APSA 134th Annual Meeting

May 25–28, 2003

Marriott Harbor Beach Resort & Spa

Fort Lauderdale, Florida

American Pediatric Surgical Association

Final Program

PLEASE BRING THIS PROGRAM WITH YOU

American Pediatric Surgical Association
Administrative Offices
60 Revere Drive
Suite 500
Northbrook, IL 60062
Telephone: 847 / 480-9576; Fax: 847 / 480-9282
E-mail: eapsa@eapsa.org
Web site: www.eapsa.org

TABLE OF CONTENTS

Final Program

Membership Directory

Directory begins on the flipside of the Final Program

Educational Objective

APSA's annual meeting is designed to provide four days of comprehensive continuing education in the field of pediatric surgery. It is APSA's intent to bring together the world's leading authorities to present and discuss their most recent clinical and research efforts.

The program begins with two half-day symposia: the first addressing Embryology; the second, Intersex Ethics. Attendees will also view and discuss video and selected poster presentations. The topics at these sessions have been selected jointly by APSA's Program and Education committees and are based on member input on what is relevant to their practices. The scientific sessions and poster sessions consist of basic research and practical clinical presentations.

This meeting covers the breadth of pediatric surgery and is intended to acquaint attendees with the latest research findings, clinical discoveries and trends that influence the day-to-day practice of pediatric surgery.

ACCME Accreditation Statement

APSA is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

APSA designates this educational activity for a maximum of 18.5 Category 1 credits toward the AMA Physician's Recognition Award. Each physician should claim only those credits that were actually spent in the activity.

Disclosure of Faculty's Commercial Relationships

Consistent with APSA policy, faculty for this meeting are expected to disclose any economic or other personal interests that create, or may be perceived as creating, a conflict related to the material discussed. This policy is intended to make you aware of faculty's interests, so you may form your own judgments about such material. APSA requires all faculty to disclose this information at the time that they submit their abstract for consideration and has noted any conflicts in this preliminary program. If no conflict is noted, then the faculty members have attested that they have no significant financial relationships to disclose.

In addition, consistent with APSA policy, faculty are expected to disclose at the beginning of their presentation, any product mentioned during their presentation that is not labeled for the use under discussion or is still investigational. This policy is intended to allow you to form you own judgments about such material.

Commercial Support

APSA would like to thank the *Journal of Pediatric Surgery* for its unrestricted educational grant for the *Journal of Pediatric Surgery* Lecture and its unrestricted educational grant for the transcription of the annual meeting technical sessions.

APSA also thanks the following sponsors for their unrestricted educational grants:

- Division of Pediatric Surgery, Columbia University, College of Physicians and Surgeons
- Children's Hospital of New York – Presybyterian
- Jerome Medical
- Springer-Verlag New York, Inc.
- Cook Surgical
- W. Lorenz Surgical
- Kimberly-Clark / Ballard Medical
- Atrium Medical Corp.
- Intuitive Surgical, Inc.
- Scanlan International, Inc.
- Computer Motion
- Ethicon Endo-Surgery
- Karl Storz Endoscopy
- Haemacure Corp.
- Zevex, Inc.
- Speciality Surgical Products, Inc.
- Stryker Endoscopy
- APSA Outcomes & Clinical Trials Center
- LSI Solutions
- DigiScript, Inc.
- Elsevier Science

Committee Meetings

The following is a listing of committee meetings during the Annual Meeting.

Saturday, May 24		Room
9 a.m. – 4 p.m.	APSA Board of Governors	Jacksonville / Tallahasse
1 p.m. – 3 p.m.	Transplant Committee	Palm Beach
3 p.m. – 4:30 p.m.	Fetal Therapy Committee	Orlando
3:30 p.m. – 4:30 p.m.	Pectus Multicenter Trial-Investigators' Meeting	Clearwater
5 p.m. – 6 p.m.	Ethics & Advocacy Committee	Clearwater
6 p.m. – 10 p.m.	Publications Committee Dinner	Jacksonville / Tallahasse

Sunday, May 25		Room
6:30 a.m. – 8:30 a.m.	Pediatric Surgery Training Directors	Caribbean I and II
6:30 a.m. – 8:30 a.m.	Education Committee	Key West
7 a.m. – 8:30 a.m.	Practice Committee	Clearwater
7 a.m. – 8 a.m.	Cancer Committee	Orlando
8 a.m. – 9 a.m.	International Relations Committee	Tallahasse
4 p.m. – 6 p.m.	AAP Program Committee	Palm Beach
4:30 p.m. – 6:30 p.m.	Outcomes and Clinical Trials Committee	Key West
4:30 p.m. – 6 p.m.	*Journal of Pediatric Surgery* Reception	Jacksonville / Tallahasee

Monday, May 26		Room
6:30 a.m. – 7:30 a.m.	Informatics Committee	Tallahasse
6:30 a.m. – 7:30 a.m.	Membership / Credentials Committee	Key West
6:30 a.m. – 7:30 a.m.	Endoscopic Surgery Committee	Palm Beach
6:30 a.m. – 7:30 a.m.	Special Task Force on Manpower Issues	Clearwater
6:30 a.m. – 7:30 a.m.	Trauma Committee	Jacksonville
6:30 a.m. – 7:30 a.m.	APSA Foundation Board of Governers	Orlando
4 p.m. – 5:30 p.m.	Advisory Council for ACS Pediatric Surgery	Sarasota
5 p.m. – 6:30 p.m.	WB Saunders Editorial Board	Jacksonville / Tallahassee

SCHEDULE AT A GLANCE

Saturday, May 24, 2003

9 a.m. – 4 p.m.	APSA Board of Governors meeting
1 p.m. – 6 p.m.	Committee meetings
6 p.m. – 10 p.m.	Publications Committee Dinner

Sunday, May 25, 2003

6:30 a.m. – 9 a.m.	Committee meetings
7 a.m. – 6 p.m.	Registration open
7:30 a.m. – 10:30 a.m.	Poster set-up
9 a.m. – 11:30 a.m.	Symposium: Embryology
11:30 a.m. – 1 p.m.	Lunch with video session
1 p.m. – 3 p.m.	Symposium: Intersex Ethics
3:45 p.m. – 4:15 p.m.	Poster presentations
4:15 p.m – 5:15 p.m.	Poster viewing area: authors in attendance
5:30 p.m. – 6:30 p.m.	Exhibit set-up
6:30 p.m. – 8:30 p.m.	Welcome reception

Monday, May 26, 2003

6 a.m. – 7:30 a.m.	Annual Fun Run
6:30 a.m. – 7:30 a.m.	Committee meetings
6:45 a.m. – 1 p.m.	Registration open
6:45 a.m. –7:30 a.m.	Continental breakfast; exhibits open; poster viewing
7:30 a.m. – 8 a.m.	Welcome and Introduction / New members introduced
8 a.m. – 9:15 a.m.	Scientific Session I
9:15 a.m. – 10:15 a.m.	Robert E. Gross Lecture: Lucian Leape, M.D.
10:15 a.m. – 10:45 a.m.	Coffee break; exhibits open; poster viewing
10:45 a.m. – Noon	Scientific Session II
Noon – 1 p.m.	Presidential Address: R. Peter Altman, M.D.
1:30 p.m. – 7 p.m.	Golf Tournament
2 p.m. – 7 p.m.	Tennis Tournament
7:30 p.m. – 9:30 p.m.	President's Reception

Tuesday, May 27, 2003

6:30 a.m. – 8 a.m.	Member business meeting and breakfast
6:30 a.m. – 1 p.m.	Registration open
7 a.m. – 8 a.m.	Continental breakfast; exhibits open; poster viewing
8 a.m. – 10 a.m.	Scientific Session III
9 a.m. – 1 p.m.	Everglades Tour
10 a.m. – 10:30 a.m.	Coffee break; exhibits open; poster viewing
10:30 a.m. – Noon	Scientific Session IV
Noon – 1 p.m.	Overseas Guest Lecture: Claire Nihoul-Fékété, M.D.
1:30 p.m. – 3:30 p.m.	Telesurgery Demonstration with lunch
3:30 p.m. – 5 p.m.	COG Surgeon's Meeting (open to all APSA meeting attendees)
6:30 p.m. – 10 p.m.	President's Banquet

Wednesday, May 28, 2003

7 a.m. – 8 a.m.	Continental breakfast; exhibits open; poster viewing
7:30 a.m. – 11:15 a.m.	Registration open
8 a.m. – 8:30 a.m.	APSA Foundation Scholars: Anthony Stallion, M.D., and Mary Beth Madonna, M.D.
8:30 a.m. – 9:30 a.m.	*Journal of Pediatric Surgery* Lecture: Patricia Donahoe, M.D.
9:30 a.m. – 11 a.m.	Scientific Session V
11 a.m.	Annual Meeting Adjourns Poster / Exhibits Dismantle

1. Registration

Please note that all authors presenting a paper at the 34th Annual Meeting are required to pay a registration fee.

The onsite registration fees for the Annual Meeting are:

APSA Member	$540
Physician Non-Member	$640
Resident / Fellow / Student*	$365
Nurse / Allied**	$365
Accompanying Person	$290

* *Residents and fellows must have a letter from their chief of service to qualify for the reduced registration fee.*

** *Registration for the APSA 34th Annual Meeting only; APSNA Annual Meeting registration is by separate subscription.*

APSA Registration Desk

Registration will be located in the Grand Ballroom Foyer during the following times:

Sunday, May 25	7 a.m. – 6 p.m.
Monday, May 26	6:45 a.m. – 1 p.m.
Tuesday, May 27	6:30 a.m. – 1 p.m.
Wednesday, May 28	7:30 a.m. – 11:15 a.m.

2. Scientific Sessions

All educational sessions will be held in Grand E-K. The daily dress code is business or business casual attire.

3. Poster Viewing

Scientific posters will be available for viewing during the following hours:

Sunday, May 25	
Poster Set-up	7:30 a.m. – 10:30 a.m.
Viewing	11:30 a.m. – 5:15 p.m.
Monday, May 26	6:45 a.m. – Noon
Tuesday, May 27	7 a.m. – Noon
Wednesday, May 28	7 a.m. – 11 a.m.

Authors are asked to be in attendance during continental breakfasts, the session on Sunday evening and morning breaks to answer audience questions.

4. Speaker-Ready Room

The speaker-ready room will be available daily, beginning Sunday, May 25, at 7 a.m. in the Miami Room.

5. Presentation Check-in

Speakers must use Microsoft PowerPoint slides during their presentations; 35mm slides will not be accepted. Please refer to the *Guide for Speakers* distributed in January for information on preparing your presentation. Only single projection facilities will be available. Speakers must turn in their computer presentations by 1 p.m. on the day *before* they are scheduled to speak.

6. Exhibits

Commercial exhibits will be located in the Gold Room. Exhibits will be open during the following hours:

Monday, May 26	7 a.m. – Noon
Tuesday, May 27	7 a.m. – Noon
Wednesday, May 28	7:30 a.m. – 11 a.m.

Continental breakfast will be served in the Exhibit Hall Monday and Wednesday for APSA members and Monday, Tuesday and Wednesday for nonmembers. Coffee and soft drinks will also be available in the Exhibit Hall during the refreshment breaks each day. For a list of exhibitors and booth assignments, see pages A148 – A150.

7. APSA Business Meeting

The APSA Business Meeting will be held 6:30 a.m. – 8 a.m. on Tuesday, May 27, in Caribbean IV-V. This is a breakfast meeting and is for APSA members only.

8. Welcome Reception

A Welcome Reception for all attendees and guests will take place on the Oceanview Terrace 6:30 p.m. – 8:30 p.m. on Sunday, May 25. Tickets for this reception will be included in your registration packet and will be required for admission to the reception. All accompanying persons 12 years and older require a ticket to be admitted to the Welcome Reception. Casual attire is appropriate.

9. President's Reception

All registered guests are invited to attend the President's Reception on Monday, May 26, 7:30 p.m. – 9:30 p.m in the Caribbean Ballroom. Internationally renowned violinist Chee-Yun will perform and cocktails and hors d'oevres will be served.

10. President's Banquet

The President's Banquet will be held in the Grand E-K on Tuesday, May 27. The reception begins at 6:30 p.m. and dinner begins at 7:15 p.m. After dinner, you are invited to join us for dancing. Tickets for the reception and banquet are included in your registration packet and will be required for admission. All accompanying persons 12 years and older require a ticket for admission to the banquet. Business attire is requested.

11. Accompanying Persons Program

The hospitality suite, 3030 Ocean, will be open Monday from 9 a.m. – 11 a.m. and on Tuesday and Wednesday from 8 a.m. – 10:30 a.m. Continental breakfast will be served each morning for registered accompanying guests. Badges are requested for entry to the hospitality suite.

12. Accompanying Persons Event

Everglades Tour – $45

One of the most unique national parks, the Florida Everglades, is the home of the rare Florida panther, alligator, manatee and many species of rare birds. This unusual tour allows you to travel the beautiful terrain on an airboat skimming along the famous "River of Grass." The tour includes transportation, a guide and taxes, and will depart the hotel at approximately 9 a.m. on Tuesday, May 27. This tour will last approximately $3^1/_2$ to 4 hours and is appropriate for everybody ages seven and older. Please note this tour is based on a minimum guarantee. If we have not met this guarantee by May 10, your money will be refunded, and you may visit the hospitality suite concierge to inquire about visiting sights on your own. The concierge will be available to answer any questions you may have regarding Fort Lauderdale, tours, restaurants and other sites of interest.

13. Photo Exhibit

We are delighted to again host a photography exhibit at the APSA 34th Annual Meeting. The exhibit in 2000 was very successful and we look forward to active participation again. Contact Karen Kelly, APSA Meeting Administrator, if you plan to participate at kkelly@eapsa.org or by phone at 847 / 480-9576, Ext. 294, so that we can ensure we have a display board available for you.

This exhibit is a non-juried show open to any APSA member, family member or friend. Many APSA members have an avid interest in photography and this is an opportunity to display some of their work, and adds another dimension to the APSA meetings.

We ask that you bring your photographs with you this year because space is limited at the headquarters office to store them. Each photograph should be mounted in a mat no larger than 11 x 14 inches, with your name, address and phone number on the back. Photos can be color, black and white or any alternative processing.

If you have any questions contact Susan O'Neil (sponeilnashville@aol.com) or Evelyn Georgeson (Egeorge705@aol.com). Set-up will be on Sunday, May 25 at 7:30 am.

14. Optional Activities

The golf tournament will take place at 1:30 p.m. on Monday, May 26. It will be a shotgun start at the Jacaranda Golf Club. Lunch will be included and the cost to participate is $100.

The annual 5K Fun Run will be on Monday, May 26, at 6 a.m. A light breakfast will be included and the cost to participate is $60.

The round-robin tennis tournament begins at 2 p.m. Monday, May 26. Light refreshments will be included and the cost to participate is $60.

Additional information about these events will be available at the APSA registration desk.

15. Messages

A message board will be maintained in the registration area during registration hours. Please check the board frequently. There will be NO PAGING during the meeting. The following phone number may be used to contact the message center: 954/525-4000. Please instruct callers to ask for the APSA registration desk in order to leave a message.

Guidelines for Authors and Discussants

1. Speakers are reminded that presentations shall be limited to six minutes, three minutes and one minute (as indicated) for case presentations.

2. Computer disks and CDs must be labeled and turned in to the projectionist by 1 p.m. on the day *before* they are to be presented.

3. Posters: Scientific posters should be set up Sunday morning from 7:30 a.m. – 10:30 a.m. Authors are asked to be in attendance during the morning refreshment breaks and the session on Sunday evening to discuss their presentations. All poster displays must be dismantled on Wednesday, immediately following the annual meeting.

4. Authors selected to present one-minute oral presentations about their poster displays are limited to two slides for their presentation. Refer to the *Guide for Speakers* mailed in January for instructions about preparing your presentation.

5. Discussants from the floor should state their name and affiliation before their remarks. The discussions will be audio recorded for transcription at a later date.

6. Typed discussion should be limited to a maximum of 200 words or less. Typed discussions that exceed 200 words will have to be edited before they are submitted to the *Journal* for publication.

7. Discussants will have the opportunity to edit a transcript of their remarks following the meeting. The publications committee reserves the right to edit the typed discussion before it is submitted to the *Journal*.

American Pediatric Surgical Foundation

The American Pediatric Surgical Association Foundation would like to thank the following APSA members who have contributed to the Foundation. This list is up-to-date as of January 31, 2003.

Samuel M. Alaish, M.D.
R. Peter Altman, M.D. ♌
Kathryn D. Anderson, M.D. ♌
David Andrews, M.D. ♌
Robert, M. Arensman, M.D. ♌
Keith W. Ashcraft, M.D ♌
Kenneth Azarow, M.D.
Richard G. Azizkhan, M.D. ♌
Charles E. Baldwin, M.D. ♌
Barbara Barlow, M.D. ♌
Bonnie Beaver, M.D.
Gail Besner, M.D.
David P. Bliss Jr., M.D. ♌
Sheldon J. Bond, M.D. ♌
Richard J. Bower, M.D. ♌
Theodore Brand, M.D. ♌
Allen F. Browne, M.D. ♌
John R. Campbell, M.D. ♌
Donna A. Caniano, M.D. ♌
Darrell L. Cass, M.D.
Clinton Cavett, M.D. ♌
Jeffrey Christian, M.D.
David L. Collins, M.D. ♌
Dale Coln, M.D.
Donald Cooney, M.D. ♌
Arnold Coran, M.D. ♌
Catherine Cosentino, M.D. ♌
Michael Curci, M.D. ♌
Albert Dibbins, M.D. ♌
Michael Dimler, M.D.
Stephen Dolgin, M.D. ♌
Patricia K. Donahoe, M.D. ♌
Edward Doolin, M.D. ♌
John Doski, M.D.
Earl C. Downey Jr., M.D.
Jeffrey J. DuBois, M.D.
Peter Ehrlich, M.D.
Sigmund Ein, M.D. ♌
Dick Ellis, M.D. ♌
Scott A. Engum, M.D.
Mary Fallat, M.D. ♌
Neil Feins, M.D. ♌
Robert Filler, M.D. ♌
Howard Filston, M.D. ♌
Eric W. Fonkalsrud, M.D.
Michael W.L. Gauderer, M.D. ♌
Howard Ginsburg, M.D. ♌
Philip Glick, M.D. ♌
Charles Goodwin, M.D. ♌
Jonathan I. Greenfeld, M.D.
Diller B. Groff III, M.D. ♌
Jay L. Grosfeld, M.D. ♌
Philip Guzzetta, M.D. ♌
Alex J. Haller, M.D.
Burton Harris, M.D. ♌
Daniel Hays, M.D. ♌
Patrick Healy, M.D. ♌
Kurt F. Heiss, M.D.
Janette A. Henderson, M.D.
W. Hardy Hendren, M.D. ♌
Leon Hicks, M.D.
David Hitch, M.D.
Dennis Hoelzer, M.D.
George Holcomb III, M.D.
Randall M. Holland, M.D.
J. Laurance Hill, M.D. ♌
David Hitch, M.D. ♌
Thomas M. Holder, M.D. ♌
Andrew R. Hong, M.D.
Ai-Xuan Holterman, M.D. ♌
Mark Holterman, M.D. ♌
Richard J. Jackson, M.D.
Subramania Jegathesan, M.D.
Dale Johnson, M.D. ♌
Stephen G. Jolley, M.D. ♌
Ali Kavianian, M.D.
Peter C.W. Kim, M.D. ♌
Samuel H. Kim, M.D. ♌
Michael Klein, M.D. ♌
Don Klotz Jr., M.D.
C. Everett Koop, M.D.
Ann Kosloske, M.D.

♌ Indicates contributions of $1,000 or more

Vinh T. Lam, M.D.
Charles A. Lankau, M.D. ♌
Michael P. LaQuaglia, M.D. ♌
Daniel Ledbetter, M.D. ♌
Eugene J. Lewis Jr., M.D.
Thom E. Lobe, M.D. ♌
Deborah Loeff, M.D.
Dennis P. Lund, M.D. ♌
John R. Maddox Jr., M.D. ♌
David K. Magnuson, M.D. ♌
Eugene D. McGahren III, M.D. ♌
John Menchaca, M.D.
William Middlesworth, M.D.
William Morgan Jr., M.D.
Steven Moulton, M.D.
Victor Nanagas, M.D. ♌
Jed Nechter, M.D.
Barry M. Newman, M.D. ♌
John Noseworthy, M.D. ♌
Keith T. Oldham, M.D. ♌
James O'Neill, M.D. ♌
Victor N. Oritz, M.D.
H. Biemann Othersen, M.D. ♌
Richard Pearl, M.D. ♌
Prabhakar D. Pendse, M.D.
Lewis W. Pinch, M.D. ♌
Cedric J. Priebe Jr., M.D.
Timothy Pittinger, M.D. ♌
Subhash R. Puranik, M.D.
Jayant Radhakrishnan, M.D. ♌
Judson Randolph, M.D.
Irving A. Ratner, M.D.
Fredrick J. Rescorla, M.D. ♌
Richard R. Ricketts, M.D. ♌
Bradley M. Rodgers, M.D. ♌
Samuel B. Rosser, M.D.
Thomas Rouse, M.D.
Marc I. Rowe, M.D. ♌
Nicholas C. Saenz, M.D.
Robert S. Sawin, M.D. ♌
Robert T. Schaller Jr., M.D.
L.R. Tres Scherer, M.D.
David J. Schmeling, M.D. ♌
John N. Schullinger, M.D. ♌
Donald B. Shaul, M.D. ♌
Neil J. Sherman, M.D.
Michael S. Slim, M.D.
Anthony Stallion, M.D.
Mindy B. Statter, M.D.
Steven Stylianos, M.D.
Riccardo A. Superina, M.D. ♌
James I. Talbert, M.D. ♌
David Tapper, M.D. ♌
Steven Teich, M.D.
Daniel H. Teitelbaum, M.D.
John M. Templeton Jr., M.D. ♌
William M. Toyama, M.D. ♌
William P. Tunell, M.D. ♌
Victor Valda, M.D.
Dennis Vane, M.D. ♌
Charles Wagner, M.D.
Rakesh Wahi, M.D.
C. Eric Walburgh, M.D. ♌
Warner H. Webb, M.D.
Malvin Weinberger, M.D. ♌
Eugene Wiener, M.D. ♌
Karen West, M.D. ♌
Albert H. Wilkinson Jr., M.D. ♌
Mark L. Wulkan, M.D.
Moritz Ziegler, M.D. ♌

PAST APSA ANNUAL MEETING DATES AND LOCATIONS

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
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

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

Program in Detail

SATURDAY, MAY 24, 2003

9 a.m. – 4 p.m.	APSA Board of Governors meeting
1 p.m. – 6 p.m.	Committee meetings
6 p.m. – 10 p.m.	Publications Committee Dinner

SUNDAY, MAY 25, 2003

6:30 a.m. – 9 a.m.	Committee meetings
7 a.m. – 6 p.m.	Registration open
7:30 a.m. – 10:30 a.m.	Poster set-up

SYMPOSIUM: FUNDAMENTALS OF EMBRYOLOGY FOR THE PEDIATRIC SURGEON

9 a.m. – 11:30 a.m.

Educational Objective:

- Understand how genetic activity controls embryonic cell differentiation in a coordinated pattern that gives rise to organs, systems and body form.
- Learn computer models and animations that can be useful tools for teaching embryology.
- Recognize the potential utility of first trimester embryo ultrasonography and the practical role of this discipline both for pediatric surgery and maternal fetal medicine.
- Review status of the stem cell field. Contrast sources of stem cells. Examine attempts at directing differentiation. Explore the utilization of stem cells in animal models of diseases and injuries. Understand scientific obstacles to utlization.

Instructors:

- Maurice J. Pescitelli Jr., Ph.D., Visiting Research Assistant Professor, University of Illinois at Chicago
- John Gearhart, Ph.D., C. Michael Armstrong Professor of Medicine, Institute for Cell Engineering, Johns Hopkins University School of Medicine
- Mark Holterman, M.D., Ph.D., Associate Professor of Surgery, Division of Pediatric Surgery, University of Illinois at Chicago
- Charles N. Paidas, M.D., Associate Professor of Surgery, Division of Pediatric Surgery, Johns Hopkins University School of Medicine

Agenda:

- Molecular Control of Pattern Formation During Embryonic Development: Maurice J. Pescitelli Jr., Ph.D.
- Stem Cell Based Therapies; Status, Hope, and Public Policy: John Gearhart, Ph.D.
- Tools for Improving Embryology Education: Mark Holterman, M.D., Ph.D.
- First Trimester Embryo Ultrasonography: Charles N. Paidas, M.D.

LUNCH WITH VIDEO SESSION

11:30 a.m. – 1 p.m.
Moderators: *Robert E. Cilley, M.D. and Edward M. Barksdale Jr., M.D.*
Educational Objective: The Video Session will update the participants on clinical problems in pediatric surgery and experimental examination of clinical and basic science issues.

V1 RESECTION OF WILMS' TUMOR WITH CAVO-ATRIAL TUMOR THROMBUS UNDER EXTRACORPORAL BYPASS
Joerg Fuchs, M.D., Philipp O. Szavay, M.D., Hans Joachim Kirschner, M.D., Wilke Schneider, M.D., Gerhard Ziemer, M.D.
Department of Pediatric Surgery, University Hospital Tuebingen, Tuebingen, Germany

V2 THORACOSCOPIC REPAIR OF CONGENITAL DIAPHRAGMATIC HERNIA IN AN INFANT
Ronald B. Hirschl, M.D., Saleem Islam, M.D.
University of Michigan, Ann Arbor, MI, USA

V3 THORACOSCOPIC LOBECTOMY FOR CONGENITAL ADENOMATOID MALFORMATION IN AN INFANT
Steven S. Rothenberg, M.D.
Mother and Child Hospital at Presbyterian/St. Lukes, Denver, CO, USA

V4 A NEW OPERATIVE TECHNIQUE FOR RESTORATIVE PROCTOCOLECTOMY: THE ENDORECTAL PULL-THROUGH COMBINED WITH A DOUBLE-STAPLED ILEO-ANAL ANASTOMOSIS
James D. Geiger, M.D., F.A.C.S., Daniel H. Teitelbaum, M.D., F.A.C.S., Ronald B. Hirschl, M.D., F.A.C.S., Arnold G. Coran, M.D., F.A.C.S.
University of Michigan, Ann Arbor, MI, USA

V5 ROBOT-ASSISTED NISSEN FUNDOPLICATION IN A CHILD
Ronald B. Hirschl, M.D., James D. Geiger, M.D.
University of Michigan, Ann Arbor, MI, USA

Underlining denotes the author scheduled to present at the meeting.

Symposium: Ethical Controversies in the Management of Intersex

1 p.m. – 3:30 p.m.
Educational Objective: This educational session will review the ethical issues surrounding the surgical management of infants with ambiguous genitalia and intersex anomalies. Recently, advocacy groups and former patients with intersex have challenged the wisdom of early reconstructive operative management. Dr. Dreger will examine the sociological basis of gender and sex identity. Dr. Reiner will review the psychological aspects of intersex and data on long-term studies in adolescent and adult patients who had genital reconstruction in infancy. Dr. Daaboul will discuss the ethical concerns in decisions regarding early reconstructive surgery versus delayed intervention when the patient attains decision-making capacity. The session will conclude with audience participation in the form of questions and discussion.

Instructors:
- Donna A. Caniano, M.D., Chair of the Ethics and Advocacy Committee of APSA, Professor of Surgery and Pediatrics, Ohio State University College of Medicine and Public Health and Surgeon-in-Chief, Children's Hospital
- Alice Dreger, Ph.D., Associate Professor of Science and Technology Studies, Lyman Briggs School, and Associate Faculty, Center for Ethics and Humanities in the Life Sciences, Michigan State University
- William Reiner, M.D., Director of Child and Adolescent Psychiatry, Johns Hopkins Hospital
- Jorge Daaboul, M.D., Assistant Professor of Pediatrics, University of California at San Francisco and Director of Endocrinology, Children's Hospital of Oakland

Agenda:
- Introduction: Donna A. Caniano, M.D.
- Historical and Social Perspectives: Alice Dreger, Ph.D.
- Long-term Issues in Persons Reconstructed in Infancy: William Reiner, M.D.
- Ethical Considerations: Jorge Daaboul, M.D.
- Questions and Discussion: Panel

Poster Session

3:45 p.m. – 4:15 p.m.
Moderator: *Daniel H. Teitelbaum, M.D.*
Educational Objective: The Poster Session will update the participants with regard to new approaches to problems in clinical pediatric surgery, as well as new experimental approaches to clinical problems.

P1 THE BILE DUCT CELL RESPONSE TO BILE DUCT INJURY IS DIFFERENTIALLY REGULATED: A METHOD TO EVALUATE BILIARY EPITHELIAL CELL HETEROGENEOUS FUNCTION (1 MINUTE)
Ai-xuan Holterman, M.D., MinHua Wang, Ph.D.
University of Illinois at Chicago, Department of Surgery/Division of Pediatric Surgery and Molecular Genetics, Chicago, IL, USA

Underlining denotes the author scheduled to present at the meeting.

P2 TERMINAL DIFFERENTIATION AND NITROFEN INDUCED APOPTOSIS IN THE P19 CELL LINE: INSIGHTS INTO THE MOLECULAR MECHANISMS OF CONGENITAL DIAPHRAGMATIC HERNIA (1 MINUTE)

Jeremy T. Aidlen, M.D., Pradeep Nazarey, M.D., David E. Kling, Ph.D., Bernard Kinane, M.D., Jay J. Schnitzer, M.D., Ph.D.
Massachusetts General Hospital, Boston, MA, USA

P3 ROLE OF INHIBITOR OF APOPTOSIS PROTEIN IN EXPERIMENTAL NECROTIZING ENTEROCOLITIS (1 MINUTE)

Jeffrey S. Upperman, M.D., Riana Rhoden, Douglas Potoka, M.D., Caterina Wong, M.S., Patricia Boyle, David Hackam, M.D., Ruben Zamora, Ph.D., Henri Ford, M.D.
Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

P4 HUMAN HEPATOCYTE SURVIVAL IN AN *IN VITRO* TISSUE-ENGINEERED LIVER DEVICE WITH A VASCULAR NETWORK OF CHANNELS (1 MINUTE)

Wing S. Cheung, M.D., Jeffrey Borenstein, Ph.D., Mohammad R. Kaazempur-Mofrad, Ph.D., Michael Shin, Ph.D., Alec Sevy, B.S., Katherine Kulig, B.A., Joseph P. Vacanti, M.D.
Massachusetts General Hospital, Boston, MA, USA

P5 QUANITATION OF LUNG SEALING IN THE SURVIVAL SWINE MODEL* (1 MINUTE)

Michael V. Tirabassi, M.D., Gregory T. Banever, M.D., David B. Tashjian, M.D., Kevin P. Moriarty, M.D., F.A.C.S., F.A.A.P
Pediatric Surgical Services, Springfield, MA, USA

P6 MORPHOLOGICAL TRANSFORMATION OF THE EMBRYONIC HUMAN LIVER**(1 MINUTE)

Eric S. Weiss, B.S., Michael Choti, M.D., Robert F. Morreale, M.S., Elizabeth C. Lockett, M.S., Grover M. Hutchins, M.D., Charles N. Paidas, M.D.
The Johns Hopkins Medical Institutions, Baltimore, MD, USA

P7 N-MYC REGULATION OF THROMBOSPONDIN-1 IN NEUROBLASTOMA (1 MINUTE)

Arnold G. Coran, M.D., Cynthia A. Corpron, M.D., Valerie Castle, M.D.
C.S. Mott Children's Hospital/University of Michigan, Ann Arbor, MI, USA

P8 FETAL CARTILAGE ENGINEERING FROM UMBILICAL CORD BLOOD (1 MINUTE)

Julie R. Fuchs, M.D., Didier Hannouche, M.D., Shinichi Terada, M.D., Ph.D., Sarvenaz Zand, B.A., Joseph P. Vacanti, M.D., Dario O. Fauza, M.D.
Harvard Center for Minimally Invasive Surgery, Massachusetts General Hospital, and Children's Hospital, Boston, MA, USA

** Author received grant/research support from Tyco Health Care/Valley Lab*

*** Author received grant/research support from the National Library of Medicine; Visible Human Embryo Project*

Underlining denotes the author scheduled to present at the meeting.

P9 CDNA MICROARRAY ANALYSIS OF NITROFEN-INDUCED CONGENITAL DIAPHRAGMATIC HERNIA IN MICE (1 MINUTE)
Marian N. Safaoui, M.D., Kerilyn K. Nobuhara, M.D., Kathryn D. Anderson, M.D., David Warburton, M.D.
Children's Hospital Los Angeles, Los Angeles, CA, USA

P10 THE ROLE OF RHO GTPASE IN MODULATING ENTEROCYTE MIGRATION ALONG THE CRYPT-VILLUS AXIS DURING NECROTIZING ENTEROCOLITIS (1 MINUTE)
S. Cetin, M.D., H. R. Ford, M.D., R. Zamora, Ph.D., P. Boyle, J. Upperman, M.D., D. J. Hackam, M.D., Ph.D.
Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

4:15 p.m. – 5:15 p.m.	Poster Viewing: Authors in Attendance
5:30 p.m. – 6:30 p.m.	Exhibit Set-up
6:30 p.m. – 8:30 p.m.	Welcome Reception

MONDAY, MAY 26, 2003

6 a.m. – 7:30 a.m.	Annual 5k Fun Run
6:30 a.m. – 7:30 a.m.	Committee meetings
6:45 a.m. – 1 p.m.	Registration open
6:45 a.m. – 7:30 a.m.	Continental breakfast; exhibits open; poster viewing
7:30 a.m. – 8 a.m.	Welcome and Introduction — R. Peter Altman, M.D. New members introduced

SESSION I: THE FETUS AND CONGENITAL DIAPHRAGMATIC HERNIA

8 a.m. – 9:15 a.m.
Moderators: *R. Peter Altman, M.D. and Robert E. Cilley, M.D.*
Educational Objective: Those attending this session will be provided with current information regarding the treatment of infants affected with congenital diaphragmatic hernia as well as related scientific developments. Other surgical problems that may be diagnosed or treated in the fetus will be discussed.

1 SACROCOCCYGEAL TERATOMA: PRENATAL ASSESSMENT, FETAL INTERVENTION, AND OUTCOME (6 MINUTES)
Holly L. Hedrick, M.D., Alan W. Flake, M.D., Timothy M. Crombleholme, M.D., Lori J. Howell, R.N., Mark P. Johnson, M.D., R. Douglas Wilson, M.D., N. Scott Adzick, M.D.
The Children's Hospital of Philadelphia, Philadelphia, PA, USA

Underlining denotes the author scheduled to present at the meeting.

2 RIGHT CONGENITAL DIAPHRAGMATIC HERNIA: PRENATAL ASSESSMENT AND OUTCOME (3 MINUTES)

Holly L. Hedrick, M.D., Timothy M. Crombleholme, M.D., Alan W. Flake, M.D., Michael L. Nance, M.D., Daniel von Allmen, M.D., Lori J. Howell, R.N., Mark P. Johnson, M.D., R. Douglas Wilson, M.D., N. Scott Adzick, M.D.
The Children's Hospital of Philadelphia, Philadelphia, PA, USA

3 FETAL TISSUE ENGINEERING ENHANCES BIOPROSTHETIC DIAPHRAGMATIC REPAIR (3 MINUTES)

Julie R. Fuchs, M.D., Amir Kaviani, M.D., Shyh-Jou Shieh, M.D., Shinichi Terada, M.D., David LaVan, Ph.D., Jung-Tak Oh, M.D., Helen Li Zhang, M.D., Joseph P. Vacanti, M.D., Dario O. Fauza, M.D.
Harvard Center for Minimally Invasive Surgery, Massachusetts General Hospital, and Children's Hospital, Boston, MA, USA

4 HYPERONCOTIC ENHANCEMENT OF PULMONARY GROWTH AFTER FETAL TRACHEAL OCCLUSION: A COMPARISON BETWEEN DEXTRAN AND ALBUMIN (3 MINUTES)

Robert W. Chang, M.D., Makoto Komura, M.D., Steven Andreoli, B.A., Markus Klingenberg, B.A., Russell Jennings, M.D., Jay Wilson, M.D., Dario Fauza, M.D.
Children's Hospital, Department of Surgery, Boston, MA, USA

5 GENETIC POLYMORPHISMS OF ANGIOTENSIN SYSTEM GENES IN CONGENITAL DIAPHRAGMATIC HERNIA ASSOCIATED WITH PERSISTENT PULMONARY HYPERTENSION (3 MINUTES)

Prem Puri, Prof, Valeria Solari, M.D.
Children's Research Centre, Our Lady's Hospital for Sick Children, and University College Dublin, Dublin, Ireland

6 IMPACT OF A CURRENT TREATMENT PROTOCOL ON OUTCOME OF HIGH-RISK CONGENITAL DIAPHRAGMATIC HERNIA (6 MINUTES)

*Pietro Bagolan, M.D., Francesco Crescenzi, M.D., Germana Casaccia, M.D., Antonella Nahom, M.D., Alessandro Trucchi, M.D., Claudio Giorlandino, M.D.^*
(Sponsored by Kevin P. Lally)
Department of Neonatal and Surgical Neonatology, Bambino Gesu Children's Hospital, Rome, Italy
^ Department of Fetal Medicine of Artemisia, CNLUS, Rome, Italy

7 THE RELATIONSHIP OF PULMONARY ARTERY PRESSURE AND SURVIVAL IN CONGENITAL DIAPHRAGMATIC HERNIA (6 MINUTES)

Peter W. Dillon, M.D., Robert E. Cilley, M.D., David Mauger, Ph.D., Christopher Zachary, M.D., Andreas Meier, M.D.
Penn State College of Medicine, Hershey, PA, USA

Underlining denotes the author scheduled to present at the meeting.

8 CONGENITAL DIAPHRAGMATIC HERNIA: ANTENATAL FETAL VITAMIN A IMPROVES POSTNATAL OXYGENATION AND VENTILATION IN THE LAMB MODEL (3 MINUTES)
Philip L. Glick, M.D., Nicola A. Lewis, F.R.C.S., Bruce A. Holm, Ph.D., Jon Rossman, Daniel Swartz
The Buffalo Institute of Fetal Therapy, Children's Hospital of Buffalo, and the Departments of Surgery, Gynecology/Obstetrics, and Pediatrics, State University of New York at Buffalo School of Medicine and Biomedical Sciences, Buffalo, NY, USA

9 *EX-UTERO* INTRAPARTUM TREATMENT PROCEDURE: LOOKING BACK AT THE EXIT (3 MINUTES)
Shinjiro Hirose, M.D., Suzanne Yoder, M.D., Hanmin Lee, M.D., Diana L. Farmer, M.D., Michael R. Harrison, M.D.
University of California, San Francisco, San Francisco, CA, USA

9:15 a.m. – 10:15 a.m.	Robert E. Gross Lecture: Lucian Leape, M.D. "Safe Health Care: Are We Up to It?"
10:15 a.m. – 10:45 a.m.	Coffee break, visit exhibits, visit posters

SESSION II: CLINICAL SURGERY AND TRAUMA: CLINICAL PROBLEMS IN PEDIATRIC SURGERY

10:45 a.m. – Noon
Moderators: *Terry L. Buchmiller-Crair, M.D. and David L. Dudgeon, M.D., FACS, FAAP*
Educational Objective: Participants in this session will be presented with current information related to the treatment of common pediatric surgical problems including trauma.

