26th

Annual Meeting

Toronto
September 19-21, 1994

Canadian Association of Paediatric Surgeons
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Twenty-sixth Annual Meeting
CANADIAN ASSOCIATION of
PAEDIATRIC SURGEONS
L'ASSOCIATION CANADIENNE de
CHIRURGIE PÉDIATRIQUE

Monday-Wednesday, September 19-21, 1994
TORONTO MARRIOTT EATON CENTRE
Trinity Ballroom
TORONTO
CANADA

please bring this program to the meeting
Welcome to Toronto! Bienvenue à Toronto! Whatever language one uses one can only say that Toronto “the Good” will be even better with this year’s meeting of the Canadian Association of Pediatric Surgeons being held in that city. This year’s meeting has the potential to again be another outstanding meeting of our association. The Program Committee under the direction of Nathan Wiseman had to pick papers from a very large number of excellent abstracts. This portends for a very interesting and informative meeting. Arlene and Siggi Ein (sorry Siggi, but Arlene must receive top billing) have been working diligently on local arrangements to ensure that both the program and the associated social events will be educational and enjoyable. We look forward to welcoming those attending the CAPS meeting for the first time, either as new members or as guests, while enjoying the opportunity of renewing acquaintances with those who have been around for a longer time. We also extend a warm welcome to our accompanying persons and invite them to enjoy all the planned social events.

CAPS is a relatively small association which gives us the opportunity to exchange views in a frank and amiable manner while enjoying the company of old friends and new acquaintances.

CAPS is strong and vibrant. "Participaction" in both the scientific and social programs will continue to keep it the premier pediatric surgical meeting.

A.W. Juckes, M.D.
President
Canadian Association of Pediatric Surgeons
Welcome to CAPS in Toronto in September- the best clinical Pediatric surgery meeting in the greatest city at the nicest time of the year. If you've been to CAPS before, welcome back! If you're experiencing us for the first time, you will surely come back again! It's a good mixture of scientific stimulation and enjoyable entertainment with a nice group of pediatric surgical lovers and their friends. Arlene and I (and a host of others) have planned this 26th annual meeting with the recent CAPS survey in mind: just the right number of good papers, just enough free time, just enough fun and entertainment and just enough monetary output so that all of the above will fill you with good times and not empty your pocket book. If you are having a hard time deciding what the proper mix is, ask Arlene or myself and we'll set you straight!

ENJOY!!

Siggie & Arlene
SCIENTIFIC and SOCIAL PROGRAM

Sunday, 18th September
07:30-09:00  Specialty Committee Meeting, Bay Room
10:00-15:00  Meeting of CAPS Council, Bay Room
15:00-18:00  Registration, Middle Foyer, Lower Level, Salon 2,3
Social Program
18:00-21:00  Welcoming Reception, Trinity Salon 1 & 2

Monday, 19th September
07:00-13:15  Registration, Middle Foyer, Lower Level, Salon 2,3
07:00-08:00  Continental Breakfast, Foyer, Trinity 3-5
07:45      Welcome and Opening ceremony Trinity 3-5
08:00-10:00  Scientific Session One, Trinity 3-5
10:00-10:30  Coffee
10:30-12:15  Scientific Session Two, Trinity 3-5
12:15-13:15  Fred MacLeod Lecture
13:15        Lunch (own arrangements)
             Free afternoon and evening
Social Program
08:30-17:30  Niagara Falls and Peninsula Day Tour (if sufficient interest) departing from the Lobby of the Marriott

Tuesday, 20th September
07:00-13:15  Registration, Middle Foyer, Lower Level, Salon 2,3
07:00-08:00  Continental Breakfast, Foyer, Trinity 3-5
08:00-10:15  Scientific Session Three, Trinity 3-5
10:15-10:45  Coffee
10:45-13:00  Scientific Session Four, Trinity 3-5
13:00-14:30  CAPS Members’ Annual Business Meeting,
Social Program
19:00        Presidential Reception, Foyer, Trinity 3-5
19:45        Presidential Dinner, Trinity Ballroom
             Black Tie preferred but not essential

Wednesday, 21th September
07:00-12:30  Registration, Middle Foyer, Lower Level, Salon 2,3
07:00-08:00  Continental Breakfast, Foyer, Trinity 3-5
08:00-10:10  Scientific Session Five, Trinity 3-5
10:10-10:40  Coffee
10:40-12:25  Scientific Session Six, Trinity 3-5
12:25        Meeting Adjourns

ACCOMPANYING PERSONS’ ACTIVITIES: Information will be available at the Registration Desk and the CAPS Hospitality Suite

Registrants are invited immediately following the Wednesday Scientific Session to the Hospital for Sick Children for a
Buffet Lunch at 12:45 and the
ANNUAL SIMPSON MEMORIAL LECTURE at 13:30-14:30.
The lecture will be followed by a
Tour of the new Sick Kids Atrium and Facilities

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Toronto offers a great variety of restaurants, shopping, sporting events (if they are not all on strike), and activities to occupy ages 1 - 99. Of course, the greatest event will be CAPS. We will have many brochures at registration and in the hospitality room for you to look at. To give you a quick idea, the shows in town are Miss Saigon, The Phantom of the Opera, Forever Plaid, Show Boat, Crazy for You, Legends of La Cage, Second City, Roy Thomson Hall etc. You don't want to miss the ROM, Casa Loma, The Art Gallery, CN Tower/Skydome, Harbourfront, St. Lawrence Market, etc. For the young as well there is the Ontario Science Centre, Metro Toronto Zoo, Black Creek Pioneer Village and for all of us, the Medieval Times Dinner & Tournament. The most exciting spot right now for the sport fans is The Hockey Hall of Fame. Shopping begins at The Eaton Centre which is connected right to the Marriott Hotel. There is also Yorkville and a dozen other shopping malls. Outside of Toronto there is the Royal Botanical Gardens, Cullen Gardens, St. Jacobs Factory Outlet Mall and Farmer's Market., The French Perfume Factory Outlet & Museum to name a few. So, as you can see, there are so many things to do that you will have a hard time deciding.

Enjoy!!!

Arlene and Siggie Ein
ABOUT THE
CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS

The Canadian Association of Paediatric Surgeons was granted its charter in 1967. Its main aim is to improve the surgical care of infants and children in Canada.

There are three main areas, diagnosis, treatment and research, which are of special concern to the members.

Infants Born With Congenital Abnormalities

Even though the majority of newborn infants who have severe congenital abnormalities can be treated successfully by a surgical operation, often the condition is either not recognized, or if it is diagnosed, the local physician may be unaware of the possibilities for surgical cure. In this situation most of these babies die, or some survive to live a life crippled by their deformity.

Malignancy in Childhood

Cancer is the second most common cause of death in childhood. Surgical removal of the tumor, combined with x-radiation and chemotherapy provided by an aggressive team utilizing new techniques can achieve a cure in over 50% of these patients.

Trauma

Finally, the number one killer of children in North America is accidents. Here again, with modern methods of first aid, transportation, resuscitation, intensive care, and specialized surgical team effort, many of these seriously injured children can be saved.

Education Program

To accomplish an improvement in surgical care for babies and children, the Canadian Association of Paediatric Surgeons has launched an educational program for doctors, nurses and others working in the paediatric health field. To support this program, an educational fund has been established.
The Education Fund underwrites the visit of a distinguished paediatric surgeon each year to visit and teach at medical centres in Canada, provides a speaker on Paediatric Surgery at the Annual Meeting of the Canadian Paediatric Society, enables the Association to sponsor a session of scientific papers at the Meeting of the Royal College of Physicians and Surgeons of Canada and supports the Annual Scientific Meeting of the Association. Financing for the Education Fund has been obtained from individuals and groups, both medical and non-medical, interested in the surgical care of children, and from foundations. It is the intent of the Association to increase the capital funding to a level where the annual interest will fully support the Education Program. The Education Fund of the Canadian Association of Paediatric Surgeons is registered with the Federal Government and all contributions are fully tax deductible. The Fund is audited annually.

Donations may be sent to:
Ray Postuma, M.D.
C.A.P.S. Secretary/Treasurer
AE 201-840 Sherbrook St
Winnipeg, MB, R3A 1S1
Canada
Telephone 1-204-787-4203
Fax: 1-204-787-4618
CAPS COUNCIL 1993-94

**EXECUTIVE**

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<tr>
<th>Position</th>
<th>Name</th>
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<tr>
<td>President</td>
<td>A. Juckes</td>
<td>(3rd year)</td>
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<tr>
<td>Past-President</td>
<td>S. Ein</td>
<td>(2nd year)</td>
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<tr>
<td>Secretary/Treas.</td>
<td>R. Postuma</td>
<td>(1st year)</td>
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<td>Director</td>
<td>D. Girvan</td>
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<td>A. Bensoussan</td>
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<td>Director</td>
<td>J-M Laberge</td>
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**COMMITTEES as of 93.12.21**

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<tr>
<th>Committee</th>
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<tr>
<td>1 Archive</td>
<td>B. Shandling</td>
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<td>S. Ein</td>
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<td>R. Cloutier</td>
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<td>3 Congenital Anomalies:</td>
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<td>M. Di Lorenzo</td>
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<td>4 Constitution and Bylaws:</td>
<td>D. Girvan</td>
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<td>G. Fraser</td>
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<td>5 Education:</td>
<td>M. Giacomantnio</td>
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<td>A. Wong</td>
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<td>6 Ethics, Moral and Legal Issues:</td>
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<td>C. Bagwell</td>
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<td>J. Desjardins</td>
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<td>R. Sonnino</td>
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<td>7 Finance:</td>
<td>A. Gillis</td>
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<td>A. Juckes</td>
<td>Treasurer (R. Postuma)</td>
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<td>R. Kennedy</td>
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<td>8 Future Meetings</td>
<td>S. Ein</td>
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<td>Secretary (R. Postuma)</td>
<td>A. Ein (non-member)</td>
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<td>Local arrangements</td>
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<td>Members at large:</td>
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<td>R. Kennedy</td>
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<td>9 Liaison with American College:</td>
<td>B. Shandling</td>
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<td>10 Liaison with Trauma Assoc. of Canada:</td>
<td>G. Blair</td>
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<td>11 Liaison with World Federation:</td>
<td>Secr. Treas., R. Postuma</td>
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<td>12 Membership and Credentials:</td>
<td>J. Desjardins</td>
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<td>13 Nominating</td>
<td>S. Ein (Past President)</td>
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<td>14 Program:</td>
<td>N. Wiseman</td>
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<td>S. Yazbeck</td>
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<td>R. Cloutier</td>
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Underlined name indicates chair of committee

Please contact the President or Secretary-treasurer if you are able to serve on any of the above committees or if corrections are necessary in the above information (Secretary: tel.(204)787-4203 or fax: 787-4618)
CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS
L'ASSOCIATION CANADIENNE DE CHIRURGIE PÉDIATRIQUE

PRESIDENTS

1967-1973  Harvey Beardmore  Montreal
1973-1975  Colin Ferguson*  Winnipeg
1975-1977  Jim Simpson*  Toronto
1977-1979  Sam Kling  Edmonton
1979-1981  Pierre Paul Collin  Montreal
1981-1983  Barry Shandling  Toronto
1983-1985  Gordon Cameron  Hamilton
1985-1987  Stanley Mercer  Ottawa
1987-1989  Alex Gillis  Halifax
1991-1993  Sigmund Ein  Toronto
1993-1995  Angus Juckes  Regina

* indicates deceased

SECRETARY-TREASURERS

1967-1974  Barry Shandling  Toronto
1974-1978  Gordon Cameron  Hamilton
1978-1983  Frank Guttman  Montreal
1989-      Ray Postuma  Winnipeg
FOUNDING MEMBERS

CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS
L'ASSOCIATION CANADIENNE DE CHIRURGIE PÉDIATRIQUE

Michael ALLEN
Phillip ASHMORE
Harvey BEARDMORE
Gordon CAMERON
Pierre-Paul COLLIN
Jean DESJARDINS
Jacques DUCHARMÉ
Frederick DUVAL
James FALLIS
Colin FERGUSON*
Alex GILLIS
Frank GUTTMAN
Angus JUCKES
Gordon KARN*
Richard KENNEDY
Murray KLIMAN
Samuel KLING
Donald MARSHALL
Russell MARSHALL
Stanley MERCER
David MURPHY
Herbert OWEN*
Barry SHANDLING
Israel SHRAGOVITCH*
James SIMPSON*
Clinton STEPHENS*
Jacques TURCOT*

* indicates deceased

1st ANNUAL MEETING was held January 22, 1969 in VANCOUVER
FUTURE C.A.P.S MEETINGS:

27th ANNUAL MEETING:
Saturday, SEPT. 2-4, 1995, MONTREAL
Chéribourg Resort near Sherbrooke
followed by joint meeting with the
French Pediatric Surgery Association
Paris, France
arrive Tuesday, Sept. 5, 1995
meeting Thursday, Sept. 7-9, 1995
return on Saturday, Sept. 9, 1995

28th ANNUAL MEETING:
Sunday, August 18-20, 1996, HALIFAX

29th ANNUAL MEETING:
September 1997
Banff or Lake Louise**

30th ANNUAL MEETING:
Friday, SEPT. 25-27, 1998, TORONTO*

31th ANNUAL MEETING:
Friday, SEPT. 24-26, 1999, MONTREAL*

32th ANNUAL MEETING:
Friday, SEPT. 22-24, 2000, OTTAWA*

** dates and locations are tentative
*dates and locations are those of the Royal College
IMPORTANT ANNOUNCEMENT
FROM THE PUBLICATION COMMITTEE

RE: 1995 PAPERS
27th Annual Meeting in
MONTREAL
September 2-4, 1995

Papers presented at the 1995 annual CAPS meeting may be selected for publication in the Journal of Pediatric Surgery. The publication committee requires SIX (6) copies of the manuscript to be submitted FOUR WEEKS before presentation to:

Dr SALAM YAZBECK
Chairman, Publication Committee
Canadian Association of Paediatric Surgeons
Hopital Ste. Justine
3175 Cote Ste. Catherine
Montreal, PQ, H3T 1C5

All manuscripts must adhere strictly to the "Information for Contributors" which appears in the Journal of Pediatric Surgery. Failure to do so will of necessity invalidate consideration of the manuscript for publication.
Dr. J. Alex HALLER, Jr.

We are very pleased that Dr. Alex Haller accepted our invitation to be the Guest Lecturer for this Annual Meeting of CAPS in Toronto. Dr. Haller is no stranger to Pediatric Surgeons. He is well known for his pioneering work in Pediatric Trauma and the care of the injured child. Besides being the Robert Garrett Professor of Pediatric Surgery at the Johns Hopkins University of Medicine in Baltimore, he is also Professor of Emergency Medicine and Pediatrics at that university. Dr. Haller is the Children's Surgeon-in-Charge at his hospital. Alex is a MD graduate from Hopkins and trained in Zurich, the
National Heart Institute in Bethesda, the John Hopkins Hospital, and the University of Pennsylvania. Apart from a four year hiatus when he was at the University of Louisville, Alex's university and hospital appointments have been with the John Hopkins University School of Medicine since 1958. He holds certifications in General, Pediatric and Thoracic Surgery. Alex is a member of numerous societies, including pediatric surgeons, university surgeons, thoracic, pediatric research, vascular surgery, trauma surgery, to name a few. He is on the editorial board of several leading Pediatric, General Surgery and Trauma journals. Dr. Haller's CV lists 345 published articles and 54 books and book chapters. His areas of publication include cardiac surgery, vascular surgery, pediatric general surgery, chest and abdominal wall deformities, surgical immunology, and pediatric critical care and trauma.

Dr Haller will be the Visiting Professor to a number of Canadian Pediatric Surgical Centres after the meeting and will be accompanied by his spouse Dr Emily Haller. The Hallers have four children. It's indeed an honor to have Dr Haller as the 1994 CAPS Guest Lecturer. Please join us in welcoming the Hallers to the CAPS "fold"!

CAPS is also pleased to acknowledge that

Dr. J. Alex HALLER, Jr.

is the Speaker

for the Royal College of Physicians and
Surgeons of Canada
RESIDENT PAPERS

The papers presented by Surgical Residents are adjudicated by a panel of members from the Publication and/or Program Committees. There are two award categories: the best Clinical paper and the best Experimental paper. Selection will be made only from the Original Papers Category. Each award is $250. The Program Committee normally tries to schedule the Resident papers during the first two days of the meeting to enable the awarding of the Resident Prizes during the Presidential Dinner. Since some of this year's Resident papers have to be presented on the final day, the Resident Prizes will be awarded after the annual meeting and announced in the next issue of CAPSULE.

WINNERS OF THE 1993 RESIDENT BEST PAPER AWARDS:

Best Clinical Paper: Dr. K.S. Shaw for the paper:
IMPROVED SURVIVAL OF CONGENITAL DIAPHRAGMATIC HERNIA BASED ON PRENATAL ULTRASOUND DIAGNOSIS AND REFERRAL TO A COMBINED OBSTETRICAL-PEDIATRIC SURGICAL CENTER
K.S. Shaw, D. Filatrault, S. Yazbeck and D. St-Vil
Hôpital Sainte-Justine, Montreal

Best Experimental Paper: Dr. A. Graham for the paper:
A STUDY OF INTRA-ABDOMINAL CO2 INSUFFLATION IN THE PIGLET.
A. Graham, D. Jirisch, K. Barrington, A. Hayashi,
Surgical Medical Research Institute, University of Alberta, Edmonton.

Congratulations Dr. Graham and Dr. Shaw !!!
THE COAT OF ARMS
OF THE
CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS
L'ASSOCIATION CANADIENNE DE CHIRURGIE PÉDIATRIQUE

Heraldic Blazon

Per pale gules and purpure, dexter a scalpel erect entwined by a serpent, sinster a child standing, all argent.
Crest: On three maple leaves slipped gules and backed purpure, the date 1967.
Motto: "Je le pensay, Dieu le guarit."

Description

The red and purple of the arms are also the colours of the Royal College of Physicians and Surgeons of Canada and represent the blood met in surgery - arterial and venous. The scalpel with the healing serpent of Æsculapius, and the figure of a well child combine to symbolize the practice of Paediatric Surgery.

The crest is the Canadian maple leaf and the founding date of the Association (1967).

The Motto is a quotation from Ambroise Pare, a father of modern surgery. The sixteenth-century French translates, "I treat him, God cures him."

