50th - 50ième

Annual Meeting - Réunion Annuelle
2018
Toronto, Ontario
Canada
September 26-29 Septembre
CAPS 2019 Annual Meeting
ACCP 2019 Réunion Annuelle

September 19-21 Septembre
Québec City, Québec
Canada

PLAN TO JOIN US!
Joignez-vous à nous!
CANADIAN ASSOCIATION of PAEDIATRIC SURGEONS
ASSOCIATION CANADIENNE de CHIRURGIE PÉDIATRIQUE

50th Annual Meeting
50 ième Réunion Annuelle

September 26-29 Septembre 2018
The Marriott Downtown Toronto Eaton Centre
Toronto, Ontario
CANADA
This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada and approved by the Office of Continuing Professional Development, Faculty of Medicine, University of Toronto for which an attendee may claim up to 12 Section 1 credits (1 hour = 1 Maincert credit) and 7.5 hours of Section 3 credits. Participants should claim the number of hours consistent with their attendance.

Cet événement est une activité de formation collective agrémentée (section 1) tel que défini par le programme de Maintien du Collège Royal des Médecins et Chirurgiens du Canada et approuvé par le bureau du perfectionnement professionnel continu de la faculté de médecine de l’Université de Toronto pour lesquels un participant peut avoir jusqu’à 12 crédits de la section 1 (1 heure = 1 Maincert crédit) et 7.5 crédits de la section 3. Les participants devraient déclarer le nombre d'heures compatibles avec leur présence.

The American Medical Association - AMA PRA Category 1
Through an agreement between the Royal College of Physicians and Surgeons of Canada and the American Medical Association, physicians may convert Royal College MOC credits to AMA PRA Category 1 Credits™. More information on the process to convert Royal College MOC credit to AMA credit: www.ama-assn.org/go/internationalcme. A total of 19.5 credits may be claimed. Participants should claim the number of hours consistent with their attendance.

European Union for Medical Specialists (UEMS) ECMEC
Live educational activities occurring in Canada and recognized by the Royal College of Physicians and Surgeons of Canada as Accredited Group Learning Activities (Section 1) are deemed by the European Union of Medical Specialists (UEMS) eligible for ECMEC®. A total of 19.5 credits may be claimed. Participants should claim the number of hours consistent with their attendance.

https://www.surveymonkey.com/r/CAPS_2018

In keeping with CMA Guidelines, program content and selection of speakers are the responsibility of the planning committee. Support is directed toward the costs of the course and not to individual speakers. All speakers have indicated no involvement with industry that may be perceived as potentially influencing the presentation of the educational material.
Educational Objectives

The Annual meeting of the Canadian Association of Paediatric Surgeons is intended to provide 3 days of comprehensive continuing education in the field of pediatric general and thoracic surgery. Specifically, the objectives are to:

- Present current updates on advances in clinical pediatric surgery
- Present current updates on advances in the pathophysiology of pediatric surgical disorders
- Provide for group discussion on controversial issues in pediatric general and thoracic surgery through:
  - Discussion of presented scientific papers
  - Interactive panel discussion on the management of clinical pediatric problems

Over the three days of the meeting, the breadth of pediatric general and thoracic surgery topics will be covered through presentation of original works by trainees, professional colleagues and allied health care workers involved in the field. The works will acquaint participants with the latest clinical and basic science research findings and trends influencing the clinical practice of pediatric surgery, as well as reacquaint participants with interesting pediatric surgical entities. Controversial topics will invite participatory discussion by the delegates.

A panel of 6 members of the CAPS Program Committee has chosen the abstracts presented, based on quality of abstracts submitted and reflecting what is commonly relevant to the practice of pediatric surgery. Input for subsequent meetings and how to improve this one will be solicited from the delegates at the conclusion of the meeting.
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<thead>
<tr>
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<th>TIME</th>
<th>LOCATION</th>
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<tr>
<td>Tuesday, Sept 25</td>
<td>Executive Finance Meeting</td>
<td>08:00-11:45</td>
<td>Carlton</td>
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<td>Council Meeting</td>
<td>11:45-17:00</td>
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<td>CAPSNet Meeting</td>
<td>17:00-19:00</td>
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<td>Publication Committee</td>
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<td>Wednesday, Sept 26</td>
<td>Scientific Meeting Session</td>
<td>13:00-17:00</td>
<td>Salons A-B &amp; Crush</td>
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<td>e-poster Session</td>
<td>12:00 – 17:15</td>
<td>Salons 1-3</td>
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<td>Social Media Committee</td>
<td>08:00 – 10:00</td>
<td>Richmond</td>
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<td>Registration</td>
<td>10:00 – 17:00</td>
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<td>CaPSNIG Meeting</td>
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<td>Afternoon Break</td>
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<td>Speaker Ready Room</td>
<td>08:00 – 17:00</td>
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<td>Welcome Reception/Buffet</td>
<td>19:00 – 23:00</td>
<td>Trinity Ballroom</td>
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<td>Thursday, Sept 27</td>
<td>Advocacy &amp; Partnership Committee</td>
<td>06:30 –08:30</td>
<td>York A</td>
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<td>RCPSC Committee</td>
<td>06:30 –08:30</td>
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<td>Exhibits</td>
<td>07:00 – 17:00</td>
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<td>Founders Lunch Buffet</td>
<td>12:00-13:30</td>
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<td>Research Committee</td>
<td>16:00-17:30</td>
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<td>16:00-17:30</td>
<td>York B</td>
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<td>Famous People Players</td>
<td>12:00-13:30</td>
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<td>Friday, Sept 28</td>
<td>Annual Business Breakfast</td>
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<td>Saturday, Sept 29</td>
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<td>Ethics &amp; Legal Committee</td>
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<td>Global Partnership Committee</td>
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<td>Registration, Breaks &amp; Lunch</td>
<td>08:00 – 15:00</td>
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<td>Exhibits</td>
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<td>Morning Break</td>
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<td>Lunch</td>
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<td>Presidential Reception</td>
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<td>Presidential Banquet</td>
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14th Annual CaPSNIG Meeting, September 26, 2018
Toronto Marriott Downtown Eaton Centre, Toronto, Ontario

8:30 - 9:00 am  CaPSNIG Business Meeting - Members only
     Breakfast will be served

9:00 - 9:30 am  Introductions & Welcome
     Hazel Pleasants-Terashita & Julia Yole – Meeting Hosts
     Christina Belza - CaPSNIG Chair
     Presidential Welcome - Dr. Erik Skarsgard

9:30 - 10:30 am  Management of Refractory Reflux: GJ vs. Fundo vs. Meds.
     Dr. Mike Livingston, Peds Surgery Fellow, McMaster Children’s Hospital

10:30 - 10:45 am  Coffee/Stretch break

10:45 - 11:15 am  Clean Closure Protocol in the OR for Patients Undergoing GI Procedures
     Aline Titzian, CSN – Operating Room, The Hospital for Sick Children

11:15 - 11:45 am  Wound Care Post-transplant Case Study
     Caroline Daoust, Infirmiere Clinicienne - CHU -Sainte-Justine

11:45 - 12:15 pm  Gastroschisis Pathway in a Level III NICU: Improving Patient Safety and Reducing Length of Stay
     Stephanie Bernardo, RN - NICU, The Hospital for Sick Children
     Charlotte So, RN – NICU, The Hospital for Sick Children

12:15 - 1:15 pm  General Discussion/G-tube Working Group Meeting
     Lunch will be served

1:15 - 1:45 pm  Mucous Fistula Refeeding in Neonates with Short Bowel Syndrome,
     Vicki Gardner, RN - NICU, McMaster Children’s Hospital

1:45-2:00pm  Evaluations & Closing Remarks - Christina Belza
     CAPS Conference to follow at 2:30pm - 5:30pm

This meeting was made possible by a generous donation from CAPS. Please thank your surgeons!
PRESIDENT'S WELCOME

SickKids paediatric surgeon and CAPS Founding member Barry Shandling described the birth of CAPS this way:

“In 1967, one hundred years after Canada became one nation from sea to sea, a letter went out to all Paediatric Surgeons in Canada regarding the establishment of an Association to foster both professional and social intercourse on an interprovincial basis. The object of our Association was quite simple. It was simply to improve the surgical care of infants and children in Canada.”

Welcome to Toronto and thank you for attending the 50th Annual Meeting of the Canadian Association of Paediatric Surgeons! To appropriately celebrate this esteemed occasion, we have organized a very special meeting in Toronto, the city of the very first CAPS meeting. This occasion is made all the more special by the attendance of 8 of CAPS Founding members. Our committees have worked very hard to create a scientific and social program you can’t afford to miss. We’ve added an extra day to the program that both celebrates CAPS’ past, and looks optimistically ahead to CAPS’ future.

Our Education committee has identified Physician Wellness as a meeting theme, and has designed the 5th Annual Sigmund Ein Panel session around internationally acclaimed guest speaker Dr Carole Ann Moulton. This year’s Fred MacLeod lecturer is NASA astronaut Col Cady Coleman, PhD who flew two space shuttle missions and spent 6 months as the lead science and robotics officer on the International Space Station, and has a unique connection to paediatric surgery.

I would like to thank BJ Hancock, our tireless secretary-treasurer, Priscilla Chiu, Program Committee Chair and Jack Langer, Local Arrangements Chair for all their work in making this meeting a success. We also are grateful to our meeting sponsors. A special thank you goes to Arlene Ein, our meeting coordinator, and the heart of CAPS, without whom this meeting would not happen.

The CAPS Annual meeting is always a wonderful opportunity to share knowledge, renew old friendships and make new ones. The 50th Anniversary celebration will make it all the more meaningful. Vive CAPS!

Erik Skarsgard MD, FRCSC, FACS, FAAP

President
Canadian Association of Paediatric Surgeons
MOT DE BIENVENUE DU PRÉSIDENT

Le chirurgien pédiatre SickKids et membre fondateur de CAPS, Barry Shandling, a décrit la naissance de CAPS de cette façon:

"En 1967, cent ans après que le Canada soit devenu une nation d’un océan à l’autre, une lettre est sortie à tous les chirurgiens pédiatiques au Canada en ce qui concerne la création d'une association pour favoriser les relations professionnelles et sociales sur une base interprovinciale. L'objet de notre association était assez simple. C'était simplement pour améliorer les soins chirurgicaux des nourrissons et des enfants au Canada."

Bienvenue à Toronto et merci d'avoir participé à la 50e assemblée annuelle de l'Association canadienne des chirurgiens pédiatiques! Pour célébrer comme il se doit cette occasion prestigieuse, nous avons organisé une réunion très spéciale à Toronto, la première réunion de l’ACEP. Cette occasion est d'autant plus spéciale que 8 membres fondateurs de CAPS sont présents. Nos comités ont travaillé très forts pour créer un programme scientifique et social que vous ne pouvez pas vous permettre de manquer. Nous avons ajouté une journée supplémentaire au programme qui célèbre à la fois le passé de CAPS et qui envisage avec optimisme l'avenir de CAPS.

Notre comité de formation a identifié le bien-être des médecins comme thème de réunion et a conçu la 5e session annuelle du panel Sigmund Ein autour de la conférencière invitée de renommée internationale, la Dre Carole Ann Moulton. Fred MacLeod, conférencier de cette année, est le colonel Cady Coleman, astronaute de la NASA.

Je tiens à remercier BJ Hancock, notre secrétaire-trésorière infatigable, Priscilla Chiu, présidente du comité du programme, et Jack Langer, président des arrangements locaux, pour tout leur travail pour rendre cette réunion un succès. Nous sommes également reconnaissants à nos commanditaires. Un merci tout particulier à Arlene Ein, notre coordinatrice de réunion et au cœur de CAPS, sans qui cette rencontre n’aurait pas lieu.

La réunion annuelle de CAPS est toujours une excellente occasion de partager des connaissances, de renouveler d'anciennes amitiés et d'en créer de nouvelles. La célébration du 50ème anniversaire le rendra d'autant plus significatif. Vive le CAPS!

Erik Skarsgard, MD, FRCSC, FACS, FAAP

Président,
Association canadienne de chirurgie pédiatrique
ABOUT THE CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS

The Canadian Association of Paediatric Surgeons was granted its charter in 1967. Its goal is to improve the surgical care of infants and children. Its areas of interest include all aspects of general and thoracic pediatric surgery with recognition of its unique responsibility to infants born with congenital anomalies and children with malignancies. While its responsibility to pediatric trauma is not unique, it assumes a pivotal role in issues related to pediatric trauma.