10 COMPLICATIONS ASSOCIATED WITH THE NUSS PROCEDURE: ANALYSIS OF RISK FACTORS AND SUGGESTED MEASURES FOR THE PREVENTION OF COMPLICATIONS (6 MINUTES)
Hyung Joo Park, M.D., Seock Yeol Lee, M.D., Cheol Sae Lee, M.D.
Soonchunhyang University Chunan Hospital, Chunan, South Korea

11 THE SIGNIFICANCE OF INTRAUTERINE GROWTH RESTRICTION (IUGR) IS DIFFERENT FROM PREMATURITY FOR THE OUTCOME OF INFANTS WITH GASTROSCHISIS (3 MINUTES)
Pramod S. Puligandla, M.D., M.Sc., Annie Janvier, M.D., Elise Mok, B.Sc., M.Sc., Sarah Bouchard, M.D., Jean-Martin Laberge, M.D., Helene Flageole, M.D., M.Sc.
The Montreal Children's Hospital and Hopital Ste-Justine, Montreal, Canada

12 COMPARSION OF THE INCIDENCE OF COMPLICATIONS IN OPEN AND LAPAROSCOPIC PYLOROMYOTOMY: A CONCURRENT SINGLE INSTITUTION SERIES (3 MINUTES)
Carroll M. Harmon, M.D., Ph.D., Douglas C. Barnhart, M.D., Keith E. Georgeson, M.D., Ashley Vernon, M.D.
University of Alabama at Birmingham, Birmingham, AL, USA

Underlining denotes the author scheduled to present at the meeting.

13 THYROGLOSSAL DUCT INFECTIONS AND SURGICAL OUTCOMES (3 MINUTES)
Sathya C. Prasad, M.D., Charles L. Snyder, M.D., Jennifer L. Watts, M.S., J. Patrick Murphy, M.D., George K. Gittes, M.D., Walter S. Andrews, M.D., Ronald J. Sharp, M.D., George W. Holcomb III, M.D., Daniel J. Ostlie, M.D.
Children's Mercy Hospital, Kansas City, MO, USA

14 APPLICATION OF THE APSA CLINICAL PRACTICE GUIDELINES FOR ISOLATED LIVER OR SPLEEN INJURIES: A SINGLE INSTITUTION EXPERIENCE (6 MINUTES)
Michael J. Leinwand, M.D., Carole C. Atkinson, R.N.C., George Taylor, M.D., David P. Mooney, M.D.
Children's Hospital-Boston, Boston, MA, USA

15 INJURY GRADE PREDICTS FUNCTIONAL OUTCOME IN NON-OPERATIVELY MANAGED RENAL INJURIES IN CHILDREN (3 MINUTES)
Martin S. Keller, M.D., F.A.C.S., C. Eric Coln, M.D., F.A.C.S., Thomas R. Weber, M.D., F.A.C.S., Jennifer J. Garza, M.D., Kennith H. Sartorelli, M.D., F.A.C.S., Christine Green, M.S.N., R.N.
Cardinal Glennon Children's Hospital, St. Louis, MO, USA

16 DIAGNOSIS OF ACUTE APPENDICITIS USING A CLINICAL PRACTICE GUIDELINE (3 MINUTES)
Douglas S. Smink, M.D., Jonathan A. Finkelstein, M.D., Barbara M. Garcia Pena, M.D., Michael W. Shannon, M.D., George A. Taylor, M.D., Steven J. Fishman, M.D.
Children's Hospital Boston, Boston, MA, USA

17 ROTAVIRUS ASSOCIATED NECROTIZING ENTEROCOLITIS: A POTENTIALLY PREVENTABLE DISEASE? (3 MINUTES)
R. Sharma, M.D., J. J. Tepas, M.D., D. L. Mollitt, M.D., R. D. Garrison, M.D., M. L. Hudak, M.D., J. A. Bradshaw, M.D., G. Stevens, Ph.D., B. R. Premachandra, M.D., P. Pieper, A.R.N.P.
University of Florida Health Science Center at Jacksonville, Jacksonville, FL, USA

18 HERBAL MEDICATION USE IN THE PEDIATRIC SURGICAL PATIENT (3 MINUTES)
Kristin Noonan, M.D., Robert M. Arensman, M.D., J. David Hoover, M.D.
Children's Memorial Hospital, Chicago, IL, USA

19 THE PARENTAL PERSPECTIVE REGARDING THE CONTRALATERAL INGUINAL REGION IN A CHILD WITH KNOWN UNILATERAL INGUINAL HERNIA (3 MINUTES)
George W. Holcomb III, M.D., Kelly A. Miller, M.D., Beverly E. Chaignaud, M.D., Steven B. Shew, M.D., Daniel J. Ostlie, M.D.
Children's Mercy Hospital, Kansas City, MO, USA

Underlining denotes the author scheduled to present at the meeting.

Noon – 1 p.m.	Presidential Address: R. Peter Altman, M.D. "The Good Old Days"
1:30 p.m. – 7 p.m.	Golf Tournament
2 p.m. – 7 p.m.	Tennis Tournament
7:30 p.m. – 9:30 p.m.	President's Reception

TUESDAY, MAY 27, 2003

6:30 a.m. – 8 a.m.	Member business meeting and breakfast
6:30 a.m. – 1 p.m.	Registration open
7 a.m. – 8 a.m.	Continental breakfast (nonmembers), visit exhibits, visit posters

SESSION III: PEDIATRIC SURGICAL DILEMMAS AND DIFFICULT PROBLEMS

8 a.m. – 10 a.m.

Moderators: *Wallace W. Neblett III, M.D. and Daniel H. Teitelbaum, M.D.*

Educational Objective: Presentations at this session will provide the attendee with information regarding unusual and difficult pediatric surgical problems. Problems related to surgical decision-making are emphasized in this session. Basic science presentations refer to specific difficult clinical problems.

20 A MULTIDISCIPLINARY APPROACH TO THE FOCAL FORM OF CONGENITAL HYPERINSULINISM LEADS TO SUCCESSFUL TREATMENT BY PARTIAL PANCREATECTOMY (6 MINUTES)
N. Scott Adzick, M.D., Paul S. Thornton, M.D., Charles A. Stanley, M.D., Robin D. Kaye, M.D., Eduardo Ruchelli, M.D.
Children's Hospital of Philadelphia, Philadelphia, PA, USA

21 DELAYED VERSUS IMMEDIATE SURGERY IN ACUTE APPENDICITIS: DO WE NEED TO OPERATE DURING THE NIGHT? (3 MINUTES)
Dani Yardeni, M.D., Ronald B. Hirschl, M.D., Robert A. Drongowski, M.S., Daniel H. Teitelbaum, M.D., James D. Geiger, M.D., Arnold G. Coran, M.D.
University of Michigan, Department of Surgery, Ann Arbor, MI, USA

22 ASYMPTOMATIC CONGENITAL CYSTIC ADENOMATOID MALFORMATION (CCAM): TO RESECT OR NOT TO RESECT? (6 MINUTES)
Dalal Aziz, M.D., Sascha Tuuha, R.N., Jacob C. Langer, M.D., Sigmund H. Ein, M.D., Greg Ryan, M.D., Peter C. W. Kim, M.D.
Hospital for Sick Children, Toronto, Canada

Underlining denotes the author scheduled to present at the meeting.

23 DO ALL PATIENTS WITH HETEROTAXIA SYNDROME REQUIRE ROUTINE SCREENING FOR INTESTINAL ROTATION ABNORMALITIES? (6 MINUTES)
Matthew Choi, B.Sc., Steven Borenstein, M.D., Lisa Hornberger, M.D., Jacob C. Langer, M.D.
Hospital for Sick Children, Toronto, Canada

24 RESULTS OF GROWTH HORMONE THERAPY IN CHILDREN WITH SHORT BOWEL SYNDROME (3 MINUTES)
Anita M. Nucci, Ph.D., David Finegold, M.D., JaneAnne Yaworski, M.S.N., R.N., Lori Kowalski, M.S., Edward M. Barksdale, M.D.
Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

25 MECHANICAL TENSION LENGTHENS INTESTINE IN JUVENILE RATS (3 MINUTES)
Shawn D. Safford, M.D., Alex J. Freemerman, Ph.D., Kristine M. Safford, M.H.Sc., Dominique M. Goyeau, B.A., Michael A. Skinner, M.D.
Duke University Medical Center, Durham, NC, USA

26 FUNCTIONAL LIVER RECOVERY PARALLELS AUTOLOGOUS GUT SALVAGE IN THE SHORT BOWEL SYNDROME (6 MINUTES)
Kishore R. Iyer, F.R.C.S., Simon Horslen, F.R.C.P., Clarivet Torres, M.D., Jon Vanderhoof, M.D., Stephen Raynor, M.D., Alan Langnas, D.O.
University of Nebraska Medical Center, Omaha, NE, USA

27 HB-EGF PROPHYLACTIC AND SALVAGE THERAPY FOR INTESTINAL ISCHEMIA/REPERFUSION INJURY (3 MINUTES)
Abigail E. Martin, M.D., Mark H. Luquette, M.D., Gail E. Besner, M.D.
Children's Hospital, Columbus, OH, USA

28 GLUCAGON-LIKE PEPTIDE-2α: A POSSIBLE NEW APPROACH IN THE MANAGEMENT OF INFLAMMATORY BOWEL DISEASE (3 MINUTES)
L. Grier Arthur, M.D., Marshall Schwartz, M.D., Keith A. Kuenzler, M.D., Ruth Birbe, M.D.
A. I. duPont Hospital for Children, Wilmington, DE, USA

29 AN INTERDISCIPLINARY APPROACH TO THE ADOLESCENT BARIATRIC PATIENT (6 MINUTES)
Thomas H. Inge, M.D., Ph.D., F.A.C.S., Linda Langford, M.S.N., R.N., Steven Daniels, M.D., Ph.D., Shelley Kirk, M.S., Helmut Roehrig, Ph.D., Raouf Amin, M.D., Meg Zeller, Ph.D., Victor Garcia, M.D., F.A.C.S.
Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

30 BASE OF TONGUE LYMPHANGIOMAS – LONG-TERM OUTCOMES AND PROPOSAL FOR MODIFICATION OF STAGING SYSTEMS (3 MINUTES)
Lynne H.Y. Lim, M.D., Michael J. Rutter, M.D., Robin T. Cotton, M.D., Richard G. Azizkhan, M.D.
Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Underlining denotes the author scheduled to present at the meeting.

31 PILONIDAL DISEASE IN ADOLESCENTS (3 MINUTES)
Sheenie Ambardar, Darrell L. Cass, M.D., Mary J. Barnes, M.D., Jay Pinsky, Michael A. Helmrath, M.D., Mary L. Brandt, M.D.
Division of Pediatric Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX, USA

32 TOTAL COLONIC MANOMETRY IN THE SURGICAL EVALUATION OF PEDIATRIC FUNCTIONAL COLONIC OBSTRUCTION (3 MINUTES)
Matthew J. Martin, M.D., James M. Noel, M.D., Scott R. Steele, M.D., Philip S. Mullenix, M.D., David Wiechmann, M.D., Kenneth S. Azarow, M.D.
Madigan Army Medical Center, Tacoma, WA, USA

10 a.m. – 10:30 a.m. Coffee break, visit exhibits, visit posters

SESSION IV: ONCOLOGY: CLINICAL AND EXPERIMENTAL

10:30 a.m. – Noon
Moderators: *Richard J. Andrassy, M.D. and Edward M. Barksdale Jr., M.D.*
Educational Objective: The participants at this session will be informed of the latest advances in the treatment of childhood cancer. Experimental studies pertinent to the biology and treatment of neuroblastoma will be presented.

33 OUTCOME AND STAGING EVALUATION IN MALIGNANT GERM CELL TUMORS OF THE OVARY IN CHILDREN AND ADOLESCENTS: AN INTERGROUP STUDY (6 MINUTES)
Deborah Billmire, M.D., Charles Vinocur, M.D., Frederick Rescorla, M.D., Barbara Cushing, M.D., Wendy London, Ph.D., Marc Schlatter, M.D., Mary Davis, M.D., Roger Giller, M.D., Steve Lauer, M.D., Thomas Olson, M.D.
Section of Pediatric Surgery, J.W. Riley Hospital for Children, On Behalf of the Children's Oncology Group, Indianapolis, IN, USA

34 THE IMPACT OF GROSS TOTAL RESECTION ON LOCAL CONTROL AND SURVIVAL IN HIGH-RISK NEUROBLASTOMA (6 MINUTES)
Michael P. LaQuaglia, M.D., Brian H. Kushner, M.D., Maryam Gholizadeh, M.D., Kim Kramer, M.D., Nancy Rosen, M.D., Sarah Abramson, M.D., Cheung Nai-kong, M.D., Ph.D.
Memorial Sloan-Kettering Cancer Center, New York, NY, USA

35 HIGH-AFFINITY VEGF BLOCKADE PROMOTES DIFFERENTIATION OF EXPERIMENTAL NEUROBLASTOMA (3 MINUTES)
Anna Serur, M.D., Tamara New, M.D., Jason S. Frischer, M.D., Jianzhong Huang, M.D., Kimberly W. McCrudden, M.D., Akiko Yokoi, M.D., Jessica J. Kandel, M.D., Darrell J. Yamashiro, M.D., Ph.D.
College of Physicians and Surgeons, Columbia University, Children's Hospital of New York, New York Presbyterian Hospital, New York, NY, USA

Underlining denotes the author scheduled to present at the meeting.

36 IMMUNO-THERAPY IS AN EFFECTIVE ADJUVANT TO SURGICAL EXCISION OF BULKY NEUROBLASTOMA DISEASE*(3 MINUTES)
Anthony D. Sandler, M.D., Sandy Fang, B.S., Xiaoyan Zhu, M.S., Gen Kobayashi, M.D., Michal Miller, M.D., Arthur Krieg, M.D.
The University of Iowa Hospitals and Clinics, Iowa City, IA, USA

37 INTERFERON-α RESTRICTS NEUROBLASTOMA GROWTH THROUGH INHIBITION OF TUMOR-INDUCED ANGIOGENESIS (3 MINUTES)
Christian J. Streck, M.D., Youbin Zhang, Ph.D., Ryan Miyamoto, B.A., Junfang Zhou, M.D., Catherine Y. C. Ng, M.S., Andrew M. Davidoff, M.D.
St. Jude Children's Research Hospital, Memphis, TN, USA

38 ENDOSTATIN-MEDIATED CONCOMITANT RESISTANCE IN NEUROBLASTOMA (6 MINUTES)
Christian J. Streck, M.D., Youbin Zhang, Ph.D., Junfang Zhou, M.D., Catherine Y. C. Ng, M.S., Andrew M. Davidoff, M.D.
St. Jude Children's Research Hospital, Memphis, TN, USA

39 THE ROLE OF SURGERY IN THE TREATMENT OF RELAPSED STAGE IV HODGKIN'S DISEASE (3 MINUTES)
Sheila Weitzman, M.B., Bch, David Dix, M.B. Bch, J. Ted Gerstle, M.D.
The Hospital for Sick Children, Toronto, Canada

40 THE CURRENT MANAGEMENT OF HEPATOBLASTOMA: A COMBINATION OF CHEMOTHERAPY, CONVENTIONAL RESECTION AND LIVER TRANSPLANTATION (3 MINUTES)
Gregory M. Tiao, M.D., Steve Allen, M.D., Maria Alonso, M.D., Nicole Bobey, M.D., John Bucuvalas, M.D., Robert Wells, M.D., Frederick Ryckman, M.D.
Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

41 SURGICAL MANAGEMENT AND OUTCOME OF OSTEOSARCOMA PATIENTS WITH UNILATERAL PULMONARY METASTASES (6 MINUTES)
Wendy T. Su, M.D., Joseph Chewning, M.D., Sara Abramson, M.D., Nancy Rosen, M.D., Maryam Gholizadeh, M.D., John Healey, M.D., Paul Meyers, M.D., Michael LaQuaglia, M.D., F.A.C.S.
Memorial Sloan-Kettering Cancer Center, New York, NY, USA

Noon – 1 p.m.	Overseas Guest Lecture: Claire Nihoul-Fékété, M.D. "Modern Surgical Management of Congenital Hyperinsulinemic Hypoglycemia"
1:30 p.m. – 3:30 p.m.	Telesurgery demonstration and box lunch
3:30 p.m. – 5 p.m.	Children's Oncology Group meeting (open to all APSA meeting attendees)
6:30 p.m. – 10:30 p.m.	President's Banquet

** Author received a grant/research support from Coley Pharmaceutical Group*

Underlining denotes the author scheduled to present at the meeting.

7 a.m. – 8 a.m.	Continental breakfast, exhibits open, poster viewing
7:30 a.m. – 11:15 a.m.	Registration open
8 a.m. – 8:15 a.m.	APSA Foundation Scholar: Anthony Stallion, M.D. "Intestinal Ischemia Reperfusion Injury Contributes to the Initiation of the Systemic Inflammatory Response Syndrome"
8:15 a.m. – 8:30 a.m.	APSA Foundation Scholar: Mary Beth Madonna, M.D. "Growth Factor Receptor Signaling and its Relationship to Cell Proliferation and Differentiation in a Neuroblastoma Cell Line"
8:30 a.m. – 9:30 a.m.	*Journal of Pediatric Surgery* Lecture: Patricia Donahoe, M.D. "Sustained Inquiry and Perseverance in the Clinic and at the Bench"

SESSION V: SURGICAL TECHNIQUES AND EXPERIENCE

9:30 a.m. – 11 a.m.

Moderators: *Bradley M. Rodgers, M.D. and John R. Gosche, M.D.*

Educational Objective: A broad array of innovative and new surgical techniques and practices will be reviewed for the participant. Large experiences with difficult surgical problems will be presented.

42 USE OF RADIOFREQUENCY ABLATION OF THE LOWER ESOPHAGEAL SPHINCHTER TO TREAT RECURRENT GASTROESOPHAGEAL REFLUX DISEASE (3 MINUTES)
Saleem Islam, M.D., James D. Geiger, M.D., Daniel H. Teitelbaum, M.D.
University of Michigan, Ann Arbor, MI, USA

43 GASTRIC TRANSPOSITION IN CHILDREN — A 21-YEAR EXPERIENCE (6 MINUTES)
Lewis Spitz, F.R.C.S., Edward Kiely, F.R.C.S., Agostino Pierro, M.D.
Institute for Child Health, University College London, London, United Kingdom

44 SURGICAL MANAGEMENT OF CLOACAL MALFORMATIONS, A REVIEW OF 339 PATIENTS (6 MINUTES)
Alberto Pena, M.D., Marc A. Levitt, M.D., Andrew R. Hong, M.D., Peter S. Midulla, M.D.
Schneider Children's Hospital, North Shore – Long Island Jewish Health System, New Hyde Park, NY, USA

45 FIBROBLAST GROWTH FACTOR 10 (FGF10) SIGNALING REGULATES NORMAL ANORECTAL DEVELOPMENT (6 MINUTES)
Timothy J. Fairbanks, M.D., David Warburton, M.D., Kathryn D. Anderson, M.D., Saverio Bellusci, Ph.D., R. Cartland Burns, M.D.
Children's Hospital Los Angeles, Los Angeles, CA, USA

Underlining denotes the author scheduled to present at the meeting.

46 ESOPHAGOGASTRIC SEPARATION (EGS) FOR FAILED FUNDOPLICATION IN NEUROLOGICALLY IMPAIRED CHILDREN (3 MINUTES)
Saleem Islam, M.D., Ronald B. Hirschl, M.D., M.S., Daniel H. Teitelbaum, M.D., William Buntain, M.D.
University of Michigan, Ann Arbor, MI, USA

47 CONTOURING BUTTOCK RECONSTRUCTION AFTER SACROCOCCYGEAL TERATOMA RESECTION (3 MINUTES)
Steven J. Fishman, M.D., Russell W. Jennings, M.D., Sidney M. Johnson, M.D., Heung B. Kim, M.D.
Children's Hospital and Harvard Medical School, Boston, MA, USA

48 NITROUS OXIDE ANALGESIA FOR MINOR PEDIATRIC SURGICAL PROCEDURES: A SAFE ALTERNATIVE TO CONSCIOUS SEDATION (3 MINUTES)
Cathy A. Burnweit, M.D., Jeannette A. Diana-Zerpa, A.R.N.P., Michel H. Nahmad, M.D., Charles A. Lankau, M.D., Malvin Weinberger, M.D., Leopoldo Malvezzi, M.D., Lisa A. Smith, M.D., Tina J. Shapiro, A.R.N.P., Kristine J. Thayer, M.D.
Miami Children's Hospital, Miami, FL, USA

49 TRANSANAL ONE-STAGE ENDORECTAL PULL THROUGH PROCEDURE FOR HIRSCHSPRUNG'S DISEASE: A MULTI-CENTER STUDY (6 MINUTES)
Essam A. Elhalaby, M.D., Kadry Wishahy, M.D., Ashraf Elkholy, M.D., Mossad Elbehery, M.D., Sameh Abdelhay, M.D., Alaa Hamza, M.D., Mohamed F. Elbarbary, M.D., Amel M. Hashish, M.D., Nezar A. Halawa, M.D., Nour A. Elkhouly, M.D.
Tanta University, Tanta, Egypt

50 PYLORIC ATRESIA: A NEW OPERATION TO RECONSTRUCT THE PYLORIC SPHINCTER (3 MINUTES)
Antonio Dessanti, Vincenzo Di Benedetto, Marco Iannuccelli, M.D., Antonio Balata, M.D., Aurelio Di Benedetto
Unit of Pediatric Surgery, University of Sassari, Sassari, Italy

51 SUBCUTANEOUS ENDOSCOPICALLY-ASSISTED LIGATION (SEAL) FOR REPAIR OF INGUINAL HERNIAS (3 MINUTES)
Michael R. Harrison, M.D., Hanmin Lee, M.D., Craig T. Albanese, M.D., Diana L. Farmer, M.D.
University of California, San Francisco, San Francisco, CA, USA

52 CONTINUOUS EPIDURAL ANESTHESIA IS SAFE AND EFFECTIVE IN NEONATES AND INFANTS UNDERGOING MAJOR ABDOMINAL SURGERY (3 MINUTES)
Pramod S. Puligandla, M.D., M.Sc., Ioana Bratu, M.D., M.Sc., Elise Mok, B.Sc., M.Sc., Etienne Goujard, M.D., Joao-Luis Pippi Salle, M.D., Helene Flageole, M.D., M.Sc.
The Montreal Children's Hospital, Montreal, Canada

Underlining denotes the author scheduled to present at the meeting.

11 a.m. – 2 p.m.	Poster / Exhibits Dismantle
11 a.m.	34th APSA Annual Meeting Adjourns

Scientific Posters (displayed only)

Educational Objective: The Poster Session will update the participants on new approaches to issues in clinical pediatric surgery and new experimental approaches to clinical problems. All meeting attendees are encouraged to view the posters on Sunday, May 25, 4:15 p.m. – 5:15 p.m. when authors will be in attendance.

P11 A NOVEL APPROACH TO THE MANAGEMENT OF LATE ONSET LIVER FAILURE IN BILIARY ATRESIA

Saleem Islam, M.D., Ronald B. Hirschl, M.D., M.S., Narasimham Dasika, M.D, Arnold G. Coran, M.D.
Section of Pediatric Surgery, C.S. Mott Children's Hospital, University of Michigan, Ann Arbor, MI, USA

P12 RECONSTRUCTION OF THE FLAIL CHEST IN CHILDREN WITH CONGENITALLY ABSENT RIBS USING A VERTICAL EXPANDABLE TITANIUM RIB PROSTHESIS*

*Robert M. Campbell, M.D.**, Melvin D. Smith, M.D.*
Department of Orthopaedics, University of Texas Health Science Center at San Antonio, San Antonio, TX, USA

P13 DEMOGRAPHIC AND ENVIRONMENTAL FACTORS PREDICT PEDIATRIC PEDESTRIAN INJURIES IN AN URBAN SETTING

Jonathan I. Groner, M.D., Justin P. Isariyawongse, B.S., Brandon K. Isariyawongse, John R. Hayes, Ph.D.
Columbus Children's Hospital, Columbus, OH, USA

P14 ILEO-ANAL S-POUCH FOR SALVAGE OF PATIENTS WITH TOTAL COLONIC AGANGLIOSIS AFTER FAILED PULL-THROUGH PROCEDURE

Dave R. Lal, M.D., Bruce A. Harms, M.D., Peter F. Nichol, M.D., Ph.D., Leonard L. Go, M.D., Dennis P. Lund, M.D.
University of Wisconsin Hospital and Clinics, Madison, WI, USA

P15 IMPLICATIONS OF CONTRAST BLUSH ON COMPUTED TOMOGRAPHY SCAN IN THE EVALUATION OF BLUNT SPLENIC TRAUMA IN CHILDREN

Nicolas Lutz, M.D., Soroosh Mahboubi, M.D., Michael L. Nance, M.D., Perry W. Stafford, M.D.
Department of Surgery, The Children's Hospital of Philadelphia, Philadelphia, PA, USA

* *Author received grant support from the National Organization of Rare Disorders and the FDA Office of Orphan Produce Development*

** *Dr. Campbell received royalties from Synthes Spine Company, L.P.*

P16 TOWARDS EVIDENCE-BASED BEST PRACTICES IN NEONATAL SURGICAL CARE II: THE RELATIONSHIP BETWEEN ILLNESS SEVERITY AND OUTCOME

Erik D. Skarsgard, M.D., F.A.C.S., F.R.C.S.-C, Shoo K. Lee, M.D., Ph.D., F.R.C.P.
Children's and Women's Hospital of British Columbia, Departments of Surgery and Pediatrics, University of British Columbia, Vancouver, Canada

P17 BIOMOLECULAR MARKERS AND INVOLUTION IN COMMON HEMANGIOMAS

Jason S. Frischer, M.D., Jianzhong Huang, M.D., Anna Serur, M.D., Akiko Yokoi, M.D., Ph.D., Darrell J. Yamashiro, M.D., Ph.D., Jessica J. Kandel, M.D.
College of Physicians and Surgeons, Columbia University and Children's Hospital of New York, The New York Presbyterian Hospital, New York, NY, USA

P18 FETAL GASTROINTESTINAL MOTILITY IN A RABBIT MODEL OF GASTROSCHISIS

Noboru Oyachi, M.D., Jayaraman Lakshmanan, Ph.D., Daryoush Bassiri, M.D., Michael G. Ross, M.D., James B. Atkinson, M.D.
Pediatric Surgery, UCLA Medical Center, Los Angeles, CA, USA

P19 NON-OPERATIVE MANAGEMENT OF COMPLETE PANCREATIC TRANSECTIONS

Andre A. S. Dick, M.D., Robert E. Cilley, M.D., Peter W. Dillon, M.D., Andreas H. Meier, M.D.
Milton S. Hershey Medical Center, Hershey, PA, USA

P20 A SURVEY OF LAPAROSCOPIC EXPERIENCE PRIOR TO PEDIATRIC SURGICAL TRAINING

APSA Endoscopy Committee
Children's Hospital of Buffalo, State University of New York at Buffalo, Buffalo, NY, USA

P21 INVASION OF CANCER CELLS BY ATTENUATED SALMONELLA TYPHIMURIUM

Leland J. Soto III, M.D., Brent S. Sorenson, B.S., Brent Nelson, Scott Solis, B.S., Arnold S. Leonard, M.D., Ph.D., Daniel A. Saltzman, M.D., Ph.D.
University of Minnesota, Department of Surgery, Minneapolis, MN, USA

P22 MINIMAL RECRUITMENT AND ACTIVATION OF DENDRITIC CELLS IN NEUROBLASTOMA

James D. Geiger, M.D., F.A.C.S., Craig A. McKinney, M.D., Rong J. Sun, M.D., Robert A. Drongowski, M.A., Brian Nickoloff, M.D., Ph.D.
University of Michigan, Ann Arbor, MI, USA

P23 EARLY VATS PROVIDES OPTIMAL TREATMENT OF EMPYEMA IN CHILDREN: AN EVIDENCED-BASED ANALYSIS

Robert L. Gates, M.D., John R. Hayes, Ph.D., Donna A. Caniano, F.A.C.S., Marjorie J. Arca, M.D., F.A.C.S.
The Ohio State University and Children's Hospital, Columbus, OH, USA

P24 SPINAL INJURIES IN CHILDREN

Bayram Cirak, M.D., Susan Ziegfeld, C.C.R.N., M.S.N., Vinita N. Misra, M.S., Anthony M. Avellino, M.D., Charles N. Paidas, M.D., F.A.C.S.
The Johns Hopkins Medical Institutions, Baltimore, MD, USA

P25 THE DIABETIC MILIEU INHIBITS PANCREATIC PRECURSOR DIFFERENTIATION

Troy L. Spilde, M.D., Amina M. Bhatia, M.D., Sheilendra Mehta, M.D., Mark J. Hembree, B.A., Barry L. Preuett, B.A., Zhixing Li, Ph.D., Krishna Prasadan, Ph.D., Charles L. Snyder, M.D., George K. Gittes, M.D.
Laboratory for Surgical Organogenesis, Kansas City, MO, USA

P26 ABERRANT FIBROBLAST GROWTH FACTOR RECEPTOR 2 SIGNALING IN ESOPHAGEAL ATRESIA WITH TRACHEOESOPHAGEAL FISTULA

Troy L. Spilde, M.D., Amina M. Bhatia, M.D., Sheilendra Mehta, M.D., Mark J. Hembree, B.A., Barry L. Preuett, B.A., Daniel J. Ostlie, M.D., Zhixing Li, Ph.D., Krishna Prasadan, Ph.D., Charles L. Snyder, M.D., George K. Gittes, M.D.
Laboratory for Surgical Organogenesis, Kansas City, MO, USA

P27 RENAL TUMORS IN INFANTS LESS THAN 6 MONTHS OF AGE

Darrell L. Cass, M.D., Richard D. Glick, M.D., M. John Hicks, M.D., Ph.D., Jed G. Nuchtern, M.D., David E. Wesson, M.D., Oluyinka O. Olutoye, M.D., Ph.D.
Baylor College of Medicine, Houston, TX, USA

P28 EXTRAHEPATIC PORTAL VEIN THROMBOSIS IS ASSOCIATED WITH AN INCREASED INCIDENCE OF BILIARY TRACT DISEASE IN CHILDREN

Riccardo Superina, M.D., Bill Chiu, M.D., Srikumar Pillai, M.D.
Children's Memorial Hospital, Chicago, IL, USA

P29 DECREASED EXPRESSION OF VOLTAGE-GATED K+ CHANNELS IN PULMONARY ARTERY SMOOTH MUSCLE CELLS IN NITROFEN INDUCED CONGENITAL DIAPHRAGMATIC HERNIA IN RATS

Prem Puri, F.A.C.S., Masato Sakai, M.D., Kei Unemoto, M.D., Valeria Solari, M.D., Bi Xun, M.D.
Children's Research Centre, Our Lady's Hospital for Sick Children and University College Dublin, Dublin, Ireland

P30 SURGICAL MANAGEMENT OF PATIENTS WHO DEVELOP THYROID NODULES AFTER NECK IRRADIATION FOR HODGKIN'S DISEASE

Kenneth W. Gow, M.D., Beth McCarville, M.D., Ashley Hill, M.D., Matthew J. Krasin, M.D., Stephen J. Shochat, M.D.
St. Jude Children's Research Hospital, Memphis, TN, USA

P31 PERINATAL MANAGEMENT OF GASTROSCHISIS: ANALYSIS OF A NEWLY ESTABLISHED CLINICAL PATHWAY DESIGNED TO PROVIDE OPTIMAL CARE WITH EXCELLENT COSMETIC RESULTS

Ravindra K. Vegunta, F.R.C.S., M.B.B.S., Lizabeth J. Wallace, M.S., R.N., Michael R. Leonardi, M.D., John S. Marshall, M.D., Howard S. Cohen, M.D., James R. Hocker, M.D., Kamlesh S. Macwan, M.D., Sue E. Clark, M.D., Susan Tolentino, M.D., Richard H. Pearl, M.D., F.R.C.S.-C.
University of Illinois College of Medicine at Peoria, Peoria, IL, USA

P32 ONTOGENY OF EGF IN A FETAL RABBIT MODEL OF INTRAUTERINE GROWTH RETARDATION

Terry L. Buchmiller-Crair, M.D., Jian Xu, M.D., Christina Cellini, M.D.
Children's Hospital of NewYork Presbyterian-Weill Cornell Medical College, New York, NY, USA

P33 MINIMALLY INVASIVE REVISION OF FAILED "RAVITCH-TYPE" PECTUS EXCAVATUM REPAIR

Donald C. Liu, M.D., Elizabeth Sailhammer, M.D., Mindy B. Statter, M.D., Yeming Wu, M.D., Arnold G. Coran, M.D., Stig Somme, M.D.
University of Chicago Children's Hospital, Chicago, IL, USA

P34 THE IMPACT OF SURGICAL APPROACH ON PYLOROMYOTOMY

Julie R. Fuchs, M.D., Nils Kaehler, B.A., David P. Mooney, M.D.
Children's Hospital, Boston, MA, USA

P35 DUODENAL INJURIES IN CHILDREN: BEWARE OF CHILD ABUSE

Barbara A. Gaines, M.D., Barbara Shultz, B.S.N., Katie Morrison, B.S., David Hackam, M.D., Henri R. Ford, M.D.
Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

P36 ELEVATED TISSUE CYTOKINE mRNA EXPRESSION PRECEDES INCREASED SERUM PROTEIN LEVELS: EVIDENCE FOR ORGAN TO ORGAN COMMUNICATION IN A MURINE MODEL OF MULTI-SYSTEM ORGAN FAILURE

Anthony Stallion, M.D., Tzuyung D. Kou, B.A., Kyle C. Chepla, B.A., Alan D. Levine, Ph.D.
Children's Hospital at the Cleveland Clinic, Cleveland, OH, USA

P37 RAPIDLY POLYMERIZING HYDROGEL PREVENTS BALLOON DISLODGEMENT IN A MODEL OF FETAL TRACHEAL OCCLUSION

Robert W. Chang, M.D., Makoto Komura, M.D., Steven Andreoli, B.A., Russell Jennings, M.D., Jay Wilson, M.D., Dario Fauza, M.D.
Children's Hospital, Department of Surgery, Boston, MA, USA

P38 PRIMARY AND SECONDARY PREVENTION PROGRAMS IMPACT HELMET USE BUT NOT INJURY SEVERITY IN PEDIATRIC BICYCLE TRAUMA

Michael W. Potter, M.D., Michael P. Hirsh, M.D., Donna Babineau, R.N., Sharon Welsh, R.N., Peter Gentile, P.A.-C., Helen Collette, R.N., Cynthia Gingelewski, M.D., Paul D. Danielson, M.D.
MassMemorial Medical Center, Worcester, MA, USA

P39 EFFECT OF AGE ON CERVICAL SPINE INJURIES IN CHILDREN AFTER MOTOR VEHICLE COLLISIONS: EFFECTIVENESS OF RESTRAINT DEVICES

B. S. Zuckerbraun, M.D., H.R. Ford, M.D., K. Morrison, B.S., B. Gaines, M.D., D. J. Hackam, M.D., Ph.D.
University of Pittsburgh School of Medicine, Division of Pediatric Surgery, Pittsburgh, PA, USA

P40 THE EFFICACY OF MULTIDETECTOR CT SCANNING

Robert P. Foglia, M.D., Russell R. Hirsch, M.D., Marilyn J. Siegel, M.D., F. R. Gutierrez, M.D., George B. Mychaliska, M.D.
Departments of Surgery, Pediatrics and Radiology, St. Louis Children's Hospital and Washington University School of Medicine, St. Louis, MO, USA

ABSTRACTS

11:30 a.m. – 1 p.m.

V1 RESECTION OF WILMS' TUMOR WITH CAVO-ATRIAL TUMOR THROMBUS UNDER EXTRACORPORAL BYPASS

Joerg Fuchs, M.D., Philipp O. Szavay, M.D., Hans Joachim Kirschner, M.D., Wilke Schneider, M.D., Gerhard Ziemer, M.D.
Department of Pediatric Surgery, University Hospital Tuebingen, Tuebingen, Germany

Purpose: Wilms' tumor involves the renal vein in 10-12% of children. In approximately 6% the tumor extends into the inferior vena cava. In very few cases the tumor extension reaches into the right atrium. From 1993 to 2001 950 children with nephroblastoma were registered in the SIOP 93-01 Wilms Tumor Study of the German Society of Pediatric Hematology and Oncology. 25 of these children had a caval tumor thrombus. This video demonstrates the combined excision of the tumor along with the caval and atrial extensions.
Methods: We present a 22 month-old-child with a nephroblastoma SIOP stage III of the left kidney with a tumor extension into the right atrium. Diagnosis was made by imaging according to the SIOP-Protocol. The patient received preoperative chemotherapy with ACT-D and VCR. There was no shrinkage of the tumor thrombus following chemotherapy. Surgical resection was performed with cardiopulmonary bypass and circulatory arrest (51 min). Following nephrectomy, the right atrium and the inferior vena cava were opened and the tumor was resected. The retrohepatic vena cava was reconstructed with a pericardial patch.
Results: There were no surgical complications and the postoperative course was uneventful. The histological examination revealed a mixed Wilms' tumor without anaplasia. Although there was a 65% regression in the size of the thrombus, malignant cells were still present in the specimen. The postoperative Doppler ultrasound showed a flow of 40 cm/s. Following the resection the child received chemo- and radiotherapy. The patient is relapse free after an 8 months follow-up.
Conclusions: Safe radical resection of a Wilms' tumor along with cavo-atrial extension can be successfully accomplished with a double team approach and lead to a good prognostic outlook. The video illustrates the essential points of this combined procedure.
Notes

Underlining denotes the author scheduled to present at the meeting.

V2 THORACOSCOPIC REPAIR OF CONGENITAL DIAPHRAGMATIC HERNIA IN AN INFANT

Ronald B. Hirschl, M.D., Saleem Islam, M.D.
University of Michigan, Ann Arbor, MI, USA

A 4-month-old female presented to her pediatrician with a cough. A left congenital Bochdalek hernia was identified on chest radiograph. In this video we demonstrate the thoracoscopic approach to repair of this diaphragmatic hernia, including the use of the Sew-Right and Tie-knot devices which are attractive alternatives to conventional intracorporeal suturing and have distinct advantages for this operation. The patient was discharged the day following her operation and has followed an uncomplicated course.

Notes

V3 THORACOSCOPIC LOBECTOMY FOR CONGENITAL ADENOMATOID MALFORMATION IN AN INFANT

Steven S. Rothenberg, M.D.
Mother and Child Hospital at Presbyterian/St. Lukes, Denver, CO, USA

Purpose: To demonstrate the technique for a Thoracoscopic Lobectomy in an infant with congenital lung disease.
Methods: Using a 3 port tecchnique, (2- 3mm, and 1- 5mm) a right lower lobectomy was performed in a 4 week old 4.4 Kg infant with a prenatal diagnosis of a CAM.
Results: The surgery took 90 minutes. The procedure was accomplished successfully with minimal blood loss. The lobe was removed through a dilated 5mm trocar site piecemeal. A chest tube was left in for 12 hours and the patient was discharged on the second post-operative day.
Conclusions: Thoracoscopic Lobectomy is a safe and effective technique even in the neonatal period. It can be performed safely and effectively in infants identified by prenatal or early antenatal diagnosis, avoiding the inherant morbidity of a standard thoracotomy.
Notes

V4 A NEW OPERATIVE TECHNIQUE FOR RESTORATIVE PROCTOCOLECTOMY: THE ENDORECTAL PULL-THROUGH COMBINED WITH A DOUBLE-STAPLED ILEO-ANAL ANASTOMOSIS

James D. Geiger, M.D., F.A.C.S., Daniel H. Teitelbaum, M.D., F.A.C.S., Ronald B. Hirschl, M.D., F.A.C.S., Arnold G. Coran, M.D., F.A.C.S.
University of Michigan, Ann Arbor, MI, USA

Background: In children, restorative proctocolectomy is usually accomplished by a rectal mucosectomy followed by a hand-sewn ileo-anal anastomosis ± ileal pouch. In certain patients, a hand-sewn anastomosis can be technically difficult. This led us to develop a new technique that combines endorectal mucosectomy with a double-stapled ileo-anal anastomosis.
Methods: After colectomy, an ileal J-pouch is constructed. The head of the circular stapler is placed in the apex of the pouch and secured. An endorectal mucosectomy is completed from the abdomen to 1.5 cm above the dentate line. The rectal mucosal/submucosal tube is everted onto the perineum. A transverse stapler is positioned 1 cm above the dentate line on the perineum and fired. The circular stapler is inserted trans-anally and the trocar advanced through the transverse staple line until the head and anvil are mated and then fired. A loop ileostomy is constructed.
Results: Thirteen patients, mean age of 12.3 years, have undergone ERDS without major complication. Operative time averaged 280 ± 70 minutes. Mean 24-hour stool frequency, with 9 months follow-up, is 6.8 ± 3.2, of which 1 ± 0.7 were at night.
Conclusions: The combination of endorectal mucosectomy with a double-stapled anastomosis (ERDS) is a new approach for patients requiring restorative proctocolectomy. In our early experience, this technique has been completed with a low complication rate and excellent functional results.
Notes

Underlining denotes the author scheduled to present at the meeting.