INSTRUCTIONS for the SCIENTIFIC PROGRAM
abbreviations used in following pages:

O-Original, 10 minute paper, followed by 5 minute discussion
R-Resident paper presentation, eligible for Resident Paper Prize Competition
C-Case presentation, Special technique or Methods; 5 minute presentation followed by 5 minute discussion after the second Case Presentation; not eligible for Resident Paper Prize Competition

Underlined name indicates the Presenter

Authors are reminded to submit SIX copies of their paper FOUR weeks before the meeting
to the chairperson of the Publication Committee:
Dr. Salam Yazbeck
Chair, CAPS Publication Committee
Hopital Ste. Justine
3175 Cote Ste. Catherine
Montreal, PQ, H3T 1C5

XX
programme détaillé

programme schedule

TORONTO
September 19-21, 1994
# TITLES/AUTHORS/CENTRE

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| 1 | O   | 0800-0815 Mon. Sep 19 | PROGRESS IN TREATMENT OF PRIMARY HEPATIC MALIGNANCIES  
Brian D. Kenney, Ana Carceller, Kenneth S. Shaw, Dickens St-VII,  
Aré L. Bensoussan, Sami Youssif and Hervé Blanchard  
Hôpital Sainte-Justine, Montreal, Canada |
| 2 | O   | 0815-0830 Mon. Sep 19 | SELECTIVE DISTAL SPLENORENAL SHUNTS FOR INTRACTABLE  
VARICEAL BLEEDING IN PEDIATRIC PORTAL HYPERTENSION  
S Evans, MC Stovroff, KF Heiss, and RR Rickets  
Emory University School of Medicine, Atlanta, USA |
| 3 | O   | 0830-0845 Mon. Sep 19 | PERSISTENT HYPERINSULINEMIC HYPOGLYCEMIA  
OF INFANCY: EXPERIENCE WITH 28 CASES.  
A Al-Rabeeah, A Al-Ashwal, A Al-Herbish, N Al-Jurayyin and N Sakati.  
King Faisal Specialist Hospital & Research Center and  
King Khalid University Hospital, Riyadh, Saudi Arabia |
| 4 | O   | 0845-0900 Mon. Sep 19 | VASCULAR COMPLICATIONS FOLLOWING PEDIATRIC LIVER  
TRANSPLANTATION  
Michel Lallier, Dickens St-VII, Josée Dubois, Khazal Paradis, Jean Martin  
Laberge, Aré L. Bensoussan,  
Frank M. Guttman and Hervé Blanchard  
Hôpital Sainte-Justine, Montreal, Canada |
| 5 | C   | 0900-0905 Mon. Sep 19 | HEPATIC ARTERY LIGATION FOR HEPATIC HEMANGIOMA WITH  
ARTERIO-VENOUS AND ARTERIO-PORTAL SHUNTS IN THE NEWBORN  
Frans WJ Hazebroek, Dick Tibbon, Simon GF Robben and Jan C  
Molenaar  
Sophia Children's Hospital and Erasmus University Medical School,  
Rotterdam, Netherlands |
| 6 | C   | 0905-0910 Mon. Sep 19 | AORTO-ENTERIC FISTULA FOLLOWING HEPATIC TRANSPLANTATION  
WITH AORTIC CONDUIT GRAFT  
Brian D Kenney, Baird M Smith, Dickens St-VII, Jean-Martin Laberge,  
André Weber, Laurent Garel and  
Hervé Blanchard  
Hôpital Sainte-Justine, Montreal, Canada |
| 7 | O   | 0915-0930 Mon. Sep 19 | BLOOD LOSS AND TRANSFUSION FOLLOWING RESECTION OF  
SACROCOCCYGEAL TERATOMA.  
A ROLE FOR APROTinin?  
JA Morecroft, RJ Brenelton, DP Drake, EM Kiely, VM Wright, L Spitz  
Hospital for Sick Children, London, England |
| 8 | C   | 0930-0935 Mon. Sep 19 | COLORECTAL CARCINOMA FOLLOWING ABDOMINAL RADIOTHERAPY  
FOR PEDIATRIC SOLID TUMOURS  
JC Langer, JP Molleston, CM Coflin, CJ Burul  
St. Louis Children’s Hospital and St. Joseph’s Health Centre, Toronto,  
Canada |
| 9 | C   | 0935-0940 Mon. Sep 19 | NECROTIZING FASCITIS IN CHILDHOOD  
R Granger, J Murphy, GK Blair, GG Miller, GC Fraser  
British Columbia's Children's Hospital, Vancouver, Canada |
| 10 | O   | 0945-1000 Mon. Sep 19 | TOBOGGAN INJURIES  
P. Kim, D Wesson, M Hendrickson, G Haddock, D Bohn  
The Hospital for Sick Children, Toronto, Canada |

1000-1030 COFFEE

O=original, 10 minute paper; R=Resident paper; C=5 minute case
### Scientific Program
**Monday, September 19, 1994**
**Trinity Room, Marriott**

#### 10:30-13:15  **SCIENTIFIC SESSION TWO**, Trinity 3-5
Co-Chairmen / Les Co-Presidentes:
Dr. D. Girvan and Dr. P. Soucy

<table>
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<tr>
<td>11</td>
<td>O R</td>
<td>1030-1045 Mon. Sep 19</td>
<td>ARE DA1 DOPAMINE RECEPTORS FUNCTIONAL IN NEWBORN PIGLET MESENTERIC AND RENAL VASOCULTURES? R James Pearson, Dennis W Jirsch, Keith J Barrington, Po-Yin Cheung Surgical Medical Research Institute, University of Alberta, Edmonton, Canada</td>
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<tr>
<td>12</td>
<td>O</td>
<td>1045-1100 Mon. Sep 19</td>
<td>SPECIFIC ACCEPTANCE OF FETAL BOWEL GRAFT AFTER TREATMENT WITH ANTIBODIES TO ICAM-1 AND LFA-1 Y Kato, A Yamalaka, H Yagita, H Basuya, H Kobayashi, K Okamura, T Miyano Departments of Pediatric Surgery and Immunology Juntendo University School of Medicine, Tokyo, Japan</td>
</tr>
<tr>
<td>13</td>
<td>O</td>
<td>1100-1115 Mon. Sep 19</td>
<td>AN INTRALUMINAL MODEL OF NECROTIZING ENTEROCOLITIS (NEC) IN THE DEVELOPING NEONATAL PIGLET M Di Lorenzo, J Bass, A Krantis Departments of Physiology and Surgery, University of Ottawa, Canada</td>
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<td>14</td>
<td>O</td>
<td>1115-1130 Mon. Sep 19</td>
<td>THE PRINCIPLES OF NORMAL AND ABNORMAL HINDGUT DEVELOPMENT Dietrich Kloth Department of Paediatric Surgery, University Hospital, Hamburg, Germany</td>
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<tr>
<td>15</td>
<td>O</td>
<td>1130-1145 Mon. Sep 19</td>
<td>FETAL RABBIT GASTROINTESTINAL DEVELOPMENT: IMPLICATIONS FOR GENE THERAPY ML Brandt, J Eckert, T Watrapt, M Wani, C Lau, M Finegold, S Henning Departments of Surgery, Pediatrics and Pathology Baylor College of Medicine and Texas Children's Hospital, Houston, USA</td>
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<td>16</td>
<td>C</td>
<td>1145-1150 Mon. Sep 19</td>
<td>FAMILIAL NON-APPLE PEEL JEJUNAL ATRESIA WITH RENAL DYSPLASIA SK Srinath, JC Langer Washington University School of Medicine, St. Louis, USA</td>
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<tr>
<td>17</td>
<td>C R</td>
<td>1150-1155 Mon. Sep 19</td>
<td>BUTTON-PGENCY REPAIR OF ILEOSTOMY AND COLOSTOMY PROLAPSE K Canil, P Fitzgerald, G Lau, G Cameron Children's Hospital at Chedoke-McMaster, Hamilton, Canada</td>
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<tr>
<td>18</td>
<td>O R</td>
<td>1200-1215 Mon. Sep 19</td>
<td>LONG-TERM ADMINISTRATION OF NOVEL IMMUNOSUPPRESSIVE AGENTS ALTERS GROWTH, NUTRITION AND SMALL BOWEL FUNCTION IN THE RAT NL Yancher, R Fedorak, N Kneteman, D Sigalit Departments of Surgery and Medicine, University of Alberta, Edmonton, Canada</td>
</tr>
</tbody>
</table>
|     | 1215-1315 Mon. Sep 19 | Fred MacLeod Lecture  
Dr. J. Alex Haller, Jr. |

"Surgical Management of Life Threatening Injuries in Children: What have we learned and what are the Challenges for the Year 2000"

**Free Afternoon and Evening**

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<tr>
<td>19</td>
<td>O</td>
<td>800-815</td>
<td>THE INCIDENCE AND SPECTRUM OF NEUROLOGIC INJURY FOLLOWING OPEN FETAL SURGERY</td>
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<td>Tue. Sep 20</td>
<td>FOR CONGENITAL ANOMALIES</td>
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<tr>
<td></td>
<td>O</td>
<td>830-845</td>
<td>John F Bealer, Eric D Skarsgard, Walter E Finkbeiner, N Scott Adzick, Michael R</td>
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<td>Tue. Sep 20</td>
<td>Harrison</td>
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<td>O</td>
<td>815-830</td>
<td>EVALUATION OF CO2, He, AND H2O AS MEDIA FOR HYSTEROSCOPIC FETAL SURGERY</td>
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<td>Tue. Sep 20</td>
<td>GJ Pelletier, SK Srinathan, PK Haberg, RH Ball, JC Langer</td>
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<td>Washington University, St. Louis, USA</td>
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<tr>
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<td>O</td>
<td>0830-0845</td>
<td>COMPLICATIONS OF MASSIVE FETAL ASCITES</td>
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<td>Tue. Sep 20</td>
<td>H Flageole, E Hashim, J-M Laberge, VR Adolph, S Khalife</td>
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<td>Montreal Children's Hospital, Montreal, Canada</td>
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<td>C</td>
<td>0845-0850</td>
<td>SUCCESSFUL TREATMENT OF CONGENITAL CHYLOUS ASCITES WITH A SOMATOSTATIN ANALOGUE</td>
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<td>Tue. Sep 20</td>
<td>MG Caty, Mary Hilliker, Richard G Azzizkan, Philip L Glick</td>
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<td>Children's Hospital of Buffalo, University at Buffalo, State University of New York</td>
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<td>Buffalo, USA</td>
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<td>0850-0855</td>
<td>SCLEROSING OF RECURRENT LYMPHANGIOMA USING OK-432</td>
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<td>Tue. Sep 20</td>
<td>M Mikhail, R Kennedy, B Cramer, T Smith</td>
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<td></td>
<td>The Dr. Charles A. Janeway Child Health Center, St. John's, Canada</td>
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<tr>
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<td>O</td>
<td>0900-0915</td>
<td>STRATIFICATION OF INJURY SEVERITY USING ENERGY EXPENDITURE RESPONSE IN SURGICAL INFANTS</td>
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<td>Tue. Sep 20</td>
<td>RW Letton, WJ Chwals</td>
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<td>O</td>
<td>0915-0930</td>
<td>FETAL ENDOSCOPIC (&quot;FETENDOSCOPIC&quot;) SURGERY; THE RELATIONSHIP BETWEEN INSUFFLATION</td>
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<td>Tue. Sep 20</td>
<td>PRESSURE AND THE PLACENTAL CIRCULATION</td>
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<td>0930-0945</td>
<td>Eric D Skarsgard, Martin Meuli, John F Bealer, N Scott Adzick, Michael R Harrison</td>
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<td>Tue. Sep 20</td>
<td>The Fetal Treatment Center, UCSF, San Francisco, USA</td>
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<tr>
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<td>O</td>
<td>0945-0950</td>
<td>GASTROSCHISIS: IS PRIMARY CLOSURE BEST?</td>
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<td>Tue. Sep 20</td>
<td>L Kallianen, K Kimura, A Sandler, J Lawrence, R Soper</td>
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<td>University of Iowa College of Medicine, Iowa City, USA</td>
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<td>0945-0950</td>
<td>GASTROSCHISIS-A SIMPLE TECHNIQUE FOR STAGED SILO CLOSURE IN THE NICU</td>
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<td>James D Fischer, Karen Chun, Don Moores, H Gibbs Andrews</td>
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<td>Loma Linda University Children's Hospital, Loma Linda</td>
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<td>0950-0955</td>
<td>SPINAL ANESTHESIA (SA) FOR PYLORIC STENOSIS: THE NEW &quot;GOLD STANDARD&quot; FOR OPERATIVE MANAGEMENT?</td>
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<td>M Keller, C Abajian, D Vane</td>
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<td>University of Vermont College of Medicine, Burlington, USA</td>
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<td>O</td>
<td>1000-1015</td>
<td>INTUSSUSCEPTION AFTER OPERATION: MANAGEMENT GUIDELINES FOR AN UNCOMMON PROBLEM</td>
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<td>RE Kelly Jr, MC Stovroff, PL Glick, RG Azzizkan, JE Allen</td>
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<td>The Children's Hospital of Buffalo, University at Buffalo, State University of New</td>
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10:15-10:45 COFFEE

O=original, 10 minute paper; R=Resident paper; C=5 minute case
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<td>30</td>
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<td>1045-1100</td>
<td>REVERSIBLE TRACHEAL OBSTRUCTION IN FETAL SHEEP: EFFECT ON TRACHEAL PRESSURES AND LUNG GROWTH</td>
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<td>E Hashim, J-M Laberge, MF Chen, E Quillen</td>
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<td>Department of Surgery, Montreal Children's Hospital, McGill University, Montreal, Canada</td>
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<td>31</td>
<td>O</td>
<td>1100-1115</td>
<td>COMBINED VENTILATION AND PERFLUOROCHEMICAL (PFC) TRACHEAL INSTILLATION AS AN ALTERNATIVE TREATMENT FOR NEAR-DEATH CONGENITAL DIAPHRAGMATIC HERNIA</td>
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<td>D Major, M Cadenas, R Cioutier, L Fournier, TH Shaffer, MR Wollson</td>
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<td>Unité de recherche en pédia trie, Centre Hospitalier de l'Université Laval, Saint-Foy, Québec</td>
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<td>Temple University School of Medicine, Philadelphia, USA</td>
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<td>32</td>
<td>O</td>
<td>1115-1130</td>
<td>SURGERY FOR CONGENITAL DIAPHRAGMATIC HERNIA: AN ELECTIVE PROCEDURE AFTER WEANING FROM EXTRACORPOREAL MEMBRANE OXYGENATION</td>
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<td>D Sigalot, V Adolph, A Tierney, T L Perretault, N Finer, R Hallgren, J-M Laberge</td>
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<td>Royal Alexander Hospital, Edmonton and Montreal Children's Hospital, Canada</td>
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<td>33</td>
<td>O</td>
<td>1130-1145</td>
<td>SURVIVAL IN NEONATAL CONGENITAL DIAPHRAGMATIC HERNIA WITHOUT EXTRACORPOREAL MEMBRANE OXYGENATION SUPPORT</td>
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<td>A Maher, M Giacomantonio, K Pippus, E Rees, DA Gillis</td>
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<td>Department of Pediatric Surgery, Isaak Walton Killam Hospital for Children, Halifax, Canada</td>
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<td>34</td>
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<td>1145-1200</td>
<td>ELEVATED PULMONARY COLLAGEN IN THE LAMB CONGENITAL DIAPHRAGMATIC HERNIA MODEL</td>
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<td>Michael J Hassett, Philip Glick, Harsh L Karamanoukian, Jon E Rossman, Duncan T Wilcox, Richard G Azizkhan</td>
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<td>Buffalo Institute of Fetal Therapy, Department of Surgery, The Children's Hospital of Buffalo, and State University of New York at Buffalo, USA</td>
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<td>35</td>
<td>O</td>
<td>1200-1215</td>
<td>TESTICULAR FATE AFTER INCARCERATED HERNIA REPAIR AND/OR ORCHIDOPEXY PERFORMED BELOW SIX MONTHS OF AGE</td>
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<td>Tue. Sep 20</td>
<td>L Walc, J Bass, S Rubin, M Walton</td>
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<td>Department of Surgery, Children's Hospital of Eastern Ontario, University of Ottawa, Canada</td>
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<td>36</td>
<td>O</td>
<td>1215-1230</td>
<td>INJURY OF THE VAS DEFERENS ASSOCIATED WITH PEDIATRIC INGUINAL HERNIORRHAPY</td>
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<td>Tue. Sep 20</td>
<td>Mary Li, H Rich, B Chenka, S Brandt, M Wipf</td>
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<td>Minneapolis Children's Medical Center, USA</td>
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<td>37</td>
<td>C</td>
<td>1230-1235</td>
<td>CONJOINED TWINS: EXPERIENCE WITH EIGHT SETS</td>
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<td>Tue. Sep 20</td>
<td>A Al-Rabeegah, S Ahmed, A Al-Rejail, T. Linjawi</td>
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<td>King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia</td>
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<td>1235-1240</td>
<td>CHRONIC VENOUS ACCESS USING ENDOGENOUS SPLEenic TISSUE: THE &quot;SPLEEN-O-PORT&quot;</td>
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<td>Tue. Sep 20</td>
<td>Samuel M Ataish, Lakshmanam D Narla, Charles E Bagwell</td>
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<td>Divisions of Pediatric Surgery and Pediatric Radiology, Medical College of Virginia, VCU, Richmond, USA</td>
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<td>39</td>
<td>O</td>
<td>1245-1300</td>
<td>IS ABDOMINAL CAVITY CULTURE OF ANY VALUE IN APPENDICITIS?</td>
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<td>Tue. Sep 20</td>
<td>R Blik, B Shandling, C Burnweit</td>
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O=original, 10 minute paper; R=Resident paper; C=5 minute case

Members' Business Luncheon Meeting follows this session
Presidential Reception and Dinner at 19:00 in the Trinity Ballroom
## Scientific Program

**Wednesday, September 21, 1994**

**Trinity Room, Marriott**

**07:00-08:00** Continental Breakfast, Foyer, Trinity 3-5

**08:00-10:00** **SCIENTIFIC SESSION FIVE**, Trinity 3-5

Co-Chairmen / Les Co-Presidents:

