPLANTATION IN A MURINE MODEL

Ramak Khosravi[1], Brooks Udelsman[1], Kevin Rocco[2], Kristin Miller, PhD[2], Tai Yi, MD[3], Jay Humphrey, PhD[2], Christopher K. Breuer, MD[4].

[1]Yale University School of Medicine, New Haven, CT, USA, [2]Department of Biomedical Engineering, Yale School of Engineering and Applied Science, New Haven, CT, USA, [3]Interdepartmental Program in Vascular Biology and Therapeutics, Yale University, New Haven, CT, USA, [4]Division of Pediatric Surgery, Department of Surgery, Yale University School of Medicine, New Haven, CT, USA.

Purpose:
We have developed a tissue-engineered vascular graft (TEVG) for use as a vascular conduit in pediatric congenital heart surgery and demonstrated its feasibility and growth potential in a pilot clinical trial. We now seek to translate this technology to the systemic circulation, which necessitates development of neotissue under greater hemodynamic loads while minimizing complications such as aneurysm, stenosis, thromboembolic events, or rupture.

Methods:
Two biodegradable interposition grafts with different degradation profiles were implanted in the infrarenal aorta of 10 week-old female C57BL/6 or SCID/bg mice: (i) long-lasting non-woven poly-l-lactic acid (PLA) scaffolds coated with a 50:50 solution of ε-caprolactone and l-lactide copolymer (PCLA) and seeded with mouse bone marrow-derived mononuclear cells (BM-MNCs) (n=20), and (ii) compliant, rapidly degrading electrospun PCLA scaffolds seeded with mouse BM-MNCs (n=30). Graft patency was evaluated post-operatively by Doppler ultrasound, graft stiffness was quantified in vitro at 1 and 2 months using biaxial biomechanical testing, and cellular infiltration and matrix deposition were analyzed using histology.

Results:
6 mice implanted with seeded PLA grafts died of aneurysmal rupture within 2 weeks of surgery; the 14 remaining grafts were patent with minimal evidence of dilatation at 2 months. All mice harboring electrospun PCLA seeded grafts died of aneurysmal rupture within 5-10 weeks of implantation. Cyclic pressure-diameter and axial force-length tests on non-ruptured grafts revealed a stiffer than native response, though aneurysmal segments exhibited modest compliance. Histology revealed minimal cellular infiltration of the electrospun PCLA graft.

Discussion:
Despite relatively rapid PCLA degradation, the biomechanical properties of our electrospun PCLA graft were defined, much like our long-lasting PLA graft, by construct-dominated stiffness due to the lack of neotissue development and modest cellular infiltration at early time points, thus leading to aneurysmal dilatation and rupture.

NOTES:

Poster Session I (cont.)

P6

EFFICACY OF OSTEOPONTIN (OPN) SIGNALING BLOCKADE USING AN RNA APTAMER AND STABLE OPN EXPRESSION KNOCKDOWN ON PULMONARY METASTATIC POTENTIAL OF OSTEOSARCOMA (OS)

Lindsay J. Talbot, MD[1], Zhiyong Mi, PhD[2], Syamal D. Bhattacharya, MD[1], Henry E. Rice, MD[1], Corinne M. Linardic, MD, PhD[1], Paul C. Kuo, MD, MBA[2].

[1]Duke University, Durham, NC, USA, [2]Loyola University, Chicago, IL, USA.

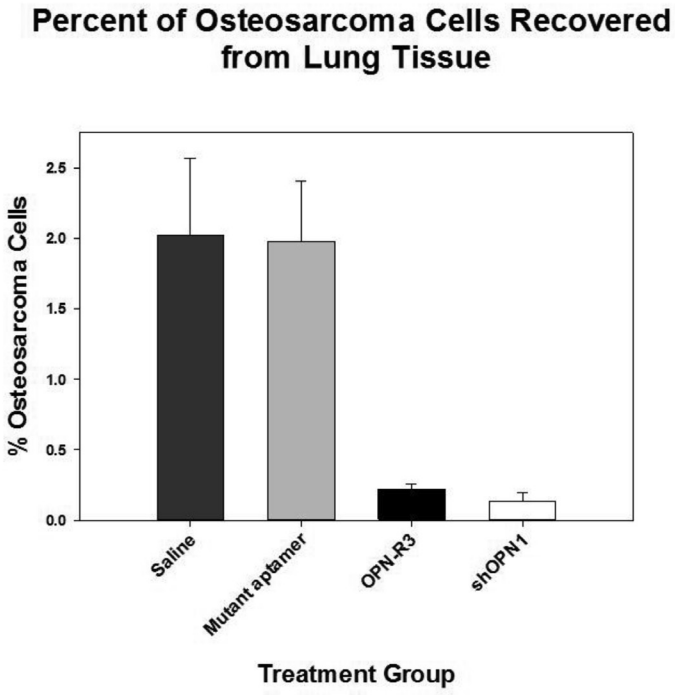
Purpose:
We previously reported reduction in pulmonary metastatic burden of osteosarcoma (OS) by 50% after treatment of xenograft mice with an RNA aptamer against osteopontin (OPN). We report *in vitro* findings and results of a second xenograft experiment as well as pilot data evaluating effect of OPN knockdown on metastatic potential of OS cells.

Methods:
Cell line LM7 was used for all experiments. Stable OPN knockdown was achieved by lentivirus-mediated shRNA transfection. Migration was assessed using Boyden transwell chambers. Invasion assays were performed on Boyden transwells with Matrigel membrane coating. Xenograft mice (six per treatment group) were generated by intratibial injection of LM7. A pilot group of three mice were inoculated with LM7 cells with stable OPN knockdown. Mice were treated with an aptamer against OPN, a nonfunctional aptamer, or saline for three weeks. Tumor growth was measured by bioluminescence. After necropsy, flow cytometry was performed on lungs to recover metastatic cells.

Results:
Aptamer-treated and OPN knockdown cells showed a small but significant reduction in migration across transwells (approximately 25%) compared to nonfunctional aptamer treated and control cells ($p = 0.046$). Both groups also displayed a trend towards reduced invasion through Matrigel membrane compared to controls. Aptamer treatment resulted in reduction of pulmonary metastatic burden by 90% compared to controls ($p < 0.002$). OPN knockdown mice showed a similar reduction in metastatic burden.

Conclusions:
OPN blockade resulted in *in vitro* reduction in migration of LM7 cells and *in vivo* reduction in pulmonary metastatic burden. Pilot *in vivo* data suggests that intracellular knockdown of OPN is also effective in reducing metastatic potential. These results confirm previous findings and illuminate an active role for OPN production and signaling in regulation of OS metastasis. OPN blockade may be a useful therapeutic target for reducing pulmonary metastasis in OS.

Poster Session I (cont.)



NOTES:

Poster Session I (cont.)

P7

SUBEROYL BIS-HYDROXAMIC ACID TREATMENT AND NOTCH EXPRESSION IN NEUROBLASTOMA

Jocelyn F. Burke, MD, Madhuchhanda Roy, MD, PhD, Muthusamy Kunnimalaiyaan, PhD.

University of Wisconsin, Madison, WI, USA.

Purpose:
Neuroblastoma is the most common solid extracranial tumor in children and has poor overall survival rates of 40-50%. Tumors derive from sympathetic neuron precursor cells that fail to complete normal differentiation. The Notch pathway is involved in neuronal differentiation, and increased levels of active Notch suppress growth in neuroblastoma cells. Suberoyl bishydroxamic acid (SBHA) is a histone deacetylase inhibitor that increases Notch1 activation in other neuroendocrine tumors. The purpose of this study was to evaluate the effect of SBHA on neuroblastoma cells.

Methods:
Baseline expression levels of active Notch1-3 were established in several neuroblastoma cell lines using Western blot analysis. Two cell lines with minimal endogenous Notch1 expression, SK-N-AS and LAN-1, were then treated with SBHA (0-30 μM) for 3 days, and cellular proliferation was assessed with MTT assays. The effect of SBHA treatment on Notch expression and downstream Notch pathway markers in SK-N-AS cells was then examined using Western blot analysis.

Results:
Cellular proliferation assays with SBHA treatment demonstrated significant dose-dependent reduction of cell growth in both LAN-1 and SK-N-AS cells. On Western blot analysis, SBHA treatment resulted in a dose-dependent increase in active Notch1 and decrease in active Notch3 protein expression in SK-N-AS cells. Importantly, we observed an associated decrease in expression levels of achaete scute complex-like1 (ASCL1), a downstream target of Notch1 in neuroendocrine tumors that is inversely correlated with Notch1 expression.

Conclusions:
Suberoyl bishydroxamic acid treatment induces Notch1 and reduces Notch3 expression in neuroblastoma cells compared to endogenous Notch levels in untreated cells. This treatment results in cellular growth suppression and reduction in downstream tumor growth markers, suggesting that Notch1 activation or Notch3 inhibition should be targets for further investigations in neuroblastoma therapy.

NOTES:

Poster Session I (cont.)

P8

IMPAIRED ANGIOGENESIS AND DECREASED HIGHLY PROLIFERATIVE ENDOTHELIAL CELLS IN AN OVINE MODEL OF CONGENITAL DIAPHRAGMATIC HERNIA

Shannon Acker, MD, Gregory Seedorf, Jason Gien, MD, David Partrick, MD, Steve Abman, MD.

University of Colorado, Aurora, CO, USA.

Purpose:
Congenital diaphragmatic hernia (CDH) is a developmental abnormality characterized by decreased vascular growth and pulmonary hypertension, which contribute to severe morbidity and mortality for affected patients. The mechanisms that decrease angiogenesis and increase the risk of pulmonary hypertension in CDH are poorly understood. We hypothesize that decreased vessel growth is caused by endothelial dysfunction and the loss of a highly proliferative phenotype (HPP).

Methods:
Proximal pulmonary artery endothelial cells (PAECs) were harvested from fetal sheep that underwent surgical diaphragmatic disruption at gestational age 75-90 days. Lungs were harvested near term. Cell growth was studied in normal and CDH PAECs. Angiogenesis was assessed utilizing a tube formation assay, with and without VEGF treatment (25ng/ml). Flow cytometry was used to sort single cells and assess proliferative capacity of the PAECs. All experiments were conducted at passages 3-7. Comparisons were made with CDH (n=6) and control (n=10) PAECs.

Results:
CDH PAECs grew more slowly than control cells (31% decrease at day 4; P=0.012). Rates of tube formation in PAECs from CDH lambs were decreased by 54% (P<0.001) compared to control. VEGF treatment increased the rate of CDH PAEC tube formation to similar values as control PAECs. When evaluated by single cell assay, CDH PAECs showed a significant shift in population as characterized by a decrease in cells with HPP. Sixty-nine percent of cells sorted from normal animals formed colonies of greater than10 cells while only 13% of cells from CDH animals formed colonies of greater than 10 cells at two weeks (P<0.0001).

Conclusion:
Diaphragmatic hernia impairs PAEC growth and tube formation *in vitro,* mediated by VEGF, and causes a loss of heterogeneity and PAECs with high proliferative capacity. We speculate that endothelial dysfunction and loss of HPP PAECs contributes to impaired vascular development and increases the risk of pulmonary hypertension in CDH.

NOTES:

Poster Session I (cont.)

P9

PRENATAL MATERNALLY-ADMINISTERED PDE5 INHIBITORS INCREASE RELATIVE EXPRESSION OF CYCLIC GMP PATHWAY PROTEINS IN LUNGS OF FETAL LAMBS WITH DIAPHRAGMATIC HERNIA

Eveline H. Shue, MD, Samuel C. Schecter, MBBS, Mozziyar Etemadi, MS, Jianfeng Wu, Peter Oishi, MD, Jeffrey Fineman, MD, Jeffrey Fineman, MD, Doug Miniati, MD.
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Purpose:
Pulmonary hypertension is a main predictor of postnatal survival in congenital diaphragmatic hernia (CDH). Though pulmonary vascular remodeling occurs in utero, no prenatal treatments are available. Phosphodiesterase type 5 (PDE5) inhibitors are used to treat pulmonary hypertension postnatally, but have not been used prenatally. The purpose of this study is to determine if the cyclic GMP (cGMP) pathway is altered in the fetal lamb model of CDH, and to determine if prenatally-administered PDE5 inhibitors can normalize cGMP pathway protein expression.

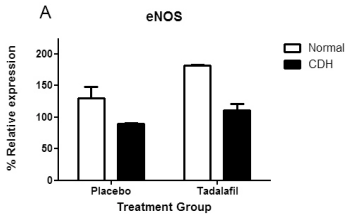
Methods:
Diaphragmatic hernias were created in time-dated pregnant ewes at mid-gestation. Postoperatively, pregnant ewes received either placebo or a PDE5 inhibitor (tadalafil at 2mg/kg/day) until delivery. Lung tissue from lambs delivered near term gestation was snap frozen for analysis. Relative expression of endothelial nitric oxide synthase (eNOS), β-subunit soluble guanylate cyclase (β-sGC), and PDE5 to β-actin was determined by Western blotting and quantified using Image J. Statistical analysis was performed using a 2-way ANOVA with Bonferroni post hoc testing, n=2/group.

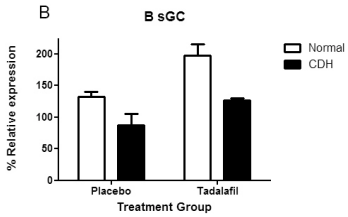
Results:
Preliminarily, relative expression of eNOS was 130±25% in normal-placebo, 75±8% in CDH-placebo, 182±2% in normal-tadalafil, and 111±14% in CDH-tadalafil lambs (Figure 1A). Relative expression of β-sGC was 133±11% in normal-placebo, 88±25% in CDH-placebo, 198±26% in normal-tadalafil, and 127±4% in CDH-tadalafil lambs (Figure 1B). Relative expression of PDE5 was 76±8% in normal-placebo, 60±13% in CDH-placebo, 99±26% in normal-tadalafil, and 138±6% in CDH-tadalafil lambs (Figure 1C). β-sGC and eNOS were significantly decreased in CDH lambs (p= 0.01 and 0.005, respectively). Tadalafil significantly increased expression of eNOS, β-sGC, and PDE5 (p=0.02, 0.02, and 0.01, respectively) compared to placebo.

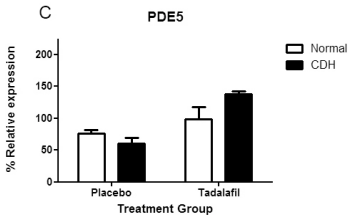
Poster Session I (cont.)

Conclusions:

β-sGC and eNOS expression decreases in fetal lambs with diaphragmatic hernia. Altered protein expression in the cGMP pathway may contribute to CDH-associated pulmonary hypertension. Antenatal maternally-administered PDE5 inhibitors normalize eNOS and β-sGC expression while increasing PDE5 expression, and may prevent vascular remodeling in CDH-associated pulmonary hypertension.







NOTES:

Poster Session I (cont.)

P10

SPINAL CORD EXPRESSION OF VIRALLY DELIVERED MULLERIAN INHIBITING SUBSTANCE EXTENDS LIFE AND PROMOTES SURVIVAL OF MOTOR NEURONS IN TRANSGENIC SOD1 MUTANT MICE

Leo Andrew O. Benedict[1], Dan Wang[2], Debra Cameron[3], David Pepin[1], Amanda Sosulski[1], Huapeng Li[2], Guangping Gao[2], Robert H. Brown[3], Patricia K. Donahoe[1].

[1]Pediatric Surgical Research Laboratories, Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA, [2]Gene Therapy Center, University of Massachusetts Medical School, Worcester, MA, USA, [3]Department of Neurology, University of Massachusetts Medical School, Worcester, MA, USA.

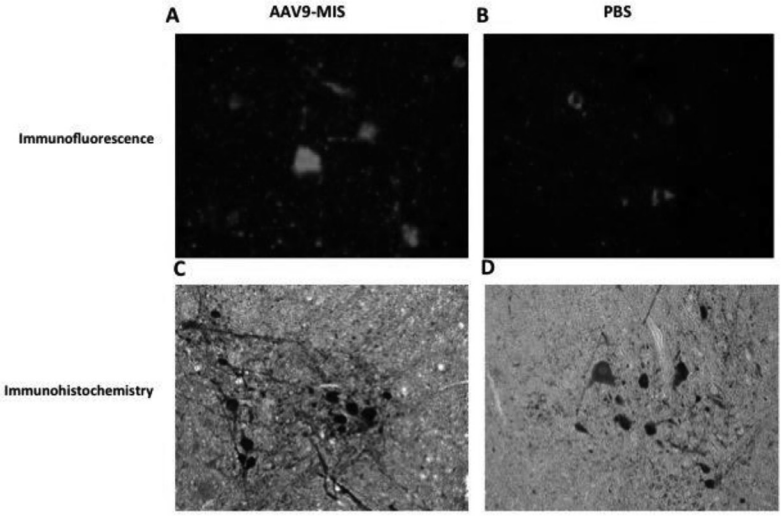
Purpose:
Motor neuron diseases are a group of neurological disorders caused by slowly progressive death of motor neurons, which control essential voluntary muscle activity. Mullerian Inhibiting Substance (MIS) is a member of the TGF-β superfamily, which includes other motor-neuron survival factors. Since MIS and its receptors are expressed in motor neurons, we hypothesized that heightened spinal cord expression of MIS would prolong survival in SOD1 mutated mice. .

Methods:
Adeno-Associated virus serotype 9 was used to deliver Mullerian Inhibiting Substance (AAV9-MIS) as a single intravenous injection at P28 (n=4 with 4 controls), P7 (n=7), or P1 (n=9) into C57/BL6 mice carrying the G93A superoxide dismutase (SOD1) mutation that occurs in 20-25% of patients with familial ALS. Genome copy number was analyzed from liver and brain specimens at disease end point to quantify the presence of vector. Phosphate buffered saline (PBS) was compared to Mullerian Inhibiting Substance for effect on the size and number of motor neurons by both immunohistochemistry and immunofluorescence of spinal cord sections using the motor neuron marker choline acetyltransferase.

Results:
SOD1 mutated mice injected with the AAV9-MIS vector demonstrated a 15 day survival benefit when compared to mice injected with PBS (P28, *p=0.026; P7, *p=0.038; P1, *p=0.013). In addition, endstage AAV9-MIS injected mice showed more robust ChAT staining in the ventral horns of the spinal cord by immunofluorescence (**FIGURE 1A-RED)** when compared to control (**FIGURE 1B-RED)**. Furthermore, AAV9-MIS injected mice demonstrated more axonal staining in the ventral horn of the spinal cord by immunohistochemistry (**FIGURE 1C-PURPLE)** when compared to control (**FIGURE 1D-PURPLE)**.

Conclusion:
The *in vivo* responses produced by virally delivered MIS indicates its use as an effective method for prolonging survival of patients with neurological diseases such as ALS and that neurotropic viral gene therapy may be an efficient mode of delivery of MIS.

Poster Session I (cont.)



Choline Acetyltransferase Expression in Motor Neurons in Anterior Spinal Cord

NOTES:

Poster Session I (cont.)

P11

INTESTINAL *MUSCULARIS PROPRIA* INCREASES IN THICKNESS WITH CORRECTED GESTATIONAL AGE AND IS FOCALLY ATTENUATED IN PATIENTS WITH ISOLATED INTESTINAL PERFORATIONS

Sarah W. Lai, MD FRCSC[1], Weiming Yu, MD, FRCPC[2], Laurie E. Wallace, BSc[1], David L. Sigalet, MD, MSc, PhD, FRCSC, FACS[1].

[1]University of Calgary, Calgary, AB, Canada, [2]Alberta Children's Hospital, Calgary, AB, Canada.

Purpose:
Intestinal perforations are common in premature infants, leading to a diagnostic dilemma between necrotizing enterocolitis and isolated intestinal perforation (IIP). IIP is thought to result from a congenital absence of muscularis propria. However, the antecedent developmental events leading to IIP are not well understood. This study examines the relationship between corrected gestational age (CGA) and intestinal musculature development in normal controls and in patients with IIP.

Methods:
With ethics board approval, specimens from stillbirths and infants undergoing intestinal surgery from 8 to 50 weeks CGA were collected from 2005 to 2012. Nine patients with IIP were identified. Control specimens were collected during 24 fetal autopsies and 47 surgeries for reversal of ileostomies. In each case, 3 sections of ileum were examined histologically for muscularis mucosa (MM), circular muscle (CM) and longitudinal muscle (LM) thickness. Comparisons of CGA and thickness in control and perforated specimens were performed via linear regression analysis and ANOVA.

Results:
Control specimens showed a linear relationship between CGA and thickness of CM up to 242 µm (r^2=0.353) and LM up to 201 µm (r^2=0.341) at 32 weeks CGA, but not with MM. In patients with IIP, CM and LM were significantly thinner in the perforated segments than in adjacent normal segments (CM perforated 62±17 vs. adjacent normal 228±4 µm; LM perforated 60±13 vs. adjacent normal 139±15 µm; mean±SEM; $p<0.001$). No differences were found in MM, CM or LM thickness between controls and the normal segments from patients with IIP.

Conclusion:
Intestinal muscularis propria increases in thickness with corrected gestational age until 32 weeks. Muscle thickness is focally attenuated in patients with isolated intestinal perforations, while the remainder of the intestine is normal, suggesting that primary repair may be an appropriate treatment.

NOTES:

Poster Session I (cont.)

P12

FETAL DERMAL SCAR FORMATION IS CONVERTED TO SCARLESS REGENERATION WITH INTERLEUKIN-10 (IL-10) OVEREXPRESSION

Michael W. Morris, MD[1], Benjamin J. Herdrich, MD[2], Myron Allukian III, MD[2], Robert C. Caskey, MD[2], Carlos Zgheib, PhD[3], Junwang Xu, MD[3], Kenneth W. Liechty, MD[3].

[1]University of Mississippi Medical Center, Jackson, MS, USA, [2]Hospital of the University of Pennsylvania, Philadelphia, PA, USA, [3]Nemours Hospital, Orlando, FL, USA.

Purpose:
We have shown that increased fetal skin wound size results in a transition from scarless regeneration to scar formation and is associated with an increased inflammatory response. Increased high molecular weight hyaluronic acid (HMW-HA) and TGF-β3 are also associated with scarless healing. IL-10 is an anti-inflammatory cytokine that is elevated in the fetus and has been shown to decrease the inflammatory cell response. We hypothesize, that IL-10 overexpression in large fetal wounds will convert the wound healing response from scar formation to scarless regeneration.

Methods:
To test this hypothesis, large (8mm) excisional dermal wounds were created in mid-gestation fetal sheep skin and injected with 109 pfu of a lentivirus containing the IL-10 transgene (n=4) or vehicle as a control (n=4). Wounds were harvested at 30 days and scar formation assessed by gross and histologic evaluation. Gene expression was assessed by Real-time PCR.

Results:
The large vehicle treated wounds demonstrated scar formation by gross and histological examination. In contrast, large wounds treated with lenti-IL-10 demonstrated a lack of scar formation by both gross and histological evaluation. Gene expression analysis demonstrated that this conversion from scar formation to scarless healing was associated with increased expression of IL-10, HAS-1 (the enzyme responsible for producing HWM-HA), and TGF-β3 in the large wounds treated with lenti-IL-10.

Conclusion:
Scar formation following injury of fetal skin occurs if the injury is of sufficient size. Overexpression of the anti-inflammatory cytokine IL-10 results in a change in wound phenotype from scar formation to scarless regeneration and a gene expression profile consistent with tissue regeneration. These results demonstrate the importance of the inflammatory response in mediating the wound healing phenotype and support the use of IL10 or other anti-inflammatory strategies for potential use in the adult to promote scarless healing.

NOTES:

Poster Session I (cont.)

P13

GENERATION OF HUMAN, TRANSGENE-FREE NEURAL PROGENITOR CELLS FOR PERINATAL MYELOMENINGOCELE REPAIR

Guihua Jiang, MS, Luis G. Villa-Diaz, PhD, Paul H. Krebsbach, DDS, PhD, K. Sue O'Shea, PhD, Shaun M. Kunisaki, MD, MSc.
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Purpose:
Fetal surgery has been shown to improve outcomes in selected cases of myelomeningocele (MMC). Nevertheless, affected children continue to incur significant neurologic morbidity, including the inability to ambulate without assistance in the majority of patients. The local delivery of neural progenitor cells (NPCs) at the time of MMC closure has been investigated as a promising adjunctive therapy aimed at promoting neural regeneration within the damaged spinal cord. The purpose of this study was to determine whether human somatic cells obtained by amniocentesis could be reliably reprogrammed into NPCs using a novel, non-integrating, transgene-free approach.

Methods:
With IRB approval, human amniotic fluid samples between 22 and 25 weeks gestation (n=2) were obtained. The amniocytes were isolated and analyzed by flow cytometry prior to reprogramming into induced pluripotent stem (iPS) cells using non-integrating Sendai RNA virus (Life Technologies, Grand Island, NY) expressing Oct4, Sox2, cMyc, and Klf4. The iPS cells were characterized in a feeder-free environment and subsequently differentiated into NPCs under defined conditions.

Results:
Human amniocytes with a predominantly mesenchymal stem cell phenotype were isolated and expanded over a four-week period. Three weeks after cellular reprogramming, iPS cell colonies were identified based on morphological characteristics and alkaline phosphatase staining. Pluripotency was confirmed by immunocytochemistry, gene expression, and tri-lineage differentiation in embryoid bodies. After six passages, loss of the Sendai virus transgene was confirmed by RT-PCR. NPCs with a normal karyotype were successfully derived from iPS cell colonies as shown by the expression of early neuronal markers, including Pax6, Sox2, Sox3, Nestin, TuJ1, and Musashi-1.

Conclusions:
To our knowledge, this is the first investigation to derive human NPCs from second-trimester amniotic fluid using a clinical-grade, integration-free approach. This study supports the feasibility of generating autologous NPCs before birth and sets the stage for further evaluation of their reparative capacity in animal models of MMC repair.

NOTES:

Poster Session I (cont.)

P14

A NOVEL ROLE FOR THE NEURAL CREST IN SPLENIC DEVELOPMENT

Ismail Zaitoun, PhD, Christopher S. Erickson, BS, Joseph F. Pierre, BS, Aaron F. Heneghan, PhD, Amanda J. Barlow, PhD, Miles L. Epstein, PhD, **Ankush Gosain, MD, PhD**.

University of Wisconsin, Madison, WI, USA.

Purpose:
Our ongoing investigation of the mechanisms of Hirschsprung's-Associated Enterocolitis has revealed perturbations in mucosal immunity and a potential role for the neural crest in gut mucosal immune development and function. The purpose of this study was to identify molecular or cellular determinants mediating this alteration.

Methods:
Following IACUC approval, conditional mutagenesis was employed to delete Ednrb (Ednrb-null and -het) from neural crest-derived cells (NCC) and to label NCC with a fluorescent protein (YFP or tdTomato). The migrating NCC wavefront was isolated from E14.5 Ednrb-null and -het embryos, YFP(+) and (-) cells sorted by FACS, and microarray analysis performed to determine differentially-expressed genes. Microarray findings were validated by qPCR. Spleens from Ednrb-null and -het animals were examined at E15-18 and P21 by fluorescence microscopy and immunohistochemistry.

Results:
Microarray analysis demonstrated a number of differentially-expressed pathways, including the B cell receptor (BCR) signaling pathway (Blnk, Cdk6, Plcg1, Plekha1, Stat1, Stat3, Tec), in YFP(-) cells at the E14.5 migrating wavefront, indicating changes in the mesenchyme after loss of Ednrb in NCC. qPCR of P21 Peyer's Patches (PP) confirmed these changes in BCR genes, supporting previous observations of B cell perturbation in Ednrb-nulls. As the spleen is the primary source of PP B cells and we have previously observed altered splenic architecture in Ednrb-nulls, we examined embryonic NCC migration and observed entry of tdTomato-NCC into the spleen between E15-18. At P21 these cells are associated with blood vessels and appear to be astrocyte-like (Sox10+, S-100+, PDGFR-beta-).

Conclusions:
Our results support a novel role for the neural crest in development of splenic architecture and mucosal immunity. These results provide an embryologic basis for our prior post-natal observations on Hirschsprung's-Associated Enterocolitis. The role of neural crest-derived astrocyte-like cells in the splenic inflammatory response remains to be determined.

NOTES:

Poster Session I (cont.)

P15

PRESSURE INDUCED LUNG INJURY IN A NOVEL *IN VITRO* MODEL OF THE ALVEOLAR INTERFACE: PROTECTIVE EFFECT OF DEXAMETHASONE

Divya D. Nalayanda, PhD[1], William B. Fulton[1], Paul M. Colombani, MD, MBA[1], Tza-Huei Wang, PhD[2], Fizan Abdullah, MD, PhD[1].

[1]Johns Hopkins University School of Medicine, Baltimore, MD, USA, [2]Johns Hopkins University, Baltimore, MD, USA.

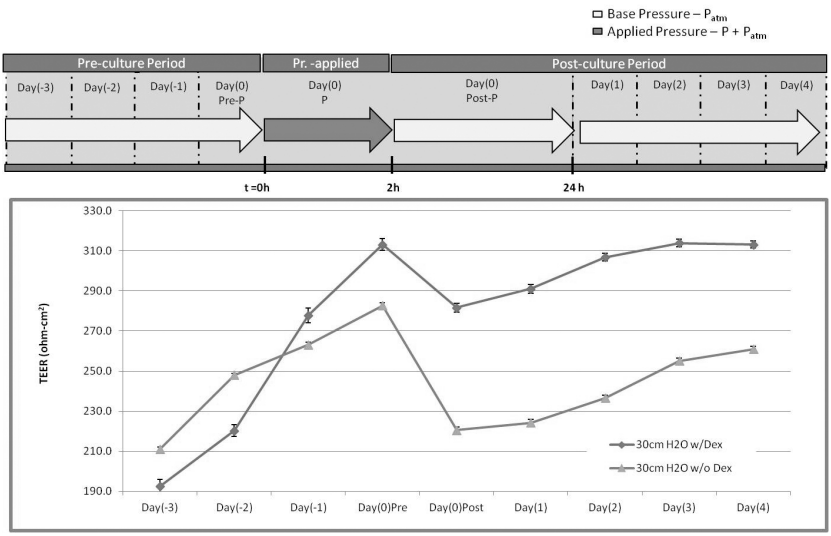
Purpose:
The lungs of newborns born with congenital diaphragmatic hernia suffer from immaturity as well as the short and long term consequences of ventilator-induced lung injury including chronic lung disease. Antenatal and postnatal steroids are among current strategies promoted to treat premature lungs and limit long term morbidity. Although studied in whole-animal models, our understanding of ventilator-induced injury at the alveolar-capillary interface as well as the benefits of steroids remains limited. The present study utilizes a novel multi-fluidic *in vitro* model of the alveolar-interface and demonstrates a dose-response relationship of pressure to lung injury which is ameliorated with the administration of dexamethasone.