V5 ROBOT-ASSISTED NISSEN FUNDOPLICATION IN A CHILD

Ronald B. Hirschl, M.D., James D. Geiger, M.D.
University of Michigan, Ann Arbor, MI, USA

An 11 year old with spastic cerebral palsy was admitted with swallowing dysfunction, gastroesophageal reflux, and recurrent pulmonary aspiration. A Nissen fundoplication using the daVinci robot was performed along with placement of a gastrostomy tube. In this video the advantages and disadvantages of the robot-assisted approach are discussed and the technique demonstrated. The postoperative course was uneventful and the patient was discharged on postoperative day two.

Notes

3:45 p.m. – 4:15 p.m.

P1 THE BILE DUCT CELL RESPONSE TO BILE DUCT INJURY IS DIFFERENTIALLY REGULATED: A METHOD TO EVALUATE BILIARY EPITHELIAL CELL HETEROGENEOUS FUNCTION (1 MINUTE)

Ai-xuan Holterman, M.D., MinHua Wang, Ph.D.
University of Illinois at Chicago, Department of Surgery/Division of Pediatric Surgery and Molecular Genetics, Chicago, IL, USA

The biliary cells (BC) of large and small bile ducts have diverse gene expression and response patterns to stimuli. Liver transcription factor HNF-6 is essential to bile duct development and potentially regulates the transcription of target genes important to BC function.
Hypothesis: BC phenotypic and functional diversity are associated with differential HNF-6 expression during biliary obstruction.
Methods: CD1 mice underwent sham surgery or common bile duct scission (n=6). In 3 animals from each group, the remnant portal tract or "biliary tree" was derived from collagenase perfused / digested liver at 72 hrs of surgery. RNA was extracted from dissected "peripheral" biliary ducts (corresponding to small ducts) and the "central" ducts (large ducts). In the remaining mice (n=3), whole liver were prepared for HNF-6 immunostaining, BrdU labeling for cellular proliferation and total RNA extraction.
Results: After biliary obstruction, BC lining bile ducts proximal to the obstruction proliferated, whole liver HNF-6 mRNA expression was 2-4 fold reduced, HNF-6 nuclear protein expression was diminished in medium / small ducts but remained unchanged in large ducts. Consistent with HNF-6 protein expression pattern, small ducts harvested from the distal biliary tree showed a 2 fold decline in HNF-6 mRNA expression relative to large ducts from the proximal biliary tree.
Conclusions: We report a method to isolate and analyze small and large bile ducts. We found that HNF-6 expression in the BC during injury is diverse according their anatomical levels in the biliary tree. This suggests selective regulation of liver transcription factors as additional mechanisms for BC functional complexity and implies that biliary target genes regulated by HNF-6 will also exhibit a differential pattern of response to bile duct injury. Further study of the BC response to injury is important for our understanding of the pathophysiology of diseases such as biliary atresia or primary biliary cirrhosis (where proximal or small ducts are selectively affected).
Notes

Underlining denotes the author scheduled to present at the meeting.

P2 TERMINAL DIFFERENTIATION AND NITROFEN INDUCED APOPTOSIS IN THE P19 CELL LINE: INSIGHTS INTO THE MOLECULAR MECHANISMS OF CONGENITAL DIAPHRAGMATIC HERNIA (1 MINUTE)

Jeremy T. Aidlen, M.D., Pradeep Nazarey, M.D., David E. Kling, Ph.D., Bernard Kinane, M.D., Jay J. Schnitzer, M.D., Ph.D.
Massachusetts General Hospital, Boston, MA, USA

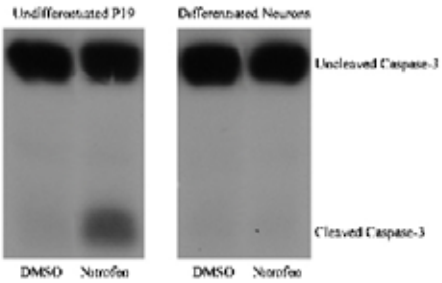
Purpose: Administration of nitrofen to pregnant rodents induces fetal pulmonary hypoplasia associated with congenital diaphragmatic hernia. We hypothesize that nitrofen induced pulmonary hypoplasia involves apoptosis of undifferentiated cells within the fetal foregut. Furthermore, we propose that terminal differentiation of these cells may protect them from nitrofen induced apoptosis.

Methods: P19 murine embryonal carcinoma cells grown in aggregate culture were differentiated into neuronal cells in the presence of retinoic acid at 10-7 to 10-5 M. Differentiation was confirmed by Western blot analysis of microtubule associated protein (MAP-2), deleted in colorectal cancer (DCC), and cyclin dependent kinase inhibitor p27, as well as immunofluoresence of MAP-2. Differentiated neurons and undifferentiated P19 cells were then exposed to nitrofen. The degree of apoptosis was measured by 1) terminal deoxynucleotidyl transferase dUTP nick-end label (TUNEL) assay, and 2) western blot analysis of caspase-3 cleavage.

Results: Retinoic acid treatment of P19 cells stimulated strikingly increased protein levels of markers of neuronal differentiation (MAP-2, DCC, and p27) compared to untreated controls. Nitrofen induced a dramatic increase in TUNEL positive cells and caspase-3 cleavage in undifferentiated groups, indicating that nitrofen induces apoptosis in these cells. A substantially decreased number of TUNEL positive cells was seen in the differentiated P19 groups. Furthermore, a significant dose dependent decrease in apoptosis was seen in differentiated groups; cells treated with 10-5 M retinoic acid showed the lowest amount of caspase-3 cleavage (0.34 +/- 0.06 relative caspase cleavage, Figure 1, $p < 0.001$), and the highest amount of p27, a marker of terminal differentiation.

Conclusions: Nitrofen induces apoptosis in undifferentiated P19 embryonal carcinoma cells. Terminal differentiation of these cells with retinoic acid protects them from nitrofen induced apoptosis. These data may facilitate development of pharmacological strategies to ameliorate congenital pulmonary disorders.

Notes

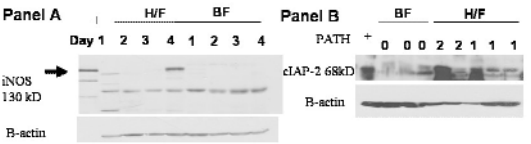


Underlining denotes the author scheduled to present at the meeting.

P3 ROLE OF INHIBITOR OF APOPTOSIS PROTEIN IN EXPERIMENTAL NECROTIZING ENTEROCOLITIS (1 MINUTE)

Jeffrey S. Upperman, M.D., Riana Rhoden, Douglas Potoka, M.D., Caterina Wong, M.S., Patricia Boyle, David Hackam, M.D., Ruben Zamora, Ph.D., Henri Ford, M.D.
Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

Purpose: Necrotizing enterocolitis (NEC) is a disease of newborns characterized by gut barrier failure, intestinal necrosis, sepsis, and multi-system organ failure. We and others have shown that nitric oxide (NO) plays a central role in gut barrier failure. Pathogenesis and mediators of human NEC remain elusive. We have previously shown that NO inhibits the inhibitor of apoptosis protein (IAP) in dendritic cells. Therefore, we hypothesized that the upregulation inducible nitric oxide synthase (iNOS) in NEC results in the down regulation IAP-2 which may contribute to enterocyte apoptosis.
Methods: Newborn rats were either subjected to 10 min. of hypoxia (5% O2, t.i.d.) and fed formula by gavage (H / F), or were breast-fed without hypoxia (BF). Rats were sacrificed on day 0 thru 4, and the distal ilea were harvested for morphological studies by H / E. SDS PAGE was performed to evaluate expression of iNOS and IAP-2.
Results: As expected, H / F neonates developed morphological changes consistent with NEC by day 4. In contrast, B / F neonates had normal morphology. By day 4 iNOS was upregulated in the H / F animals (panel A). Surprisingly by Day 4, there was a 3-fold increase IAP-2 expression in H / F compared to BF (panel B), which was localized to the enterocytes.
Conclusions: Our data suggests that in NEC IAP-2 upregulation may be an adaptive response designed to limit further epithelial injury caused by hypoxia and formula feeding.
Notes



Underlining denotes the author scheduled to present at the meeting.

P4 HUMAN HEPATOCYTE SURVIVAL IN AN *IN VITRO* TISSUE-ENGINEERED LIVER DEVICE WITH A VASCULAR NETWORK OF CHANNELS (1 MINUTE)

Wing S. Cheung, M.D., Jeffrey Borenstein, Ph.D., Mohammad R. Kaazempur-Mofrad, Ph.D., Michael Shin, Ph.D., Alec Sevy, B.S., Katherine Kulig, B.A., Joseph P. Vacanti, M.D.
Massachusetts General Hospital, Boston, MA, USA

Purpose: Increasing shortage of donor organs for transplantation has motivated our laboratory to pursue the bioengineering of living organs. The aim of the present study is to quantify hepatocyte survival in a microfabricated device that incorporates fractal topology approximating the hepatic circulation in a bioreactor system.

Methods: Using computational models, blood flow and mass transfer were simulated in microfabricated networks approximating a native vascular bed. The computationally tested microvascular networks were then constructed using silicon micromachining and their patterns were transferred to polydimethylsiloxone (PDMS) polymer. A semipermeable polycarbonate membrane separates the vascular compartment from the hepatocyte compartment. Three concentrations (0.2, 0.5, or 1 million cells / ml) of human hepatocytes (Hep G2 / C3a) were seeded into the parenchymal compartment. Media flow in the experimental devices was delivered at a rate of 0.16, 0.5, or 1 ml / hr using Harvard Syringe pumps. Control devices did not receive actively flowing media. All devices were incubated at 37∞C with 5% CO2. Using Live / Dead Assay from Molecular Probes, we evaluated hepatocyte viability after one and two week incubation time.

Results: Unlike the control hepatocytes, cells in the tests conditions survived throughout the length of the 2-week experiment. Results show an optimal flow rate of 0.5 ml / hour and a seeding concentration of 0.5 million cells / ml. Devices coated with collagen type I enhanced the number of hepatocytes by more than 100% per device. Based on preliminary studies, we estimate each device supports about 0.5 to 1 million hepatocytes.

Conclusions: Our unique microfabricated device with vascular channels can efficiently supply nutrients to sustain hepatocyte viability for at least two weeks in vitro. Moreover, these hepatocytes are organized into multiple layers rather than a single monolayer. Further studies are underway to optimize a prototype for creating a pre-vascularized liver tissue unit that can be implanted by connecting it directly to recipient blood supply.

Notes

P5 QUANITATION OF LUNG SEALING IN THE SURVIVAL SWINE MODEL* (1 MINUTE)

Michael V. Tirabassi, M.D., Gregory T. Banever, M.D., David B. Tashjian, M.D., Kevin P. Moriarty, M.D., F.A.C.S., F.A.A.P
Pediatric Surgical Services, Springfield, MA, USA

Purpose: The goal of this study was to compare sealing of lung tissue by the 5mm Ligasure device to a standard 12mm Endo-GIA stapler. Small intercostal spaces and limited cavity dimentions significantly limit the use of 12 mm stapling devices in pediatric thoracoscopic surgery.

Methods: IACUC approval was obtained (#A3-02). Nine 10Kg female swine were divided between two survival surgical groups. Lung biopsies of the lingula of the left upper lobe were taken by two methods. [Group A] Left anterolateral thoracotomy employing a 30mm Endo-GIA stapler (Autosuture, US Surgical). [Group B] Left thoracoscopy employing the Ligasure (Valley Lab) 5mm instrument. At the end of a seven day survival period the animals were euthanized. Lung burst pressures were measured by flow controlled insufflation into the trachea.

Results: Burst pressure measurement reflects the first air leak. By T-Test there were no statistically significant differences between the burst pressures, biopsy weights, or operative times. 75% (3 / 4) animals in group A (Endo-GIA) and 60% (3 / 5) animals in group B (Ligasure) developed the first air leak on the non-operative side of the chest. By Chi-Square analysis this difference was not significant (χ^2=0.255). Two animals, one from each group, had evidence of intra-pleural infections at the time of autopsy. These were asymptomatic and did not appear to affect burst pressure measurement. One animal in group A had a wound infection that did not extend beyond the subcutaneous tissues.

Conclusions: After seven days of healing, lung biopsy sites created with both the Ligasure and the Endo-GIA stapler have burst strengths equal to or greater than that of normal lung tissue in the swine model.

Notes

	AVG Burst Pressure (mmHG)	AVG Biopsy Weight (g)	Operative Time (min)
[A] Endo-GIA n=4	71.9 (46.9-92.7)	0.75 (0.51-0.85)	36 (28-43)
[B] Ligasure n=5	71.5 (41.2-96.5)	0.90 (0.75-1.03)	27 (19-55)
T-Test	p = 0.9769	p = 0.1727	p = 0.2896

** Author received grant/research support from Tyco Health Care/Valley Lab*

Underlining denotes the author scheduled to present at the meeting.

P6 MORPHOLOGICAL TRANSFORMATION OF THE EMBRYONIC HUMAN LIVER** (1 MINUTE)

Eric S. Weiss, B.S., Michael Choti, M.D., Robert F. Morreale, M.S., Elizabeth C. Lockett, M.S., Grover M. Hutchins, M.D., Charles N. Paidas, M.D.
The Johns Hopkins Medical Institutions, Baltimore, MD, USA

Purpose: Elucidate a three-dimensional (3D) reconstruction of the external contour of the embryonic liver during morphological development of the human embryo using the Carnegie Human Embryo Collection (CHEC). This process is called transformation of the embryonic liver.

Methods: Images were derived from the CHEC, which focus on normal development in the first eight weeks of pregnancy. 3D digital volume models were rendered using the CHEC and comparatively studied as a means to analyze the transformation of embryonic liver growth. Using image-editing software, nine 3D models from selected Carnegie Stages (CS) ranging from 9-23 (corresponding to days 20-56 post conception, PC) were compiled by digitally scanning, aligning, and isolating multiple serial histological sections. The final 3D compilations and "time-lapsed" transformation incorporated the use of scientific visualization and morphing software technology.

Results: We demonstrated a liver bud clearly visible in CS 11-12 (days 22-24 PC). The liver maintains a symmetrical appearance with vascular ingrowths and identification of the sinus venosus during CS 13-15 (days 28-33 PC). As the overall external shape of the embryo is transformed, the liver undergoes a similar transformation such that its asymmetrical appearance is the result of formation of other intra and retroperitoneal organs. A definitive "adult" shape of the external surface of the liver, as well as dual vasculature and biliary tree begins during CS 18 (day 44) and is completed by CS 23 (56 days PC).

Conclusions: Utilizing advanced scientific visualization software and resultant 3D volume models the liver bud was identified earlier than classic liver embryology. The shape of the liver is the result of simultaneous growth of other organs and the entire embryo. Classic teaching of liver embryogenesis must incorporate the effect of overall growth, lengthening and rotation of the embryo through the process of transformation.

Notes

*** Author received grant/research support from the National Library of Medicine; Visible Human Embryo Project*

Underlining denotes the author scheduled to present at the meeting.

P7 N-MYC REGULATION OF THROMBOSPONDIN-1 IN NEUROBLASTOMA (1 MINUTE)

Arnold G. Coran, M.D., Cynthia A. Corpron, M.D., Valerie Castle, M.D.
C.S. Mott Children's Hospital/University of Michigan, Ann Arbor, MI, USA

Purpose: Tumor growth and metastasis requires angiogenesis. N-myc amplification in neuroblastomas correlates with a biologically aggressive phenotype. It has been shown that enhanced N-Myc expression increases angiogenesis in tumors resulting from neuroblastoma cell lines injected into nude mice. We hypothesize that N-Myc regulates angiogenesis in neuroblastoma by down-regulation of the anti-angiogenic factor, Thrombospodin-1(TSP-1).
Methods: Shep-1 cells were stably transfected to overexpress N-Myc protein. Protein and RNA was isolated from Shep-1, transfected Shep-1, and several other N-Myc amplified and non-amplified neuroblastoma cell lines. Western blotting was performed with a monoclonal antibody to TSP-1. Northern blotting of the N-Myc transfected and vector transfected cell lines was performed. Immunohistochemical staining of primary neuroblastomas was performed for TSP-1. Correlations between TSP-1 staining and stage, pathology and N-Myc amplification were determined with a Fisher's exact test. IRB approval was obtained for use of the human tissue samples.
Results: N-Myc transfected Shep-1 cells showed a five-fold decrease in steady state TSP-1 mRNA by Northern blot and a four-fold decrease in TSP-1 protein by Western blot when compared to vector transfected cells. N-Myc non-amplified cell lines showed a least a 2.5 fold increase in TSP-1 protein over amplified cell lines. TSP-1 staining of primary neuroblastomas significantly correlated with stage ($p < 0.04$), N-Myc copy number ($p<0.004$) and pathology-Shimada classification ($p<.0001$).
Conclusions: N-Myc regulates steady state mRNA levels and protein levels of TSP-1 in neuroblastoma cell lines and primary neuroblastomas. TSP-1 staining correlates with stage, pathology and N-Myc amplification in primary neuroblastomas. Increased angiogenic phenotype in N-Myc amplified neuroblastomas may be a result of N-Myc down-regulation of TSP-1.
Notes

Underlining denotes the author scheduled to present at the meeting.

P8 FETAL CARTILAGE ENGINEERING FROM UMBILICAL CORD BLOOD (1 MINUTE)

Julie R. Fuchs, M.D., Didier Hannouche, M.D., Shinichi Terada, M.D., Ph.D., Sarvenaz Zand, B.A., Joseph P. Vacanti, M.D., Dario O. Fauza, M.D.
Harvard Center for Minimally Invasive Surgery, Massachusetts General Hospital, and Children's Hospital, Boston, MA, USA

Purpose: Experimentally, fetal cartilage engineering has proven useful for the treatment of select congenital anomalies. This study was aimed at determining whether cartilage could be engineered from mesenchymal progenitor cells harvested from umbilical cord blood (CB).
Methods: Ovine mononuclear cells were isolated from CB samples (n=4) by low-density fractionation. Adherent mesenchymal progenitor cells were expanded *in vitro.* Cells were then seeded onto polyglycolic acid scaffolds and the constructs were maintained in a rotational bioreactor with serum-free medium supplemented with TGF-b1 for either 4 (n=8), 8 (n=8), or 12 (n=12) weeks. Similar constructs seeded with fetal chondrocytes (n=13) were cultured in parallel for 8 weeks. Specimens were analyzed histologically and biochemically and compared with native fetal cartilage samples (n=10). Statistical analysis was by ANOVA and the Student's t test ($p<0.01$).
Results: After 12 weeks in dynamic culture, CB constructs exhibited evident chondrogenic differentiation by both standard and matrix-specific staining. In the CB constructs, there was a significant time-dependent increase in the levels of glycosaminoglycans (GAG) and type II collagen (C-II), but not of elastin (EL). The following quantitative analyses refer to 12-week CB constructs. There were no significant differences in GAG and C-II levels between CB and fetal chondrocyte constructs, however, EL levels were lower in CB constructs. Compared with native fetal cartilage, C-II and EL levels were, respectively, similar and lower in the CB constructs. These constructs had lower GAG levels than native hyaline cartilage, but comparable levels to native elastic cartilage.
Conclusions: Mesenchymal progenitor cells can be successfully isolated from umbilical cord blood and utilized for the engineering of cartilagenous tissue in vitro, displaying select histological and functional properties of both native and engineered fetal cartilage. Cartilage engineered from cord blood may prove useful for the treatment of select congenital anomalies such as tracheal and chest wall defects.
Notes

Underlining denotes the author scheduled to present at the meeting.

P9 cDNA MICROARRAY ANALYSIS OF NITROFEN-INDUCED CONGENITAL DIAPHRAGMATIC HERNIA IN MICE (1 MINUTE)

Marian N. Safaoui, M.D., Kerilyn K. Nobuhara, M.D., Kathryn D. Anderson, M.D., David Warburton, M.D.
Children's Hospital Los Angeles, Los Angeles, CA, USA

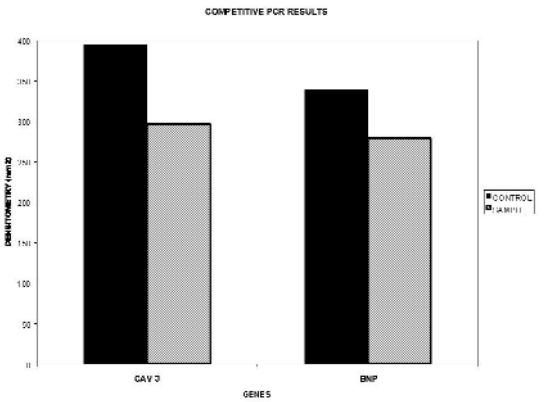
Purpose: Despite significant advances in the treatment for patients with congenital diaphragmatic hernia (CDH), mortality rates remain as high as 60%. An improved understanding of the 2,4-dichlorophenyl-p-nitrophenyl ether (nitrofen)-induced murine model of CDH may provide insight to the pathogenesis of human CDH. cDNA microarray technology allows for large scale genomic profiling in such murine models. The purpose of this study was to evaluate the nitrofen model of CDH utilizing cDNA microarray analysis.

Methods: Timed pregnant murine dams were gavage-fed 25 mg of Nitrofen on day 8 of gestation. Fetuses with CDH were subsequently identified and their lungs harvested. Total RNA isolated. Using Affymetrix Murine Genome U74v2 set, gene expression analysis was performed on three groups: Control, nitrofen exposed with CDH (N-CDH), and nitrofen exposed without CDH (N-no CDH). Bioinformatics analysis was completed, comparing Control vs. N-CDH, Control vs. N-no CDH, and N-CDH vs. N-no CDH, using Genetrix software. Genes of interest were selected if present on both the Affymetrix probe list as well as the Dchip analyzer list. Decreases in gene expression were confirmed utilizing competitive RT-PCR, with actin as the internal control. Densitometry was calculated with Scion software and analyzed by standard t-test.

Results: In the N-CDH vs. Control analysis, caveolin 3 (CAV) and natriuretic peptide precursor type b (BNP) were both significantly decreased (>9 fold). In the N-CDH vs. N-no CDH analysis, neuronatin and capping protein beta 1 were both decreased by -4.72 and -3.62 fold respectively. Using competitive RT-PCR, CAV (p=0.03) and BNP (p=0.06) were confirmed to have decreased expression (Figure 1).

Conclusions: We have identified two genes, Caveolin 3 and Natriuretic peptide precursor type b which may play an important role in the pathogenesis of congenital diaphragmatic hernia. Further studies are necessary to confirm the biological significance of these findings.

Notes



Underlining denotes the author scheduled to present at the meeting.

P10 THE ROLE OF RHO GTPASE IN MODULATING ENTEROCYTE MIGRATION ALONG THE CRYPT-VILLUS AXIS DURING NECROTIZING ENTEROCOLITIS (1 MINUTE)

S. Cetin, M.D., H. R. Ford, M.D., R. Zamora, Ph.D., P. Boyle, J. Upperman, M.D., D. J. Hackam, M.D., Ph.D.

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

Purpose: Necrotizing enterocolitis (NEC) is characterized by disrupted intestinal mucosal integrity, resulting in translocation of lipopolysaccharide into the circulation. Mucosal integrity is maintained by enterocyte migration along the crypt-villus axis and requires the formation of Rho-GTPase dependent stress fibers. We hypothesized that enterocyte migration was impaired in NEC due to altered stress fiber formation.

Methods: NEC was induced in newborn rats by combining thrice daily formula feeding with hypoxia. Control littermates were breast fed. Terminal ilea were harvested and assessed for histological changes associated with NEC. *In vivo* migration was measured by injecting rats 1h and 18h prior to death with the nucleotide analogue BrdU, then immunostaining with anti-BrdU. Rho activity was determined by stress fiber formation, using confocal microscopy in cultured intestinal epithelial cells (IEC-6 cells). *In vitro* migration across a wound edge was measured using live cell time lapsed videomicroscopy in the presence or absence of lipopolysaccharide (1-50µg / ml).

Results: Enterocyte migration *in vivo* was significantly impaired in NEC-rats compared with controls (ctrl: 210±25µm / min vs. NEC: 45± 20µm / min, $p<.05$). The migration of IEC-6 enterocytes across an *in-vitro* wound resulted in significantly increased actin stress fiber formation compared to non-migrating cells, confirming increased Rho activity. LPS treatment decreased stress fiber formation and reduced enterocyte migration (ctrl: 3±0.3µm / min vs. LPS 0.05±0.8, $p<0.05$). Activation of Rho with lysophosphatidic acid (LPA,1µm) restored stress fiber formation and enterocyte migration across an *in vitro* wound (ctrl: 3.3±0.3 µm / min vs. LPA 6.4±0.8, $p<0.05$).

Conclusions: We conclude that enterocyte migration is impaired in NEC, due to abnormalities in Rho-GTPase activity. Modulation of Rho by lysophosphatidic acid, by enhancing enterocyte migration, could provide a novel therapeutic approach to NEC.

Notes

Underlining denotes the author scheduled to present at the meeting.

8 a.m. – 9:15 a.m.

1 SACROCOCCYGEAL TERATOMA: PRENATAL ASSESSMENT, FETAL INTERVENTION, AND OUTCOME (6 MINUTES)

Holly L. Hedrick, M.D., Alan W. Flake, M.D., Timothy M. Crombleholme, M.D., Lori J. Howell, R.N., Mark P. Johnson, M.D., R. Douglas Wilson, M.D., N. Scott Adzick, M.D.
The Children's Hospital of Philadelphia, Philadelphia, PA, USA

Purpose: To understand the natural history and define indications for fetal intervention in sacrococcygeal teratoma (SCT), we reviewed all cases of SCT presenting for evaluation.
Methods: Prenatal diagnostic studies including ultrasound, MRI, echocardiography and pre and postnatal outcomes were reviewed in 29 cases of SCT that presented between 9/95 and 9/02.
Results: The mean gestational age (GA) at presentation was 23.7 weeks (range 19-38.5 weeks) with 3 sets of twins (10%). Overall outcomes included 4 terminations, 5 fetal demises (cardiac failure n=4, tumor rupture n=1), 6 neonatal deaths (prematurity <28 weeks n=4, tumor rupture n=2), and 14 survivors. Significant obstetric complications occurred in 80% of the 25 continuing pregnancies: polyhydramnios (n=7), oligohydramnios (n=3), preterm labor (n=12), preeclampsia (n=3), gestational diabetes (n=1), HELLP syndrome (n=1), and hyperemesis (n=1). Fetal intervention included cyst aspiration (n=6), amnioreduction (n=3), and open fetal surgical resection (n=4). Indications for cyst aspiration and amnioreduction were maternal discomfort, preterm labor, and prevention of tumor rupture at delivery. Although 15 SCTs were solid and at risk for cardiac failure, only four fetuses met criteria for fetal debulking based upon ultrasonographic and echocardiographic evidence of impending high output failure and favorable anatomy at 21, 23.6, 25, and 26 weeks gestation. Intraop events included maternal blood transfusion (n=1), fetal blood transfusion (n=2), chorioamniotic membrane separation (n=1), and fetal arrest requiring CPR (n=1). In the fetal resection group, 3/4 survived with mean GA at delivery of 29 weeks (range 27.6-31.7 weeks), mean birthweight = 1.3 kg, hospital stay ranging 16-34 weeks, and follow up ranging 15 months-6 years. Postnatal complications in the fetal surgery group included neonatal death (n=1 secondary to premature closure of ductus arteriosus with cardiac failure), embolic event (n=1 resulting in unilateral renal agenesis, jejunal atresia), chronic lung disease (n=1), and recurrence (n=1).
Conclusions: For fetal SCT, the rapidity at which cardiac compromise can develop and high incidence of obstetric complications warrant close prenatal surveillance. Amnioreduction, cyst aspiration, and surgical debulking are potentially life-saving interventions.
Notes

Underlining denotes the author scheduled to present at the meeting.

2 RIGHT CONGENITAL DIAPHRAGMATIC HERNIA: PRENATAL ASSESSMENT AND OUTCOME (3 MINUTES)

Holly L. Hedrick, M.D., Timothy M. Crombleholme, M.D., Alan W. Flake, M.D., Michael L. Nance, M.D., Daniel von Allmen, M.D., Lori J. Howell, R.N., Mark P. Johnson, M.D., R. Douglas Wilson, M.D., N. Scott Adzick, M.D.
The Children's Hospital of Philadelphia, Philadelphia, PA, USA

Purpose: Right-sided defects account for 10% of all cases of congenital diaphragmatic hernia (CDH). To understand the natural history, we retrospectively reviewed all cases of right CDH that presented for prenatal evaluation and / or postnatal treatment.
Methods: Between 9 / 95 and 9 / 02, a total of 194 cases of CDH were evaluated including 21 right-sided CDH. We reviewed prenatal diagnostic studies (ultrasound, MRI, echocardiography) and pre and postnatal outcomes in these 21 cases of right CDH. Five additional cases of right CDH without a prenatal diagnosis were also reviewed.
Results: The mean gestational age at presentation was 26.9 weeks (range 19-36 weeks). The lung area to head circumference ratio (LHR) ranged from 0.32 to 2.5. In all cases, the liver was herniated into the chest. Associated anomalies included ventricular septal defect (n=3), pulmonary sequestration (n=3), genitourinary (n=3), central nervous system (n=2), and omphalocele (n=1). There were no karyotype abnormalities (17 / 21 tested). Of the 4 terminations, 2 were syndromic. Nine of the 17 (53%) continuing pregnancies developed polyhydramnios, premature rupture of membranes, or preterm labor. The mean gestational age at birth was 36.6 weeks (range 33.3-39 weeks). One patient underwent tracheal occlusion at 27 weeks, and 2 patients expired before postnatal repair. A patch was utilized in 14 / 20 neonates. Overall survival (17 prenatal plus 5 postnatal diagnoses) was 18 / 22 (82%). Twelve of 22 (55%) required ECMO with a 75% survival. Significant morbidity occurred in 10 / 18 survivors, and included severe neurologic sequelae in 6 / 18 (33%).
Conclusions: US and MRI lung measurements were not predictive of survival. MRI was helpful in the determination of liver position. The greater than 50% incidence of preterm complications, frequent need for ECMO, and high prevalence of comorbidities are indicative of the severity of this CDH population and warrant close prenatal surveillance and delivery at a tertiary care center with ECMO capability.
Notes

Underlining denotes the author scheduled to present at the meeting.

3 FETAL TISSUE ENGINEERING ENHANCES BIOPROSTHETIC DIAPHRAGMATIC REPAIR (3 MINUTES)

Julie R. Fuchs, M.D., Amir Kaviani, M.D., Shyh-Jou Shieh, M.D., Shinichi Terada, M.D., David LaVan, Ph.D., Jung-Tak Oh, M.D., Helen Li Zhang, M.D., Joseph P. Vacanti, M.D., Dario O. Fauza, M.D.
Harvard Center for Minimally Invasive Surgery, Massachusetts General Hospital, and Children's Hospital, Boston, MA, USA

Purpose: Closure of congenital diaphragmatic defects with both artificial and biological prosthesis has led to high rates of hernia recurrence and other morbidities. This study was aimed at comparing different engineered and bioprosthetic constructs, in a large animal model of diaphragmatic repair.
Methods: Ovine fetal myoblasts were labeled by transduction with a retrovirus expressing green fluorescent protein (GFP), expanded, and seeded into a collagen hydrogel. Composite grafts (22cm2) made of one layer of small intestine submucosa (SIS) and another layer of either acellular human dermis (group I), or SIS (group II) received either a cell-seeded or an acellular hydrogel within their layers. After birth, animals (n=21) underwent repair of a surgically created diaphragmatic defect with either a cellular, autologous construct (n=5 in group I; n=6 in group II), or an acellular graft (n=10, 5 in each group). At 1-7 months postoperatively, implants were inspected in situ and harvested for multiple analyses. Statistical analysis was by the Fisher's exact test and unpaired Student's t-test, as appropriate (significance at $P<0.05$).
Results: Overall, diaphragmatic hernia recurrence was significantly higher in animals with acellular grafts (7 / 10, 70%), when compared with animals with engineered constructs (2 / 11, 18.2%). The same applied within group I, but not within group II. Histology revealed moderate cellularity in all grafts, albeit more organized in engineered implants, which also displayed GFP-positive cells. Ultimate uniaxial tensile strength was significantly higher in engineered versus acelullar implants in group I, but not in group II. Quantitative matrix analysis showed no differences in type-I collagen, elastin, and glycosaminoglycans concentrations between the groups, nor between cellular and acellular implants.
Conclusions: Diaphragmatic repair with engineered grafts lead to improved mechanical and functional outcomes when compared with acellular bioprosthesis, depending on scaffold composition and architecture. Fetal tissue engineering may be a preferred alternative for partial diaphragmatic replacement.
Notes

Underlining denotes the author scheduled to present at the meeting.

4 HYPERONCOTIC ENHANCEMENT OF PULMONARY GROWTH AFTER FETAL TRACHEAL OCCLUSION: A COMPARISON BETWEEN DEXTRAN AND ALBUMIN (3 MINUTES)

Robert W. Chang, M.D., Makoto Komura, M.D., Steven Andreoli, B.A., Markus Klingenberg, B.A., Russell Jennings, M.D., Jay Wilson, M.D., Dario Fauza, M.D.
Children's Hospital, Department of Surgery, Boston, MA, USA

Purpose: Intrapulmonary dextran delivery enhances lung growth after fetal tracheal occlusion. Dextran administration, however, is not without potentially relevant side effects. This study was aimed at determining whether an oncotic agent naturally occurring in the fetal lung liquid, namely albumin, could also be employed to maximize fetal pulmonary growth in this setting.

Methods: Fetal lambs (n=27) were divided in five groups late in gestation: group I (n=5) consisted of sham-operated controls; group II (n=5) underwent simple tracheal occlusion (TO); groups III (n=5), IV (n=6), and V (n=6) underwent TO and intratracheal infusion of 60cc of either saline, 6% dextran 70, or 25% human albumin, respectively. All fetuses were delivered near term, 15.7±0.9 days postoperatively. Their lungs were studied by standard morphometrics, immunohistochemistry for surfactant protein-B, electron microscopy (EM), and basic biochemistry of the lung liquid. Statistical analysis was by ANOVA and paired t-test (significance at $P<0.05$).

Results: The lung volume-to-body weight ratio was significantly higher in groups IV and V than in all other groups, but there was no difference between groups II and III, nor between groups IV and V. Airspace fraction was not significantly different among groups, suggesting a preserved maturation pattern. There were no signs of cell damage on EM. Pairwise comparisons showed that type-II pneumocyte density was higher in group I than in all other groups, with no differences among groups II, IV, and V. Lung liquid osmolarity, pH, electrolytes, and albumin concentrations were normal in all groups.

Conclusions: Albumin is as effective as dextran as an intrapulmonary hyperoncotic booster of lung growth acceleration after fetal tracheal occlusion, with no lasting increase of albumin levels in the lung liquid. Albumin may be a safer option for hyperoncotic enhancement of lung growth acceleration after temporary tracheal occlusion in the treatment of fetal pulmonary hypoplasia.

Notes

Underlining denotes the author scheduled to present at the meeting.

5 GENETIC POLYMORPHISMS OF ANGIOTENSIN SYSTEM GENES IN CONGENITAL DIAPHRAGMATIC HERNIA ASSOCIATED WITH PERSISTENT PULMONARY HYPERTENSION (3 MINUTES)

Prem Puri, Prof, Valeria Solari, M.D.
Children's Research Centre, Our Lady's Hospital for Sick Children, and University College Dublin, Dublin, Ireland

Purpose: The renin-angiotensin system plays an important role in pulmonary artery remodelling. Several polymorphisms of genes encoding for components of the renin angiotensin system such as the angiotensin converting enzyme (ACE), the angiotensinogen (AGT) gene, and the angiotensin II type 1 receptor (AT1R) have been associated with the development of pulmonary hypertension. The aim of this study was to investigate the ACE I/D genotype, the M235T polymorphism of the AGT gene and the A1166C polymorphism of AT1R in the lungs of congenital diaphragmatic hernia (CDH) complicated by persistent pulmonary hypertension (PPH) in the newborn.
Methods: Genomic DNA was extracted from archival paraffin embedded lung tissue from 13 newborns with CDH complicated by PPH and from 9 controls. Genotyping for the I/D-ACE, the M235T-AGT and the A1166C-AT1R gene polymorphisms were determined by a polymerase chain reaction based method with appropriate restriction digest when required.
Results: In controls ACE genotype distribution of DD, ID, and II was 11%, 33% and 55%, respectively, whereas in CDH it was 70% 15% and 15%, respectively. The ACE-DD genotype was significantly higher in CDH compared to controls ($p<.05$). In CDH samples the prevalence of AGT-MM genotype was lower (8% vs. 33%, $p<.05$), while the AGT-TT genotype was higher (61% vs. 22%, $p<.05$) compared to controls. There were no differences in allele frequencies of AT1R between CDH patients and controls.
Conclusions: Our data provides evidence that D allele of the ACE gene insertion/deletion polymorphism and angiotensinogen M235T polymorphism is associated with PPH in newborns with congenital diaphragmatic hernia.
Notes

Underlining denotes the author scheduled to present at the meeting.

6 IMPACT OF A CURRENT TREATMENT PROTOCOL ON OUTCOME OF HIGH RISK CONGENITAL DIAPHRAGMATIC HERNIA (6 MINUTES)

*Pietro Bagolan, M.D., Francesco Crescenzi, M.D., Germana Casaccia, M.D., Antonella Nahom, M.D., Alessandro Trucchi, M.D., Claudio Giorlandino, M.D.^*
(Sponsored by Kevin P. Lally)
Department of Neonatal and Surgical Neonatology, Bambino Gesu Children's Hospital, Rome, Italy
^ Department of Fetal Medicine of Artemisia, CNLUS, Rome, Italy

Purpose: The impact of a current treatment protocol (NO, HFOV, delayed surgery, gentle ventilation and permissive hypercarbia) on outcome of high risk (distress within 2 hours from birth / prenatal diagnosis) Congenital Diaphragmatic Hernia (CDH) is still being discussed. The aim of this study was to analyze the results using a new treatment protocol, without the use of ECMO.

Patients and Methods: Records of patients with high risk CDH treated during a six-year period (1995-2001) were reviewed. The patients were placed in three historical groups: Group A: 19 CDH (1996-97), Group B: 22 CDH (1998-99), Group C: 29 CDH (2000-2001). In the first two years of study, a new protocol was introduced without gentle ventilation and permissive hypercarbia. During 1998-99 the protocol was refined and in the last two years, gentle ventilation and permissive hypercarbia were used. Significant morbidity, defined as bronchodysplasia, need for a tracheotomy, major neurological deficits and bilateral hearing loss, was evaluated after six months of life. Univariate analysis was performed.