Dr. K. Heiss and Dr. J. Bass

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| 40 | O | 0800-0815 | PEDIATRIC LAPAROSCOPIC SPLENECTOMY  
Loma Linda University Children's Hospital, Loma Linda, USA  |
| 41 | R | 0815-0830 | LAPAROSCOPIC ANTIREFUX SURGERY: EVALUATION OF CRURAL CLOSURE TECHNIQUES  
D. Chamberlain, P. Fitzgerald, M. Marcaccio, M. Walton  
Children's Hospital at Chedoke-McMaster, Hamilton, Canada  |
| 41 | C | 0830-0835 | GASELESS LAPAROSCOPY IN INFANTS: THE RABBIT MODEL  
D. Lukas, H. Peers, J. A. Deprest, T. Leurte  
Centre for Surgical Technologies, Catholic University Leuven, Belgium  |
| 42 | C | 0835-0840 | LAPAROSCOPIC ASSISTED PERCUTANEOUS ENDOSCOPIC GASTROSTOMY  
G. Sterngel, E. Geller, M.S. Lowenheim  
State University of New York at Stony Brook, USA  |
| 44 | O | 0845-0900 | THORACOSCOPY IN THE MANAGEMENT OF PEDIATRIC EMPYEMA  
M. Stovroff, G. Teague, K. F. Heiss, P. M. Parker, R. R. Rickets  
Emory University School of Medicine, Atlanta, USA  |
| 45 | O | 0900-0915 | THE DISTRIBUTION OF NITRIC OXIDE (NO) SYNTHESIZING NEURONS IN THE MYENTERIC PLEXUS OF THE DEVELOPING PIGLET INTESTINE  
M. Di Lorenzo, J. Bass, A. Krantis  
Departments of Physiology and Surgery  
University of Ottawa, Canada  |
| 46 | O | 0915-0930 | IMMUNOHISTOCHEMICAL STUDIES IN HIRSCHSPRUNG'S DISEASE UTILIZING FORMALIN FIXED PARAFFIN BLOCKED TISSUE: AN ANALYSIS OF NEUROPEPTIDE DISTRIBUTION ON "AGANGLIONIC" AND "NORMOGANGLIONIC" SEGMENTS  
D. J. L. Alfer, S. Masood, L. Lu  
Nemours Children's Clinic, Jacksonville, USA  |
| 47 | R | 0945-0945 | WHAT ARE THE DIAGNOSTIC CRITERIA FOR INTESTINAL NEURONAL DYSPLASIA?  
H. Kobayashi, H. Hirakawa, P. Kuri  
Children's Research Centre, Our Lady's Hospital for Sick Children, Dublin, Ireland  |
| 48 | C | 0945-0950 | SALVAGE OF SOAVE-BOLEY ENDORECTAL PULL-THROUGH BY CONVERSION TO A CLASSICAL SOAVE PROCEDURE  
V. R. Dolphi, H. Flageole, J. M. LaBerge, F. M. Guttman  
Department of Surgery, Montreal Children's Hospital, McGill University, Montreal, Canada  |
| 49 | C | 0950-1000 | COLONIC ATRESIA COMBINED WITH HIRSCHSPRUNG'S DISEASE: A DIAGNOSTIC AND THERAPEUTIC CHALLENGE  
P. Ki, R. Superina, S. Ein  
The Hospital for Sick Children, Toronto, Canada  |
| 50 | C | 1000-1000 | THE COMPLETE SPECTRUM OF NEUROCRISTOPATHY  
M. Stovroff, K. F. Heiss, F. Dykes, R. R. Rickets  
Emory University School of Medicine, Atlanta, USA  |

**10:10-10:40** COFFEE

O = original, 10 minute paper; R = Resident paper; C = 5 minute case
Scientific Program  
Wednesday, September 21, 1994  
Trinity Room, Marriott  
10:40-12:25 SCIENTIFIC SESSION Six Trinity 3-5  
Co-Chairmen / Les Co-Presidents:  
Dr. A. Hayashi and Dr. R. Cloutier  

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| 51 | O   | 1040-1055 | LONG GAP OESOPHAGEAL ATRESIA  
   |     | Wed. Sep 21 | Robert Black, Mark Evans, David Girvan  
   |     |             | Division of Paediatric Surgery, Children's Hospital of Western Ontario, London, Canada |
| 52 | O   | 1055-1110 | LONG-TERM COMPLICATIONS IN ISOLATED OESOPHAGEAL ATRESIA TREATED WITH OESOPHAGEAL ANASTOMOSIS  
   |     | Wed. Sep 21 | H Lindahl, R Rintala  
   |     |             | Children's Hospital, University of Helsinki, Finland |
| 53 | O   | 1110-1125 | TWENTY FOUR HOUR MANOMETRIC pH METRIC EVIDENCE OF PERMANENT IMPAIRMENT OF CLEARANCE CAPACITY IN OESOPHAGEAL ATRESIA PATIENTS  
   |     | Wed. Sep 21 | JA Tovar, JA Diaz Pardo, G Prieto, M Molina, J Murcia, I Polanco  
   |     |             | Hospital Infantil La Paz, Universidad Autónoma, Madrid, Spain |
| 54 | C   | 1125-1130 | THE APPLICATION OF COLLIS GASTROTOMY TO THE MANAGEMENT OF ISOLATED OESOPHAGEAL ATRESIA  
   |     | Wed. Sep 21 | MG Evans  
   |     |             | Children's Hospital of Western Ontario, London, Canada |
| 55 | C   | 1130-1135 | ENDOSCOPIC CLOSURE OF RECURRENT TRACHEOESOPHAGEAL FISTULA USING TISSEEL  
   |     | Wed. Sep 21 | NE Wiseman  
   |     |             | Children's Hospital, Winnipeg, Canada |
| 56 | O   | 1140-1155 | ISOLATED CONGENITAL OESOPHAGEAL STENOSIS  
   |     | Wed. Sep 21 | Stephen G Murphy, Salam Yazbeck, Pierre Russo  
   |     |             | Hôpital Sainte-Justine, Montreal, Canada |
| 57 | C   | 1155-1200 | COLON PATCH ESOPHAGOPLASTY FOR CAUSTIC OESOPHAGEAL STRicture  
   |     | Wed. Sep 21 | Alfred Kennedy, BH Cameron, CW McGill  
   |     |             | Geisinger Medical Center, Danville, USA |
| 58 | C   | 1200-1205 | SIBLINGS WITH ALPORT'S SYNDROME REQUIRING RESECTION FOR OESOPHAGEAL LEIOMYOMATOSIS  
   |     | Wed. Sep 21 | Stephen G Murphy, Kenneth S Shaw, Ané L Bensoussan  
   |     |             | Hôpital Sainte-Justine, Montreal, Canada |
| 59 | O   | 1210-1225 | THE SAFETY OF HOME-CARE TRACHEOTOMY IN CHILDREN  
   |     | Wed. Sep 21 | A Messineo, F Giusti, N Surendra, L Antoniello, M Guillelmi  
   |     |             | University of Padua, Italy |

|       |       | 12:25    | Meeting Adjourns |

O=original, 10 minute paper; R=Resident paper; C=5 minute case

NOTE:  
SIMPSON MEMORIAL LECTURE  
All participants are invited to the Hospital for Sick Children immediately after the close of the meeting for a Buffet Luncheon at 12:45 PM and the Annual Simpson Memorial Lecture at 13:30-14:30. This will be followed by a tour of the new Sick Kids Atrium and Facilities for those wishing to see the new facilities.

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ABSTRACTS

abbreviations:

O = original 10 minute paper and 5 minute discussion
R = resident paper, same time limits
C = 5 minute case/technique report; discussion follows second Case report paper
1. Monday, 08:00-08:15; O, R

PROGRESS IN TREATMENT OF PRIMARY HEPATIC MALIGNANCIES

Brian D. Kenney, Ana Carceller, Kenneth S. Shaw, Dickens St-Vil, Arié L. Bensoussan, Sami Youssef and Hervé Blanchard
Hôpital Sainte-Justine, Montreal, Canada

To assess the outcome of treatment for primary hepatic malignancies of childhood, records of all cases of primary hepatic malignancy treated between 1960 and 1994 were reviewed. The 37 cases included 22 (59%) hepatoblastomas, 11 (30%) hepatocellular carcinomas, and 4 (11%) sarcomas or malignant mesenchymomas. Patients treated prior to 1980 were compared to more recent patients to correspond with the introduction of effective chemotherapy. Patients with hepatoblastoma were younger (mean age 2.5 ± 2.8 years, range 3 months-14 years) than non-hepatoblastoma patients (mean age 10.3 ± 2.4 years, range 6-13 years). No gender differences were apparent except for hepatoblastoma where males were twice as frequent as females. In the early group, six patients with anatomically unresectable tumors and one patient with obvious metastatic disease underwent biopsy without resection. Tumor size was not a contraindication for resection. Mean blood loss was 1493 ml (range 75-6500 ml). Three deaths occurred among 30 patients for whom curative resection was attempted. Mean duration of follow-up for survivors is survival improved from 36% (4/11) to 71% (12/17). The greatest improvement was for hepatoblastoma patients whose survival increased from 43% (3/7) to 83% (10/12). Increased survival was associated with improvements in perioperative care and chemotherapy but without the use of other advanced technologies such as magnetic resonance imaging, intraoperative ultrasonography, Cavitron ultrasonic aspirator or hemodilution. The most important factor influencing survival remains complete surgical resection.

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SELECTIVE DISTAL SPLENORENAL SHUNTS FOR INTRACTABLE VARICEAL BLEEDING IN PEDIATRIC PORTAL HYPERTENSION

S Evans, MC Stovroff, KF Heiss, and RR Rickets
Emory University School of Medicine, Atlanta, USA

The treatment of portal hypertension in the pediatric population has undergone an evolution towards and less invasive methods of care. With the advent of endoscopic sclerotherapy surgery is less common in the acute care of these patients. Few reports deal with the role of portosystemic shunting in the emergent management of variceal hemorrhage in children.

To address this issue, we studied the medical records of all pediatric patients at this institution who underwent a shunt for portal hypertension during the last 10 years. Eight patients underwent emergent shunting procedures. Six were boys and two were girls. Six patients had portal hypertension as a result of intrahepatic disease. Two patients had extrahepatic portal vein thrombosis. Five children had abnormal hepatic function. The average age at the time of procedure was 9.5 years. The indication for surgical shunting in all cases was gastrointestinal hemorrhage not responsive to sclerotherapy. All children had transfusion requirements of blood volumes greater than 40 cc/kg prior to surgical intervention. Seven patients underwent emergent distal splenorenal shunt (DSRS) and one patient underwent a nonselective mesocaval shunt. Postoperatively, all patients had cessation of their bleeding. Operative mortality was zero. Early complications included ascites (3), small bowel obstruction (1), and hepatorenal syndrome (1). The child who underwent a non-selective shunt developed encephalopathy. One DSRS thrombosed requiring re-exploration with seven shunts remaining patent (88%). Three patient went on to orthotopic live transplantation (OLT) due to progressive hepatic failure. Two children died with neither death being shunt related.

In summary this study suggests that selective shunts still have a role in the care of pediatric patients with portal hypertension. The DSRS is well tolerated and provides increased survival in the child with variceal bleeding unresponsive to medical management. It has minimal morbidity with excellent long-term patency and can be a life sustaining measure in children prior to OLT.

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Mark C. Stovroff, M.D.
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tel. 404 248-3714; fax 404 248-5030.
Between 1983 and 1993, twenty-eight infants with persistent hyperinsulinemic hypoglycemia of infancy (PHHI) were seen. The age of presentation ranged from a few hours to six months. There were 13 males and 15 females. Consanguinity was reported in 20 (71.4%) cases. One family had two affected siblings and two affected cousins. Another family had three affected siblings and one affected cousin. Three other families reported loss of siblings due to hypoglycemia and seizures. Clinical presentation was mainly with jitteriness and seizures in association with hypoglycemia. The diagnosis was suspected with glucose requirement was more than 12 mg/kg/min and also with good response to glucagon after exclusion of metabolic and storage diseases. A high insulin to glucose ratio was seen in all patients. Twenty-one patients had 90% pancreatectomy with an excellent result in all but four who required supplemental medical therapy. Six patients were treated medically and one patient's family refused treatment. Twelve patients sustained moderate to severe brain insult prior to diagnosis. There were no deaths and only one patient showed evidence of malabsorption following pancreatectomy.

In conclusion, PHHI seems to correlate well with consanguinity and family history. It also requires clinical awareness to allow early diagnosis and prompt medical and supportive therapy. Early surgery is recommended in most cases to avoid permanent brain damage. It appears the 90% pancreatectomy offers the best surgical outcome without morbidity or mortality.

D. A. Gillis

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VASCULAR COMPLICATIONS FOLLOWING PEDIATRIC LIVER TRANSPLANTATION

Michel Lallier, Dickens St-Vil, Joséée Dubois, Khazal Paradis, Jean Martin Laberge, Arié L. Bensoussan, Frank M. Guttmann and Herve Blanchard
Hôpital Sainte-Justine, Montreal, Canada

Between February 1986 and March 1994, 80 hepatic transplantations have been performed in 72 children with and overall patients survival of 83%. Forty-two patients received whole liver grafts (WLG) and 38 had reduced liver graft (RLG). Fifteen vascular complications occurred in eleven children. The incidence of hepatic artery thrombosis (HAT), portal vein thrombosis (PVT) and aorta-enteric fistula (A-E f) depending on the type of graft, is depicted below.

<table>
<thead>
<tr>
<th></th>
<th>RLG (38)</th>
<th>WLG (42)</th>
<th>Total (80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (yrs)</td>
<td>3.8</td>
<td>7.1</td>
<td>5.6</td>
</tr>
<tr>
<td>Mean weight (kg)</td>
<td>14.8</td>
<td>23.8</td>
<td>19.6</td>
</tr>
<tr>
<td># vasc. compl... (%)</td>
<td>7.0 (18)</td>
<td>8.0 (19)</td>
<td>15.0 (19)</td>
</tr>
<tr>
<td>HAT (%)</td>
<td>3.0 (8)</td>
<td>4.0 (9)</td>
<td>7.0 (9)</td>
</tr>
<tr>
<td>PVT (%)</td>
<td>4.0 (10)</td>
<td>2.0 (5)</td>
<td>6.0 (8)</td>
</tr>
<tr>
<td>A-E f</td>
<td>0</td>
<td>2.0 (3)</td>
<td>2.0 (3)</td>
</tr>
</tbody>
</table>

PVT was associated with technical complication or venous anomaly and required thrombectomy with no graft loss. An aortic conduit used early in this series in 5 patients lead to A-E f in 2 cases, HAT in 1 and 2 deaths. The incidence of HAT did not differ significantly between patients < 10 kgs (10%) and those > 10 kgs (8%). Of 9 graphs with double arterial supply, HAT occurred in 2 patients and 3 patients died from primary non function (2) and inflection (1). Of the 7 cases of HAT, 6 occurred within 30 days and required re transplantation.

Vascular complications have decreased with the use of RLG but aortic conduit (obsolete), anomalous arterial supply in the graft and technical complication remain a significant cause of morbidity and mortality.

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5. Monday, 09:00-09:05; C (five minute paper, with discussion after the next short paper)

HEPATIC ARTERY LIGATION FOR HEPATIC HEMANGIOMA WITH ARTERIO-VENOUS AND ARTERIO-PORTAL SHUNTS IN THE NEWBORN

Frans WJ Hазеброек, Dick Tibboel, Simon GF Robben and Jan C Molenaar
Sophia Children’s Hospital and Erasmus University Medical School,
Rotterdam, Netherlands

A 2 day old boy was admitted with progressive cardiac and respiratory difficulty. A firm liver was palpable with and overlying thrill. Abdominal ultrasound and arteriography revealed diffuse arterio-venous shunts of both liver lobes. Ligation of the hepatic artery provided a remarkable hemodynamic and clinical improvement.

Another boy was admitted 3 weeks after birth because of a one-week history of billious vomiting with abdominal extension and bloody stools. Abdominal examination revealed a larger liver with a systolic bruit and thrill. Plain x-rays of chest and abdomen demonstrated cardiac enlargement and dilated bowel loops with air-fluid levels. Ultrasound and arteriography revealed hepatic hemangioma with arterio-portal shunts. This boy had acute portal hypertension imitating intestinal obstruction. Laparotomy was performed and a large AV malformation was palpated in both liver lobes. The entire small bowel was congested and cyanotic but without signs of obstruction. Ligation of the hepatic artery improved the color of the bowel and the thrill disappeared.

Five and nearly four years after the operation both boys are growing normally without medication or diet. Liver function tests are within normal limits. Ultrasound showed nearly complete resolution of the hemangiomas.

Jan C. Molenaar, MD, Hon. Member

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Monday, 09:05-09:10; C, R (five minute paper, followed by a five minute discussion of this and the previous short paper)

AORTO-ENTERIC FISTULA FOLLOWING HEPATIC TRANSPANTATION WITH AORTIC CONDUIT GRAFT

Brian D Kenney, Baird M Smith, Dickens St-Vil, Jean-Martin Laberge, Andrée Weber, Laurent Gare and Hervé Blanchard
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Aorto-enteric fistula is rare in children and often has a fatal outcome. Patient A, a 3 year-old boy with biliary atresia underwent orthotopic liver transplantation in June 1987. The arterial reconstruction consisted of an aortic conduit from the donor anastomosed to the infernal aorta of the recipient. The postoperative course was complicated by episodes of severe rejection, CMV hepatitis and duodenitis and a laparotomy for repair of a leak from the aortic conduit. On p.o. #62, while patient was being prepared for discharge, he developed a massive upper gastro-intestinal (UGI) bleeding that necessitated an emergent laparotomy. An aorta-duodenal fistula was found but patient died intra-operatively from hypovolemic shock.

Patient B, a 2 year-old boy with biliary atresia, underwent hepatic transplantation in February 1986. Because the right hepatic artery (RHA) originated from the superior mesenteric artery, an aortic conduit was used to perform the arterial anastomosis at the level of the infra-renal aorta. Because of RHA thrombosis, he underwent a second transplant with the new arterial reconstruction at the level of the subdiaphragmatic aorta. The postop course was subsequently uneventful with patient discharged home on day 129. He was readmitted 7 years later with an UGI bleed; gastroscopy showed a pulsatile ulcer at the level of the third stage of the duodenum. Aortography was normal. Two days later, a second major bleed prompted an emergency laparotomy. Intra-op findings include a patent fistula between the duodenum and the aortic conduit of the first graft. The fistula was closed and the duodenum was repaired with a flap of omentum interposition. Patient was subsequently discharged home 10 days later with a stable hemoglobin and no recurrence of bleeding at 6 months follow-up. These 2 cases demonstrated a long-term complication of previously used aortic conduit.

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7. Monday, 09:15-09:30; O, R

BLOOD LOSS AND TRANSFUSION FOLLOWING RESECTION OF SACROCOCXYGEAL TERATOMA. A ROLE FOR APROTININ?