The Canadian Association of Paediatric Surgeons presents an opportunity, particularly through its annual meetings, to share information concerning diagnosis, treatment, education and research with regards to its areas of interest. In addition, it assumes responsibility to participate in the education of not only its members, but other members of the community interested in and involved in related aspects of pediatric care.

CAPS ADVOCACY: To help achieve its responsibility to education, research, advocacy and global partnerships, the Association has created several funds where directed donations can be made to support our programs. They include 4 funds: General, Education, Research and Global Partnership Funds. These funds were established and continue to exist through the generosity of individuals and groups, both medical and non-medical, interested in the surgical care of children. The Association solicits annual donations to the funds to maintain an adequate working capital to support all programs and research endeavors endorsed by the CAPS membership. These funds are registered with the federal government and all contributions are fully tax-deductible. It is audited annually.

Contributions to the CAPS Advocacy Funds can be made online at www.caps.ca or send a cheque to:

Dr. B.J. Hancock
CAPS Secretary-Treasurer
Children’s Hospital of Winnipeg
AE401 – 840 Sherbrook Street
Winnipeg, Manitoba R3A 1S1
Email: admin@caps.ca
Telephone: (204) 787-1246 Fax: (204) 787-4618
L’Association canadienne de chirurgie pédiatrique a reçu sa charte en 1967. Son objectif est d’améliorer les soins chirurgicaux des nouveau-nés et des enfants. Elle s’intéresse à tous les aspects de la chirurgie pédiatrique générale et thoracique tout en reconnaissant sa responsabilité unique à l’égard des bébés nés avec des anomalies congénitales et des enfants atteints de tumeurs malignes. Bien que sa responsabilité en matière de traumatismes pédiatriques ne soit pas unique, elle exerce un rôle crucial dans les questions relatives à ces traumatismes.

L’Association canadienne de chirurgie pédiatrique offre la possibilité, particulièrement dans le cadre de son assemblée générale annuelle, d’échanger des informations concernant le diagnostic, le traitement, l’éducation et la recherche liés à ses domaines d’intérêt. De plus, elle contribue à l’éducation non seulement de ses propres membres, mais aussi des autres intervenants qui s’intéressent aux soins pédiatriques et qui œuvrent dans ce domaine.

LES FONDS DE PLAIDOYER: Pour l’aider à remplir ses engagements, l’association a créé les fonds pour le plaidoyer. Il existe 4 fonds de plaidoyer : le fond général, le fond de l’éducation, le fond de la recherche et le fond du partenariat global. Ces fonds a été établi et continue d’exister grâce à la générosité d’individus et d’associations, de nature médicale ou autre, intéressés par les soins chirurgicaux aux enfants. L’association sollicite annuellement des dons afin de maintenir les fonds de roulement suffisant pour soutenir nos programmes de plaidoyer approuvés par les membres de l’ACCP. Ces fonds sont enregistrés auprès du gouvernement fédéral et toutes les contributions sont pleinement déductibles d’impôts. Les fonds fait l’objet d’une vérification comptable annuelle.

Les dons pour le fonds de plaidoyer peuvent être envoyés par courriel à www.caps.ca ou adressés par chèque à :

Dr. B.J. Hancock
Secrétaire-trésorière de l’ACCP
Children’s Hospital of Winnipeg
AE401 – 840 Sherbrook Street
Winnipeg, Manitoba R3A 1S1
Email: admin@caps.ca
Telephone: (204) 787-1246 Fax: (204) 787-4618
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<tr>
<th>Year</th>
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<td>1967-1973</td>
<td>Harvey Beardmore*</td>
<td>Montreal</td>
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<tr>
<td>1973-1975</td>
<td>Colin Ferguson*</td>
<td>Winnipeg</td>
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<td>1975-1977</td>
<td>Jim Simpson*</td>
<td>Toronto</td>
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<td>1977-1979</td>
<td>Sam Kling*</td>
<td>Edmonton</td>
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<td>1979-1981</td>
<td>Pierre-Paul Collin</td>
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<td>1981-1983</td>
<td>Barry Shandling*</td>
<td>Toronto</td>
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<td>1983-1985</td>
<td>Gordon Cameron</td>
<td>Hamilton</td>
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<td>1985-1987</td>
<td>Stanley Mercer*</td>
<td>Ottawa</td>
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<td>1987-1989</td>
<td>Alex Gillis</td>
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<td>1991-1993</td>
<td>Sigmund H. Ein*</td>
<td>Toronto</td>
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<td>1993-1995</td>
<td>Angus Juckes</td>
<td>Regina</td>
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<td>1995-1997</td>
<td>Jean G. Desjardins</td>
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<td>1997-1999</td>
<td>David P. Girvan</td>
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<td>1999-2001</td>
<td>Ray Postuma</td>
<td>Winnipeg</td>
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<td>2001-2003</td>
<td>Mike Giacomantonio</td>
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<td>2003-2005</td>
<td>Salam Yazbeck</td>
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<td>2005-2007</td>
<td>Nathan Wiseman</td>
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<td>2007-2009</td>
<td>Geoffrey Blair</td>
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<td>2009-2011</td>
<td>Jean-Martin Laberge</td>
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<td>2014-2016</td>
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<td>2016-2018</td>
<td>Erik Skarsgard</td>
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<tr>
<td>2018-2020</td>
<td>Leslie Scott</td>
<td>London</td>
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<td>Salam Yazbeck</td>
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<td>2002-2006</td>
<td>Peter G. Fitzgerald</td>
<td>Hamilton</td>
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<td>2006-2011</td>
<td>Juan Bass</td>
<td>Ottawa</td>
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<td>2011-2019</td>
<td>BJ Hancock</td>
<td>Winnipeg</td>
</tr>
<tr>
<td>2019-2023</td>
<td>Sarah Jones</td>
<td>London</td>
</tr>
</tbody>
</table>
**FOUNDING MEMBERS**

**MEMBRES FONDATEURS**

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>ALLEN*</td>
<td>Michael</td>
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<tr>
<td>ASHMORE*</td>
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<td>BEARDMORE*</td>
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<td>Jacques C.</td>
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<td>DUVAL*</td>
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<td>FERGUSON*</td>
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<td>Frank M.</td>
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<td>JUCKES</td>
<td>Angus</td>
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<td>KLIMAN*</td>
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<td>KLING*</td>
<td>Samuel</td>
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<td>MARSHALL*</td>
<td>Donald</td>
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<td>MARSHALL*</td>
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<td>Barry</td>
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<td>Israël</td>
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<td>THOMSON*</td>
<td>Stuart</td>
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<td>TURCOT*</td>
<td>Jacques</td>
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<td>BURRINGTON</td>
<td>John</td>
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<tr>
<td>FRASER</td>
<td>Graham</td>
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* deceased / décédé

1st ANNUAL MEETING was held January 22, 1969 in VANCOUVER

Le premier CONGRÈS ANNUEL eut lieu le 22 janvier, 1969 à VANCOUVER
THE COAT OF ARMS OF
THE CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS

LES ARMOIRIES DE
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 the three maple leaves slipped gules and blacked 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 Aesculapius, 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 Paré, a father of modern surgery. The sixteenth-century French translates, "I treated him, God cured him".

Le Blason

Au gauche, un bistouri droit entouré d'un serpent alors qu'à droite se tient un enfant, tout argent.

Au sommet se trouvent trois feuilles d'érable ainsi que la date 1967.
Devise: "Je le pensay, Dieu le guarit".

Description
Le rouge et le violet des armoiries sont les couleurs du Collège Royal des Médecins et Chirurgiens du Canada et représentent le sang artériel et veineux vu au cours de la chirurgie. L'association du bistouri avec le serpent guérisseur d'Esculape ainsi qu'avec l'image d'un enfant en bonne santé symbolise la pratique de la chirurgie pédiatrique.

La couronne du blason est la feuille d'érable du Canada et la date de fondation de notre association (1967).

La devise est une citation d'Ambroise Paré, père de la chirurgie moderne.
### Visiting Lecturers:

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>Vancouver</td>
<td>Davenport/Segal</td>
</tr>
<tr>
<td>1970</td>
<td>Montreal</td>
<td>F. Wiglesworth</td>
</tr>
<tr>
<td>1971</td>
<td>Ottawa</td>
<td>A. Sass-Kortsak</td>
</tr>
<tr>
<td>1972</td>
<td>Toronto</td>
<td>MacIntyre</td>
</tr>
<tr>
<td>1973</td>
<td>Edmonton</td>
<td>L. Stern</td>
</tr>
<tr>
<td>1974</td>
<td>Montreal</td>
<td>J. Folkman</td>
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### Fred MacLeod Lecturers:

<table>
<thead>
<tr>
<th>Year</th>
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<tr>
<td>1975</td>
<td>Winnipeg</td>
<td>D. J. Waterston</td>
</tr>
<tr>
<td>1976</td>
<td>Québec City</td>
<td>D. Pellerin</td>
</tr>
<tr>
<td>1977</td>
<td>Toronto</td>
<td>F.D. Stephens</td>
</tr>
<tr>
<td>1978</td>
<td>Vancouver</td>
<td>J.H. Louw</td>
</tr>
<tr>
<td>1979</td>
<td>Montréal</td>
<td>O. Swenson</td>
</tr>
<tr>
<td>1980</td>
<td>Ottawa</td>
<td>D.Cohen</td>
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<tr>
<td>1981</td>
<td>Toronto</td>
<td>H.W. Clatworthy</td>
</tr>
<tr>
<td>1982</td>
<td>Québec</td>
<td>P. Mollard</td>
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<tr>
<td>1983</td>
<td>Calgary</td>
<td>K. Kimura</td>
</tr>
<tr>
<td>1984</td>
<td>Montréal</td>
<td>M. M. Ravitch</td>
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<tr>
<td>1985</td>
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<td>P. Jones</td>
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<tr>
<td>1986</td>
<td>Halifax</td>
<td>A. F. Schärli</td>
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<td>1987</td>
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<td>S. L. Gans</td>
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<td>1988</td>
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<td>J. G. Raffensperger</td>
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<td>1989</td>
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<td>J.C. Molenaar</td>
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<td>1990</td>
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<td>K. D. Anderson</td>
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<td>A. G. Coran</td>
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<td>1993</td>
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<td>K. W. Ashcraft</td>
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<td>1995</td>
<td>Chéribourg Magog, Québec</td>
<td>J. A. Tovar</td>
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<td>1996</td>
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<td>N. P. Kenny</td>
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<tr>
<td>1997</td>
<td>Banff</td>
<td>R. Satava</td>
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<td>1998</td>
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<td>R. Resnick</td>
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<td>1999</td>
<td>Montreal</td>
<td>P. K. Donahoe</td>
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<td>2001</td>
<td>9 / 11</td>
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<tr>
<td>2002</td>
<td>Vancouver</td>
<td>D. Birabwa-Male</td>
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**JPS/Fred MacLeod Lecturers:**

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<th>Year</th>
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<tr>
<td>2003</td>
<td>Niagara-on-the-Lake</td>
<td>Scott Adzick</td>
</tr>
<tr>
<td>2004</td>
<td>Winnipeg</td>
<td>Keith Georgeson</td>
</tr>
<tr>
<td>2005</td>
<td>Québec City</td>
<td>Abdullah Al-Rabeeah</td>
</tr>
<tr>
<td>2006</td>
<td>Calgary</td>
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<tr>
<td>2007</td>
<td>St. John’s</td>
<td>Charles J. H Stolar</td>
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<tr>
<td>2008</td>
<td>Toronto</td>
<td>Jose Boix-Ochoa</td>
</tr>
<tr>
<td>2009</td>
<td>Halifax</td>
<td>Michael Gauderer</td>
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<tr>
<td>2010</td>
<td>Saskatoon</td>
<td>Hugo A. Heij</td>
</tr>
<tr>
<td>2011</td>
<td>Ottawa</td>
<td>Marcelo Martinez-Ferro</td>
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<tr>
<td>2012</td>
<td>Victoria</td>
<td>John M. Hutson</td>
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<tr>
<td>2013</td>
<td>Charlottetown</td>
<td>Keith Oldham</td>
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<td>2014</td>
<td>Montréal</td>
<td>Ronald B. Hirschl</td>
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<tr>
<td>2015</td>
<td>Niagara Falls</td>
<td>Kevin P. Lally</td>
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<tr>
<td>2016</td>
<td>Vancouver</td>
<td>Shawn Rangel</td>
</tr>
<tr>
<td>2017</td>
<td>Banff</td>
<td>Riccardo Superina</td>
</tr>
<tr>
<td>2018</td>
<td>Toronto</td>
<td>Col Catherine “Cady” Coleman</td>
</tr>
</tbody>
</table>
The Canadian Association of Paediatric Surgeons
L’Association canadienne de chirurgie pédiatrique

is pleased to invite
est fière d’inviter

Col. Catherine “Cady” Coleman (RET) PhD
United States Air Force, National Aeronautics and Space Administration

to give the JPS / Fred MacLeod Annual Lecture.
à donner la conférence annuelle JPS/ Fred MacLeod:

“Lessons from space – for the crew on Planet Earth”

The visit by
La visite du
Col. Coleman

is made possible with the financial support of
est rendue possible grâce à la générosité de
Elsevier Publishing Company
Dr. Cady Coleman is a chemist, a retired United States Air Force Colonel, and former NASA Astronaut with more than 180 days in space, accumulated during two space shuttle missions and a six-month expedition to the International Space Station (ISS). She launched and landed aboard the Russian Soyuz spacecraft, and acted as the Lead Robotics and Lead Science officer during her tenure aboard the ISS, performing the second-ever free flyer robotic capture from the station.