Methods:
Human alveolar epithelial cell lines, H441 and A549 (passages 2-8) were cultured in a custom-built chamber under constant aerodynamic shear for 3 days prior to the introduction of pressure stimuli. Varying pressure was applied to cells with and without dexamethasone at 0.1μM concentration. On-chip measurements of transepithelial electrical resistance (TEER) were noted at 24h intervals, in addition to pre- and post- stimuli readings, to track changes to the cellular surface. Fluorescent images for live-dead cell assay were acquired prior and post the stress stimuli to ascertain cellular viability.

Results:
Pressure-exposed alveolar cultures of H441 (figure) and A549 (not shown) demonstrated a dose-response relationship with increasing pressure being associated inversely with TEER values. Addition of dexamethasone resulted in increased alveolar layer integrity as demonstrated by higher TEER values. Furthermore, dexamethasone-treated cells exhibited faster recovery and the effects of pressure were mitigated in both cell types.

Conclusion:
Using a novel *in vitro* model of the gas-exchange interface, we demonstrate for the first time a dose-response relationship between the application of pressure and loss of alveolar cell layer integrity. This effect was shown to be alleviated by the addition of dexamethasone with a faster recovery time in both cell types.

Poster Session I (cont.)



NOTES:

Poster Session II

Poster Session II
Clinical Science
Thursday, May 2, 4:30 p.m. – 6:15 p.m.

P16

PULMONARY SUPPORT ON HOSPITAL DAY-30 AS A PREDICTOR OF LONG-TERM MORBIDITY IN CONGENITAL DIAPHRAGMATIC HERNIA SURVIVORS

Ryan P. Cauley, MD, Nora M. Fullington, MD, Kristina Potanos, MD, Jonathan Finkelstein, MD, MPH, Dionne Graham, PhD, Ronald Becker, MD, Catherine Sheils, MD, Virginia Kharasch, MD, Charles J. Smithers, MD, MPH, Thomas Jaksic, MD, PhD, Terry Buchmiller, MD, Jay M. Wilson, MD.
Boston Children's Hospital, Boston, MA, USA.

Purpose:
Oxygen supplementation on hospital day-30 has been shown to be a strong predictor of oxygen-needs at discharge and in-hospital mortality in Congenital Diaphragmatic Hernia (CDH). We hypothesized that pulmonary support on hospital day-30 can also predict long-term pulmonary and neuro-developmental outcomes in CDH survivors.

Methods:
We analyzed the records of 145 CDH survivors treated at a single academic medical center between 1995 and 2006. Follow-up was 86.9% and 70.3% at 1 and 5 years respectively. Pulmonary support was defined as: (1) invasive support (ventilator or extracorporeal oxygenation, n=30), (2) noninvasive support (nasal cannula/CPAP, n=32), or (3) room air (RA, n=83). Logistic regression was used to estimate the defect-size adjusted association of pulmonary support on day-30 with pulmonary and developmental outcomes at 1 and 5 years.

Results:
On univariate analysis, more invasive pulmonary support at day-30 was associated with significantly greater pulmonary and developmental morbidities at 1 and 5 years (Table-1). Pulmonary support on day-30 was associated with a significantly increased odds of steroid use and developmental delays at 1-year and inhaler-dependent asthma and developmental delays at 5-years even after adjusting for defect-size (Table-2).

Conclusions:
CDH survivors continue to have significant long-term pulmonary and developmental morbidities. The level of pulmonary support on day-30 is a strong independent predictor of pulmonary and developmental outcome at 1 and 5 years and may be used as a simple prognostic indicator for identification of high-risk infants.

Poster Session II (cont.)

Table 1. Risks and Long-term outcomes in CDH survivors by pulmonary support on hospital day 30.

Risk Factors:	Invasive Pulmonary Support on Day-30 (n=30) N (%)	Noninvasive Pulmonary Support on Day-30 (n=32) N (%)	Room Air on Day-30 (n=83) N (%)	p-value
Birthweight, kilograms Median (IQR)	3.1 (2.8-3.6)	3.2 (2.9-3.4)	3.3 (2.8-3.6)	.64
ECMO Required	18 (60.0)	19 (59.4)	3 (3.6)	<.001*
Patch Repair	25 (86.2)	24 (75.0)	14 (17.7)	<.001*
Defect Size Small/Medium Large/Agenesis	3 (12.5.0) 21 (87.5)	6 (20.7) 23 (79.3)	56 (73.7) 20 (26.3)	<.001*
Long-Term Outcomes:				
One Year: -Inhaler Use -Steroids -On Diuretics -On Oxygen -Developmental Delay Referral	 20 (76.9) 13 (50.0) 17 (65.4) 13 (50.0) 17 (65.4)	 13 (46.4) 9 (32.1) 12 (42.9) 5 (17.9) 14 (50.0)	 22 (30.6) 15 (20.8) 5 (6.9) 2 (2.8) 12 (16.7)	 <.001* .02* <.001* <.001* <.001*
Five Years: -Dx of Asthma -Inhaler Use -Steroids -Developmental Delay Referral	 9 (40.9) 13 (59.1) 9 (40.9) 11 (50.0)	 16 (66.7) 18 (75.0) 12 (50.0) 15 (62.5)	 17 (30.4) 22 (39.3) 13 (24.1) 15 (26.8)	 .01* .01* .05* .006*
Deaths after Initial Hospitalization	2 (6.7)	0 (0.0)	0 (0.0)	.09

Poster Session II (cont.)

Table 2. Logistic regression analysis adjusted for defect size and pulmonary support on day-30						
	Steroid UseAt 1 Year		Asthma + InhalerAt 5 Years		Referral for Developmental DelaysAt 5 Years	
Variable	Odds Ratio (95%CI)	p-value	Odds Ratio 95%CI)	p-value	Odds Ratio (95%CI)	p-value
Defect Size: A/B (Small/Medium) C/D (Large/ Agenesis)	1.01.2 (.5-3.4)	Ref..66	1.01.3 (.5-3.5)	Ref..62	1.0.9 (.3-2.6)	Ref..88
Pulmonary Support on Day-30-Invasive Support-Noninvasive Support-Room Air	3.4 (1.1-11.2)1.8 (.6-5.4)1.0	03.32 Ref.	1.3 (.4-4.4)3.8 (1.2-12.7)1.0	.69.02 Ref.	2.9 (.8-10.5) 4.5 (1.4-15.5) 1.0	.09.01 Ref.

NOTES:

Poster Session II (cont.)

P17

PREDICTORS OF FAILURE IN THE NON-OPERATIVE MANAGEMENT OF PEDIATRIC PERFORATED APPENDICITIS

Lauren B. Nosanov, BA[1], Irene T. Ma, MD[2], **Kristina J. DeMaster, BS**[1], Obi Okoye, MD[3], Allison L. Speer, MD[3], Jeffrey S. Upperman, MD[4], Henri R. Ford, MD, MHA[4], James R. Pierce, MD[4].

[1]University of Southern California Keck School of Medicine, Los Angeles, CA, USA, [2]Department of Surgery, Mayo Clinic, Scottsdale, AZ, USA, [3]Department of Surgery, Los Angeles County + University of Southern California, Los Angeles, CA, USA, [4]Department of Pediatric Surgery, Children's Hospital Los Angeles, Los Angeles, CA, USA.

Purpose:
Prior studies have compared the relative benefits of initial non-operative management with interval appendectomy and early appendectomy for children with complicated appendicitis. However, factors that contribute to the success of non-operative management remain poorly understood. The purpose of this study was to delineate predictors of failure in non-operative therapy in order to improve guidelines for initial management.

Methods:
Following IRB approval (CCI-10-00068), a single-center retrospective review was performed for all children with complicated appendicitis between 2004-2010. Patients who underwent initial non-operative management were identified, and data were collected regarding demographics, pre-operative presentation, treatment parameters, and clinical outcomes. All patients treated non-operatively received IV antibiotics and underwent percutaneous abscess drainage by Interventional Radiology where appropriate. Treatment failure was defined as lack of clinical improvement warranting operative intervention prior to the anticipated interval appendectomy. Variables significant on univariate analysis ($p \leq .2$) were entered in a stepwise multivariate logistic regression to determine independent predictors of failed non-operative management ($p \leq .05$).

Results:
Of 1532 patients with complicated appendicitis, 142 were treated non-operatively. 92 had abscess on initial CT and 64 underwent drainage. The failure rate was 19%. Elevated neutrophil count, bandemia, and absence of abscess on CT were significant on univariate analysis. Additionally, age, WBC count, BMI, nausea, vomiting, and dysuria were included in the multivariate analysis. Bandemia, absence of abscess on CT, and young age were identified as independent predictors of failure.

Conclusion:
This is the largest study to date to evaluate independent predictors of failure of non-operative management for complicated pediatric appendicitis. Our data suggest that patients with bandemia, absence of abscess on CT and young age should

Poster Session II (cont.)

undergo early appendectomy, due to the increased likelihood of failure of non-operative therapy. By restricting use of non-operative management to patients more likely to succeed, it may be possible to improve clinical outcome parameters.

NOTES:

Poster Session II (cont.)

P18

NON-ENDOSCOPIC IMAGE-GUIDED HYDROSTATIC BALLOON ESOPHAGEAL DILATION IN *EPIDERMOLYSIS BULLOSA* PATIENTS IN A NATIONAL REFERRAL CENTER IN THE USA

Beth Rymeski, DO, John Racadio, MD, Neil Johnson, MD, Michael Farrell, MD, Anne Lucky, MD, Richard Azizkhan, MD.

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

Purpose:
To review our Epidermolysis Bullosa (EB) Center perioperative experience with fluoroscopic guided hydrostatic balloon dilation (HBD) of esophageal strictures in EB patients to document complications and outcomes in these medically fragile and complex patients.

Methods:
IRB approved (#2012-0168) retrospective review of the electronic medical records and patient charts of 73 EB patients who have undergone HBD at our institution. 72 had complete evaluable records.

Results:
72 patients had 356 HBD (1998-2012). The median procedure number/patient was 3 (range 1-28, SD+/- 5.6). The number of strictures treated per procedure ranged from 1-5: 116 procedures were for 1 stricture, 240 for 2 or more strictures. The most common patterns of stricture locations were cervical esophagus only (n=123, 34.5%), cervical and mid esophagus (n=116, 32.5%), and cervical, mid, and distal esophagus (n=78, 22%). The force required to efface the strictures ranged from 1-5 atmospheres (mean 2.0, SD+/-0.47). The time between dilations ranged from 8-3309 days with a mean of 208 days (SD+/-161). 30 patients (42%) had gastrostomy tubes and half had one or more retrograde dilations performed via the gastrostomy site. Three required novel strategies to traverse the extremely tight strictures. Although there was no perioperative mortality, anesthetic complications occurred in 2 patients (0.56%), including one patient who suffered a cardiac arrest on anesthesia induction. 1 patient experienced a contained intramural esophageal perforation that was managed non-operatively. 1 patient had an obliterated esophageal lumen that was not accessible from ante- or retrograde approaches.

Conclusions:
Non -endoscopic fluoroscopic HBD is a safe and effective means of managing esophageal strictures in EB patients. This is the procedure of choice to maintain esophageal continuity and function in these patients. While complication rates of these procedures are low, attention to peri-operative management of these complicated patients is essential with standardized protocols and an experienced team.

NOTES:

Poster Session II (cont.)

P19

A MULTIVARIATE ANALYSIS OF CLINICAL CHARACTERISTICS AND STAGING SYSTEMS, INCLUDING POST-TEXT STAGING, AS PROGNOSTIC FACTORS IN HEPATOBLASTOMA

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Purpose:
Several hepatoblastoma staging systems, including pretreatment extent of disease (PRETEXT), post-treatment extent of disease (POST-TEXT), and staging classifications of the Children's Oncology Group (COG) and the American Joint Committee on Cancer (AJCC), have been used to stratify patients and predict survival. We analyzed our institutional hepatoblastoma database to determine the independent predictive effect of clinical variables and these four staging systems on disease-specific survival.

Methods:
After obtaining an IRB waiver, we retrospectively reviewed the records of patients treated for hepatoblastoma at our institution from 1980 through June 2012. Variables that correlated with survival were identified in univariate analysis using Kaplan-Meier distributions and log-rank testing and were then compared using the Cox proportional hazards model for independent predictive effects. The analytical endpoint was overall disease-specific survival. The predictive value of each staging system was computed using the concordance probability estimate.

Results:
We identified 61 patients with a median age at diagnosis of 1.4 years and median follow-up of 3.1 years. Twelve patients (20%) died from progressive disease. Overall 5-year survival was 76% for all patients and 84% for patients in low-risk categories. There was no correlation between POST-TEXT stage and complete (R0) resection. The results of the univariate analysis are presented in the Table. PRETEXT ($p=0.003$), COG ($p=0.005$), and AJCC ($p=0.02$) staging effectively stratified prognostic risk, but POST-TEXT ($p=0.36$) did not. On multivariate analysis, only PRETEXT stage independently correlated with survival ($p<0.003$).

Conclusion:
Although multiple variables influence outcome in hepatoblastoma, PRETEXT staging provides the most complete prognostic information and risk stratification and should be used in future protocols. POST-TEXT stage did not correlate with R0 resection or survival.

Poster Session II (cont.)

TABLE. Univariate analysis of clinical variables and staging systems	
VARIABLE	p VALUE
R0 resection	<0.0001
Multifocality	<0.005
Metastases at diagnosis	<0.0001
Tumor size >10 cm	Not significant
AJCC stage	<0.005
COG stage	<0.001
PRETEXT (N=47)	<0.002
POST-TEXT (N=33)	Not significant

NOTES:

Poster Session II (cont.)

P20

A REVIEW OF 218 PEDIATRIC CASES OF HEPATOCELLULAR CARCINOMA

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Purpose:
The aim of this study was to define current incidence trends and outcomes for children with hepatocellular carcinoma (HCC) and evaluate for factors predictive of survival.

Methods:
The Surveillance, Epidemiology, and End Results registry was queried from 1973 to 2009 for all patients with HCC younger than 20 years of age.

Results:
Overall, 218 patients were identified. The annual age-adjusted incidence was 0.49 cases per million in 2009. HCCs were more frequent in boys, with a M/F ratio of 1.37. The majority of tumors were seen in children >10y (76%) and the highest incidence was among adolescents (0.8 per million). Tumors were also more commonly seen in Caucasian (73%) and non-Hispanic (82%) patients. The most common histologic subtype was usual variant (73%) followed by fibrolamellar (25%). Fibrolamellar subtype tumors were exclusive to children >5y. 10-yr survival was better for fibrolamellar compared to usual subtype (65% vs. 25% respectively, p=0.001). Tumor extirpation for patients with resectable disease significantly improved overall survival at 5 years compared to no surgery (60% vs. 0% respectively, p<0.0001). Overall 5, 15 and 25-year survival for the entire cohort was 24%, 23% and 8%, respectively. Multivariate analysis identified surgical resection (HR 0.18 95%CI: 0.12 - 0.29; p<0.0001), Hispanic ethnicity (HR 0.52 95%CI: 0.33 - 0.85, p=0.009), and local disease at presentation (HR 0.46 95%CI: 0.27 - 0.80, p=0.006) as independent prognostic factors of survival.

Conclusion:
The incidence of hepatocellular carcinomas has remained relatively stable. Surgical resection for curative intent dramatically improves outcomes. Children of Hispanic ethnicity with hepatocellular carcinoma have lower mortality rates.

NOTES:

Poster Session II (cont.)

P21

IS COMPLETE VACTERL EVALUATION NEEDED IN NEWBORNS WITH RECTOPERINEAL FISTULA?

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Purpose:
Given that anorectal defects with rectoperineal fistula are developmentally the most mature in the spectrum of imperforate anus lesions, it is not clear whether these merit a complete VACTERL evaluation. These evaluations are variably performed by pediatric surgeons. We sought to determine if the same evaluation is required to rule out associated anomalies in newborns with rectoperineal fistula as those with more complex anorectal malformations.

Methods:
A retrospective review was performed of the pediatric colorectal center database at our tertiary care children's hospital (2000-2011). All patients with anorectal malformations were categorized as rectoperineal fistula or "other". Patients in which the specific type of anorectal malformation could not be determined from the records were placed into the "other" group.

Results:
308 patients were treated at our institution during the time period (rectoperineal fistula=95, others=213). Sixty patients with rectoperineal fistula were male. The frequency of associated malformations is presented in the table. Abnormal evaluation includes 95% confidence interval based on only the proportion of patients who were evaluated. Prior to initiation of our colorectal center evaluations were variable in rectoperineal patients. Evaluations for cardiac, genitourinary, sacral and spinal cord abnormalities were incomplete in 33%, 22%, 47% and 45% of rectoperineal patients respectively.

Conclusion:
Our review demonstrates that newborns with a rectoperineal fistula frequently have associated anomalies and should undergo a thorough evaluation similar to those with more complex lesions. These associated malformations may be even more common than demonstrated in our series given the significant number of patients who were incompletely evaluated. These findings illustrate the importance of a structured approach to the evaluation of even the most straightforward lesions.

Poster Session II (cont.)

Table: Extent and results of VACTERL evaluations. Table shows number of overall sample (n=95).			
Associated Anomaly	Abnormal Evaluation (95% CI)	Normal evaluation	Not evaluated
Structural Cardiac	20 (21-41%)	44	31
Genitourinary	24 (23-44%)	50	21
Sacrum	15 (19-44%)	35	45
Tethered cord	8 (8-28%)	44	43

NOTES:

Poster Session II (cont.)

P22

VESICOURETERAL REFLUX AND FEBRILE URINARY TRACT INFECTIONS IN ANORECTAL MALFORMATIONS: A RETROSPECTIVE REVIEW

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Purpose:
Multiple studies document a correlation between anorectal malfromations (ARM) and vesicoureteral reflux (VUR), VUR and urinary tract infections (UTI), and UTI's and renal disease. We aimed to determine which characteristics in ARM patients are associated with VUR and/or UTI diagnoses to better define who would benefit from voiding cystourethrogram (VCUG) testing and/or UTI prophylactic antibiosis.

Methods:
A retrospective review of ARM patients at a free-standing children's hospital from January, 1996 to December, 2011 was performed. Main patient variables included ARM classification and presence and type of co-morbid diagnoses. Simple and multivariable logistic regression was used to investigate the associations between VUR and UTI and the collected variables. Statistical significance was set at p=0.05.

Results:
190 patients were included in this study. Of them, 133 (70%) had a VCUG performed during their index admission and 41 (31%) received a diagnosis of VUR. 31 of the 190 patients had at least one febrile UTI (16%). Of these, only 14 (45%) had a diagnosis of VUR. On simple logistic regression, spina bifida (p=0.044), ectopic kidney (p=0.004), and genitourinary (GU) malformations (p=0.002) were associated with having VUR. On multivariable regression, only ectopic kidney remained associated with VUR (p=0.026). VUR (p=0.001) and a concurrent GU malformation (p=0.004) were the only variables associated with a UTI diagnosis on simple logistic regression. Controlling for VUR, the presence of GU malformations (p=0.073) remained the closest variable associated with developing a UTI.

Conclusions:
In ARM patients, VUR is associated with the presence of GU and other caudal abnormalities. UTI in these patients is both related to VUR and the presence of GU malformations. Thus, VCUG testing on ARM patients should be pursued when there are other caudal and GU abnormalities, regardless of fistula location. Antibiotic prophylaxis for UTI should be considered in children with ARM and any GU malformation, not only VUR.

NOTES:

Poster Session II (cont.)

P23

RATE OF LUNG GROWTH PREDICTS OUTCOME IN CONGENITAL DIAPHRAGMATIC HERNIA

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Purpose:
To study the rate of lung growth in prediction of outcome in congenital diaphragmatic hernia (CDH).

Methods:
A retrospective review of all CDH patients (n=171) between June 2004 and July 2012 was conducted. Singleton patients with isolated left CDH, 2 fetal MRI (obtained at initial evaluation and late gestational (GA)), and postnatal data were selected (n=44). Total lung volume (TLV) and percent predicted lung volume (PPLV) were measured by MRI. Rate of lung growth (LG/Δt) was defined as $[TLV_{late}-TLV_{initial}]/[GA_{late}-GA_{initial}]$. Change in PPLV over time (ΔPPLV/Δt) was defined as $[PPLV_{late}-PPLV_{initial}]/[GA_{late}-GA_{initial}]$. Variables were compared to outcome measures of survival, ECMO use, length of stay (LOS), and length of mechanical ventilation. Analysis was performed using t-test, Spearman correlation, and receiver operator characteristics (ROC).

Results:
Patients who survived had significantly higher TLV_{late}, higher $PPLV_{late}$, better lung growth and smaller ΔPPLV/Δt. Those who required ECMO had significantly lower TLV_{late}, $PPLV_{late}$, less lung growth and larger ΔPPLV/Δt (table). $PPLV_{late}$ and TLV_{late} correlated significantly with days of mechanical ventilation (r=-0.543, p=0.006 and r=-0.595, p=0.002 respectively), while only TLV_{late} was significantly correlated with LOS (r=-0.4157, p=0.0485).

Conclusion:
The rate of lung growth as determined by fetal MRI appears to be prognostic of outcomes. With further studies, this data could be used to stratify patients into risk categories and guide counseling.

Poster Session II (cont.)

Table 1.						
	Survivor (mean±SEM)	Death (mean±SEM)	Area under the Curve (p-value)	No ECMO (mean±SEM)	ECMO (mean±SEM)	Area under the Curve (p-value)
$TLV_{initial}$ (ml)	11.07±1.210	10.70±1.040		12.07±1.298	9.725±0.909	
TLV_{late} (ml)	29.66±2.261*	20.59±1.850	0.744 (0.006*)	30.15±2.166*	20.93±2.037	0.765 (0.003*)
Lung Growth (ml/week)	2.022±0.228*	1.144±0.148	0.738 (0.007*)	2.080±0.226*	1.165±0.167	0.773 (0.002*)
$PPLV_{initial}$ (%)	23.65±1.716	21.86±1.604		22.37±1.543	23.30±1.818	
$PPLV_{late}$ (%)	19.08±1.298*	13.36±1.053	0.731 (0.009*)	19.24±1.356*	13.72±1.063	0.743 (0.006*)
$\Delta PPLV/\Delta t$ (%/week)	-0.387±0.149*	-0.921±0.155	0.729 (0.010*)	-0.278±0.118*	-0.981±0.165	0.775 (0.002*)

*p-value<0.05 is significant

NOTES:

Poster Session II (cont.)

P24

UROLOGIC AND GASTROINTESTINAL COMPLICATIONS OF SACROCOCCYGEAL TERATOMAS: PRENATAL AND POSTNATAL PREDICTORS

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Purpose:
Gastrointestinal (GI) and urologic sequalae are observed in long-term survivors of sacrococcygeal teratoma (SCT). In this study we evaluate the incidence and predictors of GI and urologic complications in SCT.

Methods:
A retrospective review was performed for all SCT patients who underwent resection at a single institution between 2000-2012. Enrollment criteria included a minimum of 6 months follow-up. Categorical variables were analyzed by Fisher's exact test and continuous variables by Student's unpaired t-test ($p<0.05$).

Results:
51 patients were studied. SCT resection was accomplished by definitive postnatal resection following either open fetal debulking (n=3), EXIT with debulking (n=1), or planned early delivery with immediate debulking (n=3) in 7 patients and primary postnatal definitive resection in 44 patients. Additional procedures included perineal reconstruction (PSARP, anoplasty or vaginoplasty, n=1 respectively), and excision of recurrent SCT after initial definitive resection (n=3). GI complications occurred in 28%, including severe chronic constipation (n=8) and fecal incontinence (n=4). Urologic complications occurred in 31%, including frequent UTIs (n=6), neurogenic bladder (n=11), urogenital sinus (n=1), and urinary incontinence (n=6). Prenatal imaging by fetal MRI demonstrated mass effect with obstruction of the bowel (n=2) or bladder and collecting system (n=7) in a subset of patients with postnatal complications (GI 2/2, PPV 100%; urologic 5/7, PPV 63%). Postnatal complications were not associated with gender, gestational age, timing of SCT resection, or tumor pathology. GI and urologic complications were associated with Altman stage greater than 1 ($p=0.004$), perineal reconstruction ($p=0.041$), increased length of NICU admission ($p=0.001$), and resection of recurrent SCT ($p=0.041$). No GI or urologic complications occurred in patients with Altman stage I tumors.

Conclusions:
Urologic and GI complications are common in patients with SCT. Higher Altman classification and prenatal imaging suggestive of GI or urologic obstruction should prompt focused prenatal counseling and postnatal screening for GI and urologic dysfunction.

NOTES:

Poster Session II (cont.)

P25

MATERNAL MEDICAL AND BEHAVIORAL RISK FACTORS FOR CONGENITAL DIAPHRAGMATIC HERNIA

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Purpose:
Maternal factors contributing to the etiology of congenital diaphragmatic hernia (CDH) remain unclear. We hypothesized that specific maternal medical conditions (chronic hypertension, pregestational diabetes) and behaviors (smoking, alcohol use) would be associated with the risk of CDH.

Methods:
We conducted a population-based case-control study using Washington State birth certificates linked to hospital discharge records. Among all infants born between 1987 and 2009, 492 CDH cases were identified by ICD-9 codes. Controls were randomly chosen among infants born without any major gastrointestinal anomaly. Demographic and clinical characteristics, as well as maternal status for the exposures of interest, were extracted from birth certificate data. Logistic regression was used to adjust for covariates. $P<0.05$ was considered statistically significant.

Results:
Overall incidence was 2.74 CDH cases per 10,000 births. Cases and controls were generally similar regarding demographics, although CDH infants were more likely to be male than controls (58.5% vs. 51.3%) and mothers of CDH infants were more likely to have body mass index (BMI) >30 (25.4% vs. 19.0%). Each of the exposures of interest was more common among mothers with CDH infants than among control mothers. In univariate analysis, alcohol use, hypertension, and pregestational diabetes were each significantly associated with the outcome. After multivariate adjustment, only alcohol use (OR=2.81, p=0.02) and pregestational diabetes (OR=8.11, p=0.001) maintained significance. Maternal smoking was not significantly associated with CDH, even after accounting for number of cigarettes smoked per day.

Conclusions:
Maternal pregestational diabetes and alcohol use were significantly associated with increased risk of CDH in infants. These are important modifiable risk factors to consider with regard to efforts seeking to impact the incidence of CDH.

Poster Session II (cont.)

Odds ratios for exposures of interest, adjusted for infant gender, maternal age, race, parity, BMI			
	Odds Ratio	95% C.I.	p-value
SMOKING	1.03	0.61-1.75	0.907
ALCOHOL USE	2.81	1.19-6.64	0.019
CHRONIC HYPERTENSION	1.66	0.39-7.08	0.491
PREGESTATIONAL DIABETES	8.11	2.34-28.07	0.001

NOTES:

Poster Session II (cont.)

P26

INFANT CAR SAFETY SEAT DESIGN AND RISK OF HEAD INJURY

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Purpose:
We have observed a high incidence of shaken baby-like traumatic brain injuries (TBI) in properly restrained infants involved in high speed motor vehicle crashes (MVCs). We hypothesized that car safety seats (CSS) are not adequately protecting infants from TBI.

Methods:
A retrospective review of infants <1 year old who were properly restrained or improperly/unrestrained passengers in MVCs was conducted. Crash data from our state Department of Transportation (DOT) (n=833, 2007-2011) was queried. We also evaluated data from our state Department of Public Health (DPH) of infants who presented to a level I, II, or III trauma center after MVC (n=152, 2000-2011). Data analysis was performed using student's t-test with significance set at $p<0.05$, and odds ratio (OR) with 95% confidence intervals.

Results:
DOT data revealed that 788/833 (94.6%) infants involved in MVCs were properly restrained and positioned in a CSS. DPH data showed that 95/152 (62.5%) infants who presented to a trauma center after MVC were properly restrained in a CSS. TBI was diagnosed in 99/152 (65.1%) infants. Of infants with TBI, 60/99 (60.6%) were properly restrained, with an average Injury Severity Score (ISS) of 18.23 and average head Abbreviated Injury Score (AIS) of 3.07. By comparison, there were 39/99 (39.4%) infants who were improperly/unrestrained, with average ISS of 16.64 and average head AIS of 3.64. ISS and head AIS of properly restrained and improperly/unrestrained infants with TBI were statistically similar ($p>0.05$). A properly restrained infant evaluated at a trauma center after MVC was equally likely to be diagnosed with TBI as an improperly/unrestrained infant (OR=0.79, CI 95% 0.39-1.59).

Conclusion:
The incidence and severity of traumatic brain injury in infants evaluated at a trauma center after a motor vehicle crash are similar in properly restrained and improperly/unrestrained infants. These results question the effectiveness of current infant car safety seat design.

NOTES:

Poster Session II (cont.)

P27

VALIDATION OF THE TRAUMA MORTALITY PREDICTION MODEL IN PEDIATRIC PATIENTS

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Purpose:
Researchers are constantly challenged to identify mortality risk adjustment methodologies that perform accurately in pediatric patients. This study evaluated the new Trauma Mortality Prediction Model (TMPM) in pediatric trauma patients.

Methods:
2010 annual National Trauma Data Bank data on pediatric patients (< 18 years) were analyzed (N=113,794). Patients with missing age, discharge status or Injury Severity Score (ISS) were excluded. The TMPM model was applied using Stata 12.0 software using ICD9 codes. Accuracy in predicting mortality was compared between TMPM and ISS by area under the receiver operator characteristic curve (ROC). Subgroup analyses compared methods by injury severity, age, and blunt vs penetrating. Valid comparisons are shown across rows for ROCs. ROC > 0.90 is excellent, 0.80-0.89 is good. This analysis is included in the Injury Research Centers exempt protocol for existing data.

Results:
ROC for TMPM was superior in every category; demonstrating excellent accuracy in predicting mortality. The mortality rate was slightly low in most categories, possibly reflecting missing data on deaths; however, this is the largest dataset of pediatric trauma patients. TMPM showed excellent performance in age subgroup analyses; the ROC for TMPM being .5 higher in the younger patients and .3 higher than ISS in the oldest group. The largest improvement over ISS was demonstrated in the least severely injured patients.

Conclusions:
TMPM demonstrated excellent accuracy across all age groups. TMPM shows promise of a much needed, simple risk adjustment tool with application to both adult and pediatric patients. Researchers should continue to validate this tool in robust pediatric datasets.

Poster Session II (cont.)

ROC for TMPM Compared to ISS for Accuracy in Predicting Mortality			
Patient Subgroups	TMPM ROC	ISS ROC	% Mortality
All patients	0.96	0.93	1.00
ISS > 15	0.85	0.80	7.02
ISS < 15	0.88	0.77	0.08
Age < 5	0.96	0.91	1.19
Age 5-10	0.97	0.96	0.43
Age 11-17	0.96	0.93	1.14
Blunt Injury	0.97	0.94	0.7
Penetrating Injury	0.96	0.92	3.1

NOTES:

Poster Session II (cont.)