JA Morecroft, RJ Brereton, DP Drake, EM Kiely, VM Wright, L Spitz
Hospital for Sick Children, London, England

Since Smith demonstrated the vascular anatomy of sacrococcygeal teratoma and defined the surgical approach by coccyxectomy and ligation of the median sacral vessels, several series have continued to report deaths from hemorrhage. Despite this, there is no data on blood loss or transfusion requirements following successful resection. In this study blood loss was calculated from pre and post operative haematocrits, estimated blood volume (EBV=80mL/kg) and volume of blood transfused in 30 neonates who underwent resection of a sacrococcygeal teratoma between 1982 and 1992.

Aprotinin (TrasyloI), an inhibitor of fibrinolysis that reduces blood loss in cardiac, vascular and liver transplant surgery, was given to 4 infants undergoing resection of sacrococcygeal teratoma (1mg/kg bolus + 1ml/kg/h infusion). Results are expressed as mean ± sem and compared by unpaired t tests. There was no difference in weight, tumour size, operation time, pre and post operative haematocrit or intraoperative colloid infusion between the two groups.

<table>
<thead>
<tr>
<th></th>
<th>no aprotin. n=30</th>
<th>aprotinin n=4</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>blood (ml)</td>
<td>95 ± 8</td>
<td>37 ± 5</td>
<td>0.02</td>
</tr>
<tr>
<td>loss (%EBV)</td>
<td>42 ± 4</td>
<td>19 ± 5</td>
<td>0.03</td>
</tr>
<tr>
<td>blood (ml)</td>
<td>89 ± 10</td>
<td>20 ± 12</td>
<td>0.02</td>
</tr>
<tr>
<td>transfusion (%EBV)</td>
<td>39 ± 4</td>
<td>12 ± 8</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Resection of sacrococcygeal teratoma is associated with considerable blood loss and transfusion requirements and both may be significantly reduced by the use of aprotinin.

Evelyn H. Dykes

Lewis Spitz
Institute of Child Health, 30 Guildford Street, London WC1N 1EH
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Colorectal carcinoma is well recognized after radiotherapy for cervical cancer in adult women. We report two cases of colorectal cancer appearing many years after abdominal radiotherapy for pediatric solid tumors.

Patient 1 had a right-sided Wilms tumour during infancy, treated with "high-dose" radiation followed by resection. Chemotherapy was not used. At age 30 he presented with rectal bleeding and weight loss, and a strictured right colon. An ileocolic resection was done, and pathology revealed multifocal Duke B carcinomas.

Patient 2 had a retroperitoneal rhabdomyosarcoma which was treated with chemotherapy and total abdominal radiation (3500 cGy) at one year of age, followed by complete resection. At age 2 he developed radiation enteritis which required a small bowel resection. He had no recurrence of this tumour. At age 11 he presented with obstipation and weight loss, and investigation revealed a stricture 5 cm from the anus. Core biopsies showed cellular atypia and inflammation. He underwent low anterior resection with a stapled anastomosis and defunctioning sigmoid colostomy. Pathology revealed a Duke B rectal carcinoma, chronic radiation changes and several adenomatous polyps.

These cases illustrated the potential for malignant change in the intestine many years after abdominal radiation during infancy. Children undergoing abdominal radiotherapy should be followed carefully and investigated aggressively if they develop gastrointestinal symptoms.

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9. Monday, 09:35-09:40; C,R (five minute paper, followed by a five minute discussion of this and the previous short paper)

NECROTIZING FASCIITIS IN CHILDHOOD

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British Columbia’s Children’s Hospital, Vancouver, Canada

Despite several reports stating that necrotizing fasciitis is a rare entity in the pediatric population, we have encountered four cases at our institution over the past twelve months. Two occurred in oncology patients who were profoundly neutropenic. One was receiving chemotherapy for a brain tumor and the second had just received a bone marrow transplant for relapsed leukemia. The other two cases occurred following soft tissue trauma despite normal immune function.

All four patients were treated with aggressive surgical debridement and local wound care, broad-spectrum antibiotics, and nutritional support. In addition, the neutropenic children received granulocyte colony stimulating factor (GCSF). The bone marrow transplant recipient also received granulocyte transfusions.

The leukemia patient died due to overwhelming sepsis and bone marrow graft failure. The other three patients eventually recovered completely, although one experienced a transient neurologic deficit in the affected extremity.

Necrotizing fasciitis may be becoming a more common surgical problem. Aggressive chemotherapeutic regimes and more frequent use of bone marrow transplantation may be a factor in this. Early diagnosis and aggressive surgical therapy is critical. However, morbidity and mortality may be significant, especially in neutropenic patients.

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TOBOGGAN INJURIES

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The Hospital for Sick Children, Toronto, Canada

Toboggan accidents can cause serious injuries and even death. Data on mechanisms and type of injury, morbidity and mortality caused by toboggan accidents, are scarce. We have reviewed all records of the last 22 consecutive toboggan related injuries admitted to HSC between 1991 and 1993.

<table>
<thead>
<tr>
<th>Median Age / Sex:</th>
<th>-10 yrs (range 3-17) Male 13, Female 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial site of impact:</td>
<td>-head (13/22), trunk (5/22), extremities (5/22)</td>
</tr>
<tr>
<td>Mechanism of injury:</td>
<td>-tree (8/22), toboggan (5/22), fall-off (5/22), motor vehicle (2/22), wall (1/22)</td>
</tr>
<tr>
<td>Use of protective gear:</td>
<td>1/22</td>
</tr>
<tr>
<td>Injured organs: head:</td>
<td>-7 concussions / contusions, 6 skull fractures, 1 major scalp laceration</td>
</tr>
<tr>
<td>face/legs:</td>
<td>-4 mandibular fractures, 1 dental injury, 1 pelvic fracture, 2 femoral fractures, 1 hip dislocation, 1 tibial-fibular fracture</td>
</tr>
<tr>
<td>arms:</td>
<td>-1 brachial plexus injury, 1 fracture of radius, 1 brachial artery and median nerve injury</td>
</tr>
<tr>
<td>abdomen:</td>
<td>-1 splenic tear, 1 avulsion of spleen and kidney, 1 perforation of stomach &amp; liver laceration</td>
</tr>
<tr>
<td>Patients requiring operation:</td>
<td>13/22</td>
</tr>
<tr>
<td>Duration of hospitalization:</td>
<td>6.1 days (range 1-36 days)</td>
</tr>
<tr>
<td>Mortality:</td>
<td>2/22</td>
</tr>
<tr>
<td>Morbidity:</td>
<td>1 seizure, 1 numbness of arm, 1 pelvic abscess, 1 wound infection, 1 pneumonia</td>
</tr>
</tbody>
</table>

Although toboggan injuries represent a small fraction of all injuries occurring in children requiring hospitalization, these are preventable injuries. A better public awareness and the use of protective gear are recommended.

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10:00-10:30 coffee follows this paper
ARE DA₁ DOPAMINE RECEPTORS FUNCTIONAL IN NEWBORN PIGLET MESENTERIC AND RENAL VASCULOBURES?

R James Pearson, Dennis W Jirsch, Keith J Barrington, Po-Yin Cheung
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Newborn response to dopamine differ from the adult, possibly due to immature adrenergic receptors. Mesenteric and renal vascular response to dopamine and fenoldopam (a selective DA₁ agonist) were assessed in the newborn piglet. Fenoldopam was used as a pharmacological probe for DA₁ receptors because dopamine is known to cross-react with alpha and beta receptors at higher dosages.

Two groups of ten piglets (48 hours old) were instrumented with catheters in the external jugular vein and common carotid artery. Ultrasonic perivascular flow probes were placed around the retroperitoneal superior mesenteric artery (SMA) and the left renal artery. Two days post-instrumentation measurements were recorded on conscious, non-sedated piglets in response to dopamine 2-32 μ g/kg/min (group 1) or fenoldopam 1-100 μ g/kg/min (group 2).

No significant renal vasodilatation was found in response to dopamine or fenoldopam. The highest dosage (32 μ g/kg/min) of dopamine produced a significant (p<.05) vasoconstriction, likely mediated by alpha receptors.

No significant mesenteric vasodilatation was found with low dosages of dopamine (2-8 μ g/kg/min) but higher dosages of dopamine (16,32 μ g/kg/min) produced significant (P<.05) vasodilatation. Fenoldopam produced significant (P<.05) vasodilatation of the mesenteric circulation at 5, 10, 25, 50, 100 μ g/kg/min.

Dopamine is not a renal or mesenteric vasodilator in the clinically used low dosage range. The absence of dopamine "protective effect" on these vascular beds suggests that other pressors should be investigated.

Gordon M. Lees/David L. Sigalet

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SPECIFIC ACCEPTANCE OF FETAL BOWEL GRAFT AFTER TREATMENT WITH ANTIBODIES TO ICAM-1 AND LFA-1

Y Kato, A Yamataka, H Yagita, H Basyuda, H Kobayashi, K Okumura, T Miyano
Departments of Pediatric Surgery and Immunology
Juntendo University School of Medicine, Tokyo, Japan

The aim of this study is to see whether tolerance could be induced using simultaneous administration of monoclonal antibodies (MAbs) to intercellular adhesion molecule-1 (CAM-1) and leukocyte function-associated antigen-1 (LFA-1) following transplantation of fetal small bowel between fully incompatible mice strain.

The fetal BALB/c(H-2^d) small bowel was transplanted into the space between the peritoneum and rectus abdominis of adult C3H/He(H-2^k) recipient mice. In group 1(n=8), no immunosuppressants were given. MAbs to ICAM-1 (50 µg/day) were simultaneously administered (i.p.) following surgery in group 2(n=10) for 4 weeks. Syngeneic transplants served as control (n=6). All mice in control and group 1 were killed 4 weeks after transplantation and five mice in group 2 were killed 4 weeks after cessation of the MAbs. The graft as well as the recipient spleen were taken for the following investigations; 1) Histological examination and survival ratio of the graft, 2) Mixed lymphocyte reaction (MLR) assay, 3) Cell mediated cytotoxicity (CMC) assay. Each mouse in the remaining five mice in group 2 was transplanted with BALB/c and C57BL/6 (as third party) full thickness body skin simultaneously 8 weeks after cessation of the MAbs.

Results:

<table>
<thead>
<tr>
<th>Histological Finding (graft survival ratio)</th>
<th>MLR (cpm) (responder/stimulator ratio=1)</th>
<th>CMC(%) (effector/target ratio=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>control normal villi (6/6)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>group 1 graft disappeared (0/8)</td>
<td>37969 ± 3042 20879 ± 2051</td>
<td>27.3 17.5</td>
</tr>
<tr>
<td>group 2 normal villi without infiltration of leukocytes (5/5)</td>
<td>12434 ± 794 21619 ± 936</td>
<td>4.8 12.6</td>
</tr>
</tbody>
</table>

Third-party skin (C57BL/6) was rejected within 14 days, whereas bowel donorsyngeneic skin (BALB/c) was accepted indefinitely in all mice (C3H/He) tested.

Our findings suggest that in fetal mice small bowel transplantation tolerance could be induced using simultaneous postoperative 4 weeks administration of MAbs to ICAM-1 and LFA-1. This mode of immunosuppression could perhaps be applied to individuals undergoing small bowel transplantation.

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Takeshi Miyano, MD, Department of Pediatric Surgery, Juntendo University School of Medicine, 2-1-1-Hongo, Bunkyo, Tokyo 113, Japan

12
13. Monday, 11:00-11:15; O

AN INTRALUMINAL MODEL OF NECROTIZING ENTEROCOLITIS (NEC) IN THE DEVELOPING NEONATAL PIGLET

M. Di Lorenzo, J Bass, A Krantis
Departments of Physiology and Surgery, University of Ottawa, Canada

The most common risk factors for development of NEC are prematurity and enteral feeding. Most models of NEC involve ischemic insult resulting in generalized necrosis different from the classical ileo-caecal predilection of NEC. This anatomic predisposition is explained by dysmotility of immature gut leading to bacterial overgrowth in terminal ileum and colon. Infant formula containing lactose as sole carbohydrate source overwhelms partially developed lactase activity allowing enteric bacteria to ferment excess carbohydrate to short chain fatty acids, decreasing intraluminal gut pH and predisposing to mucosal injury. Impaired clearance of intraluminal contents exacerbates this effect. We present a model of NEC, originally developed in rabbits and based on analysis of intestinal contents of NEC babies, modified and adapted here to neonatal piglets.

Methods: Piglets 0 to 4 weeks old (n=16) were laparotomized. Loops created from terminal ileum to proximal colon were injected with iso-osmolar acidified casein of 0.9% saline. Segments were harvested 3 hours later, sectioned for H&E and graded from 0= intact villi to 4= transmural necrosis.

Results: Acidified casein-induced damage included areas of necrosis, submucosal edema, inflammatory cell infiltrate and lymphatic distention. In younger animals, lesions were more pronounced (3.25±.13 for the <3 day olds versus 2.43±.14 for the 2 week old piglets, p<0.005).

Conclusion: We believe that this NEC model most closely approximates human NEC because it incorporates 2 most common risk factors: dysmotility by creating intestinal loops, and enteral feeding by intraluminal injection of acidified casein.

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THE PRINCIPLES OF NORMAL AND ABNORMAL HINDGUT DEVELOPMENT

Dietrich Kluth
Department of Paediatric Surgery, University Hospital, Hamburg, Germany

In the past, several theories have been proposed to explain the occurrences of ano-rectal malformations. Most authors believe that these malformations are the result of and impaired process of septation. However, in 1986 vd Putte challenged all theories which tried to explain ano-rectal malformations by a faulty fusion of lateral ridges of the cloaca.

To elucidate the principles of normal and abnormal cloacal development, we studied the morphology of this region in normal embryos of rats and abnormal embryos of Sd mice which often have abnormal cloacas. Using scanning electron microscopy (SEM), a total of 245 normal rat embryos and 80 abnormal Sd-mice embryos were observed.

The results were:
1) In normal embryos, the region of the future anal opening can be identified soon after the establishment of the cloacal membrane. This part a fixed point in cloacal development.
2) In abnormal embryos, the cloacal membrane is too short. The region of the future anal opening is missing.
3) In abnormal embryos, a spectrum of malformed cloacas can be observed. This is in accordance to the spectrum of ano-rectal malformations clinically observed in humans.
4) Our observations also support recent findings that the “fistula” in ano-rectal malformations resembles a normal anus at an ectopic position.

Salam Yazbeck

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FETAL RABBIT GASTROINTESTINAL DEVELOPMENT: IMPLICATIONS FOR GENE THERAPY

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Baylor College of Medicine and Texas Children's Hospital, Houston, USA

An anatomic study was performed to answer several questions about the rabbit as an animal model for fetal gene therapy of the gastrointestinal (GI) tract. Specifically, gastric volume of rabbit fetuses of various ages, intestinal length, GI patency, peristalsis and intraluminal mucus was evaluated. The mean gastric volume for the 3-week fetuses was 0.15 ml (n=4) versus 2.6 ml (n=12) for the 4-week fetuses. Gastric pH averaged 6.43. The average length of the small bowel in the 4-week fetuses was 44.1 cm. The entire gastrointestinal tract of both the 3 and 4 week old fetuses was fully patent. In adult animal models, the presence of mucus in the GI tract has interfered with retroviral transfection of enterocytes. PAS sections of the esophagus, stomach, small bowel, and colon from 3 and 4-week old rabbit fetuses revealed absence of goblet cells in the esophagi of the 3 and 4-week fetuses. Goblet cells were present, in the duodenum, small bowel and colon of both the 3 and 4-week fetus. However, minimal luminal mucus was noted in both three and four week fetuses when compared with adult controls. Barium was successfully instilled in the stomach of 18/26 fetuses in 7 maternal rabbits by ultrasound guided, transplacental puncture. In these 18 fetuses, barium was documented histologically in the esophagus (22%), stomach (100%), duodenum (83%), jejunum (72%), ileum (44%), appendix (6%), and colon (6%) following sacrifice four hours later. We conclude that the rabbit fetus has a GI tract which is accessible by transplacental puncture of the stomach, is patent, and has adequate peristalsis to deliver viral vectors to the small bowel. The absence of luminal mucus is especially encouraging as this should decrease the barrier to viral transfection of the GI tract.

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FAMILIAL NON-APPLE PEEL JEJUNAL ATRESIA WITH RENAL DYSPLASIA

SK Srinathan, JC Langer
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Jejunal atresia with an apple peel deformity (type IIIb) and multiple type I have a familial inheritance in many cases. We report a family involving three cases of jejunal atresia of different types, all of which were associated with renal dysplasia.

A 22 year old woman had type II proximal jejunal atresia repaired at birth. She also had an absent left kidney and a dysplastic right kidney which resulted in mild chronic renal failure in adulthood. Her first pregnancy consisted of dizygotic twins, and was complicated by mild thrombocytopenia, polyhydram-nios and gestational diabetes. There was no maternal exposure to teratogens. Fetal ultrasound showed dilated proximal bowel in both fetuses. The infants were born at 32 gestational weeks, and were taken to the operating room on the first day of life for management of complete jejunal obstruction.

Twin A was a 1455 gram boy, and was found to have two intestinal webs, 3 cm and 5 cm distal to the ligament of Treitz. Web incision and jejunooplasty was performed. Echogenic cortices were present on ultrasound although the kidneys were grossly normal. Revision of the jejunooplasty with tapering duodenoplasty was done at 28 days of age, and intraoperative renal biopsies confirmed dysplasia.

Twin B was a 1600 gram girl who had a single jejunal web 6 cm from the ligament of Treitz. Web incision and transverse jejunooplasty was done and the proximal jejunum was tapered. Like her brother, she renal cortical cysts on ultrasound with grossly normal kidneys. Sweat chlorides and karyotypes were normal in both infants, and both are now eating normally and growing, with normal renal function to date.

The association of renal dysplasia and jejunal atresia has not been previously reported, nor has a family with types I and II jejunal atresia. This case raises interesting questions about the etiology of proximal jejunal atresia, and calls into question the vascular theory which is currently accepted.

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BUTTON-PEXY REPAIR OF ILEOSTOMY AND COLOSTOMY PROLAPSE

K Canil, P Fitzgerald, G Lau, G Cameron
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Intestinal stomas play a vital role in the management of a wide range of congenital and acquired gastrointestinal conditions in the pediatric age group. Unfortunately, stomal complications are relatively common and include stenosis, infection, bleeding, skin excoriation and prolapse. Stomal prolapse may only be a source of annoyance for both parents and patients due to associated appliance problems. However, stomal prolapse causing severe skin excoriation, bleeding, or leading to incarceration with ischemia and necrosis represent serious potential complications.

The technique of button-pexy repair of stomal prolapse involves fixation of the reduced bowel to the anterior abdominal wall with a suture bolstered with two plastic buttons. One button lies within the lumen of the bowel and the other on the skin of the abdominal wall, effectively dissipating the pressure of the suture. Fibrosis occurs between the serosal surface of the bowel ad the peritoneum allowing removal of the suture and buttons at 2 to 4 weeks.