Results: The three groups were homogenous with regard to predictive factors of mortality such as sex, side, prenatal diagnosis, stomach and liver in the thorax, associated malformations, blood gases analysis and patch. Overall survival significantly increased from 47% (9 / 19) in Group A to 50% (11 / 22) in Group B to 90% (26 / 29) in Group C (p=0.02). None of 19 patients in Group A developed significant morbidity compared with 1 / 22 (4,5%) patients in Group B and 2 / 29 (7%) patients in Group C. Preoperative pneumothorax significantly decreased in Group C with regard to Groups A and B (7 / 19-37% vs. 6 / 22-27% vs. 2 / 29-7%) (p=0.03).

Conclusions: Application of new treatment protocol for CDH allowed a significant increase in survival with an increase in morbidity as well. Significant reduction of pneumothorax was observed after the introduction of permissive hypercarbia and gentle ventilation.

Notes

Underlining denotes the author scheduled to present at the meeting.

7 THE RELATIONSHIP OF PULMONARY ARTERY PRESSURE AND SURVIVAL IN CONGENITAL DIAPHRAGMATIC HERNIA (6 MINUTES)

Peter W. Dillon, M.D., Robert E. Cilley, M.D., David Mauger, Ph.D., Christopher Zachary, M.D., Andreas Meier, M.D.
Penn State College of Medicine, Hershey, PA, USA

Purpose: Pulmonary hypertension is an integral part of the pathophysiology of the respiratory failure associated with congenital diaphragmatic hernia. Despite current therapeutic interventions little is known of the natural history of pulmonary hypertension in this disorder. Hypothesizing that the progression or resolution of the pulmonary hypertension would determine clinical outcome, we examined the evolution of pulmonary artery pressures in relation to survival in our CDH patients.
Methods: We performed a retrospective chart review of all neonates with the diagnosis of CDH from 1991-2001 at our institution. Infants with complex congenital heart disease, prematurity, or who had limited treatment were excluded from the study. Cardiac ECHO data were used to estimate pulmonary artery pressures as a ratio to systemic pressure. Statistical analyses of estimated pulmonary pressure ratios stratified by survival status and time were performed using Chi Square and Fisher's Exact Test Methods.
Results: 47 full term CDH infants with 428 cardiac ECHO evaluations were studied. Long-term survival was 74%. 49% of patients developed normal pulmonary artery pressure estimates within the first three weeks of life (34% week 1, 9% week 2, 6% week 3). All patients survived. 17% had persistent systemic or supra-systemic pressure estimates unrelieved by treatment interventions resulting in 100% mortality. 34% had intermediate reductions in pressure estimates over time with 75% survival. Systemic pulmonary artery pressures were associated with decreased survival at all time points when compared to normal pressure survivors: week 1 – 60% ($p<.003$); week 3 – 38% ($p<.007$); week 6 – 0% ($p<.02$).
Conclusions: The evolution of pulmonary hypertension over time is a critical determinant of survival in CDH patients with current treatment strategies. Three groups can be modeled with markedly different clinical performance patterns. Using serial cardiac ECHO examinations pulmonary artery pressure estimations can be used to predict clinical outcome.
Notes

Underlining denotes the author scheduled to present at the meeting.

8 CONGENITAL DIAPHRAGMATIC HERNIA: ANTENATAL FETAL VITAMIN A IMPROVES POSTNATAL OXYGENATION AND VENTILATION IN THE LAMB MODEL (3 MINUTES)

Philip L. Glick, M.D., Nicola A. Lewis, F.R.C.S., Bruce A. Holm, Ph.D., Jon Rossman, Daniel Swartz

The Buffalo Institute of Fetal Therapy, Children's Hospital of Buffalo, and the Departments of Surgery, Gynecology/Obstetrics, and Pediatrics, State University of New York at Buffalo School of Medicine and Biomedical Sciences, Buffalo, NY, USA

Purpose: The hypoplastic lungs in congenital diaphragmatic hernia (CDH) are immature and surfactant deficient. This leads to persistent pulmonary hypertension and respiratory failure in the newborn period. Vitamin A is an important modulator of lung development and has been shown to increase lung alveolarization and surfactant production. We hypothesized that antenatal vitamin A would alter lung development and lead to an improvement in gaseous exchange in the fetal lamb model of CDH.

Methods: The surgical model of CDH was created at 78 days gestation. CDH fetuses were divided into two groups; Group 1 (n=3) underwent right jugular vein catheterization at 120 days and received doses of intravenous vitamin A over 14-17 days; Group 2 (n=5) fetuses were untreated. Twin littermates and sham operated lambs served as controls (n=5). Lambs were delivered via cesarean section at 136-139 days and ventilated for two hours based on a set protocol. Physiologic data was recorded and the lungs were harvested for histologic analysis, type II cell isolation and choline incorporation. Bronchoalveolar lavage protein and phospholipid levels were also measured. Two-tailed t-Tests were performed.

Results: Treated and untreated groups had significant pulmonary hypoplasia. Preductal PaCO2 was decreased and predctal pH increased ($p<0.05$) in treated versus untreated lambs. (Figure 1) Bronchoalveolar lavage phospholipid levels were marginally increased in treated lambs (0.64 ± 0.52 vs. 0.12 ± 0.003 $p>0.05$). True alveoli and thinning of the interalveolar septum were seen in treated lambs.

Conclusions: Antenatal vitamin A leads to significant improvements in ventilation and alveolar development in the fetal lamb model of congenital diaphragmatic hernia.

Notes

	Po_2 (mmHg)	Pco_2 (mmHg)	pH	Compliance (mls/cmH2O/kg)
Control (n=5)	173 ± 43	54 ± 21	7.31 ± 0.09	0.62 ± 0.1
CDH (n=5)	45 ± 19	196 ± 12	6.70 ± 0.05	0.07 ± 0.025
CDH + vitamin A (n=3)	162 ± 86	96 ± 49 *	7.12 ± 0.2 *	0.3 ± 0.1

Underlining denotes the author scheduled to present at the meeting.

9 *EX-UTERO* INTRAPARTUM TREATMENT PROCEDURE: LOOKING BACK AT THE EXIT (3 MINUTES)

Shinjiro Hirose, M.D., Suzanne Yoder, M.D., Hanmin Lee, M.D., Diana L. Farmer, M.D., Michael R. Harrison, M.D.
University of California, San Francisco, San Francisco, CA, USA

Purpose: The *ex-utero* intrapartum treatment (EXIT) procedure was originally developed for management of airway obstruction following fetal surgery, and indications have continued to expand for a variety of fetal anomalies. We review our single institution experience with EXIT.

Methods: A retrospective review of all patients who underwent an EXIT procedure from 1993 to 2002 (n=51) was performed. Variables evaluated include: indication for EXIT, gender, gestational age at EXIT, birth weight, maternal blood loss, operative complications, operative time, and survival.

Results: Long term follow-up was available for all patients. Fifty of 51 patients were born alive. Currently, 30 of 51 patients (59%) are alive. All deaths have been in patients with congenital diaphragmatic hernia (CDH). Forty-five patients underwent EXIT for reversal of tracheal occlusion for CDH. Of these patients, 30 underwent tracheal clip removal. Two patients had repair of tracheal injury from clipping at EXIT. Fourteen patients underwent bronchoscopy and tracheal balloon removal. Five patients underwent EXIT procedure for tumors. Tracheostomy was performed in three of these patients. One patient was successfully intubated, and one patient underwent resection of the neck mass while on placental support. The last patient underwent EXIT procedure and tracheostomy for congenital high-airway obstruction syndrome. Average gestational age at delivery was 31.95 weeks. Average birth weight was 1895 gm. Average maternal blood loss was 970 ml.

Conclusions: EXIT procedures can be performed with minimal morbidity. It is an excellent strategy for establishing an airway in a controlled manner, avoiding “crash” intubation or tracheostomy. EXIT procedures have evolved from an adjunct to fetal surgery to potentially life saving procedures in fetuses with airway compromise at birth. Longer procedures on placental support allowing for definitive management of airway obstruction have been realized.

Notes

9:15 a.m. – 10:15 a.m. Robert E. Gross Lecture: Lucian Leape, M.D.
"Safe Health Care: Are We Up to It?"

Lucian Leape is an Adjunct Professor of Health Policy in the Department of Health Policy and Management at the Harvard School of Public Health. Prior to joining the faculty at Harvard in 1988, he was Professor of Surgery and Chief of Pediatric Surgery at Tufts University School of Medicine and Tufts-New England Medical Center.

Dr. Leape has been an outspoken advocate of the nonpunitive systems approach to the prevention of medical errors and he has talked and written widely about the need to make patient safety a national priority. He has published over 40 papers on patient safety. In addition, he has done research on overuse and underuse of cardiovascular procedures.

Dr. Leape was one of the founders of the National Patient Safety Foundation, the Massachusetts Coalition for the Prevention of Medical Error, and the Harvard Kennedy School Executive Session on Medical Error. He was a member of the Institute of Medicine's Quality of Care in America Committee, which published "To Err is Human" in 1999 and "Crossing the Quality Chasm" in 2001.

Recent honors include the Distinguished Service Award of the American Pediatric Surgical Association, the Donabedian Award from the American Public Health Association, a Robert Wood Johnson Foundation Investigator's Award in Health Policy Research, and honorary fellowship in the Royal College of Physicians and Surgeons of Canada.

10:45 a.m. – Noon

10 COMPLICATIONS ASSOCIATED WITH THE NUSS PROCEDURE: ANALYSIS OF RISK FACTORS AND SUGGESTED MEASURES FOR THE PREVENTION OF COMPLICATIONS (6 MINUTES)

Hyung Joo Park, M.D., Seock Yeol Lee, M.D., Cheol Sae Lee, M.D.
Soonchunhyang University Chunan Hospital, Chunan, South Korea

Purpose: Since the Nuss procedure for the correction of pectus excavatum is in its early stage, there have been problems that need to be solved. We examined complications in a single center experience of the Nuss technique in order to develop possible solutions to prevent them.
Methods: 335 consecutive patients who underwent the Nuss procedure between August 1990 and September 2002, were studied retrospectively. Median age was 8 (range 1 to 46). 264 patients (78.8%) were in pediatric group (age≤15) and 71 patients (21.2%) were in adult group (age≥16). 193 patients (57.6%) had symmetric and 142 patients (42.4%) had asymmetric pectus configurations. Risk factors predicting postoperative complications were analyzed using multivariate logistic regression.
Results: Postoperative complication rates were 16.1% (54 / 335) in total patient. Early complications (within a month) were pneumothorax (n=23, 6.9%), wound seroma (n=11, 3.3%), and bar displacement (n=8, 2.4%). Late complications (after a month) were pericarditis and pericardial effusion (n=5, 1.5%), hemothorax (n=4, 1.2%), and bar displacement (n=4, 1.2%). Techniques were modified to prevent complications especially in bar shaping and fixation, which led to decrease of complication rate in later experience (Operation Date 1: 29.4%, 15 / 51 vs. Operation Date 2: 12.0%, 34 / 284, p=0.004). Grand Canyon type (eccentric long canal type) showed higher complication rate than other types (40%, 12 / 30 vs. 12.1%, 37 / 305, p=0.000). Risk factors were analyzed in each group (Table 1).
Conclusions: Major complications were related to severe eccentric type of pectus configuration (Grand Canyon type) and lack of surgeon's experience (early date of operation). Complication rate was reduced with accumulation of experience and advancement of surgical techniques. The Nuss procedure can be performed at low risk of complications with the current technique.
Notes

(graphic on next page)

Underlining denotes the author scheduled to present at the meeting.

COMPLICATION:	ALL PATIENTS		PEDIATRIC GROUP	
RISK FACTORS	Odds Ratio	p-value	Odds Ratio	p-value
Bar Displacement:				
Grand Canyon Type	15.052	0.007	24.510	0.013
Operation Date 1	7.365	0.047	--	NS
Pneumothorax:				
Grand Canyon Type	5.459	0.015	--	NS
Operation Date 1	4.590	0.002	4.800	0.008
Reoperation:				
Grand Canyon Type	5.274	0.026	18.973	0.001
Operation Date 1	5.797	0.013	6.724	0.021
Parallel Bar Technique	5.854	0.040	--	NS
Oblique Bar Placement	4.670	0.032	--	NS

Table 1. Complications and Risk Factors in each Group.

11 THE SIGNIFICANCE OF INTRAUTERINE GROWTH RESTRICTION (IUGR) IS DIFFERENT FROM PREMATURITY FOR THE OUTCOME OF INFANTS WITH GASTROSCHISIS (3 MINUTES)

Pramod S. Puligandla, M.D., M.Sc., Annie Janvier, M.D., Elise Mok, B.Sc., M.Sc., Sarah Bouchard, M.D., Jean-Martin Laberge, M.D., Helene Flageole, M.D., M.Sc.
The Montreal Children's Hospital and Hopital Ste-Justine, Montreal, Canada

Purpose: Recent reviews of gastroschisis identify prematurity and low birthweight as predictors of morbidity and mortality. We compared the outcomes of IUGR infants with gastroschisis to those without growth restriction since IUGR is different from prematurity.
Methods: A retrospective analysis was performed for infants with gastroschisis between 1990-2000 at two pediatric hospitals. Patients were segregated into 3 groups based on birthweight (corrected for GA): Group 1 (IUGR;<5th percentile), Group 2 (5-25th percentile) and Group 3 (>25th percentile). Patient demographics, method of closure, number of surgeries, presence of atresia, and time to full feeding were assessed. Mortality rate, length of stay (LOS), and readmission rates were also compared. ANOVA / student's t-test and Fisher Exact Tests were used for statistical analysis ($p<0.05$ significant).
Results: 114 patients were included (Group 1=17; Group 2=43; Group 3=54). Overall, infants with IUGR had similar outcomes to non-IUGR infants, including full PO and TPN days, LOS, readmission and mortality rates (each $p>0.05$). The method of closure did not affect outcome ($p>0.05$). Infants with atresia had significantly longer times to full feeding (95 vs. 34 days, $p=0.034$), more surgeries (2.7 vs. 1.4, $p=0.002$), and longer LOS (106 vs. 48 days, $p=0.011$). Infants born <37 weeks had significantly increased NPO (28 vs. 18 days, $p=0.005$) and TPN (51 vs. 25 days, $p=0.007$) days, more surgeries (1.7 vs. 1.3, $p=0.021$) and longer LOS (65 vs. 37 days, $p=0.006$) when compared to infants born >37 weeks.
Conclusions: Although infants with gastroschisis are generally small for gestational age, the outcomes of growth-restricted infants are similar to other infants. The type of closure does not impact outcome, regardless of birthweight. The presence of atresia or prematurity does lead to longer times for full feeding and LOS. Therefore, premature delivery of infants with gastroschisis should not be advocated, even in the context of IUGR.
Notes

Underlining denotes the author scheduled to present at the meeting.

12 COMPARSION OF THE INCIDENCE OF COMPLICATIONS IN OPEN AND LAPAROSCOPIC PYLOROMYOTOMY: A CONCURRENT SINGLE INSTITUTION SERIES (3 MINUTES)

Carroll M. Harmon, M.D., Ph.D., Douglas C. Barnhart, M.D., Keith E. Georgeson, M.D., Ashley Vernon, M.D.
University of Alabama at Birmingham, Birmingham, AL, USA

Purpose: The purpose of this study was to compare the incidence and type of technical complications seen in a large concurrent series of open and laparoscopic pyloromyotomies.
Methods: The medical records of all patients who underwent pyloromyotomy for congenital hypertrophic pyloric stenosis over a 66-month period were reviewed (n=457). Information obtained included demographic information, operative time, and complications. Complications were limited to those that would be considered technical in nature. Groups were compared using Student's t-test for continuous variables and Chi-square for categorical variables.
Results: Four hundred and fifty-six pyloromyotomies were equivalently distributed between the two techniques (225 open, 232 laparoscopic). Demographic characteristics were comparable. These included age in weeks (open 4.8±0.15 vs. laparoscopic 6.0±0.15, p=0.4), weight in kilograms (open 3.86±0.06 vs. laparoscopic 3.84±0.06, p=0.77) and male gender (open 80.9% vs. laparoscopic 82.3% p=0.70). Operative times were shorter with the laparoscopic technique (24 minutes vs. 29 minutes, p<0.01). There were no deaths in the series. The total technical complication rate between groups was similar (open 4.4% vs. laparoscopic 5.6%, p=0.60). There was a greater rate of perforation with the open technique and a higher rate of postoperative problems in the laparoscopic group (Table 1).
Conclusions: The open and laparoscopic approaches for pyloromyotomy have similar overall complication rates. The distribution of the type of complications differs however.
Notes

TABLE 1	Open (n=225)	Laparoscopic (n=232)	p value
Mucosal perforation	8 (3.6%)	1 (0.4%)	0.025 *
Duodenal injury	0	2 (0.9%)	0.20
Revision pyloromyotomy	0	5 (2.2 %)	0.05 *
Readmission	2 (0.9%)	3 (1.3%)	0.70
Incisional hernia	0	2 (0.9%)	0.20
Conversion to open	NA	4 (1.7%)	NA
Total (excluding conversion to open)	10 (4.4%)	13 (5.6%)	0.60

Underlining denotes the author scheduled to present at the meeting.

13 THYROGLOSSAL DUCT INFECTIONS AND SURGICAL OUTCOMES (3 MINUTES)

Sathya C. Prasad, M.D., Charles L. Snyder, M.D., Jennifer L. Watts, M.S., J. Patrick Murphy, M.D., George K. Gittes, M.D., Walter S. Andrews, M.D., Ronald J. Sharp, M.D., George W. Holcomb, III, M.D., Daniel J. Ostlie, M.D.
Children's Mercy Hospital, Kansas City, MO, USA

Purpose: Thyroglossal duct cysts (TGDC) are the most common head and neck congenital anomaly in children and often present as an infected neck mass. We reviewed our experience with TGDC to determine if preoperative infection was related to postoperative complications including recurrence and wound infection.
Methods: The medical records of 99 patients undergoing excision of TGDC from January 1991 to July 2002 were reviewed. Factors thought to be associated with recurrence (age, history of infection, drainage, abscess, and operative procedure) were analyzed.
Results: 99 patients made up the study group. Mean age at operation was 5.0 years (range 6 mo to 16 yrs) with a male:female ratio of 1.6:1. There was no gender bias for those with and without recurrence. TGDC recurred in 12.1% (12 of 99) of patients. Preoperative drainage was used in 10 / 87 patients without recurrence and 1 / 12 with recurrence (NS). The presence of an abscess preoperatively (18 / 99 patients), did not correlate with recurrence. Similarly, preoperative infection (abscess and / or inflammation) occurred in 22% of patients and was not associated with recurrence. Postoperative infection occurred in 13 / 99 patients and was independent of preoperative infection. 7 / 77 patients without recurrence developed postoperative infection, while 6 / 12 of those who developed a recurrence had a post operative infection ($p < 0.001$). Mean length of follow up was 3.7 years, and was comparable for the two groups (recurrence vs. resolution). Twelve patients underwent repeat Sistrunk procedure for recurrence. There were no second recurrences.
Conclusions: In this large series of TGDC, preoperative infection occurred in approximately 1 / 5 patients and was not predictive of recurrence. Although postoperative infection did not correlate with the presence of preoperative infection, it was seen statistically more often in patients that developed recurrence. Important management principles include control of preoperative infection with antibiotics or incision and drainage as needed, followed by a meticulous Sistrunk procedure with wide excision.
Notes

Underlining denotes the author scheduled to present at the meeting.

14 APPLICATION OF THE APSA CLINICAL PRACTICE GUIDELINES FOR ISOLATED LIVER OR SPLEEN INJURIES: A SINGLE INSTITUTION EXPERIENCE (6 MINUTES)

Michael J. Leinwand, M.D., Carole C. Atkinson, R.N.C., George Taylor, M.D., David P. Mooney, M.D.
Children's Hospital-Boston, Boston, MA, USA

Purpose: The American Pediatric Surgical Association (APSA) proposed clinical practice guidelines (CPG) for the treatment of stable children with isolated liver or spleen injuries. This study was conducted to determine the impact of these guidelines upon a single institution.

Methods: We instituted the APSA CPG in 09/98 and prospectively evaluated these patients (Post-CPG: 09/98 to 06/02). These data were compared to patients before the CPG was instituted (Pre-CPG: 02/92 to 10/97). Groups were analyzed for age, CT grade, minimum hematocrit, Injury Severity Score (ISS), length of ICU stay, length of hospital stay, number of hematocrits obtained, number of follow-up imaging studies performed, and outcome.

Results: Of approximately 10,000 trauma patients admitted during the study period, 328 had liver or spleen injuries. 223 patients with isolated liver or spleen injuries comprised the study groups, 116 pre-CPG, and 107 post-CPG. Post-CPG patients were older (10.4 ± 3.2 vs. 9.2 ± 3.4 years, $p=0.02$), had a higher CT grade of injury (2.7 ± 0.9 vs. 2.4 ± 0.8, $p=0.03$), a higher minimum hematocrit (32.3 ± 3.4 vs. 30.9 ± 3.4, $p=0.02$), and a higher ISS (9.5 ± 4.1 vs. 7.7 ± 3.2, $p=0.003$). Despite this, post-CPG patients had shorter ICU stays (0.4 ± 0.6 vs. 1.4 ± 0.6 days, $p<0.001$), shorter hospital stays (3.8 ± 1.2 vs. 7.2 ± 1.4 days, $p<0.001$), fewer hematocrits obtained (4.7 ± 2.2 vs. 9.2 ± 3.1, $p<0.001$), and fewer imaging studies performed (0.3 ± 0.4 vs. 2.1 ± 1.1, $p<0.001$). No urgent laparotomies were performed in either group. One post-CPG patient underwent delayed excision of a splenic pseudocyst. There were no major complications in either group.

Conclusions: The treatment of children with isolated liver or spleen injuries using the APSA guidelines resulted in decreased length of ICU and hospital stays, and decreased resource utilization without any noted effect on outcome.

Notes

Underlining denotes the author scheduled to present at the meeting.

15 INJURY GRADE PREDICTS FUNCTIONAL OUTCOME IN NON-OPERATIVELY MANAGED RENAL INJURIES IN CHILDREN (3 MINUTES)

Martin S. Keller, M.D., F.A.C.S., C. Eric Coln, M.D., F.A.C.S., Thomas R. Weber, M.D., F.A.C.S., Jennifer J. Garza, M.D., Kennith H. Sartorelli, M.D., F.A.C.S., Christine Green, M.S.N., R.N.
Cardinal Glennon Children's Hospital, St. Louis, MO, USA

Purpose: To better define the functional outcome of nonoperatively managed renal injuries in children.
Methods: Following institutional review board approval, the records of all children sustaining blunt renal trauma managed nonoperatively were reviewed for injury grade, computed tomography (CT), blood urea nitrogen (BUN), creatinine (Cr), blood pressure and percent function by 99m technetium dimercaptosuccinic acid renal scan (DMSA) after complete healing.
Results: Over a 2-year period, 17 children (mean age 10 years, range 2-16) were conservatively managed for their renal injuries without operative, endourologic or interventional radiographic procedures. Injury grades were 2-grade II, 2-grade III, 9-grade IV, and 4-grade V. Complete healing, with resolution of perinephric hematoma and urinoma was documented in all cases with serial CTs by 2 months post-injury. Renal scarring and parenchymal volume loss was evident in all healed high-grade injuries (grades IV-V) on CT. DMSA scanning obtained at 3 months demonstrated a significant decline in percent of total renal function for the high-grade injuries corresponding to severity (50 +/- 0.7% function grades II and III, 41.8 +/- 9.2% grade IV vs. 27.7 +/- 8.6% grade V, $p<0.05$) due to scarring. Only 2 (22%), however, with grade IV injury had severe compromise of function (< 30% contribution). At follow-up, all children were asymptomatic and none had abnormal BUN or Cr (10.5 +/- 5.1 and 0.6 +/- 0.2 mg/dl, mean BUN, Cr). All children had normal blood pressures.
Conclusions: Nonoperative management of hemodynamically stable children with blunt renal injuries is possible regardless of injury severity. Functional outcome in the injured kidney (contribution to total renal function) is best determined by DMSA scanning and correlates to admission injury grade. Grades II-IV injuries managed conservatively retain near normal function. Grade V injuries have a significant loss of function due to scarring and parenchymal volume loss. Long-term follow-up of these children appears warranted.
Notes

Underlining denotes the author scheduled to present at the meeting.

16 DIAGNOSIS OF ACUTE APPENDICITIS USING A CLINICAL PRACTICE GUIDELINE (3 MINUTES)

Douglas S. Smink, M.D., Jonathan A. Finkelstein, M.D., Barbara M. Garcia Pena, M.D., Michael W. Shannon, M.D., George A. Taylor, M.D., Steven J. Fishman, M.D.
Children's Hospital Boston, Boston, MA, USA

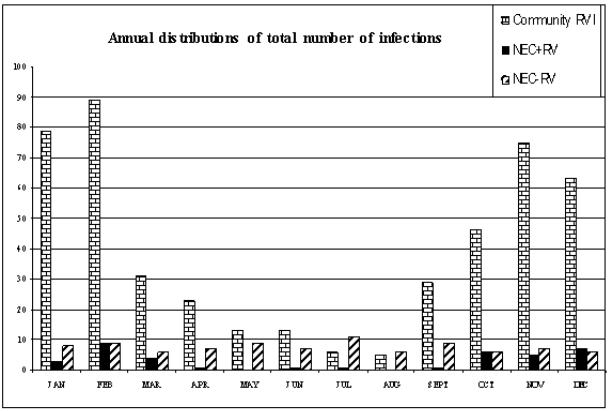
Purpose: In October 2000, our institution implemented a clinical practice guideline (CPG) utilizing selective computed tomography (CT) and ultrasound (US) for the evaluation of children with suspected appendicitis. We sought to determine surgical outcomes and diagnostic accuracy under the CPG.
Methods: We retrospectively analyzed the medical records of patients evaluated under the CPG at our institution between January 1 and December 31, 2001. Depending upon a patient's clinical presentation, the CPG recommends immediate surgery or further evaluation with CT and/or US. Patients were identified for the study if they received an appendectomy or a CT or US for suspected appendicitis. Patients under age 4 or with a complex medical history were excluded from the CPG. Negative appendectomy and perforation rates were compared with appendectomy patients at our hospital in 1997, prior to frequent utilization of imaging studies. Sensitivity and specificity of the CPG were calculated.
Results: Under the CPG, 571 patients were evaluated for acute appendicitis, with 272 undergoing an appendectomy. While 511 patients received a CT and/or US, only 34 patients with equivocal evaluations were admitted to the surgical service for serial examinations. Patients with a normal appendix on pathology decreased from 27 of 256 (10.6%) in 1997 to 15 of 272 (5.5%) in 2001 (p=0.03). 57 (22.2%) patients in 2001 had a perforated appendix, compared to 64 (28.0%) in 1997 (p=0.14). The CPG, incorporating clinical judgment and selected imaging, had a sensitivity of 98.8%, a specificity of 95.2%, and positive and negative predictive values of 94.4% and 99.0%.
Conclusions: A clinical practice guideline selectively utilizing CT and US is highly accurate in the diagnosis of acute appendicitis, thus minimizing the need for inpatient admission for serial examinations.
Notes

17 ROTAVIRUS ASSOCIATED NECROTIZING ENTEROCOLITIS: A POTENTIALLY PREVENTABLE DISEASE? (3 MINUTES)

R. Sharma, M.D., J. J. Tepas, M.D., D. L. Mollitt, M.D., R. D. Garrison, M.D., M. L. Hudak, M.D., J. A. Bradshaw, M.D., G. Stevens, Ph.D., B. R. Premachandra, M.D., P. Pieper, A.R.N.P.
University of Florida Health Science Center at Jacksonville, Jacksonville, FL, USA

Purpose: To test the hypothesis that rotavirus associated NEC (NEC+RV) differs from NEC associated with other organisms (NEC-RV).
Methods: Over a 63-month period, neonates with NEC Bell Stage II or higher were included in this prospective study. Data collected included maternal and neonatal demographic information, neonatal laboratory, radiographic studies, and clinical course. Immunoelectron microscopy for confirmation of RVI was performed on stools from all neonates.
Results: Of 2,444 NICU admissions, 129 (5.3%) developed NEC. Thirty eight (29%) were rotavirus positive. The two groups did not differ in maternal or neonatal characteristics. Advanced NEC (Stage III) was more common in the NEC-RV infants (62% vs. 39%; $p = .032$). Recurrence of NEC was more common in NEC+RV group ($p = < .0001$). Interestingly among those with focal pneumatosis (52), predominant distribution of pneumatosis was right sided in NEC-RV group and left in NEC+RV group ($p < .0001$). Surgical intervention (SI) including: laparotomy, peritoneal drain and peritoneal drain followed by laparotomy, did not differ in two groups ($p = .140$). Similarly the incidence of complications (strictures, enterocutaneous fistulae, cholestasis, short bowel syndrome, and mortality did not differ ($p = .251$). Severe pneumatosis (Odds ratio, 7.8; CI, 1.9, 32.1) and severe thrombocytopenia (Odds ratio, 18.3; CI, 3.5, 94.3) increased the odds for SI. Human milk feedings decreased the odds for SI (Odds ratio, 0.251; CI, 0.080, 0.791). The annual distribution of NEC+RV paralled RVI in the community, NEC-RV did not (Fig 1).
Conclusions: Overall, NEC+RV is a less severe disease than NEC-RV. However, it can reach advanced stages obscuring distinction from NEC-RV. Indication for surgery should not be altered by identification of RVI in association with NEC. Monitoring RVI in the community, adhering to infection control measures, human milk feedings, improving neonatal immunity against RVI may reduce the incidence of NEC+RV.

Notes



Underlining denotes the author scheduled to present at the meeting.

18 HERBAL MEDICATION USE IN THE PEDIATRIC SURGICAL PATIENT (3 MINUTES)

Kristin Noonan, M.D., Robert M. Arensman, M.D., J. David Hoover, M.D.
Children's Memorial Hospital, Chicago, IL, USA

Purpose: To determine the prevalence of herbal medication use (r) (HMU) in the pediatric surgical patient since herbal medications can cause major drug and anesthetic interactions.
Methods: A questionnaire on all drug use prior to surgery was given to the parents of 1100 consecutive pediatric surgical patients, operated on at a metropolitan children's hospital between June 14, 2002 and August 14, 2002.
Results: 1100 questionnaires provided 914 returned (83%) 192 parents were HMU (129 / 914) 21% 91 parents reported the surgeon inquired about HMU preoperatively (91 / 914) 10% 36 children were HMU (36 / 914) 4% average 2.4 herbal medications per patient 15 of the 36 were also taking prescription medications 13 of the 15 (86%) were at risk for major drug or anesthetic interactions Echinacea (14.9%), chamomile (10.3 %) and aloe (8.0%) were the most frequently used herbal medications The last dose of HMU occurred an average of 3.5 days prior to surgery HMU parents reported child use in 18.9% vs. 0.8% use in children of nonHMU parents ($p<.05$) 20 / 36 (55%) of the HMU patients were considered by their parents to have a chronic disease whereas only 37% of nonusers (878) were considered to have a chronic disease ($p<.05$) There was no statistical difference between the HMU and nonHMU with regard to age, race or surgeon inquiry.
Conclusions: This is the first report on herbal medication use in the preoperative pediatric patient. The prevalence of herbal medication use is significantly higher in patients whose parents use herbal medications and consider their child to be chronically ill. Surgeons need to inquire about the use of herbal medications in their patients to prevent possible harmful drug interactions and postoperative complications.
Notes

19 THE PARENTAL PERSPECTIVE REGARDING THE CONTRALATERAL INGUINAL REGION IN A CHILD WITH KNOWN UNILATERAL INGUINAL HERNIA (3 MINUTES)

George W. Holcomb III, M.D., Kelly A. Miller, M.D., Beverly E. Chaignaud, M.D., Steven B. Shew, M.D., Daniel J. Ostlie, M.D.
Children's Mercy Hospital, Kansas City, MO, USA

Purpose: The management of the contralateral region in a child with a known unilateral inguinal hernia has been debated for over 50 years. Advantages and disadvantages exist with both unilateral repair alone and with unilateral repair and inspection / repair of the contralateral region. However, the perspective of the child's parents has not been sought. This study was designed to seek parental views on this topic.
Methods: Following IRB approval, all patients < 10 years with a unilateral inguinal hernia seen by the senior surgeon were prospectively studied from 11 / 2001 through 10 / 2002. A study sheet was given to the parents about the nature of an inguinal hernia, the incidence of 20-40% of a contralateral patent processus vaginalis (CPPV), and surgical options (perform repair of the unilateral inguinal hernia only, repair the unilateral inguinal hernia with contralateral exploration and repair if indicated, or unilateral inguinal hernia repair with laparoscopy through the ipsilateral hernia sac and repair of a CPPV if discovered). The parents were given time to read the study sheet and questions were answered. Additionally, they were specifically told that there was not a right or a wrong answer, but that only their preference was requested. The parents of the last 94 patients requesting contralateral inspection were asked their motives (convenience or anesthesia concerns) regarding their decision.
Results: 144 patients comprised the study group. Eight parents chose unilateral repair alone, 11 chose bilateral incisions with contralateral repair if a CPPV was found, and 125 chose unilateral hernia repair with laparoscopic contralateral inspection followed by repair if needed. Regarding their motives, 78 of the last 94 parents requesting contralateral inspection indicated that convenience was the primary motive. Surprisingly, only 16 exhibited concerns about their child undergoing a second anesthesia.
Conclusions: When presented options regarding management of a unilateral inguinal hernia, parents prefer laparoscopic inspection and repair of the contralateral region more for convenience than for concerns about a second procedure and anesthesia.
Notes

Underlining denotes the author scheduled to present at the meeting.

Noon – 1 p.m. Presidential Address: R. Peter Altman, M.D.
"The Good Old Days"

R. Peter Altman served his internship at the Mt. Sinai Hospital in New York. He trained in general surgery at the Tufts-New England Medical Center and in pediatric surgery at the Children's Hospital Medical Center in Washington D.C. completing his training in 1969. He remained on the staff at Children's Hospital and the faculty of the George Washington University School of Medicine until 1980 when he was recruited to the then Babies Hospital, Columbia-Presbyterian Medical Center to succeed Dr. Thomas Santulli as Chief of Pediatric Surgery. He was appointed Surgeon-in-Chief in 1992. He directed the Division of Pediatric Surgery from 1980 to 2000 when he assumed his present position as Senior Vice President for Medical Affairs, and Physician-in-Chief, Children's Health System, New York-Presbyterian Hospital. Dr. Altman is Professor of Surgery and Pediatrics, College of Physicians & Surgeons, Columbia University and Surgeon-in-Chief, Children's Hospital of New York-Presbyterian.

Dr. Altman has held numerous leadership positions in American surgery. He served on the Residency Review Committee for Surgery and currently sits on the ACGME Appeals Panel. He was a member of the ACS Graduate Education Committee and the AMA Graduate Education Advisory Committee. He served both the Surgical Section, American Academy of Pediatrics and the American Pediatric Surgical Association as Chair of the Education and Program Committees. He was a member of the APSA Board of Governors from 1996-1999. He is also on the Board of Directors of the Children's Oncology Society of New York, Ronald McDonald House and Foundation.

He has devoted his career to improving the surgical care for infants and children and enjoys a national and international reputation for his contributions in the field of hepato-biliary surgery in infants. He is a dedicated teacher and has trained more than 20 young surgeons in pediatric surgery. He is the author of more than 150 papers and serves on the editorial boards of several leading journals.

Hanna, Dr. Altman's wife of 38 years, is an art educator at the Solomon Guggenheim Museum in New York. They have two married sons, one a television newscaster living in Columbus, Ohio and the other, an investor residing in Manhattan. They have two grandchildren and expect another this summer.

SESSION III: PEDIATRIC SURGICAL DILEMMAS AND DIFFICULT PROBLEMS

8 a.m. – 10 a.m.

20 A MULTIDISCIPLINARY APPROACH TO THE FOCAL FORM OF CONGENITAL HYPERINSULINISM LEADS TO SUCCESSFUL TREATMENT BY PARTIAL PANCREATECTOMY (6 MINUTES)

N. Scott Adzick, M.D., Paul S. Thornton, M.D., Charles A. Stanley, M.D., Robin D. Kaye, M.D., Eduardo Ruchelli, M.D.
Children's Hospital of Philadelphia, Philadelphia, PA, USA

Purpose: Congenital Hyperinsulinism (HI) causes severe hypoglycemia in neonates and infants. Recessive mutations of the beta cell K-ATP channel genes cause diffuse HI, whereas loss of heterozygosity together with inheritance of a paternal mutation cause focal adenomatous HI. Although these two forms of HI are clinically identical, focal HI can be cured surgically. We reviewed our experience with partial pancreatectomy for focal HI.
Methods: From 1999 to 2002, 34 patients (ages 2 weeks to 14 months; median age = 7 weeks) were treated with partial pancreatectomy for focal HI. Before surgery, patients first underwent acute insulin response testing to distinguish focal from diffuse HI, then had localization studies using selective arterial calcium stimulation with venous sampling and / or transhepatic portal venous sampling. At operation, the focal lesion was found using the preoperative localization data and multiple pancreatic biopsies with frozen section analysis, followed by partial pancreatectomy. A complete response at follow-up was defined as no requirement for glycemic medications and no diabetes mellitus.
Results: Sixteen pancreatic focal lesions were in the head, 13 were in the neck, body or tail, and 5 had more extensive involvement. Five lesions that required substantial resection of the pancreatic head underwent Roux-en-Y pancreaticojejunostomy to preserve the normal body and tail. Lesions of the body or tail were treated with partial distal pancreatectomy. 91% of patients had a complete response to surgery. Three patients have required glycemic medications. No patient is diabetic. Surgical complications included repeat resection for residual disease (3), small bowel obstruction requiring laparotomy (2), and chylous ascites (3) that resolved with medical management.
Conclusions: We conclude that a multidisciplinary approach (pediatric endocrinology, radiology, pathology, and surgery) to patients with the focal form of congenital hyperinsulinism can distinguish focal from diffuse disease, localize focal lesions, and permit partial pancreatectomy with cure in most patients.
Notes

Underlining denotes the author scheduled to present at the meeting.

21 DELAYED VERSUS IMMEDIATE SURGERY IN ACUTE APPENDICITIS: DO WE NEED TO OPERATE DURING THE NIGHT? (3 MINUTES)

Dani Yardeni, M.D., Ronald B. Hirschl, M.D., Robert A. Drongowski, M.S., Daniel H. Teitelbaum, M.D., James D. Geiger, M.D., Arnold G. Coran, M.D.
University of Michigan, Department of Surgery, Ann Arbor, MI, USA

Purpose: Over the last 4 years, we have changed our management of acute non-perforated appendicitis from emergent surgery within the first 2-6 hours of admission to delayed operation within 24 hours of admission in those seen in the late evening or night. Delaying nighttime surgery is becoming more important and common as we face resident working hour constraints. We examined, therefore, whether a delay in operation for acute appendicitis would affect perforation rate, length of stay (LOS), hospital charges, or operative time.
Methods: We retrospectively reviewed the medical records of 96 patients with acute appendicitis occurring between 1998 and 2001. Incidence of perforation at surgery, LOS, hospital charges, and operative time were analyzed by student t-tests and regression analysis with $P<0.05$ considered significant.
Results: Thirty-two children (33%) were operated on within 6 hours of admission, while the remaining 64 children (67%) were operated on between 6 to 24 hours from admission. Multivariable linear regression analysis failed to identify LOS, hospital charges, surgery time, or perforation as significant predictors of time to OR.
Conclusions: In children with acute appendicitis, delaying surgery for more than 6 hours did not affect LOS, hospital charges, operative time, or perforation rate. Delayed management allows greater efficiency and cost effective use of physician and hospital resources, including decreased resident operations during the night.
Notes

Surgical Management Group	**Time to OR (hours)** Mean ±SD	**Perforation Rate** % (n)	**Charges (dollars)** Mean ±SD	**LOS (days)** Mean ±SD	**Surgery Time (min)** Mean ±SD
< 6 hours (n=32)	4.3 ±1.3	12.5% (4)	$8,904 ±7,313	2.2 ±3.0	58.3 ±28.4
> 6 hours (n=64)	14.1 ±6.3	15.6% (10)	$9,114 ±4,149	2.3 ±2.1	57.6 ±24.8
P value	**0.00**	**0.79**	**0.86**	**0.91**	**0.91**

Underlining denotes the author scheduled to present at the meeting.