P28

ARE CT SCANS OBTAINED AT REFERRING INSTITUTIONS JUSTIFIED PRIOR TO TRANSFER TO A PEDIATRIC TRAUMA CENTER?

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Purpose:
Computed Tomography (CT) imaging has been used with increasing frequency in the evaluation of pediatric trauma patients. Referring institutions often use CT scans for the evaluation of injuries in these patients, ostensibly to determine the necessity for transfer to a pediatric trauma center. We evaluated a cohort of pediatric trauma patients who received CT scans at referring institutions to determine whether state guidelines for stabilization and immediate transfer to a pediatric trauma center without pre-transfer CT imaging were met.

Methods:
This was a 3-year retrospective cohort study completed at our level 1 pediatric trauma center. Pediatric trauma patients who had CT imaging at referring institutions were classified according to whether state criteria were met for immediate transfer. Demographic data and injury profile characteristics were abstracted from patient medical records and our pediatric trauma registry.

Results:
A total of 262 patients with 413 CT scans were reviewed from 2008-2011 and 244 (59%) of those CT scans were negative for any injury. Of the 138 patients 10 years of age or younger, 63 (45%) had negative CT scans. 172 patients scanned (66%, 95% CI: 60%, 71%) met criteria for immediate transfer to a pediatric trauma center with 143 of those patients (83%) having injuries that required a higher level of care. GCS score <14 (45%) was the most common requirement for transfer and CT scan of the head was the most frequent scan obtained (53%).

Conclusion:
The majority of pediatric trauma patients were subjected to CT scans at referring institutions despite meeting statewide trauma guidelines for stabilization and immediate transfer to a pediatric trauma center without any CT imaging. Furthermore, the majority of pre-transfer CT scans were negative and provided no clinical benefit in determining the need for transfer.

NOTES:

Poster Session II (cont.)

P29

IMPACT OF A CHECKLIST ON ATLS TASK PERFORMANCE DURING PEDIATRIC TRAUMA RESUSCITATION

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Purpose:
Although Advanced Trauma Life Support (ATLS) improves outcomes related to trauma resuscitation, deviations from the protocol are common. Other medical domains have used checklists to increase protocol adherence and improve outcomes. In our previous work, a checklist was developed for pediatric trauma resuscitation and found to improve compliance with ATLS tasks during simulated resuscitations. The purpose of this study was to evaluate the impact of a pediatric trauma resuscitation checklist on the frequency and timing of ATLS task completion in clinical practice.

Methods:
Data was prospectively collected for trauma resuscitations of injured children during two 15-week periods before (n=187) and after (n=166) trauma checklist implementation. Video-recordings of resuscitations were reviewed for time to completion of specific ATLS primary (n=14) and secondary (n=15) survey tasks. The frequency of and mean time to completion of tasks were calculated for each cohort. Differences were calculated using Pearson's chi-square and Student's t-test.

Results:
The mean number of primary, secondary, and overall tasks completed was higher ($p<0.001$, all) in the post-implementation period. Oxygen administration (42.3% vs. 70.0%, $p<0.001$), evaluation of pulses (85.6% vs. 94.0%, $p=0.01$), clothing removal (78.6 vs. 89.2%, $p=0.008$), and eight secondary survey tasks ($p<0.005$, all) were all completed more frequently. The time required for task completion improved for vital sign measurements (temperature, heart rate, respiratory rate, and oxygen saturation; $p<0.006$, all). No tasks were completed less frequently after checklist implementation, and only time to assessment of Glasgow Coma Scale was slower (2.4 vs. 2.8 min, $p=0.03$). The average resuscitation time was similar in each cohort (25.8 minutes for both). No differences were observed in event or patient characteristics between cohorts, including activation level, team composition, and number of high-acuity patients requiring life-saving interventions.

Conclusions:
Use of a checklist during pediatric trauma resuscitation significantly improves ATLS task completion without increasing resuscitation duration.

NOTES:

Poster Session II (cont.)

P30

UTILITY OF REPEAT CRANIAL IMAGING IN HEAD INJURED CHILDREN

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Purpose:
Nearly 500,000 children suffer traumatic brain injury (TBI) annually in the United States. Serial head computed tomography (CT) has been proposed as a means to detect evolving brain injury, but its clinical value must be weighed against the economic cost and the risk of radiation exposure. We therefore evaluated the yield of repeat cranial imaging in head injured children.

Methods:
The trauma registry and patient records were reviewed from 2004 to 2008 at a level I pediatric trauma center. We included all pediatric trauma patients (<18 years old) who received at least one head CT.

Results:
819 patients were identified, with a mean age of 7 years. We excluded 24 patients who had surgery prior to second CT. Of the remaining 792 patients, 285 (36%) had repeat CT scan. The median time to second CT was 15 hours. Patients who were transferred from another hospital were nearly twice as likely to get a repeat scan (52% v. 23%, $p<0.001$). 191 repeat scans showed stable or improved findings (67%). Of the 92 patients with worse findings, 18 (22%) underwent subsequent cranial surgical intervention. An additional 14 patients underwent surgery after improved or stable findings; however, it is unlikely that the additional imaging prompted operative intervention in these patients. Overall, 6.4% of repeat scans had findings which may have prompted surgical intervention. A subgroup analysis showed significantly more operations after repeat imaging in patients with intracranial hemorrhages compared to those with normal findings or isolated fractures on initial imaging (10.2% v. 0.9%, $p=0.02$).

Conclusions:
Our results suggest that unselected serial head computed tomography in head injured children results in a low likelihood of surgical intervention. Patients with intracranial hemorrhages may benefit from repeat imaging, but additional evaluations are necessary to better identify the sub-group of children in which it is of the highest yield.

NOTES:

Poster Session II (cont.)

P31

RADIATION EXPOSURE FROM COMPUTED TOMOGRAPHY FOR THE INITIAL EVALUATION OF TRAUMA AT NON-PEDIATRIC FACILITIES: A MATCHED COMPARATIVE STUDY

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Purpose:
Computed tomography (CT) imaging is an important diagnostic tool in the evaluation of injured children. However, it is a potentially significant source of radiation that may result in malignancy development over time. We hypothesize that children treated initially at a referral facility (RF) before transfer to a pediatric trauma center (PTC) would have an increased radiation exposure as compared to those treated solely at the PTC.

Methods:
Patients younger than 18 years who received a CT scan within the first 24 hours of admission to our PTC from January 1, 2005, to April 30, 2011, were eligible for inclusion. Patients treated solely at the PTC were randomly selected and matched to patients transferred from an RF based upon age, injury severity score, primary diagnosis, and mechanism of injury. One hundred and fourteen pairs of subjects were matched; of these, 58 pairs of subjects had complete records that allowed for analysis of total radiation exposure. Data collected included the radiation dose, number of images, and types of exams performed. Our outcome variables were the differences within matched pairs for these data. Statistical analysis was performed using the Wilcoxon Signed Rank Test with significance considered at a p-value of 0.05.

Results:
Subjects transferred from the RF received significantly more CT exams (p-value 0.01) and more radiation from these scans (p-value 0.04) in the first 24 hours of care than the corresponding matched subjects who presented initially to the PTC.

Conclusions:
We found that children initially evaluated in non-pediatric facilities receive an increased number of exams and higher radiation exposure as compared to those treated solely at a pediatric center. Education of all regional health professionals regarding the appropriate use of imaging for the evaluation of trauma in children is vital in reducing excessive radiation exposure.

NOTES:

Scientific Session I

Scientific Session I
Oncology and Trauma
Friday, May 3, 7:30 a.m. – 9:00 a.m.

1

QUALITY ASSURANCE OF THE REAL-TIME SURGICAL REVIEWS OF AREN03B2: A COG RENAL TUMOR COMMITTEE STUDY

Thomas E. Hamilton, MD[1], Douglas Barnhart, MD[2], Kenneth Gow, MD[3], Fernando Ferrer, MD[4], Jessica Kandel, MD[5], Richard Glick, MD[6], Roshni Dasgupta, MD[7], Arlene Naranjo, PhD[8], Eric Gratias, MD[9], James Geller, MD[10], Elizabeth Mullen, MD[1], Peter Ehrlich[11].

[1]Dana Farber Cancer Institute, Boston Children's Hospital, Boston, MA, USA, [2]Primary Childrens Medical Center, Salt Lake, UT, USA, [3]Seattle Children's Hospital, Seattle, WA, USA, [4]Connecticut Children's Hospital, Hartford, CT, USA, [5]Columbia University Medical Center, New York, NY, USA, [6]Steven and Alexendra Cohen Medical Center of New York, New York, NY, USA, [7]Cinncinnati Children's Hospital, Cincinnati, OH, USA, [8]Children's Oncology Group, Gainesville, FL, USA, [9]T. C. Thompson Children's Hospital, Chattanooga, TN, USA, [10]Cincinnati Children's Hospital, Cincinnati Medical Center, MA, USA, [11]C.S. Mott Children's Hospital, University of Michigan, MI, USA.

Purpose:
The Children's Oncology Group (COG) renal tumor study (AREN03B2) requires real-time central review of radiology, pathology and the surgical procedure to determine appropriate risk based therapy. The purpose of this study was to determine the accuracy and inter-rater reliability of the surgical reviews.

Methods:
Of the first 3000 enrolled AREN03B2 patients a sample of 100 enriched for blood vessel involvement, spill, rupture, and lymph node involvement, were selected for analysis. The surgical assessment was then performed independently by two blinded surgical reviewers and compared to the original assessment by committee surgeons. Variables assessed included surgeon-determined local tumor stage, disease stage, type of renal procedure performed, preoperative tumor rupture, occurrence of intraoperative tumor spill, blood vessel involvement, presence of peritoneal implants, and interpretation of residual disease. Inter-rater reliability was measured using the Fleiss' Kappa statistic two-sided hypothesis tests (Kappa, p-value).

Results:
Local tumor stage correlated in all 3 reviews except in one case (0.9775, $p<0.001$). Similarly, overall disease stage had excellent correlation (0.9422, $p<0.001$). There was strong correlation for type of renal procedure (0.8357, $p<0.001$), preoperative tumor rupture (0.6858, $p<0.001$), intraoperative tumor spill (0.6493, $p<0.001$),

Scientific Session I (cont.)

and blood vessel involvement (0.6470, p<0.001). Variables that had lower correlation were determination of the presence of peritoneal implants (0.2753, p<0.001) and interpretation of residual disease status (0.5310, p<0.001).

Conclusion:
The inter-rater reliability of the surgical review is high based on the great consistency in the 3 independent review results. The ultimate contribution of real-time surgical review is the assignment of local and overall disease stage to determine therapy and in this, the process is excellent. Inter-rater reliability for operative findings is lower than expected and highlights potential areas for improvement. This analysis provides validation and establishes precedent for precise and rapid real-time central surgical review to determine treatment assignment in a risk-based stratagem for multimodal cancer therapy.

NOTES:

Scientific Session I (cont.)

2

TISSUE INHIBITOR OF METALLOPROTEINASES-1 MEDIATES NEUROBLASTOMA LIVER METASTASIS

Pritha Paul, MS, **Eric Long, MD**, Sora Lee, MS, Jingbo Qiao, PhD, Dai H. Chung, MD.

Vanderbilt University Medical Center, Nashville, TN, USA.

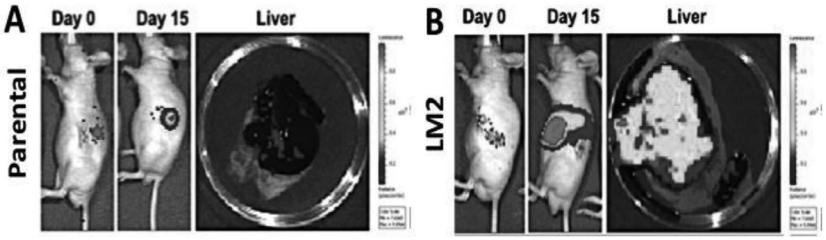
Purpose:
Tumor microenvironment contributes to invasive growth of neuroblastoma; however, the exact cellular mechanisms are unknown. Despite recent studies demonstrating a role of pro-metastatic signaling pathways that promote liver metastasis through modulation of extracellular proteolytic enzymes, their contribution in the progression of metastatic disease in neuroblastoma has yet to be elucidated. Therefore, the purpose of this study was two-fold: (1) to establish *in vivo* tumor selection model of neuroblastoma to isolate highly aggressive metastatic cell population, and (2) to discern molecular mechanisms responsible for liver metastasis.

Methods:
Human neuroblastoma BE(2)-C cells ($1x10^6$) expressing luciferase [BE(2)-C/Luc] were injected into spleen of athymic nude mice. At week 4, metastatic liver lesions were harvested and grown *in vitro* using zeocin as a selection marker for cells expressing luciferase. Using these cells, intrasplenic injection was repeated and subsequent liver metastatic foci were isolated and labeled as BE(2)-C/LM2. Finally, BE(2)-C/Luc or BE(2)-C/LM2 cells were injected into the spleen of another group of mice. Primary tumors and liver metastases were monitored using a bioluminescence system, and harvested for analyses. This study was approved by IACUC.

Results:
Mice injected with BE(2)-C/Luc showed barely detectable liver lesions (Fig. A). In contrast, mice injected with BE(2)-C/LM2 cells developed large liver metastases at day 15 (Fig. B). Cytokine array analysis using plasma from mice injected with BE(2)-C/LM2 cells showed a significant increase in tissue inhibitor of metalloproteinases (TIMP)-1. BE(2)-C/LM2 cells demonstrated increased cell proliferation and soft agar colony formation *in vitro*; TIMP-1 silencing revered these cellular growth effects to a rate comparable to BE(2)-C parental cells.

Conclusion:
We established an *in vivo* selection tumor model of neuroblastoma, which produces a highly aggressive metastatic phenotype; this may be a valuable tool to discern molecular mechanisms responsible for liver metastasis. Moreover, TIMP-1 is an important regulator of neuroblastoma liver metastasis.

Scientific Session I (cont.)



NOTES:

Scientific Session I (cont.)

3

REPEAT NEPHRON-SPARING SURGERY FOR CHILDREN WITH BILATERAL WILMS TUMOR

Kathleen Kieran, MD[1], Mark A. Williams, MD[2], Lisa M. McGregor, MD, PhD[3], Jeffrey S. Dome, MD[4], Matthew J. Krasin, MD[3], Andrew M. Davidoff, MD[3].

[1]University of Iowa Hospitals and Clinics, Iowa City, IA, USA, [2]University of Tennessee/ LeBonheur Children's Hospital, Memphis, TN, USA, [3]St Jude Children's Research Hospital, Memphis, TN, USA, [4]Children's National Medical Center, Washington, DC, USA.

Purpose:
Renal insufficiency is a significant complication of treatment for Wilms tumor in the 5% of children presenting with bilateral disease. Nephron-sparing surgery (NSS) is recommended after neoadjuvant chemotherapy for initial tumor resection; however, the role of NSS in recurrent disease is unknown. We reviewed our experience to assess the feasibility, and oncologic and functional outcomes of repeat NSS for children with recurrent disease.

Methods:
A retrospective review was performed of all children treated at our institution for bilateral, favorable histology (FH) Wilms tumor. Patients undergoing repeat NSS for locally recurrent disease were identified. The outcomes evaluated included tumor recurrence, renal function, and patient survival.

Results:
Since 2001, 36 children with bilateral FH Wilms tumor have been treated at our institution. Overall survival is 92% (mean follow-up, 3.9±1.5 years). Eight patients (22%) underwent repeat NSS for locally recurrent disease, a mean of 1.5 years (range: 2 months-3 years) following initial surgery. All initial recurrences were unilateral and of favorable histology; one patient had a second local recurrence, but in the contralateral kidney, and underwent a third NSS. Overall survival after repeat NSS is 88%, with an average follow-up of 4.5±1.7 years. The patient who died of disease had blastemal-predominant histology at repeat NSS. The seven surviving patients have normal renal function based on technetium-99m renal clearance study (mean GFR=86.7±12.5ml/min/1.73m^2) and serum creatinine (mean=0.4±0.1mg/dL), and all are currently disease-free. Two patients require medical management of hypertension.

Conclusions:
Our experience suggests that repeat NSS for local recurrence of FH bilateral Wilms tumor is feasible and affords acceptable oncologic outcome, with preservation of renal function. However, more aggressive therapy may be required for patients whose recurrence has blastemal-predominant histology, given the poor outcome for this patient in our series.

NOTES:

Scientific Session I (cont.)

4

"TRAP-DOOR" AND "CLAMSHELL" SURGICAL APPROACHES FOR THE MANAGEMENT OF PEDIATRIC TUMORS OF THE CERVICOTHORACIC JUNCTION AND MEDIASTINUM

Emily R. Christison-Lagay, MD, **David Darcy, MD**, Eric J. Stanelle, MD, Stacy DaSilva, BA, Michael P. La Quaglia, MD.

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

Introduction:
In pediatric patients with tumors of the cervicothoracic junction, an isolated cervical or thoracic surgical approach is often insufficient for achieving complete resection. The proximity of critical nerve and vascular structures necessitates an approach that guarantees adequate surgical exposure to facilitate complete resection. We retrospectively reviewed outcomes for pediatric patients who underwent either a "trap-door" or "clamshell" thoracotomy at our institution during a 20-year period.

Methods:
With IRB approval, we searched our institutional pediatric database for patients with cervicothoracic junction tumors who underwent a resection via a clamshell or trap-door thoracotomy between 1991 and 2011. We reviewed patient records for tumor characteristics, surgical technique, completeness of resection, morbidity, and outcome.

Results:
Fifteen patients underwent either a "trap-door" (n=12) or a "clamshell" (n=3) thoracotomy. Tumor types included neuroblastoma (n=9), germ cell tumor (n=2), non-rhabdomyosarcoma soft tissue sarcoma (n=3), and rhabdomyosarcoma (n=1). Eleven patients presented with cervicothoracic primaries, and 4 presented with metastatic disease. Gross total resection was achieved in 14 patients (93%). There were no intraoperative deaths. Median length of hospital stay was 7 postoperative days (range, 4-27 d). Postoperative complications were limited to two cases of mild upper-extremity neuropraxia, which resolved within 6 months. Overall survival in this series was 64% (median follow-up, 1.9 y; range, 2 mo - 23.4 y). Of 14 patients who underwent a successful gross total resection, 10 had no evidence of disease recurrence. Median survival in this group was 7.7 years (range, 8 mo - 23.4 y). Overall survival of patients who presented with primary cervical or mediastinal disease was 90%. The four patients with metastatic disease all succumbed to disease progression within 2 years.

Conclusions:
Gross total resection of primary tumors of the cervicothoracic junction can be accomplished in appropriately selected patients with minimal morbidity and an excellent chance of long-term survival.

NOTES:

Scientific Session I (cont.)

5

β-CATENIN MEDIATES CELLULAR INVASION AND METASTASES IN EWING'S SARCOMA

Meade P. Barlow, MD[1], Anthony J. Hesketh, MD[1], Alexandra Lucs, PhD[2], Richard D. Glick, MD[1], Bettie M. Steinberg, PhD[2], Samuel Z. Soffer, MD[1].

[1]Cohen Children's Medical Center, New Hyde Park, NY, USA, [2]Feinstein Institue for Medical Research, Manhasset, NY, USA.

Purpose:
Celecoxib, a COX-2 inhibitor, has been shown to prevent lung metastases in Ewing's Sarcoma (ES) via a COX-2 independent pathway that may involve downregulation of β-catenin and inhibition of cellular invasion. To confirm β-catenin as the critical mediator, we hypothesized that celecoxib's effect on invasion could be overcome by increased levels of β-catenin.

Methods:
ES cells were treated with an inhibitor of GSK-3β (a kinase which targets β-catenin for degradation) and increased β-catenin was confirmed by western blot. Additionally, a subset of ES cells were transfected with a β-catenin expression vector. Untreated, GSK-3β-inhibited and transfected ES cells were then cultured in standard media +/- celecoxib or rofecoxib, a more selective COX-2 inhibitor with different off-target effects. These cells were used for Boyden Chamber invasion assays in medium supplemented with celecoxib, rofecoxib, or solvent. After 48 hours, cells that invaded through the assay were stained and counted.

Results:
Celecoxib-treated cells had decreased invasion compared to controls, whereas rofecoxib-treated cells showed no inhibition of invasion. Cells treated with GSK-3β inhibitor had an increase in number of invaded cells and resulted in a partial rescue of celecoxib's inhibition ($p<0.001$). Cells transfected with the expression vector also showed increased invasion compared to untreated transfected cells ($p=0.05$), and when compared to non-transfected cells treated with celecoxib ($p<0.001$). Western blot confirmed increased levels of β-catenin in cells treated with GSK-3β inhibitor.

Conclusion:
Celecoxib inhibits invasion of ES cells via downregulation of β-catenin. This inhibition is overcome by increased β-catenin levels, affirming the key role of β-catenin as a critical mediator of the metastatic process in ES. β-catenin may be an important target for anti-metastatic strategies.

NOTES:

Scientific Session I (cont.)

6

TARGETING AURORA KINASE A DOWNREGULATES CELL PROLIFERATION AND ANGIOGENESIS IN NEUROBLASTOMA

Pritha Paul, MD, **Carmelle Romain, MD**, Kwang W. Kim, PhD, Jingbo Qiao, PhD, Dai H. Chung, MD.

Vanderbilt University Medical Center, Nashville, TN, USA.

Purpose:
Aurora kinase A (AURKA) overexpression is associated with clinically aggressive neuroblastoma (NB) and correlates with advanced tumor stage and risk of relapse. AURKA overexpression upregulates VEGF mRNA levels in gastric cancer cells; however, the exact role of AURKA in regulating angiogenesis and neuroblastoma cell proliferation is unknown. AURKA-mediated stabilization of N-myc may affect VEGF expression and angiogenesis in neuroblastoma, as N-myc induces NB tumor angiogenesis. Therefore, we sought to determine whether inhibition of AURKA modulates angiogenesis through downregulation of VEGF.

Methods:
Cell viability assay was performed to determine cell proliferation of human neuroblastoma cells after silencing AURKA (shAURKA) or upon treatment with MLN8237 (0, 50, 100, and 500 nM). Immunofluorescent staining was used to determine the location of N-myc. Protein expression was confirmed by immunoblotting. Human umbilical endothelial cells (HUVECs) were grown on 300 µl of Matrigel to determine tubule formation using cell culture supernatants. ELISA was performed to assess VEGF levels in AURKA silenced cells. Soft agar colony formation was used to determine tumorigenicity of tumor cells *in vitro*. This study was approved by IACUC.

Results:
Silencing AURKA resulted in a significant decrease in cell proliferation after 72 and 96 h. N-myc expression and nuclear localization was reduced in NB cells after transfection with shAURKA when compared to controls. Anchorage-independent colony growth was decreased upon AURKA silencing. Silencing AURKA decreased VEGF expression and reduced tubule formation by HUVECs in comparison to controls. MLN8237 compound significantly decreased tumor cell viability in neuroblastoma cell lines at a concentration of 100 nM at 72 h.

Conclusions:
Our findings demonstrate that AURKA plays a key role in NB tumor angiogenesis. AURKA regulates the nuclear translocation of N-myc in human neuroblastoma cells, which affects cell proliferation, anchorage-independent cell growth and angiogenesis. Therefore, targeting AURKA and might provide a potential novel therapeutic strategy in treating aggressive neuroblastomas.

NOTES:

Scientific Session I (cont.)

7

DEVELOPMENT OF A HUMAN LYMPHATIC MALFORMATION MODEL FROM PLURIPOTENT LYMPHATIC ENDOTHELIAL CELLS IN IMMUNODEFICIENT MICE

Arul S. Thirumoorthi, MD, Peter Liou, BA, John P. Andrews, BA, Chris Kitajewski, BA, Angela Kadenhe-Chiweshe, MD, June K. Wu, MD, Carrie J. Shawber, PhD, Jessica J. Kandel, MD.

Columbia University, New York, NY, USA.

Purpose:
Lymphatic malformations (LMs) are congenital lesions associated with significant morbidities, including vision loss, respiratory failure, and recurrent infections. Even when LMs are identified early in infancy, they often recur despite surgery and drug treatment. Because their pathobiology is not understood, effective and durable treatments are lacking. Notch proteins play a critical role in early vascular cell fate determination, with a specific role recently found for the Notch3 receptor during lymphangiogenesis. We hypothesized that Notch3-expressing cells would reflect this early pluripotency, with the ability to recapitulate LM formation in vivo.

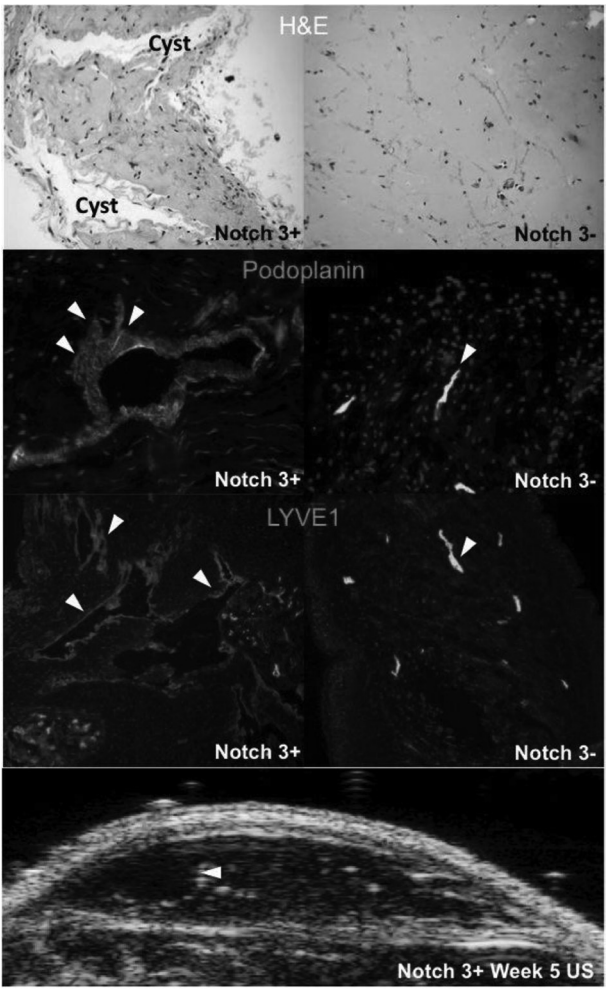
Methods:
Lymphatic endothelial cells were isolated from banked lymphatic tissue and cyst fluid. Notch3(+) and Notch3(-) subpopulations were isolated using specifically-labeled magnetic beads. To determine the differential ability of these cells to recapitulate source LMs, 10[6] Notch3(+) and Notch3(-) cells were mixed with a solubilized extracellular matrix preparation (Matrigel) and implanted subcutaneously in immunodeficient mice (n=26, n=14 respectively). Implants were monitored with high-resolution ultrasound and magnetic resonance imaging, and excised for histologic analysis at 5 weeks.

Results:
High-resolution ultrasound and MRI demonstrated the formation of cystic structures within 3 weeks of implantation of Notch3(+) cells. These structures persisted through 5 weeks and lacked flow by Doppler. H&E staining of the implants confirmed cystic lesions that recapitulated histologic characteristics of human LMs. Immunofluorescent staining confirmed the presence of lymphatic endothelial cell markers (Lyve1, Podoplanin) in the cyst endothelium. Notch3(-) control cell implants did not develop any structures either by imaging or histology.

Conclusions:
We found that Notch3(+) lymphatic endothelial cells were capable of recapitulating development of lymphatic malformations in vivo. Noninvasive monitoring

Scientific Session I (cont.)

with MRI and ultrasound, and immunohistochemistry suggest that these lesions phenocopy characteristics of human LMs. Thus, this model may provide a platform both for exploring LM pathobiology, and for developing new therapies for these challenging lesions.



NOTES:

Scientific Session I (cont.)

8

OPERATIVE VERSUS NON-OPERATIVE MANAGEMENT FOR BLUNT PANCREATIC TRANSECTION: MULTI-INSTITUTIONAL OUTCOMES

Corey W. Iqbal, MD[1], Shauna M. Levy, MD[2], Kuojen Tsao, MD[2], Mikael Petrosyan, MD[3], Timothy D. Kane, MD[3], Elizabeth M. Pontarelli, MD[4], Jeffrey S. Upperman, MD[4], Sarah Hill, MD[5], Mark L. Wulkan, MD[5], Obinna O. Adibe, MD[6], Marcus Malek, MD[7], R. Cartland Burns, MD[7], Saleem Islam, MD[8], David M. Gourlay, MD[9], Melissa Christensen, BS, CCRC[9], Kathleen D. Graziano, MD[10], David M. Notrica, MD[10], Todd A. Ponsky, MD[11], Eloise Lemon, RN, BSN[11], Wendy T. Su, MD[12], Shawn D. St. Peter, MD[1].

[1]Children's Mercy Hospital, Kansas City, MO, USA, [2]University of Texas Health Science Center at Houston, Houston, TX, USA, [3]Children's National Medical Center, Washington D.C., DC, USA, [4]Children's Hospital of Los Angeles, Los Angeles, CA, USA, [5]Children's Healthcare of Atlanta at Egleston, Atlanta, GA, USA, [6]Duke University, Durham, NC, USA, [7]Children's Hospital of Pittsburgh, Pittsburgh, PA, USA, [8]University of Florida Gainesville, Gainesville, FL, USA, [9]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [10]Phoenix Children's Hospital, Phoenix, AZ, USA, [11]Akron Children's Hospital, Akron, OH, USA, [12]Oakland Children's Hospital, Oakland, CA, USA.

Purpose:
The management of traumatic pancreatic transection remains controversial.

Methods:
A multi-institutional review (2000-2011) was conducted comparing operative to non-operative management for grades II and III injuries in patients <18 years. Penetrating injuries and those undergoing exploration for other life-threatening injuries were excluded. Data are presented as mean ± standard error.

Results: Twelve pediatric trauma centers participated, yielding 162 patients, of which 57 patients underwent distal pancreatectomy and 92 patients were managed non-operatively. Thirteen patients were treated with operative drain placement only and were analyzed separately. All 3 groups were comparable for gender (p=0.6), age (p=0.6), injury severity score (p=0.5), and need for intensive care (p=0.3). The distal pancreatectomy group was quicker to goal feeds (7.8±0.7 days) than the non-op group (15.1±2.7 days) (p=0.01). This did not affect total days in the hospital (13.1±1.1 vs 13.9±1.1 days, p=0.6). The non-operative group had a higher pseudocyst rate (0 vs 18%, p=0.002) which resulted in higher rates of endoscopic (2 vs 21%, p=0.01) and interventional radiologic procedures (0 vs 18%, p=0.03) compared to distal pancreatectomy. Those who underwent exploration with only drain placement had a similar delay to goal feeds (18.7±4.9 days) as the non-operative group (p=0.15), but had more days in hospital (30.3±5.9) (p=0.01). Similar to the non-operative group, those managed with drainage alone had a higher rate of pseudocyst formation compared to the distal pancreatectomy group (0 versus 15%, p=0.04) with higher rates of endoscopic (2 vs 43%, p=0.003) and interventional radiologic procedures (0 vs 38%, p<0.001).