We describe our experience with the button-pexy, as originally described by C.W. Mayo, for correction of ileostomy and colostomy prolapse.

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LONG-TERM ADMINISTRATION OF NOVEL IMMUNOSUPPRESSIVE AGENTS ALTERS GROWTH, NUTRITION AND SMALL BOWEL FUNCTION IN THE RAT

NL Yanchar, R Fedorak, N Kneteman, D Sigalet
Departments of Surgery and Medicine, University of Alberta, Edmonton, Canada

The primary obstacle to successful clinical intestinal transplantation is the lack of effective, non-toxic immunosuppressive regimes. This study investigates the effects of cyclosporin (CsA) and the novel immunosuppressive agent, FK506, rapamycin, 15-deoxyspergualin (DSG), and mycophenolate mofetil (RS61443) in normal rats, with a focus on growth, nutrition and small bowel function.

Alternate day injection of vehicle (controls), CsA (15mg/kg), FK506 (2mg/kg) rapamycin (2mg/kg), RS61443 (25mg/kg) or DSG (3 mg/kg) were administered to juvenile Lewis rats over 6 weeks. Weight gain, feed intake, general health and behavior were monitored throughout. A 3-day balance study, determining fat and carbohydrate absorption was conducted in the fifth week. Intestinal permeability was tested in vivo by measuring urinary excretion of orally administered $^{99}$Tc-DTPA, mannitol and lactulose. In vivo active transport of glucose by intestinal epithelia, using radiolabelled 3-O methyl-glucose (3OMeG), as well as electrophysiological parameters of the tissues, were measured in Ussing chamber. Finally, bowel histology and villus morphometry were assessed.

Weight gain was significantly impaired in the FK506, rapamycin and DSG-treated rats (by 79%, 73%, and 26%, respectively, p<0.001 for all). Feed intake was similar in all groups. FK506 and DSG-treated animals demonstrated anemia, diarrhea and significantly aggressive behavior. Fat and/or energy absorption were significantly decreased in all but the RS61443 animals; the largest effect seen in the FK506 rats. CsA induced a 33% increase in ileal mucosal-to-serosal ($J_{MS}$) and 52% increase in serosal-to-mucosal ($J_{MS}$) 3OMeG fluxes (p<0.05 for both values). These fluxes represent active uptake and back diffusion of glucose, respectively. RS61443-treated rats demonstrated a significant 25% reduction (p<0.05) of active 3OMeG uptake in the jejunum, with a compensatory 34% increase (p<0.001). FK506 resulted in the most marked changes, with 2- to 3-fold increases in $J_{MS}$ and $J_{SM}$ in both regions of the small bowel (p<0.001). Conductance, potential difference and intestinal short-circuit current, paralleled these findings and, combined with in vivo testing, indicated significantly increased intestinal permeability in the CsA, DSG and FK506-treated animals. Villus size was significantly increased with CsA and decreased with DSG, while rapamycin induced marked villus blunting in the ileum.

We conclude that measurable effects on small bowel function and nutrient absorption are induced by several of these drugs. DSG, rapamycin and FK506, especially, adversely affected weigh gain and animal well-being, paralleled by marked changes in bowel permeability and in vivo glucose transport. These factors may impact on the use of these agents in intestinal transplantation.

Gordon Lees

the Fred MacLeod Lecture follows this paper
Monday, September 19, 1994
1215-1315

FRED MacLEOD LECTURE

Dr. J. Alex Haller, Jr.

"Surgical Management of Life Threatening Injuries in Children: What have we Learned and What are the Challenges for the Year 2000"

Dr. Haller's biography appears on page xvi

13:15 LUNCH: PLEASE MAKE YOUR OWN ARRANGEMENT
Listing of Restaurants is enclosed with Delegate Package
Enjoy the Free Afternoon and Evening
Continental Breakfast beginning at 7 AM tomorrow
Scientific Sessions begin at 8 AM
THE INCIDENCE AND SPECTRUM OF NEUROLOGIC INJURY FOLLOWING OPEN FETAL SURGERY FOR CONGENITAL ANOMALIES

John E. Bealer, Erik D. Skarsgard, Walter E. Finkbeiner, N. Scott Adzick, Michael R. Harrison
The Fetal Treatment Center, USCF, San Francisco, USA

The immature brain of the preterm infant is susceptible to both anoxic and hemorrhagic injury during periods of physiologic stress. With the advent of intraperitoneal surgery for congenital defects, a population of fetuses are now subject to similar stresses that place them at risk for neurologic injury. The aim of this report was to evaluate the frequency and nature of such injuries in fetal patients undergoing in utero procedures for non-neurologic congenital anomalies. Of 33 fetuses undergoing open surgical procedures, neurologic injuries have been identified in 2 of 17 survivors (12%), and 2 of 16 autopsied non-survivors (31%). One survivor had a Grade II subependymal hemorrhage (SEH) diagnosed by serial head sonography on the 9th postoperative day. In spite of persistent bilateral ventriculomegaly and an area of porencephaly by sonogram, this infant is neurologically normal at 4 months of age. The second survivor demonstrated postnatal bilateral subependymal cystic changes consistent with periventricular leukomalacia (PVL), following serially normal postoperative (in utero) head ultrasounds. This infant is also neurologically normal at age 3 months. Neurologic injury in the 5 autopsied non-survivors consisted of intraventricular and/or perivenricular hemorrhage with or without white matter necrosis in 4, and PVL without hemorrhage in 1. Fetal distress, manifest by preterminal fetal bradycardia occurred in all 5 non-survivors, suggesting that fetal asphyxia likely contributed to the neurologic injury. The injuries to the 2 surviving fetal patients occurred unexpectedly during the post-operative in utero course, without associated signs of fetal distress. We speculate that these injuries (one hemorrhagic, one ischemic) may have been caused by sudden fluxes in cerebral blood flow caused by the maternal tocolytics (indomethacin, nitroglycerine and terbutaline) used to prevent postoperative preterm labor.

Robert M. Filler

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20. Tuesday, 08:15-08:30; O, R
EVALUATION OF CO₂, He, AND H₂O AS MEDIA FOR HYSTEROSCOPIC FETAL SURGERY

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Washington University, St. Louis, USA

Hysteroscopic techniques may provide a promising approach to minimize some of the complications of fetal surgery. However, the intraamniotic environment must permit clear visualization and safe use of electrocautery. We tested three agents as potential environmental media for use during hysteroscopic fetal surgery.

Fetal lambs were used at 110 days gestation. Through a hysterotomy fetal ECG leads, esophageal temperature probe and arterial catheter were placed, and the fetus was returned to the amniotic cavity. The uterus was sutured in 2 layers. The amniotic cavity was then filled with warm saline via a balloon-tipped catheter secured at one end of the hysterotomy, and the fetus was stabilized for 30 minutes. The three test media were then randomly but sequentially administered via the catheter to an intraamniotic pressure of 15 mmHg for 30 minutes each. A 30 minute stabilization between each medium was used during which the previous medium was withdrawn and warm saline was infused. Maternal and fetal arterial samples were drawn at the end of each stabilization and at 15 and 30 minute intervals for each test medium (n=10 for each group). Results are shown as mean change form stabilization ± SEM.

<table>
<thead>
<tr>
<th></th>
<th>H₂O</th>
<th>CO₂</th>
<th>He</th>
<th>H₂O</th>
<th>CO₂</th>
<th>He</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>-0.01 ± 0.02</td>
<td>*-0.08 ± 0.02</td>
<td>0.00 ± 0.01</td>
<td>-0.02 ± 0.03</td>
<td>-0.10 ± 0.03</td>
<td>-0.03 ± 0.03</td>
</tr>
<tr>
<td>pO₂ (mmHg)</td>
<td>-2.9 ± 1.2</td>
<td>*2.2 ± 1.7</td>
<td>-2.9 ± 0.4</td>
<td>-4.8 ± 1.3</td>
<td>*3.1 ± 1.9</td>
<td>-4.0 ± 1.0</td>
</tr>
<tr>
<td>pCO₂ (mmHg)</td>
<td>3.0 ± 3.1</td>
<td>*13.7 ± 3.8</td>
<td>-3.7 ± 1.6</td>
<td>5.0 ± 5.1</td>
<td>18.8 ± 5.3</td>
<td>*3.9 ± 4.6</td>
</tr>
<tr>
<td>Na (mmol/L)</td>
<td>-1.7 ± 0.9</td>
<td>1.1 ± 0.7</td>
<td>1.3 ± 0.3</td>
<td>-2.3 ± 0.9</td>
<td>2.0 ± 1.0</td>
<td>0.9 ± 0.7</td>
</tr>
<tr>
<td>Cl (mmol/L)</td>
<td>-3.8 ± 1.2</td>
<td>-0.1 ± 1.2</td>
<td>0.2 ± 0.8</td>
<td>-4.2 ± 0.9</td>
<td>0.6 ± 2.0</td>
<td>-0.4 ± 0.8</td>
</tr>
</tbody>
</table>

* p<0.05, One Factor ANOVA

There was no change in K+, HCO₃-, HR, BP, hematocrit, or temperature.

This study demonstrated that intraamniotic CO₂ produced significant fetal acidosis and hypercarbia, while water caused significant but clinically mild hypochloremia and hypochloremia. Helium and water, therefore, warrant further evaluation as environmental media for hysteroscopic fetal surgery.

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COMPLICATIONS OF MASSIVE FETAL ASCITES

H Flageole, E Hashim, J-M Laberge, VR Adolph, S Khalife
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Fetal ascites is frequently encountered as part of fetal hydrops or as a complication of intestinal or urinary obstruction. Rarely, fetal ascites may be secondary to a lymphatic leak. Based on 4 cases of massive fetal ascites, we reviewed the natural history, causes and complications pre and postnatally. The diagnosis was made between 28 and 30 weeks. The ascites was massive and isolated or accompanied by mild scalp edema. The lymphatic origin was confirmed by the presence of 90-100% lymphocytes in the fluid on paracentesis. Viral screening and cultures were normal. In the first case, massive polyhydramnios caused premature labor and delivery at 29 weeks; the infant expired postoperatively at 7 weeks of age and the autopsy showed diffuse abdominal and pulmonary lymphangiectasia. In the second case, massive ascites caused abdominal dystocia during vaginal delivery with skin slough and facial petechiae. Renal and respiratory failure improved after drainage of the ascites; the ascites resolved and the child is developing normally (>2 y.o.). To avoid such dystocia in the third case, 750 cc of ascites was drained before delivery; despite this the neonate had renal and respiratory failure which led to withdrawal of treatment at 8 weeks of age. Autopsy failed to show lymphatic anomalies. This experience led us to perform repeated fetal paracentesis to decompress the abdomen in the fourth case; postnatally, however, there was evidence of a storage disorder, and severe neuraminidase deficiency (congenital sialidosis type II) was confirmed at autopsy.

Conclusions: Fetal ascites should be investigated. Massive chyloous ascites, in the absence of an associated lethal disease, should be treated by repeated paracentesis or abdomino-amniotic shunt to prevent pulmonary hypoplasia, renal failure and dystocia. Drainage of excessive amniotic fluid may also prevent premature labor.

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SUCCESSFUL TREATMENT OF CONGENITAL CHYLOUS ASCITES WITH A SOMATOSTATIN ANALOGUE

MG Caty, Mary Hilfiger, Richard G Azizkhan, Philip L Glick
Children's Hospital of Buffalo, University at Buffalo,
State University of New York, Buffalo, USA

Congenital chylous ascites results from poorly characterized abnormalities of the intraabdominal lymphatic system. Traditional therapy has included abdominal paracentesis, intestinal rest, total parenteral nutrition, and surgery. Octreotide is a somatostatin analogue that has been used in the treatment of pancreatic and intestinal fistulas. We present a newborn with congenital chylous ascites treated with octreotide. Resolution of ascites occurred within one week of the institution of octreotide.

K.L. was a 3300 gram infant born with trisomy 21 at 37 weeks gestation to a G2 P1 mother. Fetal ascites had been noted on ultrasound at 32 weeks. Cesarean section was performed urgently for a nonreactive nonstress test. Due to massive abdominal distention, the child underwent operative exploration. Approximately 600 ccs of ascites were removed. The small intestine and urinary tract appeared normal and a peritoneal drain was placed. Persistent daily peritoneal drainage of 200 ccs of fluid occurred. A HIDA scan was normal. A VCUG and renal ultrasound were normal. The child was placed on total parenteral nutrition and gut rest. An elevated lymphocyte count from the ascitic fluid confirmed the chylous nature of the fluid. After 18 days of persistent ascitic fluid leak, octreotide was begun on the following schedule: 6.25 mcg SQ bid X 2 days, 12.5 mcg SQ bid X 2 days, 20 mcg SQ bid. The initiation of octreotide was associated with the rapid and complete cessation of peritoneal drainage. The newborn was begun on Portagen. After a complete oral diet was established, the octreotide was stopped with no recurrent ascites.

This case demonstrates a potential beneficial application of octreotide to the problem of congenital chylous ascites.
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23. Tuesday, 08:50-08:55; C (five minute paper, followed by a five minute discussion of this and the previous short paper)

SCLEROSE OF RECURRENT LYMPHANGIOMA USING OK-432

M Mikhail, R Kennedy, B Cramer, T Smith
The Dr. Charles A. Janeway Child Health Center, St. John’s, Canada

We present two cases of tissue lymphangiomata of cervico-facial region, treated with a new investigation drug in North America, using OK-432 (Picibanil) as sclerosing intralosional injection.

Both patients had been treated surgically and presented again with the recurrence of the tumor.

Injection of OK-432 intralosion without aspiration was employed for the first patient and after aspiration for the second patient.

Change in consistency (with softening followed by marked shrinkage of the tumor) have been observed.

No serious complication either locally or systematically has been noticed during follow up period of (10 months - 16 months).

In both cases satisfactory results were obtained resulting in definite reduction in size and improvement in cosmetic appearance, and we recommend OK-432 intralosional injection for surgically challenging lymphangioma. Our result supports a recent Japanese study of using OK-432 as sclerosing therapy for unresectable lymphangioma.

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24. Tuesday, 09:00-09:15; O

STRATIFICATION OF INJURY SEVERITY USING ENERGY EXPENDITURE RESPONSE IN SURGICAL INFANTS

RW Letton, WJ Chwals
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**Aim of Study:** Injury severity stratification has important clinical outcome significance and can influence nutritional management. While surgery alone has been shown to increase measured energy expenditure (MEE) substantially, large increases in MEE can result from severe underlying acute illness which frequently necessitates surgery (like sepsis or intense inflammation). We hypothesized that the magnitude and duration of the MEE response to surgery associated with a severe preoperative acute injury would exceed that of surgery in which no substantial preoperative stress was present, thus representing an index of overall injury severity in surgical infants.

**Methods:** MEE (Kcal/kg/D) was determined on postoperative days (POD) 2, 5 and 8 in 12 infants (avg. age 47 days) following two separate injury insults (at least 8 days apart). In each patient, one operation resulted in a peak serum C-reactive protein (CRP) concentration of <6.5 mg/dl (LOW STRESS) while a second operation, preoperatively associated with sepsis or a major inflammatory insult, resulted in a peak CRP>6.5 mg/dl (HIGH STRESS). Data were paired so that each child served as its own control. Initial basal protein-calorie delivery was similar in both groups.

**Main Results:** Mean peak CRP values were 14.1 ± 10.7 mg/dl (high stress) and 4.1 ± 2.3 mg/dl (low stress) and returned to normal levels earlier (before POD 8) following injury insult in the low stress group. Group-specific MEE stress response comparisons are represented in the figure.

**Conclusions:** The early (POD 2) hyper metabolic response to injury as determined by MEE effectively differentiated the high from the low stress group. This finding suggests acute underlying illness is an important determinant of postoperative MEE. Furthermore, in the low stress group, serial CRP levels returned to normal earlier, associated with significantly greater late (POD 8) MEE values. Since MEE is directly proportional to growth rate in healthy infants, and growth is retarded during acute metabolic stress, these finding suggest increased energy utilized for growth recovery following earlier resolution of the acute injury response in the low stress group. These data indicate that serial postoperative MEE can be used to stratify injury severity and may be an effective parameter to monitor the return of normal growth metabolism in surgical infants.

Ed. Note: insufficient space for reproduction of Graph

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FETAL ENDOSCOPIC ("FETENDOSCOPIC") SURGERY: THE RELATIONSHIP BETWEEN INSUFFLATION PRESSURE AND THE PLACENTAL CIRCULATION

Eric D Skarsgard, Martin Meull, John F Bealer, N Scott Adzick, Michael R Harrison
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Application of endoscopic surgical techniques to the gravid uterus requires volume expansion of the amniotic cavity to create a "working space". Expansion of the amniotic space with sufficient gas of fluid to cause an elevation in intrauterine pressure could potentially increase placental vascular "resistance", and thereby reduce placental blood flow. To test this hypothesis we developed a fetal sheep model to examine the relationship between insufflating intrauterine pressure and flow in the placental circulation.

Four gravid ewes at 120-130 days gestation (term=145 days), underwent laparotomy. After measurement of baseline intrauterine pressure, a hysterotomy was performed and the common umbilical artery of the fetal lamb was encircled with an ultrasonic flow probe. After placement of aortic and central venous catheters and a calibrated pulse oximeter, the fetus was returned to the uterus and all cables and catheters (including 2 uterine catheters) were exteriorized. Maternal placental blood flow was measured via a flow probe placed around the uterine artery on the side of the gravid uterine horn, while maternal blood pressure was transduced through a hind limb arterial catheter. The intrauterine pressure was raised sequentially by a combination of volume expansion with warm saline and external uterine compression. Fetal heart rate and blood pressure, total umbilical (Qumb) and uterine (Querine) artery flow rates, and fetal oxygen saturation were recorded synchronously, with periodic fetal arterial blood gas sampling.

Baseline uterine pressure measured 12 mm Hg. Elevation of intrauterine pressure resulted in a statistically significant (p<0.01, single factor ANOVA) reduction in placental flow despite fetal and maternal hemodynamic stability. Periods of reduced placental flow were associated with fetal hypoxemia and acidosis.