In her spare time aboard the ISS, Cady played the flute 220 miles above the earth, joining Jethro Tull flutist Ian Anderson for a duet between earth and space and coached actress Sandra Bullock in preparation for Bullock’s role as a stranded astronaut in the movie “Gravity.” After returning to Earth, she became an Innovation Lead and managed LAUNCH.ORG for NASA’s Office of the Chief Technologist at NASA Headquarters, before retiring from NASA after a 26-year career.

Currently, she is a public speaker, advocating for inclusion in STEM and STEAM fields and on teams everywhere, and a technical consultant for microgravity research. She serves on several boards, including the Smithsonian Natural History Museum and Dent the Future. She received a bachelor of science degree in chemistry from the Massachusetts Institute of Technology, and a doctorate in polymer science and engineering from the University of Massachusetts.

We are honoured to have Col. Coleman participate in our 2018 CAPS Annual Meeting Program and look forward to her JPS / Fred MacLeod Lecture.
RESIDENTS’ OR MEDICAL STUDENTS’ PAPERS
A panel of members from the Publication Committee adjudicates the oral presentations presented by medical students or residents. A panel of members from the Program Committee adjudicates the posters presented by medical students or residents.

PRÉSENTATIONS DES RÉSIDENTS OU DES ÉTUDIANTS EN MÉDECINE
Les présentations orales faites par les étudiants ou les résidents sont jugées par un jury constitué des membres du comité de publication. Les présentations d’affiches faites par les étudiants ou les résidents sont jugées par un jury constitué des membres du comité de programme.

Trainee Prizes: CAPS 2017, Banff Alberta, October 5-7, 2017

A. President’s Prize - Prix Du Président

For Outstanding Presentation by a Student- Pour La Meilleure Présentation Par Un(E) Étudiant(E)

Name: Jakob Pugi (Supervisor: Dr. Jacob C Langer)

Paper Title: Results after laparoscopic partial splenectomy for children with hereditary spherocytosis: are outcomes influenced by genetic mutation?

Institution: Hospital for Sick Children (Toronto, ON)

Prize: Monetary award

B. Poster Prizes

First: Lina Antounians (Supervisors: Dr. Augusto Zani)

Paper Title: Effect of exosomes derived from amniotic fluid stem cells and mesenchymal stem cells on experimental lung injury

Institution: Hospital for Sick Children (Toronto, Ontario)

Prize: 1-year subscription to Journal of Pediatric Surgery

Second: Stephanie Polites (Supervisor: Dr. Christopher Moir)

Paper Title: Safety on the slopes- ski versus snowboard injuries in children

Institution: Mayo Clinic (Rochester, Minnesota)

Prize: 1-year subscription to Seminars in Pediatric Surgery
C. Oral Presentations

First: Canaan Aumua (Supervisor: Dr. Udayangani Samarakkody)
**Paper Title:** Racial disparity in an outreach pediatric surgical service: real or unreal?  
**Institution:** University of Auckland (Auckland, New Zealand)  
**Prize:** 1-year subscription to *Journal of Pediatric Surgery*

Second: Catherine Beaumier (Supervisor: Dr. Nelson Piché)
**Paper Title:** Pediatric surgeons’ involvement in pediatric palliative care  
**Institution:** CHU Ste-Justine, Université de Montréal (Montréal, Québec)  
**Prize:** 1-year subscription to *Seminars in Pediatric Surgery*

D. Prix pour le meilleur effort de bilinguisme / Bilingualism Prize

Nom/Name: Dr. Annie Chabot (Supervisor: Dr. Robert Baird)  
**Titre de la présentation/Paper Title:** Experience with peritoneal thermal injury during subcutaneous endoscopically assisted ligation for pediatric inguinal hernia  
**Institution:** McGill University (Montréal, Québec)  
**Prix/Prize:** Monétaire/monetary

E. Innovation Prize

Name: Ishna Sharma (Supervisor: Dr. Christine Finck)  
**Paper Title:** Synthetic scaffolding and amniotic fluid mesenchymal stem cells: a new surgical option for long gap esophageal atresia  
**Institution:** UConn Health (Farmington, Connecticut)  
**Prize:** Monetary
THE CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS WOULD LIKE TO ACKNOWLEDGE THE FINANCIAL SUPPORT OF THE FOLLOWING SPONSORS

L'ASSOCIATION CANADIENNE DE CHIRURGIE PÉDIATRIQUE REMERCIÉ LES COMMANDITAIRES POUR LEUR CONTRIBUTION

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Commanditaire de la conférence JPS/Fred MacLeod et des prix

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B.J. Hancock
Secretary-Treasurer
PROGRAM SCHEDULE
PROGRAMME DÉTAILLÉ