22 ASYMPTOMATIC CONGENITAL CYSTIC ADENOMATOID MALFORMATION (CCAM): TO RESECT OR NOT TO RESECT? (6 MINUTES)

Dalal Aziz, M.D., Sascha Tuuha, R.N., Jacob C. Langer, M.D., Sigmund H. Ein, M.D., Greg Ryan, M.D., Peter C. W. Kim, M.D.
Hospital for Sick Children, Toronto, Canada

Purpose: Management of the small asymptomatic CCAM remains controversial. Although most surgeons recommend resection of these lesions to prevent future infection, the natural history of untreated asymptomatic CCAM is unknown. We wished to compare the risk of an expectant approach to the risk of standard surgical resection.
Methods: All prenatally or neonatally diagnosed CCAM's, and all patients presenting with late diagnosis of CCAM, were reviewed between 1996 and 2002.
Results: Forty-eight children were diagnosed perinatally, 13 of whom were symptomatic and required surgery as a neonate. Of the 35 asymptomatic infants, 6 underwent elective resection before 6 months of age (median 4.5 months). The other 29 asymptomatic infants were followed for 6 months or more. Of these, 9 remained asymptomatic and were eventually operated on electively (median age 13 months). Three (10%) developed CCAM infections at 6, 8 and 11 months of age and required resection. The other 17 children have not undergone resection and remain asymptomatic (median follow up 3 years). An additional 12 patients presented with a late diagnosis of CCAM. All presented with complications (infection or pneumothorax) and underwent resection (median age 6 years). There was no significant difference in complication rate between those undergoing resection of an asymptomatic CCAM (2 / 15) and those undergoing resection of a CCAM which had already developed infection or pneumothorax (4 / 15) ($p= 0.64$).
Conclusions: Ten percent of asymptomatic infants developed complications requiring surgery, although the true incidence is probably higher given the relatively short follow up in our series and the existence of a group of older children presenting with complications in a previously undiagnosed CCAM. Morbidity was similar after resection of a complicated or an asymptomatic CCAM. Expectant management of the asymptomatic CCAM is a reasonable option, but further follow-up is necessary to more clearly define the long-term risk of complications.
Notes

23 DO ALL PATIENTS WITH HETEROTAXIA SYNDROME REQUIRE ROUTINE SCREENING FOR INTESTINAL ROTATION ABNORMALITIES? (6 MINUTES)

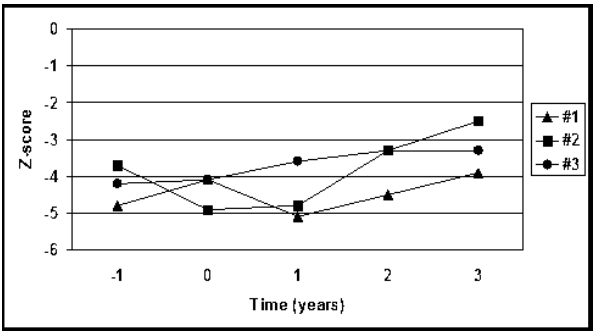
Matthew Choi, B.Sc., Steven Borenstein, M.D., Lisa Hornberger, M.D., Jacob C. Langer, M.D.
Hospital for Sick Children, Toronto, Canada

Purpose: Heterotaxia syndrome involves multiple anomalies, including cardiac malformations and intestinal rotation abnormalities (IRA). Most authors recommend routine radiological evaluation, with laparotomy and Ladd procedure if an IRA is found. We wished to determine if routine radiological screening is necessary, and if there is a group of children that can safely be managed expectantly.
Methods: The charts of all children with heterotaxia syndrome at our hospital from 1968 to 2002 were retrospectively reviewed.
Results: Complete data were available for 177 patients with heterotaxia. Twenty-five patients (14%) had neonatal gastrointestinal symptoms (feeding intolerance, vomiting). Ten of these 25 had gastrointestinal contrast studies, of which 7 were abnormal and led to surgery (4 malrotation, 2 duodenal web, 1 gastroesophageal reflux). None of the 15 symptomatic neonates who were not imaged developed intestinal complications on followup (median 48 months). Of the 152 asymptomatic neonates, 9 had radiological screening and 6 studies were abnormal; however none were thought to have narrow based mesenteries and none underwent surgery. There were no intestinal complications on followup in this group (median 18 months). The other 143 asymptomatic children did not undergo radiological screening and were closely followed. Four subsequently developed gastrointestinal symptoms and had a contrast study; 1 of these had malrotation and underwent a Ladd procedure and the other 3 were normal. Of the remaining 132 patients who remained asymptomatic, 60 (45%) died of cardiac disease and none developed intestinal symptoms or complications related to malrotation (median followup 114 months).
Conclusions: These data suggest that asymptomatic children with heterotaxia syndrome do not require routine screening for IRA and can be safely managed expectantly with close followup. Those that develop gastrointestinal symptoms should undergo investigation, and should be operated upon if significant rotational abnormalities are found.
Notes

24 RESULTS OF GROWTH HORMONE THERAPY IN CHILDREN WITH SHORT BOWEL SYNDROME (3 MINUTES)

Anita M. Nucci, Ph.D., David Finegold, M.D., JaneAnne Yaworski, M.S.N., R.N., Lori Kowalski, M.S., Edward M. Barksdale, M.D.
Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

Purpose: In addition to the structural, ultrastructural and functional changes that occur after extensive enterectomy or *in utero* bowel loss that results in short bowel syndrome (SBS), a complex array of humoral responses take place that may also affect adaptation of the remaining small intestine as well as nutritional status and / or growth. These include alterations in the levels of circulating hormones and trophic substances such as growth hormone (GH) and insulinlike growth factors (IGF-1 and IGFBP-3). The purpose of this investigation is to report on the management / treatment of 3 children with SBS (>4 years in duration) and growth failure.
Methods: Serum measures of growth factors and response to GH stimulation following an arginine insulin tolerance test (AITT) were determined. Weight and height z-scores as well as linear growth velocity were calculated annually pre- and post-initiation of medication therapy.
Results: Patient #1 (male, 8.5 years old, midgut volvulus, 36 cm bowel) was found to be GH deficient while patients #2 (female, 12.5 years old, gastroschisis, 70 cm bowel) and #3 (male, 13 years old, jejunal atresia, 21 cm bowel) were found to have limited GH responsiveness. Subsequently, treatment with GH [#1] and growth releasing factor (GRF) [#2 & 3] was prescribed. Z-scores for both weight and height improved over time. Positive linear growth velocity was observed from initiation of therapy (<0.5 cm / year for all) to over 3 years of treatment (mean #1: 4.7 cm / year, #2: 9.0 cm / year, #3: 5.0 cm / year [normals >4.5, >8.5 and >4.9 cm / year, respectively]). All patients consumed a regular diet with oral supplements while two received parenteral nutrition support for ~1 year.
Conclusions: In children with medically refractory SBS, it is not only important to offer trophic factors but also essential that sufficient nutrient substrate be provided to achieve adequate growth.
Notes

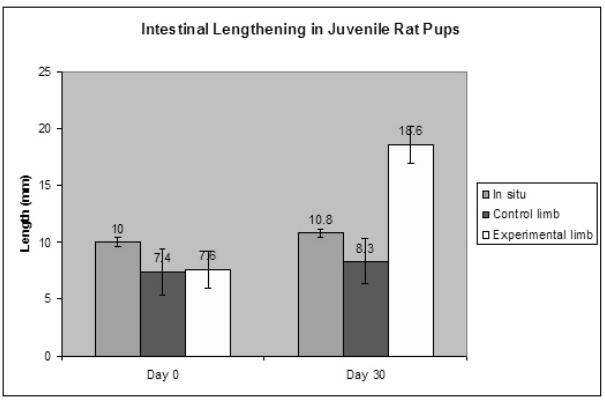


Underlining denotes the author scheduled to present at the meeting.

25 MECHANICAL TENSION LENGTHENS INTESTINE IN JUVENILE RATS (3 MINUTES)

Shawn D. Safford, M.D., Alex J. Freemerman, Ph.D., Kristine M. Safford, M.H.Sc., Dominique M. Goyeau, B.A., Michael A. Skinner, M.D.
Duke University Medical Center, Durham, NC, USA

Purpose: Short gut syndrome affects 10-20,000 children in the United States. Currently, the treatment of short gut syndrome consists of long-term parenteral nutrition and various operative techniques to lengthen the intestine. Such techniques are variably successful, and do not induce true intestinal growth. The aim of this study was to examine whether intestinal growth can be induced by continuous mechanical traction.
Methods: Seven juvenile rat pups underwent midline laparotomies and isolation of a 16 mm segment of bowel. A double-barreled, blind-loop ostomy was created using the isolated segment of bowel. We developed an intestinal lengthening devise that was inserted into one of the limbs. The second limb was used as an internal control. As a control for normal growth of the intestine, a 1 cm length of *in situ* bowel was marked with sutures. After recovery, the lengthening device was advanced approximately 1 mm / day for 30 days. We examined the experimentally lengthened segment, the control unlengthened segment, and the in situ segment of bowel for length, weight and histology.
Results: The intestinal lengthening device induced an increase in the length of bowel by over 110% compared to control (Figure 1, $p<0.001$). No difference in length was identified between the *in situ* or control bowel ($p=0.4$). The experimental bowel showed no difference in total mucosal thickness, villous height, or villous width in comparison to *in situ* bowel ($p=0.3$). Total muscular thickness was increased in the expermental loop of bowel in comparison to *in situ* bowel (37.2 um v. 5.8 um, $p<0.001$). Finally, the average wet weight of the experimental bowel was 3 times greater than control (235 mg v. 78 mg, $p<0.001$).
Conclusions: We conclude that constant mechanical tension can induce significant intestinal lengthening in juvenile rat pups. This observation may have implications in the management of children with short gut syndrome.
Notes



Underlining denotes the author scheduled to present at the meeting.

26 FUNCTIONAL LIVER RECOVERY PARALLELS AUTOLOGOUS GUT SALVAGE IN THE SHORT BOWEL SYNDROME (6 MINUTES)

Kishore R. Iyer, F.R.C.S., Simon Horslen, F.R.C.P., Clarivet Torres, M.D., Jon Vanderhoof, M.D., Stephen Raynor, M.D., Alan Langnas, D.O.
University of Nebraska Medical Center, Omaha, NE, USA

Purpose: To report apparent improvement in parenteral nutrition (PN) – associated liver dysfunction in a cohort of children with short bowel syndrome.
Methods: A retrospective case-record review of all patients managed within a dedicated Intestinal Rehabilitation Program (IRP) identified 13 patients with short bowel who had PN-associated liver dysfunction, defined for this purpose as hyperbilirubinemia and / or an abnormal liver biopsy.
Results: At referral, 12 of the 13 patients were exclusively on PN, and one was on 50% PN. At current follow-up, 3 patients have achieved complete enteral autonomy from PN and 7 patients have had smaller decrements in PN requirements. Specific operative procedures to improve intestinal function were undertaken in 8 patients; 4 patients also underwent cholecystectomies with biliary irrigation at the time of intestinal reconstruction. The median highest bilirubin in these 13 patients was 6.4mg% (range 2.3 ñ 24.5 mg%). Liver biopsies indicated that 5 patients were cirrhotic, 3 had bridging fibrosis, and 4 had severe cholestasis or lesser degrees of fibrosis. Of 12 survivors in this series, 10 patients currently have a serum bilirubin < 1.2 mg% with a median bilirubin of 0.7 mg% (range 0.1 ñ 6.7mg%). Twelve of the 13 patients in this series were initially referred for liver-small bowel transplantation.
Conclusions: This preliminary experience suggests that PN-dependent patients with advanced liver dysfunction in the setting of the short bowel syndrome may experience functional and biochemical liver recovery, which appears to parallel autologous gut salvage in most cases. As a corollary, we believe that even advanced degrees of liver dysfunction should not preclude attempts at autologous gut salvage in carefully selected patients. Such a policy of “aggressive conservatism” may avoid the need for liver / intestinal transplantation in some patients who appear to be failing PN.
Notes

Underlining denotes the author scheduled to present at the meeting.

27 HB-EGF PROPHYLACTIC AND SALVAGE THERAPY FOR INTESTINAL ISCHEMIA/REPERFUSION INJURY (3 MINUTES)

Abigail E. Martin, M.D., Mark H. Luquette, M.D., Gail E. Besner, M.D.
Children's Hospital, Columbus, OH, USA

Purpose: We have previously demonstrated that heparin-binding EGF-like growth factor (HB-EGF) is an intestinal cytoprotective agent. The current study examined whether HB-EGF is effective as salvage therapy as well as prophylactic therapy for intestinal ischemia/reperfusion (I/R) injury.

Methods: Total midgut I/R injury in rats was achieved by occlusion of a first order branch of the superior mesenteric artery for 60 minutes followed by reperfusion. Rats were intraluminally treated with 600 µg/kg HB-EGF (n=25) or saline control (n=9). Rats that received HB-EGF received the growth factor either 5 minutes prior to ischemia (n=8), half way through the ischemic event (n=9), or 5 minutes after ischemia (n=8). After 6 hours of reperfusion, intestine was harvested, examined histologically, and graded for histologic injury in a blinded fashion, with scores ranging from 1 (no damage) to 6 (transmural necrosis). Seven to eleven histologic sections of jejunum were examined for each experimental animal.

Results: Animals treated with saline had a mean histologic injury score of 3.54. Animals that received HB-EGF prior to injury had a mean injury score of 2.25 ($p<0.05$ compared to control; 2 tailed paired students t test). Animals that received HB-EGF during ischemia had a mean injury score of 2.76 ($p<0.05$ compared to control), and animals that received HB-EGF after injury had a mean injury score of 2.79 ($p<0.05$ compared to control).

Conclusions: These data show that HB-EGF acts as an effective intestinal cytoprotective agent when administered not only prior to injury, but also during injury, and most importantly, even after intestinal injury has already occurred. Our long-term goal is to use HB-EGF to treat patients with intestinal ischemia/reperfusion injury, including newborns with necrotizing enterocolitis. The current findings support a basis for the prophylactic use of HB-EGF in high-risk patients (i.e., the very low birth weight premature), as well as for the administration of HB-EGF to salvage patients in which an intestinal insult has already occurred.

Notes

28 GLUCAGON-LIKE PEPTIDE-2α: A POSSIBLE NEW APPROACH IN THE MANAGEMENT OF INFLAMMATORY BOWEL DISEASE (3 MINUTES)

L. Grier Arthur, M.D., Marshall Schwartz, M.D., Keith A. Kuenzler, M.D., Ruth Birbe, M.D.
A. I. duPont Hospital for Children, Wilmington, DE, USA

Purpose: Glucagon-like peptide-2α (GLP-2α) is a growth factor specific to the small intestine, which may have clinical usefulness in short bowel syndrome. This study was designed to investigate the potential benefits of intravenous and luminal administration of GLP-2α on a unique model of inflammatory bowel disease (IBD).

Methods: Transfection of the HLA-B27 gene into Fisher rats induces a phenotype similar to IBD. HLA-B27 rats were treated for 14 days with either intravenous saline (n=6) or GLP-2α (50 μg/kg/day; n=5); or with luminal saline (n=5) or GLP-2α (50 μg/kg/day; n=5). Rats were evaluated for improvement of diarrhea based on the following scale: 1, normal stool; 2, loose pellet-shaped stool; 3, loose stool, no pellets; and 4, severe diarrhea with mucous. Gross analysis of bowel lesions was scored by two blinded reviewers. Microscopic analysis of sections from the ileum, cecum, and colon was performed by a blinded pathologist and inflammation was scored as: 0, none; 1, mild; 2, moderate; or 3, severe. Statistics were determined using ANOVA. A p value of .05 was considered significant. The Animal Care and Use Committee approved all protocols.

Results: See Table. Intravenous GLP-2α significantly decreased diarrhea and the number of gross lesions in the small and large intestine. Intravenous GLP-2α reduced microscopic inflammation, but it was not statistically significant. Luminal GLP-2α significantly decreased diarrhea, the number of small intestine lesions, and the microscopic inflammation, but it did not statistically reduce the overall number of bowel lesions.

Conclusions: GLP-2α ameliorates the signs and symptoms of inflammatory bowel disease in these HLA-B27 rats. Intravenous GLP-2α reduces diarrhea more effectively than luminal administration. Interestingly, both luminal and intravenous routes are as effective in ameliorating inflammatory bowel disease. GLP-2α administration potentially provides a new pharmacologic modality in the treatment of inflammatory bowel disease.

Notes

Table

Observation	GLP-2α (IV)	GLP-2α (LUM)
Diarrhea	**↓35%***	↓26%
Total Bowel Lesions	**↓51%***	↓43%
Small Bowel Lesions	**↓48%***	**↓58%***
Histologic Inflammation	↓24%	**↓44%***

Results reflect percent change with respect to matched control groups (*p<0.05)

Underlining denotes the author scheduled to present at the meeting.

29 AN INTERDISCIPLINARY APPROACH TO THE ADOLESCENT BARIATRIC PATIENT (6 MINUTES)

Thomas H. Inge, M.D., Ph.D., F.A.C.S., Linda Langford, M.S.N., R.N., Steven Daniels, M.D., Ph.D., Shelley Kirk, M.S., Helmut Roehrig, Ph.D., Raouf Amin, M.D., Meg Zeller, Ph.D., Victor Garcia, M.D., F.A.C.S.
Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Purpose: Obesity has reached epidemic proportions in pediatric age groups in the U.S. Although significant co-morbidities are seen in obese adolescents, there are no surgical programs specifically dedicated to the management of clinically severely obese adolescents. Our purpose was to establish a comprehensive, interdisciplinary weight management center (CWMC) in a children's hospital setting.
Methods: The clinical team consisted of a pediatric cardiologist, dietitian, pediatric psychologist, exercise physiologist, nurse practitioner, and pediatric surgeons, each with special expertise in obesity. During program development, input from an ethicist, pediatric gastroenterologist, pediatric pulmonologist, and adolescent medicine physician was also required.
Results: Physician referrals to the CWMC have numbered 43. The average age was 15.9 years and the average BMI of patients referred was 51.6. Comorbidities included type II diabetes, deep vein thrombosis and pulmonary embolus, obstructive sleep apnea syndrome, panniculitis, arthropathies, hyperinsulinism, hypertension, dyslipidemia, GERD, and psychosocial impairments. Of the patients referred, 18 have been considered appropriate for gastric bypass surgery and 15 have been triaged to continued medical management. Two patients have undergone open roux-en-Y gastric bypass (RYGBP) and two have undergone laparoscopic RYGBP. Complications included one patient who required readmission at postopertive week 5 due to dumping syndrome. Another patient developed partial obstruction of the roux limb 5 months after open RYGBP which required laparoscopic revision. Two patients are 17 and 19 months postop, with excess weight loss of 44 and 78%, respectively. Two other patients are 3 months postop and have lost 22 and 24% of excess weight, repectively. All report resolution of comorbidities. One patient experienced complete resolution of obstructive sleep apnea associated with significant improvements in sleep efficiency and sleep architecture.
Conclusions: We conclude that an interdisciplinary team of pediatric specialists is necessary for optimal management of severely obese adolescents. Surgical results from this program have been satisfactory and justify a multi-institutional clinical trial to study the outcomes and better define the indications and benefits of bariatric surgery in the adolescent population.
Notes

30 BASE OF TONGUE LYMPHANGIOMAS – LONG-TERM OUTCOMES AND PROPOSAL FOR MODIFICATION OF STAGING SYSTEMS (3 MINUTES)

Lynne H.Y. Lim, M.D., Michael J. Rutter, M.D., Robin T. Cotton, M.D., Richard G. Azizkhan, M.D.
Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Introduction: Base of tongue lymphangiomas (BOTL) are challenging to manage, and have not been specifically studied.
Purpose: 1) To determine long-term outcomes of surgical interventions of BOTL. 2) To determine prognostic value of existing staging systems.
Methods: Retrospective chart review of 14 consecutive pediatric patients with BOTL from a tertiary pediatric hospital (1971 -2002). Average follow-up was 11.4 years.
Results: Male: female ratio (1.9: 1) and presentation at birth (93%) were higher than previously reported. The chief complaint was airway obstruction and feeding difficulty in 13 patients. BOTL was more frequently associated with supraglottic lymphangioma (86%) than anterior tongue lymphangioma (43%). 21% had subglottic or tracheal lymphangioma; sites not previously described. 85% required tracheotomy, and 25% are decannulated. Supraglottic / subglottic lymphangioma prevented decannulation in 6 patients. Existing staging systems over-staged 5 of our patients. Conservative long-term follow-up when surgery had failed allowed 2 decannulations at 8 and 28 years. BOTL surgery consisted of 4 radiofrequency ablation surgerys, 4 LASER surgerys, 3 bovie excisions, 1 harmonic scarpel excision, 2 deroofing and 1 transcervical pharyngotomy excision. Associated sites of lymphangioma were treated with 6 anterior tongue resections, 6 alcohol sclerotherapys, 13 neck dissections, 7 supraglottis LASER surgerys, 1 epiglottopexy and no laryngectomy. No mode of surgery completely removed BOTL. A revision surgery, not the mode of surgery, had better success of decreasing BOTL size ($p = 0.02$). 3 BOTL diminished without tongue surgery. 1 patient died from extensive cranial lymphangioma and meningitis.
Conclusions: A revision surgery, not the type of surgery, predicted successful reduction of base of tongue lymphangioma size. As decannulation may be possible with growth, aggressive tongue and laryngeal surgery may not be warranted. Current staging systems may overstage some BOTL.
Notes

Underlining denotes the author scheduled to present at the meeting.

31 PILONIDAL DISEASE IN ADOLESCENTS (3 MINUTES)

Sheenie Ambardar, Darrell L. Cass, M.D., Mary J. Barnes, M.D., Jay Pinsky, Michael A. Helmrath, M.D., Mary L. Brandt, M.D.
Division of Pediatric Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX, USA

Purpose: Pilonidal disease is a common condition with in adolescents. Although rarely dangerous, pilonidal disease can be a particularly morbid condition. The purpose of this study was to determine the rate of complications following pilonidal cystectomy.
Methods: A retrospective review of patients with pilonidal disease treated from 1992-2002 was performed. Variables studied included demographic information, duration and types of symptoms, previous treatments attempted, surgical procedure performed, and outcomes.
Results: There were 36 patients, 12 boys (33%) and 24 girls (67%). The average age was 16 (range 5-20 yrs) and the average weight was 60.8 kg (range 16-93.3). Initial presentation was acute infection 6 / 36 (16 %), chronic infection after previous therapy 17 / 36 (47%), chronic infection without previous therapy 4 / 36 (11%), and sacral lesion only 9 / 36 (25%). Average length of symptoms was 15 months (range 1 day to 10 years). All patients underwent pilonidal cystectomy with primary closure (n= 31) or with an open wound (n= 5). Average follow-up after surgery was 4 months (range: 1-24 months). 5 / 36 patients were lost to follow-up. 12 / 31 pts (39%) had primary healing with no infection. 19 / 31 pts (61%) had a wound complication (wound infection, drainage, chronic granulation tissue). 6 / 36 patients (17%) required surgery for recurrence of their pilonidal disease.
Conclusions: There is a high incidence of post-operative complications and recurrence following pilonidal cystectomy. Armstrong et al (Arch Surg 12, 914, 1994) reported that local wound care with lateral drainage of infections, when they occurred, resulted in fewer complications, fewer hospital days, and a more rapid overall recovery in patients with pilonidal disease. Based on these data, and the reported data concerning outcome with conservative therapy, we feel a prospective trial comparing operative (pilonidal cystectomy) to non-operative therapy (local wound treatment only) for adolescents with pilonidal disease is warranted.
Notes

32 TOTAL COLONIC MANOMETRY IN THE SURGICAL EVALUATION OF PEDIATRIC FUNCTIONAL COLONIC OBSTRUCTION (3 MINUTES)

Matthew J. Martin, M.D., James M. Noel, M.D., Scott R. Steele, M.D., Philip S. Mullenix, M.D., David Wiechmann, M.D., Kenneth S. Azarow, M.D.
Madigan Army Medical Center, Tacoma, WA, USA

Purpose: Functional colonic obstruction encompasses a broad group of motility disorders. Medical and surgical evaluation and management is complex. Total colonic manometry can directly measure intraluminal pressures and contractile function along the entire length of the colon. The utility of manometry to guide surgical management has not been previously reported.

Methods: A retrospective review of a prospective database. Manometry was performed on all patients referred for surgical evaluation of refractory functional colonic obstruction. Manometric tracings were obtained while fasting, after feeding, and after pharmacologic stimulation both preoperatively (n=8) and postoperatively (n=6).

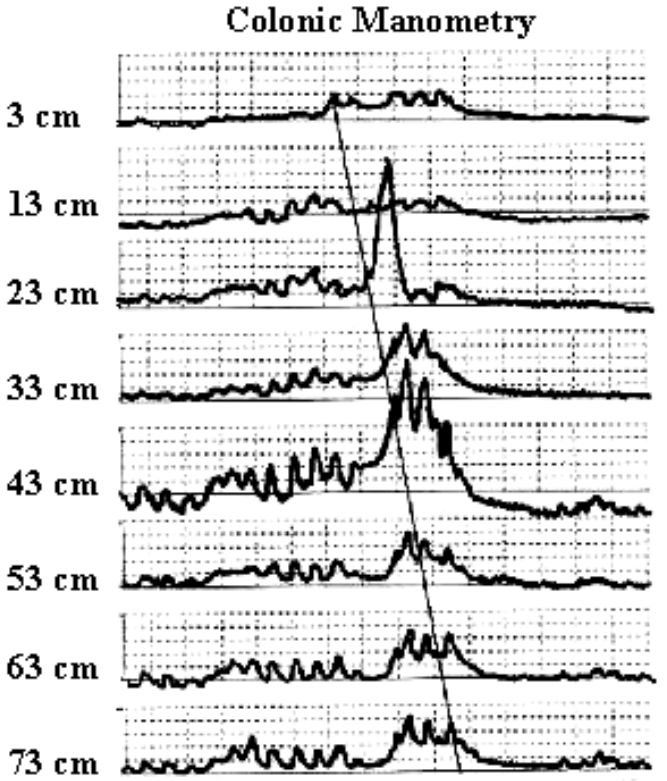
Results: Nine patients were referred for refractory colonic obstruction. The mean age was 4.8 years and the mean duration of follow up was 23 months. Two patients had functional obstruction after repair of Hirschsprung's disease and seven patients had idiopathic functional obstruction. In the idiopathic group, four distinct motility patterns were identified: 1) normal motility (fig. 1), 2) dysmotility with massive distension, 3) persistent segmental dysmotility, and 4) global neuropathy / myopathy. Both Hirschsprung's patients demonstrated global motility abnormalities. Surgical management in all patients was primarily guided by manometry results. All have demonstrated improved growth curves and 89% have an improved quality of life. Colon motility has normalized in 89% and bowel function has improved from an average of 0.2 to 3.0 bowel movements / day ($p<0.01$). An unnecessary laparotomy was avoided in two patients. Only one patient has required permanent diversion.

Conclusions: Total colonic manometry can be used to guide the surgical evaluation and management of colonic functional obstruction syndromes. Patients can be categorized by the pattern of dysmotility seen on manometry. In addition to its diagnostic utility, direct measurement of colonic motor activity can be valuable in deciding the need for and timing of diversion, the extent of resection required, and the suitability of the patient for restoring bowel continuity.

Notes

(graphic on next page)

Underlining denotes the author scheduled to present at the meeting.



Normal motility study demonstrating conduction of a high-amplitude phasic contraction from cecum to anus

10:30 a.m. – Noon

33 OUTCOME AND STAGING EVALUATION IN MALIGNANT GERM CELL TUMORS OF THE OVARY IN CHILDREN AND ADOLESCENTS: AN INTERGROUP STUDY (6 MINUTES)

Deborah Billmire, M.D., Charles Vinocur, M.D., Frederick Rescorla, M.D., Barbara Cushing, M.D., Wendy London, Ph.D., Marc Schlatter, M.D., Mary Davis, M.D., Roger Giller, M.D., Steve Lauer, M.D., Thomas Olson, M.D.
Section of Pediatric Surgery, J.W. Riley Hospital for Children, On Behalf of the Children's Oncology Group, Indianapolis, IN, USA

Purpose: An evaluation of outcome and the role of surgical staging procedures in malignant germ cell tumors (GCT) of the ovary in children and adolescents.
Methods: From 1990-1996, 2 intergroup trials for malignant GCT were undertaken by Pediatric Oncology Group (POG) and Children's Cancer Study Group (CCG). Stage I-II patients were treated with surgical resection and 4 cycles of standard dose cisplatin (100 mg / m2 / cycle), etoposide, and bleomycin (PEB) chemotherapy. Stage III-IV patients were treated with surgical resection and randomized to chemotherapy with PEB or high dose cisplatin (200 mg / m2 / cycle) with etoposide and bleomycin (HDPEB). Patients unresectable at diagnosis had second look operation after 4 cycles of chemotherapy, if residual tumor was seen on imaging studies. IRB approval of the protocols was obtained at each participating institution. An analysis of outcome data, operative notes and pathology reports in girls with ovarian primary site was done for this report.
Results: There were 131 patients with ovarian primaries out of 515 entered on these studies. Mean age was 11.9 years (range 1.4-20 yrs). Outcome per Figure 1. In only 3 / 131 patients were surgical guidelines followed completely. Surgical omissions resulting in protocol non-compliance resulted from: failure to biopsy bilateral nodes (97%), no omentectomy (36%), no peritoneal cytology (21%), no contralateral ovary biopsy (59%). More aggresssive procedure than recommended by guidelines included initial total hysterectomy and bilateral salpingo-oophorectomy in three patients and retroperitoneal node dissection in 10 patients. Correlation of gross operative findings with pathology results was carried out for ascites, lymph nodes, implants, omentum and contralateral ovary.
Conclusions: Pediatric ovarian malignant GCT (Stages I-IV) have excellent survival with conservative surgical resection and platinum-based chemotherapy. Survival appears to have been unaffected by deviations from surgical guidelines. New surgical guidelines are proposed based on correlation of gross findings, histology and outcome in these intergroup trials.
Notes

Underlining denotes the author scheduled to present at the meeting.

34 THE IMPACT OF GROSS TOTAL RESECTION ON LOCAL CONTROL AND SURVIVAL IN HIGH-RISK NEUROBLASTOMA (6 MINUTES)

Michael P. LaQuaglia, M.D., Brian H. Kushner, M.D., Maryam Gholizadeh, M.D., Kim Kramer, M.D., Nancy Rosen, M.D., Sarah Abramson, M.D., Cheung Nai-kong, M.D., Ph.D.
Memorial Sloan-Kettering Cancer Center, New York, NY, USA

Purpose: Gross total resection of the primary tumor in treatment of high-risk neuroblastoma remains controversial. Furthermore, there are few reports of the effect of primary tumor resection on local control as opposed to overall survival. We reviewed our institutional experience to assess the effect of primary tumor resection on local control and overall survival.
Methods: A total of 141 patients were treated on protocol between 11/1/97 and 6/25/02 and are the subject of this report. Gross total resection was assessed by review of operative notes, postoperative computerized axial tomograms, and later postoperative MIBG1 scans. Probability distributions for overall survival and local progression-free survival were compared using the log-rank test.
Results: The mean age was 3.3 years and all patients were stage 4 with 79% having metastases to cortical bone. The primary site was the adrenal gland in 69%, the central abdominal compartment in 15%, the posterior mediastinum in 8%, and the paraspinal area in 6%. Gross total resection was accomplished in approximately 30% on early protocols but in excess of 90% in more recent treatment regimens. Five kidneys were lost overall but none in the last protocol. Local progression-free survival was 90% for patients undergoing gross total resection compared to 38% of patients with un-resected tumors ($p<0.0001$). Overall survival in resected patients was 45% compared to less than 20% in un-resected patients ($p<0.0001$).
Conclusions: Our data indicate that local control and overall survival are correlated with gross total resection of the primary tumor in high-risk neuroblastoma. Gross total resection should be a goal in present clinical protocols.
Notes

Underlining denotes the author scheduled to present at the meeting.

35 HIGH-AFFINITY VEGF BLOCKADE PROMOTES DIFFERENTIATION OF EXPERIMENTAL NEUROBLASTOMA (3 MINUTES)

Anna Serur, M.D., Tamara New, M.D., Jason S. Frischer, M.D., Jianzhong Huang, M.D., Kimberly W. McCrudden, M.D., Akiko Yokoi, M.D., Jessica J. Kandel, M.D., Darrell J. Yamashiro, M.D., Ph.D.

College of Physicians and Surgeons, Columbia University, Children's Hospital of New York, New York Presbyterian Hospital, New York, NY, USA

Purpose: Differentiated neuroblastoma is associated with favorable clinical outcomes. Metabolic stressors, such as hypoxia and nutrient depletion, may promote neuronal differentiation. Partial blockade of the proangiogenic cytokine vascular endothelial growth factor (VEGF) inhibits neoangiogenesis, but co-option of existing host vessels may partially rescue tumor growth. Such co-opted vessels are destabilized by higher-affinity binding of VEGF in aggressive experimental neuroblastoma. We hypothesized that the tumor hypoxia induced by high-affinity binding of VEGF would lead to increased neuronal differentiation of tumor cells, potentially resulting in a less aggressive phenotype.

Methods: 10(6) SY5Y-SH neuroblastoma cells were implanted intrarenally in athymic mice (N=20). Vehicle, humanized monoclonal anti-VEGF antibody (100mcg), and the soluble decoy receptor construct VEGF-Trap at 100mcg and 500mcg dose-levels were administered by intraperitoneal injection. Affinity of antibody for VEGF is ~1-10 nM, whereas affinity of VEGF-Trap is ~10-100 pM. Animals were sacrificed at 6 weeks. Vasculature was mapped by fluorescein angiography and immunohistochemistry, and differentiation assessed by chromograninA expression. Apoptosis was examined by TUNEL assay. Tumor weights were compared using Kruskal-Wallis analysis.

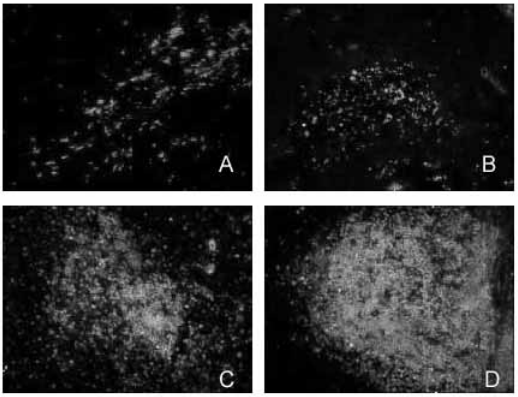
Results: Tumor growth was significantly suppressed in the animals receiving high and low dose VEGF-Trap (98%, $p<0.011$; 86%, $p<0.031$, respectively) but not in the anti-VEGF Ab group (75%, $p<0.142$). Vasculature was diminished in VEGF-Trap-exposed tumors. Tumors in these two groups displayed increased levels of chromograninA, indicating differentiation. Such differentiated regions were surrounded by cuffs of apoptotic cells. Differentiation and apoptosis were comparatively sparse in control and antibody groups (Fig.1).

Conclusions: High-affinity VEGF blockade reduces both tumor neoangiogenesis and host vessel co-option, resulting in smaller, less vascular lesions with greater apoptotic indices. VEGF-Trap-exposed xenografts displayed neuronal differentiation. These results suggest that hypoxia resulting from decreased perfusion plays a role in regulating both differentiation and apoptosis. Thus, high-affinity VEGF blockade may prove useful in neuroblastoma by reducing tumor perfusion and promoting differentiation.

Notes

(graphic on next page)

Underlining denotes the author scheduled to present at the meeting.



Double fluorescent labeling for Chromogranin A and TUNEL assay. Chromogranin A-positive cells are indicated in green, and apoptotic (TUNEL-positive) cells in red. **A** and **B**: control and anti-VEGF-antibody treated tumors show scant chromogranin and apoptotic staining. **C, D**: 100ug, 500ug VEGF-Trap-exposed neuroblastoma cells stain for chromogranin A; these areas are surrounded by apoptotic cells.

Double fluorescent labeling for Chromogranin A and Tunel assay

36 IMMUNO-THERAPY IS AN EFFECTIVE ADJUVANT TO SURGICAL EXCISION OF BULKY NEUROBLASTOMA DISEASE* (3 MINUTES)

Anthony D. Sandler, M.D., Sandy Fang, B.S., Xiaoyan Zhu, M.S., Gen Kobayashi, M.D., Michal Miller, M.D., Arthur Krieg, M.D.
The University of Iowa Hospitals and Clinics, Iowa City, IA, USA

Purpose: High risk neuroblastoma has a devastating outcome despite aggressive multi-modal therapy. Immuno-therapy is a novel approach with potential benefits that are as yet undefined. We have developed a therapeutic vaccine that exploits normal immune mechanisms *in vivo* and is capable of destroying an established microscopic challenge of neuroblastoma in a syngeneic murine model. This study was undertaken to define the role of our vaccine in an established model of bulky disease.

Methods: Twenty mice were divided into four study groups after establishing subcutaneous neuroblastoma tumors of 5-10mm in size. Group 1 underwent no further therapy and acted as control. Group 2 underwent resection only, while Group 3 was administered the tumor vaccine alone. Group 4 underwent resection plus vaccination at the same setting. The vaccine consisted of irradiated Neuro-2a tumor cells engineered to express GM-CSF admixed with IL-12(5ug), TNFa(0.5ug) and the immuno-stimulatory CpG oligonucleotide, 1826(200ug), administered as a single intra-peritoneal inoculation.

Results: Mice that received immunotherapy alone had no benefit over control (median survival of 20 days and 17 days respectively). All mice in the group that received surgery alone developed recurrent local and/or metastatic disease, and had only a marginal benefit in survival time over mice in groups 1 and 3 (median 25 days). The mice that underwent both resection and vaccination had the slowest growth rate of recurrent disease ($p<0.0001$) with improved survival time (median 35 days, $p=0.002$) and complete cure in 25%. A re-challenge of neuro-2a two months after cure failed to induce new tumor growth.

Conclusions: In the face of bulky established murine neuroblastoma, the proposed vaccine strategy alone appears inadequate for impeding the progress of disease. However, in a state of minimal residual disease following surgical excision, a single dose of the proposed vaccine is a remarkably effective adjuvant that provides long-term tumor specific immunity.

Notes

Underlining denotes the author scheduled to present at the meeting.