Scientific Session I (cont.)

Conclusions:
In children with blunt pancreatic transection, distal pancreatectomy is superior to non-operative management and operative drainage with more rapid resumption of diet, lower rate of pseudocyst formation, and less need for further interventions.

NOTES:

Scientific Session I (cont.)

9

EARLY OUTCOMES FROM A PROSPECTIVE OBSERVATIONAL STUDY WITH A LIMITED BEDREST PROTOCOL IN THE MANAGEMENT OF BLUNT RENAL INJURY IN CHILDREN

Kathleen D. Graziano, MD[1], David Juang, MD[2], David Notrica, MD[1], Victoria L. Grandsoult[1], Juan Acosta, MD[1], Susan W. Sharp, PhD[2], J Patrick Murphy, MD[2], Shawn D. St. Peter[2].

[1]Phoenix Children's Hospital, Phoenix, AZ, USA, [2]Children's Mercy Hospital, Kansas City, MO, USA.

Purpose:
There are no published guidelines for a non-operative management scheme for blunt renal injuries. We are conducting a 2-center prospective observational study with a fixed management scheme and long-term follow up. In this study we report the early outcomes with this hospital management scheme.

Methods:
Following IRB approval, children with CT proven renal injuries were enrolled with permission. Ambulation is allowed when comfortably able regardless of grade. Discharge planning began when tolerating a regular diet and oral pain medications regardless of hematuria. Urinalysis is evaluated at follow up 2-4 weeks after discharge, and repeated as indicated. Imaging was performed for urinary extravasation or other specific concern on initial CT.

Results:
Between 9/2008 and 9/2012, 70 patients were enrolled. Mean age was 11.8 years (3-17) and were 70% male. The mean grade of injury was 2.8 +/- 1.1 (1-5). Transfusions were used in 6 patients (8.6%), with 1 (1.4%) due to the kidney with grade 5 and hilar vessels bleeding. One nephrectomy (1.4%) was performed for devascularizing grade 5 injury. Other renal interventions included angiographic embolization for the aforementioned hilar bleed and one cystotomy was performed for a clot in the bladder.

Mean length of stay (LOS) was 2.9 days +/- 2.4 days. In patients without other major injury or requiring renal intervention, LOS was 1.9 +/-1.7 days (0.4-8 days). There were 5 (7%) readmissions, 3 for pain, 1 for worsening hematuria, 1 for bladder clot.
58 patients (83%) gave urinalysis samples at initial follow up (med 18 days) where 31 (53%) were positive for blood.

Follow-up imaging was obtained in 10 patients (14%) which demonstrated a concerning finding in one case. There was no mortality or persistent morbidity.

Scientific Session I (cont.)

Conclusions:
Children with blunt renal injury can be conservatively managed without strict bedrest guidelines. Hematuria appears to have little influence on recovery.

NOTES:

Scientific Session I (cont.)

10

TRAUMA SURGEON BECOMES CONSULTANT: OUTCOMES AFTER IMPLEMENTATION OF A NEW PROTOCOL

Sara C. Fallon, MD[1], David M. Delemos, MD[1], Daniel P. Christopher, RN[2], Mary H. Frost, RN[2], David E. Wesson, MD[1], Bindi Naik-Mathuria, MD[1].

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

Purpose:
At our hospital, a level I trauma center and high-volume children's hospital, 9-54 intermediate-level ("level 2") trauma activations are received per month. Previously, the surgery team was required to respond to and assume responsibility for the care of all patients who had a "level 2" trauma activation. In 8/2011, we implemented a protocol in which the emergency room (ER) physician primarily manages these patients and consults the trauma surgeon only when surgical evaluation or admission is required. The purpose of this study was to prospectively evaluate the effects of the new protocol to ensure that patient safety and quality of care were maintained.

Methods:
We compared outcomes of patients treated PRE-implementation (10/2010-7/2011) and POST-implementation (9/2011-5/2012), including surgeon consultation rate, utilization of imaging and laboratory testing, ER length of stay, admission rate, and missed injuries or early readmissions. Statistical analysis included chi-square and Student's t-test.

Results:
We identified 472 patients: 179 in the PRE period and 293 in the POST period. The populations had similar baseline clinical characteristics including demographics, injury mechanisms and injury severity. The surgical consultation rate in the POST period was only 42%, but no missed injuries, readmissions, or delays in care were noted. The ER length of stay did not change; however, in the POST period there were significant decreases in the admission rate (73% to 44%) and the mean number of CT scans (1.4 to 1), radiographs (2.4 to 1.7) and laboratory tests (5.1 to 3.3) ordered in the emergency room (all $p < 0.001$).

Conclusion:
Intermediate-level pediatric trauma patients can be efficiently and safely managed by pediatric emergency room physicians, with surgical consultation only as needed. The protocol change improved resource utilization by decreasing testing and admissions. Additionally, the decreased surgical consultation rate streamlined resident utilization in an era of reduced duty hours.

NOTES:

Scientific Session II

Scientific Session II
Fetal and Newborn Critical Care Science
Friday, May 3, 10:45 a.m. - Noon

11

NEONATAL NECROTIZING ENTEROCOLITIS IS ASSOCIATED WITH A COMPROMISED ENTERIC NERVOUS SYSTEM

Yu Zhou, MD, PhD, Yanwei Su, MD, Daniel Watkins, MD, Mika Matthews, MD, Laura Boomer, MD, **Gail E. Besner, MD**.
Nationwide Children's Hospital, Columbus, OH, USA.

Purpose:
The underdeveloped enteric nervous system (ENS) of premature infants may predispose them to necrotizing enterocolitis (NEC). In addition, NEC patients develop long-term intestinal dysmotility, indicating that the injured ENS is not completely recovered after acute NEC. We investigated the integrity of the ENS, and intestinal neurogenesis, in human NEC patients.

Methods:
Human intestinal specimens were resected from premature babies (<32 weeks gestational age) with acute NEC, age-matched patients undergoing surgery for bowel atresia (BA), or the same patients undergoing subsequent stoma closure. Intestinal cross-sections were subjected to apoptosis assays and immunohistochemistry for HUC/D, nNOS, nestin and Ki67, and fresh intestinal tissues were subjected to real time RT-PCR for nNOS and nestin.

Results:
Increased apoptosis in enteric neurons and glia was present in the submucosal and myenteric plexuses of patients with NEC compared to BA. There was decreased nNOS expression in the myenteric ganglia of NEC compared to BA patients. The ratio of nNOS-positive neurons to HUC/D-positive total neurons was significantly decreased in patients with NEC compared to BA (0.23 ± 0.4 *vs.* 0.35 ± 0.3, $p<0.05$). nNOS-expressing cells were increased in NEC patients at the time of stoma closure, but were still decreased compared to patients undergoing ostomy closure after BA (0.29 ± 0.2 *vs.* 0.38 ± 0.3, $p<0.05$). Intestinal neurogenesis, determined by expression of mRNA for nestin, a specific marker of neural stem cells, was decreased in patients with NEC compared to BA. Lastly, nNOS-expressing cells were mainly distributed in the periphery of enteric ganglia and co-localized with the cell proliferation marker Ki67, indicating that nNOS expression may be involved in enteric neurogenesis after NEC injury.

Scientific Session II (cont.)

Conclusions:
We have demonstrated that the ENS is injured during NEC and that enteric neurogenesis is suppressed in patients after acute NEC. Decreased nNOS expression may lead to compromised ENS neurogenesis in patients with NEC.

NOTES:

Scientific Session II (cont.)

12

PLASMA PROTEOMICS REVEALS NOVEL INSIGHT TO THE PATHOPHYSIOLOGY OF NEC IN HUMAN INFANTS

Ghuozhong Tao, PhD[1], Xuefeng Ling, PhD[1], Fizan Abdullah, MD[2], Mary Brandt, MD[3], Richard Ehrenkranz, MD[4], Mary Catherine Harris, MD[5], Tim Lee, MD[3], Corinna Bowers, MS[6], R. Lawrence Moss, MD[6], **Karl G. Sylvester, MD**[1].

[1]Stanford University & Lucile Packard Children's Hospital, Stanford, CA, USA, [2]John Hokins University School of Medicine, Baltimore, MD, USA, [3]Texas Children's Hospital, Baylor, Houston, TX, USA, [4]Yale University School of Medicine, New Haven, CT, USA, [5]Children's Hospital of Philadelphia, Philadelphia, PA, USA, [6]Nationwide Children's Hospital, Ohio State University, Columbus, OH, USA.

Purpose:
NEC continues to present confounding challenges for clinical diagnosis and management. Despite robust animal models, there have been few biologic studies in humans that lend insight to disease pathogenesis.

Methods:
To gain further insight, we utilized a combination of poly-acrylamide gel electrophoresis (PAGE) and liquid chromatography mass spectrometry (LCMS) to profile the plasma proteins of infants with early (n=17) and advanced (n=15) NEC, infants with suspicion for sepsis (n=13) and non-ill age-matched controls (n=11). Subjects were recruited from a consortium of five children's hospitals under IRB approval. Clinical-epidemiologic data was collected along with blood samples on enrolled subjects. Western blot and ELISA were utilized to validate significant findings of interest. Fischer's Exact or Student t-test was used to determine statistical significance.

Results:
Significant differences in expression of proteins involved in inflammation, coagulation, angiogenesis and heme metabolism were observed. The exclusive presence of Fibrinogen G (FGG) dimers in infants without NEC, and complete absence of FGG dimers in infants with NEC were identified. These findings corresponded to a significant measurable difference in the expression of Factor XIII as the catalytic enzyme targeting FGG dimerization in NEC subjects versus sepsis ($p=7.99\times10^{-3}$), and non-ill controls ($p=5.01\times10^{-5}$). Additionally, a significant loss of the plasma heme binding protein Hemopexin was observed and found to be statistically significant in infants that went on to require surgery for progressive NEC versus non-progressive NEC ($p=8.75\times10^{-5}$).

Conclusions:
These data suggest that abnormal coagulation involving FXIII-FGG and progressive hemolysis with excessive heme liberation and hemopexin consumption are

Scientific Session II (cont.)

significant contributors to the pathogenesis of NEC. Biomarkers indicating the presence of disease (FGG) and its progression (HPX) may be derived from these novel mediators while further studies are needed to determine their mechanistic role in the etiology and progression of disease.

NOTES:

Scientific Session II (cont.)

13

THE EFFECT OF GLUTAMINE SUPPLEMENTATION ON MICROBIAL INVASION IN SURGICAL INFANTS REQUIRING PARENTERAL NUTRITION—RESULTS OF A RANDOMISED CONTROLLED TRIAL

Mark Bishay[1], Kathryn Harris[2], Venetia Horn[2], Danielle Hesketh[2], Marlene Ellmer[2], Sarah Macdonald[1], Jane Hawdon[3], Elizabeth Erasmus[3], Kate MK Cross[2], David P. Drake[2], Joseph I. Curry[2], Edward M. Kiely[2], Paolo De Coppi[1], Nigel Klein[1], Simon Eaton[4], Agostino Pierro[1].

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Purpose:
To determine whether parenteral and enteral glutamine supplementation influences microbial invasion in surgical infants requiring parenteral nutrition.

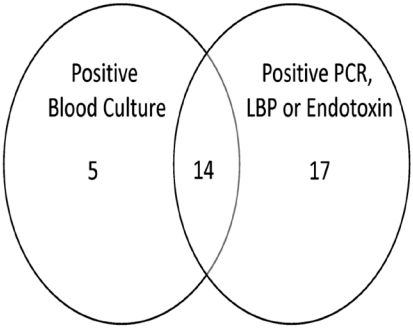
Methods:
This was an ethically-approved prospective double-blind randomised controlled trial studying surgical infants receiving parenteral nutrition for at least five days for congenital or acquired intestinal anomalies (July 2009 - March 2012). The target power was 60 infants. Infants were randomised using minimisation to receive either glutamine supplementation (parenteral and enteral; total 400mg/kg/day) or isonitrogenous control.
Microbial invasion was evaluated after five days of supplementation and defined as either i) positive conventional blood culture; ii) evidence of microbial DNA in blood (PCR); iii) plasma endotoxin level ≥50 pg/ml; or iv) plasma level of lipopolysaccharide-binding protein (LBP) ≥50 ng/ml. Data are given as median (range) and compared by binary logistic regression.

Results:
Sixty infants were randomised and reached the primary endpoint. Age at enrolment was 6 days (0-95), gestational age 37 weeks (24-49), and weight 2.3 kg (0.6-4.6). The underlying diagnoses were: 25 patients had congenital/neonatal intestinal obstruction, 19 had anterior abdominal wall defects, 13 had necrotising enterocolitis, and 3 had other causes of intestinal dysfunction.

Thirty six infants showed some evidence of microbial invasion during the study: 17 of these were not detected by conventional blood culture (Figure).
There was no significant difference between the two groups in the primary outcome: evidence of microbial invasion after five days was found in 9/31 in the control group and 8/29 in the glutamine group: odds ratio 0.83 (0.24 - 2.86; p=0.77).

Scientific Session II (cont.)

During episodes of clinically suspected sepsis, plasma levels of endotoxin and LBP were significantly raised (p=0.04 and p=0.0006, respectively).Conclusion: More than half of surgical infants requiring parenteral nutrition showed evidence of microbial invasion. Approximately half of this was not detectable by conventional blood cultures. Glutamine supplementation had no effect on the incidence of microbial invasion.



NOTES:

Scientific Session II (cont.)

14

IN UTERO REPAIR OF FETAL MYELOMENINGOCELE WITH AUTOLOGOUS AMNIOTIC MEMBRANE IN THE FETAL LAMB MODEL

Payam Sadaii[1], **Erin Brown**[2], Chris Pivetti[2], Diana Farmer[2].

[1]University of California, San Francisco, San Francisco, CA, USA, [2]University of California, Davis, Sacramento, CA, USA.

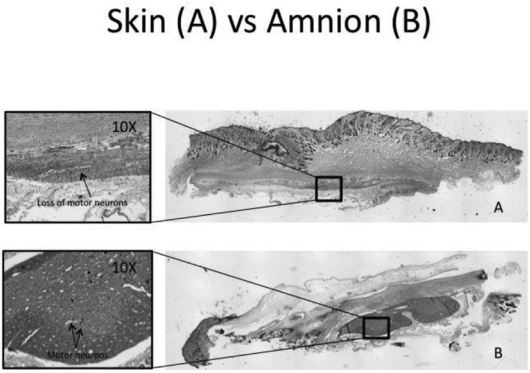
Purpose:
Myelomeningocele (MMC) results in devastating deficits in neurologic function despite recent advances in fetal repair with primary in utero skin closure. Amniotic membrane (AM) is biologically active tissue that has demonstrated anti-inflammatory effects in other surgical settings and has been anecdotally used for human fetal MMC repair. The goal of this study was to evaluate the use of autologous AM in comparison to standard skin closure in an established fetal model of MMC.

Methods:
Seven fetal lambs underwent surgical MMC creation at gestational age (GA) 75 days followed by in utero repair at GA-100. Lambs received either autologous AM repair followed by skin closure (n = 4) versus standard skin closure without AM (n = 3). Gross necropsy and immunohistochemistry of the harvested spinal cords were performed at term to assess for neuronal preservation at the level of the MMC lesion.

Results:
Immunohistochemical analysis of repaired spinal cords demonstrated improved protection of spinal cord tissue in AM-repaired lambs as evidenced by a larger density of neuronal tissue present in the spinal cord. Additionally, preserved motor neurons are also seen. In comparison, lambs repaired with only skin closure demonstrated severe loss of nearly all spinal cord tissue and did not demonstrate any preserved motor neurons.

Conclusions:
This is the first description of the use of autologous AM as a patch repair in an established fetal model of MMC. Lambs repaired with AM showed increased protection of normal spinal cord tissue in comparison to those repaired with standard skin closure. Although the fetal lamb model is not completely analogous to the human repair, these results suggest a potential role for improvements to the standard skin closure in fetal MMC repair.

Scientific Session II (cont.)



NOTES:

Scientific Session II (cont.)

15

AMNIOTIC FLUID STEM CELLS IN A BIOENGINEERED SCAFFOLD: A NEW FRONTIER IN PATIENT SPECIFIC THERAPY FOR PREMATURE LUNG DISEASE

Eric D. Girard, MD[1], Camilo A. Moncada, PhD[2], Todd Jensen, MSc[2], Fan Zhang, MSc[2], Stephanie R. Davis, MS[2], Christine M. Finck, MD[1].

[1]Connecticut Children's Medical Center, Hartford, CT, USA, [2]University of Connecticut Health Center, Farmington, CT, USA.

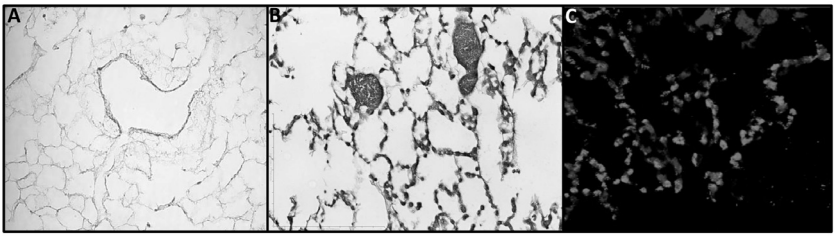
Purpose:
Stem cells in a biomimetic engineered scaffold may be used as a potential model for tissue engineered transplants. We have previously published on a novel acellular immuno-privileged lung scaffold. We have been able to utilize patient specific amniotic fluid stem (AFS) cells and reconstitute this engineered lung scaffold. Within the scaffold, these AFS cells were differentiated into a distal airway cell phenotype. Orthotopic transplantation of these scaffolds is feasible providing a preliminary short term platform for translational research.

Methods:
All experiments were performed per IRB and IACUC approved protocols. AFS cells, obtained during third trimester amniocentesis, were manually isolated, cultured and characterized. 12 million cells were seeded into a perfusion-decellularized rat lung scaffold. These scaffolds were cultured in a bioreactor using small airway growth medium for fifteen days. The cells in the scaffold were characterized using immunofluorescence (IF) for distal lung markers thyroid transcription factor-1 (TTF1) and pro-surfactant C (SPC). An orthotopic left lung transplant of the scaffold was subsequently performed.

Results:
AFS cell characterization by fluorescence activated cell sorting and IF showed the presence of pluripotent and mesenchymal markers and lacked hematopoietic markers. The cells seeded into the scaffold were well distributed, viable, and appeared to reconstitute the epithelium. IF characterization demonstrated distal lung markers TTF1 and SPC. Orthotopic xenograft transplantation was a technical success.

Conclusion:
AFS cells are patient specific, accessible early in pregnancy, and yield pluripotent cells that can differentiate to distal alveolar cells in a biomimetic decellularized lung scaffold. These cells have high potential to be clinically translatable and functional outcomes of orthotopic transplanted lungs are actively being studied.

Scientific Session II (cont.)



(A) A bioengineered scaffold from rat lung showing the remaining extracellular matrix and lack of cells. Hematoxylin and eosin staining (B) and thyroid transcription factor-1 (red) immunofluorescence staining (C) of amniotic fluid stem (AFS) cells cultured with small airway growth medium for 15 days demonstrating a distal airway cell phenotype (40x magnification).

NOTES:

Scientific Session II (cont.)

16

TUBE THORACOSTOMY IN CHILDREN DURING EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)

Shannon Longshore, MD[1], Jake Feldman, BS[1], Katie Zirschky[1], Hope Jackson, MD[2], Cynthia Gingalewski, MD[2], Gerald Gollin, MD[1].

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Purpose:
Pneumothoraces and pleural effusions are frequent in infants and children treated with extracorporeal membrane oxygenation (ECMO). Because these patients are anticoagulated, tube thoracostomy during ECMO is potentially hazardous and there are anecdotal reports of catastrophic hemorrhage following chest tube placement in this setting. We sought to better define the risks associated with tube thoracostomy in a large population of children managed with ECMO.

Methods:
The records of 189 consecutive infants and children who were managed with ECMO at two large children's hospitals were reviewed. Demographics, the indications for ECMO, and the details of the ECMO courses were reviewed. The occurrence of pleural collections and the frequency and technique of chest tube placement were evaluated. The incidence of complications and mortality were determined.

Results:
The median age of the subjects was 2 days (birth-14 years) and the most frequent indications for ECMO were meconium aspiration (28.6%) and congenital diaphragmatic hernia (24.3%). The overall mortality was 26.5%. A pneumothorax was found in 19 (10.1%), a pleural effusion in 26 (13.8%), and a hemothorax in 2 (1.1%). A chest tube was placed in 27 subjects (16 by a needle-guide wire technique and 11 by cutdown). Major bleeding complications occurred in 6 subjects (22%). Two of these required a thoracotomy for control of hemorrhage and three died as a direct result of uncontrollable thoracic bleeding. There was no significant difference in the incidence of bleeding complications based upon the technique of chest tube placement.

Conclusions:
In a large population of infants and children treated with ECMO, we found a significant incidence of major bleeding complications and death associated with tube thoracostomy. The placement of a chest tube during ECMO should be limited to situations in which physiological collapse is imminent or weaning of ECMO support is persistently precluded by a pneumothorax or effusion.

NOTES:

Scientific Session II (cont.)

17

CARDIOVASCULAR PERFORATION DURING ECMO: ARE ALL CANNULAS THE SAME?

Sidney M. Johnson, MD[1], Nathan Itoga[2], **Gwendolyn M. Garnett, MD**[3], Melody Kilcommons, RNC, BSN[1], Devin P. Puapong, MD[1], Russell K. Woo, MD[1].

[1]Kapiolani Medical Center for Women and Children, Honolulu, HI, USA, [2]University of Hawaii, John A. Burns School of Medicine, Honolulu, HI, USA, [3]Children's Hospital Boston, Boston, MA, USA.

Purpose:
Cardiac or major vascular perforation is a known risk of ECMO. We sought to determine if perforation rates are related to cannula design and/or intended position.

Methods:
Three different methods were used to evaluate cardiovascular perforation on ECMO.

1. The ELSO registry was queried to establish the historical rate of hemorrhagic pericardial tamponade, the closest registry surrogate for cardiac/vascular perforation.
2. All ELSO centers were surveyed about types/brands of ECMO cannulas used, specific perforation events and radiographic techniques used for placement over a four year time period (Jan '08-Jan '12).
3. The FDA's Manufacturer and User Device Experience (MAUDE) database was reviewed looking for adverse events related to different types and brands of ECMO cannulas.

Results:
The ELSO registry historical rate of hemorrhagic pericardial tamponade for neonatal respiratory ECMO was 0.53% (~1985-2011). The ELSO center survey revealed seven reports of cannula-related perforation for a rate of 0.59% (7/1185), with twenty-two ELSO centers responding (17% response). The incidence of perforation for catheters with a dual-lumen bi-caval design/positioning was 3.2% (6/190), while catheters using atrial design/positioning was 0.1% (1/995), p-value < 0.0001. Perforation occurred in the right atrium in 86% (6/7); one perforation occurred in the SVC. Half (3/6) of the atrial perforations resulted in death, all three using the bi-caval cannula. Review of the FDA's MAUDE database revealed 19 adverse events related to the bi-caval cannula design, 16 of which were hemorrhagic pericardial effusions with 10 surgically confirmed atrial perforations and 1 SVC perforation. The MAUDE database review was also notable for one SVC perforation with the atrial cannula design.

Conclusions:
These findings suggest a relatively high rate of cardiac perforation associated with the bi-caval cannula. This may be related to inherent differences in cannula design, or the specific IVC positioning required by the design.

NOTES:

Scientific Session II (cont.)

18

THORACOSCOPIC SEGMENTECTOMY FOR CONGENITAL AND ACQUIRED PULMONARY DISEASE; A CASE FOR LUNG SPARING SURGERY

Steven S. Rothenberg, MD[1], Arul Thirumoorthi, MD[2], Angela Kadenhe-Chiweshe, MD[2], Piotr Czauderna, MD[3], Kristin Shipman, MD[1].

[1]The Rocky Mountain Hospital For Children, Denver, CO, USA, [2]Columbia University College of Physicians and Surgeons, New York, NY, USA, [3]Medical University of Gdansk, Gdansk, Poland.

Purpose:
There is still debate about the need to perform complete lobectomy for some congenital and acquired cystic lung disease. Some advocate observation rather then resection, despite possible long term complications of non treated lesions. However, high resolution CT scans and physical findings at the time surgery, along with new advanced thoracoscopic techniques allows for discreet segmental anatomic resections to preserve normal lung. This study evaluates the feasibility and early results using these techniques.

Methods:
From January 2006 to September 2012 21 patients, age 1 month to 16 years and weight 3.8 to 42 KG underwent thoracoscopy for planned lobectomy. Pathology was congenital cystic lung disease in 17 and bronchiectasis in 3, and arteriovenous malformation in 1. In each case findings on CT scan and at the time of surgery, warranted consideration of lung preserving surgery. Procedures were performed through 3 ports with single lung ventilation. Anatomically based segmentectomies were performed in each case.

Results:
All procedures were completed successfully thoracoscopically. An anatomic segmental resection was achieved in 20/21 cases. Operative time ranged from 30 to 240 minutes (mean 120). Single segments were excised in 19 pts and 2 in 2 pts.. Hospital stay ranged from 1 to 6 days (mean 2.3). F/u CT scans obtained at 1 to 6 years (mean 28 months) show no residual disease in 16/17 patients. The recurrence was in a pt with CPAM in which an anatomic resection was impossible. This patient underwent a secondary resection.

Conclusion:
Thoracoscopic lung conserving therapy is technically feasible and safe. The magnification provided by a thoracoscopic approach makes identification of segmental anatomic planes easier. Anatomic may be appropriate in case of bilateral or extensive disease, or in cases where the diseased tissue is clearly limited to one anatomic segment. Continued long term F/U is needed.

Scientific Session II (cont.)

NOTES:

Scientific Session III

Scientific Session III
Gastrointestinal Science and Surgery
Saturday, May 4, 9:00 a.m. – 10:30 a.m.

19

SHORT TERM THERAPY OF INSULIN-LIKE GROWTH FACTOR I (IGF-I) REVERSES UNDERWEIGHT GROWTH IN A MALNOURISHED MURINE ANIMAL MODEL

Kavita Deonarine, MD[1], James S. Lin[1], Jennifer A. Hawkins, MS[1], Sean Moore, MD[1], Nambirajan Sundaram, PhD[1], Thomas Blom, MS[2], Michael A. Helmrath, MD, MS[1].

[1]Cincinnati's Children Medical Center, Cincinnati, OH, USA, [2]University of Cincinnati, Cincinnati, OH, USA.

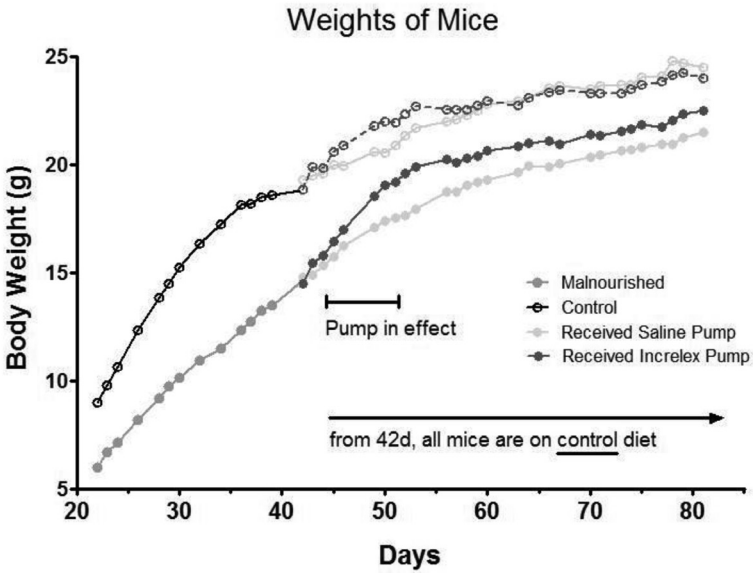
Purpose:
Sustained poor growth during infancy is the result of several conditions including malnutrition. In this study we developed a mouse model of malnutrition during development that leads to stunted growth not completely reversible by change of diet alone to address our hypothesis that brief IGF-I therapy augments and sustains development.

Methods:
Litters of C57/Bl/6 mice (n=5-8/group) were randomized to control isocaloric vs protein malnourished diets provided during sucking to mothers, and then weaned to randomized groups at 21d until 6wks when all mice were returned to control diet. At 6wks, groups were randomized to receive either a subcutaneous IGF-I pump (120ug/d) or saline given over 7d. Mice were sacrificed at 21d, 6wks, 7wks, and 12wks for intestinal measurements, histology and qRT-PCR analysis of relative gene expression for IGF-I and GLP-2 in intestine. Statistical analysis utilized a mixed linear model with $p<0.05$ considered significant.

Results:
When corrected for gender and litter origin differences, mice that received malnourished diet had significantly less weight gain that was not reversed with diet at 6wks. Administration of IGF-I resulted in significant and sustained increased weight gain out to 12 weeks compared to saline (p=0.006). Control diet vs malnourished improved intestinal developed as measured by crypt fission 6wks (14% vs 6%) that was augmented in malnourished groups only by IGF-I at 7 wks (19% vs 7%) and resulted in significant increases in intestinal length/body weight at 12 wks. Serum levels of endogenous IGF-I increased when diet was changed to the control alone in the mice receiving IGF-I therapy.

Scientific Session III (cont.)

Conclusion:
We developed a model of malnutrition during development that results in stunted growth that is partially reversed with IGF-1 therapy at the time of returning to normal diet. Therapies that enhance IGF-I may benefit infants with stunted growth.



NOTES:

Scientific Session III (cont.)

20

FIRST STEPS: SERIAL TRANSVERSE ENTEROPLASTY AS A PRIMARY PROCEDURE IN NEONATES WITH CONGENITAL SHORT BOWEL

Gwendolyn M. Garnett, MD[1], Kuang H. Kang, MD[1], Tom Jaksic, MD[1], Russell K. Woo, MD[2], Devin P. Puapong, MD[2], Heung B. Kim, MD[1], Sidney M. Johnson, MD[2].
[1]Children's Hosptial Boston, Boston, MA, USA, [2]Kapiolani Medical Center for Women and Children, Honolulu, HI, USA.