ABBREVIATIONS

O  oral presentation- présentation orale
R  resident paper- présentation par résident
C/T case/technique report- présentation de cas ou de technique
P  poster presentation- présentation d'affiche
O, R, P  Adjudicated- éligible pour les prix
C/T  Not adjudicated (except for bilingual effort)- non-éligible pour les prix (sauf pour le bilinguisme)
<table>
<thead>
<tr>
<th>13:30 - 14:30</th>
<th>Scientific Session #1 Oral Presentations: Trauma/Quality/Care Delivery</th>
<th>Moderators: Dafydd Davies, Dickens Saint-Vil</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>O R 13:30 - 13:37</td>
<td>Where to start? Traumatic injury prevention priority scores in Canadian children</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Samuel Jessula</strong>, <strong>Mark Asbridge</strong>, <strong>Rodrigo Romao</strong>, <strong>Robert Green</strong>, <strong>Natalie L Yanchar</strong></td>
</tr>
<tr>
<td></td>
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<td>1 Division of General Surgery, Department of Surgery, Dalhousie University, Halifax, Nova Scotia, Canada</td>
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<td></td>
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<td>2 Department of Community Health and Epidemiology, Dalhousie University, Halifax, Nova Scotia, Canada</td>
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<td>3 Division of Pediatric General and Thoracic Surgery, IWK Health Centre, Department of Surgery, Dalhousie University, Halifax, Nova Scotia, Canada</td>
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<td>4 Department of Critical Care, Dalhousie University, Halifax, Nova Scotia, Canada</td>
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<td>5 Trauma Nova Scotia, Halifax, Nova Scotia, Canada</td>
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<td>6 Division of Pediatric Surgery, Department of Surgery, University of Calgary, Calgary, Alberta, Canada</td>
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<tr>
<td><strong>2</strong></td>
<td>O R 13:38 - 13:45</td>
<td>Defining massive transfusion in civilian pediatric trauma</td>
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<td>1 Baylor College of Medicine, Texas Children's Hospital, Houston, Texas, USA</td>
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<td>2 Children's Hospital of Alabama, Birmingham, Alabama, USA</td>
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<td><strong>Patricio Lau</strong>, <strong>Eric Rosenfeld</strong>, <strong>Sohail R Shah</strong>, <strong>Bindi Naik-Mathuria</strong>, <strong>David Wesson</strong>, <strong>Adam M Vogel</strong></td>
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<tr>
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<td>Baylor College of Medicine, Texas Children’s Hospital, Houston, Texas, USA</td>
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<tr>
<td><strong>4</strong></td>
<td>O R 13:54 - 14:01</td>
<td>Predictive model for gastrostomy and/or tracheostomy (GT/TT) requirement in pediatric trauma patients with head injury (HI)</td>
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<td><strong>Radu Filipescu</strong>, <strong>Collin Powers</strong>, <strong>David Rothstein</strong>, <strong>Caroll Harmon</strong>, <strong>Kathryn Bass</strong></td>
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<td>John Oishei Children's Hospital of Buffalo, Buffalo, New York, USA</td>
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<td><strong>5</strong></td>
<td>O R 14:02 - 14:09</td>
<td>Age-adjusted shock index: from injury to arrival</td>
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<tr>
<td></td>
<td></td>
<td><strong>Andrew Nordin</strong>, <strong>Junxin Shi</strong>, <strong>Krista Wheeler</strong>, <strong>Henry Xiang</strong>, <strong>Brian Kenney</strong></td>
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<tr>
<td></td>
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<td>1 Nationwide Children's Hospital, Columbus, Ohio, USA</td>
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<td>2 University at Buffalo, Buffalo, New York, USA</td>
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<tr>
<td>No.</td>
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<tr>
<td>6</td>
<td>14:10</td>
<td><strong>The Canadian pediatric surgery workforce: a 5-year prospective study</strong></td>
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<tr>
<td>7</td>
<td>14:18</td>
<td><strong>Survey on patient safety: comparative analysis between CAPS and APSA respondents</strong></td>
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<td>8</td>
<td>14:26</td>
<td><strong>Patient or practitioner? The etiology of high center mortality rates in congenital diaphragmatic hernia</strong></td>
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<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter</th>
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<tr>
<td>14:35 - 15:00</td>
<td><strong>CAPS Travelling Fellow Presentation</strong></td>
<td>Robin Petroze</td>
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<td>15:00 - 15:30</td>
<td><strong>Coffee Break and Exhibit Hall</strong></td>
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<tr>
<td>15:30 - 16:30</td>
<td><strong>Scientific Session #2 Oral Presentations: Video/Technique Session</strong></td>
<td>Moderators: Juan Bass, Jessica Mills</td>
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<td>9</td>
<td>O R 15:30 - 15:37</td>
<td><strong>Surgical management of a case of catecholaminergic polymorphic ventricular tachycardia</strong></td>
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<tr>
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<td>10</td>
<td>15:38-15:45</td>
<td>Duodenal webs: a laparoscopic approach</td>
</tr>
<tr>
<td>11</td>
<td>15:46-15:53</td>
<td>Image-guided and muscle sparing laparoscopic anorectoplasty using real-time magnetic resonance imaging (MRI)</td>
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<tr>
<td>12</td>
<td>15:54-16:01</td>
<td>Laparoscopic vaginal pull through in congenital adrenal hyperplasia with high confluence: early results of a novel technique</td>
</tr>
<tr>
<td>13</td>
<td>16:02-16:09</td>
<td>Posterior extra peritoneal laparoscopic adrenalectomy for children with adrenal tumors</td>
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<tr>
<td>14</td>
<td>16:10-16:17</td>
<td>Treatment of recurrent or persistent pneumothorax in children with glue pleurodesis</td>
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<td>15</td>
<td>16:18-16:25</td>
<td>Laparoscopic-assisted enteroscopy: a favorable technique to treat complex small bowel pathology</td>
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<td>21</td>
<td>P R</td>
<td>Requirement and duration of tube feed supplementation among congenital diaphragmatic hernia patients</td>
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<td>1 Division of General and Thoracic Surgery, The Hospital for Sick Children, Toronto, Ontario, Canada</td>
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<td>4 Division of Respiratory Medicine, The Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada</td>
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<td>22</td>
<td>P R</td>
<td>Treatment failure in children with empyema managed with chest tube insertion and fibrinolytics: what is the role of surgery?</td>
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<td>1 McMaster Children’s Hospital, Hamilton, Ontario, Canada</td>
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<td>3 Applied Health Research Centre of the Li Ka Shing Knowledge Institute, St. Michael’s Hospital, Toronto, Ontario, Canada</td>
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<td>4 Children’s Hospital of Eastern Ontario, Ottawa, Ontario, Canada</td>
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<td>5 Centre Hospitalier Universitaire Sainte-Justine, Montréal, Quebec, Canada</td>
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<td>6 British Columbia’s Children’s Hospital, Vancouver, British Columbia, Canada</td>
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<td>7 Alberta Children’s Hospital, Calgary, Alberta, Canada</td>
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<td>23</td>
<td>P</td>
<td>Chest tube versus surgery for spontaneous pneumothorax in a pediatric population: a retrospective chart review</td>
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<td>1 Department of Pediatric Surgery, Children’s Hospital of Eastern Ontario, Ottawa, Ontario, Canada</td>
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<td>2 Children’s Hospital of Eastern Ontario Research Institute, Ottawa, Ontario, Canada</td>
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<td>3 Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada</td>
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<td>24</td>
<td>P R</td>
<td>Right-sided congenital diaphragmatic hernia: the role of prenatal predictors and perinatal characteristics on early outcomes: a fourteen-year prospective study</td>
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<td>Surgical and Clinical Neonatal Department, Bambino Gesu Research Children’s Hospital, Rome, Italy</td>
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| 25  | 17:15 - 17:19 | Management preferences in ECMO mode for CDH | Patrick T Delaplain, Tim Jancelewicz, Matteo Di Nardo, Lishi Zhang, Peter T Yu, John P Cleary, Matthew T Harting, Danh V Nguyen, Yigit S Guner | 1. Children’s Hospital Los Angeles, Department of Pediatric Surgery, Los Angeles, California, USA  
2. University of California Irvine Medical Center, Department of Surgery, Orange, California, USA  
3. Le Bonheur Children's Hospital, University of Tennessee Health Science Center, Division of Pediatric Surgery, Memphis, Tennessee, USA  
4. Pediatric Intensive Care Unit, Children’s Hospital Bambino Gesù, IRCCS, Rome, Italy  
5. University of California Irvine Biostatistics, Institute for Clinical and Translational Science, Irvine, California, USA  
6. Children’s Hospital of Orange County, Division of Pediatric Surgery, Orange, California, USA  
7. Children’s Hospital of Orange County, Division of Neonatology, Orange, California, USA  
8. Department of Pediatric Surgery, University of Texas McGovern Medical School and Children’s Memorial Hermann Hospital, Houston, Texas, USA  
9. University of California, Irvine School of Medicine, Department of Medicine, Orange, California, USA |
| 26  | 17:20 - 17:24 | Congenital diaphragmatic hernia associated with congenital heart disease: a systematic review of the literature | Louise Montalva, Augusto Zani | Division of General and Thoracic Surgery, Hospital for Sick Children, Toronto, Ontario, Canada |
| 27  | 17:25 - 17:29 | Prenatal prediction of survival in congenital diaphragmatic hernia: an audit of postnatal outcomes | Robin T Petroze, Josée Trebichavsky, Natasha G Caminsky, Sarah Bouchard, Annie Le-Nguyen, Jean-Martin Laberge, Sherif Emil, Pramod Puligandla | 1. Division of Pediatric General and Thoracic Surgery, Montreal Children’s Hospital, McGill University, Montreal, Quebec, Canada  
2. Division of Paediatric Surgery, CHU Sainte-Justine, University of Montreal, Montreal, Quebec, Canada  
3. Department of General Surgery, University of Montreal, Montreal, Quebec, Canada |
| 28  | 17:30 - 17:34 | Use of pediatric endoscope for lower pouch identification in long-gap esophageal atresia | Kristy Rialon, Annika Mutanen, Peter Church, Agostino Pierro | 1. Division of General and Thoracic Surgery, Hospital for Sick Children, Toronto, Ontario, Canada  
2. Division of Gastroenterology, Hepatology and Nutrition, Hospital for Sick Children, Toronto, Ontario, Canada |
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<tr>
<td>29</td>
<td>P R</td>
<td>16:30 - 16:34</td>
<td>Management of ovarian lesions diagnosed during infancy</td>
<td>Kristy L Rialon¹, Adesola Akinkuotu¹, Aodhnait S Fahy¹, Susan Shelmerdine², Jeffrey Traubici², Priscilla Chiu¹</td>
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<td>² Division of Diagnostic Imaging, Hospital for Sick Children, Toronto, Ontario, Canada</td>
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<td>30</td>
<td>P R</td>
<td>16:35 - 16:39</td>
<td>Defining quality indicators for paediatric surgical oncology: a review of outcomes from Alberta Children's Hospital</td>
<td>Steven Langer¹, Tony Truong², Paul Beaudry³</td>
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<td>³ Department of Surgery, University of Calgary, Calgary, Alberta, Canada</td>
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<td>31</td>
<td>P R</td>
<td>16:40 - 16:44</td>
<td>Comparison of pediatric and adult gastric adenocarcinoma: a National Cancer Database study</td>
<td>Matthew Dellinger¹, Robert Tessler¹, Morgan K Richards¹, Adam B Goldin¹, Elizabeth A Beierle², John J Doski³, Monica Langer⁴, Jed G Nuchtern⁵, Mehul V Raval⁶, Sanjeev Vasudevan⁷, Kenneth W Gow¹</td>
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<td>¹ Seattle Children's Hospital, Seattle, Washington, USA</td>
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<td>³ UT Health San Antonio, San Antonio, Texas, USA</td>
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<td>⁴ Northwestern University, Evanston, Illinois, USA</td>
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<td>Baylor Scott &amp; White Healthcare, Texas A&amp;M University College of Medicine, Temple, Texas, USA</td>
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<td>33</td>
<td>P R</td>
<td>17:00 - 17:04</td>
<td>Intestinal injury is prevented by amniotic fluid stem cell administration before the onset of necrotizing enterocolitis</td>
<td>Marissa Cadete¹, Bo Li¹, Carol Lee¹, Hiromu Miyake¹, Joshua O'Connell¹, Agostino Pierro¹,²,³</td>
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<td>¹ Translational Medicine Program, Hospital for Sick Children, Toronto, Ontario, Canada</td>
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<td>³ Department of Surgery, University of Toronto, Toronto, Ontario, Canada</td>
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<td>34</td>
<td>P R</td>
<td>17:05 - 17:09</td>
<td>A retrospective review examining the safety of mucous fistula refeeding in neonates with short bowel syndrome</td>
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<td>35</td>
<td>P R</td>
<td>17:10 - 17:14</td>
<td>Remote ischaemic conditioning as a novel therapeutic intervention for experimental NEC</td>
<td>Tessa Elliott $^{1,2}$, Bethany Easterbrook $^{1,3}$, Samantha DeSilva $^2$, J Mark Walton $^{1,2}$</td>
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<td>Department of Surgery, McMaster University, Hamilton, Ontario, Canada</td>
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<td>McMaster Pediatric Surgery Research Collaborative, McMaster University, Hamilton, Ontario, Canada</td>
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<td>36</td>
<td>P R</td>
<td>17:15 - 17:19</td>
<td>Contemporary outcomes of necrotising enterocolitis – a systematic review</td>
<td>Ian Jones $^{1,2}$, Jane Collins $^1$, Nigel Hall $^{1,2}$</td>
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<td>University of Southampton, Southampton, United Kingdom</td>
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<td>Southampton Children's Hospital, Tremona Road, Southampton, United Kingdom</td>
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<td>37</td>
<td>P R</td>
<td>17:20 - 17:24</td>
<td>Laparoscopic Ladd procedure for the management of malrotation and volvulus</td>
<td>Justin A Sobrino, Joseph Sujka, Shawn D St. Peter, Jason D Fraser</td>
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<td>Children's Mercy Hospital, Kansas City, Missouri, USA</td>
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<td>38</td>
<td>P R</td>
<td>17:25 - 17:29</td>
<td>Pick the PICC: prolonged use of peripherally inserted central venous catheters in children with intestinal failure</td>
<td>Kathryn Larusso $^1$, Tiffany Fung $^1$, Justin Long $^1$, Marie-Pier Dumas $^2$, Ana Sant'Anna $^2$, Zahia Attari, Geraldine Schaack $^3$, Yasmine Yousef $^1$, Rajam Ragunathan $^1$, Hidy Girgis $^1$, Sherif Emil $^1$</td>
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<td>Division of Pediatric General and Thoracic Surgery, Montreal Hospital, Montreal, Quebec, Canada</td>
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<td>Complex Care Service, Montreal Children's Hospital, McGill University Health Centre, Montreal, Quebec, Canada</td>
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18:30 - 23:00 Welcome Reception/Buffet - Toronto Marriott Downtown Eaton Centre

08:30 – 10:00  CAPS at 50- “Future CAPS: The Next Generation”
Moderator: Erik Skarsgard
CAPS Global Surgery- Shant Shekhherdimian
CAPS Research- Richard Keijzer
CAPS and Innovation- Abdullah Saleh
CAPS and its support of international members- Alana Beres

**Learning objectives**
At the end of this session, participants will be able to:
1. Outline achievements, challenges and vision of CAPS Global Paediatric Surgery.
2. Describe strategies to develop viable and productive careers as paediatric surgeon-scientists.
3. List the value of CAPS membership for its international members.
4. Appreciate strategic opportunities for CAPS to advance device/technology innovation.

10:00 – 10:30  Coffee Break and Exhibit Hall

10:30 – 12:00  CAPS Founders: CAPS Archives Committee Retrospective

12:00 – 13:30  CAPS Founders’ Lunch and Exhibit Hall- Group photo

13:30 – 14:30  CAPS at 50- “The Twilight Generation”
Moderator: Robert Baird
Spotlight on: Geoff Blair, Jacob Langer, Jean-Martin Laberge

**Learning objectives**
At the end of this session, participants will be able to:
1. Outline the anticipated emotional reactions you may encounter as you retire from Paediatric Surgical practice.
2. Describe strategies to work through and cope with the emotional reactions of planning/ going through retirement.
3. List what retired people say they miss most from their pre-retirement years.

14:30 – 16:00  CAPS Next 50- “CAPS Serving Canada”
Moderator: Sarah Bouchard
1. Outreach: Reaching indigenous and underserved populations- Melanie Morris, Kris Milbrandt, David Price
2. Education: CAPS and pediatric surgery training- CAPS Education Committee
3. New knowledge and discovery: Leading pediatric surgery through new research and research collaborations - Sherif Emil, Natalie Yanchar
4. Diversity of CAPS: the role of women and minorities within CAPS - Kathryn Martin

Learning objectives
At the end of this session, participants will be able to:
1. Outline the individual, corporate and technological opportunities to reach remote, underserved and Indigenous children in need of paediatric surgical care.
2. Describe the changes and their impact on surgical training and postgraduate education undertaken by the Royal College of Physicians and Surgeons of Canada.
3. Describe the new Canadian initiatives and opportunities for multi-centre research collaborations.
4. List some of the individuals and accomplishments of past and present women and visible minority CAPS members.

18:00 – 22:00 | CAPS Group Tour- dinner theatre at Famous People Players

FRIDAY, SEPTEMBER 28, 2018

06:30 – 07:00 | Breakfast for CAPS Business Meeting
07:00 – 08:50 | CAPS Annual Business Meeting

| 09:00 - 09:45 | Scientific Session #3 Oral Presentations: Oncology/Education/Global Surgery |
| Moderators: Andrea Winthrop, Paul Beaudry |

| 39 | O R | 09:00 - 09:07 | Multifocal hepatoblastoma: what is the risk of recurrent disease in the remnant liver? |
| Aodhnait S Fahy ¹, Furqan Shaikh ², Justin T Gerstle ¹ |
| ¹ Division of General and Thoracic Surgery, Hospital for Sick Children, Toronto, Ontario, Canada |
| ² Division of Haematology/Oncology, Hospital for Sick Children, Toronto, Ontario, Canada |

| 40 | O R | 09:08 - 09:15 | A national transition to discipline curriculum for pediatric surgery residents: evaluation of the 2017 pilot pediatric surgery “boot camp” |
| Christopher Blackmore ¹, Pramod S Puligandla ², Sherif Emil ², Rodrigo Romao ¹, Steven R Lopushinsky ³ |
| ¹ Dalhousie University, Halifax, Nova Scotia, Canada |
| ² McGill University, Montreal, Quebec, Canada |
| ³ University of Calgary, Calgary, Alberta, Canada |

| 41 | O | 09:16 - 09:23 | Improvement in resident wellness from a trainee perspective |
| Michael Buckle, Lisa Post, Dana Lin, Claudia M Mueller |
| Stanford University School of Medicine, Stanford, California, USA |

| 42 | O R | 09:24 - 09:31 | Incidence and prevalence of congenital anomalies in low-and middle-income countries: a systematic review |

Yasmine Yousef¹, Asra Toobaie², Saba Balvardi², Etienne St-Louis³, Robert Baird⁴, Dan Poenaru³

¹ University of Montreal, Department of General Surgery, Montreal, Quebec, Canada
² McGill University, Montreal, Quebec, Canada
³ Department of Pediatric Surgery, McGill University, Montreal, Quebec, Canada
⁴ Division of Pediatric General Surgery, BC Children’s Hospital, University of British Columbia, Vancouver, British Columbia, Canada

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| 09:32 - 09:39 | OR 43 | **Pilot results of the global assessment in pediatric surgery (GAPS): an evidence-based pediatric surgical capacity assessment tool for low-resource settings**

Yasmine Yousef¹, Etienne St-Louis², Robert Baird³, Emily Smith⁴, Emmanuel Ameh⁵, Sherif Emil², Jean-Martin Laberge², Dan Poenaru²

¹ Department of General Surgery, University of Montreal, Montreal, Quebec, Canada
² Department of Pediatric Surgery, McGill University, Montreal, Quebec, Canada
³ Division of Pediatric General Surgery, BC Children’s Hospital, University of British Columbia, Vancouver, British Columbia, Canada
⁴ Baylor University College of Human Sciences, Waco, Texas, USA
⁵ Department of Surgery, National Hospital, Abuja, Nigeria.