37 INTERFERON-α RESTRICTS NEUROBLASTOMA GROWTH THROUGH INHIBITION OF TUMOR-INDUCED ANGIOGENESIS (3 MINUTES)

Christian J. Streck, M.D., Youbin Zhang, Ph.D., Ryan Miyamoto, B.A., Junfang Zhou, M.D., Catherine Y. C. Ng, M.S., Andrew M. Davidoff, M.D.
St. Jude Children's Research Hospital, Memphis, TN, USA

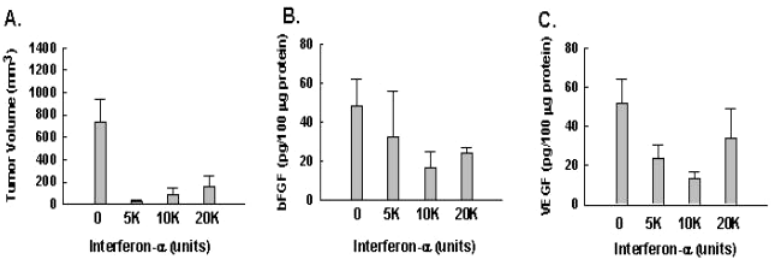
Purpose: Interferon-α has proven efficacy against vascular tumors of children through the down-regulation of basic fibroblast growth factor (bFGF). We hypothesized that this antiangiogenic activity could also be utilized to affect the growth of solid pediatric malignancies. The purpose of this study was to determine whether Interferon-a could inhibit neuroblastoma growth in murine models.

Methods: Human neuroblastoma xenografts (IMR-32), both heterotopic (subcutaneous [SC]) and orthotopic (retroperitoneal [RP]), were established in SCID mice. Five days after tumor cell inoculation, daily SC injections of human Interferon-α were initiated with cohorts of mice (n=5 / group) receiving a range of Interferon-α doses (5,000, 10,000 or 20,000 units) or PBS (control) for 30 days. Mice were sacrificed 30 days later and tumor size, microvessel density (CD34 immunohistochemistry) and level of intratumoral bFGF and vascular endothelial growth factor (VEGF) expression (ELISA) were determined.

Results: Interferon-α had no effect on neuroblastoma proliferation in vitro. However, SC tumors were significantly smaller in Interferon-α-treated mice, as compared to PBS-treated control mice ($p<0.005$, Fig. 1A). Intratumoral bFGF ($p<0.15$, Fig. 1B) and VEGF ($p<0.05$, Fig 1C) expression were also decreased in Interferon-α-treated mice and intratumoral mean microvessel density was lower in the Interferon-α-treated mice (6.7 ± 0.5 / hpf) as compared with controls (22.5 ± 4.0 / hpf, $p<0.002$). Similar antiangiogenic and antitumor efficacy was seen with the treatment of retroperitoneal tumors. Interestingly, in both models, the lower doses of Interferon-α were more effective than the higher dose.

Conclusions: As with vascular lesions of childhood, treatment with Interferon-α had a significant impact on neuroblastoma growth in mice. This activity appears to be mediated, at least in part, by its ability to inhibit tumor-induced angiogenesis through the down-regulation of both bFGF and VEGF expression. However, the data also suggest that careful titering of the dose of Interferon-α is required to achieve maximal antitumor efficacy.

Notes



Underlining denotes the author scheduled to present at the meeting.

38 ENDOSTATIN-MEDIATED CONCOMITANT RESISTANCE IN NEUROBLASTOMA (6 MINUTES)

Christian J. Streck, M.D., Youbin Zhang, Ph.D., Junfang Zhou, M.D., Catherine Y. C. Ng, M.S., Andrew M. Davidoff, M.D.
St. Jude Children's Research Hospital, Memphis, TN, USA

Purpose: Concomitant resistance, the phenomenon whereby a primary malignancy inhibits the growth of metastatic lesions, is likely due to the production of endogenous antiangiogenic factors. The purpose of this study was to evaluate the influence of the angiogenesis inhibitor, endostatin, expressed by primary sites of neuroblastoma, on synchronous disease.
Methods: Two neuroblastoma models were used to evaluate concomitant resistance. First, the growth of a second primary tumor in mice with an already established primary tumor was compared to tumor growth in naïve mice. Second, the growth of liver metastases arising spontaneously from a subcutaneous tumor, was compared in mice in which the primary tumor was either excised or left in place. Serum endostatin levels were followed by ELISA.
Results: Subcutaneous tumors in mice with pre-existing neuroblastoma were 28% the size of tumors in naïve mice (n=5 / group) after 15 days (108±66mm3 v. 379±63mm3, $p<0.001$). Systemic endostatin levels at the time of tumor implantation were 55.7±5.4ng / ml in mice with pre-existing tumors, nearly three times that of naïve mice (20.8±3.7ng / ml). Similarly, the weight of liver metastases 31 days after subcutaneous tumor cell inoculation was 50% less in mice where the primary tumor was left in place (1.01±0.4gm) as compared to when the primary tumor was excised (1.92±1.18gm, $p<0.155$). Systemic endostatin levels decreased from 42.9±5.4ng / ml to 31.9±3.7ng / ml when the primary tumor was excised but increased to 60.1±6.0ng / ml when the primary tumor was retained. Thus the presence of an established primary neuroblastoma had a significant inhibitory effect on the growth of secondary disease and was associated with elevated systemic endostatin levels.
Conclusions: Concomitant antitumoral resistance occurs in these experimental models of neuroblastoma and appears to be moderated, at least in part, by the elaboration of endostatin from primary tumors. This finding has potential implications when planning a treatment strategy for patients with metastatic neuroblastoma.

Notes

Underlining denotes the author scheduled to present at the meeting.

39 THE ROLE OF SURGERY IN THE TREATMENT OF RELAPSED STAGE IV HODGKIN'S DISEASE (3 MINUTES)

Sheila Weitzman, M.B., Bch, David Dix, M.B., Bch, J. Ted Gerstle, M.D.
The Hospital for Sick Children, Toronto, Canada

Purpose: Approximately one-third of children with stage IV Hodgkin's Disease will eventually experience a relapse. In these patients complete response rates to second-line salvage therapy are only in the range of 20-60%. The five-year survival for these patients is less than 35%. If there is disease progression subsequent to second-line salvage therapy, palliative treatment is often the only course of action. The purpose of this study was to look at the role of surgery for the treatment of patients with relapsed, stage IV Hodgkin's Disease who have failed second-line salvage therapy.

Methods: We looked retrospectively at the hospital charts of all patients with histologically-confirmed Hodgkin's Disease from January 1985 to July 2001.

Results: Over the 15-year period from January 1985 to July 2001, 210 patients were diagnosed with histologically-confirmed Hodgkin's Disease. Sixteen of these 210 patients experienced a relapse. Seven of the 16 patients were identified with relapsed, stage IV disease. Five of these 7 stage IV patients were refractory to second-line salvage therapy, including myeloablative treatment with stem cell rescue. Having failed this second-line salvage therapy, they were not expected to survive. In 3 of the 5 patients, the disease was confined to one discreet anatomical location. Each of these 3 patients underwent definitive resection of the residual tumour. Two of these surgical patients are alive and disease-free at a follow-up of 26 and 143 months. The third surgical patient relapsed 12 months after her resection; she is now receiving third-line salvage therapy and has stable disease.

Conclusions: We conclude that there is an important role for surgery in the management of patients with relapsed, stage IV Hodgkin's Disease who have failed second-line salvage therapy and have residual disease which is confined to a discreet anatomical location. In some of these patients, long-term survival has been observed.

Notes

40 THE CURRENT MANAGEMENT OF HEPATOBLASTOMA: A COMBINATION OF CHEMOTHERAPY, CONVENTIONAL RESECTION AND LIVER TRANSPLANTATION (3 MINUTES)

Gregory M. Tiao, M.D., Steve Allen, M.D., Maria Alonso, M.D., Nicole Bobey, M.D., John Bucuvalas, M.D., Robert Wells, M.D., Frederick Ryckman, M.D.
Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Purpose: Hepatoblastoma (HB) is the most common liver tumor in children. The successful use of adjuvant chemotherapy and liver transplantation has changed the treatment strategy. The Purpose of this study was to review our experience in the management of HB since the initiation of a liver transplant program.
Methods: A retrospective review of 30 patients treated for HB at a single institution since 1986 was performed. Follow-up ranged from two months to 16 years.
Results: Twenty-seven of thirty patients underwent surgical resection. In twelve patients, primary resection was undertaken (lobectomy-11, Right trisegmentectomy-1) of which nine received post-operative chemotherapy. Fifteen patients with bulky disease were not amenable to primary resection and underwent biopsy followed by adjuvant chemotherapy. All responded and ten then underwent conventional liver resection (lobectomy – 4, trisegmentectomy – 5, central liver resection – 1). Five patients had persistent bilobar disease and underwent liver transplantation. Three patients presented with metastatic disease. None survived long enough to undergo resection. Three other patients developed metastatic disease post resection. Of the 7 patients who underwent aggressive surgical resection (trisegmentectomy or central liver resection), three had positive surgical margins and underwent liver transplantation. One developed locally invasive recurrent disease. Overall, 73% of the patients survived. There was no operative mortality during surgical therapy although one patient died in the post-operative period because of a cerebral vascular accident. Five of six patients who presented or developed metastatic disease expired. One patient who developed recurrent locally invasive disease also died. All eight liver transplant recipients were tumor free, but one died from lymphoma 7 years post-transplant.
Conclusions: Preoperative chemotherapy may reduce tumor size to allow for conventional resection. If aggressive surgical resection (i.e. trisegmentectomy) is necessary to obtain clear margins or bilobar disease persists after chemotherapy, primary liver transplantation is recommended.
Notes

Underlining denotes the author scheduled to present at the meeting.

41 SURGICAL MANAGEMENT AND OUTCOME OF OSTEOSARCOMA PATIENTS WITH UNILATERAL PULMONARY METASTASES (6 MINUTES)

Wendy T. Su, M.D., Joseph Chewning, M.D., Sara Abramson, M.D., Nancy Rosen, M.D., Maryam Gholizadeh, M.D., John Healey, M.D., Paul Meyers, M.D., Michael LaQuaglia, M.D., F.A.C.S.
Memorial Sloan-Kettering Cancer Center, New York, NY, USA

Purpose: The surgical management of osteosarcoma patients with unilateral pulmonary nodules is controversial. Some centers perform bilateral thoracotomies in all such cases while others only explore the clinically involved side. We reviewed our institutional experience to develop surgical guidelines for these patients.
Methods: We retrospectively obtained data on all consecutive osteosarcoma patients from 1980 to 2002. Eighty-four patients with pulmonary nodules were identified. Forty had bilateral disease, and forty-four had unilateral involvement by CT scan.
Results: All 44 patients with unilateral nodules underwent ipsilateral thoracotomies (IT). Fifteen patients had negative explorations, and only one had pulmonary relapse 2 years later. Of the 29 patients with metastases confirmed at IT, nine underwent contralateral explorations. Six of these nine had osteosarcoma on the contralateral side not seen on CT scan but identified at thoracotomy (67%). Four of the six patients eventually died of disease, and 2 were long-term survivors at 6 and 14 years. The remaining three patients had negative contralateral explorations; one developed contralateral disease 15 months later, while the other two remain disease free. Fourteen patients had extensive pleural or extrapulmonary disease at IT followed by rapid progression, precluding the evaluation of contralateral chest. Five others had metachronous metastases presenting after long disease free intervals (median 2.85 years). Two of the five patients subsequently developed contralateral metastases while the other three remain disease free. The final patient had complete tumor necrosis at IT, and is disease free at 11 years.
Conclusions: Our data indicate that there is a high rate of contralateral involvement in osteosarcoma patients with unilateral nodules diagnosed by CT scan. Patients with unilateral metachronous pulmonary metastases have a lower yet significant rate of contralateral disease. Staged bilateral thoracotomies should be considered in osteosarcoma patients presenting with unilateral pulmonary disease.
Notes

Underlining denotes the author scheduled to present at the meeting.

Noon – 1 p.m. Overseas Guest Lecture: Claire Nihoul-Fékété, M.D.
"Modern Surgical Management of Congenital Hyperinsulinemic Hypoglycemia"

Claire Nihoul-Fékété completed her medical studies in Paris, France in 1966 and has served as Chief of the Department of Pediatric Surgery at the Hopital des Enfants Malades in Paris since 1990. Dr. Nihoul-Fékété was the General Secretary of the French Society of Pediatric Surgery (SFCP) from 1975 to 1980, and served as President from 1991-1993. She was a member of the European Union of Specialists from 1992-1999 and has served as an expert at the Court of Appeal of Paris for fetal medicine and pediatric surgery since 1994.

Dr. Nihoul-Fékété is a member of numerous scientific associations, including the Académie Française de Chirurgie, the Association Française de Chirurgie, the Société Française de Chirurgie Pédiatrique, the British Association of Pediatric Surgery and the American Academy of Pediatrics, Section of Surgery. She received the Chevalier de l'Ordre National du Mérite in 1980 and the Chevalier de l'Ordre de la Légion d'Honneur in 1999.

8 a.m. – 8:15 a.m.	APSA Foundation Scholar: Anthony Stallion, M.D. "Intestinal Ischemia Reperfusion Injury Contributes to the Initiation of the Systemic Inflammatory Response Syndrome"

8:15 a.m. – 8:30 a.m.	APSA Foundation Scholar: Mary Beth Madonna, M.D. “Growth Factor Receptor Signaling and its Relationship to Cell Proliferation and Differentiation in a Neuroblastoma Cell Line”

8:30 a.m. – 9:30 a.m. *Journal of Pediatric Surgery* Lecture:
Patricia Donahoe, M.D.
"Sustained Inquiry and Perseverance in the Clinic and at the Bench"

Patricia Donahoe was born in Boston, Massachusetts. After finishing her undergraduate education at Boston University she attended medical school at Columbia University College of Physicians and Surgeons. She then did general surgical training from internship through Chief Surgical Residency at Tufts New England Medical Center. Shortly after that, she became a Research Fellow in Surgery at the Children's Hospital in Boston under the direction of Dr. M. Judah Folkman where she established her initial interest in Pediatric Surgery and began a career as a Surgeon Scientist. A Clinical and Research Fellowship followed at the Massachusetts General Hospital with Dr. Hardy Hendren, who fostered her life-long interest in pediatric urology, which was enhanced by a senior registrar post at the Alder Hey Children's Hospital in Liverpool, England with Dr. Herbert Johnson. In 1973 she began her first faculty position, joining Dr. Hendren at the Massachusetts General Hospital and becoming Director of the Pediatric Surgical Research Laboratory. She rose through the ranks at the Harvard Medical School to become the Marshall K. Bartlett Professor of Surgery. Dr. Donahoe became Chief of the Division of Pediatric Surgery at MGH in 1982, and since 1993, has held the title of Chief of The Pediatric Surgical Services of the MassGeneral Hospital for Children. She has also been a faculty member in the Graduate Program of Biological & Biomedical Sciences in the Department of Cell Biology and a Distinguished Scholar in the Academy of the Harvard Medical School. Dr. Donahoe is a Fellow of the National Academy of Science and of the American Academy of Arts and Sciences. She is also a member of the Institute of Medicine of the National Academy.

Dr. Donahoe has trained over 70 research fellows who have gone on to faculty positions in basic sciences and in pediatric surgery; she considers them to be among her most important accomplishments.

Her research in developmental biology addresses problems of congenital anomalies, molecular oncology, and reproductive biology. She has been funded continuously by the National Institute of Health since 1973.

Dr. Donahoe has served on many scientific advisory boards nationally and internationally. She is Chair of the Scientific Advisory Board of St. Jude's Medical Center, has been a member of the Scientific Advisory Board of Memorial Sloan-Kettering Cancer Center, and served on Council of the National Institute of Child Health and Development. She was President of the Boston Surgical Society and has held leadership positions in the American Pediatric Surgical Association and the American Surgical Association. She has served as a Trustee of Boston University since 1994.

9:30 a.m. – 11 a.m.

42 USE OF RADIOFREQUENCY ABLATION OF THE LOWER ESOPHAGEAL SPHINCHTER TO TREAT RECURRENT GASTROESOPHAGEAL REFLUX DISEASE (3 MINUTES)

Saleem Islam, M.D., James D. Geiger, M.D., Daniel H. Teitelbaum, M.D.
University of Michigan, Ann Arbor, MI, USA

Purpose: Recurrent gastroesophageal reflux disease (GERD) after gastroesophageal surgery is a troublesome problem. Reoperative surgery is often complicated by adhesions and increased risk of vagal nerve injury. All of our patients developed recurrent GERD after previous gastroesophageal surgery. Radiofrequency ablation (Stretta procedure) of the lower esophageal sphinchter (LES) via an endoscopic route is a new method to treat GERD, and has recently been reported to be successful in adults. This study is the first report describing the use of the Stretta procedure in pediatric patients.

Methods: Five patients who as children underwent previous gastroesophageal surgery presented with GERD. Patients medical records were reviewed and the severity of the GERD was graded on the basis of a modified socring system. All patients underwent a Stretta procedure and were followed postoperatively and graded for severity of GERD at 6 months post-procedure.

Results: All 5 patients underwent the Stretta procedure without difficulty. Mean operating time was 81±12 mins. Mean age at the initial fundoplication was 13±4 years, and for the Stretta procedure 19±3 years. All patients were discharged as outpatients. Early postoperative complications occurred in one child who developed self-resolving acute gastric distention the night of the procedure. Since discharge the patient has been asymptomatic. Four of the 5 patients became completely asymptomatic 4 months after the Stretta procedure and 3 of 4 have stopped all anti-secretory and H-2 blocking agents. One patient remains slightly improved, but still with symptomatic GERD at 6 months post-procedure. Mean GERD score pre-Stretta was 5.2±1.0. GERD score 6 months post-Stretta was 1.6±1.9 ($P<0.05$ using paired t-test).

Conclusions: Use of the Stretta procedure is a potentially highly successful and minimally invassive modality to treat recurrent gastroesophageal reflux disease in children. Further experience with this procedure may yield a very useful modality to address this frustrating problem.

Notes

Underlining denotes the author scheduled to present at the meeting.

43 GASTRIC TRANSPOSITION IN CHILDREN — A 21-YEAR EXPERIENCE (6 MINUTES)

Lewis Spitz, F.R.C.S., Edward Kiely, F.R.C.S., Agostino Pierro, M.D.
Institute for Child Health, University College London, London, United Kingdom

Purpose: To analyse the outcome in 173 children (104 M, 69 F) undergoing transposition since 1981.

Methods: The commonest indications for esophageal replacement included failed repair of different varieties of esophageal atresia (128), caustic injury (24) and peptic strictures (8). 81% of the patients were referred from other hospitals (50% from other countries). Age at operation ranged from 7 days to 17 years. The gastric transposition was performed using blunt mediastinal dissection only in 90 patients with an additional 81 patients undergoing lateral thoracotomy. The retrosternal position was used in two patients.

Results: There were no graft failures including those who had previously had failed gastric tube or Scharli-type operations. Anastomotic leakage occurred in 11.5% (all resolved spontaneously). Anastomotic stricture, requiring dilatation occurred in 11.5% Half of these patients had previous caustic esophageal injury. There were 9 deaths in the group (5.2%). One death occurred intraoperatively, five in the early postoperative period and there were three late deaths. In over 90% of our patients, the outcome was considered good to excellent in terms of absence of swallowing difficulties or other gastrointestinal symptoms. Many, however, preferred to eat small frequent meals. Poor outcome was particularly associated with multiple previous attempts at esophageal salvage. There was no deterioration in the function of the gastric transposition in those patients followed for more than ten years.

Conclusions: Gastric transposition for esophageal substitution is an acceptable procedure. It is attended by 5% mortality and an 11.5% leak rate. 11.5% of the patients needed anastomotic dilatation for stricture. In the long term, good function has been maintained. Gastric transposition compares favourable with alternative methods of esophageal replacement.

Notes

Underlining denotes the author scheduled to present at the meeting.

44 SURGICAL MANAGEMENT OF CLOACAL MALFORMATIONS, A REVIEW OF 339 PATIENTS (6 MINUTES)

Alberto Pena, M.D., Marc A. Levitt, M.D., Andrew R. Hong, M.D., Peter S. Midulla, M.D.
Schneider Children's Hospital, North Shore – Long Island Jewish Health System, New Hyde Park, NY, USA

Purpose: To describe lessons learned from the authors series of patients with cloaca, and convey the better understanding of the conditions wide spectrum of complexity.
Methods: 339 patients were retrospectively reviewed, spanning 20 years.
Results: 265 patients underwent primary operations, 74 secondary, including posterior sagittal anorectovaginourethroplasty in 286, (122 underwent total urogenital mobilization), posterior sagittal anorectovaginoplasty (no urethral mobilization) in 19, a transpubic approach in 17 complex cases, and a transanorectal approach in 17 posterior cloacas. 111 required a laparotomy in addition to the posterior approach. The average common channel was 4.7 cm for patients that required laparotomy, and 2.3 cm for those that did not. Vaginal reconstruction involved vaginal pull-through in 196, vaginal flap in 38, vaginal switch in 30, and vaginal replacement in 75, utilizing rectum (36), ileum (31), or colon (8). Complications included vaginal stricture / atresia in 17, urethral stricture / atresia in 6, and urethrovaginal fistula in 19. All of these occurred before introduction of the total urogenital mobilization maneuver. 54% of all patients have urinary continence. 24% remain dry with intermittent catheterization, and 22% have a continent diversion. 78% of patients with a common channel >3cm require intermittent catheterization (through native urethra or a Mitrofanoff), compared to 28% with a common channel <3cm. 60% have voluntary bowel movements (28% of them never soil, 72% soil occasionally). 40% are fecally incontinent but remain clean with a bowel management program.
Conclusions: Cloacas comprise a spectrum of defects requiring a complex array of surgical decisions. The length of the common channel is an important determinant of the potential for urinary control, and predicts the extent of surgical repair. Total urogenital mobilization prevents many complications. A majority of patients have fecal and urinary continence, and those that do not can be kept clean and dry with a bowel and urinary management program.
Notes

Underlining denotes the author scheduled to present at the meeting.

45 FIBROBLAST GROWTH FACTOR 10 (FGF10) SIGNALING REGULATES NORMAL ANORECTAL DEVELOPMENT (6 MINUTES)

Timothy J. Fairbanks, M.D., David Warburton, M.D., Kathryn D. Anderson, M.D., Saverio Bellusci, Ph.D., R. Cartland Burns, M.D.
Children's Hospital Los Angeles, Los Angeles, CA, USA

Purpose: Anorectal malformations occur in 1 per 4,000 live births, and represent a surgical challenge. The endodermally derived rectum normally joins the ectodermally derived anus by E12.5 to E13.5 in murine development. Although critically important, the basic mechanisms of normal anorectal union are incompletely understood. Fgf10 signaling is known to serve a key role in mesenchymal/epithelial interactions in many organ systems including the gastrointestinal tract (GIT).

Hypothesis: We hypothesized that Fgf10 signaling could regulate the development of normal anorectal structures.

Methods: Fgf10 expression in wild type C57Bl/6 (WT) embryos was evaluated using whole mount in-situ hybridization. WT and Fgf10-/-embryos were harvested from timed pregnant mothers at E10.5 through E17.5 and were analyzed for anorectal phenotype.

Results: WT development of union between anorectal structures is complete at E12.5 to E13.5 with communication of the lumen of epithelial distal hindgut to the cutaneous anus. Fgf10 is discreetly expressed as early as E10.5 in the structures of the distal hindgut and persists to the completion of anorectal development. Fgf10-/- mutants demonstrate failure of normal hindgut development and of union of the endoderm-derived rectum and ectoderm-derived anus. Interestingly, the ectodermal anal structures develop normally despite the failure of proximity with the Fgf10 expressing endodermal rectal structures.

Conclusions: These data demonstrate that Fgf10 is expressed early (E10.5) in the distal hindgut indicating an initiating role in normal anorectal communication. Furthermore, after Fgf10 invalidation (Fgf10-/- mutant), the anorectal structures fail to form normal communication. Intact Fgf10 function is required for hindgut and anorectal interaction. Of note, ectodermal anal structures develop independently of the Fgf10 pathway, and are normal in Fgf10-/- mutants. Further mechanistic investigation of Fgf10 function in hindgut and anus interactions should lead to a better understanding of the development of imperforate anus.

Notes

46 ESOPHAGOGASTRIC SEPARATION (EGS) FOR FAILED FUNDOPLICATION IN NEUROLOGICALLY IMPAIRED CHILDREN (3 MINUTES)

Saleem Islam, M.D., Ronald B. Hirschl, M.D., M.S., Daniel H. Teitelbaum, M.D., William Buntain, M.D.
University of Michigan, Ann Arbor, MI, USA

Purpose: Recurrent gastroesophageal reflux (GER) following a fundoplication in severely neurologically impaired children is a common and frustrating problem without an effective solution: redo fundoplications carry a significant recurrence rate and gastrojejunostomy (GJ) tube feedings are associated with frequent tube dislodgement and requires that families administer continuous feeding. Therefore, we report a unique series of EGS procedures specifically aimed at the management of failed fundoplication in neurologically impaired children.
Methods: Medical records of 10 patients who underwent EGS for recurrent GER were retrospectively reviewed. Variables examined included diagnosis, preoperative problems, operative and perioperative data, as well as outcomes.
Results: None of the patients were feeding orally and all were completely dependant on tube feedings prior to EGS. An average of 1.6±1.0 (range 1 to 3) fundoplications had been previously performed and had failed. As such, all had preoperative emesis and feeding intolerance, while 8 had failure to thrive and 5 had recurrent pneumonias. Feedings were via GJ tubes in 7 of 10 cases. Mean age at time of the procedure was 8.9±6.6 years. Average operative time was 5±1 hours. Post operative length of stay was 10±4 days and there were no leaks from the esophagogastric anastomosis. Salivary secretion intolerance was the most common postoperative problem (n=9). One patient died a year after the procedure due to pneumonia. Repeat exploration was required for perforation of the colon in one and paraesophageal hernia in another. Recurrent GER was not noted. All nine currently surviving children are tolerating bolus gastrostomy feeds which was viewed as an advantage by all parents.
Conclusions: EGS is an attractive alternative for failed fundoplication in severely neurologically impaired children.
Notes

47 CONTOURING BUTTOCK RECONSTRUCTION AFTER SACROCOCCYGEAL TERATOMA RESECTION (3 MINUTES)

Steven J. Fishman, M.D., Russell W. Jennings, M.D., Sidney M. Johnson, M.D., Heung B. Kim, M.D.
Children's Hospital and Harvard Medical School, Boston, MA, USA

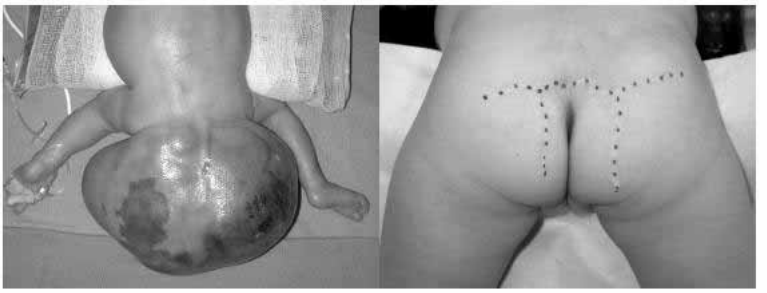
Purpose: Massive sacrococcygeal teratomas are typically resected and closed in a "chevron" fashion. The resultant scar may leave protruberant "dog-ears" and extend across and below the infra-gluteal creases down onto the posterior thighs, causing undesirable buttock deformity. Given the redundant skin often available, we sought to develop a closure technique to minimize deformity and unpleasant scars.

Methods: After resection of two sacrococcygeal teratomas, attention was directed to minimizing redundant skin, restoring normal buttock contour, and avoiding scars crossing the infragluteal crease. After properly securing the anal location, serial polygonal skin excisions were performed, working the excess tissue centrally rather than peripherally, leaving two right angled scars on each buttock.

Results: Each infant was successfully reconstructed with a normal buttock contour without redundancy. All scars are on the buttock to be easily covered by bathing attire (Figure 1).

Conclusions: The excess skin expanded by large sacrococcygeal teratomas affords an opportunity to apply straightforward tissue rearrangement principles to reconstruct the buttocks with a normal contour and hidden scars.

Notes



48 NITROUS OXIDE ANALGESIA FOR MINOR PEDIATRIC SURGICAL PROCEDURES: A SAFE ALTERNATIVE TO CONSCIOUS SEDATION (3 MINUTES)

Cathy A. Burnweit, M.D., Jeannette A. Diana-Zerpa, A.R.N.P., Michel H. Nahmad, M.D., Charles A. Lankau, M.D., Malvin Weinberger, M.D., Leopoldo Malvezzi, M.D., Lisa A. Smith, M.D., Tina J. Shapiro, A.R.N.P., Kristine J. Thayer, M.D.
Miami Children's Hospital, Miami, FL, USA

Purpose: Minor surgical procedures in children, while usually not requiring general anesthesia, need effective control of pain, anxiety, and motion. Certain techniques of conscious sedation may result in loss of protective airway reflexes. Nitrous oxide analgesia, however, maintains protective reflexes and does not require fasting or post-procedure monitoring. This study prospectively examined the safety and efficacy of nitrous oxide analgesia in children undergoing outpatient surgical procedures.
Methods: Over a 2-year period (2000-2002), 150 consecutive children were given nitrous oxide analgesia as an alternative to a general anesthetic, sedation, or local anesthetic alone. Nitrous oxide (≤50%) was administered by our practice's sedation-certified nurse practitioner without an anesthesiologist present. The children used the Wong-Baker Faces Scale (0-5) to score pain at different intervals (pre-procedure, at injection, during procedure, and post-procedure) and event memories were tabulated.
Results: Of 150 children, 5 were uncooperative and could not participate. 145 children ages 1 to 20 years (M=9.83±4.92 years) successfully underwent procedures (58 cyst / nevus excisions, 49 abscess drainages, 38 other) using nitrous. Two patients were too young to score pain. Pre- and post-procedure pain scores were significantly higher in the abscess group ($p<.0001$); during the procedures, however, all groups reported mean pain scores < 1, with parents citing 100% satisfaction with the technique. Of 129 children receiving local anesthesia, 123 (86%) had no recall of the injection. Complications were limited to 4 patients; 2 experienced nausea and 2 vomited. All resolved without interrupting the procedure.
Conclusions: Nitrous oxide analgesia is a safe, cost-effective and efficacious alternative to conscious sedation or general anesthesia for minor pediatric surgical procedures. The technique provides for almost pain / anxiety-free surgery, no post-procedure monitoring, and a high degree of satisfaction for patients, parents and staff.
Notes

Underlining denotes the author scheduled to present at the meeting.

49 TRANSANAL ONE-STAGE ENDORECTAL PULL THROUGH PROCEDURE FOR HIRSCHSPRUNG'S DISEASE: A MULTI-CENTER STUDY (6 MINUTES)

Essam A. Elhalaby, M.D., Kadry Wishahy, M.D., Ashraf Elkholy, M.D., Mossad Elbehery, M.D., Sameh Abdelhay, M.D., Alaa Hamza, M.D., Mohamed F. Elbarbary, M.D., Amel M. Hashish, M.D., Nezar A. Halawa, M.D., Nour A. Elkhouly, M.D.
Tanta University, Tanta, Egypt

Purpose: This prospective study was designed to evaluate the safety and efficacy of one stage transanal endorectal pull through (ERPT) technique in the management of patients with Hirschsprung's disease.
Methods: One hundred and forty nine children (116 males & 33 females) aged 8 days to 14 years underwent a transanal ERPT procedure over a 18 month period in 5 academic centers and affiliated private hospitals. Median follow-up was 12 months (range, 3 to 21 months). These patients were evaluated as regard to age, sex, length of the aganglionic segment, intra operative details, and postoperative functional results or complicatons. An EMG, endorectal ultrasound and lower GIT motility studies were done to patients with postoperative problems with bowel control.
Results: Operative time, averaged 120 minutes (range, 60 to 210 minutes). The average length of bowel resected was 25 cm (range, 15 to 45 cm). 13 patients required laparotomy due to extension of aganglionic segment beyond the sigmoid colon in 9, tear in the mesenteric vessels in 2, and due to difficulties in getting to the submcosal plain in 2, one had a previous extensive myectomy. Three deaths (2 %) occurred 3, 4 days & 4 weeks postoperatively. Postoperative complications included transient perianal excoriation in 48 patients (30 were < 3months of age), anastomotic stricture (n = 7), recurrent constipation (6, 2 had a hypoganglionosis at distal end of pulled through segment}, recurrent enterocolitis (6), cuff abscess(3), adhesive obstruction (1) and rectal prolapse (1). Complete anorectal continence was noted in 35 of 42 (83.3%) children older than 3 years while soiling and frequent accidents still occurs in 7, although there was steady improvement in continence status
Conclusions: We conclude that one stage transanal ERPT technique is both feasible and safe technique in properly selected patients. It is associated with excellent early clinical results.
Notes

Underlining denotes the author scheduled to present at the meeting.

50 PYLORIC ATRESIA: A NEW OPERATION TO RECONSTRUCT THE PYLORIC SPHINCTER (3 MINUTES)

Antonio Dessanti, Vincenzo Di Benedetto, Marco Iannuccelli, M.D., Antonio Balata, M.D., Aurelio Di Benedetto
Unit of Pediatric Surgery, University of Sassari, Sassari, Italy

Purpose: The standard method of surgical correction of pyloric atresia is a gastroduodenostomy, that can in the long term cause bilious duodeno-gastric reflux with consequent complex clinical problems related to alkaline gastritis. We report two cases of pyloric atresia in which the pyloric atresia was corrected by a new technique wich allowed reconstruction of the pyloric sphincter.
Methods: Two premature babies, weight 2100 and 1700 g, showed early non-bilious vomiting. X-ray revealed gastric dilatation with an absence of gas in the rest of the intestinal tract, suggesting a congenital gastric obstruction. At laparotomy, atresia of the pylorus was found, with the appearance of a well-vascularized pyloric solid segment. The atresic pylorus was incised longitudinally showing the presence of an internal muscular layer which was separated. By this longitudinal pyloromyotomy, the cul-de-sacs of gastric and duodenal mucosa were reached and then isolated for more than 1 cm in the respective gastric and duodenal sides in order to obtain better mobilization. The mucosal cul-de-sacs, thus mobilized, were easily advanced into the pyloric canal which had been opened longitudinally, and were sutured together using end-to-end anastomosis. The longitudinal pyloromyotomy was then closed above the reconstructed mucosal pyloric neo-canal.
Results: The postoperative course was normal. Oral feeding was started in the two newborns on the 11th and 15th postoperative day respectively, after an upper gastrointestinal X-ray showed a patent anastomosis. At 6 years (infant n∞ 1) and 2 years (infant n∞ 2) after operation, both are well: no gastrointestinal disorders are present, confirmed by X-ray barium meal which showed good competence of the pyloric sphincter and by HIDA 99mTc hepatic scintiscan which excluded any bilious duodeno-gastric reflux.
Conclusions: Our technique of the correction of pyloric atresia allows preservation of the pyloric sphincter, whose sphincter muscular layer, although hypoplastic, is present in these cases.
Notes

51 SUBCUTANEOUS ENDOSCOPICALLY-ASSISTED LIGATION (SEAL) FOR REPAIR OF INGUINAL HERNIAS (3 MINUTES)

Michael R. Harrison, M.D., Hanmin Lee, M.D., Craig T. Albanese, M.D., Diana L. Farmer, M.D.
University of California, San Francisco, San Francisco, CA, USA

Background: High ligation of the patent processus sac through an inguinal incision is a proven procedure with low recurrence, but does not allow assessment of the opposite side, requires manipulation of vas and vessels, and can be technically demanding in small babies.
Methods: Several years experience with laparoscopy of the other canal (LOOC) to study the contralateral side convinced us that transperitoneal endoscopy could achieve better visualization of the internal ring and may allow a safer high ligation of the sac at the internal ring with contrast visualization of the vas and vessels without a groin incision. The following technique evolved by trial and error over two years.
Results: Internal rings, vas and vessels are visualized through a 2.8 30° scope in the umbilicus. High ligation of the internal ring is achieved by passing two curved side-hole Thowy needles extraperitoneally on either side of the sac, then manipulating around the vas and vessels under endoscopic control. A divided suture is passed down one needle and out the other using finger-controlled suction. We tested a wide range of suture-passing strategies: a specially designed handle which allows fingertip control of suction and lever attachment of disposable needles proved best. Finally, the problem of leaving a small gap around the vas and vessels which could lead to recurrence and leaving the sac intact which leads to hydrocele formation is solved by depositing an adhesive under direct vision before ligating the sac.
Conclusions: A single port provides excellent visualization of internal rings, vas and vessels in both sides. “SEAL”-ing allows secure high ligation of the internal ring (cornerstone of traditional repair) with visual protection of the vas and vessels, and allows obliteration of the residual sac, mimicking the normal development process. This technique should prove cost-effective because it is technically easier than open repair, requires only simple equipment, and can be accomplished rapidly (<10 min) through a single small umbilical port and a stab wound in the groin.
Notes

Underlining denotes the author scheduled to present at the meeting.

52 CONTINUOUS EPIDURAL ANESTHESIA IS SAFE AND EFFECTIVE IN NEONATES AND INFANTS UNDERGOING MAJOR ABDOMINAL SURGERY (3 MINUTES)

Pramod S. Puligandla, M.D., M.Sc., Ioana Bratu, M.D., M.Sc., Elise Mok, B.Sc., M.Sc., Etienne Goujard, M.D., Joao-Luis Pippi Salle, M.D., Helene Flageole, M.D., M.Sc.
The Montreal Children's Hospital, Montreal, Canada

Purpose: To assess the safety, outcomes and gastrointestinal (GI) effects of continuous epidural anesthesia (CEA) for neonates and infants undergoing major abdominal surgery.
Methods: The records of infants <24 months of age who received CEA and underwent major surgery from 1999-2002 were reviewed. Complications, catheter-related problems, quality of pain control and return of GI function were assessed. Comparisons were made to a control group of similar patients who received narcotics. Subgroup analyses were based on the type / location of surgery (upper / lower abdominal or retroperitoneal) as well as for NICU patients. Fisher Exact and Student t-tests were used for statistical analysis ($p<0.05$ significant).
Results: Fifty-four (mean age 30.6 weeks; weight 7.0 kg) and 69 (mean age 32.7 weeks; weight 7.3 kg) patients were in the CEA and control groups, respectively. No major complications occurred in the CEA group. Differences in ASA classification, frequency of apnea, sedation, urinary tract infection, urinary retention, pneumonia or oxygen requirement were not observed between groups. Two patients required premature termination of CEA secondary to catheter-related problems (3.7%). Five patients with CEA had poor pain control (9.3%). Vomiting ($p<0.001$) and time to full enteral feeding (FPO) (4.68 vs. 3.22 days, $p=0.051$) were increased in the control group. Anesthesia preparation (60.0 vs. 31.0 minutes, $p<0.001$) and operative times (297 vs. 175 minutes, $p=0.044$) were significantly greater in the CEA group. For subgroup analyses, patients with upper abdominal procedures and CEA had significantly less vomiting ($p=0.006$) and shorter times to FPO ($p=0.026$) vs. control patients. These differences were not observed for NICU patients or for those having lower abdominal / retroperitoneal procedures.
Conclusions: Despite longer operative times, CEA is safe and was successful in 90.7% of patients in our series. The greatest benefit was observed for patients having upper abdominal surgery, who experienced less vomiting and shorter times to FPO.
Notes

Underlining denotes the author scheduled to present at the meeting.