<table>
<thead>
<tr>
<th>Pumb (mmHg)</th>
<th>Qumb (ml/min/kg)</th>
<th>Querine (ml/min)</th>
<th>O2 Sat'n (mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>209 +/- 19</td>
<td>128 +/- 8</td>
<td>0.68</td>
</tr>
<tr>
<td>20</td>
<td>205 +/- 10</td>
<td>123 +/- 15</td>
<td>0.65</td>
</tr>
<tr>
<td>25</td>
<td>191 +/- 13</td>
<td>93 +/- 28</td>
<td>0.58</td>
</tr>
<tr>
<td>30</td>
<td>156 +/- 25</td>
<td>73 +/- 6</td>
<td>0.40</td>
</tr>
<tr>
<td>35</td>
<td>137 +/- 25</td>
<td>60 +/- 13</td>
<td>0.26</td>
</tr>
<tr>
<td>40</td>
<td>110 +/- 29</td>
<td>43 +/- 6</td>
<td>0.24</td>
</tr>
</tbody>
</table>

We conclude that: 1) elevation of amniotic pressure is associated with a significant reduction in both fetal umbilical and maternal uterine artery flow, 2) reduction of placental blood flow results in fetal hypoxemia and acidosis, and 3) the critical relationship between amniotic pressure and placental flow must be considered during uterine insufflation for fetal endoscopic intervention.

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Michael R. Harrison, The Fetal Treatment Center, San Francisco
GASTROCHISIS: IS PRIMARY CLOSURE BEST?

L Kalliiainen, K Kimura, A Sandler, J Lawrence, R Soper
University of Iowa College of Medicine, Iowa City, USA

Primary closure is the treatment goal in patients with gastroschisis if fascial approximation can be done safely. However, we have noted several potential problems with primary closure.

Between 1988 and 1993, we treated 36 neonates for gastroschisis. The initial operation performed was primary closure (PC:28), skin flap closure (SF:5) and silo techniques (ST:3). All patients survived. No significant difference was noted among these treatment gouts in duration of ventilatory support, stay in the ICU, intravenous nutrition and hospitalization. Oral feeding was started on day 14 in patients with PC, day 7 with SF, and day 25 with ST. Eight of 28 patients with PC (28%) required further abdominal surgery: 3 developed bowel obstruction within 2 weeks, and 4 underwent late repair of ventral hernias. Patients with SF and ST required late secondary fascial closure, but none needed further abdominal surgery. The complications requiring further abdominal surgery after PC were secondary to facial closure producing substantial elevation of intra-abdominal pressure and tension on the abdominal wall.

This study suggests that skin flap closure or silo technique is recommended when high intra-abdominal pressure and tension on the abdominal wall occurs during attempted primary closure of gastroschisis.

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27. Tuesday, 09:45-09:50; C (five minute paper, with discussion after the next short paper)

GASTROCHISIS-A SIMPLE TECHNIQUE FOR STAGED SILO CLOSURE IN THE NICU

James D Fischer, Karen Chun, Don Moores, H Gibbs Andrews
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In conjunction with the Neonatology Department at Loma Linda University Children's Hospital, we have evolved a new protocol for management of infants with gastroschisis that obviates both risks associated with primary (PC) and stages allo closure (SC). Following stabilization of the infant in the Neonatal Intensive Care Unit under sterile conditions, a 5 or 7 centimeter silastic allo with a spring-loaded ring is placed over the exposed viscera under the fascial defect. No sutures are required. A fentanyl drip is given and the bowel is gradually reduced over the next few days. The transparent material of the allo allows the continuous monitoring of the condition of the bowel. Second staged closure in the operating room is performed using a purse-string suture in the fascia to create a pseudo umbilicus. From October 1992 to April 1994, we have managed ten cesarean-born infants using this protocol. Results are compared to vaginally and C-section delivered infants at Loma Linda University Children's Hospital from August 1992 through June 1993. Outcome parameters to be compared include time to OR closure, time on ventilator, days of TPN, time to start oral feedings, time to tolerate full volume oral feedings, and time to hospital discharge. Our results will conclude that allo closure in the NICU is simple, quick, and natural accommodation of the bowel into the abdominal cavity with little edema and minimal vascular compromise and has become our treatment of choice for infants with gastroschisis.

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28. Tuesday, 09:50-09:55; C (five minute paper, followed by a five minute discussion of this and the previous short papers)

SPINAL ANESTHESIA (SA) FOR PYLORIC STENOSIS: THE NEW "GOLD STANDARD" FOR OPERATIVE MANAGEMENT?

M. Keller, C. Abajian, D. Vane
University of Vermont College of Medicine, Burlington, USA

We hypothesized that SA would be useful for short duration supra umbilical laparotomies in infants with risks for general anesthesia (GA). All infants undergoing operation for hypertrophic pyloric stenosis (HPS) between 1/1/91-8/31/93 were reviewed for age, weight, preoperative risk, anesthetic, operative data and outcome.

Thirty-five consecutive infants required laparotomy. Fifteen (43%) underwent SA. All were term infants although those undergoing SA were younger and weighed less. Medical history predating the HPS was more significant in the SA group. Two of these infants had profound respiratory distress (1 meconium aspiration, 1 pneumonia), which required extended intensive care unit stays, and 3 had a history of apnea requiring home monitors. The remainder in both groups had no confounding medical problems.

SA was successful in all attempts. Midazolam was required in 6 for intraoperative agitation. None required conversion to GA. There was no respiratory embarrassment due to "high spinal". Induction, transfer and operative times were less in the SA group, but not significantly different (p=0.9866, p=0.0594, p=0.9668). Morbidity occurred in 6 (30%) infants in the GA group (1 hemophiliac/hemorrhage; 1 emesis/aspiration during induction requiring extended hospitalization, 4 apnea) and 1 (6.7%) with the SA (wound infection). Postoperatively, vomiting and time to regular diet tolerance was similar.

This study indicates that SA is effective and safe for selected supra umbilical procedures. By eliminating the risk of aspiration and apnea SA reduces the operative risk, especially in infants with preexisting pulmonary disease. SA is an advance in the care of young children and may be the "Gold Standard" for selected patients.

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INTUSSUSCEPTION AFTER OPERATION: MANAGEMENT GUIDELINES FOR AN UNCOMMON PROBLEM

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Few guidelines for the management of intussusception following operation have been offered. Recent reports suggest an increased incidence of this complication. We reviewed the recent experience at a children’s hospital to search for patterns which might direct the care of these patients.

From 1972 to 1994, of a total of 516 patients with intussusception 11 patients developed intussusception after surgery (2.1%). Each instance of intussusception followed a different abdominal procedure, and occurred within the first week. Half the patients had undergone extensive dissection in the retroperitoneum. Seventy-eight patients underwent resection of Wilms’ tumor during this period, with one postoperative intussusception (1.2%); eighty patients underwent resection of neuroblastoma, with one postoperative intussusception (1.2%). Of 268 patients undergoing fundoplication during this period, only one (0.37%) developed intussusception. All children presented with vomiting and distension. An abdominal series showing bowel obstruction suggested the diagnosis; in 6 of the 11 patients, an contrast study (either upper gastrointestinal series or barium enema) was performed, and confirmed complete intestinal obstruction, leading to operation an average of 2.5 days after onset of distention. Manual reduction of intussusception was possible in all cases of small-bowel-small-bowel intussusception (10 of 11 patients). There was no evidence of bowel infarction of necrosis in these patients. In a single patient with ileocolic intussusception, resection with primary anastomosis was necessary. No lead point was discovered in any patient. All patients made prompt recovery without complication.

We conclude that postoperative intussusception remains an infrequent problem. No particular operation appeared to predispose to the condition; however, half the patients had some form of retroperitoneal procedure or dissection. Use of gastrointestinal contrast studies led to prompt operation. An excellent outcome was realized in all patients treated.

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coffee following this paper (10:15-10:45)
CONGENITAL DIAPHRAGMATIC HERNIA (CDH) continues to carry a high morbidity and mortality despite ECMO and attempts at direct fetal repair. The search continues for a way to prevent pulmonary hypoplasia. The purpose of this study was to see the effect of reversible fetal tracheal occlusion on tracheal pressure and lung development. Nine fetal sheep were divided into two groups. Group 1 (n=4) had intratracheal balloons placed and the balloons left inflated for 21-28 days. Group 2 (n=5) served as controls and had either uninflated balloons placed or were left unoperated. Tracheal pressure was 3.85 ± .49mm Hg in experimental animals while it was an average of 0.27 ± .27mm Hg in controls (p<.0001). Tracheal occlusion nearly tripled lung weight and volume (p<.0001 and p=.0006, respectively) while heart and liver weights remained similar to controls. All values were corrected for body weight. Airspace fraction and radial alveolar counts were marginally elevated (p=.044 and p=.0002, respectively) and alveolar number per lung volume was preserved, however, as was the DNA and protein content per unit weight of lung tissue. The chronic indwelling balloon catheter caused some mucosal and submucosal damage at the balloon site and proximal to it. These results show that balloon occlusion of the trachea leads to an elevation of intratracheal pressure that increases lung growth tremendously over a short period in the third trimester fetal sheep. The techniques used in this experiment may be easily modified for use with laparoscopic equipment.

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COMBINED VENTILATION AND PERFLUOROCHEMICAL (PFC) TRACHEAL
INSTILLATION AS AN ALTERNATIVE TREATMENT FOR NEAR-DEATH
CONGENITAL DIAPHRAGMATIC HERNIA

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Temple University School of Medicine, Philadelphia, USA

Tracheal instillation of PFC lowers interfacial surface tension in the lung
and thus could reduce barotrauma commonly associated with conventional
gas ventilation (GV). It could be a promising alternative of treatment in some
cases of congenital diaphragmatic hernia (CDH) when GV is proving
inefficient.

We compared data of 7 newborn lambs with surgically induced CDH.
Animals were GV and studied in 2 groups for up to 3.5 h. GR (n=3) was gas
ventilated only. In GR II (n=4), after 30 min of GV, 10-12ml/kg of warm,
oxygenated PFC liquid (LiquidVent TM) was instilled into the lung via the
trachea under pressure-volume curves monitoring. Arterial pressure/blood
chemistry and pulmonary mechanics were evaluated serially; histologic
analysis was performed.

At 30 min of life the cardiopulmonary profile was indicative of severe
respiratory distress (PaO2 < 72 torr with FiO2 at 1.0; PaCO2 > 90 torr;
compliance < 0.10 ml/ch H2O/kg) and not different between groups.
Thereafter we observed a dramatic improvement in acid- base status and
pulmonary compliance in Group II. Perivascular emphysema was present at
morphometrics in all animals.

This technique of ventilation may become an alternative to ECMO in
near-death CDH, but further experiments are needed to find optimal timing
and respiratory parameters.

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SURGERY FOR CONGENITAL DIAPHRAGMATIC HERNIA:
AN ELECTIVE PROCEDURE AFTER WEANING FROM EXTRACORPoreal MEMBRANE OXYGENATION

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Treatment of congenital diaphragmatic hernia (CDH) has undergone a revolutionary change in philosophy, from previous urgent repair to the present practice of stabilization and delayed repair. However, when ECMO support is required, many people feel that the risk of postoperative pulmonary hypertension (PPHN) mandates hernia repair while on ECMO. This report details the experience in two Canadian ECMO centers with stabilization, ECMO if required, and CDH repair post ECMO.

All CDH patients presenting in the newborn period with a gestational age of at least 34 weeks were retrospectively reviewed. Standard criteria were used to select patients for ECMO. High frequency jet or oscillating ventilators and nitric oxide were not routinely available throughout the study period, but were used in some of the latter patients. In Institution A, a total of 42 patients were identified, presenting from 1989 to 1994. Of these, 16 did not require ECMO, and 100% survived. Initially, all patients were repaired before or during the ECMO run; survival was 11/17 (65%). Due to complications (primarily bleeding) this strategy was changed to delayed repair, after the ECMO run. Survival was 5/9 (55%). In the latter group, two patients were not repaired, since they could not be stabilized on ECMO and two late deaths occurred, one due to intraventricular hemorrhage, and one to pulmonary insufficiency. However, the incidence of perioperative complications was much less in this group of patients.

In Institution B, the policy of initial stabilization and delayed operation after ECMO decannulation was adopted from the onset. Eighteen patients presented from 1991 to 1994; eight required no ECMO and all survived. Of the 10 placed on ECMO, seven were weaned form ECMO, and had delayed repair. All survived. Of the three that died, two could not be weaned secondary to cardiovascular or pulmonary defects, and one patient died after gastric volvulus while on ECMO.

The overall survival rate for these two Institutions then is 47/60 patients presenting (78%). Of patients managed with the protocol of delayed CDH repair after stabilization or ECMO, combined survival at the two Institutions was 83%. Of the 17 patients repaired after decannulation from ECMO, none developed PPHN.

These results compare very favorably with previous reports, and we would recommend that children presenting with CDH should be managed using this protocol.

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SURVIVAL IN NEONATAL CONGENITAL DIAPHRAGMATIC HERNIA WITHOUT EXTRACORPOREAL MEMBRANE OXYGENATION SUPPORT

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The experience with high-risk congenital diaphragmatic hernia (CDH) at an institution which does not offer extracorporeal membrane oxygenation (ECMO) support was reviewed.

Between January 1, 1983 and December 31, 1993, 38 children were presented with Bochdalektype CDH. Excluded were two with lethal cardiac anomalies and four presenting after 6 hours thus identifying 32 high risk patients. All showed early respiratory distress and were intubated within 5 hours of birth. Sixteen were born at our institution; the rest were transferred within 24 hours. Nineteen were male; 13 female. Three died before surgery could be attempted. The remaining 29 children were repaired with in 48 hours of birth. Twenty-two children survived giving an overall survival rate of 69% (22/32).

Fourteen of the 32 children had a best preoperative postductal Pa02 of less than 100mm Hg. ECMO might have been offered to these patients at another institution. Three of these children could not be stabilized and died without surgical repair. Six died following repair (three of these had cardiac anomalies). The survival rate of these possible ECMO candidates was 36% (5/14). The remaining 18/32 patients had a best preoperative postductal Pa02 of greater than 100mm Hg. The survival rate in this group was 94% (17/18).

Our results compare favorably with published experience from centres offering ECMO support

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ELEVATED PULMONARY COLLAGEN IN THE LAMB CONGENITAL DIAPHRAGMATIC HERNIA MODEL

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Decreased pulmonary compliance is one significant pathophysiologic feature associated with congenital diaphragmatic hernias (CDH). The objective of this work was to determine whether this abnormal lung compliance results from elevated concentrations of collagen and/or elastin in the lung parenchyma.

The CDH model was created in the fetuses of pregnant ewes at 80 days gestation. The fetuses were delivered and sacrificed at 140 days (term=145 days). The concentrations of collagen (as hydroxyproline), elastin, DNO, and total protein were measured in CDH and control lungs using standard techniques and expressed as mg per gram lung tissue.

<table>
<thead>
<tr>
<th></th>
<th>DNA (mg/g lung)</th>
<th>Total Protein (mg/g lung)</th>
<th>DNA/Total Protein</th>
<th>Elastin (mg/g lung)</th>
<th>Collagen (mg/g lung)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDH (n=7)</td>
<td>7.00 ±2.01</td>
<td>43.3 ±8.8</td>
<td>0.169</td>
<td>2.06 ±0.36</td>
<td>1.334 ±0.276*</td>
</tr>
<tr>
<td>Control (n=6)</td>
<td>5.70 ±3.06</td>
<td>36.1 ±14.7</td>
<td>0.164</td>
<td>2.12 ±0.45</td>
<td>0.865 ±0.138</td>
</tr>
</tbody>
</table>

Data is expressed as mean ± standard deviation. *P≤0.001 (Mann-Whitney test).

There was more collagen per gram lung tissue in CDH than control lung, but the elastin concentration in CDH was not significantly different from control. This elevated collagen concentration may be responsible for the decreased intrinsic compliance of CDH lungs. The DNA/total protein ratios in the CDH and control lungs were identical. Thus, the elevated collagen concentration was not due to atrophy or hypertrophy of the lungs.

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TESTICULAR FATE AFTER INCARCERATED HERNIA REPAIR AND/OR ORCHIDOPEXY PERFORMED BELOW SIX MONTHS OF AGE


Survival of the testes following inguinal surgery in the first six months of life is not well documented. This study assessed testicular viability using both ultrasonographic and clinical examination. Postoperatively the charts of 338 infants (475 procedures) with incarcerated hernia and/or undescended testis were reviewed. Of these patients, 56, patients were recalled assessment 6.5 months to 17 years postoperatively. 120 elective contralateral inguinal hernia repairs were used as controls.

<table>
<thead>
<tr>
<th>Group</th>
<th>Procedure</th>
<th># of testes</th>
<th>% atrophy retrospective</th>
<th>% atrophy ultrasound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hernia (H)</td>
<td>120</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Incarcerated hernia (IH)</td>
<td>214</td>
<td>4.7</td>
<td>7.5</td>
</tr>
<tr>
<td>3</td>
<td>IH + orchidopexy</td>
<td>56</td>
<td>12.5</td>
<td>16.1</td>
</tr>
<tr>
<td>4</td>
<td>H + orchidopexy</td>
<td>85</td>
<td>3.5</td>
<td>7.1</td>
</tr>
</tbody>
</table>

Conclusions:
Testicular atrophy after repair of IH particularly if associated with orchidopexy is common. Intraoperative or early postoperative evaluation of testicular viability may not correlate with the fate of the testis. Long term follow-up of these children is necessary.

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INJURY OF THE VAS DEFERENS ASSOCIATED WITH PEDIATRIC INGUINAL HERNIORRHAPHY

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This retrospective review examines the incidence of injury to the vas deferens at the time of indirect inguinal hernia repair in infants and children. The records of all repairs of indirect inguinal hernias, communicating hydroceles, and undescended testes done at our medical center during the 7 year period from 1987 through 1993 were examined. 4666 male hernia repairs were done. All specimens were examined both grossly and microscopically. Segments of vas deferens were found in 5 specimens, an overall incidence of 0.11%.

These operations were done by pediatric surgeons, general surgeons, and urologists. Incidence of vasal injury for individual surgeons varied from 0 to 1.0%. Our series is compared to the other few reported series in the literature. Comments will be made regarding recommended treatment once the injury is discovered.

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CONJOINED TWINS: EXPERIENCE WITH EIGHT SETS

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Eight sets of conjoined twins seen in a seven-year period were reviewed. One set of female omphalopagus twins and one set of female xiphoomphalo-schiopagus tripus twins were successfully separated. Six sets of thoracoomphalopagus twins were found to have major cardiac and other abnormalities which precluded surgical separation. All died between 1-3 months of age.