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JPS/Fred MacLeod Lecture: Col. Catherine “Cady” Coleman (RET) PhD, United States Air Force, National Aeronautics and Space Administration

“Lessons from space – for the crew on Planet Earth”

The Journal of Pediatric Surgery/Fred MacLeod lecturer for the 50th Annual Meeting is Col. Cady Coleman (RET), a former astronaut from the National Aeronautics and Space Administration. After 24 years and three trips to space, astronaut Coleman left NASA on Dec. 1, 2016. During her time at NASA, she flew on two space shuttle missions and spent six months aboard the International Space Station. Col. Coleman has continued to reach out to children to promote Science, Technology, Engineering and Mathematics (STEM) as a mother and a scientist.

**Learning Objectives**

At the completion of this activity, participants will:

1. Be able to identify barriers to establishing and maintaining good team dynamics.
2. Understand the effects of personal perspective on one’s ability to function in a team.
3. Describe approaches to acknowledge effort and people on your team to create an affirmative and high functioning team.

10:45 - 11:15 | Coffee Break and Exhibit Hall
### CAPS Advocacy/Wellness 4th Ein Panel Session

“Peeking behind the curtain: surgical judgment beyond cognition”

**Speaker:** Carol-Anne Moulton  
**Moderator:** Ioana Bratu  
**Panelists:** Geoff Blair, Kurt Heiss, Claudia Mueller, Andrea Winthrop

The CAPS Advocacy Wellness Session will consist of an expert presentation followed by case presentations and scenarios to engage the CAPS audience with interactive discussions. Participants will be asked to use the audience response system to provide survey answers to the MCQ’s provided for questions regarding clinical decision making, surgeon wellness, burn out signs and symptoms.

**Learning Objectives**

At the completion of this activity, participants will:

1. **Provide theoretical underpinnings for the power of medical culture in influencing decision making and judgment.**
2. **Describe unintended consequence of culture on clinician wellness and learning.**
3. **Demonstrate that a culture shift towards vulnerability and transparency is possible and likely more suitable to expert practice and clinician wellness.**

### Lunch box pick up

### CAPS Educational Session: “Difficult Case Conference and Lunch with Experts”

**Moderators:** Andrea Winthrop, Steve Lopushinsky

The Education Session will present challenging clinical cases for the audience to discuss, including diagnostic work up, case management dilemmas and treatment options. The audience will be invited to weigh in on the discussion to provide additional insights. Audience participation will be incorporated using the audience response system.

**Learning Objectives**

At the completion of this activity, participants will be able to:

1. **Provide background and latest evidence for the clinical management of complex paediatric surgical conditions with the focus on treatment options.**
2. **Understand the value and role of multi-disciplinary management and specialized care.**
3. **Manage cases similar to those presented and chart patient outcomes in their own personal practice.**

### Coffee Break and Exhibit Hall

### Scientific Session #4 Oral Presentations: Thoracic

**Moderators:** Sarah Bouchard, Jacob Langer

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<tr>
<th>44</th>
<th>O R</th>
<th>14:45 - 14:52</th>
<th>Are circular RNAs a new biomarker for abnormal lung development and congenital diaphragmatic hernia?</th>
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<td>Shana Kahnamouí, Richard Wagner, Naghmeh Khoshgoo, Thomas H</td>
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<td>45</td>
<td>OR</td>
<td>14:53 - 15:00</td>
<td>High expression of epithelial cell marker Cadherin-26 in cystic lesions of CPAM lungs</td>
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<td>46</td>
<td>O</td>
<td>15:01 - 15:08</td>
<td>Cerebral oxygenation in early life and neurodevelopmental outcome in congenital diaphragmatic hernia survivors</td>
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<td>49</td>
<td>O</td>
<td>15:25 - 15:32</td>
<td>GMP-grade extracellular vesicles derived from clinically compliant human amniotic fluid stem cells regenerate the lung epithelium in a model of pulmonary hypoplasia</td>
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| Page | O R | 15:33 - 15:40 | **Prenatal echocardiography (ECHO) in assessment of structural heart defects in congenital diaphragmatic hernia patients: is early postnatal ECHO necessary for ECMO candidacy?**  
Candace C Style\(^1,2\), Oluyinka O Olutoye\(^1,2\), Keila N Lopez\(^1\), Mariatu A Verla\(^1,2\), Patricio E Lau\(^1\), Stephanie M Cruz\(^1\), Jimmy Espinoza\(^1\), Caraciolo J Fernandez\(^1\), Sundeep G Keswani\(^1,2\), Adam M Vogel\(^1,2\), Timothy C Lee\(^1,2\)  
\(^1\) Baylor College of Medicine, Houston, Texas, USA  
\(^2\) Texas Children’s Hospital, Houston, Texas, USA |
|---|---|---|---|
Alessandra Di Pede\(^1\), Laura Valfre\(^1\), Manuela Magliozzi\(^2\), Irma Capolupo\(^1\), Andrea Conforti\(^1\), Andrea Dotta\(^1\), Pietro Bagolan\(^1\), Antonio Novelli\(^2\), Maria Cristina Digilio\(^2\)  
\(^1\) Surgical and Clinical Neonatal Department, Bambino Gesu Research Children’s Hospital, Rome, Italy  
\(^2\) Genetic Department, Bambino Gesu Research Children's Hospital, Rome, Italy |
| 52 |  | 15:49 - 15:56 | **Does creating a dome reduce recurrence in congenital diaphragmatic hernia following patch repair?**  
Mariatu A Verla\(^1,2\), Timothy C Lee\(^1,2\), Candace C Style\(^1,2\), Fariha Sheikh\(^1,2\), Patricio E Lau\(^2\), Amy R Mehollin-Ray\(^1,3\), Caraciolo J Fernandez\(^1,4\), Sundeep G Keswani\(^1,2\), Oluyinka O Olutoye\(^1,2\)  
\(^1\) Texas Children’s Fetal Center, Houston, Texas, USA  
\(^2\) Michael E DeBakey Department of Surgery, Houston, Texas, USA  
\(^3\) Departments of Radiology and Pediatrics, Houston, Texas, USA  
\(^4\) Newborn Section, Baylor College of Medicine, Houston, Texas, USA |
| 53 |  | 15:57 - 16:04 | **The effects of tracheal occlusion on Wnt signaling in a rabbit model of congenital diaphragmatic hernia**  
Martina Mudri\(^1\), Shane Smith\(^1\), Christina Vanderboor\(^2\), Jacob Davidson\(^1\), Timothy R H Regnault\(^2\), Andreana Bütter\(^1\)  
\(^1\) Division of Pediatric Surgery, Children’s Hospital, London Health Sciences Centre, London, Ontario, Canada  
\(^2\) Departments of Obstetrics & Gynaecology and Physiology & Pharmacology, Schulich School of Medicine & Dentistry, Western University, London, Ontario, Canada |

CAPS President’s Address

**16:05 - 17:00**  
Erik Skarsgard – “CAPS at 50…Now comfortably seated with the grown ups”
### Scientific Session #5 Oral Presentations: Hepatobiliary/General
Moderators: Sonia Butterworth, Nigel Hall