P11 A NOVEL APPROACH TO THE MANAGEMENT OF LATE ONSET LIVER FAILURE IN BILIARY ATRESIA

Saleem Islam, M.D., Ronald B. Hirschl, M.D., M.S., Narasimham Dasika, M.D., Arnold G. Coran, M.D.
Section of Pediatric Surgery, C.S. Mott Children's Hospital, University of Michigan, Ann Arbor, MI, USA

Purpose: Late onset hyperbilirubinemia in patients who have undergone a successful portoenterostomy (PE) for biliary atresia (BA) is usually considered as evidence of ongoing severe liver failure. As a result, imaging studies are seldom carried out to look for another cause of hyperbilirubinemia. We have recently treated two patients who had undergone a successful portoenterostomy and developed acute hyperbilirubinemia years and months after the PE. They underwent percutaneous transhepatic cholangiography and drainage intraoperatively, a novel combined radiologic and operative approach to this problem, with dramatic reduction in their bilirubin levels.
Methods: Data from two cases with BA and late onset hyperbilirubinemia from obstruction were reviewed and analysed. IRB approval was obtained.
Results: Two patients (15 year old boy and a 2.5 year old girl) presented with increasing serum bilirubin after a PE for BA in infancy. Both had extensive preoperative workup including CT scan which revealed intrahepatic biliary dilatation in the boy and a large bile lake in the girl. They underwent percutaneous transhepatic cholangiograms and unsuccessful attempts at placing a stent into the PE. They were brought to the OR, and through a combined percutaneous and intra abdominal access, the dilated ducts were connected to the PE. A dramatic reduction in the serum bilirubin level was noted in these patients, and they have done well since.
Conclusions: When patients with BA after a successful PE present with sudden onset of hyperbilirubinemia, an evaluation for biliary obstruction should be carried out, such as CT or MRCP. If some type of biliary dilitation is found, then a combined radiologic and operative approach should be performed to connect the dilated ducts with the PE. This approach should reduce the hyperbilirubinemia, and may delay the need for liver transplant.
Notes

P12 RECONSTRUCTION OF THE FLAIL CHEST IN CHILDREN WITH CONGENITALLY ABSENT RIBS USING A VERTICAL EXPANDABLE TITANIUM RIB PROSTHESIS*

*Robert M. Campbell, M.D.**, Melvin D. Smith, M.D.*
Department of Orthopaedics, University of Texas Health Science Center at San Antonio, San Antonio, TX, USA

Purpose: Congenital absence of multiple ribs with flail chest is very uncommon. The vertical expandable titanium rib (VEPTR) was developed to treat such patients. Our purpose was to reconstruct the thorax through an expansion thoracoplasty, stablize the flail chest wall, controll associated spine deformity, and maintain or improve the respiratory status of these patients. The device is later expanded as an outpatient procedure to accomodate growth.
Methods: From October 1987 to April 2002, we have treated 13 patients with flail chest due to multiple absent ribs. Patients were required to be between 6 months of age and not beyond skeletal maturity for treatment. The devices were implanted through a standard posterior-lateral thoracotomy and secured on existing ribs above and below the defect or to a lumbar vertebra. Outpatient expansion of the devices is carried out through incisions of approx. 3 cms in length every 6 month. Our “Assisted Ventilation Rating (AVR)” graded clinical respiratory status: +0:no assistance needed,on room air; +1:supplemental oxygen required; +2:nighttime ventilator; +3:parttime ventilator / CPAP; +4:full time ventilator. Postoperative chest wall stability was measured clinically and scoliosis was measured on x-ray.
Results: The average at operation was 5 years (7 months to 15 years). Average follow-up was 4 years (6 months to 15 years). All patients had a clinically stable chest wall at follow-up and scoliosis was stable. Four patients were AVR +4 preop; post op, two improved to +2, one to +3, and one unchanged. Two patients were +3 preop; one remained unchanged; another worsened to +4. One went from +0 to +1. Five remained stable on room air (+0). One patient died of neurosurgical complications.
Conclusions: We conclude that VEPTR is an effective device for treating absent ribs and flail chest. Because of its expandability, thoracic growth is not inhibited. We offer this as the treatment of choice for this rare group of patients.
Notes

** Author received grant support from the National Organization of Rare Disorders and the FDA Office of Orphan Produce Development*

*** Dr. Campbell received royalties from Synthes Spine Company, L.P.*

P13 DEMOGRAPHIC AND ENVIRONMENTAL FACTORS PREDICT PEDIATRIC PEDESTRIAN INJURIES IN AN URBAN SETTING

Jonathan I. Groner, M.D., Justin P. Isariyawongse, B.S., Brandon K. Isariyawongse, John R. Hayes, Ph.D.
Columbus Children's Hospital, Columbus, OH, USA

Purpose: To develop a method for identifying demographic and environmental factors that are associated with increased risk of pediatric pedestrian injuries.
Method: Two investigators surveyed sites where child pedestrians had been struck by cars (n=62) and control sites (n=89) in a blinded, randomized fashion. Children struck by cars in driveways or parking lots were excluded. Control sites were generated by random sampling of map coordinates (n=38) or random selection of addresses from a residential phone book (n=51). Site surveys included speed limit, number of parked cars, type of street (direction and lanes), presence of nearby stop signals, and other factors. Statistical controls were implemented by matching 2000 census data information (population, housing, income, education levels, and other factors) by ZIP code with the observed sites. A hierarchical stepwise logistic regression was performed first considering census variables then surveyor's descriptors of the specific site.
Results: Many census factors associated with poverty correlated with an increased risk of pedestrian injury: low education level, low median income, high number of young children living below poverty level. In particular, children living in zip codes where few adults had high school diplomas were 2.8 times more likely to be injured than children living in "high education" ZIP codes. After controlling for census variables, increased posted speed limit correlated with increased risk of injury compared to either control group (p=0.01). "No parking" zones, stop signals, and one-way streets had no effect.
Conclusions: This preliminary study demonstrates that it is possible to detect neighborhood characteristics and environmental properties that increase the risk for pediatric pedestrian injuries. Increased speed limit and factors associated with poverty were found in neighborhoods were children were more likely to be struck by cars.
Notes

P14 ILEO-ANAL S-POUCH FOR SALVAGE OF PATIENTS WITH TOTAL COLONIC AGANGLIOSIS AFTER FAILED PULL-THROUGH PROCEDURE

Dave R. Lal, M.D., Bruce A. Harms, M.D., Peter F. Nichol, M.D., Ph.D., Leonard L. Go, M.D., Dennis P. Lund, M.D.
University of Wisconsin Hospital and Clinics, Madison, WI, USA

Purpose: Total colonic aganglionosis (TCA) occurs in 3-12% of Hirschsprung's patients. Although numerous surgical techniques are available for the treatment of these patients, little information is available regarding optimal surgical management of their frequent complications or failures. The ileoanal S pouch (IASP) technique has been utilized in the treatment of children with familial adenomatous polyposis and ulcerative colitis. We present the results of IASP for slavage of three TCA patients who had poor results after total colectomy and Soave pull-through.

Methods: Data was obtained by chart review and telephone questionnaire with IRB approval. Patient #1 (11y.o. girl) presented with chronic constipation and recurrent enterocolitis (8 years duration) requiring daily enemas, rectal dilatation and antibiotic suppression. Patient #2 (8y.o. boy with Down's syndrome) suffered from stool incontinence with resulting chronic perineal skin breakdown and dehydration beginning shortly after primary repair. Patient #3 (17y.o. girl) had undergone a Soave procedure that was complicated by pelvic abscess, sepsis and recurrent anal fistulae. She developed incontinence after a fistulotomy and at age 7 was converted to an end ileostomy. In Patient #1 IASP was created in a single stage whereas patients #2 and #3 underwent a two-staged procedure with a temporary diverting ileostomy. All pouches were constructed to hold a volume of approximately 150cc.

Results: There were no postoperative complications. All patients reported significant improvement of continence and quality of life after salvage surgery with IASP (Table 1). Constipation and recurrent enterocolitis resolved in patient #1. Diarrhea, dehydration and perineal excoriation resolved in patient #2. Patient #3 is continent after undergoing a sphincter reconstruction following IASP.

Conclusions: Ileoanal S pouch is a effective salvage technique in patients with total colonic aganglionosis and failed previous surgery. Ileoanal S pouch can result in excellent functional outcomes and should be considered in the management of these challenging patients. Further studies are required to determine if ileoanal S pouch should be considerd for primary reconstruction of patients with total colonic aganglionosis.

Notes

	Patient 1		**Patient 2 (Downs syndrome)**		**Patient 3**	
	Before Surgery	After Surgery	Before Surgery	After Surgery	Before Surgery	After Surgery
Number of BM Per day	2 requiring daily enema	1-2 spontaneous	10-15	4-6	Ileostomy	5-6
Spotting/leaking	None	None	Continuous	6-8 times per week	Ileostomy	None
Complications	Recurrent enterocolitis	One episode of C. difficile	Dehydration and Perineal excoriation	One episode of C. difficile	Incontinence after fistulotomy	None
Treatments	Daily rectal dilitation and enemas	Occasional rectal dilitation	Anti-diarrheal medication and perineal care	None	None	None

Results after salvage IASP

P15 IMPLICATIONS OF CONTRAST BLUSH ON COMPUTED TOMOGRAPHY SCAN IN THE EVALUATION OF BLUNT SPLENIC TRAUMA IN CHILDREN

Nicolas Lutz, M.D., Soroosh Mahboubi, M.D., Michael L. Nance, M.D., Perry W. Stafford, M.D.
Department of Surgery, The Children's Hospital of Philadelphia, Philadelphia, PA, USA

Purpose: Most children and adults with blunt splenic injuries are treated non-operatively by well-established protocols. Adult treatment algorithms often include the "blush sign" as an indication for embolization or surgical intervention. The "blush sign" represents an active pooling of contrast material within or around the spleen seen during enhanced computed tomography scan (CT scan). This study was designed to evaluate the incidence and treatment implications of a "blush sign" in children with blunt splenic injuries

Methods: All children (age≤15) with blunt splenic injuries treated from 1/96 to 12/01 at a Level One Pediatric Trauma Center were reviewed. Patients were treated using an established protocol. Age, CT scan findings and outcome were recorded. Treatment was categorized as operative or non-operative. A single pediatric radiologist reviewed CT scans to confirm injury grade and the presence or absence of a "blush sign".

Results: 133 eligible children with a mean age of 9.1 years were admitted with blunt splenic trauma including 86 with a CT scan available for review. The distribution of splenic injury by grade, presence of "blush sign" and success of non-operative treatment are summarized in table 1. Overall, 6 children, all with grade 3 or above splenic injuries, demonstrated a "blush sign" on CT scan, including 5 treated non-operatively. In this series, the single failure of non-operative treatment was a child with a "blush sign", who sustained severe polytrauma and required urgent splenectomy and left nephrectomy. No child required splenic embolization. None of the children died from their splenic injury.

Conclusions: Although associated with higher grades of injury, the "blush sign" did not mandate surgical intervention or embolization in children with blunt splenic injuries. Severe splenic injuries with a "blush sign" on CT scan can in most patients be managed successfully by non-operative treatment protocols. Management should be based primarily on physiologic response to injury.

Notes

Grade of injury	1	2	3	4 and 5
Distribution	17	33	13	23
Blush sign	0	0	2	4
Surgery	0	0	0	1

P16 TOWARDS EVIDENCE-BASED BEST PRACTICES IN NEONATAL SURGICAL CARE II: THE RELATIONSHIP BETWEEN ILLNESS SEVERITY AND OUTCOME

Erik D. Skarsgard, M.D., F.A.C.S., F.R.C.S.-C, Shoo K. Lee, M.D., Ph.D., F.R.C.P.
Children's and Women's Hospital of British Columbia, Departments of Surgery and Pediatrics, University of British Columbia, Vancouver, Canada

Purpose: The Canadian NICU Network consists of 17 neonatal centres which collectively account for 75% of admissions to tertiary neonatal beds in Canada. The network database stratifies patients according to diagnosis and illness-severity, and reports several outcome variables. Hypothesizing that: 1) illness severity correlates linearly with outcome, and 2) variations in correlation may be due to clinical practice variations, the purpose of our study was to determine the best outcome correlate of illness severity for 3 surgical groups, and identify factors contributing to variations in correlation within groups.
Methods: The IRB approved Canadian NICU Network was queried for the following categories: patients undergoing major surgery -group 1; patients admitted with an abdominal wall defect (AWD)-group 2; patients admitted with CDH-group 3. Illness severity scores (Score for Neonatal Acute Physiology version II; SNAP-II) were correlated with two outcome variables: length of stay (LOS) and technology / resource consumption (Neonatal Therapeutic Intervention Scoring System; NTISS), for the whole group as well as for individual centres. Pearson's coefficients (r) were used to compare illness severity with outcome, with calculated p values of <0.05 considered significant. Multiple linear regression analyses were performed to identify variables contributing to outcome variations between centres.
Results: 19,507 admissions were recorded in the database over the 22 month study period, and included 1157 patients in group 1, 151 patients in group 2, and 88 patients in group 3. Although illness severity (SNAP-II) correlated poorly with LOS, its correlation with technology / resource consumption (NTISS) was reasonably strong across groups (table 1). A variable correlation within groups (i.e. between centres) was not explained by case volume, percentage outborn or advanced therapy availability (ECMO).
Conclusions: Analysis of a population-based NICU dataset confirms that a surgical group-specific correlation exists between illness severity and outcome. Linkage of variations in outcome to clinical practice may illuminate "best practice" strategies.
Notes

Table 1:

Group	**(r)** SNAP-II v LOS	**(r)** SNAP-II v NTISS
all surg (I)	0.259, p<.01	0.586, p<.01
AWD (II)	0.054, NS	0.347, p<.01
CDH (III)	0.032, NS	0.663, p<.01

P17 BIOMOLECULAR MARKERS AND INVOLUTION IN COMMON HEMANGIOMAS

Jason S. Frischer, M.D., Jianzhong Huang, M.D., Anna Serur, M.D., Akiko Yokoi, M.D., Ph.D., Darrell J. Yamashiro, M.D., Ph.D., Jessica J. Kandel, M.D.
College of Physicians and Surgeons, Columbia University and Children's Hospital of New York, The New York Presbyterian Hospital, New York, NY, USA

Purpose: Vascular anomalies are a diverse set of lesions with distinct clinical behaviors, whose biomolecular characteristics are largely undefined. Common hemangiomas proliferate during the first year of life; then involute at a variable pace over several years. Other vascular tumors may involute much more quickly (rapidly involuting congenital hemangiomas, RICH), not at all (lymphangiomas), or display malignant behavior (angiosarcoma). Key cytokines driving angiogenesis include vascular endothelial growth factor (VEGF) family members / receptors (VEGF-A, VEGF-C, placental growth factor (PlGF), VEGFR-2) and angiopoietins. We hypothesized that involuting hemangiomas would display biologic markers distinctly different from non-involuting vascular lesions.
Methods: 6 patient samples were analyzed: (1) RICH, (2) proliferating hemangioma, (3) involuting hemangioma, (4) tufted angioma, (5) angiosarcoma, and (6) lymphangioma. Detailed examination of endothelial / vascular mural cell status was performed by fluorescent double-label immunostaining using specific markers (PECAM-1, αSMA) in combination with markers of proliferation (anti-phospho-histone H3) or apoptosis (TUNEL). Expression of PlGF, VEGF-A, VEGF-C, VEGFR-2, and Ang-1 was localized by in situ hybridization.
Results: Involuting / proliferating common hemangiomas demonstrated vasculature with abundant vascular mural cells αSMA(+); in contrast, αSMA(+) cells were rare in RICH vessels. Endothelial apoptosis was dramatically increased (Figure 1), but proliferation unchanged during involution. VEGF-A was expressed in all lesions except lymphangioma, which displayed VEGF-C and Ang 1 upregulation. Strikingly, PlGF expression was increased markedly in the lesions predicted to involute / actively involuting, but virtually absent from noninvoluting tumors.
Conclusions: Vessel architecture and endothelial / vascular mural cell status differed between lesions, differentiating even common versus rapidly involuting hemangioma, and corresponded to clinical involution. VEGF-A expression characterized endothelial-derived lesions, whereas VEGF-C marked lymphatic-derived cells. PlGF expression occurred only in vascular anomalies predicted to involute or actively involuting, a pattern potentially linked to PlGF function as a conditional antagonist of VEGF-A. Thus, distinct patterns of morphology and angiogenic factor expression characterize vascular anomalies with different clinical behaviors.
Notes

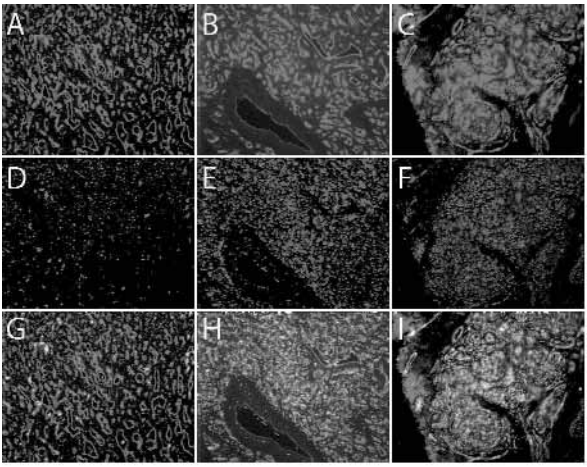


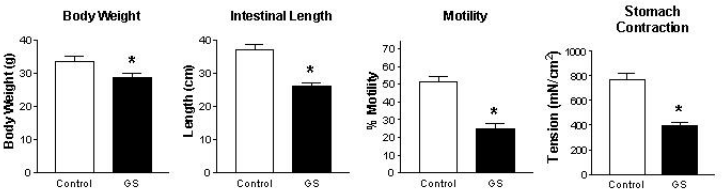
Figure 1. Apoptotic cells (TUNEL, red) co-localized with endothelium (PECAM-1, green) using fluorescent double-label immunostaining of a proliferating common hemangioma from a 7 week old, an involuting common hemangioma from an 8 month old, and a RICH from a 5 week old. Panels A, D, and G demonstrate PECAM-1, TUNEL, and PECAM-1/TUNEL double staining in a proliferating common hemangioma. Panels B, E, and H exhibit PECAM-1, TUNEL, and PECAM-1/TUNEL double staining in an involuting common hemangioma, and panels C, F, and I show PECAM-1, TUNEL, and PECAM-1/TUNEL double staining in a RICH.

Fluorescent double-label immunostaining for PECAM-1 and TUNEL assay (20x)

P18 FETAL GASTROINTESTINAL MOTILITY IN A RABBIT MODEL OF GASTROSCHISIS

Noboru Oyachi, M.D., Jayaraman Lakshmanan, Ph.D., Daryoush Bassiri, M.D., Michael G. Ross, M.D., James B. Atkinson, M.D.
Pediatric Surgery, UCLA Medical Center, Los Angeles, CA, USA

Purpose: Although the clinical outcome of gastroschisis (GS) has improved in recent years, the mechanism of prolonged postoperative adynamic ileus remains unknown. To investigate the timing and nature of intestinal dysmotility, we created by fetal surgery a rabbit GS model and evaluated fetal GI motility.
Methods: Surgery: New Zealand White pregnant rabbits (n=7) were operated on gestation day 24 (term=31d). One uterine horn was randomly selected for GS. Ovarian-end fetuses were exposed via hysterectomy and intestine eviscerated via a right paramedian incision. Control fetuses underwent hysterotomy and exposure. All fetuses were returned to the uterus and incisions repaired. In vivo motility: On day 29, a 26-ga needle was percutaneously inserted through the uterus into each fetal stomach under ultrasound guidance, and 2% Fluorescein (0.4ml) injected. Two hours after injection, fetuses were operatively delivered, and stomach and small intestine were harvested intact. “GI motility” was calculated as the distance traveled by fluorescein (measured by UV-light optical density) divided by the total small intestinal length. *In vitro* contractility: Stomach circular muscle strips obtained from GS (n=3) and control (n=3) fetuses at day 29 were examined for the contractile response to bethanechol in an organ-bath system. Data was analyzed as paired t-test and expressed as mean±SEM.
Results: Gastroschisis reduced the fetal body weight and ileal length (Figure). *In vivo* “GI motility” (24.8±2.7 vs 51.4±2.9%, $p<0.05$) was significantly reduced among gastroschisis as compared to control fetuses. As quantified in vitro, gastroschisis gastric muscle demonstrated significantly reduced contractile tension (396±26 vs 769±53mNcm2, $p<0.05$).
Conclusions: Rabbit fetal peritoneal exposure in late pregnancy impairs upper GI motility and contractility. We speculate that the amniotic fluid-induced inflammatory responses retard GI and systemic development in gastroschisis patients. This rabbit model may allow the study of amniotic fluid manipulations to delay or alter the bowel injury pattern of gastroschisis.
Notes



P19 NON-OPERATIVE MANAGEMENT OF COMPLETE PANCREATIC TRANSECTIONS

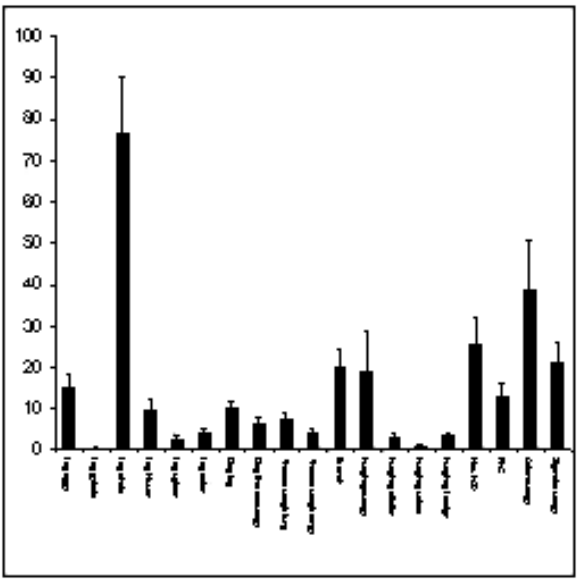
Andre A. S. Dick, M.D., Robert E. Cilley, M.D., Peter W. Dillon, M.D., Andreas H. Meier, M.D.
Milton S. Hershey Medical Center, Hershey, PA, USA

Purpose: Injury to solid intra-abdominal organs secondary to blunt abdominal trauma in the pediatric population is primarily managed non-operatively. Pancreatic contusions and complications of pancreatic injury, such as psuedocysts are generally managed non-operatively. Debate continues regarding the appropriate management of major pancreatic injury defined by complete pancreatic transection or laceration of the major pancreatic duct. We reviewed our experience with the management of children with major pancreatic injury at our institution
Methods: A retrospective analysis, using data obtained from the Pediatric Trauma Registry at our institution over the last 10 years was performed
Results: There were twenty-five patients with pancreatic injury. Nineteen patients with pancreatic contusions were treated non-operatively. Six patients (24%) sustained complete pancreatic transection. Mechanism of injury included bicycle and ATV (all terrain vehicle) handlebars (5) and kicked in the abdomen (1). Most injuries occured in males (M:F, 5:1) and the ages ranged from 5 to 8 years old. One patient initially underwent spleen preserving distal pancreatectomy and has pancreatic exocrine insufficiency. Five patients were managed initially non-operatively. Four patients had complete healing distal to the site of transection. One patient required Roux-en-Y drainage of the distal pancreas. Median length of hospital stay was 11.8 days. Two of the six patients developed pseudocysts (33%). Home total parenteral nutrition (TPN) was used until complete healing occurred by computed tomography scan and the patient was asymptomatic. All patients are currently symptom free.
Conclusions: Pancreatic transection secondary to blunt abdominal trauma is a rare entity. One previous report has been published on non-operative management of complete pancreatic transection. Our findings concur that complete pancreatic transection can be managed non-operatively in a stable patient. Disadvantage of non-operative management is prolonged TPN use. Current retrospective studies do not support one treatment option over the other. Handlebar impact is associated with serious intra-abdominal injury.
Notes

P20 A SURVEY OF LAPAROSCOPIC EXPERIENCE PRIOR TO PEDIATRIC SURGICAL TRAINING

APSA Endoscopy Committee
Children's Hospital of Buffalo, State University of New York at Buffalo, Buffalo, NY, USA

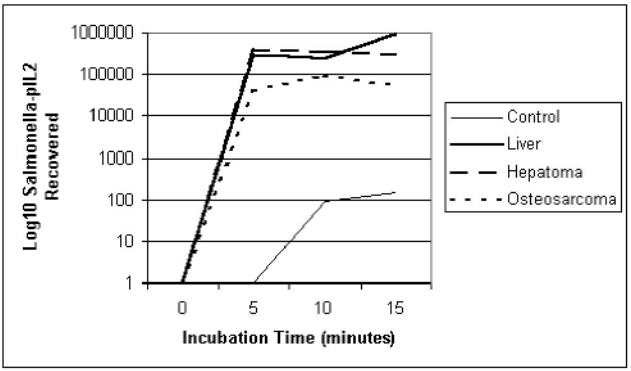
Purpose: Laparoscopic approaches to common pediatric surgical problems have become accepted modes of practice. Pediatric surgical training programs must ensure competency of laparoscopic skills in their trainees. In order to establish goals for laparoscopic education, an assessment of laparoscopic skills attained prior to pediatric surgical training is important.
Methods: A survey of first year trainees in pediatric surgery was conducted. Trainees were asked to self-report laparoscopic, thoracoscopic and endoscopic procedures. Numerical responses to 19 procedures were collated. Nineteen of 23 trainees responded. Descriptive statistics (mean, standard error of the mean) were performed on the summary data.
Results: Trainees reported an average of 260 (range 96 - 600) laparoscopic/endoscopic procedures during general surgery training. Experience with basic laparoscopy included laparoscopic appendectomy (15 +/-3.44), laparoscopic cholecystectomy (76.7 +/- 13.4), and diagnostic laparoscopy (10 +/- 1.33). Experience with advanced laparoscopy included laparoscopic Nissen fundoplication (9.47 +/- 2.6), laparoscopic splenectomy (2.36 +/- 0.6) and laparoscopic colon resection (4 +/- 1.15). Only one trainee had performed a laparoscopic pyloromyotomy. Summary data is presented in graphical format.
Conclusions: First year trainees in pediatric surgery have adequate prior experience in basic laparoscopy. Prior experience in advanced laparoscopy (Nissen fundoplication, splenectomy, intestinal resection) is lacking. The total number of laparoscopic cases among residents is heterogeneous. The lack of experience with advanced laparoscopy in individual trainees should be recognized by training programs. Moreover, the establishment of sponsored training courses for advanced pediatric laparoscopy is substantiated by the data.
Notes



P21 INVASION OF CANCER CELLS BY ATTENUATED SALMONELLA TYPHIMURIUM

Leland J. Soto, III, M.D., Brent S. Sorenson, B.S., Brent Nelson, Scott Solis, B.S., Arnold S. Leonard, M.D., Ph.D., Daniel A. Saltzman, M.D., Ph.D.
University of Minnesota, Department of Surgery, Minneapolis, MN, USA

Purpose: Salmonella typhimurium is a facultative intracellular parasite that colonizes the liver. We have previously described local delivery of interleukin-2 to the liver using attenuated Salmonella typhimurium (Salmonella-pIL2) and reported its laudable anticancer activity in a mouse model of hepatic colorectal metastases. Recently, the accumulation of Salmonella within multiple subcutaneous adenocarcinomatous tumors has been reported. This study provides the first in-vitro quantification of Salmonella's hepatic vs. cancer invasion in non-epithelial derived tumors.
Methods: 5x105 osteosarcoma, hepatoma or fresh mouse hepatocytes were placed in 6-well plates 18 hours prior to experimentation (n=6 each). Control wells contained no cells. Attenuated Salmonella typhimurium was grown overnight in luria broth, then subcultured in 30:1 dilution in luria broth for 3 hours to obtain log-phase growth. Approximately 108 cfu of bacteria were added to each well and incubated for 5-15 minutes. Wells were washed and incubated in a gentamicin exclusion assay for 40 minutes. Cells were then lysed with 1% Triton-X100, 1% SDS in PBS and quantitatively cultured.
Results: Significant uptake of both Salmonella strains into all cell types was noted, compared to control wells at each incubation time (ANOVA; $p<0.02$; Figure 1). The uptake of Salmonella-pIL2 was similar in hepatocytes and hepatocellular cancer at 5 and 10 minutes incubation times (mean 2.7x105 vs. mean 3.6x105 cfu recovered, respectively). However, hepatocytes incubated with Salmonella-pIL2 for 15 minutes displayed a modest increase in uptake compared to hepatocellular cancer (9x105 vs 3x105; $p=0.0001$; Fisher's exact). Salmonella-pIL2 was more readily recovered from hepatocytes as compared to osteosarcoma at all incubation times (mean 5.7x105 vs. mean 6.5x104 cfu recovered; $p<0.01$), however recovery of Salmonella-pIL2 from osteosarcoma was nearly 1000X higher than controls.
Conclusions: Attenuated Salmonella typhimurium may represent a novel form of immunotherapy for the treatment of many unresectable solid tumors, including metastatic pulmonary osteosarcoma and advanced hepatocellular carcinoma.
Notes



Mean colony forming units (cfu) of bacteria recovered from cultured cells after varying times of incubation with Salmonella-pIL2

P22 MINIMAL RECRUITMENT AND ACTIVATION OF DENDRITIC CELLS IN NEUROBLASTOMA

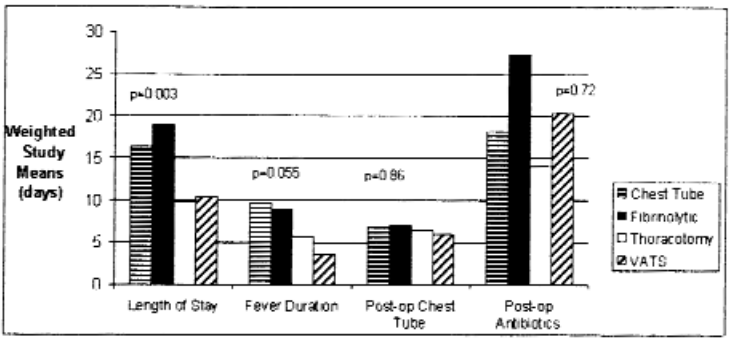
James D. Geiger, M.D., F.A.C.S., Craig A. McKinney, M.D., Rong J. Sun, M.D., Robert A. Drongowski, M.A., Brian Nickoloff, M.D., Ph.D.
University of Michigan, Ann Arbor, MI, USA

Purpose: Neuroblastoma has the potential for differentiation and spontaneous regression that may in part be immune mediated. The degree of dendritic cell (DC) infiltration in other tumors correlates with patient survival. We investigate the potential relationship between the level of DC infiltration and activation with the degree of tumor differentiation and aggressiveness in patients with neuroblastoma.
Methods: Neuroblastoma (NB) and ganglioneuroma (GN) specimens were collected from 20 children and immunostained for DC markers (F13a, CD80, CD86, HLA-DR, and CD83) and lymphocyte markers (CD3, CD4, CD8, and CD45RO). The degree of DC infiltration and activation was compared between NB and GN as well as within the NB patients organized by risk groups. The NB patients were organized into risk groups based on age, histology, N-myc amplification, ploidy, and INSS stage that are utilized by the Children's Oncology Group to determine therapy.
Results: There was no significant difference in the degree of DC infiltration between NB and GN or among the low, intermediate, and high risk NB groups. The majority of the DC were found in peritumor areas and did not show any evidence of activation or maturation which is needed for stimulating a anti-tumor T-cell response. Even when the DC had infiltrated the tumor they were not mature. There was a relative paucity of T-cell infiltration into GN tumors.
Conclusions: The majority of DC found are peritumoral, immature, and the degree of infiltration into NB does not correlate with the aggressiveness of the tumor. The lack of immune cell infiltration into GN may indicate that immune mechanisms are not primarily responsible for tumor differentiation. Our data indicate that the tumor either fails to activate DC or inhibits their activation, and overcoming this inhibition may be critical to effective immunotherapy of NB.
Notes

P23 EARLY VATS PROVIDES OPTIMAL TREATMENT OF EMPYEMA IN CHILDREN: AN EVIDENCED-BASED ANALYSIS

Robert L. Gates, M.D., John R. Hayes, Ph.D., Donna A. Caniano, F.A.C.S., Marjorie J. Arca, M.D., F.A.C.S.
The Ohio State University and Children's Hospital, Columbus, OH, USA

Purpose: Video-assisted thorascopic surgery (VATS) is a safe and effective treatment of thoracic empyema in children. While other methods may be effective, an evidenced-based review of the literature is necessary to determine the most appropriate treatment.
Methods: The MEDLINE database was searched for English and Spanish articles published from 1987 through 2002 regarding the treatment of thoracic empyema in children. Additional unpublished data was obtained by contacting individual study authors. There were no multi-institutional prospective studies; all were retrospective, institutional series. A true meta-analysis could not be performed because of inherent institutional bias and variablility in outcome measures among studies. A Kruskal-Wallis non-parametric test was used to compare methods detailed in the individual studies.
Results: Fifty-five retrospective studies with a total of 1083 patients were examined. Four treatment strategies were compared: chest tube drainage alone (14 studies, 507 patients), chest tube drainage with fibrinolytic instillation (10 studies, 81 patients), thoracotomy (8 studies, 143 patients), and VATS (23 studies, 352 patients). Outcome measures common to the majority of studies included length of stay, fever duration, antibiotic duration, and duration of chest tube drainage. Trends are shown in figure 1. Patients undergoing early VATS or thoracotomy had shorter length of stay ($p=0.003$) and shorter duration of post-operative fever ($p=0.055$) compared with chest tube alone or with fibrinolytic therapy. There was no difference in chest tube duration. There was no trend correlating antibiotic use with treatment methods, length of stay, fever duration, or chest tube duration.
Conclusions: Early VATS or thoracotomy leads to shorter length of stay and fever duration. The duration of chest tube placement and antibiotic use appear to be random and empiric. A carefully designed, multi-institutional, randomized study would lead to the development of evidence-based standards that may optimize the treatment of thoracic empyema in children.
Notes



Outcome Measures by Treatment Method

P24 SPINAL INJURIES IN CHILDREN

Bayram Cirak, M.D., Susan Ziegfeld, C.C.R.N., M.S.N., Vinita N. Misra, M.S., Anthony M. Avellino, M.D., Charles N. Paidas, M.D., F.A.C.S.
The Johns Hopkins Medical Institutions, Baltimore, MD, USA

Purpose: A descriptive review of childhood spinal injuries (CSI).
Methods: Retrospective analysis was performed of trauma patients (n=11,200) under the age of 14 that were treated at a Level I Pediatric Trauma Center with the diagnosis of spinal injury between 1991 and 2002 (n=406, 4%).
Results: The mean age was 9.5 (+/-3.8 years) and male:female ratio was 1.8:1. The most common overall mechanism of injury was MVC (30%). However, falls ranked highest for ages 2-9 whereas sports injuries ranked highest in the 10-14 group. Nearly 70% of our CSI were soft tissue injuries. Of the remaining 122 CSI (Table), the most common injury level was the high cervical spine C2-C4. Cervical fractures were most common in the 6 – 14 yrs groups and thoraco-lumbar fractures were highest in the pre-teens. Sub-Disl. were evenly distributed in all age groups and exclusively high cervical (C1-C4). The incidence of SCIWORA was 6% with 50% in the pre-teens. Overall mortality was 4%, and no ED sudden deaths. Only 33% of mortality was attributed exclusively to CSI and these were all high cervical injuries. Traumatic Brain injury (47%) was the most common associated injury and accounted for nearly 50% of the non-CSI deaths. CSI resulted in permanent paralysis in 15 patients.
Conclusions: In this descriptive study of a predominantly urban cohort, mechanism, injury levels, and SCIWORA vary according to age. These observations are in contrast to the literature and may reflect our local catchment. Major neurological sequalae are infrequent, but are associated with significant morbidity in this small proportion of children. These data suggest that prospective evidence-based guidelines, outcome analysis and prevention initiatives for all types of childhood spinal injuries are warranted.
Notes

Age	Mechanism of injury	Injury level (Most frequent to least)	Fracture	Sub-Disl.+	SCIWORA^
0-1	MVC*>Others*>fall	C2-4>C5-7>O-C1=T11-L1	6 (4 C,2 T)	4 (C)	3
2-5	Fall>MVC>Pedestrian>Others*	C2-4>C5-7>O-C1,T1-10,L2-5 >S>T11-L1	13 (6 C,2 T,4 L,1 S)	6 (C)	6
6-9	Fall>MVC>Pedestrian>Others*	C2-4>L2-5>O-C1=C5-7>T-LS	19 (10 C,4 T,3 L,2S)	7 (C)	2
10-14	Others*>MVC>Fall>Pedestrian>GSW	C2-4>C5-7>L2-5>S>O-C1 =T1-10>T11-L1	38 (13 C,11 T,10 L,4 S)	5 (C)	13

*MVC:moto-vehicle crashes C:Cervical, O:Occipital, T:Thoracic, L:Lumbar, S;Sacral, Sub-Disl.:+Subluxation-Dislocation,*Others: assault, struck, sports related injury, bike, diving, abuse ,GSW,Gunshot wound.^ SCIWORA: Spinal Cord Injury Without Radiologic Abnormality.

P25 THE DIABETIC MILIEU INHIBITS PANCREATIC PRECURSOR DIFFERENTIATION

Troy L. Spilde, M.D., Amina M. Bhatia, M.D., Sheilendra Mehta, M.D., Mark J. Hembree, B.A., Barry L. Preuett, B.A., Zhixing Li, Ph.D., Krishna Prasadan, Ph.D., Charles L. Snyder, M.D., George K. Gittes, M.D.
Laboratory for Surgical Organogenesis, Kansas City, MO, USA

Purpose: We previously showed that isolated embryonic pancreatic epithelia placed under the renal capsule develops into mainly islets. We hypothesized that the diabetic milieu may enhance islet formation, with implications for future islet / stem cell transplantation.
Methods: Embryonic day 13.5 rat pancreases were harvested and, in half of these, the epithelium was separated from surrounding mesenchyme by mechanical dissociation. Pancreases were transplanted under the renal capsule of adult syngeneic rats using four experimental groups: 1)non-diabetic host transplanted with whole embryonic pancreas, 2)non-diabetic host with isolated embryonic pancreatic epithelium, 3)streptozotocin-induced diabetic host with whole pancreas, 4)diabetic with epithelium. After two weeks, standard histology and quantitative immunohistochemistry for insulin-, glucagon-, and amylase-positive cells was performed.
Results: Surprisingly, there were less insulin-positive cells in pancreases that developed in a diabetic milieu ($p<0.05$), and also surprising was that there were fewer insulin-positive cells in the absence of mesenchyme ($p<0.005$). Blood glucose was not affected in any groups.
Conclusions: The diabetic environment inhibits differentiation of pancreatic precursor cells into insulin-positive cells, which may present yet another hurdle in diabetic treatment strategies using stem cells. Also, since the surrounding pancreatic mesenchyme is necessary for optimal insulin differentiation, such factors may be applicable to optimal stem cell engineering for transplantation.
Notes

P26 ABERRANT FIBROBLAST GROWTH FACTOR RECEPTOR 2 SIGNALING IN ESOPHAGEAL ATRESIA WITH TRACHEOESOPHAGEAL FISTULA

Troy L. Spilde, M.D., Amina M. Bhatia, M.D., Sheilendra Mehta, M.D., Mark J. Hembree, B.A., Barry L. Preuett, B.A., Daniel J. Ostlie, M.D., Zhixing Li, Ph.D., Krishna Prasadan, Ph.D., Charles L. Snyder, M.D., George K. Gittes, M.D.
Laboratory for Surgical Organogenesis, Kansas City, MO, USA

Purpose: Although the pathogenesis of EA/TEF remains unknown, we have shown that despite its esophageal appearance, the fistula tract originates from respiratory epithelium. We now hypothesize that defects in fibroblast growth factor (FGF) signaling contribute to the esophagus-like phenotype of the fistula tract. FGF2R is critical to normal lung morphogenesis and occurs in two isoforms (FGF2RIIIb and FGF2RIIIc), each with different ligand-binding specificity. In order to characterize FGF signaling in the developing EA/TEF, we analyzed levels of FGF2R splice variants in experimental EA/TEF.
Methods: The standard adriamycin-induced EA/TEF model in rats was used. Individual foregut components from adriamycin-treated and control embryos were processed for real-time, fluorescence-activated semi-quantitative reverse transcriptase PCR on gestational days 12.5 and 13.5.
Results: Both fistula tract and adriamycin-treated or normal esophagus showed significantly lower levels of FGF2RIIIb than either adriamycin-treated lung buds (E12.5, $p=0.02$; E13.5, $p<0.005$) or normal lung buds (E12.5, $p<0.005$; E13.5, $p<0.01$). At E13.5, the fistula tract had lower levels of FGF2RIIIc than either treated ($p<0.01$) or normal lung ($p<0.05$).
Conclusions: Levels of FGF2R in the developing fistula tract resemble that of distal esophagus, rather than developing lung. This defect in FGF2RIIIb signaling may account for the non-branching, esophagus-like phenotype of the fistula, despite its respiratory origin.
Notes

P27 RENAL TUMORS IN INFANTS LESS THAN 6 MONTHS OF AGE

Darrell L. Cass, M.D., Richard D. Glick, M.D., M. John Hicks, M.D., Ph.D., Jed G. Nuchtern, M.D., David E. Wesson, M.D., Oluyinka O. Olutoye, M.D., Ph.D.
Baylor College of Medicine, Houston, TX, USA

Purpose: Renal tumors are rare in infants less than 6 months of age, and may have associated paraneoplastic syndromes. To better define the characteristics of these tumors we reviewed our 10-year institutional experience.
Methods: We searched the pathology database to identify all renal tumors resected at our institution since 1992. The clinical presentation, operative details, pathology and outcome for all children ≤ 6 months of age were reviewed.
Results: Of 99 children who had renal tumors resected at our institution during this period, 10 (10%) were 6 months of age or less. Histopathologic examination showed congenital mesoblastic nephroma (CMN) in 6 patients (3 with cellular features), Wilms' tumor in 3 patients, and ossifying renal tumor of infancy in 1. Renal masses were detected antenatally in 2 patients and during newborn exam in 1 patient, however the mean age at diagnosis was 73 ± 19 days. 3 children had gross hematuria, 9 had a palpable abdominal mass, and 6 had hypertension (4 CMN; 2 Wilms'). Only 1 child had hypercalcemia (cellular CMN). Nine infants had nephroureterectomy and 1 had partial nephrectomy. At follow-up (mean 4.4 ± 1.2 years) 9 patients are alive with no evidence of disease. 1 newborn with hydrops and a massive Wilms' tumor developed abdominal compartment syndrome preoperatively and died during surgery.
Conclusions: About 10% of renal masses may occur in infants less than 6 months of age. Although mesoblastic nephroma is the most common renal tumor in this age group, Wilms' tumor also may be seen. Paraneoplastic symptoms, such as hypertension and hypercalcemia, are common in these infants and are not specific for any tumor type. In this age group, both benign and malignant renal tumors have an excellent prognosis.
Notes

P28 EXTRAHEPATIC PORTAL VEIN THROMBOSIS IS ASSOCIATED WITH AN INCREASED INCIDENCE OF BILIARY TRACT DISEASE IN CHILDREN

Riccardo Superina, M.D., Bill Chiu, M.D., Srikumar Pillai, M.D.
Children's Memorial Hospital, Chicago, IL, USA

Background: Children with extrahepatic portal vein thrombosis (EHPVT) frequently present with upper gastrointestinal varices and signs and symptoms of hypersplenism. The effect of deprivation of portal flow to the liver on bile composition and the biliary system remains undefined. This report catalogues our experience with biliary tract problems in children with EHPVT.