Conjoined twins present major medical, surgical and ethical challenges requiring precise investigation and organized planning if surgical separation is to be undertaken. The eight cases are analyzed to illustrate these issues. In the omphalopagus twins, after appropriate investigations, surgical separation was undertaken at 12 days of age and proved to be a relatively simple exercise. The ximphoomphalo-schiopagus twins were not referred until one year of age and were investigated extensively before surgical separation with pediatric surgery, urology, orthopedic and plastic surgery teams. They had a single liver, colon, urinary bladder, internal genitalia and one kidney each. The internal organs were successfully separated, one twin being left with a urinary faecal diversion. Options with regard to abdominal wall closure had been carefully considered preoperatively and pedicled grafts from the shared limb proved to be satisfactory. The omphalopagus twins were normal girls at three years of age and the ximphoomphalo-schiopagus twins were well and thriving two years after operation.

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CHRONIC VENOUS ACCESS USING ENDOGENOUS SPLENIC TISSUE: 
THE "SPLEEN-O-PORT"

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Objective: The authors sought to determine whether endogenous splenic tissue placed in a subcutaneous pouch ("spleen-o-port") could function as a viable alternative to central venous catheter/ports for chronic venous access.

Methods: A small transverse incision was made in the LUQ of each puppy (n=4) under general anesthesia. Using a stapler, the authors divided the splenic parenchyma. The superior portion was returned to its native location, and a subcutaneous pocket was created to house the inferior pole with its attached vascular supply. The fascial and muscular layers were closed with care to avoid compressing the blood supply to the "spleen-o-port". Post-operatively, the dogs resumed normal activity.

Results: There have been no deaths, infectious complications, splenic ruptures, or thromboses over a 4 month period. By post-operative day (POD) 6, two dogs developed pocket hematomas which resolved after percutaneous drainage. Under fluoroscopy, dogs were imaged from POD 10 to 120. Contrast agent entering the splenic parenchyma was promptly visualized in the splenic vein and then filled the portal vein. Electrolytes measured from "spleen-o-port" blood samples were identical to those from peripheral venous samples. After gentamicin (mixed in a crystalloid solution) was infused through the "spleen-o-port", the peak serum level corresponded to therapeutic levels seen following standard intravenous (IV) administration.

Conclusions: The "spleen-o-port" permits rapid infusion of both drugs and crystalloid and allows repetitive blood sampling, while eliminating the foreign body which can promote septicemia in the immunocompromised patient.
IS ABDOMINAL CAVITY CULTURE OF ANY VALUE IN APPENDICITIS?

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The value of intra-operative abdominal cavity culture was assessed in 489 patients with perforated (Group A) and non-perforated (Group B) appendicitis. Perforation was diagnosed in 181 patients at operation (35.8%) and histologically in 178 (98.3% accuracy). 36 patients (21%) in Group A had intra-abdominal abscesses, 48 had localized peritonitis and 92 (51.7%) had diffuse peritonitis. A single organism was cultured in 30.6% and 35% in Group A and B respectively whereas multiple fecal flora were cultured in 66.7% in Group A and 22.5% in Group B. Intra-operative cultures were not obtained in 32.9% and 69.9% of the patients in Group A and B respectively. 58.5% of patients who were suspected to be in Group A pre-operatively received triple antibiotics pre-operatively (Ampicillin, Gentamycin and Flagyl or Clindamycin). Post-operatively this percentage in Group A became significantly higher (82.9% p<0.0001). The majority in Group B were treated pre- and post-operatively by single antibiotic (59.4% and 51.2% respectively p>0.05). Group A were treated significantly longer with antibiotics than Group B (22.4 +/- 9.4 vs. 5.7 +/- 7.4 doses respectively p<0.0001). Post-operative complication rates (wound infection, intra-abdominal abscess and small bowel obstruction) were similar in both groups whether intra-abdominal culture was obtained or not (21.2 vs. 21.9% in Group A and 5.9 vs. 4.7% in Group B p>0.05).

We conclude that colonic flora can be predicted and antibiotics begun without any culture results.

Thus we recommend that intra-operative abdominal cavity culture need only be obtained in cases of questionable appendicitis. This practical approach well save money and reduce laboratory work without affecting patient morbidity.

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CAPS Members Business Luncheon Meeting follows this paper
PEDIATRIC LAPAROSCOPIC SPLENECTOMY

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Laparoscopic surgery is becoming widely accepted as an alternative to conventional procedures. It is becoming more and more evident that laparoscopic techniques can be successfully applied to pediatric patients. Advantages of these techniques include less post-operative pain, decreased ileus, fewer pulmonary complications, and shorter hospital stays. Elective splenectomy for hematologic disease or for staging of Hodgkin's lymphoma would also appear to be amenable to laparoscopic techniques.

This report details 12 consecutive splenectomies successfully performed laparoscopically since July 1993. No case required conversion to laparotomy.

Each case was reviewed for operative time and cost, estimated blood loss identification of accessory spleens, time to full oral intake, analgesia requirement and length of stay. Factors contributing to morbidity such as ileus, pulmonary complications and wound infections were evaluated. Documentation was also reviewed for late sequelae such as intestinal obstruction and incisional hernias. This series was compared to 20 consecutive who underwent open splenectomy in the time period immediately preceding the use of laparoscopic splenectomy.

Laparoscopic splenectomy, in our experience, is a safe alternative to open splenectomy, has few complications, is cost effective, and has been well accepted by patients and families.

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LAPAROSCOPIC ANTIREFLUX SURGERY: EVALUATION OF CRURAL CLOSURE TECHNIQUES

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Advanced laparoscopic procedures are now being applied to the pediatric age group. Prior to initiating a program in advanced laparoscopic surgery we completed a study using a porcine animal model to evaluate a stapled crural repair in anti-reflux surgery and to gain additional expertise in advanced laparoscopic techniques.

Twelve animals (15 kg) underwent a standard 5 trocar laparoscopic Nissen fundoplication with randomization to a stapled (Ethicon Endopath Titanium EAS) or a sewn crural repair (2-0 silk). All animals were sacrificed at the end of the procedure and examined for operative injury and adequacy of the crural repair and fundoplication.

The mean operating time for the stapled group was 100 +/- 10.9 minutes and for the sewn group 108 +/- 20.6 minutes (ns). The time required to complete the crural repair in the stapled group was 18 +/- 6.8 minutes and in the sewn group 32 +/- 6.1 minutes (p<0.01). In the stapled group the amount of crural tissue encompassed was small and easily disrupted in all 6 animals. The sewn crural repair was inadequate in 2 of 6 animals. The fundoplication was assessed as adequate in all animals in both groups. Operative complications included a small laceration to the anterior gastric wall in 1 animal in each group.

Stapled crural repairs were inadequate. A sewn crural repair should remain the standard as laparoscopic techniques are applied to anti-reflux surgery in children. Appropriate didactic instruction, laboratory training, and proctored clinical experience is recommended prior to utilizing advanced laparoscopic procedures.

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GASLESS LAPAROSCOPY IN INFANTS: THE RABBIT MODEL

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Laparoscopic operations can be performed in neonates and infants, but carbon dioxide pneumoperitoneum may be more dangerous than in adults. The concept of gasless laparoscopy is therefore especially attractive in small children. We have developed an animal training model of gasless infant laparoscopy using the rabbit. Eight New-Zealand white rabbits (mean weight 2.2 kg) were premedicated with fentanyl 0.2mL i.m. and maintained under inhalation anesthesia by mask, with halothane 1.0 - 2.5% in oxygen and nitrous oxide (1:1). The animals were neither intubated nor mechanically ventilated. Heart rate and oxygen saturation were monitored by pulse oximetry. A supra-umbilical incision was made through the peritoneum, and an abdominal wall elevator (Laparofit, Origin) was inserted. A 4 mm diameter, 30° endoscope was introduced through the same hole, allowing excellent visualization of the abdominal cavity. Three additional 5 mm cannulas were placed, and a standard Nissen fundoplication was performed in seven animals. In six of these, a left nephrectomy was also performed, after insertion of an additional cannula in the left lower quadrant. Five mm pediatric, as well as 2.7 mm laryngoscopic instruments were used. The rabbit can serve as a training model for gasless laparoscopy with abdominal elevation in the infant.

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We recently described two techniques for laparoscopic-guided gastrostomy placement. One of the most important advantages of laparoscopic gastrostomy is the ability to place the gastrostomy under direct vision in the less gastric curvature, hence decreasing the incidence of gastrooesophageal reflux (GER).

We report two cases managed with Laparoscopic Guided Percutaneous Endoscopic Gastrostomy (LAPPEG). They failed attempts of simple Percutaneous Endoscopic Gastrostomy (PEG).

A 13 year old extremely obese boy, sustained brain injury following diabetic coma. Gastrostomy was indicated for long term feedings and medications. UGI series and pH probe were normal. Attempts of PEG placement failed because of his marked obesity. LAPPEG was easily accomplished.

A 14 year old girl with Static Encephalopathy developed progressive inability to swallow. She had severe scoliosis and was recently treated with spinal fusion and instrumentation. UGI series demonstrated moderate GER but pH probe was within normal limits. Attempts of PEG placement failed because of a horizontal stomach. LAPPEG was easily accomplished.

The technique consisted of a combination of upper GI endoscopy and Laparoscopy. A gastrostomy kit of the pull-through type was used. The Gastrostomy was placed in the lesser gastric curvature and secured to the right side of the abdominal wall with "T-fasteners".

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THORACOSCOPY IN THE MANAGEMENT OF PEDIATRIC EMPYEMA

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The surgical management of empyema is divided between aggressive therapy with thoracotomy and decortication versus conservative treatment with chest tube drainage and IV antibiotics. Recently, Rogers and colleagues introduced thorascoscopic debridement as an adjunct to the management of children with empyema with promising results. We therefore report our experience with thorascopy in the management of pediatric patients with empyema.

In the last year, 10 children have undergone thorascoscopic debridement (TD) for empyema. The average age was 6.9 years (range 2-16). Children underwent TD on average 14 days (range 8-16) following initial presentation and 4 days (range 2-6) following admission to our hospital. Indications for TD were persistent requirement of supplemental oxygen and failure of conservative medical management that consisted of antibiotics and tube thoracostomy. Three children had positive pleural fluid cultures for S. pneumoniae. In all cases, preoperative US or chest CT showed dense pleural fluid with septation. At surgery, TD allowed for lung expansion and precise chest tube placement in all patients except one who required conversion to minithoracotomy and decortication for persistent encasement with a thick pleural peel. There were no postoperative complications secondary to the procedure. Following TD, all children had prompt clinical improvement. Children were weaned off supplemental oxygen by postoperative day 2 and following early chest tube removal, nine children were discharged to home by postoperative day 7 (range 3-10). One child required further hospitalization for her underlying renal failure. In our hands, TD was effective in producing prompt clinical improvement in children with empyema. It should therefore be considered as an alternative to prolonged tube thoracostomy or thoracotomy in children with recalcitrant empyema.

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THE DISTRIBUTION OF NITRIC OXIDE (NO) SYNTHESIZING NEURONS IN THE MYENTERIC PLEXUS OF THE DEVELOPING PIGLET INTESTINE

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NO is a putative mediator of intrinsic inhibitory innervation of the gastrointestinal tract. The status of this innervation can profoundly influence gut motility. However, little is known about this innervation in the developing gut. We have investigated the distribution of NO neurons in the myenteric plexus (MP) of developing piglet intestine.

Method: Laminar preparations of the MP of small and large intestine at different stages of development were processed for histochemical localization of nitricergic neural elements. Piglets 9 days premature, <72 hours old and 2 weeks old were evaluated for the frequency of NO neurons in the duodenum, jejunum, ileum, caecum and colon.

Results: In all 3 stages of development the frequency of positive neurons / ganglion increased aborally from duodenum to colon. However, we observed a significant decrease in frequency of positive neurons with increasing post-conceptional age in all regions of the small bowel. This decrease was also evident for the large bowel, with maximal decrease already evident in the <72 hour group.

Conclusion: NO neurons are present in the MP of the developing piglet intestine with increasing frequency in the cranio-caudal direction. However, there was an overall decrease in these neurons with increasing post-conceptional age. This correlates with recent evidence in the developing human gut and likely reflects the change in regulatory potential of the enteric nervous system with age. We believe the piglet gut is an ideal model for the study of the disruption in enteric innervation associated with gut motility disorders in the premature and neonatal infant.

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IMMUNOHISTOCHEMICAL STUDIES IN HIRSCHSPRUNG'S DISEASE UTILIZING FORMALIN FIXED PARAFFIN BLOCKED TISSUE: AN ANALYSIS OF NEUROPEPTIDE DISTRIBUTION ON "AGANGLONIC" AND "NORMOGANGLIONIC" SEGMENTS

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A retrospective analysis of 40 patients with Hirschsprung's Disease was performed by immuno-histochemical methodology utilizing commercially prepared antibodies established as markers of neuropeptidergic proteins. A standard indirect immunoperoxidase technique, the avidin-biotin conjugate method (ABC), was applied to routine formalin fixed paraffin embedded tissue modified by labeled streptavidin to reduce background interference and microwaved for enhancement of antigen retrieval.

The antibodies include NSE (neuron specific enolase), S-100 and NFP (nerve filament protein), general markers of the Enteric Nervous System (ENS), VIP (vasoactive intestinal peptide), Sub. P. (polysubstance P) and ENK (enkephalin), specific intrinsic markers and TH (thyroxine hydroxylase) a marker of adrenergic neurotransmitters. Fixation resulted in permanent slides available for analysis. Results were blinded. All slides were quantitatively graded for the labeled peptides as 0/absent, 1+/minimal, 2+/moderate, 3+/normal, and 4+/above normal.

All neurotransmitters were easily identified. The anatomical distribution of ganglion cells, supporting nerve tissue, and axons, within control specimens, normoganglionic segments, and aganglionic segments revealed specific patterns of abnormalities: 1) aganglionic segments revealed the absence of all ganglion cells and Schwann cells, the absence of any staining by Sub. P. or ENK in all layers and positive labeling of nerve bundles by all markers except Sub. P. and ENK: 2) normoganglionic segments and controls yielded similar staining patterns for all neuropeptides studies although a quantitative decrease in both Sub. P. and ENK was noted in 15-20% of the cases, and: 3) NSE, S-100 and TH labeling of neural tissue in the submucosa allowed easy differentiation of aganglionic from normal bowel.
Intestinal neuronal dysplasia (IND) has been described proximal to the aganglionic segment in Hirschsprung's disease (HD) and less frequently as an isolated condition. Some investigators have reported that 25% to 35% of patients with HD have associated IND, whereas others have rarely encountered IND in association with HD. The incidence of isolated IND has varied from 0.3% to 62% of all suction rectal biopsies in different centres. The uncertainty regarding the incidence of IND has resulted from the considerable confusion regarding the essential diagnostic criteria for IND.

In an attempt to clarify the diagnostic criteria for IND, we examined biopsy material from the following three groups using acetylcholinesterase (AChE) histochemistry: 1) full thickness normal colon from 23 controls (aged 1 day to 12 years), 2) full thickness biopsy from 19 patients (age 15 days to 2 yrs.) with HD who demonstrated IND in the proximal margin of the resected segment, 3) suction rectal biopsy from 9 patients (age 8 days to 30 months) who had isolated IND. The results are shown in the Table.

<table>
<thead>
<tr>
<th></th>
<th>AChE activity in lamina propria and muscularis mucosae</th>
<th>AChE activity around the vessels</th>
<th>Giant Ganglia</th>
<th>Hyperganglionosis</th>
<th>Ectopic Ganglion Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moderate increase</td>
<td>Normal</td>
<td>Increased</td>
<td>None</td>
<td>+</td>
</tr>
<tr>
<td>Normal Colon</td>
<td>(n=23)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>19</td>
<td>0</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>IND with HD</td>
<td>(n=10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>IND</td>
<td>(n=9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Our data shows that hyperganglionosis is the most consistent finding in both IND associated with HD and isolated IND. Other histochemical criteria of IND were dependent on whether the biopsy was full-thickness or suction rectal biopsy. Where full-thickness biopsies were available, giant ganglia and ectopic ganglion cells were seen in all cases. Increases in AChE-positive nerve fibers in the mucosa was a frequent finding in patients with IND diagnosed by suction rectal biopsies. We recommend that the patients suspected to have IND on suction rectal biopsies should have full-thickness biopsy for the detailed examination of the submucous and myenteric plexuses.

Ray Postuma
Prem Puri, Children's Research Center, Our Lady's Hospital for Sick Children Crumlin, Dublin 12, Ireland
48. Wednesday, 09:45-09:50; C (five minute paper, with discussion after the next two short papers)

SALVAGE OF SOAVE-BOLEY ENDORECTAL PULL-THROUGH BY CONVERSION TO A CLASSICAL SOAVE PROCEDURE

VR Adolph, H Flageole, J-M Laberge, FM Guttman
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The endorectal pull-through procedure described by Soave and subsequently modified by Boley to include primary coloanal anastomosis is one of the most common procedures for Hirschsprung’s disease. The Boley modification carries a 5% risk of dehiscence of the anastomosis. This is generally treated with proximal colonic diversion and delayed revision of the pull-through. We report the use of the original Soave procedure to treat this complication.

We performed a Soave-Boley pull-through on a five week old boy. His postoperative course was complicated by a prolonged ileus. On the eleventh postoperative day he was explored and found to have a dehiscence of the anterior wall of the coloanal anastomosis with a pelvic abscess. To avoid the need for colostomy and, more importantly, the need for a secondary procedure in a previously infected pelvis, we took down the entire anastomosis and mobilized the left colon further so that a pull-through could be performed similar to the original Soave procedure. This functioned well and the patient made a rapid recovery. The colo-anal anastomosis was performed four weeks later without difficulty. The patient has done well in the three months since the last procedure and is being treated with dilatations by the parents at home once or twice a week.

This is the first report we could find on the use of the Soave procedure as originally described to salvage a pull-through complication. This technique is a safe way to treat the complication, avoids the need for a colostomy and subsequent closure, and most important, avoids the need for a secondary pull-through in a previously infected pelvis.

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49. Wednesday, 09:50-09:55; C (five minute paper, with discussion after the next short paper)

COLONIC ATRESIA COMBINED WITH HIRSCHSPRUNG'S DISEASE: A DIAGNOSTIC AND THERAPEUTIC CHALLENGE

P Kim, R Superina, S Ein
The Hospital for Sick Children, Toronto, Canada

The co-occurrence of colonic atresia with Hirschsprung's disease is a rare event. However, it represents a challenging diagnostic and therapeutic dilemma. Only 2 isolated cases have been previously reported in the surgical literature. We report 3 new cases of children who were initially treated for colonic atresia and who were subsequently discovered to have an associated Hirschsprung's disease.