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Presenters</th>
<th>Institutions</th>
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<tbody>
<tr>
<td>09:00-10:35</td>
<td>O R</td>
<td>Demographic factors affecting parental attitudes to clinical research in paediatric surgery: a pilot study</td>
<td>Yoong Wend Chen , Li Wen Lee , Candy SC Choo , Yong Chen , Shireen A Nah</td>
<td>Duke-NUS Medical School, Singapore, Department of Pediatric Surgery, KK Women’s &amp; Children’s Hospital, Singapore</td>
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<td>09:00-09:07</td>
<td>O R</td>
<td>Demographic factors affecting parental attitudes to clinical research in paediatric surgery: a pilot study</td>
<td>Yoong Wend Chen , Li Wen Lee , Candy SC Choo , Yong Chen , Shireen A Nah</td>
<td>Duke-NUS Medical School, Singapore, Department of Pediatric Surgery, KK Women’s &amp; Children’s Hospital, Singapore</td>
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<td>09:08-09:15</td>
<td>O</td>
<td>Removal of tunneled central venous catheters using the traction technique without cuff dissection: a single-centre review of long-term results</td>
<td>Lisa VanHouwelingen , John Martin Lu , Lynn Wynn , Amy Kimble , Jianrong Wu , Israel Fernandez-Pineda , Andrew Murphy , Andrew Davidoff</td>
<td>McMaster Children's Hospital, Hamilton, Ontario, Canada, University of Tennessee Health Sciences Program, Memphis, Tennessee, USA, St Jude Children's Research Hospital, Memphis, Tennessee, USA</td>
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<td>09:16-09:23</td>
<td>O R</td>
<td>Comparing outcomes and complication rates of traditional percutaneous endoscopic gastrostomy and laparoscopic-assisted gastrostomy tube insertion in low birth-weight infants: a two-centre retrospective review</td>
<td>Alisha Fernandes , Nathalie Carey , Tessa Elliott , Jacob Davidson , Neil Merritt , Sarah Jones , J Mark Walton</td>
<td>McMaster Children's Hospital, Hamilton, Ontario, Canada, Department of Surgery, Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada, McMaster Pediatric Surgery Research Collaborative, Department of Surgery, McMaster University, Hamilton, Ontario, Canada</td>
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<td>09:24-09:31</td>
<td>O R</td>
<td>Evolution and outcomes of a Canadian pediatric bariatric surgery program</td>
<td>Adesola C Akinkuotu , Jill Hamilton , Catherine Birken , Alene Toulany , Michele Strom , Rebecca Noseworthy , John Hagen , Jacob C Langer</td>
<td>Division of General &amp; Thoracic Surgery, Hospital for Sick Children, Toronto, Ontario, Canada, Division of Endocrinology, Hospital for Sick Children, Toronto, Ontario, Canada, Division of Paediatric Medicine, Hospital for Sick Children, Toronto, Ontario, Canada, Department of General Surgery, Humber River Hospital, Toronto, Ontario, Canada</td>
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<td>58</td>
<td>09:32-09:39</td>
<td>Laparoscopic versus open Kasai portoenterostomy for biliary atresia: a propensity score analysis</td>
<td>Naruhiko Murase, Yuiro Tanaka, Chiyoe Shirota, Takahisa Tainaka, Wataru Sumida, Kazuki Yokota, Kazu Ohshima, Kosuke Chiba, Hiroo Uchida</td>
<td>Department of Pediatric Surgery, Nagoya University Graduate School of Medicine, Nagoya, Japan</td>
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<td>60</td>
<td>09:48-09:55</td>
<td>Laparoscopy reduces the risk of surgical site infections in infants and children: a systematic review and meta-analysis</td>
<td>Giuseppe Lauriti, Maria Enrica Miscia, Enrico La Pergola, Gabriele Listi, Pierluigi Lelli Chiesa, Agostino Pierro, Augusto Zani</td>
<td>Division of General and Thoracic Surgery, Hospital for Sick Children, Toronto, Ontario, Canada</td>
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<td>2 Department of Pediatric Surgery, “Spirito Santo” Hospital, “G. d’Annunzio” University, Chieti-Pescara, Italy</td>
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<td>61</td>
<td>09:56-10:03</td>
<td>Conservative management of urachal anomalies</td>
<td>Robert Cusick, Christopher Dethlefs</td>
<td>Children’s Hospital and Medical Center, Omaha, Nebraska, USA</td>
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<td>62</td>
<td>10:04-10:11</td>
<td>Does triangular cord sign represent disease progression in biliary atresia?</td>
<td>Kosuke Endo, Akiko Yokoi, Makiko Yoshida</td>
<td>Kobe Children's Hospital, Kobe, Japan</td>
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<td>2 Kitano Hospital, Osaka, Japan</td>
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<td>63</td>
<td>10:12-10:19</td>
<td>The effectiveness of wedge resection versus Vandenbos procedure for the surgical management of ingrown toenail in children: a retrospective chart review</td>
<td>Youssef Nasr, Marcos Bettolli, Carolyn Wayne, Michelle Li, Katrina J Sullivan, Jui-Hsia Cleo Hung, Ahmed Nasr</td>
<td>Department of Pediatric Surgery, Children’s Hospital of Eastern Ontario, Ottawa, Ontario, Canada</td>
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<td>64</td>
<td>10:20-10:27</td>
<td>Laparoscopic versus open inguinal hernia repair in children: which is the true gold-standard? A systematic review and meta-analysis</td>
<td>Navot Kantor, Carolyn Wayne, Ahmed Nasr</td>
<td>Department of Pediatric Surgery, Children’s Hospital of Eastern Ontario, Ottawa, Ontario, Canada</td>
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<td>65</td>
<td>10:28 - 10:35</td>
<td><strong>Cystic fibrosis and portal hypertension: shunt or transplant?</strong></td>
<td>Caroline Lemoine, Katherine Brandt, Joan Lokar, Riccardo Superina</td>
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<td>Transplant Surgery, Ann &amp; Robert H Lurie Children's Hospital of Chicago, Chicago, Illinois, USA</td>
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<td>10:35 - 11:00</td>
<td><strong>Coffee Break and Exhibit Hall</strong></td>
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<td>11:00 - 11:30</td>
<td><strong>CAPS Global Surgery Scholar Presentation</strong></td>
<td>Aiah Lebbie, Sierra Leone</td>
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<td>66</td>
<td>11:30 - 11:34</td>
<td><strong>Incidental appendectomy during surgical intussusception reduction</strong></td>
<td>Emile I Gleeson, Eric H Rosenfeld, Elaa Mahdi, Suveera Dang, Derek S Wakeman, David E Wesson, Adam M Vogel</td>
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<td>2 University of Rochester Medical Center, Rochester, New York, USA</td>
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<td>67</td>
<td>11:35 - 11:39</td>
<td><strong>Methodological issues in identifying sepsis events in pediatric surgery patients</strong></td>
<td>Karen Bailey, Tessa Elliott, Emilio Aguirre, April Kam, Jeffrey Pernica, Michelle Welsford, Niranjan Kissoon, Lehana Thabane, Alison Fox-Robichaud, Karen Choong, Melissa Parker</td>
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<td>5 Department of Pediatrics and the British Columbia Children’s Research Institute, University of British Columbia, Vancouver, British Columbia, Canada</td>
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<td>68</td>
<td>11:40 - 11:44</td>
<td><strong>Non-tuberculous mycobacterial (NTM) lymphadenitis in children: a subtropical disease with diagnostic challenge</strong></td>
<td>Shani Fernando, Udaya Samarakkody, Noel Karalus</td>
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<td>1 Waikids Department of Paediatric Surgery, Waikato Hospital, Hamilton, New Zealand</td>
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| 69   | P R  | 11:45 - 11:49 | Early versus delayed feeding protocols after uncomplicated intussusception reduction in children: a systematic review and meta-analysis of outcomes | Sanjena K Amuddhu 1, Yong Chen 2, Te-Lu Yap 2, Shireen Anne Nah 2  
1 Yong Loo Lin School of Medicine, National University of Singapore, Singapore  
2 Department of Pediatric Surgery, KK Women’s & Children’s Hospital, Singapore |
| 70   | P R  | 11:50 - 11:54 | Minimally invasive surgery versus conventional wide excision for pilonidal sinus: a systematic review and meta-analysis | Yong Chen, Shireen A Nah, Te-Lu Yap, Jemima Xu, Liwei Chiang, Linyin Ong  
Department of Pediatric Surgery, KK Women’s & Children’s Hospital, Singapore |
| 71   | P    | 11:55 - 11:59 | An observational study of Smoflipid® versus Intralipid® on the evolution of parenteral nutrition associated liver disease in neonates with intestinal failure | Christina Belza 1, John C Wales 1, Glenda Courtney-Martin 1, Nicole de Silva 1, Yaron Avitzur 1,2, Paul W Wales 1,3  
1 Group for the Improvement of Intestinal Failure and Treatment, Hospital for Sick Children, Toronto, Ontario, Canada  
2 Division of Gastroenterology, Hepatology and Nutrition, Hospital for Sick Children, Toronto, Ontario, Canada  
3 Division of General and Thoracic Surgery, Hospital for Sick Children, Toronto, Ontario, Canada |
| 72   | P R  | 12:00 - 12:04 | Impact of manometric guidance during laparoscopic Heller myotomy on quality of life and symptom severity for children with achalasia | Yangyang R Yu 1, Eric H Rosenfeld 1, Eric H Chiu 2, Bruno P Chumpitazi 2, Sara C Fallon 1, Mary L Brandt 1  
1 Baylor College of Medicine, Department of Surgery, Division of Pediatric Surgery, Texas Children's Hospital, Houston, Texas, USA  
2 Department of Pediatrics, Division of Gastroenterology, Hepatology, and Nutrition, Texas Children's Hospital, Houston, Texas, USA |
| 73   | P R  | 12:05 - 12:09 | Factors associated with early peritoneal dialysis catheter malfunction | Caroline Lemoine, Katherine Brandt, Riccardo Superina  
Ann & Robert H Lurie Children's Hospital of Chicago, Chicago, Illinois, USA |
| 74   | P R  | 12:10 - 12:14 | Predictors of outcomes following Kasai procedure for biliary atresia | Sara C Fallon 1, Jennifer L Carpenter 1, Sanjiv Harpavat 2, Eric H Rosenfeld 1, David E Wesson 1, Paula M Hertel 2, Milton Finegold 3, Wei Zhang 4, Benjamin Shneider 2, Mary L Brandt 1 |
|   |    | 12:15 - 12:19 | **Necrotizing enterocolitis: one name, various disorders**
Ilaria Falconi, Flaminia Calzolari, Guglielmo Salvatori, Fabrizio Gennari, Andrea Dotta, Pietro Bagolan, Francesco Morini
Department of Medical and Surgical Neonatology, Ospedale Pediatrico Bambino Gesù, IRCCS, Rome, Italy |
| 75 | P  | 12:20 - 12:24 | **Pediatric urologic and perineal trauma: a single institution experience**
Christopher McLaughlin, Joseph Hess, Brett Engbrecht, Kathryn Martin
1 Division of Pediatric General and Thoracic Surgery, Montreal Children’s Hospital, McGill University, Montreal, Quebec, Canada
2 Division of Paediatric Surgery, CHU Sainte-Justine, University of Montreal, Montreal, Quebec, Canada
3 Department of General Surgery, University of Montreal, Montreal, Quebec, Canada |
| 76 | PR | 12:30 - 12:34 | **A modified approach for perforated appendicitis in children**
Jonathan H DeAntonio, Hae Sung Kang, Hannah C Cockrell, Jeffrey M Stern, Claudio Oiticica, David A Lanning
1 Virginia Commonwealth University, Department of Surgery, Richmond, Virginia, USA
2 Children’s Hospital of Richmond at VCU, Richmond, Virginia, USA |
| 77 | P  | 12:35 - 12:39 | **Outcomes of extra-corporeal, transumbilical, versus intracorporeal laparoscopic appendectomy for acute uncomplicated appendicitis in children and adolescents: a retrospective observational cohort study**
Mostafa El-Beheiry, Jacob Davidson, Neil Merritt
Department of Surgery, Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada |
| 78 | P  | 12:40 - 12:44 | **Utilization of a handheld telemedicine device in postoperative pediatric surgical care**
Jonathan H DeAntonio, Hannah C Cockrell, Hae Sung Kang, Claudio Oiticica, David A Lanning
1 Virginia Commonwealth University, Department of Surgery, Richmond, Virginia, USA
2 Children’s Hospital of Richmond at VCU, Richmond, Virginia, USA |
<p>| 79 | P  | 12:45 - 12:49 | <strong>Practice variation in the integration of advanced providers in pediatric surgery in North America</strong> |</p>
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<tr>
<td>81</td>
<td>Impact of practice change on perforation risk for pediatric gastrojejunostomy tube placement</td>
<td>Calista M Harbaugh (^1), Christine Wu (^1), Farokh Demehri (^2), Samir K Gadepalli (^1), Peter F Ehrlich (^1)</td>
<td>(^1) University of Michigan, Ann Arbor, Michigan, USA (^2) Boston Children's Hospital, Boston, Massachusetts, USA</td>
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<td>82</td>
<td>The needs of a pediatric surgical safety checklist: a mixed methods review of barriers, facilitators and attitudes towards the checklist in a pediatric setting by clinicians, administrators and parents</td>
<td>Laura Rivera (^1), Luke Green (^1), Megan Crosby (^2), Helene Flageole (^3), Steven Lopushinsky (^1), Jennifer YK Lam (^1), Mary Brindle (^1)</td>
<td>(^1) University of Calgary, Calgary, Alberta, Canada (^2) University of Alberta, Edmonton, Alberta, Canada (^3) McMaster University, Hamilton, Ontario, Canada</td>
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<td>83</td>
<td>Optimizing post-operative follow-up in pediatric surgery (OFIPS)</td>
<td>Tamara Gimon (^1), Osama Almosallam (^2), Natalie L Yanchar (^2)</td>
<td>(^1) Department of Surgery, University of Calgary, Calgary, Alberta, Canada (^2) Section of Pediatric Surgery, University of Calgary, Alberta Children's Hospital, Calgary, Alberta, Canada</td>
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<td>84</td>
<td>The burden of pediatric surgical disease at a remote referral hospital in southeastern Liberia</td>
<td>Shahrzad Joharifard (^1,2,3), Emmanuel Nyiemah (^2), Andrew F Wallace (^2), Nnajieneh Stanley Chukwuemeka (^1,2), Johnet Tucker Clarke (^2), Emilee Flynn (^1,2,4), Rebecca Cook (^1,2,4), Sara Beste (^1,2,4)</td>
<td>(^1) Partners in Health, Boston, Massachusetts, USA (^2) JJ Dossen Memorial Hospital, Harper, Maryland County, Liberia (^3) Harvard School of Public Health, Boston, Massachusetts, USA (^4) Pediatric Global Health Fellowship, University of Massachusetts, Worcester, Massachusetts, USA</td>
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<td>85</td>
<td>Laparoscopic pyloromyotomy technique variation in a low resource pediatric tertiary hospital post Hurricane Maria</td>
<td>Natalia Velez, Keila Diaz, Carlos Sanchez-Glanville, Jorge J Zequeira</td>
<td>University of Puerto Rico School of Medicine, Department of Surgery, Division of Pediatric Surgery, San Juan, Puerto Rico</td>
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| 86 | PR | 12:15 - 12:19 | **Resident led initiative to improve surgery clerkship orientation**  
Gary Ko, Shannon Zhang, Gabrielle Gauvin, Lauren O’Malley, Mila Kolar  
Department of Surgery, Queen’s University, Kingston, Ontario, Canada |
| 87 | PR | 12:20 - 12:24 | **Negative appendicectomy rates and cost implications with increased use of abdominal imaging in children with appendicitis**  
Tessa E Ong, Yong Chen, Mark I L Angus, Candy S C Choo, Te-Lu Yap, Shireen A Nah  
Department of Pediatric Surgery, KK Women’s & Children’s Hospital, Singapore |