Purpose:
In the initial description of the serial transverse enteroplasty procedure (STEP), the possibility of primary/neonatal STEP was recognized, but not condoned as a treatment option for neonates with congenital short bowel syndrome (SBS) resulting from a perinatal event. To date a comprehensive review of the outcomes of neonatal STEP has not been reported by the International STEP Data Registry.

Methods:
A retrospective review of the International STEP Data Registry was performed to identify all patients who underwent STEP as a primary operative procedure for the treatment of congenital SBS.

Results:
Fifteen patients underwent primary STEP procedures for congenital SBS between September 1, 2004 and April 10, 2012. Fourteen patients had follow-up information available. Causes of congenital SBS included closing gastroschisis, small bowel atresia, and midgut volvulus. Average intestinal length was increased by a mean of 15 cm with primary STEP. There was one death from intestinal failure associated liver disease and another required liver and intestinal transplantation. The most commonly reported complication following primary STEP was obstruction or bowel re-dilatation requiring additional operative interventions. Nine patients underwent second STEP procedures under these circumstances. Full enteral autonomy has been achieved in 3 patients. Of the remaining patients, seven had available follow up information. Five of these patients have achieved >50% enteral tolerance.

Conclusions:
Primary STEP is a feasible and safe surgical option for the treatment of congenital conditions resulting in SBS. Primary STEP establishes early bowel continuity, creates intestinal length from congenitally dilated bowel, and appears to obviate the need for interval stomas and their associated loss of bowel length in neonates with congenital SBS. Although infrequently utilized, the favorable outcomes seen thus far in patients undergoing primary STEP indicate that the STEP procedure can be reasonably considered as a primary intervention for congenital conditions resulting in SBS.

NOTES:

Scientific Session III (cont.)

21

EXPERIENCE WITH REDO-PULLTHROUGHS FOR HIRSCHSPRUNG DISEASE

Matthew W. Ralls, MD, Jennifer L. Freeman, MD, Arnold G. Coran, MD, Raja Rabah, MD, Peter F. Ehrlich, Daniel H. Teitelbaum, MD.
University of Michigan, Ann Arbor, MI, USA.

Purpose:
The experience with redo-pullthroughs(RedoPT) for Hirschsprung disease(HD) is extremely limited. This study presents our surgical experience for RedoPTs, outcomes and stooling pattern analysis.

Methods:
A retrospective review of our institution's RedoPTs as well as one author's overseas cases was performed. Stooling scores were tabulated from an established survey, and compared to primary-PT matched patients.

Results:
Between 1974 and 2012, 46 individuals(61% males) underwent RedoPT. Median age at first PT and second PT was 1 year(range 1week-18years) and 3.5 years(range 8 weeks-41years), respectively. Initial operation was performed at our institution in 28%, with 59% having rectosigmoid disease, 13% left-sided and 9% mid-colon/right-sided disease. Open endorectal-PT(ERPT) was the most frequent primary-PT(41%), followed by transanal ERPT(22%), Swenson(17%), and Duhamel(11%). Early complication after primary-PT occurred in 44%, including anastomotic leak(19%), obstruction(9%), twisted-PT(6%), and enterocolitis(6%). Indications for RedoPT were predominately retained aganglionosis/transition zone pathology(71%); followed by stricture/obstructing Duhamel pouch(19%), tight cuff(8%) and twisted-PT(4%); however, none for repeated bouts of enterocolitis. Open ERPTwas the most commonly performed secondary procedure(38%), followed by Swenson(25%), Duhamel(13%), and transanal ERPT(7%); an additional 13% had an end-to-end stapled anastomosis in cases of frozen pelvis or a second RPT. Eleven were lost to follow-up, 2 were not yet toilet-trained and 3 had stomas during the survey. Using an established survey, stooling scores(Table) were significantly worse for RedoPTs versus matched-group of open abdominal primary-PT children, but similar continence rates. Early and late complications(Table) were similar to primary-HDs. Type of operation did not contribute to outcome.

Conclusion:
In one of the largest series of RedoPT aganglionosis and anatomic problems predominated. RedoPT outcomes are worse than primary-PT, and should be approached after careful planning/selection.

Scientific Session III (cont.)

Stoolilng and Post-op Complications

STOOLING SURVEY (lower score = better outcome)	Transbdominal PT(n=104)	RedoPT (n=17)	P value
Total (0-40)	11.4±1.2	12.2±5.8	0.003
Continence (0-21)	6.2±0.8	3.9±4.1	0.335
Stooling pattern (0-9)	1.9±0.2	3.9±1.8	<0.001
Enterocolitis (0-10)	3.3±0.4	4.3±2.2	<0.001
COMPLICATIONS(%)			
Anastomotic leak	5	9	0.200
Constipation	2	15	0.005
Stricture	10	15	0.290
Incontinence	2	11	0.600

NOTES:

Scientific Session III (cont.)

22

PREDICTORS OF SUCCESSFUL OVARIAN PRESERVATION AND THE ROLE OF LAPAROSCOPY IN GIRLS WITH OVARIAN TUMORS

Jonathan C. Papic, MD, Frederick J. Rescorla, MD, Deborah F. Billmire, MD, Maria E. Finnell, MD, Charles M. Leys, MD.

Riley Children's Hospital, Indianapolis, IN, USA.

Purpose:
Ovarian preservation is desirable in girls with benign ovarian tumors. The aims of this study were to determine 1) preoperative predictors of malignant tumors and 2) predictors of ovarian preservation in benign tumors.

Methods:
Girls age 1-18 years with ovarian tumors managed at a single tertiary care children's hospital were retrospectively identified from 1997 to 2012 based on CPT codes. Data on presenting symptoms, imaging, biochemical markers, treatment, outcome, and pathology were extracted. Logistic regression models were used to analyze the associations between clinical predictors and the dichotomous outcomes malignant tumor and ovarian preservation.

Results:
150 patients with 152 ovarian tumors were identified. Large tumor size, solid components, and elevated tumor markers (AFP, HCG, or LDH) were significantly predictive of malignancy (Table 1). All tumors were benign if negative for all three predictors (size <10cm, predominantly cystic, and negative tumor markers). For benign tumors, successful ovarian preservation was significantly associated with use of laparoscopy, size <10cm, predominantly cystic tumor, and absence of torsion and calcifications. In the multivariate model, laparoscopy remained a significant independent predictor of ovarian preservation after controlling for tumor size, imaging characteristics (solid/cystic, calcifications), and torsion (Table 2). Pathology reports for mature teratomas managed with oophorectomy (without preservation) found gross ovarian tissue in only 8 of 58 tumors, though 24 had evidence of microscopic ovarian tissue.

Conclusion:
In our study, tumors <10cm, primarily cystic, and negative tumor markers had a 100% likelihood of being benign. For benign tumors, the use of laparoscopy is associated with greater likelihood of ovarian preservation and is recommended for tumors with low malignant potential.

Scientific Session III (cont.)

Tables 1&2. (1) Predictors of malignancy. (2) Predictors of ovarian preservation.

(1) PREDICTORS OF MALIGNANCY	Malignant n=19	Benign n=133	Univariate OR (95% CI)	Multivariate OR (95% CI)
Solid Component	15 (79%)	50 (38%)	6.23 (1.96, 19.81)	Non-estimable
Size ≥10cm	16 (84%)	60 (45%)	6.49 (1.81, 23.33)	Non-estimable
Positive Tumor Marker	15 (79%)	2 (2%)	111.24 (22.60, 547.55)	Non-estimable
(2) OVARIAN PRESERVATION	Yes n=33	No n=100	Univariate OR (95% CI)	Multivariate OR (95% CI)
Laparoscopy	25 (76%)	23 (23%)	10.46 (4.16, 26.31)	6.21 (1.89, 20.44)
Size <10cm	26 (79%)	47 (47%)	4.19 (1.67, 10.53)	5.60 (1.51, 20.73)
Cystic	30 (90%)	53 (53%)	8.87 (2.54, 30.95)	5.42 (1.09, 26.99)
No Torsion	29 (88%)	59 (59%)	5.04 (1.65, 15.42)	8.71 (2.12, 35.77)
No Calcification	31 (94%)	54 (54%)	13.20 (1.67, 58.13)	10.74 (1.90, 60.81)

NOTES:

Scientific Session III (cont.)

23

FAST TRACK MANAGEMENT IS SAFE AND EFFECTIVE AFTER BOWEL RESECTION IN CHILDREN WITH CROHN'S DISEASE

Jesse D. Vrecenak, MD, Peter Mattei, MD, FACS, FAAP.
Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Purpose:
Fast-track management (FT) challenges traditional postoperative tenets and may help to minimize postoperative discomfort and hasten recovery. Studies to determine its safety and effect in children have not previously examined a population with chronic GI pathology. To do so, we evaluated FT management in patients with Crohn's disease (CD).

Methods:
We retrospectively reviewed consecutive patients undergoing isolated laparoscopic ileocecectomy for CD at our institution between December 2000 and December 2010, excluding patients with multiple resections, bladder involvement or age >18y. Critical components of our FT protocol include: oral intake within 24 hours postoperatively, no routine NG tube, rectal suppository on POD 2 if no spontaneous stool, and minimization of narcotics. Ketorolac was routinely used to decrease narcotic requirements; intravenous narcotic use was calculated in mg morphine/kg using equianalgesic dose equivalents. Non-parametric data was analyzed using the Mann-Whitney U test.

Results:
Seventy-one patients (8-18y) underwent laparoscopic ileocecectomy for CD, of which 45 met FT criteria. Individual practice patterns primarily determined which patients were FT-managed, and there was no significant difference in the number of preoperative Crohn's medications or duration of treatment. Though 13/45 FT patients experienced postoperative emesis, only one required NG replacement. Length of stay (LOS) for FT patients averaged 3.7d vs. 5.0d for the non-FT cohort ($p<0.01$). Likewise, time to first stool averaged 2.2 vs. 3.3d ($p<0.01$), time to full diet 2.1 vs. 3.7d ($p<0.01$) and intravenous narcotic use averaged 1.4 vs. 2.9 mg/kg ($p<0.01$). Two in each group required bowel function-related readmission. Twenty-three patients experienced complications; no significant difference in complications or disease progression was observed between groups during mean follow-up of two years.

Conclusions:
We conclude that FT is safe and effective in patients with CD. Despite CD-related GI pathology, FT patients realized benefits in terms of LOS, time to bowel function, and narcotic use, without an increase in complications.

NOTES:

Scientific Session III (cont.)

24

THE NATURAL HISTORY OF FAMILIAL ADENOMATOUS POLYPOSIS SYNDROME: A 24 YEAR REVIEW OF A SINGLE CENTER EXPERIENCE IN SCREENING, DIAGNOSIS, TREATMENT AND OUTCOMES

Raelene D. Kennedy, MD, D. Dean Potter, MD, Christopher R. Moir, MD, Mounif El-Youssef, MD.

Mayo Clinic, Rochester, Rochester, MN, USA.

Purpose*:*
We present a 24-year review of a single center experience with pediatric Familial Adenomatous Polyposis (FAP).

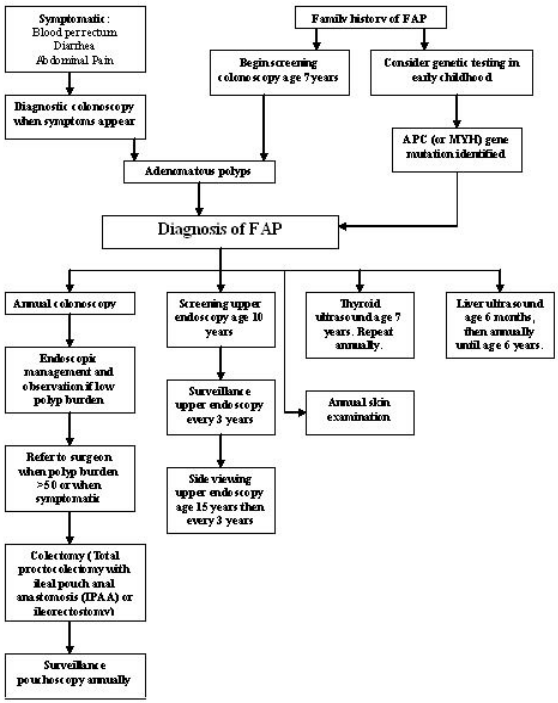
Methods:
Retrospective review of all patients ≤ 20 years of age diagnosed with FAP at our multi-disciplinary center between 1987 and 2011. We examined diagnostic methods, extraintestinal manifestations, polyp burden, family history, histology, gene mutations, surgical interventions and outcomes.

Results:
Polyposis was discovered in 167 patients. Diagnosis was made at a mean age of 12.5 years, most frequently by colonoscopy (69%, mean age 13.7) or genetic screening (25%, mean age 9.1). Family history was known in 85% of patients. Genetic testing was performed in 52% of patients with 88% confirming an APC mutation. Most children (58%) were asymptomatic at screening for family history. Rectal bleeding was the most common (37%) symptom prompting evaluation. Colon polyps appeared at a mean age 13.4 years, but were observed as young as 8 months. Polyp burden exceeded 50 polyps at diagnosis in 60% of cases. High grade dysplasia was found on one colonoscopy (age 18) and in 5 patients at colectomy (ages 13-20). Adenocarcinoma was found on one colonoscopy (age 18) and in 5 patients at colectomy (ages 17-20). Upper GI polyps occurred in 85% of patients at a mean age of 17.4 years (range 7-37 years). Colectomy has been performed in 79% of patients (IPAA 103 patients, ileorectostomy 13 patients) at a mean age of 15.4 years (youngest 4 years). Extraintestinal manifestations included congenital hypertrophy of the retinal pigment epithelium (11.3%), desmoids (10.6%), osteomas (6.7%), sebaceous cysts (5.5%), extranumerary teeth (3.7%), papillary thyroid cancer (3.1%) and hepatoblastoma (2.5%). Six deaths have occurred (2 colorectal cancer, 3 desmoids, 1 adriamycin cardiac toxicity).

Conclusion:
The natural history of pediatric FAP is varied. Screening to reduce the risk of cancer is key. We recommend an individualized patient-oriented algorithm (Figure 1).

Scientific Session III (cont.)

Figure 1: FAP Screening algorithm



NOTES:

Scientific Session III (cont.)

25

OPERATIVE MANAGEMENT OF ACQUIRED JEUNE'S SYNDROME

Maria Grazia Sacco Casamassima, MD, Seth D. Goldstein, MD, Dominic Papandria, MD, Jose H. Salazar-Osuna, MD, Kimberly H. McIltrot, CRNP, Fizan Abdullah, MD,PhD, Paul M. Colombani, MD,MBA.

Division of Pediatric Surgery Johns Hopkins Hospital, Baltimore, MD, USA.

Purpose:
Acquired Jeune's syndrome is a severe iatrogenic deformity of the thoracic wall which results as a consequence of premature or overly aggressive pectus excavatum repair. We report herein our technique and experience with this rare condition.

Methods:
From 1996 - 2011 in a tertiary referral center, nineteen patients with acquired Jeune's syndrome were identified by abnormal chest wall growth and pulmonary function tests consistent with a restrictive pattern. These patients are repaired using a technique to expand the thoracic wall where 1) sternum is released from tissue scar 2) multiple transverse rib osteotomies are performed 3) sterno-costal junctions are reconstructed by wiring the costal cartilage to the edge of sternum. One or two Lorenz bars are then positioned to support the sternum and maintain the expansion of the thorax. Electronic charts were retrospectively reviewed to determine patient outcomes.

Results:
The mean age at first operation was 4.6 years and in all cases the initial pectus excavatum repair was the Ravitch procedure. The most common major complications were: seven patients requiring reoperation for bar displacement, one patient died from sepsis on postoperative day ten, one developed cardiac tamponade due to migration of a wire suture fragment, and one patient required multiple reoperations. Long-term cosmetic results and improvement in daily life was reported positive in 84.2% of cases.

Conclusions:
We report herein our anterior chest wall reconstruction technique which allows expansion of the thoracic cage and restoration of the costal-sternal junction in an anatomic configuration. This technique successfully treated our series of patients with acquired Jeune's syndrome but individualized intensive surgical planning is still required considering the variability of clinical presentations. Additionally, instability of the bar represents a major complication of this approach.

NOTES:

Scientific Session III (cont.)

26

HIGH RATES OF METAL ALLERGY AMONGST NUSS PROCEDURE PATIENTS DICTATE THE NEED FOR BROADER PRE-OPERATIVE TESTING

Bhairav Shah, MD, PharmD[1], Amy Haldeman[2], Frazier Frantz, MD[2], Robert E. Kelly, MD[2], Marcia A. Kuhn, MD[2], Michele Lombardo, MD[2], Robert Obermeyer, MD[2], Michael Goretsky, MD[2].

[1]EVMS, Norfolk, VA, USA, [2]Children's Hospital of the Kings and Daughters, Norfolk, VA, USA.

Purpose:
The most common technique used to repair pectus excavatum requires placement of sub-sternal metal bars. Previous studies have estimated as little as 2.2% of patients suffer from bar allergy while orthopedic literature quotes rates of 13% or more. The goal of this study was to assess if more intensive metal allergy testing is required prior to surgery.

Methods:
A retrospective review of a prospectively gathered database was undertaken for all consenting patients undergoing repair between September 2004 to December 2010. Incidence of bar allergy was based on the number of patients receiving titanium bars, suspicion for post-operative allergic reaction, and TRUE® patch testing positivity pre- or post-operatively. Collection of demographic data, history of atopy in various forms as well suspicion for metal allergy reported by the patient was performed. Outcomes data reviewed for this study included type and number of bars used, suture site infection, skin rash and wound infection.

Results:
640 charts were analyzed, revealing a total of fifty-one (8.0%), mostly male, patients with a metal allergy. Family history of metal allergy, seasonal or environmental allergies, pre-operative history of metal sensitivity, eczema or drug allergy were found to be significant attributes in these patients while history of previous repair, asthma or asthma like symptoms, allergic rhinitis and food allergy were not. One patient suffered metal allergy after testing negative to TRUE® patch preoperatively.

Conclusions:
The rate of metal bar allergy in the pectus excavatum population may be higher than previously suspected and closer to figures presented in the orthopedic literature. Close attention should be paid to family history of metal allergy, seasonal or environmental allergies, previous metal sensitivity, eczema or complaints of drug allergies as they may indicate increased risk for pectus bar allergy. Routine metal allergy testing should be an important part of pre-operative testing for the Nuss procedure.

NOTES:

Scientific Session III (cont.)

27

RISK FACTORS FOR MORTALITY IN PATIENTS WITH MULTIFOCAL AND DIFFUSE HEPATIC HEMANGIOMAS

Kristy L. Rialon, MD, Rudy Murillo, MD, Rebecca D. Fevurly, MD, Ann M. Kulungowski, MD, Emily R. Christison-Lagay, MD, David Zurakowski, PhD, Harry PW Kozakewich, MD, Ahmad I. Alomari, MD, Steven J. Fishman, MD.
Boston Children's Hospital, Boston, MA, USA.

Purpose:
Multifocal and diffuse hepatic hemangiomas are true infantile hemangiomas, which likely exist in a continuum. Focal lesions are now recognized to be biologically distinct rapidly involuting congenital hemangiomas (RICH). We reviewed our hepatic hemangioma registry to identify prognostic indicators for mortality in patients with true infantile hepatic hemangiomas.

Methods:
With IRB approval, registry records of patients entered between 1995 and 2012 with a diagnosis of hepatic hemangioma were reviewed. Clinical characteristics were evaluated for prognostic significance using the multivariate Cox proportional hazards model. Survival data were analyzed using the Kaplan-Meier method, with significance determined by the log-rank test.

Results:
We identified 94 patients with multifocal (n=71) and diffuse (n=23) hepatic hemangiomas. Twenty-four patients had enough imaging data to determine time to resolution, which occurred at a median of 14.8 months. Mortality was 16% (n=15); 60% (n=9) of these were multifocal and 40% (n=6) were diffuse lesions. Multivariate analysis demonstrated that only congestive heart failure (CHF) was a significant risk factor for mortality across the continuum (hazard ratio: 11.9, 95% CI: 3.4-42.4, p<.001); cardiomegaly, the presence of shunts, and hypothyroidism were not statistically significant independent risk factors. Further subgroup analysis revealed that CHF was a highly significant risk factor only in patients with multifocal lesions (p=<.001). Among patients with diffuse lesions, 5 of 6 (83%) who died had abdominal compartment syndrome (ACS), which was found to be a significant risk factor for mortality (p=.003).

Conclusion:
Most patients with multifocal and diffuse hepatic hemangiomas resolve without sequelae. Multifocal patients with CHF and diffuse patients with ACS are at higher risk for mortality. Patients with multifocal lesions without CHF may go undetected until lesions become diffuse, then presenting with hepatomegaly and hypothyroidism. Aggressive treatment of symptomatic patients and close follow-up of asymptomatic patients may improve mortality.

NOTES:

Scientific Session III (cont.)

28

PATIENT AND PARENTAL SCAR ASSESSMENT AFTER SINGLE INCISION VERSUS STANDARD 3-PORT LAPAROSCOPIC APPENDECTOMY: LONG TERM FOLLOW-UP FROM A PROSPECTIVE RANDOMIZED TRIAL

Shawn D. St. Peter, E Marty Knott, DO, PhD, **Alessandra C. Gasior, DO**, George W. Holcomb III, MD, MBA, Daniel J. Ostlie, MD.

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

Purpose:
Single site umbilical laparoscopy is supported by many case series suggesting a cosmetic advantage, but prospective comparative data are lacking. We conducted a prospective, randomized trial comparing single site appendectomy to the standard 3-port approach, including scar assessment at early and long term follow-up.

Methods:
Patients over 12 years old and parents of patients under 12 years old enrolled in the trial were asked to complete the validated Patient Scar Assessment Questionnaire (PSAQ) at early follow-up around 6 weeks postoperative and by phone call after 18 months (late follow-up). The PSAQ consists of 4 scored subscales: Appearance, Consciousness, Satisfaction with Appearance, and Satisfaction with Symptoms. Each subscale is a set of questions with 4-point categorical responses (1=most favorable, 4=least favorable). The sum of the answers for each question quantifies each subscale. The total score can range from 28 (best) to 112 (worst). Data are expressed as mean +/- standard deviation.

Results:
Questionnaires from early follow-up were obtained from 99 3-port and 100 single site patients where the single site approach produced superior overall scar assessment (P=0.003). By telephone, late follow-up was obtained for 49 3-port and 56 single site patients/parents at a median of 25 (18-32) months. Overall assessment was not significantly different between groups and approached best possible score in both groups (Table). Effect size was small for all comparisons (Cohen's $d \leq 0.43$)

Conclusions:
Patients or parents of patients undergoing single site appendectomy express small but superior overall scar assessment compared with the 3- port technique at early follow-up. However, the difference in overall scar assessment is no longer present at long term follow-up.

Scientific Session III (cont.)

Table

	Early	Follow	Up	Late	Follow	Up
Variable (Best Score)	3 Port (N=98)	Single Site (N=100)	P Value	3 Port (N=49)	Single Site (N=56)	P Value
Appereance (9)	15.3 +/- 3.8	13.5 +/- 3.3	<0.0001	10.4 +/- 2.0	9.6 +/- 1.3	0.03
Consciousness(6)	9.3 +/- 2.4	8.6+/- 2.4	0.05	6.4 +/- 1.1	6.3 +/- 0.9	0.52
Satisfaction with Appearance (8)	11.8 +/- 3.8	10.8 +/- 3.7	0.06	8.1 +/- 0.3	8.2 +/- 1.1	0.49
Satisfaction with Symptoms (5)	6.7 +/- 2.5	6.3 +/- 2.1	0.16	5.00 +/- 0.00	5.0 +/- 0.1	0.35
TOTAL (28)	43.1 +/- 9.2	39.1 +/- 9.2	0.003	29.9 +/- 3.0	29.1 +/- 2.4	0.16

NOTES:

Scientific Session IV

Scientific Session IV

Databases and Randomized trials for Optimization and Regionalization of Surgical Care

Saturday, May 4, 11:00 a.m. - Noon

29

HIGHER COSTS, CHARGES AND RESOURCE UTILIZATION DO NOT AFFECT SURVIVAL IN CONGENITAL DIAPHRAGMATIC HERNIA

Ryan P. Cauley, Kristina Potanos, MD, Nora Fullington, MD, Jonathan Finkelstein, MD MPH, Dionne Graham, PhD, Jay M. Wilson, MD.

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

Purpose:
Congenital Diaphragmatic Hernia (CDH) is associated with significant mortality, cost, and variations in resource utilization. Using the Pediatric Health Information System (PHIS) we aimed to examine the adjusted effects of regional hospital pricing tiers and resource utilization on outcome in CDH.

Methods:
2357 CDH patients treated at 45 freestanding children's hospitals between 2006-2010 within 7 days of birth were analyzed using PHIS. Hospitals were divided into tiers within region by mean costs/charges of initial CDH hospitalization based on whether their costs were in the (1) upper quartile, (2) middle-50% or (3) lower quartile within their region. Multivariate models were used to determine the case-mix adjusted association of price tier with inpatient-mortality and costs/charges.

Results:
While hospitals in the upper cost tiers were associated with significantly longer length-of-stay, and greater costs and charges on unadjusted analyses, there was no difference in unadjusted inpatient mortality (Table-1). The case-mix adjusted cost of an initial hospitalization was $178,091 greater at upper pricing-tier hospitals compared to those in the lowest tier (Table-2). Finally, hospital cost tier was not associated with differences in the case-mix adjusted risk of mortality.

Conclusion:
While hospital cost tiers were associated with significant differences in length-of-stay, costs and charges, there was no apparent difference in survival to discharge even after adjusting for hospital case-mix; suggesting that increased resource utilization may not be associated with improved outcomes in CDH.

Scientific Session IV (cont.)

Table 1. Risks, Charges, and Outcome by Hospital Cost Tier				
Characteristics/Outcomes	Upper Cost-Tier Hospitals (n =537) N (%)	Middle Cost-Tier Hospitals (n=1247)	Lower Cost-Tier Hospitals (n=450)	p-value
Low Birthweight (≤2 kg)	51 (9.5)	132 (10.6)	41 (9.1)	.60
Extracorporeal Membrane Oxygenation (ECMO) Used	160 (29.8)	365 (29.3)	133 (29.6)	.97
Payment Source Government Private Insurance Other	251 (46.7) 227 (42.3) 59 (11.0)	600 (48.1) 494 (39.6) 153 (12.3)	249 (55.3) 160 (35.6) 41 (9.1)	04*
Region Midwest Northeast South West	220 (41.0) 116 (21.6) 118 (22.0) 83 (15.5)	288 (23.1) 298 (70.6) 347 (27.8) 314 (25.2)	86 (14.5) 8 (1.9) 268 (59.6) 88 (19.6)	<.001*
High Volume Hospital (≥50 CDH cases over 5 years)	292 (54.4)	994 (79.7)	394 (87.6)	<.001*
Length of Stay, Days Median (IQR)	32 (13.5-72)	27 (15-54)	27 (14-56)	.04*
Total Reported Costs per Initial hospitalization, $ Median 25th% 75th%	200,912.71 75,766.42 416,248.88	110,578.76 50,101.03 233,142.50	99,233.30 42,787.41 217,478.07	<.001*
Charges by Type, $ Median Total Clinical Imaging Lab Room/Other Pharmacy Supply	517,327.86 141,497.28 22,136.78 56,650.38 171,328.80 41,732.38 18,509.99	270,339.11 38,461.99 12,389.17 26,333.19 127,282.97 23,636.42 5,702.63	235,917.10 41,300.11 11,063.33 26,689.65 94,96739 23,336.98 8,514.92	<.001*<.001* <.001*<.001* <.001*<.001* <.001*

Scientific Session IV (cont.)

Survival Overall ECMO Used	394 (73.4) 78 (48.8)	902 (72.3) 172 (47.1)	335 (74.4) 74 (55.6)	.67 .24

Table 2. Multivariate regression analysis predicting cost and inpatient mortality.

	Adjusted Total Cost of Initial Hospitalization		Adjusted Odds of Mortality	
Variable	Beta [95%CI]	p-value	Odds Ratio (95%CI)	p-value
Low Birthweight (≤2kg)	+ $31,264 [13,695-48,834]	<.001*	4.48 (3.28-6.10)	<.001*
ECMO Used	+ $99,556 [87,717-111,395]	<.001*	6.61 (5.31-8.27)	<.001*
ECMO Available	- $23,098 [(-)62,781-16,583]	.25	1.34 (.61-3.32)	.48
Region-Midwest-Northeast-South-West	+ $31,404 [12,653-50,155]-$37,160 [(-)61,567-(-)12,753]+$25,066 [6,951-43,180]-$19,310 [(-)38,665-46]	.001*.003*.007*.051	1.27 (.94-1.73)1.13 (.80-1.60)1.07 (.80-1.43)1.0	.12.49.66Ref
Payment Source-Private-Government-Other	+ $5,211 [(-)11,020-21,442]+$4,566 [(-)11,025-20,158]-9,777 [(-)31,547-11,992]	.53.57.38	1.01.22 (.97-1.52)1.16 (.82-1.63)	Ref..09.40
Regional Pricing Tier-Upper Tier-Middle Tier-Lower Tier	+ $99,411 [78,420-120,402]-$20,731 [(-)36,302-(-)5,159]-$78,680 [(-)98,805-(-)58,556]	<.001*.009*<.001*	1.01.22 (.94-1.59)1.17 (.82-1.67)	Ref.13.38
Hospital Volume-High (≥50 cases/5 yrs)-Low	+ $22,251 [7,840-36,663]-$22,251 [(-)36,663-(-)7,840]	.003*.003*	1.01.53 (1.17-1.99)	Ref.002*

NOTES:

Scientific Session IV (cont.)

30

LIMITATIONS OF AN ADMINISTRATIVE DATABASE COMPARED TO A RESEARCH DATABASE IN THE EVALUATION OF OUTCOMES IN NEWBORNS WITH CONGENITAL DIAPHRAGM HERNIA

Sara C. Fallon[1], Pamela A. Lally, MD[2], Kevin P. Lally, MD, MS[2], Mary T. Austin, MD, MPH[2], Timothy C. Lee, MD[1], Lillian S. Kao, MD, MS[2], Monica E. Lopez, MD[1], Kuojen Tsao, MD[2].

[1]Division of Pediatric Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX, USA, [2]Center for Surgical Trials/Evidence-Based Practice, Department of Pediatric Surgery, University of Texas School of Medicine at Houston, Houston, TX, USA.

Purpose:
Administrative databases are used to study large cohorts of patients with rare diseases, such as congenital diaphragmatic hernia (CDH). However, data accuracy and its impact on subsequent conclusions are questionable. This study evaluated data fidelity between an administrative (Pediatric Health Information System, PHIS) and disease-specific research database (Congenital Diaphragmatic Hernia Registry, CDHR).