Methods: Twenty-nine patients with symptomatic idiopathic EHPVT were evaluated for the Rex shunt procedure (mesenterico-left portal bypass) over a 4-year period. There were 17 boys and 12 girls, ranging in age from four months to 15 years at the time of surgery. We retrospectively reviewed all operative reports and pre and postoperative abdominal ultrasound findings with regards to associated congenital anomalies and abnormal biliary tract findings.

Results: Seven of the 29 patients with EHPVT (24%) had associated congenital abnormalities: tetralogy of Fallot (2), anomalous pulmonary venous return (1), esophageal atresia (1), Down's syndrome (1), malrotation (1), and choledochal cyst (1). Figure 1: Twenty-four of 29 (83%) patients had detectable biliary tract pathology by ultrasound examination. Nine (31%) patients were found to have either gallstones or sludge, ten (34%) had gallbladder wall thickening, and four (14%) were noted to have gallbladder distention. One (3%) patient had common bile duct dilatation. Biliary symptoms developed in three of the nine (33%) patients with either stones or sludge (10.3% of all patients). Two patients were treated by cholecystectomy. There was no statistical correlation between biliary tract pathology and the age of presentation, symptoms of portal hypertension, gender, or underlying medical condition.

Conclusions: We have noted a high incidence of biliary tract pathology in patients with EHPVT compared to the normal population and a 10% incidence of symptomatic biliary pathology in our series. Comprehensive treatment plans must take into account the higher than expected incidence of biliary disease in these patients.

Notes

	Cholelithiasis	Sludge	Wall Thickening	Bile Duct Dilatation	Gallbladder distention	No Pathology	Total
Number of Patients	5	4	10	1	4	5	29
Percentage	17%	14%	34%	3%	14%	17%	100%

Number of Patients with Gallbladder Pathology

P29 DECREASED EXPRESSION OF VOLTAGE-GATED K+ CHANNELS IN PULMONARY ARTERY SMOOTH MUSCLE CELLS IN NITROFEN INDUCED CONGENITAL DIAPHRAGMATIC HERNIA IN RATS

Prem Puri, F.A.C.S., Masato Sakai, M.D., Kei Unemoto, M.D., Valeria Solari, M.D., Bi Xun, M.D.
Children's Research Centre, Our Lady?s Hospital for Sick Children and University College Dublin, Dublin, Ireland

Purpose: The newborn with congenital diaphragmatic hernia (CDH) is at high risk of developing persistent pulmonary hypertension (PPH). Recently, smooth muscle K+ channels have been implicated in hypoxic pulmonary vasoconstriction in adults. We hypothesized that the hyperreactivity of the newborn pulmonary vasculature in CDH might reflect a relatively low level of smooth muscle K+ channel activity because of hypoxemia which could give rise to excessive smooth muscle cell depolarisation leading to failure of pulmonary vasculature to adapt to extrauterine life. We therefore investigated K+ channel subunits in pulmonary artery smooth muscle cells (PASMC) in nitrofen induced CDH lung in rats.
Methods: CDH model was induced in pregnant rats after administration of 100 mg nitrofen on day 9.5 of gestation (term, 22 days). Dexamethasone (0.25 mg/Kg) was given on day 18.5 and 19.5. Cesarean section was performed on day 21. Fetuses were divided into three groups: group I, normal controls; group II, nitrofen induced CDH; and group III, nitrofen-induced CDH with antenatal dexamethasone treatment. Reverse transcription-polymerase chain reaction (RT-PCR) was performed to evaluate the relative amounts of the potassium channels Kv1.2, Kv2.1 and KvCa mRNA. Indirect immunohistochemistry was performed using laser scanning confocal microscope with anti- Kv1.2, anti- Kv2.1 and anti- KvCa antibodies.
Results: In CDH lung Kv1.2, Kv2.1 and KvCa immunoreactivity was markedly decreased in PASMC compared to controls. Relative mRNA levels of potassium channels Kv1.2, Kv2.1 and KvCa were significantly decreased in CDH lung compared to controls ($p < .05$). Dexamethasone treatment increased Kv1.2, Kv2.1 and KvCa immunoeactivity and mRNA levels in CDH lung.
Conclusions: Changes in voltage gated K+ channel subunits expression in CDH lung suggest that potassium channels may play a casual role in the development of pulmonary hypertension. Antenatal Dex may modulate pulmonary vascular tone in CDH hypoplastic lung by selectively upregulating local expression of Kv1.2, Kv2.1 and KvCa.
Notes

P30 SURGICAL MANAGEMENT OF PATIENTS WHO DEVELOP THYROID NODULES AFTER NECK IRRADIATION FOR HODGKIN'S DISEASE

Kenneth W. Gow, M.D., Beth McCarville, M.D., Ashley Hill, M.D., Matthew J. Krasin, M.D., Stephen J. Shochat, M.D.

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

Purpose: Patients with Hodgkin's disease treated with mantle irradiation have an increased risk of developing thyroid carcinoma. Monitoring is essential to detect early clinical changes suggestive of malignancy. However, nonspecific thyroid nodules are often discovered posing a dilemma to surgeons consulted for diagnostic procedures. We sought to evaluate the clinical and diagnostic imaging features of thyroid nodules in these patients to identify features that may identify neoplastic changes.

Methods: We reviewed the records of 36 children treated for Hodgkin's disease who had thyroid nodules detected by ultrasonography. We reviewed clinical findings, diagnostic imaging characteristics of the detected nodules, operative records, and outcomes.

Results: Of the patients studied, 21 were male and 15 were female. The median age at diagnosis of Hodgkin's disease was 12.9 (range 4 to 18.7) years. All patients had mantle irradiation with a median cumulative dose to the neck of 35 (range 20 to 43.2) Gy. The average time from radiation to first abnormal ultrasound was 10.1 (± 4.6) years. Of the 36 patients, all had at least one ultrasound, 29 had two, 20 had three and 9 had more than 3 ultrasounds for a total of 94 studies. In those with more than one ultrasound, the average size of the nodule did not increase. The significant clinical and ultrasound features are shown in Figure 1 for those patients managed expectantly and those who had operations.

Conclusions: Thyroid nodules that are less than 0.8 cm and hypoechoic after mantle irradiation for Hodgkin's disease do not require further investigation, especially if they do not grow over subsequent serial exams. However, patients with palpable lesions or those with nodules larger than 0.8 cm in diameter that are hyperechoic should undergo further evaluation for thyroid malignancy.

Notes

	Palpable lesion	Number of ultrasounds (n=94)	Hyperechoic on ultrasound (N=)	Size of lesion on ultrasound (cm ±1SD)	Pathology
Non-operative	6 (7%)	87	17 (20%)	0.8 ± 0.5	Not applicable
Operative	4 (57%)*	7	5 (71%)*	1.4 ± 0.4*	1 Papillary carcinoma, 4 Follicular adenomas, 2 Normal thyroid

* P < 0.05 when comparing Non-operative to Operative groups

P31 PERINATAL MANAGEMENT OF GASTROSCHISIS: ANALYSIS OF A NEWLY ESTABLISHED CLINICAL PATHWAY DESIGNED TO PROVIDE OPTIMAL CARE WITH EXCELLENT COSMETIC RESULTS

Ravindra K. Vegunta, F.R.C.S., M.B.B.S., Lizabeth J. Wallace, M.S., R.N., Michael R. Leonardi, M.D., John S. Marshall, M.D., Howard S. Cohen, M.D., James R. Hocker, M.D., Kamlesh S. Macwan, M.D., Sue E. Clark, M.D., Susan Tolentino, M.D., Richard H. Pearl, M.D., F.R.C.S.-C.
University of Illinois College of Medicine at Peoria, Peoria, IL, USA

Purpose: A new pathway was developed for optimal management of fetuses with an antenatal diagnosis of gastroschisis. Presented here is the outcome of our first 30 consecutive patients.

Methods: Once an antenatal diagnosis of gastroschisis is made perinatologists, neonatologists and pediatric surgeons counsel the parents. Fetal ultrasonography is performed every four weeks. Bowel dilatation, thickness and motility are followed in addition to amniotic fluid volume and fetal development. The babies are delivered by planned cesarean section between 36 and 38 weeks gestation if the lungs are mature by amniocentesis or earlier if bowel complications occur. They are resuscitated in the delivery room; bowel loops are placed in the midline and covered. In the NICU, the babies are intubated, paralyzed and ventilated. Gastroschisis repair is scheduled for 90 minutes after birth. In the operating room, meconium is cleared with n-acetylcystiene rectal wash to decompress the bowel. A Foley catheter is placed to monitor bladder pressure. Primary repair is attempted in all cases through the abdominal wall defect without an additional incision, provided bladder pressure does not exceed 20mm of Hg and adequate low-pressure ventilation can be maintained. A Broviac catheter is placed in all babies. This repair results in an umbilicus with no abdominal scar.

Results: This clinical pathway allowed us to schedule delivery rooms and operating rooms electively. 29 out of the 30 babies thus delivered had no bowel matting or peel. See table for details.

Conclusions: Our new protocol of both scheduled cesarean section and expeditious gastroschisis repair resulted in a higher proportion of primary repairs without an additional abdominal incision. This achieved shorter duration of mechanical ventilation, earlier full feeds and shorter lengths of stay, with no increase in mortality or morbidity when compared with most published reports. The primary repair babies had no mortality and excellent cosmesis.

Notes

Total number of patients = 30	
Gender ratio (M:F)	1:1
Gestational age at birth in weeks – median	35.7
Weight in kilograms at birth – median	2.275
Time to operating room in minutes – median	112.5
Associated anomalies – number of patients	10(33.33%)
Primary repair – number of patients	25(83.33%)
Maximum bladder pressure mm of Hg – median	9
Time to extubation in days – median	3
Time to full feeds in days – median	19
Time to discharge in days – median	24
Complications – number of patients	11(36.66%)
Deaths	3(10%) all had silos

P32 ONTOGENY OF EGF IN A FETAL RABBIT MODEL OF INTRAUTERINE GROWTH RETARDATION

Terry L. Buchmiller-Crair, M.D., Jian Xu, M.D., Christina Cellini, M.D.
Children's Hospital of NewYork Presbyterian-Weill Cornell Medical College, New York, NY, USA

Purpose: EGF is a GI peptide that stimulates mucosal proliferation and maturation. Premature and IUGR infants have impaired GI function with feeding difficulties and predisposition to NEC. The rabbit provides a model of IUGR based on uterine position. Previous studies administering EGF have normalized small intestinal (SI) nutrient transport and disaccharidase function in IUGR rabbits. To determine native EGF expression in premature and IUGR fetuses, this rabbit model was studied under guidelines by institutional ACC.
Methods: Twenty-two fetal rabbit pairs (Fav/IUGR) were harvested on day 23, 25, 27, 29, or 31 (term). The liver, stomach, SI (proximal, middle, distal), and colon (right, left) were harvested. RT-PCR was used to measure EGF /GAPDH mRNA densitometric band ratios. Statistical analysis was performed using the paired Students' t test.
Results: Weights were decreased in IUGR fetuses from day 25 to term ($p<0.05$). Liver, stomach, proximal and middle SI EGF mRNA peaked on day 25-27 and was higher in Fav >IUGR fetuses. EGF mRNA equalized by day 29. By day 31, IUGR fetuses expressed higher EGF levels than their favored counterparts ($p<0.05$ in liver, proxSI). EGF mRNA remained relatively constant throughout gestation in the distal SI and colon.
Conclusions: EGF is expressed throughout the rabbit gastrointestinal tract throughout the last one-third of gestation. Starting at low levels in the early third trimester, EGF expression peaked in the mid-third trimester, and stabilized near term, paralleling known patterns of fetal intestinal function. Differential expression was seen between normal and IUGR fetuses when weight differences were apparent. Foregut and midgut EGF expression in IUGR fetuses surpassed that of the normal littermates only at term, a time when fetal response to exogenous EGF administration is the most pronounced. Pharmacologic administration of exogenous EGF is supported in promoting the maturation of intestinal function in preterm and IUGR fetuses.
Notes

P33 MINIMALLY INVASIVE REVISION OF FAILED "RAVITCH-TYPE" PECTUS EXCAVATUM REPAIR

Donald C. Liu, M.D., Elizabeth Sailhammer, M.D., Mindy B. Statter, M.D., Yeming Wu, M.D., Arnold G. Coran, M.D., Stig Somme, M.D.
University of Chicago Children's Hospital, Chicago, IL, USA

Purpose: Traditional "redo" surgery for pectus excavatum entails extensive dissection often resulting in significant associated morbidities, including substantial blood loss. The authors have recently been utilizing techniques of the minimally-invasive (MIS) bar repair for "redo" correction of children with failed "Ravitch-type" pectus excavatum repair. We present a retrospective study of six such children who have undergone the MIS bar repair assessing surgical outcome.

Methods: A retrospective chart review of six children (age range: 5 y.-11 y.) who underwent MIS bar repair for revision of previous pectus repair between July 2001 and July 2002 was performed. Surgical parameters assessed include demographics, deformity, operative technique, operative course, complications, and short term outcome.

Results: All six children had successful "redo" surgery via MIS bar repair. Operative time averaged 63 minutes with estimated blood loss less than 50 cc in all cases. Intra-operative or post-operative complications did not develop in any cases. Average hospitalization was four days (range: 3-5 d.). Cosmetic results were judged satisfactory in all cases.

Conclusions: Minimally invasive bar repair is a viable alternative approach to reoperative open surgery for failed "Ravitch-type" pectus excavatum repair. Notably, minimal blood loss can be achieved in contrast to that expected with traditional "redo" surgery via open technique.

Notes

P34 THE IMPACT OF SURGICAL APPROACH ON PYLOROMYOTOMY

Julie R. Fuchs, M.D., Nils Kaehler, B.A., David P. Mooney, M.D.
Children's Hospital, Boston, MA, USA

Purpose: The umbilical incision for pyloromyotomy offers a cosmetic advantage over the right upper quadrant (RUQ) incision, but increased complications have been reported. This study investigates the impact of the pyloromyotomy incision upon postoperative course.
Methods: A retrospective chart review of all infants who underwent pyloromyotomy was undertaken for the time period of January, 1999 to July, 2002 at a single institution, involving 9 surgeons. A standard postoperative feeding plan was used. Data included: age, sex, weight, operative duration, time to the first feed, emesis, time to discharge, and postoperative complications. The Student's t test and Fisher's exact test were employed for statistical analysis ($p<0.05$).
Results: 258 patients underwent pyloromyotomy. 16 were excluded for conditions that altered their operative and / or infectious risk. 129 underwent a RUQ approach, 108 umbilical, and 5 laparoscopic. Follow-up to the first postoperative visit occurred in 86% of patients. Patient age, weight and sex were similar for RUQ and umbilical groups ($p>0.05$). Operative time was significantly greater in the umbilical group compared to the RUQ group (53.7 vs. 45.9 minutes, $p<0.0001$), but time to the first feed and to discharge were significantly less ($p<0.001$ and $p=0.046$, respectively). There were no significant differences in postoperative emesis or wound infections between the two groups, although slightly more wound infections were noted in the umbilical group (5.6% vs. 1.6%, $p=0.15$). There were no mucosal perforations. 1 hernia was noted in the umbilical group.
Conclusions: Although the umbilical approach in pyloromyotomy may require an average of 8 minutes longer to perform, it may shorten time to the first feed and to discharge, while not significantly affecting rates of postoperative emesis, wound infection, or hernia. These findings as well as the cosmetic benefit suggest that the umbilical approach to pyloromyotomy may be a superior choice in the treatment of pyloric stenosis.
Notes

P35 DUODENAL INJURIES IN CHILDREN: BEWARE OF CHILD ABUSE

Barbara A. Gaines, M.D., Barbara Shultz, B.S.N., Katie Morrison, B.S., David Hackam, M.D., Henri R. Ford, M.D.
Children's Hospital of Pittsburgh, Pittsburgh, PA, USA

Purpose: Dudodenal injuries in the pediatric population are relatively infrequent, but often result in significant morbidity and mortality. Unsuspected mechanisms may contribute to delay in diagnosis and thus, morbidity in duodenal injuries. We examined our experience at a level one pediatric trauma center with duodenal injuries to define the underlying mechanism and pattern of injury.

Methods: An eight-year (1994-2002) retrospective review of a pediatric level I trauma center database was performed and information regarding patients with duodenal injuries was abstracted. Demographic variables, injury severity, length of stay, mortality, and mechanism of injury were examined. Statistical analysis was performed using descriptive statistics and student's t-test. Significance was set at $p<.05$.

Results: Over the 8 year study period 8968 patients were admitted, 2179 (24%) were under 3 years of age. Thirty children (0.3%) suffered an injury to the duodenum, with 20 hematomas and 10 perforations. Patients were predominantly male (80%), with an average age of 7.6+4.4 years and an ISS of 14.8+10. No patients died. Children were injured by a variety of mechanisms, including collisions involving motor vehicles (10), bicycles (4), and ATVs (2). However, non-accidental trauma accounted for all duodenal injuries in children less than 4 years old. This represents 2.8% of all child abuse admissions. Three of these children suffered perforation of the duodenum. Among the entire population, children who suffered perforation had a significantly higher ISS (23.7+7.2 vs. 9.6+7.3, $p<.0003$) and longer length of stay (27.1+15.3 vs. 12.6+11.7, $p<.007$) than those with hematoma, regardless of age.

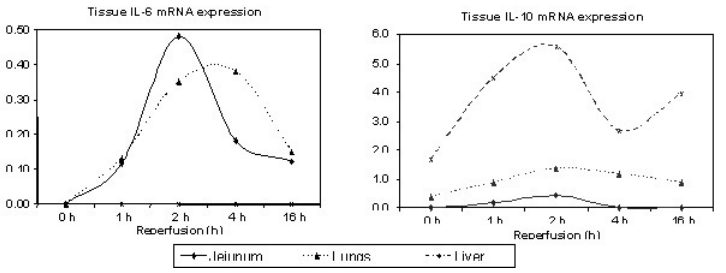
Conclusions: Injury to the duodenum is unusual in the pediatric trauma patient, but does result in significant injury severity and prolonged hospitalization. In the young child, one must maintain a high index of suspicion regarding the etiology of the injury, as the vast majority of injuries result from child abuse.

Notes

P36 ELEVATED TISSUE CYTOKINE mRNA EXPRESSION PRECEDES INCREASED SERUM PROTEIN LEVELS: EVIDENCE FOR ORGAN TO ORGAN COMMUNICATION IN A MURINE MODEL OF MULTI-SYSTEM ORGAN FAILURE

Anthony Stallion, M.D., Tzuyung D. Kou, B.A., Kyle C. Chepla, B.A., Alan D. Levine, Ph.D.
Children's Hospital at the Cleveland Clinic, Cleveland, OH, USA

Purpose: Multi-system organ failure (MSOF), the final common endpoint of uncontrolled systemic inflammation, is a major cause of morbidity and mortality. The multiple etiologies of MSOF, which can affect the intestine both directly and indirectly, result in mucosal tissue damage leading to epithelial cell apoptosis, loss of barrier function, bacterial translocation, and cytokine production. We previously reported increases in jejunal cytokine mRNA expression and serum proteins after ischemia and reperfusion injury to the small bowel.
Aims: To investigate the effects of intestinal injury on systemic inflammation, we examined cytokine mRNA expression in distal organs during MSOF.
Methods: The superior mesenteric artery of Balb/c mice was occluded for 50 min and then reperfused for16 hours. Time-matched sham-operated mice were used as controls. Total tissue cytokine mRNA was evaluated using reverse-transcriptase polymerase chain reaction (RT-PCR). GAPDH mRNA expression served as a control.
Results: Figure 1. IL-6 mRNA expression was significantly increased at 1 hour and peaked around 2 hours of reperfusion in the jejunum and lungs ($p<0.05$). IL-10 mRNA expression was significantly elevated in jejunum, lungs, and liver by 1 hour and peaked at 2 hours of reperfusion ($p<0.05$). Serum cytokine levels were not detectable until 2 hours and peaked at 4 hours of reperfusion.
Conclusions: Cotemporal expression of IL-6 and IL-10 mRNA in the intestine, lung and liver after ischemic damage to the jejunum, prior to a significant increase in serum cytokine levels, implies that the intestinal can initiate a systemic inflammatory response and propagate organ to organ communication leading to multi-system organ failure.
Notes



P37 RAPIDLY POLYMERIZING HYDROGEL PREVENTS BALLOON DISLODGEMENT IN A MODEL OF FETAL TRACHEAL OCCLUSION

Robert W. Chang, M.D., Makoto Komura, M.D., Steven Andreoli, B.A., Russell Jennings, M.D., Jay Wilson, M.D., Dario Fauza, M.D.
Children's Hospital, Department of Surgery, Boston, MA, USA

Purpose: Treatment of pulmonary hypoplasia associated with congenital diaphragmatic hernia (CDH) by fetal tracheal balloon occlusion has met with limited success, in part due to premature dislodgement of the detachable silicone balloon employed as the occlusive device. This study sought to determine whether an injectable hydrogel could buttress the balloon, thus preventing its displacement.

Methods: Time-dated pregnant ewes at 104 to 127 days of gestation underwent a laparotomy and partial uterine exposure. Fetal lambs underwent fetal tracheal occlusion through local delivery of a 6mm, 1.5cc detachable silicone balloon, either through open technique, or under ultrasound guidance. Fetuses were then divided in two groups. Group I had no further manipulations. Group II received an intratracheal injection of 6ml of a rapidly polymerizing, nontoxic, biodegradable hydrogel, through a 6F dual lumen catheter deployed cranially to the balloon. Euthanasia was performed near term, when balloon placement was examined, the lung volume-to-body weight ratio (LV:BW) was determined, and tracheal histology was performed. Statistical analysis was by the Fisher's exact test, with significance set at $P<0.05$.

Results: Complete tracheal occlusion was achieved in all fetuses (n=11) intra-operatively. At euthanasia, the rate of balloon dislodgement was significantly higher in group I (4/7, or 57.1%) than in group II (0/4). Group II balloons were recovered *in situ* with a column of varying amounts of residual hydrogel reinforcing their cephalad positions. The LV:BW ratio was significantly higher in animals in which balloon occlusion was maintained. No histological evidence of tracheal damage was noticed in any animal.

Conclusions: Intratracheal delivery of a rapidly polymerizing hydrogel cephalad to detachable silicone balloons results in improved fetal tracheal occlusion, with no harmful effects to the trachea. This adjuvant principle may enhance minimally invasive balloon occlusion for treatment of severe pulmonary hypoplasia associated with CDH.

Notes

P38 PRIMARY AND SECONDARY PREVENTION PROGRAMS IMPACT HELMET USE BUT NOT INJURY SEVERITY IN PEDIATRIC BICYCLE TRAUMA

Michael W. Potter, M.D., Michael P. Hirsh, M.D., Donna Babineau, R.N., Sharon Welsh, R.N., Peter Gentile, P.A.-C., Helen Collette, R.N., Cynthia Gingelewski, M.D., Paul D. Danielson, M.D.
MassMemorial Medical Center, Worcester, MA, USA

Purpose: Legislation and community programs can affect bicycle helmet use among children. We sought to examine the effect of prevention programs on helmet use and injury pattern following pediatric bicycle accidents.
Methods: A retrospective review of registry data from a Level 1 trauma center was performed. Three time periods were examined: 1990-94 (Period I, prior to mandatory bicycle helmet legislation), 1995-97 (Period II, after law enactment), 1998-01 (Period III, after initiation of a community based helmet education and distribution program). Data were collected on 413 victims and analyzed using Chi square test and Student's t-test.
Results: The rate of bicycle injuries remained constant although we observed an increase in helmet usage (5% in period 1 to 27% in period 3, p value .001). Helmet use did not alter injury severity score (9.65 vs 8.33), hospital length of stay (3.48 vs 3.55), or the number of head injuries sustained (47 vs 53 expected p = .09) except in the last period where helmet use was the greatest. In this period helemeted patients actually sustained higher ISS (12 vs 8.05 p value .01). Bicycle accidents in urban areas tended to cause less severe injuries (ISS 5.76) and shorter hospital stays (LOS 2.275 days) than those in suburban areas (9.73 and 3.83) significantly so only in period 3, following the initiation of the helmet education program. Younger patients (age < or = to 12) also had lower ISS (7.90) and LOS (3.03) than teenagers (10.0 and 4.11 p values .01 and .04).
Conclusions: Primary and secondary prevention programs are associated with a significant increase in helmet use but no concomitant decrease in frequency of head injury or overall injury severity. It will be necessary to further enhance compliance with helmet use as well as to identify other factors which could reduce head injury amongst children.
Notes

P39 EFFECT OF AGE ON CERVICAL SPINE INJURIES IN CHILDREN AFTER MOTOR VEHICLE COLLISIONS: EFFECTIVENESS OF RESTRAINT DEVICES

B. S. Zuckerbraun, M.D., H. R. Ford, M.D., K. Morrison, B.S., B. Gaines, M.D., D. J. Hackam, M.D., Ph.D.
University of Pittsburgh School of Medicine, Division of Pediatric Surgery, Pittsburgh, PA, USA

Purpose: Despite the devastating consequences of cervical spine (C-spine) injury in children after motor vehicle collisions (MVC), the factors leading to injury and the appropriateness of protective restraints remain undefined. We hypothesized that age-related anatomic factors contribute to inadequate restraints and therefore increased injury severity after MVC.
Methods: All children (<18yrs, 1997-2002) admitted to a level 1 pediatric trauma center were prospectively collected and retrospectively reviewed. Those with C-spine injuries due to motor vehicle crash were extracted, and divided into two groups: Young (0-8 years) and Old (9-18 years). Statistical comparison was by student's t-test or Chi-square, with $p<0.05$ accepted as significant.
Results: Of 5117 trauma admissions, 94 had C-spine injuries with a mean age of 11±5years, 66% of which were male. Among 1124 patients who had sustained MVC there were 27 C-spine injuries (2.4% incidence), of whom 12 were under 8 and 15 were over 8 years. Restraint devices were utilized at least as frequently in younger children (young: 58% vs. old 43%, NS). However, younger children had an increased incidence of permanent cord deficit (young: 57% versus old:13%, $p<0.05$) and closed head injury (young:50% versus old:7%, $p<0.05$) even while wearing restraint devices, suggesting that restraint devices are inadequate or inproperly used in younger patients. This is supported by the increased injury severity scores of the younger group (young: 37.7±8.5 versus old: 16.5±4.6, $p<0.05$).
Conclusions: We conclude that younger children suffer more severe cervical spine injuries after motor vehicle collisions than their older counterparts, in part due to inadequacy of currently existing restraint devices. Design modifications to current restraints, including the use of head straps, might improve outcome after MVC in younger patients.
Notes

P40 THE EFFICACY OF MULTIDETECTOR CT SCANNING

Robert P. Foglia, M.D., Russell R. Hirsch, M.D., Marilyn J. Siegel, M.D., F. R. Gutierrez, M.D., George B. Mychaliska, M.D.
Departments of Surgery, Pediatrics and Radiology, St. Louis Children's Hospital and Washington University School of Medicine, St. Louis, MO, USA

Purpose: Single detector CT (SDCT) is the standard in diagnostic imaging. However, if diagnostic information is incomplete, especially regarding vascular anatomy, further invasive studies may be required in evaluating various lesions in children. We report our experience with a multidetector CT (MDCT) scanner in three patients with suspected pulmonary sequestration (PS). Occasionally, the diagnosis is in question, and venous drainage is rarely delineated by SDCT.

Methods: One child had a non-diagnostic SDCT. MDCT scans were performed on a Siemens scanner with contrast enhancement. MDCT has a 4 sensor array that allows accurate 3D reconstruction. Scan protocols were designed to minimize radiation. Total scan time was 5-5.8 seconds. No child required airway support or supplemental oxygen. Multi-planar images were acquired and 3D reconstructions were obtained using commercial software. Images could be rotated at will, and overlying structures "excised" via software to better visualize areas of interest.

Results: All patients had left-sided PS. In the first patient, SDCT revealed a possible collateral from the aorta. In patients 1 and 3, MDCT elucidated the abnormal artery from the aorta, and venous return to the left atrium via the pulmonary vein. In patient 2, the PS was supplied by the celiac axis and drained via a vein which crossed the mediastinum from the left lung to enter the right pulmonary vein. In all cases, arterial and venous drainage were clearly defined as well as the intralobar nature of the PS, something not possible with SDCT.

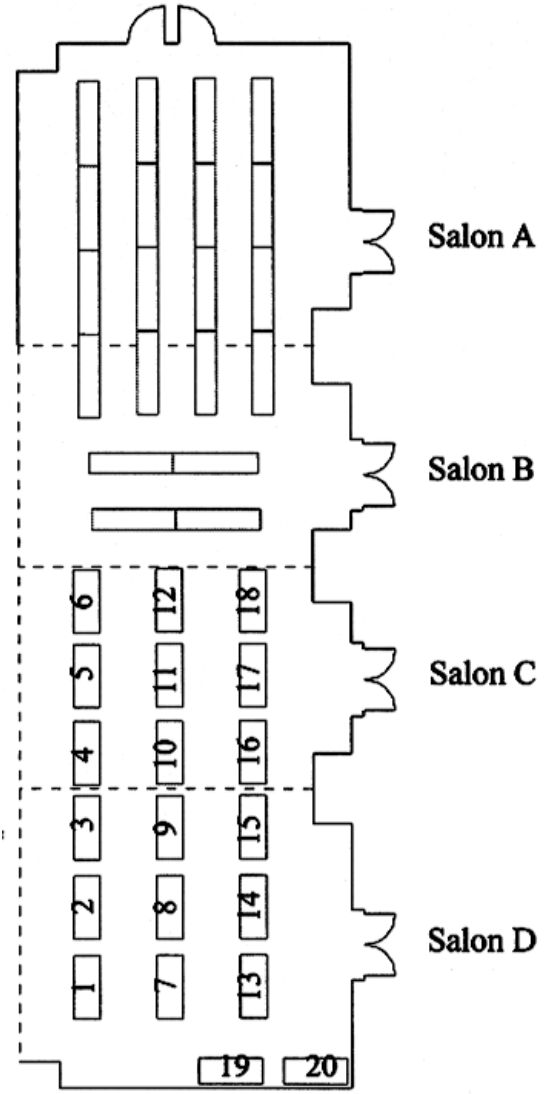
Conclusions: The MDCT offers: 1) a revolutionary enhancement in image quality; 2) is done in a shorter time period than SDCT; 3) can be performed with little or no sedation; 4) can replace angiography in selected cases; 5) can be used in evaluating vascular anomalies, benign and malignant masses and the airway.

Notes

EXHIBIT DATES AND HOURS

Monday, May 26	7 a.m. – Noon
Tuesday, May 27	7 a.m. – Noon
Wednesday, May 28	7 a.m. – 11 a.m.

EXHIBIT HALL FLOORPLAN



APSA Outcomes Center 2

633 N. St. Clair Street, 25 NE, Chicago, IL 60611

The APSA Outcomes Center is a research initiative to develop specific national, evidence-based guidelines applicable across the continuum of care for infants and children with surgical problems. The Center will display article reprints, informational brochures, and fact sheets.

Atrium Medical Corp. 15

5 Wentworth Drive, Hudson, NH 03051

Computer Motion 7

130-B Cremona Drive, Santa Barbara, CA 93117

Computer Motion, the world's leading developer of computer-assisted robotic surgical systems, serves 3000 surgeons in 32 countries. Products include: AESOP®, a voice controlled endoscope positioning robot, HERMES®, a centralized system to voice-control the O.R., ZEUS® Surgical System for minimally invasive microsurgery procedures, and the SOCRATES™ System for remote surgeon telepresence and mentoring.

Cook Surgical 18

750 Daniels Way, P.O. Box 489, Bloomington, IN 47402

Cook Surgical will be exhibiting Surgisis® Gold Hernia Repair Graft, a naturally occurring extracellular matrix for tissue reinforcement. Other featured items will be products for Common Bile Duct exploration, Cholangiography catherers and our Nathanson Liver Retractor.

Elsevier Science 12

10810 SW 14th Court, Davie, FL 33324

Elsevier Science will be displaying WB Saunders, Mosby, Churchhill Livingston and Butterworth Heinemann Medical Books and Periodicals.

Ethicon Endo-Surgery 8

4545 Creek Road, Cincinnati, OH 45242

Ethicon Endo-Surgery is transforming patient care through innovation with its comprehensive line of minimally invasive and open surgical products. In addition to its full line of surgical products, Ethicon Endo-Surgery will showcase their line of Bladeless Access Trocars, the Harmonic Scapel® 300 Generator, and lap Disc for hand-assisted laparoscopic surgery.

HAEMACURE 20

2 N. Tamiami Trail, Suite 802, Sarasota, FL 34236

Hemaseel' APR, the first commercially available Fibrin Sealant, is a biological tissue adhesive with superior sealant and hemostatic properties. Hemaseel' APR is a prepackaged, ready-to-mix Fibrin Sealant which offers surgeons a new level of component consistency and viral safety. Haemacure Corporation is dedicated exclusively to the innovation in Fibrin Sealants.

Intuitive Surgical, Inc. 16

950 Kifer Road, Sunnyvale, CA 94086

Intuitive Surgical, the market leader in operative surgical robotics, has developed the da Vinci™ Surgical System, the first approved surgical robot cleared by the FDA for laparoscopic and thoracoscopic procedures. The da Vinci™ Surgical System utilizes articulating EndoWrist™ Instruments and a unique 3-D Insite™ Vision System. For more information, visit our web site at www.intuitivesurgical.com.

Jerome Medical 13

305 Harper Drive, Moorestown, NJ 08057

Visit Jerome Medical to see what's new in pediatric c-spine immobilization. For your pediatric patients, Miami Jr. collars provide sizing options specifically for children from infant through twelve years old. We will also demonstrate the Miami JTO Thoracic Extension. Adaptable to Miami J Collars, this innovative combination extends your control by providing additional stabilization.

Karl Storz Endoscopy 6

600 Corporate Pointe 5th Floor, Culver City, CA 90230-7600

Karl Storz will be introducing AIDA™ DVD, the new singe-source solution for capturing editing and archiving digital video. Karl Storz will also be exhibiting its fully integrated pediatric surgery line, including Hopkins® rod lens telescopes, reusable trocars, KOH needle drivers, minilaparoscopes and Clickline® hand instruments.

Kimberly-Clark / Ballard Medical 14

12050 S. Lone Peak Pkwy., Draper, UT 84020

Now a part of Kimberly-Clark, Ballard Medical features the MIC-KEY* Low-Profile Gastrostomy Feeding Tube with recessed intra-gastric distal tip and the MIC* Transgastric-Jejunal Feeding Tube for simultaneous gastric decompression and jejunal feeding, in addition to a complete line of Enteral feeding tubes and accessories.

LSI Solutions 4

7796 Victor-Mendon Road, Victor, NY 14564

LSI SOLUTIONS® based in Victor New York, is a medical device research manufacturing, and marketing corporation dedicated to providing innovative solutions and proprietary products for the advancement of minimally invasive therapeutic procedures.

Scanlan International, Inc. 19

One Scanlan Plaza, Saint Paul, MN 55107

Speciality surgical products designed and manufactured by the Scanlan family since 1921, including over 3,000 delicate instrument designs in titanium and stainless steel-featuring pediatric titanium clamps, retractors and custom manufacturing amd modifications. SCANLAN® SuperCut™ scissors, Heifetz™ temporary occlusion clips, Micro VASCU-STATT® sinfle-use bulldog clamps, magnifying loupes and more.

Specialty Surgical Products, Inc. 5

1131 North U.S. Hwy. 93, Victor, MT 59875

You asked, and we listened...our new "Wide Body" 4.0cm silicone silo bag design has a 5.5cm silo bag that tapers to the 4.0cm ring, giving you more room to house contents without enlarging the defect. Pediatric anal dialators 3mm-19mm also available.

Springer-Verlag New York, Inc. 3

175 Fifth Avenue, New York, NY 10010-7858

Stryker Endoscopy 1

5900 Optical Court, San Jose, CA 95138

Minimally invasive video equipment and related products.

W. Lorenz Surgical 17

1520 Tradeport Drive, Jacksonville, FL 32218

W. Lorenz Surgical, Inc. is a leading developer, manufacturer and distributor of advanced craniomaxillofacial products. Featured innovative products include LactoSorb® an advanced resorbable fixation system and the Lorenz Pectus Bar used to aid in the correction of Pectus Excavatum.

Zevex Incorporated 9

4314 Zevex Park Lane, Salt Lake City, UT 84123

Zevex Incorpoated welcomes you to discover our optimal line of clinical nutrition products. Our Enteralite® Ambulatory Enteranal Feeding Pump features our patented pinch clip occluder that automatically prevents formula free-flow. Zevex also offers a complete line of nasoenteric gastrostomy and low profile gastrostomy feeding tubes.