12:30 - 13:30 **Lunch and Exhibit Hall**

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<th>13:30 - 14:00</th>
<th><strong>Update from the CAPS Research Committee</strong></th>
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<td>The CAPS Research Committee will provide the audience with updates on the CAPS research grant and clinical trials currently open for pediatric surgeon participation. The 2016 CAPS Research Award Presentation will be given by Dr. Andreana Bütter.</td>
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**Scientific Session #6 Oral Presentations: NEC/midgut/colorectal**  
**Moderators: Francesco Morini, Dan Poenaru**

| 88 | O | 14:00 - 14:07 | **The utility of intestinal fatty acid binding protein in guiding surgical decision making in infants with necrotising enterocolitis**  
Nigel J Hall ¹, Haris Achilleos ², Stefano Giuliani ³, Clare Rees ⁴, Ashwath Bandi ³, Mark Peters ⁴, Simon Eaton ²  
¹ University Surgery Unit, Faculty of Medicine, University of Southampton, Southampton, United Kingdom  
² UCL Great Ormond Street Institute of Child Health, London, United Kingdom  
³ St George's Hospital, Tooting, London, United Kingdom  
⁴ Great Ormond Street Hospital, London, United Kingdom |
| 89 | O R | 14:08 - 14:15 | **Long-term outcomes of ultra-short bowel syndrome due to malrotation with midgut volvulus managed at an interdisciplinary pediatric intestinal rehabilitation center**  
Charles R Hong ¹, Sam M Han ¹, Steven J Staffa ², Alexandra N Carey ³, Biren P Modi ¹, Tom Jaksic ¹  
¹ Center for Advanced Intestinal Rehabilitation, Department of Surgery, Boston Children’s Hospital and Harvard Medical School, Boston, Massachusetts, USA  
² Department of Surgery, Boston Children’s Hospital and Harvard Medical School, Boston, Massachusetts, USA  
³ Center for Advanced Intestinal Rehabilitation, Center for Nutrition, Division of Gastroenterology, Hepatology, and Nutrition, Boston Children’s Hospital and Harvard Medical School, Boston, Massachusetts, USA |
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<tr>
<td>90</td>
<td>O R</td>
<td>14:16 - 14:23</td>
<td>Duration of intestinal damage after experimental necrotizing enterocolitis</td>
<td>Hiromu Miyake, Shogo Seo, Bo Li, Carol Lee, Agostino Pierro</td>
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<td>91</td>
<td>O R</td>
<td>14:24 - 14:31</td>
<td>MicroRNAs in the pathophysiology of necrotizing enterocolitis and remote ischemic conditioning</td>
<td>Niloofar Ganji, Maarten Janssen Lok, Yuhki Koike, Marissa Cadete, Bo Li, Carol Lee, Agostino Pierro</td>
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<td>92</td>
<td>O R</td>
<td>14:32 - 14:39</td>
<td>Outcome of children post serial transverse enteroplasty in the current era of intestinal failure management</td>
<td>Kevin Fitzgerald, Christina Belza, Mitsuru Muto, Nicole de Silva, Yaron Avitzur, Paul W Wales</td>
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<td>1 Group for the Improvement of Intestinal Failure and Treatment, Hospital for Sick Children, Toronto, Ontario, Canada</td>
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<td>96</td>
<td>O R</td>
<td>15:04 - 15:11</td>
<td>Is interval appendectomy necessary following initial non-surgical management of perforated appendicitis? A systematic review</td>
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<td>97</td>
<td>15:12 - 15:19</td>
<td>Preference for non-operative treatment or surgery for acute appendicitis amongst parents</td>
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**Azim Kasmani**¹, **Nancy Wang**², **Carolyn Wayne**³, **Ahmed Nasr**³,⁴

¹ Department of Surgery, Queen's University, Kingston, Ontario, Canada
² School of Medicine, Queen's University, Kingston, Ontario, Canada
³ Department of Pediatric Surgery, Children's Hospital of Eastern Ontario, Ottawa, Ontario, Canada
⁴ Department of Surgery, University of Ottawa, Ottawa, Ontario, Canada

**Nigel J Hall**¹,², **Kitty Monks**¹

¹ University Surgery Unit, Faculty of Medicine, University of Southampton, Southampton, United Kingdom
² Southampton Children's Hospital, Southampton, United Kingdom

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<td>15:30 - 16:30</td>
<td>President's Closing Remarks</td>
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<tr>
<td>16:30</td>
<td>CAPS Program Committee Post-Meeting Debrief</td>
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<td>18:30 - 24:00</td>
<td>Presidential Reception and Banquet</td>
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Toronto Marriott Eaton Centre Hotel
Where to start? Traumatic Injury prevention priority scores in Canadian children

Samuel Jessula 1, Mark Asbridge 2, Rodrigo Romao 3, Robert Green 4,5, Natalie L Yanchar 6
1 Division of General Surgery, Department of Surgery, Dalhousie University, Halifax, Nova Scotia, Canada
2 Department of Community Health and Epidemiology, Dalhousie University, Halifax, Nova Scotia, Canada
3 Division of Pediatric General and Thoracic Surgery, IWK Health Centre, Department of Surgery, Dalhousie University, Halifax, Nova Scotia, Canada
4 Department of Critical Care, Dalhousie University, Halifax, Nova Scotia, Canada
5 Trauma Nova Scotia, Halifax, Nova Scotia, Canada
6 Division of Pediatric Surgery, Department of Surgery, University of Calgary, Calgary, Alberta, Canada

Purpose: Given limited resources for injury prevention, it is essential to determine which Mechanisms of Injury (MOI) to prioritize for injury prevention policy and research. We developed objective, evidence-based Injury Prevention Priority Scores (IPPS) for injured Canadian children across four prevention perspectives: mortality, injury severity, resource utilization and societal cost.

Methods: Using population-based national data registries, we performed a retrospective cohort study of all injuries in Canada in individuals aged 0 to 19 years old between 1/04/2009-31/03/2014 resulting in hospitalization or death. For each MOI, an IPPS was calculated as a balanced measure of injury frequency and either mortality rate, median ICD-10 derived Injury Severity Score (ICISS), median cost per hospitalization or median Potential Years of Life Lost (PYLL).

Results: Of 86,981 injuries, 83,076 were non-fatal hospitalizations and 3,905 were deaths. The overall mortality rate was 0.04 deaths/injury, the median ICISS/injury was 0.007, median cost/hospitalization was $3207 and median PYLL/injury was 63 years. The top MOIs for prevention in mortality were falls, intentional self-harm and drowning (respective IPPS 72, 68, 65); for severity were falls, drowning and suffocation (respective IPPS 73, 71, 61); for resource utilization were falls, fires and suffocation/intentional self-harm (respective IPPS 70, 65, 60); and for societal cost were falls, cuts/struck by, and motor vehicle collisions (respective IPPS 73, 60, 58).

Conclusion: Injury Prevention Priority Scores objectively identify mechanisms of injury for prevention prioritization. Falls, if prevented, would provide the most benefit to the largest proportion of the Canadian pediatric population and should be prioritized in injury prevention policy and research.
Defining massive transfusion in civilian pediatric trauma

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Purpose: The purpose of this study was to identify an optimal definition of massive transfusion in civilian pediatric trauma.

Methods: Children age <18 years with an injury severity score <25 and without traumatic brain injury in the Trauma Quality Improvement Program 2015-2016 datasets that received blood were identified. Receiver operating curves and sensitivity/specificity analysis were used to identify an MTP threshold. Continuous variables are presented as median[IQR]. P<0.05 was considered significant.

Results: Of the 270 included children, the overall mortality was 27% (74) of which 65% (48) were within the first 24-hours of hospital arrival. Patients that died had lower Glasgow Coma Scores (14 [5,15] vs. 3 [3,5]; p<0.01) and were more frequently hypotensive (74% vs. 44%; p<0.01). There were no differences in demographics or mechanism of injury between children that lived or died. Total blood products infused were greater in those who died (47 ml/kg/4-hours [20,139] vs. 25 [12,45]; p<0.01). On multivariate analysis, increasing 4-hour blood transfusion volume predicted the need for a hemorrhage control procedure (1.02; 95% CI 1.01-1.04; p<0.01) and 24-hour mortality (OR 1.01; 95% CI 1.01-1.02; p<0.01) but not for in-hospital mortality (OR 1.00; 95% CI 0.98-1.01; p=0.62). The sensitivity and specificity for 24-hour mortality was optimized at a 4-hour transfusion volume of 37 ml/kg. After controlling for other significant variables, a threshold of 37 ml/kg/4-hours predicted the need for a hemorrhage control procedure (OR 8.60; 95% CI 4.25-17.42; p<0.01) and 24-hour mortality (OR 4.24; 95% CI 1.96-9.16; p<0.01).

Conclusion: An MTP threshold of 37 mL/kg/4-hours of transfused blood products predicted the need for hemorrhage control procedures and 24-hour mortality.

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**Sternal fractures in children: an NTDB study**

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**Purpose:** To describe the epidemiology and evaluate the clinical significance of pediatric traumatic sternal fractures.

**Methods:** Children age <18 years with sternal fractures in the National Trauma Database research datasets 2007-2014 were identified. Outcomes were analyzed using descriptive statistics and logistic regression.

**Results:** 3160 children were included with a median age of 17 [15,18] years; 66% were male. Injury data is presented in Table 1. 90% of injuries occurred in children aged 12-18 years. EKGs were obtained in 5%; 1% were diagnosed with an arrhythmia and only 1 patient had a myocardial infarct. 12% were transferred to the OR for immediate intervention and 3% required a thoracic procedure. 52% were admitted to the ICU. Median hospital length of stay was 2 [2,9] days. Overall in-hospital mortality was 8%. Mortality for patients with an isolated sternal fracture was 5%. Multivariate regression showed significant predictors of mortality were GCS (OR 0.72; 95% CI 0.7-0.8; p<0.01), ISS (OR 1.1; 95% CI 1.0-1.1; p<0.01), oxygen saturation (OR 0.97; CI 0.96-0.99; p<0.01), hypotension (OR 2.8; 95% CI 1.4-5.5; p<0.01) and cardiac arrest (OR 13; 95% CI 3.5-48.5; p<0.01). Use of protective devices and seat belts did not affect mortality.

**Conclusion:** Sternal fractures in children increase in incidence with age and poor outcomes are impacted by associated injuries and complications. The presence of a sternal fracture should trigger a careful diagnostic evaluation.

<table>
<thead>
<tr>
<th>Table 1-Injury details</th>
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<tr>
<td><strong>Table 1: Injury Details</strong></td>
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<tr>
<td><strong>Injury Severity Score</strong></td>
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<td><strong>Blunt Mechanism</strong></td>
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<tr>
<td><strong>Associated Injuries</strong></td>
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<tr>
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<tr>
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<td>Abdominal Injury</td>
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<tr>
<td>Rib Fracture</td>
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<td>Blunt Cardiac Injury</td>
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Predictive model for gastrostomy and/or tracheostomy (GT/TT) requirement in pediatric trauma patients with head injury (HI)

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**Purpose:** Dysphagia and the inherent risk for aspiration are common sequela of moderate to severe HI and may hinder prompt transition to sub-acute rehabilitation. We sought to develop a predictive model to facilitate clinical decision making in placement of GT/TT in the pediatric trauma population.

**Methods:** We included N=11,685 patients from the National Trauma Data Bank 2011-2015 who had HI ICD-9-CM-Diagnosis Codes reflecting the length of loss of consciousness (LOC) and were admitted to Operating Room or Intensive Care Unit. Non-survivors, transfers and patients with concomitant face and/or spine injuries were excluded. Multivariate analysis was conducted ascertain significant predictors. A predictive model was developed on a Derivation Cohort (DC, N=7,280) and confirmed on a Validation Cohort (VC, N=4,405).

**Results:** In DC, age, Injury Severity Score, admission Glasgow Coma Scale, LOC duration and time on ventilator, were significant predictors for GT/TT placement (p<0.001). The difference in model's performance in DC (R2=0.594, ROC=0.961, accuracy-90%) versus VC (R2=0.589, ROC=0.969, accuracy-94.3%) was not significant (p=0.4). The score obtained using the odds ratios performed similarly. Values greater than 40 (Range=1.026–127.67) predicted GT/TT placement with an accuracy of 90.3% (sensitivity–90.2%, specificity–90.3%, cut-off–0.087).

**Conclusion:** The score demonstrated good discrimination and may be a useful tool in predicting the need for GT/TT in children with moderate to severe HI who are ventilator dependent 1-week post injury.

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Age-adjusted shock index: from injury to arrival

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Purpose: Several recent studies have demonstrated the superior ability of the age-adjusted shock index (SIPA) in predicting outcomes over standard vital signs in pediatric blunt trauma patients. However, all studies to date have utilized SIPA values calculated on emergency department (ED) arrival. We sought to evaluate the utility of SIPA at the scene and describe the change in SIPA from the scene of injury to the ED.

Methods: 2014 Trauma Quality Improvement Program Data was used to identify blunt trauma patients 1-15 years old with an injury severity score greater than 15. We calculated SIPA using vital signs obtained both at the trauma scene and on ED arrival. Established cut off values were utilized to determine whether SIPA was abnormal. Outcome measures included ISS, transfusion within 24 hours, ICU and hospital length of stay (LOS), ventilator days, and mortality. Statistical analysis was performed to a significance of p < 0.05.

Results: We identified 915 blunt trauma patients. 61.8% of patients had a normal SIPA in the field which remained normal through ED arrival; 13.8% patients had a SIPA that remained abnormal. An abnormal SIPA at any point in the prehospital course was associated with transfusions and the need for mechanical ventilation. A persistently elevated SIPA was associated with increased ICU and overall LOS.