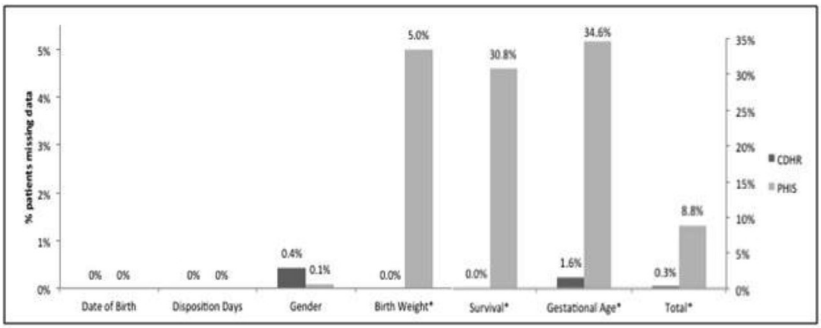
Methods:
From 2007-2011, 18 hospitals common to PHIS and CDHR were queried for all CDH patients, admitted at <8 days of life. To identify those present in both datasets, patients were matched on hospital, year, birthdate, admission date, gender, birthweight, survival, and days to disposition. Outcomes included differences in the two cohorts, the quantity of missing data, and discrepancies in specific variables. Only variables explicitly entered into each database were utilized to quantify missing data.

Results:
1,224 patients were identified in PHIS and 925 in CDHR. 899 patients were common to both databases (73.4% PHIS, 97.2% CDHR). In comparing all patients in both sets (Table), the overall repair rate was significantly higher in CDHR (82.1% CDHR vs. 69.4% PHIS, $p<0.001$), while the survival among patients not repaired was significantly higher in PHIS (1.2% vs. 45.5%, $p<0.001$). Among the unmatched PHIS patients (n=325), 92 (7.5%) were assumed erroneously labeled due to survival and discharge without repair, 32 (2.6%) were plication procedures, while 201 (16.4%) were indeterminate. Among 6 variables, PHIS was missing 8.8% of the total possible data points compared to 0.25% in CDHR ($p<0.05$) (Graph).

Conclusions:
Before using administrative data for clinical outcomes research, careful evaluation of the data integrity is required. Differences in key definitions can result in large discrepancies in outcomes and flawed conclusions.

Scientific Session IV (cont.)

Comparison of PHIS versus CDH patients						
Variable	All PHIS patients (n=1224)	All CDHR patients (n=925)	p-value	Matched PHIS patients (n=899)	Matched CDHR patients (n=899)	p-value
Male Gender	61.5%	62.9%	0.52	63.3%	63.2%	1.0
Gestational Age	37.3 +2.7	37.4+2.5	0.73	37.6+2.4	37.4+2.5	0.26
Birth weight (kg)	2.89 +0.7	2.92+0.6	0.20	2.93+0.7	2.93+0.6	0.99
ECMO required	33.7%	34.8%	0.58	35.6%	35.3%	0.88
Days until Disposition	51.2+63.0	49.9+57.6	0.59	49.7+58.2	49.4+55.9	0.91
CDH repaired	69.4%	82.1%	<0.001	81.0%	82.8%	0.33
Days until Repair	9.5+14.2	8.9+9.6	0.38	9.4+12.5	8.8+8.2	0.37
Survival	73.4%	70.9%	0.24	71.2%	71.4%	0.94
Survival in Non-repaired CDH	45.5%	1.2%	<0.001			



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Scientific Session IV (cont.)

31

ENHANCING NSQIP-PEDS THROUGH INTEGRATION WITH THE PEDIATRIC HEALTH INFORMATION SYSTEM

Katherine J. Deans, MD[1], Peter C. Minneci[1], Jennifer N. Cooper, PhD[1], Mehul V. Raval, MD[1], Shawn J. Rangel, MD[2], R. Lawrence Moss, MD[1].

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]Children's Hospital Boston, Boston, MA, USA.

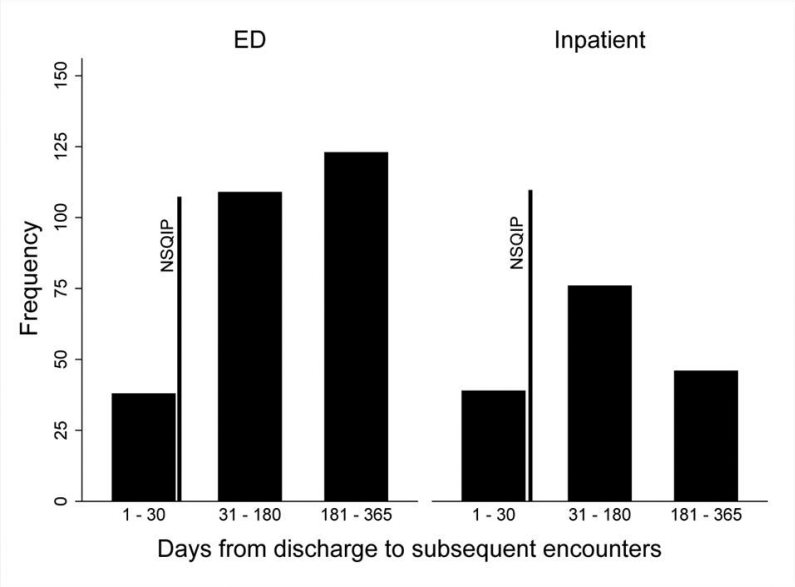
Purpose:
The American College of Surgeons National Surgical Quality Improvement Program-Pediatric (NSQIP-Peds) provides validated, clinically meaningful data but is limited to 30-day follow-up. The Pediatric Health Information System (PHIS) is a longitudinal administrative database which contains patient-level data on diagnoses, procedures, medications, and costs. We describe the implementation and validation of a method to link NSQIP-peds to PHIS to create a dataset that capitalizes on the strengths of both.

Methods:
All NSQIP-Peds and PHIS cases submitted from our institution between 1/1/2010 and 3/31/2010 were matched based on gender and dates of birth, admission, and discharge, allowing +/- 1 day for either date of admission or discharge.

Results:
Of the 375 NSQIP-Peds records and 17,987 PHIS records, 94.1% met match criteria. Validation using medical record numbers revealed that 100% were true matches. 172 of the 375 NSQIP-Peds patients (45.9%) returned to the hospital within 1 year. Within this group there were a total of 483 subsequent hospital visits, 399 (82.6%) of which occurred after the 30-day NSQIP monitoring period (Figure 1). The median number of subsequent visits per child was 2 (IQR 1-3). Of the 172 patients, 129 (75.0%) returned to the ED and 66 (38.4%) were admitted to the hospital.

Conclusions:
Indirect identifiers can be used to link the NSQIP-Peds and PHIS databases with excellent accuracy and completeness at a single institution. The high rate of hospital utilization outside of the 30 day NSQIP-Peds follow-up period indicates that a merger of these datasets may provide a more comprehensive way to study healthcare utilization, practice variability, and clinical outcomes. A national effort to confirm the feasibility of combining these databases across participating institutions is warranted.

Scientific Session IV (cont.)



NOTES:

Scientific Session IV (cont.)

32

SIMPLIFYING SIMPLE APPENDICITIS: IMPLEMENTATION OF A SAME DAY DISCHARGE PROTOCOL

Laura A. Boomer, Kelli Kurtovic, BS, Katherine J. Deans, MD, Peter C. Minneci, MD, Jennifer Aldrink, MD, Benedict Nwomeh, MD, Karen Diefenbach, MD, Brian Kenney, MD.

Nationwide Children's Hospital and the Ohio State University College of Medicine, Columbus, OH, USA.

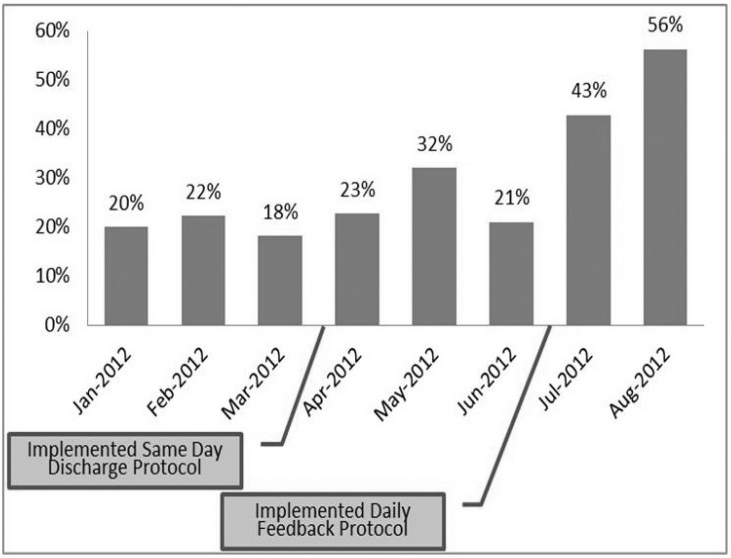
Purpose:
Same day discharge (SSD) has been implemented for several surgical procedures, but only a few reports have demonstrated the feasibility of SDD after appendectomy for simple appendicitis in children. We implemented a SDD protocol to improve the ratio of quality to cost for these patients.

Methods:
Data was collected on all patients undergoing appendectomy for a diagnosis of simple appendicitis at our institution from January 2011 to August 2012. A protocol for SDD was implemented in April 2012. Deviations from the protocol were monitored and reported back to clinicians to understand variation and maximize compliance. Monthly results were analyzed by p chart and intervention effect was examined using the test of two proportions.

Results:
During the study period, 463 patients presented with simple appendicitis. SDD was achieved in only 19.5% before, compared to 35.5% after implementation of the protocol ($P < 0.001$). Protocol implementation led to incremental increases in SDD with recent compliance reaching 56.3% (Figure). The most common reasons for protocol noncompliance were: completion of surgery after 8pm (57%), procedure related issues (21%), concurrent medical diagnoses (14%), and family apprehension for SDD (7%). The rate of readmission did not change with the implementation of the SDD protocol (1.2% pre vs. 0.78% post, $p=1.0$). In addition to the intended effect of increasing the number of SDDs, the overall length of stay for simple appendicitis decreased from 1.31 days to 1.18 days ($p=0.021$) with an average cost savings of $2500 per patient.

Conclusion:
Adoption of a quality improvement protocol with continuous monitoring and feedback to promote SDD after appendectomy for simple appendicitis safely increased the number of patients discharged home on the same day of their operation, incurred substantial cost savings, and decreased the length of stay for this population.

Scientific Session IV (cont.)



NOTES:

Scientific Session IV (cont.)

33

SHIFTS TOWARDS CHILDREN'S HOSPITALS IN THE TREATMENT OF COMMON PEDIATRIC SURGICAL CONDITIONS: TRENDS AND OUTCOMES

Jarod P. McAteer, MD[1], Cabrini A. LaRiviere, MD, MPH[2], Keith T. Oldham, MD[3], Adam B. Goldin, MD, MPH[1].

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Purpose:
Several position statements have urged referral of certain childhood surgical conditions to fellowship-trained pediatric surgeons, but it is unclear whether such changes have occurred. We hypothesized that an increasing proportion of common procedures are performed in children's hospitals over time, and that outcomes are superior at these centers.

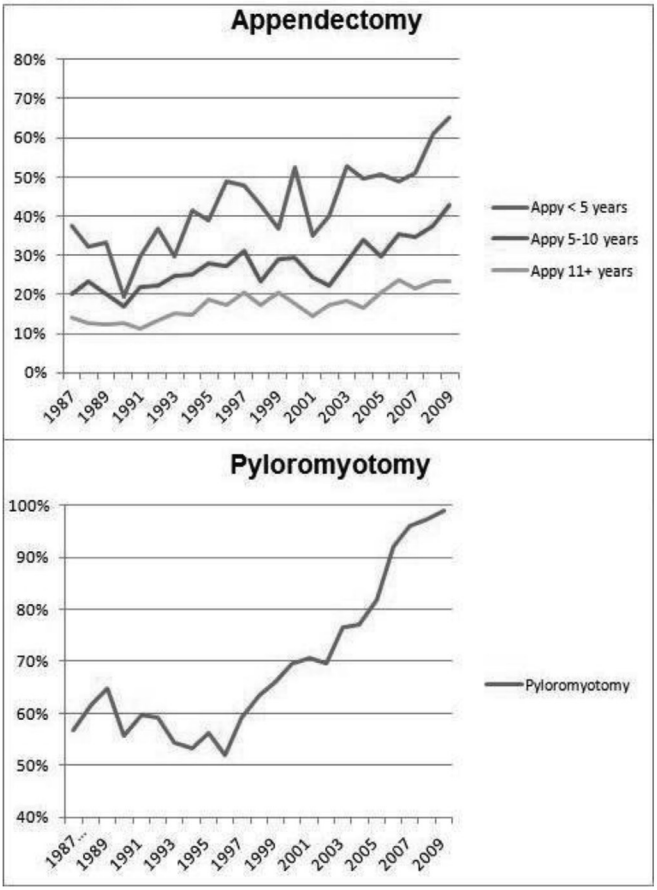
Methods:
We conducted a population-based retrospective cohort study using Washington State discharge records. All children ages 0-17 years undergoing non-incidental appendectomy (n=39,472) and pyloromyotomy (n=3,500) from 1987-2009 were included. Children's hospitals were defined as centers with full-time pediatric-trained specialists. Logistic regression was used to identify factors associated with care at a children's hospital, and factors associated with postoperative complications ($p<0.05$ significant).

Results:
Among appendectomy patients, children's hospitals (compared to non-children's) treated a greater proportion of patients under age 5 (8.9% vs. 3.3%), as well as children with perforation (31.6% vs. 25.4%) and comorbidities (6.5% vs. 3.6%). Children's hospitals also treated a greater proportion of pyloromyotomy patients with comorbidities (6.5% vs. 1.8%). Over the study period, the percentage of procedures performed at children's hospitals steadily increased; the percentage of appendectomies increased from 17% to 32%, and pyloromyotomies from 57% to 99%. On multivariate analysis, each successive year independently increased the likelihood of care at a children's hospital for both appendectomy (OR=1.04, $p<0.001$) and pyloromyotomy (OR=1.09, $p<0.001$). For pyloromyotomy, care at a children's hospital was associated with decreased risk of postoperative complications (OR=0.36, $p<0.001$). Appendectomy outcomes did not differ significantly between hospital types, except for decreased negative appendectomy risk at children's hospitals for ages 5-10 (OR=0.68, $p=0.04$).

Scientific Session IV (cont.)

Conclusions:
The shift towards care at these centers with advanced pediatric specialty resources is associated with improved outcomes in children, even for common procedures. While the mechanisms of this observation remain as of yet unknown, consolidating pediatric care in specialized environments may continue to lead to optimized safety and outcomes.

Percentage of procedures performed at children's hospitals in Washington State, by year.



NOTES:

Scientific Session IV (cont.)

34

REPORT OF A PROSPECTIVE, RANDOMIZED, DUAL-CENTER, SINGLE BLINDED TRIAL OF LAPAROSCOPIC VERSUS OPEN APPENDECTOMY IN CHILDREN

David W. Bliss, MD, FACS, FAAP[1], David Cho, MD[2], Julie Mckee, PNP[2], Sanjay Krishnaswami[2], Garret Zallen, MD, FACS, FAAP[2], Mark Silen, MD, FACS, FAAP[2], Marvin Harrison, MD, FACS, FAAP[2].

[1]Children's Hospital Los Angeles, Los Angeles, CA, USA, [2]Oregon Health and Science University, Portland, OR, USA.

Purpose:
Insufficient data exists to support the use of laparoscopic or open methods in the treatment of Pediatric appendicitis. We hypothesized that laparoscopic appendectomy would have a lower rate of wound and intra-abdominal infections.

Methods:
Under dual IRB approval at two regional children's hospitals staffed by the same attending Pediatric Surgeons from January 2008-December 2010, children with appendicitis were randomized to undergo laparoscopic (n=177) or open (n=206) operations. All care was otherwise identical and protocol-driven. Children were excluded for reasons of parental/guardian refusal, language other than English or Spanish (institution B), and severity of illness demanding emergency midline laparotomy. Patients, families, and caregivers including hospital staff, trainees, and the data collector were blinded to the operation type for 7 days post-operatively. Comprehensive demographic, operative, medication, and outcome data was recorded. Statistical significance ($p<0.05$) was determined using chi-squared method for categorical data and the student t-test for comparison of means for continuous data.

Results:
Patient demographics for the two groups including age, weight, height, gender, ethnicity, co-morbidities, and degree of appendicitis were similar in both groups. The study was terminated when a statistically significant difference in the primary outcome (wound and/or intra-abdominal infection) was reached [laparoscopic vs. open, n=6 (3.4%) vs. n=23 (11.2%), p=0.004]. Median operative time was also shorter in laparoscopy (0.72 vs. 1.1 hours, $p<0.001$). There were no differences in the number of doses of intravenous pain medication while inpatient, the time to tolerate feeds, length of stay, other complications, readmission, or visits to other providers.

Conclusions:
In a randomized trial of laparoscopic versus open appendectomy in children, laparoscopy demonstrated superior performance with regard to wound or intra-abdominal infections and operative time. Open and laparoscopic techniques had equivalent results with respect to pain medication requirements, time to feed, length of stay, other complications, readmissions, and visits to other providers.

NOTES:

Scientific Session IV (cont.)

35

PROTOCOL VERSUS *AD LIB* FEEDS AFTER LAPAROSCOPIC PYLOROMYOTOMY: A PROSPECTIVE RANDOMIZED TRIAL

Obinna O. Adibe, MD, Corey W. Iqbal, MD, David Juang, MD, Susan W. Sharp, PhD, Charles L. Snyder, MD, George W. Holcomb III, MD, MBA, Daniel J. Ostlie, MD, Shawn D. St. Peter.

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

Purpose:
The use of a protocol for advancing feeds after pyloromyotomy is the historical standard. Several groups have advocated for ad lib feeding, however, prospective comparative data are lacking. Therefore, we conducted a prospective, randomized trial comparing protocol to ad lib feeding after pyloromyotomy.

Methods:
After IRB approval, infants undergoing laparoscopic pyloromyotomy for pyloric stenosis were randomized to protocol versus ad lib feeding strategies. Exclusion criteria included operative complications. The protocol started with pedialyte 2 hours post-operative. This was repeated by another round of pedialyte then 2 rounds of half-strength formula or breast milk followed by 2 rounds of full strength formula or breast milk followed by home feeding regimen at which the patient was discharged if well. The ad lib group was allowed formula or breast milk 2 hours after the operation and considered for discharge after tolerating 3 consecutive feeds. The primary outcome variable was post-operative duration of hospitalization. Utilizing a power of 0.9 and an alpha of 0.05, a sample size of 150 patients was calculated.

Results:
150 patients were enrolled between 1/2010 and 12/2011. There were no differences in patient characteristics at presentation (Table). While the ad lib group reached goal feeds sooner than the protocol group, this did not translate into a difference in duration of hospitalization (Table). There were more patients with emesis in the ad lib group after goal, but no difference in readmissions with 2 patients in each group.

Conclusions: Ad lib feeding allows patients to reach goal feeds more rapidly than protocol feeding. However, this goal is usually reached beyond discharge hours resulting in a similar duration of hospitalization.

Scientific Session IV (cont.)

Table

	Ad Lib (N=75) Mean +/- S.D.	Protocol (N=75) Mean =/- S.D.	P Value
Age (Days)	39.9 +/- 19.1	39.8 +/- 14.9	0.93
Pyloric Thickness (mm)	4.4 +/- 0.8	4.4 +/- 0.9	0.93
Operating Time	20.6 +/- 10.6	18.2 +/- 8.0	0.11
Doses of Analgesics	1.5 +/- 1.4	1.6 +/- 1.4	0.68
Patients with Pre-Goal Emesis	45 (60%)	51 (68%)	0.40
Patients with Post-Goal Emesis	31 (41%)	11 (14.6%)	<0.0001
Time to Goal (Hours)	9.2 +/- 7.0	16.6 +/- 7.9	<0.0001
Hospitalization after Goal (hours)	16.2 +/- 14.6	9.2 +/- 6.2	0.0002
Hospitalization after Operation (hours)	25.4 +/- 15.4	25.8 +/- 10.1	0.85

NOTES:

Scientific Session IV (cont.)

36

OPERATIONALIZING QUALITY IMPROVEMENT IN A PEDIATRIC SURGICAL PRACTICE

Marjorie J. Arca, MD[1], Jessica A. Enters, BA, BSN[1], Melissa Christensen, BS, CCRC[1], Thomas T. Sato, MD[1], Robert Thielke, PhD[2], Keith T. Oldham, MD[1].

[1]Medical College of Wisconsin/Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]Children's Hospital of Wisconsin, Milwaukee, WI, USA.

Purpose:
Quality improvement (QI) is critical to enhancing patient care. It is necessary to prioritize which QI initiatives are relevant to one's institution and practice, as implementation is resource intensive. This report describes a process we have developed and implemented to identify QI opportunities in our practice.

Methods:
We designed a web-based Pediatric and Infant Case Log and Outcomes (PICaLO) instrument using Research Electronic Data Capture (REDCap™) to record all surgical procedures in our practice. At the time of operation, a surgeon fills out a case form (1-2 minutes). His/her administrative assistant enters data in REDCap™ (3-5 minutes) within 2-4 days. Patient variables include demographics, ASA status, operative details, and risk factors. Adverse outcomes such as complications, unplanned readmissions/reoperations/transfers to a higher level of care, and deaths are recorded by the surgery team at the time of each encounter and during weekly Morbidity and Mortality Conferences.
Complications are classified as technical, patient disease, lack of judgment/experience, communication errors, or other. Variables were chosen and defined based on national standards from groups like the American College of Surgeons (ACS) National Surgical Quality Improvement Program and ACS Patient Based Learning Log. Occurrences are queried for potential QI initiatives.

Results:
From January 1 to August 30, 2012, 2393 cases were entered. During that time, there were 122 complications (5%), 64 unplanned reoperations (3%), 41 unplanned readmissions (2%), and 8 deaths recorded (0.3%). Two specific QI opportunities were prospectively identified during the first six months of review: (1) instrument use during laparoscopic appendectomies and (2) preoperative antibiotics for infants in the Neonatal Intensive Care Unit.

Conclusion:
Data on procedures and outcomes can be collected effectively in a busy academic pediatric surgery practice to delineate pertinent QI initiatives. PICaLO is recognized by the American Board of Surgery as the only institution-specific instrument to meet Maintenance of Certification 4 criteria.

NOTES:

Innovation Session

Abstracts on New and Innovative Techniques and Procesures

Saturday, May 4, 1:30 p.m. – 2:30 p.m.

i1

THE DEVELOPMENT OF A MURINE MODEL FOR INVESTIGATING THE USE OF A TISSUE ENGINEERED VASCULAR GRAFT IN THE PORTAL CIRCULATION

Mark W. Maxfield, MD[1], Hirotsugu Kurobe, MD, PhD[2], Tai Yi, MD[2], Zhen W. Zhuang, MD[1], Kevin A. Rocco, BS[3], Paul Bagi, BS[1], Shuhei Tara, MD, PhD[2], Muriel Cleary, MD[1], Daniel Solomon, MD[1], Albert J. Sinusas, MD[1], Toshiharu Shinoka, MD, PhD[2], Christopher K. Breuer, MD[2].

[1]Yale University School of Medicine, New Haven, CT, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA, [3]Yale University, New Haven, CT, USA.

Purpose:
The surgical management of choice for children with prehepatic portal hypertension is Meso-Rex bypass. Currently used vascular conduits are problematic. Use of autologous grafts is limited by supply and the additional morbidity associated with harvesting the conduit while use of synthetic vascular grafts is limited by a high incidence of thromboembolic complications and lack of growth potential. Tissue engineered vascular grafts (TEVGs) offer an attractive theoretical alternative. There are currently no validated animal models for investigating the use of vascular grafts in the portal circulation. Herein, we describe a small animal model for investigating the feasibility of TEVGs as Meso-Rex shunts.

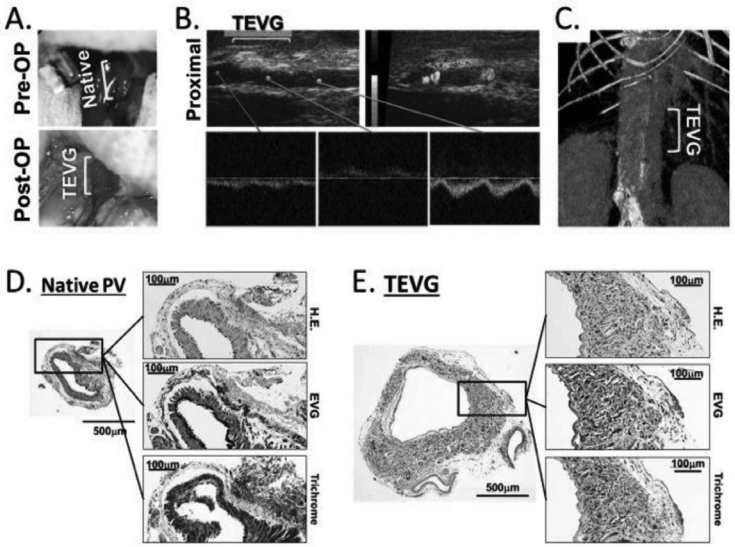
Methods:
Under IACUC approved protocol, biodegradable scaffolds were constructed using poly(glycolic acid) fabric with poly(ε-caprolactone-co-l-lactic acid) sealant resulting in sub-1mm inner luminal diameters and lengths of 3mm (Figure A) and were surgically implanted as portal vein interposition conduits in female (SCID/bg) mice. Graft patency was monitored using serial Doppler ultrasound and in vivo micro-computed tomography (microCT). Grafts were explanted at 4, 8, and 24-weeks post-implantation and analyzed using histologically.

Results:
Twelve grafts were successfully implanted. Serial ultrasound showed excellent patency. There were no signs of stenosis or aneurism to six months after implantation (Figure B). MicroCT confirmed graft patency and morphometry (Figure C). Histological evaluation of explanted grafts demonstrated cellular infiltration within the graft wall with robust neotissue formation (Figure D,E).

Conclusion:
We developed a small animal model to investigate the use of TEVGs for use in Meso-Rex bypass shunts and demonstrated the feasibility of this technology. Continued use of this model will enable us to explore the cellular and molecu-

Innovation Session (cont.)

lar mechanisms underlying vascular neotissue formation in TEVG. Translation of this technique to a large animal model will help evaluate its safety and efficacy for ultimate application in children with extra-hepatic portal vein obstruction requiring operative intervention.



NOTES:

Innovation Session (cont.)

i2

A NOVEL NEONATAL POSITIONING SYSTEM FOR ECMO CANNULATION AND THERAPY

Miramar Lee Choy, BS[1], Zachary Trimble, PhD[1], Joel Hijirida, BS[1], Brandon Neill, BS[1], Sonya Ling, BS[1], My Van Vo, BS[1], Scott Miller, PhD[1], **Russell K. Woo, MD**[2].

[1]University of Hawaii, Department of Mechanical Engineering, Honolulu, HI, USA, [2]University of Hawaii, Department of Surgery, Honolulu, HI, USA.

Purpose:
The effectiveness of neonatal Venovenous Extracorporeal Membrane Oxygenation (VV ECMO) is influenced by the position and orientation of the venous cannula. In particular, newer bicaval, dual lumen cannulas require precise placement of their differential ports, often with image guidance. Proper positioning of the patient with neck extended and rotated facilitates the insertion procedure. This is usually accomplished with cushions placed under the patient's chest. Subsequent repositioning to a more neutral position requires potentially abrupt removal of these cushions and can lead to breaks in the sterility or cannula migration. We sought to develop an improved method for positioning infants to facilitate safety and convenience during neonatal VV ECMO cannula insertion and subsequent therapy.

Methods:
A collaborative, multi-disciplinary team of faculty and students utilized the engineering design process and the principles of Quality Function Deployment to define, validate, and develop a solution to the clinical need. A detailed list of design requirements and engineering specifications was developed to guide an exhaustive brainstorming process. An array of possible solutions was narrowed down to five candidate concepts. After testing and analysis of the concepts, the group advanced a final solution through prototyping and refinement.

Results:
A neonatal positioning device utilizing a slider crank linkage assembly within a lightweight, ergonomic frame was developed. The device is fully compatible with existing neonatal open warmers and is capable of finely controlled, remote operation. The device can accommodate a range of patient sizes and positions. Biocompatibility, sterilization, and electrical issues were considered and addressed.

Conclusions:
The device accomplishes remotely controlled, slow and precise patient neck extension and flexion while maintaining sterility and avoiding abrupt motion. This may improve safety and convenience during ECMO cannulation procedures and subsequent therapy. Further development is focused on expanding the capabilities of the device to facilitate other neonatal surgeries and procedures.

NOTES:

Innovation Session (cont.)

i3

A NOVEL BIODEGRADABLE DEVICE FOR INTESTINAL LENGTHENING

Veronica F. Sullins, Justin P. Wagner, Elvin K. Chiang, Arnold Suwarnasarn, Steven L. Lee, Benjamin M. Wu, James CY Dunn.

UCLA, Los Angeles, CA, USA.

Purpose:
Previous studies demonstrated successful mechanical lengthening of rat jejunum using an encapsulated Nitinol spring device over a stabilizing guidewire. We sought to improve the applicability of intestinal lengthening by creating a biodegradable device.

Methods:
Using previously measured properties of the Nitinol spring device, we created biodegradable springs with similar outer diameter (3.4mm) and spring constant (0.0010 N/mm). Heat-set polycaprolactone (PCL, a polymer used in absorbable sutures) springs were created and tested in dry and hydrated environments for different durations to simulate *in vivo* conditions. The optimal PCL springs were placed into coated gelatin capsules. A 1-cm segment of rat jejunum was isolated and lengthened *in vivo* using the encapsulated PCL spring device. After a period of lengthening, the isolated segment of jejunum was measured, and tissue histology was analyzed.

Results:
The optimal PCL springs most closely resembling the Nitinol spring devices had an average spring constant of 0.0018 ± 0.00039 N/mm, pitch (distance between coils) 1.55 ± 0.85 mm and band width 0.825 ± 0.016 mm. After hydration, the PCL springs maintained similar spring constants for two weeks *in vitro*. When tested *in vivo*, jejunal segments were lengthened from 1.0 cm to 2.8 cm without the need for a stabilizing guidewire. Lengthened segments had increased smooth muscle thickness and fewer ganglia compared to normal intestine. Lengthened jejunum was successfully restored back into intestinal continuity (Fig. 1) and possessed mucosa with crypts and villi. The restored segment demonstrated peristalsis under fluoroscopy and had normal orocecal transit time.

Conclusions:
A novel biodegradable encapsulated spring device was created and successfully used to mechanically lengthen intestinal segments. Use of a biodegradable device may obviate the need for retrieval after lengthening. This approach improves the applicability of the device and may be useful for the treatment of short bowel syndrome.