<table>
<thead>
<tr>
<th>Patients:</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational age:</td>
<td>40 weeks</td>
<td>41 weeks</td>
<td>39 weeks</td>
</tr>
<tr>
<td>Sex:</td>
<td>female</td>
<td>male</td>
<td>male</td>
</tr>
<tr>
<td>Time of presentation</td>
<td>48 hours</td>
<td>72 hours</td>
<td>36 hours</td>
</tr>
<tr>
<td>Site of Colonic Atresia</td>
<td>distal descending</td>
<td>transverse</td>
<td>ascending</td>
</tr>
<tr>
<td>Initial operation:</td>
<td>ascending colostomy &amp; mucus fistula</td>
<td>ileotransverse colostomy</td>
<td>ileotransverse colostomy</td>
</tr>
<tr>
<td>Clinical Course:</td>
<td>closure of colostomy &amp; ileotransverse colostomy</td>
<td>-ileostomy &amp; mucus fistula</td>
<td>-re-do anastomosis</td>
</tr>
<tr>
<td></td>
<td>-excision of anastomosis &amp; double-barrel colostomy</td>
<td>-ileocolostomy</td>
<td>-ileostomy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-ileostomy &amp; Hartmann</td>
<td></td>
</tr>
<tr>
<td>Diagnosis of Hirschsprung</td>
<td>7 months</td>
<td>7 months</td>
<td>16 months</td>
</tr>
<tr>
<td>Definitive operation</td>
<td>ileostomy &amp; Koch pouch</td>
<td>Duhamel-Martain pull-through</td>
<td>ileorectal anastomosis</td>
</tr>
</tbody>
</table>

In conclusion, checking the status of ganglionosis in the distal colon is recommended in patients presenting with the colonic atresia. If patients who were initially operated for colonic atresia, are slow in resuming normal intestinal function, a rectal biopsy must be considered to rule out Hirschsprung's disease.

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THE COMPLETE SPECTRUM OF NEUROCRISTOPATHY

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Neuroblastoma, Hirschsprung’s disease, and central hypoventilation (Ondine’s curse) are considered aberrations of neural crest cell growth, migration, or differentiation and as such are considered under the general heading of neurocristopathy. Their combined occurrence in a newborn infant presenting with total colonic aganglionosis, central hypoventilation, and multi-focal neuroblastoma has not been reported to date.

JK was a 2.3 kg white female term infant who required endotracheal intubation due to persistent apnea in the first hours of life. With progressive abdominal distention and failure to pass meconium, a barium enema was done demonstrating microcolon with meconium pellets at the distal ileum. At laparotomy, the distal ileum was obstructed with insipated meconium; an ileostomy and appendectomy were performed. The resected specimens were aganglionic. An additional 20cms of aganglionic ileum was removed and a normally innervated ileostomy was constructed.

The child failed numerous attempts at extubation as a result of apnea. An extensive apnea work-up including EEG, MRI, bronchoscopy, and pH probe was normal. Sleep studies showed congenital central hypoventilation syndrome and the child underwent a tracheostomy.

At three months, an abdominal ultrasound performed within a septic work-up demonstrated a right supra-renal mass extending across the midline. Thoracic and abdominal MRI’s demonstrated large bilateral adrenal and posterior mediastinal masses. Serum catcholamines and ferritin were markedly elevated, suggestive of neuroblastoma. In light of her multiple problems, the family chose to forego further work-up (including a tissue biopsy) and therapy. In the following two months, her tumor load rapidly progressed and she died of respiratory insufficiency. An autopsy was refused. This is the first report of the co-existence of total colonic aganglionosis, multi-focal neuroblastoma, and central hypoventilation syndrome.

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coffee to follow this paper (10:10-10:40)
LONG GAP OESOPHAGEAL ATRESIA

Robert Black, Mark Evans, David Girvan
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Within the spectrum of oesophageal atresia and tracheoesophageal fistula the long gap atresia continues to present a challenge to the surgeon to re-establish oesophageal continuity. We have reviewed our experience over a 22 year period during which 58 patients have been treated for oesophageal atresia and/or tracheoesophageal fistula. There was a median follow-up of 9 years (range, 9 months to 21 years). Of these, 14 had a long gap atresia, defined as the inability to perform a primary anastomosis. These infants had a lower gestational age (35 ± 3 weeks, mean ± SD, P<.05*) and a lower birth weight (2200 ± 700 grams, P<.05*) compared to infants with a short gap atresia (38 ± 3 weeks, 2700 ± 700 grams). Division of fistula and primary anastomosis (D+A) was performed in all cases of short gap atresia. Isolated atresias were treated by gastrostomy and delayed reconstruction. Those infants with long gap oesophageal atresia were treated by primary repair following Lividitis myotomy in 4 cases, repair using the suture fistula technique in 6 cases, and staged repair by gastric tube reconstruction in 2 cases. Follow-up:

<table>
<thead>
<tr>
<th>REPAIR TYPE</th>
<th>MINOR</th>
<th># DILATATIONS</th>
<th>MAJOR</th>
<th>MORTALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>D + A</td>
<td>20 (50%)</td>
<td>3.5 ± 5.6 (mean ± SD)</td>
<td>4 (10%)</td>
<td>2 (8%)</td>
</tr>
<tr>
<td>Suture</td>
<td>6 (100%)</td>
<td>16 ± 14**</td>
<td>2 (33%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td>Fistula</td>
<td>4 (100%)</td>
<td>26 ± 9**</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lividitis</td>
<td>4 (100%)</td>
<td>10 ± 7**</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Myotomy</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Staged</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Repair</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**p<0.05 compared to D + A, ANOVA. *STUDENTS T TEST

In summary, long gap oesophageal atresia continues to present a challenge to the surgeon and its management remains diverse. Initial gastrostomy and delayed reconstruction is well tolerated with a low incidence of serious complications. Lividitis myotomy will often allow primary repair but has a high incidence of stricture formation. The suture fistula technique will also allow primary repair of the oesophagus in selected cases and appears to carry a comparatively acceptable complication rate.

Mark Evans, MD., FRCSC and David Girvan, MD., FRCSC

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LONG-TERM COMPLICATIONS IN ISOLATED ESOPHAGEAL ATRESIA TREATED WITH ESOPHAGEAL ANASTOMOSIS

H Lindahl, R Rintala
Children's Hospital, University of Helsinki, Finland

During 1982 to 1992 delayed esophageal anastomosis was performed on nine patients with isolated (type A) long-gap esophageal atresia. In all patients Livaditis myotomy was used to enable anastomosis. All operations were successful and there were no surgical complications. Two patients, both with Down's syndrome and congenital cardiovascular malformations, later died because of pulmonary hypertension, which left seven patients for long-term follow-up. The length of the follow-up was 1.2 - 11.3 (mean 5.4) years. Last endoscopy was performed at the age of 1.2 - 11.3 (mean 5.2) years.

All seven patients had severe gastroesophageal reflux (GER) resulting in anastomotic strictures which required prolonged dilatations. All patients needed fundoplication. Three strictures had to be resected. At last follow-up, the subject results according to Desjardins et al were: excellent 4, and good 3 patients. Last endoscopy showed Barrett's esophagus in one patient, esophagitis in three, and normal mucosa in three patients. The fundoplication was partly disrupted in two patients. In three patients the fundoplication was competent, but partly intrathoracic. Histology showed moderate esophagitis in three, mild esophagitis in one, and normal mucosa in three patients.

In conclusion, long-term complications caused by GER are common in patients with isolated esophageal atresia treated with esophageal anastomosis. Therefore, active search and treatment of reflux is necessary in these patients. Because recurrent reflux after fundoplication is common, long-term endoscopic follow-up is warranted.

Ray Postuma

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TWENTY FOUR HOUR MANOMETRIC pH METRIC EVIDENCE OF PERMANENT IMPAIRMENT OF CLEARANCE CAPACITY IN ESOPHAGEAL ATRESIA PATIENTS

JA Tovar, JA Diez Pardo, G Prieto, M Molina, J Murcia, I Polanco
Hospital Infantil La Paz, Universidad Autónoma, Madrid, Spain

As a result of structural abnormalities, gastroesophageal reflux (GER) is frequent after repair of esophageal atresia (EA) and it is not known if dismotility improves beyond infancy allowing expectations of a benign natural history.

Seventeen EA patients age 15.7 ± 4 years (mean ± SD) were investigated manometrically and pH-metrically during 24-h with a combined 5-channel probe connected to a portable recorder. They considered themselves symptom-free but, in fact, 14 (82%) had dysphagia, 11(64%) heartburn and 6 (35%) chronic respiratory tract disease. Excessive acid exposure due to gastro-esophageal reflux (GER) was detected in 10 (58%) patients all of whom had prolonged nocturnal episodes of reflux with very defective clearance. Esophagitis was present in 6 cases.

Motor function was uniformly disorganized, regardless of the presence or absence of GER, with very similar patterns: Reduced number of waves at upper, middle and lower esophageal levels (0.6 ± 0.1, 0.5 ± 0.2 and 0.8 ±0.5 w/min) with almost absence of them during sleep (0.16 ±0.2, 0.3 ± 0.3 and 0.6 ± 0.6 w/min). Peristaltic waves were scanty at the three levels (37.3 ± 20.4%, 33.6 ± 20.4% and 32.8 ± 19.3%) and the proportions of ineffective ones was 94.5 ± 4.2% for the 24-h period, 95.3 ± 5.1% during sleep and 91 ± 6.6% during meals.

In conclusion: EA patients, with or without GER, have a permanent impairment in esophageal peristalsis with practically absence of waves leading to a uniform pattern of long nocturnal episodes of GER. We believe that it is not realistic to expect spontaneous improvement with time and, therefore long-term esophageal assessment is mandatory to offer surgical treatment when symptoms and/or esophagitis are present.

Dr. Salam Yazbeck, MD

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54. Wednesday, 11:25-11:30; C (five minute paper, with discussion after the next short paper)

THE APPLICATION OF COLLIS GASTROPLASTY TO THE MANAGEMENT OF ISOLATED OESOPHAGEAL ATRESIA

MG Evans
Children's Hospital of Western Ontario, London, Canada

Within the spectrum of oesophageal atresia and tracheoesophageal fistula, the isolated oesophageal atresia continues to present the greatest therapeutic challenge. This paper reports a novel approach to the management of isolated oesophageal atresia using the Collis gastroplasty. A newborn infant weighing 2460 grams was referred with an isolated oesophageal atresia, and underwent the insertion of a gastrostomy tube initially. Contrast studies revealed a large gap isolated atresia with the upper pouch sitting at the thoracic outlet and the lower pouch sitting at the diaphragm, a distance of 6 cms. This distance had changed minimally at 3 months of age when the child underwent definitive repair. At laparotomy the gastrostomy was taken down and a lesser curve gastric tube was fashioned using the endo GIA stapler. Through a right thoracotomy the upper pouch was mobilized, and a Lividitis myotomy was performed to allow a primary anastomosis. Following a contrast oesophagram 13 days later oral feeds were commenced, but one month later repeat oesophagography revealed an anastomotic stricture. His subsequent management has included multiple dilatations and a Nissen Fundoplication. The child is currently 17 months of age, is feeding orally and weighs 8.7 kgs. Historically, infants with isolated oesophageal atresia were subjected to early cervical oesophageal diversion and delayed reconstruction. Recent studies have established the principle of delayed primary repair for this lesion negating the necessity for complex reconstructive procedures. In spite of this some isolated atresias will defy primary repair and in this context innovative procedures such as the greater curvature gastric tube and the gastric inter-position (pull-up) have been advocated to re-establish continuity. The current paper offers as an alternative using the Collis gastroplasty as an oesophageal lengthening technique which in combination with a Lividitis myotomy will allow a primary repair using the native oesophagus. Morbidity associated with this procedure is comparable to that seen following conventional techniques.

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55. Wednesday, 11:30-11:35; C (five minute paper, followed by a five
minute discussion of this and the previous short paper)

ENDOSCOPIC CLOSURE OF RECURRENT TRACHEOESOPHAGEAL
FISTULA USING TISSEEL

NE Wiseman
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One in 20 patients undergoing primary repair of esophageal atresia with
tracheoesophageal fistula will return with a recurrent tracheoesophageal
fistula. This complication is traditionally treated by re-thoracotomy and
carries a high morbidity and mortality.

Patient 1 was lost to follow-up for four years after primary repair of
esophageal atresia with tracheoesophageal fistula and presented with
recurrent pulmonary suppuration secondary to aspiration. Barium contrast
study revealed a recurrent tracheoesophageal fistula and this was treated
by successful endoscopic Tisseel injection.

Patient 2 who had severe VATER Syndrome had an early recurrent
fistula which had been treated unsuccessfully by open thoracotomy.
Subsequently, 3 Tisseel injections were required to achieve closure.

The technique of endoscopic closure includes:
1) Denuding of the epithelial lining of the fistula using a bronchial brush
2) Hemostasis of the fistula using a gauze pledget
3) Injection of .5mL of Tisseel using a progressive withdrawal technique

It is proposed that his technique is superior to open repair as it carries a
significant success rate with considerably less morbidity. It is
recommended that endoscopic closure is the first choice in the management
of recurrent TEF.

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ISOLATED CONGENITAL ESOPHAGEAL STENOSIS

Stephen G Murphy, Salam Yazbeck, Pierre Russo
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The incidence of congenital esophageal stenosis (CES) is approximately 1 in 25,000 to 50,000 live births. There is an associated esophageal atresia in one third of cases, the remainder are classified as isolated CES. Histologically, the anomaly may include tracheobronchial remnants, a membranous diaphragm or diffuse fibrosis of muscularis and submucosa. We report our experience of three patients with isolated CES.

The patients were all free of symptoms for the first 6 months of life. All experienced difficulty with feeds from age 6-12 months, corresponding with the introduction of solids. Most solid feeds were regurgitated.

Evaluation consisted of cine-esophagogram, pH-monitoring, manometry and endoscopy with biopsies to exclude a diagnosis of gastro-esophageal reflux. All patients underwent hydrostatic dilatation but benefit was only transient. Patients were referred for surgical correction when symptoms recurred.

A limited resection of the esophageal stenosis with primary anastomosis was performed on all three patients via a left thoracotomy. The stenoses were located in the distal third of esophagus near the junction with the middle third pathologic examination revealed tracheobronchial remnants in two patients and fibrotic muscle in the other.

Average age at operation was 19 months. Hospital stay averaged 8 days. Contrast study at 1 week post-thoracotomy demonstrated esophageal patency with no leak in all patients. All were discharged from hospital tolerating solid food.

CES should be sought for in patients presenting with dysphagia to solid food starting after the first 6 months of life. Its treatment is a limited oesophageal resection and is usually associated with good results.

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COLON PATCH ESOPHAGOPLASTY FOR CAUSTIC ESOPHAGEAL STRicture

Alfred Kennedy, BH Cameron, CW McGill
Geisinger Medical Center, Danville, USA

Severe caustic injury with stricture may require esophageal replacement. The available methods of esophageal substitution do not satisfactorily replace the peristaltic and antireflux properties of the native esophagus. We report our results in 2 children treated with colon patch esophagoplasty and preservation of the injured esophagus.

Both children were three years of age when they accidentally swallowed corrosive lye. Long esophageal strictures developed which were resistant to repeated dilatation. After an interval of 9 to 10 months following the injury, each child underwent colon patch esophagoplasty. A segment of left colon was opened along its antimesenteric border, tailored to the length of the stricture, and anastomosed side-to-side to the incised esophageal stricture. One child later developed a sharp recurrent stricture and diverticulum, which resolved after revision of the distal end of the anastomosis. Follow-up endoscopy has documented healing of the esophagus and resolution of the strictures, and both children are eating normally 3 years following surgery, without symptoms of gastroesophageal reflux.

Colon patch esophagoplasty is a viable alternative to esophageal replacement for long caustic esophageal strictures. Its advantage is the preservation of the peristaltic and antireflux mechanisms of the conserved esophagus. Assessment of ultimate function will required longer follow-up.

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58. Wednesday, 12:00-12:05; C (five minute paper, followed by a five minute discussion of this and the previous short paper)

SIBLINGS WITH ALPORT’S SYNDROME REQUIRING RESECTION FOR ESOPHAGEAL LEIOMYOMATOSIS

Stephen G Murphy, Kenneth S Shaw, Arie L Bensoussan
Hôpital Sainte-Justine, Montreal, Canada

Leiomyomata of the esophagus is rare in childhood and may be associated with Alport’s syndrome. We report 2 siblings with known Alport’s syndrome who were subsequently found to have diffuse esophageal leiomyomatosis.

A 6 year-old-girl presented with diffuse esophageal leiomyomatosis following investigation for dysphagia of several years duration. She underwent esophageal resection and replacement using a reversed gastric tube. The procedure was complicated by pneumonia and an anastomotic leak which resolved with conservative therapy. She was discharged on postoperative day 49. At 6 year follow-up, she has no dysphagia and contrast study demonstrates normal transit through the gastric tube.

At age 7, her brother was diagnosed with diffuse esophageal leiomyomatosis following investigation for dysphagia. His esophageal resection and replacement with a reversed gastric tube was complicated by an anastomotic leak requiring drainage of a thoracic fluid collection. Pathologic examination of the specimen confirmed diffuse leiomyomata. He was discharged from hospital on postoperative day 47 and at follow-up has had no dysphagia.

These are the youngest patients reported in the world literature to undergo esophageal replacement for diffuse esophageal leiomyomatosis associated with Alport’s disease. Although their postoperative courses were complicated by anastomotic leaks, both are currently well.

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THE SAFETY OF HOME-CARE TRACHEOTOMY IN CHILDREN

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Home tracheotomy care could avoid prolonged hospitalization in children requiring tracheotomies for a long time, but previous reports have stated a high rate of complications. Since 1987 our policy was to train parents of children with tracheotomies in all aspects of tracheotomy care; when proficiency was obtained, children were discharged home and seen monthly as outpatients. Results are here presented.

Over a 7-year period, 35 children (26 <1 year of age) underwent tracheotomy in our institution. Indications included congenital and acquired upper airway obstructions in 21 cases (60%), central nervous system lesions in 6 (17%), chronic pulmonary insufficiency in 6 (17%) and miscellaneous conditions in 2 (6%).

We excluded 6 children who were managed in hospital because of their associated problems; the other 29 (82%) were discharged home. Parental training lasted from 10 to 40 days after surgery and included the substitution of the cannula. Children were sent home once all the necessary equipment (aspirator, humidifier, etc.) was available. The 29 children remained for an average of 27 months in home care over a period of 34 months with tracheotomy; twelve of them (41%) have been decannulated. The only complications reported were 2 partial obstructions of the cannula and 2 accidental decannulations that required an emergency substitution.

Although the number of complications can be underestimated by parents, the low number of accidents reported indicate that children with tracheotomy, necessitating of chronic care, can be managed safely at home.

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