Innovation Session (cont.)

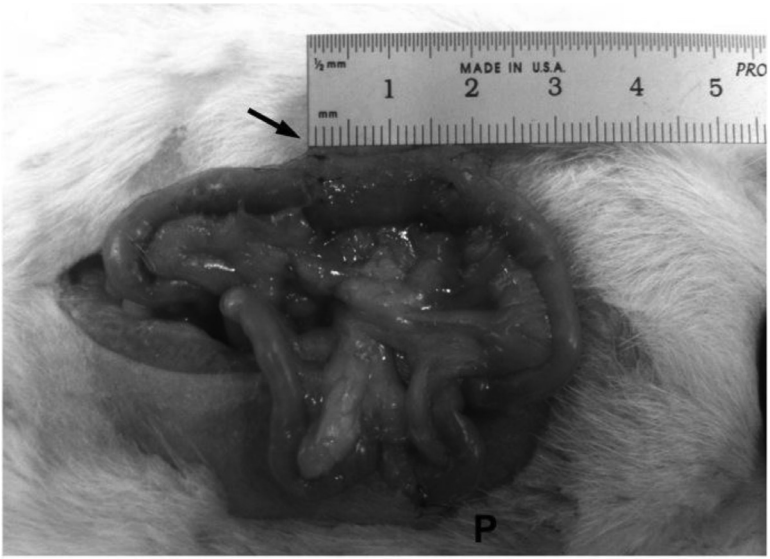


Figure 1: Photograph of the lengthened, restored jejunal segment (arrow). P indicates the proximal anastomosis.

NOTES:

Innovation Session (cont.)

i4

DEVELOPMENT AND PROTOTYPING OF A DETACHABLE, ADJUSTABLE, MAGNETICALLY ANCHORED GRASPER FOR MINIMALLY INVASIVE SURGERY IN CHILDREN

Keiko Amano, MS, Matthew Sander, MS, Yang Zhao, MS, Dillon A. Kwiat, BS, Michael R. Harrison, MD.

University of California San Francisco, San Francisco, CA, USA.

Purpose:
A limiting problem in single-port (and single-surgeon) laparoscopic procedures in children is the inability to maintain adequate retraction due to difficult retraction angles. This problem could be solved by a device that allows retraction independent of the available abdominal wall port. This device would have to 1) be delivered through an existing port; 2) be capable of grasping the organ to be retracted (e.g. gallbladder) with adjustable pressure controlled by the surgeon (i.e. not spring-loaded); 3) be detached from the delivery mechanism so the port would be free for other instruments; and 4) be manipulated and anchored from outside the abdomen without using the port.

Methods:
We employed CAD tools and rapid prototyping techniques including 3D printing to develop and prototype a detachable, magnetically anchored laparoscopic retractor. Proof-of-concept testing included measures of the forces generated between magnets, measures of the forces on tissue, and ability to disconnect and reconnect the detachable device.

Results:
A CAD drawing is shown below. The prototype device was able to detach and reattach at the will of the operator. The magnet at the proximal end was able to be manipulated and anchored by the external magnet. When the distance across the abdominal wall was greater than 6cm, the B field was too weak for the two magnets to engage. Despite offering the significant advantage of detachability, the forces applied to the tissue by the grasper jaws were comparable to those of conventional graspers.

Conclusion:
This detachable, magnetically anchored grasper can be manipulated from outside the body without an abdominal wall opening. It facilitates exposure by allowing a multitude of retraction angles. It reduces the number of ports required for minimally invasive surgeries, improving cosmesis and reducing OR time. It also offers surgeons the capacity to conduct minimally invasive surgeries with fewer personnel.

Innovation Session (cont.)

NOTES:

Innovation Session (cont.)

i5

VALIDATION OF A NOVEL THORACOSCOPIC ESOPHAGEAL ATRESIA/ TRACHEOESOPHAGEAL FISTULA REPAIR SIMULATOR

Katherine A. Barsness, MD[1], Deborah M. Rooney, PhD[2], Lauren M. Davis, BA[3], Anthony C. Chin, MD[1].

[1]Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, [2]University of Michigan Medical School, Ann Arbor, MI, USA, [3]Northwestern University Feinberg School of Medicine, Chicago, IL, USA.

Purpose:
Thoracoscopic esophageal atresia/tracheoesophageal fistula (EA/TEF) repair requires advanced minimally invasive skills. A validated high fidelity simulation model would provide a safe environment to teach advanced skills to novice learners. The study purpose was to evaluate validity evidence for performance measures on the simulator. We hypothesized that experts would perform at a higher level than novice surgeons.

Methods:
IRB exempt pilot data were collected at a 2012 national pediatric surgery meeting. Twelve self-reported "novice" and eight "expert" pediatric surgeons volunteered to participate. Participants evaluated the simulator across 24 different items. Deidentified operative performances were videotaped and independently rated by two surgeons, using the validated Objective Structured Assessment for Technical Skills (OSATS) instrument. Participants' observed averages of survey ratings were analyzed for evidence of content validity evidence. Inter-item consistency (Cronbach alpha) and inter-rater agreement (ICC) evaluated evidence relevant to internal structure. Novice and expert OSATS were compared. $P < 0.05$ was significant.

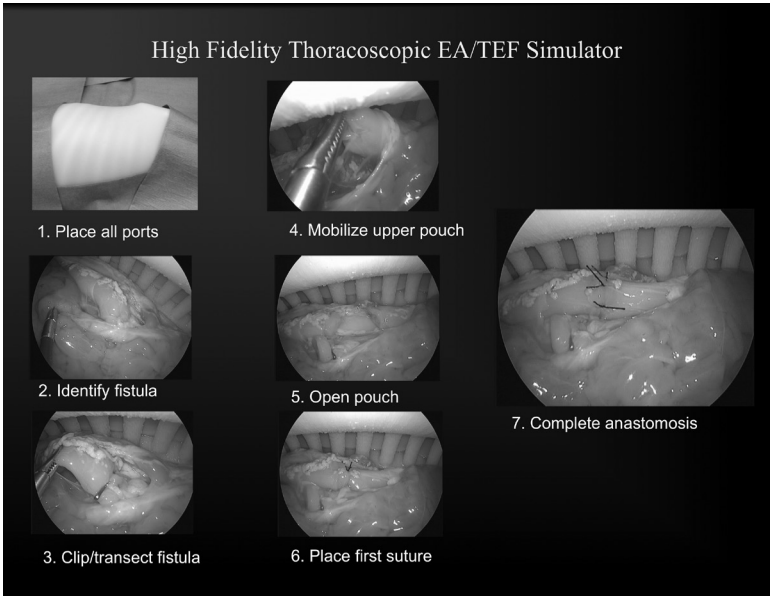
Results:
Simulator evaluation ratings were higher for experts (4.5) compared to novices (4.4), $p = .01$. Internal structure validity was supported by high inter-item consistency ($\alpha = .95$ and .96), and inter-rater agreement (ICC) [.52, .84] for OSATS ratings. Experts performed at a significantly higher level than novices for all 5 primary and 2 supplemental OSATS items ($p<.05$).

Conclusion:
Favorable simulator ratings from experts and novices indicate the simulator is relevant to clinical practice and valuable as a learning tool. Additionally, the simulator can discriminate expert and novice performances of EA/TEF repair. We conclude that the simulator can be used for performance assessment, representing the first validated simulation model for pediatric surgical training.

Innovation Session (cont.)

Comparison of novice vs. expert mean OSATS scores

OSATS (ratings 1-5 were averaged for two raters)	Novice (n=12)	Expert (n=8)	p value
Cumulative Score (range, 0-25)	15	21	0.01
1. Respect for tissue	3.2	4.1	0.04
2. Time and motion	2.6	4.0	0.001
3. Instrument handling	2.8	4.0	0.009
4. Flow of operation	3.4	4.4	0.049
5. Knowledge of specific procedure	3.4	4.4	0.025
6. Patent anastomosis	0.46 +/- 0.52	1.0 +/- 0.0	0.009
7. Completed within allotted time	0.58 +/- 0.52	1.0 +/- 0.0	0.036
8. Time to complete (minutes)	34.67 +/- 11.29	27.4 +/- 6.02	0.127



NOTES:

Innovation Session (cont.)

i6

ENDOSCOPIC SUBMUCOSAL DISSECTION FOR THE TREATMENT OF A LARGE GASTRIC HAMARTOMA IN PEUTZ-JAGHER SYNDROME

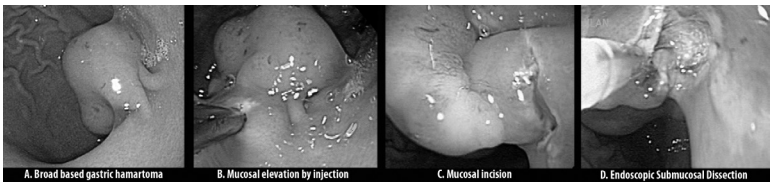
James Wall, MD, MSE, William Burquist, MD, Craig Albanese, MD, MBA.
Stanford University, Palo Alto, CA, USA.

Purpose:
Wide gastric lesions are not amenable to the standard endoscopic snare polypectomy technique. Endoscopic Submucosal Resection (ESD) is gaining popularity for en bloc resection of large gastric masses including early stage cancer in adults. This video demonstrates the use of ESD for a large gastric polyp that would have otherwise required a conventional surgical resection via gastrotomy.

Methods:
A 4-year-old girl with Peutz-Jegher's syndrome had a broad based (~3.5 cm diameter) pedunculated polyp at the incisura, adjacent to the gastric outlet. A single channel gastroscope with 2.8mm working channel was used to access the gastric lumen. A submucosal injection was performed with a mixture of normal saline and epinephrine. The initial mucosal incision was performed with an endoscopic needle knife and subsequent dissection was performed using a combination of blunt dissection and a triangle tip endoscopic knife. Vessel coagulation was achieved with monopolar forceps. A snare was used to complete the polypectomy. Image 1 shows the key aspects of the procedure. The procedure was approved by the hospital's institutional review board.

Results:
Gross total resection of the polyp was accomplished. Estimated blood loss was 10 cc and there were no complications. The procedure took 98 minutes. The patient was discharged on the first postoperative day.

Conclusion:
The video demonstrates a successful ESD technique for endoscopic resection of a large broad-based gastric lesion in a small child.



NOTES:

Video Session

Saturday, May 3, 2:30 p.m. – 3:30 p.m.

V1

THE TRANSPUBIC APPROACH FOR THE REPAIR OF COMPLEX ANORECTAL AND UROGENITAL MALFORMATIONS

Andrea Bischoff, Marc A. Levitt, MD, Alberto Peña.
Cincinnati Children Hospital, Cincinnati, OH, USA.

Purpose:
The transpubic approach is a useful technique for the repair of complex anorectal and urogenital malformations. It has been used by the authors in 44 patients: 16 with complex urogenital malformations, 15 with covered cloacal extrophies, 7 with long urogenital sinus and normal rectum, and 6 cloaca patients who had undergone a previous failed attempted repair.

Methods:
A video was recorded highlighting the important technical details of the transpubic approach in a case of a cloaca that was previously operated and needed a reoperation. During the original operation, only the rectum was repaired and the patient was left with a persistent urogenital sinus, and also had an ectopic ureter and bilateral vesico-ureteral reflux. The junction of the vagina to the urinary tract was extremely high and the patient had no bladderneck.

Results:
The exposure obtained transpubically allowed for a meticulous separation of the bladder from the vagina, protection and reimplantation of both ureters, opening of a vesicostomy and creation of an adequate vaginal introitus; all of that under direct vision.

Conclusion:
The transpubic approach is particularly useful to repair complex urogenital malformations that are difficult to approach through the abdomen, through the perineum or posterior sagitally; especially when the patient has a normal functioning rectum and in cases with severe pelvic fibrosis.

NOTES:

Video Session (cont.)

V2

THORACOSCOPIC DIVISION OF A DOUBLE AORTIC ARCH AND TEF REPAIR THROUGH THE LEFT CHEST IN A PATIENT WITH A DOMINANT RIGHT ARCH

Steven S. Rothenberg, Saundra M. Kay, MD.
The Rocky Mountain Hospital For Children, Denver, CO, USA.

Introduction:
This video depicts a thoracoscopic division of a double aortic arch and repair of a Tracheo-esophageal fistula (TEF) in a infant with a type 3 TEF and a dominant right arch.

Methods:
The patient was a former 36 week premature with an undiagnosed TEF. Initial KUB showed a very small upper pouch and an ECHO suggested a normal left arch. The patient underwent a right thoracoscopic exploration with ligation of the TEF. Because of the long gap and abnormal vascular anatomy at the time of exploration no repair was performed and a laparoscopic G tube was placed. Follow up CT showed a double aortic arch with a dominant right side. A barium study showed the gap between the upper and lower pouch to be 3 ½ vertebral bodies.
At 47 weeks adjusted age and at a weight of 3.6 kg the infant underwent a thoracoscopic division of the left aortic arch and repair of the long gap EA. The procedure was accomplished with a right mainstem intubation and through 3 ports, 2-3mm and 1-5mm, in the left chest. The procedure took 150 minutes.

Results:
The operation was completed successfully thoracoscopically. A small leak was present on day six but sealed spontaneously on day 9. The patient retained good flow to all extremities and follow-up ECHO showed normal cardiac function.

Conclusion:
This video shows a demonstration of division of a vascular ring and repair of a relatively long gap EA. It demonstrates that a left sided approach can be used successfully. To the best of our knowledge this is the first reported case of these 2 anomalies being treated together using a thoracoscopic approach.

NOTES:

Video Session (cont.)

V3

BRONCHOSCOPIC ASSISTED CLOSURE OF AN AIRWAY DEFECT TO PREVENT NARROWING DURING BRONCHOGENIC CYST RESECTION

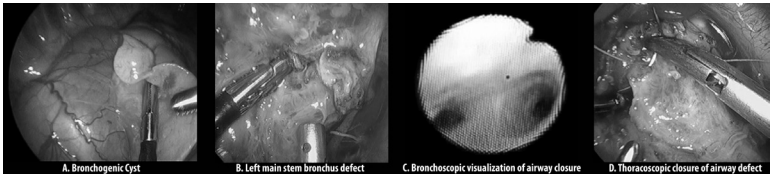
James Wall, MD, MSE, Marilyn Butler, MD, Matias Bruzoni, MD.
Stanford University, Palo Alto, CA, USA.

Purpose:
Bronchogenic cyst (BC) is a relatively rare cause of congenital cystic lung disease and usually does not communicate with the airway. However, communication with the airway significantly raises the complexity of resection. This video demonstrates a combined thoracoscopic and flexible bronchoscopic approach to the management of communication between a bronchogenic cyst and main stem bronchus.

Methods:
A full term neonate with a prenatal diagnosis of left Congenital Pulmonary Airway Malformation was asymptomatic at birth. CT scan at 3 months of age revealed a large cystic component and resection was recommended. Thoracoscopy revealed a BC. During the resection, communication to the left main stem bronchus was recognized and sutured closed. Intraoperative flexible bronchoscopy revealed significant internal narrowing of the airway. The airway closure was revised thoracoscopically under simultaneous direct bronchoscopic vision to insure minimal narrowing.

Results:
The BC was resected completely. The procedure took 114 minutes. The patient had no post-operative respiratory compromise and no air leak from the airway repair.

Conclusion:
This video demonstrates successful management of a bronchial defect during resection of an extralobar BC. Visualization of the airway by flexible bronchoscopy during thoracoscopic closure is a helpful technique to help prevent narrowing of the airway.



NOTES:

Video Session (cont.)

V4

LAPAROSCOPIC ASSISTED RESECTION OF A TYPE IV SACROCOCCYGEAL TERATOMA IN A 6-MONTH-OLD GIRL

Hans Joachim Kirschner, Guido Seitz, Juergen Schaefer, Joerg Fuchs.
University Children's Hospital Tuebingen, Tuebingen, Germany.

Purpose:
We present the case of a six-month-old girl suffering from an extended sacrococcygeal teratoma. The main clinical symptom was constipation.
Diagnostic work up including ultrasound and MRI showed a type IV sacrococcygeal teratoma, according to the Altman classification. Therefore, decision was taken to perform a laparoscopic assisted resection of the tumor.

Methods:
A three port technique was used for the minimal invasive approach in supine position. After abdominal dissection of the teratoma, the child was repositioned in a prone jack-knife position. A posterior longitudinal midline incision was carried out to remove the tumor completely.

Results:
We performed a successful laparoscopic assisted complete resection of a type IV sacrococcygeal teratoma. Histology showed a mature teratoma. The postoperative course was uneventful. After a follow-up of 9 months, there were no signs of tumor recurrence or any urological problems.

Conclusions:
Laparoscopic assisted resection of an extended sacrococcygeal teratoma can be carried out safely in small children. This video highlights the essential steps of the procedure.

NOTES:

Video Session (cont.)

V5

TECHNICAL REAPPRAISAL OF LAPAROSCOPIC KASAI FOR UNCORRECTABLE BILIARY ATRESIA

Atsuyuki Yamataka, Hiroki Nakamura, Abudebieke Halibieke, Hiroyuki Koga, Go Miyano, Manabu Okawada, Geoffrey J. Lane, Tadaharu Okazaki.
Juntendo University School of Medicine, Tokyo, Japan.

Purpose:
We reappraised laparoscopic Kasai (LK) for the surgical treatment of uncorrectable biliary atresia (UBA) achieving results after mean follow-up of 2.5 years (range: 3.4 - 1.2 years) similar to open
Kasai. We present our LK.

Methods:
An extra 5mm trocar is placed in the epigastrium, in addition to conventional trocar placement, and a Ligasure device is inserted to dissect the biliary remnant and divide portal vein branches at the porta hepatis instead of hook diathermy, because Ligasure causes less

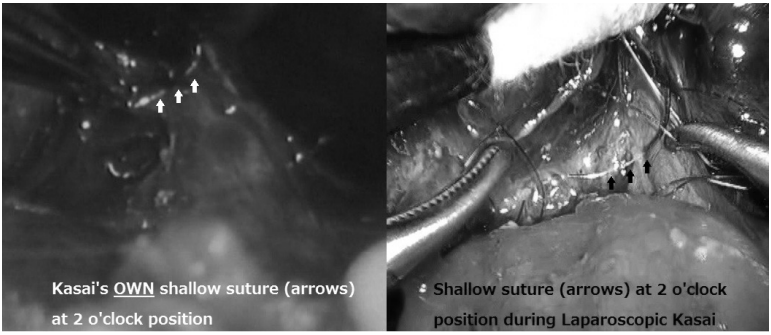
lateral thermal injury than diathermy. The biliary remnant is then transected shallowly as per Kasai's original technique rather than performing an extended dissection. Anastomotic sutures are placed around the margin of the transected biliary remnant, porta hepatis, and at 2 and 10 o'clock where the original right and left bile ducts were, shallowly to the connective tissues, not the liver

parenchyma nor the biliary remnant. An individualized Roux-limb is created extracorporeally through the umbilicus by bringing the distal end of the limb up to just above the xiphoid process. The jejunojejunostomy is also custom made to fit into the splenic flexure when it is returned to the abdominal cavity. The "short" Roux-limb is then approximated to the native jejunum for 8cm cranially to prevent intestinal contents of the native jejunum into the Roux-limb. Thus, Roux-limb redundancy and reflux/stasis, associated with Roux-limbs of predetermined length are prevented.

Results:
We treated 8 UBA patients using LK. Ages at LK were: 59, 119, 72, 70, 54, 64, 29, and 75 days. All became jaundice-free (total bilirubin < 1.5mg/dL) within 2 months of LK. After mean follow-up of 2.5 years, 6 remain jaundice-free with the native liver and 2 required liver transplantation although both were jaundice-free.

Conclusion:
LK may prove to be a promising alternative to open Kasai after our technical reappraisal.

Video Session (cont.)



NOTES:

Video Session (cont.)

V6

LAPAROSCOPIC REPAIR OF BILATERAL FEMORAL HERNIAS IN A CHILD

Curt S. Koontz, **Robert J. Vandewalle, MD**, Michael G. Carr, MD.
University of Tennessee, College of Medicine, Chattanooga, Chattanooga, TN, USA.

Purpose:
This video describes the laparoscopic repair of bilateral femoral hernias in a pediatric patient.

Introduction:
A 5 year-old male was referred to our center with a "recurrence" of his right inguinal hernia & newly noted swelling in his left groin. He had a past surgical history significant for right inguinal hernia repair with mesh by an adult surgeon at age 3. During the physical exam, a Valsalva maneuver revealed bilateral bulges (right greater than left) inferior to the inguinal ligament suggesting femoral hernias. We elected for a laparoscopic repair.

Methods/Results:
During the initial laparoscopic examination, hernia defects were noted bilaterally, inferior to the inguinal ligaments and medial to the iliac veins, which was diagnostic for femoral hernias. The hernia sacs were everted and excised with electocautery. Care was taken to identify and preserve the Vas deferens and the iliac vein. The femoral hernia defects were then obliterated by approximating the inguinal and pectineal (Cooper's) ligaments with 2-0 braided nylon suture. The patient tolerated the procedure well and was discharged home the same day. Operative time was approximately 60 minutes for each hernia defect, for a total time of around 120 minutes.

Conclusion:
Laparoscopy allows for the accurate diagnosis of a femoral hernia, as well as its subsequent repair.

NOTES:

Scientific Session V

Scientific Session V
Rare and Miscellaneous Surgical Issues
Sunday, May 5, 8:00 a.m. – 9:15 a.m.

37

REPORT OF THE 2012 APSA WORKFORCE COMMITTEE MEMBERSHIP SURVEY

Wolfgang Stehr[1], Aviva Katz, MD[2], Richard G. Weiss, MD[3], Daniel A. Saltzman, MD, PhD[4], Don K. Nakayama, MD, MBA[5], 2012 Members of the APSA Workforce Committe[6].

[1]Children's Hospital and Research Center Oakland, Oakland, CA, USA, [2]Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA, USA, [3]Connecticut Children's Medical Center; University of Connecticut School of Medicine, Hartford, CT, USA, [4]University of Minnesota Amplatz Children's Hospital, Minneapolis, MN, USA, [5]Mercer University School of Medicine, Macon, GA, USA, [6]American Pediatric Surgical Association, Deerfield, IL, USA.

Purpose:
This survey was undertaken to evaluate the current pediatric surgical workforce as well as the market for new graduates. We asked questions regarding certain features of current practices, and the current compensation profiles of active pediatric surgeons, as well as retirement plans.

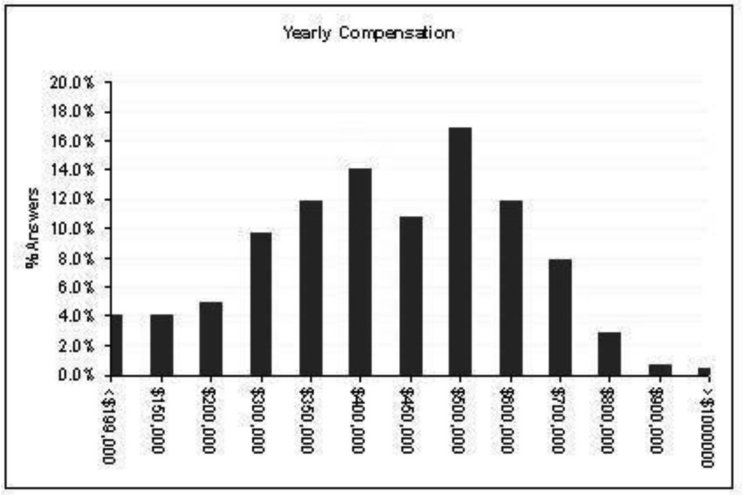
Methods:
An electronic 32-question survey was sent out in April 2012 to 1100 APSA members.

Results:
323 (29%) surveys were completed. In this abstract all numbers are reported as percentages of received answers per question. Position: 60% work fulltime academic, 10% are fulltime employed by multi-specialty hospital, 9% work in private practice with clinical academic appointment. 80% are providing full coverage, 18% are providing no trauma coverage. 27% are fulltime clinical, 42% clinical with administrative duties, 25% clinical with research. Hospital: 24% work in freestanding children's hospitals, 70% in a general hospital with NICU/PICU; Over 95% have full NICU and PICU support. 62% cover multiple hospitals. Growth: The average group size is 5.7. 52% report that they don't need another partner, while 22% think they need at least 3 more. Locum tenens: 11% have locum tenens and 82% of those are paid for by the hospital. 80% don't need locum tenens, 10 % need, but don't have one.

Compensation:
53% of surgeons report that their compensation is productivity based. (Yearly compensation see figure). Retirement: Estimated average time to retirement is 15 years, with over 30% planning to work over 20 more years. 10% have delayed their retirement due to financial constraints.

Scientific Session V (cont.)

Conclusion:
In 2012 the average APSA member surveyed pediatric surgeon works in a full time academic position with 5 partners, works at 2.3 hospitals with PICU/NICU support and provides full pediatric surgical coverage and administrative activities. He/She is compensated $500,000 and is hoping to retire in 15 years.



NOTES:

Scientific Session V (cont.)

38

RANDOMIZED CONTROLLED TRIAL OF MECHANICAL BOWEL PREPARATION FOR CHILDREN UNDERGOING ELECTIVE COLORECTAL SURGERY

Jennifer H. Aldrink, MD, Cindy McManaway, CFNP, Wei Wang, MS, Benedict C. Nwomeh, MD.

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

Purpose:
Adult literature supports the elimination of mechanical bowel preparation (MBP) for elective colorectal surgical procedures. Prospective data for the pediatric population regarding the utility of MBP is lacking. The primary aim of this study was to compare infectious complications, specifically anastomotic leak, intraabdominal abscess, and wound infection in patients who received MBP to those who did not.

Methods:
Following institutional review board approval, a randomized controlled study comparing MBP with polyethylene glycol to no MBP was performed at our institution. Patients 0-21 years old undergoing elective colorectal surgery were eligible, and were randomized within the following age strata (years): infants (<1), toddler (1-5), children (6-12), and adolescents (13-21). Protocol dictated two perioperative doses of intravenous antibiotics. Statistical analyses was performed using Chi-square or Fisher's exact test for categorical data and t-test or Wilcoxon two-sample test for continuous data.

Results:
Thirty-nine patients were enrolled in the study from December 2010 to August 2012. Twenty-two (56%) received MBP and 17 (44%) did not. There were no differences in baseline demographics between the groups. Two patients (5%) had anastomotic leak, 4 (10%) had intraabdominal infection, and 7 (18%) had wound infections. The rate of anastomotic leak, intraabdominal abscess, and wound infection did not differ between the two groups (Table). While compliance with the protocol antibiotic regimen was lower in the no MBP compared to the MBP group (47% vs 78%, respectively, p=0.02), this did not alter infection rates.

Conclusions:
Mechanical bowel preparation for elective colorectal surgery in children does not affect the incidence of infectious complications. A larger multi-institutional study is necessary to validate the results of this single-institution pilot study.

Scientific Session V (cont.)

Rate of Infectious Complications					
Characteristic		Total	MBP % (n)	No MBP % (n)	P-value (2-sided)
Anastomotic Leak	n	37	57.1 (21)	42.9 (16)	1.0
	y	2	50 (1)	50 (1)	
Intraabdominal Infection	n	34	55.9 (19)	44.1 (15)	1.0
	y	5	60 (3)	40 (2)	
Wound Infection	n	32	53.1 (17)	46.9 (15)	0.44
	y	7	71.4 (5)	28.6 (2)	

NOTES:

Scientific Session V (cont.)

39

LOOP VERSUS DIVIDED COLOSTOMY FOR THE MANAGEMENT OF ANORECTAL MALFORMATIONS

Omar Odah, MD, Dafydd A. Davies, MD, MPhil, Kimberly Colapinto, RN(EC), Justin T. Gerstle, MD.

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

Purpose:
The aim of this study was to compare the clinical outcomes of loop and divided colostomies performed as part of the surgical management of anorectal malformations (ARM).

Methods:
We performed a retrospective cohort study reviewing the medical records of all ARM managed with diverting colostomies between 2000 and 2010 at our institution. Along with the type of colostomy, independent variables of gender, type of ARM, age at stoma creation and duration of stoma were examined. Outcome measures of stoma complications (retraction, prolapse, parastoma hernia, obstruction, need for revision, urinary tract infection (UTI) and the development of a megarectum) were analyzed by parametric measures and logistic regression where appropriate.

Results:
144 patients managed with a colostomy for ARM were evaluated (37.5% female, 49% divided, 51% loop). The incidence of stoma complications was significantly higher in patients receiving loop rather than divided colostomies (8.45 vs 21.92% respectively, p=0.025), however only the incidence of prolapse was significantly different when complications were evaluated individually (2.82 vs 17.81%, p=0.003). Proximal colonic stomas were also more prone to complications (sigmoid 9.82%, descending 28.57%, transverse 38.89%, p<0.002). Multivariable-logistic regression controlling for independent variables found to be significant on univariable analysis (level of colostomy p=0.005) found that loop colostomies were positively associated with the development and number of stoma complications ((OR 3.13, 95%CI (1.09, 8.96), p=0.03)OR 2.46, 95%CI (1.06, 5.67) p=0.03), respectively).

Conclusions:
Loop colostomies were found to be associated with a higher incidence of complications than divided stomas in patients with ARM; prolapse accounts for the vast majority of these complications. Contrary to popular belief, the clinical outcomes of the development UTI's and megarectum were independent of the type of colostomy performed.

NOTES:

Scientific Session V (cont.)

40

THE PROBLEMATIC SOAVE CUFF IN HIRSCHSPRUNG DISEASE: MANIFESTATIONS AND TREATMENT

Belinda H. Dickie, MD, PhD, Keith M. Webb, MD, **John G. Schneider, MD**, Balgopal Eradi, MD, Marc A. Levitt, MD.

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

Purpose:
Following a Soave pull-through for Hirschsprung disease (HD), some children struggle with obstructive symptoms. We hypothesized that these symptoms could result from a functional obstruction of the pull through caused by the Soave cuff, and that cuff resection might improve bowel emptying.

Methods:
We reviewed patients referred to our center from 2008 to 2012 with obstructive problems following a Soave pull-through for HD (CCHMC IRB # 2011-2385). Only patients with an obstructing Soave cuff were analyzed. Patients with other reasons for obstruction (anastomotic stricture, transition zone, aganglionic segment) were excluded.

Results:
36 patients underwent reoperation at our center for obstructive symptoms after an initial Soave pull-through. 17 of these patients had a Soave cuff only as the potential source of obstruction. Pre-operative symptoms included enterocolitis (10), constipation (6), and failure to thrive (1). 9 patients (53%) required irrigations to manage distension or enterocolitis pre-operatively. 14/17 patients (82%) had a palpable cuff on rectal exam. 8 patients (47%) had radiographic evidence of a cuff demonstrated by distal narrowing (4) or a prominent presacral space (4). 4 children (23%) underwent excision of the cuff only; 13 (76%) had removal of the cuff and proximally dilated colon [(average length 7.2 cm) (12 performed transanally, 5 needed laparotomy as well.)] Post-operatively, episodes of enterocolitis were reduced to zero and need for irrigation to treat distension was reduced by 50%. 9 patients have voluntary bowel movements; 5 are clean on enemas. 3/6 patients with pre-operative constipation or impaction now empty without enemas. (Follow up 1-17 months, mean 7 months.)

Conclusions:
Recurrent enterocolitis, constipation, or failure to thrive can indicate a functional obstruction due to a Soave cuff when no other pathologic cause exists. Physical exam or contrast enema can identify a problematic cuff. Reoperation with cuff resection can dramatically improve bowel emptying.

NOTES:

Scientific Session V (cont.)

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NITROUS OXIDE PROCEDURAL SEDATION IN NON-FASTING PEDIATRIC PATIENTS UNDERGOING MINOR SURGERY: A 12-YEAR EXPERIENCE

Raquel Pasaron, DNP, ARNP, FNP-BC, Jeannette A. Zerpa, MSN, ARNP, PNP-BC, Leopoldo Malvezzi, MD, Colin G. Knight, MD, Carmen T. Ramos-Irizarry, MD, Tina Shapiro, PhD, ARNP, PCNS-BC, Joanne Mora, PA-C, Cathy A. Burnweit, MD.
Miami Children's Hospital, Miami, FL, USA.

Purpose:
This follow-up to our 2002 pilot study examines the safety and efficacy of nitrous oxide (N_2O) sedation in minor pediatric procedures.

Methods:
A retrospective review (IRB-Exemption 317859) of data collected prospectively from 2000-2012 identified 1058 consecutive children receiving N_2O analgesia as an alternative to general anesthesia, sedation or local anesthetic alone. The pediatric surgery service's sedation-certified nurse practitioners or physician assistants administered N_2O (<60%) with no anesthesiologist present. We noted fasting status and American Society of Anesthesiology Class (ASA). In children mature enough to answer, post-operative questioning determined the Wong-Baker Scale pain score (1-10) at specific points: pre-procedure, injection, mid-procedure, post-procedure. We tabulated event recollection. Safety was evaluated using oxygen saturation >92% and complications. Efficacy was measured by injection and pain recall. We analyzed data using the Statistical Package for Social Sciences 19®, with $p<0.05$ considered significant.

Results:
Children (n=1058, male-42%, female-58%) aged 1-23yrs (mean=9.8$\pm$5.1yrs) underwent surgery using N_2O. Only 9 children (0.9%) fasted. ASA status was I-II in 1053 (99.5%) of patients; five (0.5%) had an ASA III. No procedure was aborted or caused major complications (desaturation<92%, intubation, aspiration, post-procedure hospitalization) noted. Minor complications (e.g., headache, vomiting) occurred in 1.9%; there was no association between minor complications and ASA, fasting status or maximum N_2O% administered (all $p>0.05$). "I&D Abscess" had significantly higher pain scores compared to all other procedures ($p<0.01$). Post-operatively, of 972 patients able to respond, 98% denied getting an injection. Eighty-two percent reported mild or no procedural pain; significantly lower pain scores were noted post-procedure and mid-procedure compared with pre-procedure (mean=1.72$\pm$1.62 verses 2.45$\pm$2.30 verses 2.75$\pm$2.87) ($p<0.01$, all comparisons).

Scientific Session V (cont.)

Conclusions:
This is the longest reported study using non-anesthesiologist-administered N_2O as a single agent for minor inpatient and outpatient pediatric cases. The technique provides exceedingly safe sedation, allowing pain and anxiety-reduced surgery with no fasting or postoperative monitoring.

NOTES:

Scientific Session V (cont.)

42

EVALUATION OF LAPAROSCOPIC MANAGEMENT OF RECURRENT GASTROESOPHAGEAL REFLUX DISEASE AND HIATAL HERNIA, LONG-TERM RESULTS AND EVALUATION OF CHANGING TRENDS

Steven S. Rothenberg, Sami Bansai, MD.

The Rocky Mountain Hospital For Children, Denver, CO, USA.

Introduction:
Recurrent gastro-esophageal reflux disease (GERD) following fundoplication remains a common problem. This study evaluates a long-term experience with laparoscopic management of these cases.

Methods:
From January 1994 to September 2012, 228 patients with recurrent GERD underwent a laparoscopic redo Nissen (LRN) fundoplication. Ages ranged from 3 months to 19 years and weight from 4 kg Kg to 98 Kg. 84 had previous open fundoplications and 144 previous LNR, 32 had more then one previous fundoplication. 108 patients had hiatal hernias (H/H) associated with their GERD. Recurrent H/Hs were treated with crural stitches with teflon pledgets and giant H/Hs were treated with diaphragmatic patches and relaxing incisions (16)

Results:
All procedures were completed successfully laparoscopically. The average operative time was 85 minutes (range 30-280). The intra-operative complication rate was 3.5%, the most common being a gastrotomy during the mobilization.. The average time to full feeds (soft diet) was 1.8 days and average hospital stay was 2.2 days. The post-operative complication rate was 3.6%. The wrap failure rate at an average of 72 months F/U is 6.2%.

Conclusion:
During the first half of the study the most common cause of failure following a LNR was H/H, during the second half the most common was a loose wrap or wrap placed at the GE junction. The highest recurrence rate was in patients receiving their LNR before 4 months of age (6.4%) Redo Laparoscopic Nissen fundoplication and H/H repair is a safe and effective procedure. It is a associated with the same benefits as a primary laparoscopic Nissen for GERD with low morbidity and quicker recovery. A change in the etiology of recurrence suggests that there is a failure to adequately identify and mobilize the GE junction in laparoscopic cases. Follow-up suggests the long-term outcome is superior then that associated with a open redo-fundoplication.

NOTES:

Scientific Session V (cont.)

43

AORTOPEXY FOR SEVERE TRACHEOMALACIA

Russell Jennings, MD[1], Thomas E. Hamilton, MD[1], C. Jason Smithers, MD[1], **Monawat Ngerncham, MD, MSPH**[2], John Foker, MD, PhD[1].

[1]Boston Childrens Hospital/Harvard Medical School, Boston, MA, USA, [2]Faculty of Medicine Siriraj Hospital, Bangkok, Thailand.

Purpose:
Tracheomalacia may cause significant pulmonary problems and life-threatening events. The purpose of this study was to determine outcomes among different surgical methods of aortopexy for severe tracheomalacia.

Methods:
Retrospective review of all patients who underwent aortopexy by pediatric surgeons (1997-2012) at a single institution. Data collected included operative approaches and clinical results (Table 1). The data were analyzed using Chi-square, Fisher's exact test and Mann-Whitney U test where appropriate. Statistical significance is considered as $p<0.05$.

Results:
Forty two patients (age: 21 days to 11 years at operation) had either a partial sternotomy (19), open thoracotomy (12), thoracoscopic approach (16), or a cervical approach (1). In this limited series, partial sternotomy provided an improvement in resolution of symptoms vs. thoracotomy (100% vs 77%, $p=0.05$) and thoracoscopy (100% vs 75%, $p=0.07$). Intraoperative bronchoscopy seemed to improve the effective placement of the suspension sutures reducing the recurrence of tracheomalacia symptoms ($p=0.06$) (data not shown). Among the 14 patients with failure-to-thrive before successful aortopexy by any technique, all but one demonstrated significant improvement in their growth ($p<0.001$). The thoracoscopic group had an increased recurrence of tracheomalacia requiring reoperation (37.5%, $p=0.02$) vs. partial sternotomy.

Conclusion:
The partial sternotomy approach to severe tracheomalacia has the technical advantages of improved exposure of structures, non-distorted analysis by bronchoscopy of the effects of elevation of the arteries and the ability to selectively suspend the pulmonary arteries over the mainstem bronchi. From this limited series, the partial sternotomy technique had reliable resolution of symptoms, no recurrence requiring reoperation, and the ability to open the mainstem bronchomalacia.
Table 1: Aortopexy Techniques

Scientific Session V (cont.)

Operative approaches N (%)	Partial Sternotomy 20 (47.6%)	Open thoracotomy 13 (24.1%)	Thoracoscopy 8 (14.8%)	Cervical 1 (1.8%)	Total 41 (100%)
Long-gap esophageal atresia	8 (40.0%)	1 (7.7%)	2 (25.0%)	0 (0%)	11 (26.8%)
Acute life-threatenting events	14 (70.0%)	11 (84.6%)	8 (100%)	0 (0%)	33 (80.5%)
Preoperative intubation	9 (45.0%)	3 (23.1%)	1 (12.5%)	0 (0 %)	13 (31.7 %)
Prior tracheostomy	5 (25.0%)	1 (7.7 %)	0 (0 %)	0 (0 %)	6 (14.6 %)
Pulmonary artery suspension	3 (15.0%)	0 (0%)	0 (0%)	0 (0%)	3 (7.3%)
Simultaneous bronchoscopy	19 (95.0%)	8 (61.5%)	3 (37.5%)	0 (0%)	29 (70.7%)
Recurrence required reoperation	0 (0%)	0 (0%)	3 (37.5%)	1 (100%)	4 (9.8%)
Symptoms resolved	20 (100%)	10 (76.9%)	6 (75.0%)	0 (0%)	35 (85.4%)

NOTES:

APSA Past Meeting Lectures

Journal of Pediatric Surgery Lectures

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"

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

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"

APSA Past Meeting Lectures (cont.)

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

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

2005
W. Hardy Hendren, MD
"Looking Back 50 Years"

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

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

2002
Harold Shapiro, PhD
"The Ethical Dimensions of Scientific Progress"

2001
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"

1994
W. French Anderson, PhD
"Human Gene Therapy"

1993
Judah Folkman, MD
"Clinical Applications of Angiogenesis Research"

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

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

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

APSA Past Meeting Lectures (cont.)

Jay & Margie Grosfeld Lectures

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

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

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

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

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

International Guest Lectures

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?"

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"

APSA Past Meeting Lectures (cont.)

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

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

1999
Bernardo Ochoa, MD
"Pediatric Surgery in Latin America"

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

1997
Justin Kelly, MD
"Bladder Exstrophy — Problems and Solutions"

1996
Prem Puri, MD
"Variant Hirschsprug's Disease"

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

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

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

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 Past Meetings

43rd Annual Meeting
May 20 – 23, 2012
APSA-IPSO Symposium
May 19 – 20, 2012
JW Marriott San Antonio Hill Country Resort & Spa
San Antonio, Texas

42nd Annual Meeting
May 22 – 25, 2011
JW Marriott Desert Springs Resort & Spa
Palm Desert, California

41st Annual Meeting
May 16 – 19, 2010
Loews Portofino Bay Hotel at Universal Orlando
Orlando, Florida

40th Annual Meeting
May 28 – 30, 2009
El Conquistador Golf Resort & Golden Door Spa
Fajardo, Puerto Rico

39th Annual Meeting
May 27 – 31, 2008
APSA-IPSO Symposium
May 28, 2008
JW Marriott Desert Ridge Resort & Spa
Phoenix, Arizona

38th Annual Meeting
May 24 – 27, 2007
JW Marriott Orlando Grande Lakes
Orlando, Florida

37th Annual Meeting
May 21 – 24, 2006
Marriott Beach & Golf Resort
Hilton Head, South Carolina

36th Annual Meeting
May 29 – June 1, 2005
JW Marriott Desert Ridge Resort & Spa
Phoenix, Arizona

35th Annual Meeting
May 27 – 30, 2004
APSA-IPSO Symposium
May 26, 2004
Sawgrass Marriott Resort
Ponte Vedra Beach, Florida

34th Annual Meeting
May 25 – 28, 2003
Marriott Harbor Beach Resort & Spa
Ft. Lauderdale, Florida

33rd Annual Meeting
May 19 – 22, 2002
The Arizona Biltmore Resort and Spa
Phoenix, Arizona

32nd Annual Meeting
May 20 – 23, 2001
The Registry Resort
Naples, Florida

31st Annual Meeting
May 25 – 28, 2000
APSA-IPSO Symposium
May 24, 2000
Walt Disney World Swan
Lake Buena Vista, Florida

30th Annual Meeting
May 16 – 19, 1999
Westin Mission Hills
Rancho Mirage, California

29th Annual Meeting
May 10 – 13, 1998
The Hyatt Regency
Hilton Head, South Carolina

28th Annual Meeting
May 18 – 21, 1997
The Registry Resort
Naples, Florida

27th Annual Meeting
May 19 – 22, 1996
The Hyatt Regency
San Diego, California

APSA Past Meetings

26th Annual Meeting
May 20 – 23, 1995
The Boca Raton Resort and Club
Boca Raton, Florida

25th Annual Meeting
May 14 – 17, 1994
Loews Ventana Canyon Resort
Tucson, Arizona

24th Annual Meeting
May 15 – 18, 1993
The Hyatt Regency
Hilton Head, South Carolina

23rd Annual Meeting
May 12 – 16, 1992
The Broadmoor
Colorado Springs, Colorado

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“EXHIBITS & SUPPORT”

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Intuitive Surgical

JustRight Surgical

Karl Storz Endoscopy-America, Inc.

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APSA Thanks the following exhibitors for their contributions to the 44th Annual Meeting

Platinum Exhibitor
Sidra Medical and Research Center

Gold Exhibitor
Kimberly-Clark Healthcare

Silver Exhibitor
Karl Storz Endoscopy-America, Inc.

Traditional Exhibitors

American Academy of Pediatrics
American College of Surgeons
American Pediatric Surgical Association Foundation (APSAF)
American Pediatric Surgical Nurses Association (APSNA)
Applied Medical Technology, Inc. (AMT)
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Barnabas Health
Beacon Health System
BK Medical
Carolinas HealthCare System
CHERUBS – The Association of Congenital Diaphragmatic Hernia Research, Awareness and Support
Community Health Network
CRC Press – Taylor & Francis
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HCA Kids
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LocumTenens.com
Mediflex Surgical Products
Medline Industries
Mercy Clinic
New Hampshire's Hospital for Children
Northwestern University & Lurie Children's Hospital of Chicago Laparoscopic Duodenal Atresia and Thoracoscopic Diaphragmatic Hernia Simulation
Ochsner Health System
Pediatric Search Partners
Saint Francis Health System
Shire AG
Specialty Surgical Products, Inc.
Stryker
SuccessEHS
Thompson Surgical Instruments
Weatherby Healthcare

Exhibit Directory

American Academy of Pediatrics
Section on Surgery
141 Northwest Point Blvd
Elk Grove Village, IL 60007
Phone: +1-800-433-9016
Email: vthorne@aap.org
Website: www.aap.org

The Section on Surgery (SOSu), founded in 1948, has as its primary goals:

- to present a scientific program which will provide state-of-the art techniques and information for pediatric surgeons
- to serve in a consulting capacity to the AAP Board of Directors to make recommendations for educationalprograms, policy statements, and other actions on matters relating to the surgical care of infants, children, adolescents and young adults.

The Section traditionally presents a 2½ day educational program at the AAP National Conference & Exhibition. This program features two days of abstract and poster presentations, a distinguished overseas guest lecture, and a symposium panel. The Section also presents three annual awards: the William E. Ladd Medal, the Arnold M. Salzberg Award, and the Stephen L. Gans Distinguished Overseas Lectureship. In addition, three pediatric surgery resident research prizes are awarded at each meeting to those young investigators who have performed innovative research studies.

American College of Surgeons
633 North Saint Clair St.
Chicago, IL 60611-3211
Phone: +1-312-202-5352
Email: kheneghan@facs.org
Website: www.facs.org/patienteducation

The American College of Surgeons, Patient Education Program is dedicated to improving the quality of surgical patient care and promoting a better recovery through education and skills training. Patient and professional education programs are developed that utilize best practice, simulation and sound evaluation criteria to ensure safe, cost effective outcomes. Come see the new award winning Pediatric Ostomy Homes Skills Kit, Pediatric Surgery Brochures and Surgical Patient Education Website www.surgicalpatienteducation.org

American Pediatric Surgical Association Foundation (APSAF)
Website: http://www.eapsa.org/About_the_Foundation.htm

The American Pediatric Surgical Association Foundation (APSAF) was founded in 1995 to provide support for young pediatric surgical investigators and promote pediatricsurgical research and education. The vital support provided by APSA members and others energizes the productivity of our young pediatric surgeon-scientists and results in important new discoveries that benefit our patients and profession. This would be impossible to accomplish without your generous financial support. Please consider contributing to the APSA Foundation in 2013.

Exhibit Directory

American Pediatric Surgical Nurses Association (APSNA)
111 Deer Lake Road, Suite 100
Deerfield, IL 60015
Phone: +1-612-625-0680
Email: webadmin@apsna.org
Website: www.apsna.org

APSNA members are dedicated to promoting excellence in pediatric surgical nursing practice. We are an organization of more than 600 RNs, Advanced Practice RNs, Physician Assistants and affiliates who care for children of all ages across the spectrum of pediatric surgical services. Encourage your nurses, advanced practice nurses and PAs from your clinic, office and hospital to join APSNA. We are currently running our annual membership drive to coincide with our annual meetings and Nurses Week 2013. Membership is now discounted 20% to $72.00. Consider giving the gift of APSNA membership to one of your nursing colleagues in honor of Nurses Week May 6-12, 2013.

Applied Medical Technology (AMT)
8000 Katherine Blvd
Brecksville, OH 44141
Phone: +1-800-869-7382
Fax: +1-440-717-4200
Email: info@appliedmedical.net
Website: www.appliedmedical.net

Applied Medical Technology, Inc. (AMT) was present at the birth and development of the Percutaneous Endoscopic Gastrostomy (PEG) movement. Our founder co-invented the first Button low profile feeding device, which AMT manufactured for distribution by C.R. Bard, Inc. AMT continues to create and manufacture innovative medical devices, such as the AMT Bridle™ Nasal Tube Retaining System, the AMT Mini ONE® low profile buttons and the new AMT G-JET® low profile gastro-jejunal enteral tube.

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Fax: +1-602-747-3800
Email: doctors@bannerhealth.com
Website: www.bannerdocs.com

From Alaska to Arizona, Banner Health is dedicated to fulfilling our nonprofit mission of making a difference in people's lives through excellent patient care. Based in Phoenix, Arizona, Banner is one of the largest, nonprofit health care systems in the country.

We are the leading nonprofit provider of hospital services in all the communities we serve. Our Western Region facilities serve a number of rural areas—many are the only inpatient facilities available within the community. In addition to basic emergency and medical services, Banner Health offers a variety of specialized services including:

- heart care
- cancer care
- pediatric care
- high-order multiple births
- organ transplants
- level 1 trauma services
- rehabilitation services
- behavioral health services

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95 Old Short Hills Road
West Orange, NJ 07052
Phone: +1-973-322-4364
Fax: +1-973-324-5265
Email: acatanzaro@barnabashealth.org
Website: www.barnabashealth.org

Barnabas Health is New Jersey's largest integrated health care delivery system, which includes the Children's Hospital at Monmouth Medical Center in Long Branch, NJ. As a regional leader dedicated to children's health, The Children's Hospital offers the highest level of pediatric care for newborns to adolescents. We are currently seeking to employ a full-time board-certified pediatric surgeon with excellent clinical skills, preferably experienced in minimally invasive surgery. Please visit Booth #29 for more information.

Beacon Health System
100 E. Wayne Street, Suite 500
South Bend, IN 46601
Phone: +1-574-647-1652
Fax: +1-647-1693
Email: lvognild@memorialsb.org
Website: www.beaconhealthsystem.org

Beacon Health System practice seeking an experienced board certified Pediatric Surgeon to initiate a new surgical program at Memorial Hospital in South Bend, Indiana. The right candidate would assume the role as Medical Director and be the key leader in establishing the infrastructure and protocols. This individual will also be the driving force and decision maker for future partners. Qualified candidates will be excellent clinicians along with a proven record in program development and leadership.

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Peabody, MA 01960
Phone: +1-978-326-1300
Fax: +1-978-326-1399
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Suite 200
Charlotte, NC 28217
Phone: +1-704-401-8896
Fax: +1-704-355-5033
Email: sarah.foster@carolinashealthcare.org
Website: www.carolinashealthcare.org

Carolinas Healthcare System (CHS) is one of the largest public, not-for-profit health systems in the nation, operating more than 39 hospitals. We are currently seeking Pediatric Surgeons to join over 125 pediatric subspecialists at Levine Children's Hospital in Charlotte, NC and Jeff Gordon Children's Hospital in Concord, NC. There are currently over 990 pediatric and family medicine referring physicians. The surgeons will rotate between locations. CHS offers a competitive income, incentives, and comprehensive benefits package.

CHERUBS – The Association of Congenital Diaphragmatic Hernia Research, Awareness and Support
3650 Rogers Road #290
Wake Forest, NC 27587
Phone: +1-919-610-0129 / +1-855-CDH-BABY
Fax: +1-815-425-9155
Email: info@cdhsupport.org
Website: www.cdhsupport.org

CHERUBS in an international charity created to help families affected by Congenital Diaphragmatic Hernia by providing free support services, promoting and funding CDH research and raising awareness of this devastating birth defect through dozens of volunteer-supported projects. Founded in 1995, CHERUBS has helped more than 4300 families in 60 countries.

Community Health Network
7240 Shadeland Station, Suite 300
Indianapolis, IN 46256
Phone: +1-855-621-2141
Fax: +1-317-355-7590
Email: docjobs@ecommunity.com
Website: www.eCommunity.com/PhysicianRecruitment/

Community Health Network is seeking an exceptional candidate who specializes in pediatric surgery to join our growing pediatric unit to expand one of Indiana's fastest growing pediatric and neonatal programs in Indiana.

Community Health Network hosts Indiana's largest private NICU, with 36 private suites and a dedicated pediatric unit with 22 beds and an in-house Pediatric Hospitalist team. Community Hospital Network is a leading not-for-profit eight hospital health system, nationally recognized for our successful physician partnerships.

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Fax: +1-800-329-ENDO
Email: massari.nate@endo.com
Website: www.endopharma.com

Endo, a health solutions company, is a US-based diversified healthcare company that is redefining healthcare value by finding solutions for the unmet needs of patients along care pathways for pain management, pelvic health, urology, endocrinology and oncology. Through our operating units: AMS®, Endo Pharmaceuticals®, HealthTronics® and Qualitest®, Endo is dedicated to improving care through a combination of branded products, generics, devices, technology and services.

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FDA Office of Orphan Products Development
10903 New Hampshire Ave.
W032-5271
Silver Spring, MD 20993
Phone: +1-800-638-2041
Fax: +1-301-847-8149
Email: dsmica@fda.hhs.gov
Website: www.fda.gov/MedicalDevices/

Development of medical devices designed specifically for children lags behind that for adults. Please stop by FDA's Medical Devices Booth to learn about pediatric medical device development resources and regulatory processes. We're here to answer your questions or put you in touch with people who can! This booth is an educational and outreach activity supported by FDA's Office of Orphan Products Development and the Center for Devices and Radiological Health (CDRH).

Galisano Children's Hospital of Southwest Florida
9981 S. HealthPark Drive, Suite 456
Fort Myers, FL 33908
Phone: +1-239-343-5698 or +1-239-343-6636
Fax: +1-239-343-5119
Email: Kathy.bridge-liles@leememorial.org or Emad.salman@leememorial.org
Website: www.leememorial.org

HCA Kids
3 Maryland Farms, Ste 250
Brentwood, TN 37027
Phone: +1-937-235-5890
Fax: +1-866-850-7677
Email: Kathleen.Kyer@HCAHealthcare.com
Website: www.PracticeWithUs.com

HCA Kids, a centralized recruitment office where you can make just one call to learn about opportunities across the nation. HCA owns and manages 163 hospitals in 20 states. We offer opportunities in big cities and rural areas, near sandy beaches and skyward reaching mountains. Excellent opportunities are available in private practices and two of the top academic medical centers in the nation.

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Email: inquiry@hitachi-aloka.com
Website: www.hitachi-aloka.com

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Kaiser Permanente, The Permanente Medical Group, Inc. (TPMG, Inc.)
1800 Harrison St., 7th Fl.
Oakland, CA 94612
Phone: +1-800-777-4912
Email: Christine.K.Stough@kp.org
Website: www.physiciancareers.kp.org

Kaiser Permanente is seeking Pediatric Surgeons to join our outstanding teams at state-of-the-art medical centers in Roseville and Oakland, California. Both hospitals are regional referral centers for pediatric tertiary care. Pediatric Surgeons who join TPMG, Inc. enjoy competitive salaries and an unparalleled benefit package.

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El Segundo, CA 90245
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Fax: +1-424-218-8537
Email: info@karlstorz.com
Website: www.karlstorz.com

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Kimberly-Clark Healthcare
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Roswell, GA 30076
Phone: +1-770-587-8578
Fax: +1- 920-225-4531
E-mail: abwillner@kcc.com
Web site: www.kcdigestivehealth.com

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Mediflex Surgical Products
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Islandia, NY 11749
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Fax: +1-631-582-4520
Email: sales@flexbar.com
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Fax: +1-847-949-3012
Email: mmiller@medline.com
Website: www.medline.com/woundcare

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1965 S. Freemont, Suite 200
Springfield, MO 65804
Phone: +1-417-820-2166
Fax: +1-417-820-7495
Email: lindsay.fielder@mercy.net
Website: www.mercy.net

Mercy is a physician-led and professionally managed integrated health system with more than 1,600 physicians and more than 250 advanced practitioners across Arkansas, Kansas, Missouri and Oklahoma. We focus on clinical integration ensuring that the latest technology and specialty care is available to all locations.

New Hampshire's Hospital for Children
One Elliot Way
Manchester, NH 03103
Phone: +1-603-663-4926
Fax: +1-603-663-4960
Email: jStagner@elliot-hs.org
Website: www.elliothospital.org/Childrens/

New Hampshire's Hospital for Children in Manchester, NH, is an affiliate of Elliot Health System, a Level II Regional Trauma Center. NHHC provides a growing list of comprehensive pediatric services to include surgery, anesthesia, intensive care, gastroenterology, neurology and sleep medicine, pulmonary, nephrology and medical urology, integrative medicine, Maternal Fetal, Developmental/Behavioral, a hospitalist program, a level III NICU, radiology, orthopedics, child advocacy, child life programs and the state's first dedicated pediatric emergency medicine department. http://www.elliothospital.org/Childrens

Northwestern University & Lurie Children's Hospital of Chicago Laparoscopic Duodenal Atresia and Thoracoscopic Diaphragmatic Hernia Simulation
225 East Chicago Ave., Box 63
Chicago, IL 60611
Phone: +1-312-227-4210
Fax: +1-312-227-9678
Email: kbarsness@luriechildrens.org
Website: www.luriechildrens.org

Laparoscopic duodenal atresia repair and thoracoscopic diaphragmatic hernia repair simulators are here. We are once again collecting data on validation measures for our exciting new neonatal simulators. We welcome all surgeons, no matter the level of your MIS experience, to come to our booth and help us collect validation data. Both simulators are size appropriate neonatal models with real tissue.

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Ochsner Health System
1514 Jefferson Highway
New Orleans, LA 70121
Phone: +1-800-488-2240
Fax: +1-225-761-5441
Email: profrecruiting@ochsner.org
Website: www.ochsner.org

Ochsner Health System, www.ochsner.org, in New Orleans is seeking an additional BC/BE Pediatric Surgeon. Our pediatric physicians and subspecialists number over 100 with teams of Anesthesiology, CV Surgery Anesthesia and Radiology. We utilize a 42-bed Level III-C NICU, a 14-bed PICU and a full-time, regional in-house transport team. We care for more than 55,000 unique pediatric patients annually and have more than 4,000 deliveries per year. We are a physician-led, non-profit, academic, multi-specialty healthcare delivery system.

Pediatric Search Partners
100 Congress Ave., Suite 2000
Austin, TX 78701
Phone: +1-877-440-3832
Fax: +1-512-672-7038
Email: gelnda@pediatricsearchpartners.com
Website: www.pediatricsearchpartners.com

Pediatric Search Partners is a boutique search firm focused solely within pediatrics and pediatric subspecialties.

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Saint Francis Health System
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Tulsa, OK 74136
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Fax: +1-918-481-4063
Email: srmcgee@saintfrancis.com
Website: www.saintfrancis.com

Saint Francis Health System offers a complete continuum of healthcare services. Almost 1,000 physicians serve the patients of Saint Francis Health System through primary care medicine and advanced medical specialties. The Saint Francis Health System encompasses the following entities: Saint Francis Hospital, The Children's Hospital at Saint Francis, Heart Hospital at Saint Francis, Saint Francis Hospital South, Laureate Psychiatric Clinic and Hospital, and Warren Clinics. For more information, contact Sarah McGee 918-638-5874 srmcgee@saintfrancis.com.

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300 Shire Way
Lexington MA, 02421
Phone: +1-781-482-0691
Email: meknight@shire.com
Website: www.shire.com/shireplc/en/home

Pediatric surgeons may be one of the first to suspect the signs and symptoms of the rare disorder Hunter syndrome. By recognizing surgical history patterns and key clinical features, you can help identify/refer patients with symptom clusters who may be at risk for this chronic, progressive metabolic disease.

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Sidra Medical and Research Center
P.O Box 26999
St. Al Corneich St.
Doha, Qatar 00974
Phone: +974-4404-2333
Fax: +974-4404-2015
Email: Hamda@sidra.org
Website: www.sidra.org

Sidra Medical and Research Center is a groundbreaking hospital, research and education institution, currently under construction in Doha, Qatar, that will focus on the health and wellbeing of women and children regionally and globally. Sidra will be a fully digital facility, incorporating the most advanced information technology applications in clinical, research and business functions. Sidra will initially have around 400 beds with infrastructure to enable expansion to 550 beds in a subsequent phase.

Sidra represents the vision of Her Highness Sheikha Moza bint Nasser who serves as its Chairperson. The high-tech facility will not only provide world-class patient care but will also help build Qatar's scientific expertise and resources. Sidra will be funded by a US $7.9 billion endowment from Qatar Foundation, one of the largest endowments of its kind in the world.

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Victor, NT 59875
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Fax: +1-406-961-0103
Email: csylvester@spp-inc.com
Website: www.ssp-inc.com

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SuccessEHS
One Metroplex Drive, Suite 500
Birmingham, AL 35209
Phone: +1-888-879-7302
Email: stevep@successehs.com
Website: www.successehs.com

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Fax: +1-231-922-0174
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American Pediatric Surgical Association
Future Meetings

45th Annual Meeting
May 29 – June 1, 2014
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46th Annual Meeting
April 30 – May 3, 2015
Harbor Beach Marriott Resort & Spa
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