Conclusion: Even at the scene, SIPA may predict outcomes in pediatric trauma patients, and its change over time may have even greater predictive ability. Our findings suggest utility in triaging pediatric trauma patients and monitoring resuscitation, however further study is required.

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The Canadian pediatric surgery workforce: a 5-year prospective study

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Purpose: In 2014, we published a survey study of the Canadian pediatric surgery workforce that predicted a need for two new pediatric surgeons per year in Canada. We conducted a 5-year prospective study to assess these predictions and evaluate the status of the workforce.

Methods: With IRB approval, a web-based survey was sent to all pediatric surgery division chiefs in Canada each year (2013-2017). The survey gathered data on the number of practicing pediatric surgeons and full time equivalent (FTE) positions, as well as data regarding fellowship graduates from Canadian training programs.

Results: Complete responses were received from all 18 divisions (100% response rate). Between 2013 and 2017, the number of practicing pediatric surgeons and FTE positions increased from 73 to 78, and 64.6 to 67.5, respectively. Eleven positions were vacated (4 retirement, 7 new practice), and 18 were filled. Eight were filled by new Canadian graduates (5 after fellowship, 3 after additional training), 7 by Canadians previously working in Canada or abroad, and 3 by non-Canadian overseas surgeons. Thirty-eight fellows completed training in Canada, with the majority (24) being non-Canadians, all of whom returned to their country of origin. The nine Canadians who started practicing immediately after fellowship took positions in Canada (5) and the US (4).

Conclusion: Predictions made in 2014 were largely accurate. There has been little growth in the Canadian pediatric surgery workforce over the last 5 years. A significant mismatch continues to exist between Canadian pediatric surgery graduates and attending staff positions.
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Survey on patient safety: comparative analysis between CAPS and APSA respondents

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Purpose: Quality and patient safety have rapidly become priorities in surgery. APSA ‘s quality and safety committee wanted to characterize pediatric surgeons’ attitudes and perceptions of this topic. The goal of this study was understand the differences between Canadian and American surgeons’ responses.

Methods: An IRB approved survey was sent to all APSA members containing questions touching on the knowledge, perceptions, attitudes and institutional culture about patient safety and quality. An adapted survey to the Canadian context was sent to CAPS members. The data were reviewed and direct comparisons were made between APSA and CAPS respondents and analysed with chi square test.

Results: 353 APSA, compared to 36 CAPS members, responded. More APSA (55%) than CAPS (33%) member feel strongly that their institutions values safety (p=0.003). More US institutions participate in external safety programs (72% vs. 48%, p = 0.006). Both memberships state cost as the main barrier. For both, lack of time and support from administration are the main reasons not to be engaged in patient safety. CAPS members are more skeptical/negative of the surgical safety checklist’s value in improving patient safety: 66.7% vs 39% for APSA (p=0.07). Both groups valued education about quality and safety topics.

Conclusion: APSA members and their institutions were more often involved in quality and safety, particularly participation in external programs. Changes are starting in Canada, as more institutions join NSQIP. Surgeons and administration must collaborate to reach their safety goals. APSA and CAPS can play a key role in providing education to their members.

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Patient or practitioner? The etiology of high center mortality rates in congenital diaphragmatic hernia (CDH)

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Purpose: Management of CDH is highly variable from center to center, as are patient outcomes. The purpose of this study was to examine whether poor survival at a single center may be related to population characteristics or to patient management.

Methods: A retrospective single-center review of CDH patients was performed, and outcomes compared to those reported by the CDH Study Group (CDHSG) registry. Patient demographics, disparities, and clinical characteristics were examined to identify any unique features of the cohort. A model derived using the registry that estimates probability of death or use of extracorporeal membrane oxygenation (ECMO) in CDH newborns was used to risk-stratify patients. Observed-to-expected ECMO use rates were then calculated to measure whether excess or appropriate ECMO use was occurring. Similar measures were made for mortality rates.

Results: There were 78 CDH patients treated between 2004-2017. In comparison with the CDHSG registry, there were a higher proportion of Black patients, a higher ECMO use rate (41% versus 29%), and lower overall survival (52% versus 71%). Race did not significantly affect survival. High-risk White patients tended to be more likely to receive ECMO. Overall mortality in low-risk patients was significantly higher for publicly insured/uninsured patients. The risk model accurately predicted combined ECMO/mortality with a c-statistic of 0.8 (P=0.002). Observed combined ECMO/mortality (47.4%) closely matched predicted (50.4%).

Conclusion: Severity of CDH is the most important determinant of survival at a high-mortality center. While risk-adjusted ECMO use and mortality rates did not exceed expected, there may be socioeconomic disparities in how aggressively patients are treated.

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Surgical management of a case of catecholaminergic polymorphic ventricular tachycardia

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Purpose: To present the use of a thoracoscopic left thoracic sympathectomy for the management of catecholaminergic polymorphic ventricular tachycardia.

Methods: Video illustrating a thoracoscopic cardiac sympathectomy to manage an 11 year old with life-threatening catecholaminergic polymorphic ventricular tachycardia, which were responsible for two near-drowning episodes. A thoracic epidural was inserted by anesthesia to block the sympathetic drive and prevent intraoperative arrhythmias. Defibrillating pads were also in place. After a double lumen endotracheal intubation, the patient was placed in a right lateral decubitus position, and a left thoracoscopic cardiac sympathectomy from T2 to T4 was performed. Three 5 mm ports were placed and the first and fourth ribs identified. Using hook electrocautery, the pleura over the sympathetic chain was incised, at the level of the fourth rib. The sympathetic chain was divided at the T4 ganglion, and the pleura dissected up to the stellate ganglion. The stellate ganglion was then partially resected using scissors, so as to avoid the use of electrocautery near the stellate ganglion, which could result in complete damage and Horner's syndrome. Hemostasis was achieved by pressure with a Surgicel®. Finally, a chest tube was inserted and the lung re-inflated.

Results: The patient recovered well without evidence of further arrhythmias, or Horner’s syndrome.

Conclusion: A thoracoscopic left thoracic sympathectomy is an effective treatment in patients with catecholaminergic polymorphic ventricular tachycardia.

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Duodenal webs: a laparoscopic approach

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Purpose: Duodenal webs are one of the most frequent causes of duodenal atresia. The clinical manifestation of a web depends on the size of its aperture. Most cases are diagnosed in infancy, but late diagnosis is not rare. This video presents the laparoscopic management of a duodenal web.

Methods: A four-year old girl presented with a history of coin ingestion with early passage beyond the stomach. An initial conservative treatment of Golytely failed. She underwent an upper gastro-intestinal endoscopy with extraction of the foreign body which was located in a dilated proximal duodenum. An important amount of gastric residuals was encountered, despite a 12 hours fast. A contrast study post-extraction of the coin demonstrated a windsock deformity, typical of duodenal webs. The patient underwent a duodenal web resection by laparoscopy.

Results: The procedure was well tolerated. The patient was discharged on post-operative day 4. At four week follow-up, the patient recovered from all of her pre-operative symptoms: vomiting, early satiety, abdominal pain and frequent eructation. She has remained asymptomatic two years after the procedure.

Conclusion: Laparoscopic management of a duodenal web is feasible in children. The clinical outcomes of this procedure are good and have a great impact on the quality of life of these patients.

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Imaged-guided and muscle sparing laparoscopic anorectoplasty using real-time magnetic resonance imaging (MRI)

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Purpose: A challenge when repairing imperforate anus is positioning the neo-rectum into the center of the sphincter muscle complex (SMC) with limited muscle injury and scarring. We have used MRI to delineate the SMC and guide a needle through the center using standard MRI-guidance. However, asynchronous scanning requires multiple scans and prevents visualizing the needle as it is advanced. We recently integrated software allows placement of the needle with real-time MRI. We report the feasibility and utility of real time MRI-assisted image-guided surgery.

Methods: A challenge when repairing imperforate anus is positioning the neo-rectum into the center of the sphincter muscle complex (SMC) with limited muscle injury and scarring. We have used MRI to delineate the SMC and guide a needle through the center using standard MRI-guidance. However, asynchronous scanning requires multiple scans and prevents visualizing the needle as it is advanced. We recently integrated software allows placement of the needle with real-time MRI. We report the feasibility and utility of real time MRI-assisted image-guided surgery.

Results: Patient demographics are shown in Table 1. Three were primary operations; the fourth was a redo secondary to a retracted recto-vestibular fistula. Figure 1 is a clip that demonstrates real-time needle placement. Operative time ranged from 187-505 minutes. Average hospital stay was 4.5+/−1.2 days. There were no intraoperative complications although one patient had temporary urinary retention post-op.

Conclusion: Muscle sparing laparoscopic anorectoplasty using real-time MRI is feasible and facilitates needle placement through the SMC.
Table 1: Patient Demographics

<table>
<thead>
<tr>
<th>Case</th>
<th>Age at Surgery (months)</th>
<th>Gender</th>
<th>Type of fistula</th>
<th>Needle passes</th>
<th>OR Duration (minutes)</th>
<th>Complications</th>
<th>LOS (days)</th>
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</table>

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Laparoscopic vaginal pull through in congenital adrenal hyperplasia with high confluence: early results of a novel technique

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Purpose: Surgical management of high urogenital sinus (UGS) is challenging specially separation of vagina from UGS. Presence of short urethra is a contraindication for UGS mobilization as this will jeopardize urinary continence. Also vaginal reconstruction of high suprasphincteric UGS is complex and prone to complications with high failure rate.

Methods: This study included seven girls undergoing laparoscopically assisted vaginal pull through. All had congenital adrenal hyperplasia with high UGS and short urethra above urogenital confluence (<15 mm). Patients were preoperatively assessed by genitography. We mobilized vagina till confluence became visible and vagina became tapered at its junction with urethra. Then connection is sutured or clipped then divided. Pullthrough tract is created from perineum and a clamp is passed from down to peritoneal cavity. Vagina is grasped and pulled outside then sutured to skin. Uterine round ligaments are divided. Good vaginal mobilization and direct perineal anastomosis can be performed without skin flap augmentation of vaginal wall. Clitroplasty and labioplasty were performed after 3 months.

Results: Mobilization of vagina has been possible on all cases without injuries to adjacent pelvic structures. Dilatation started 2 weeks postoperative and showed patency with good diameter. At 6 months follow up all had good cosmetic outcome with no urinary incontinence symptoms.

Conclusion: Laparoscopically assisted vaginal pull through approach provides optimal exposure, facilitates vaginal dissection and separation from urethra, avoids injuries to urinary structures. Also allows vaginal reconstruction without tension. Only two cases of high UGS confluence treated by this approach are reported in literature.

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Posterior extra peritoneal laparoscopic adrenalectomy for children with adrenal tumors

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**Purpose:** Retroperitoneal laparoscopy provides a direct access to retroperitoneal cavity with an interesting approach to adrenal gland surgery. We report our initial experience with retroperitoneal laparoscopic adrenalectomy to determine its efficacy for children with adrenal tumor.

**Methods:** We performed adrenalectomies by extra peritoneal laparoscopy in 7 cases with unilateral adrenal tumor less than 5 cm with mean age 5.6 years. Preoperative diagnosis was virilizing tumor in 3, feminizing tumor in 1, Cushing syndrome in 2, and masculinizing adrenal tumor in 1 patient. The operations were performed with patients placed in prone position and 3 trocars were positioned. Retroperitoneal space was created bluntly by the index finger through a 10 mm skin incision, and the retroperitoneal space was insufflated with CO₂ at pressure of 15-20 mmHg. Dissection of adrenal gland and adrenal vein was performed by Ligasure. Completely freed adrenal gland was enclosed in a bag and extracted through middle trocar.

**Results:** We removed 6 right and 1 left adrenal glands successfully. Average tumor size was 34 mm. Average hospital stay was 2.1 days. Blood loss was minimal. There was no intraoperative complication. Postoperative analgesic requirements were moderate. Conversion to open surgery was not necessary. The morbidity rate was low, with no mortality.

**Conclusion:** Retroperitoneal adrenalectomy is associated with excellent clinical results. It is a reliable, safe and effective technique. At our institution retroperitoneal laparoscopy is becoming the standard adrenal surgery approach for tumors less than 5 cm.

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Treatment of recurrent or persistent pneumothorax in children with glue pleurodesis

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Purpose: Primary spontaneous pneumothorax (PSP) resulting from ruptured apical blebs is usually amenable to video-assisted thoracoscopic surgery (VATS); however, there are a subset of patients who are either physiologically intolerant of surgery or develop recurrent pneumothorax after VATS. The purpose of this study is to report our preliminary experience with a novel technique of localized glue pleurodesis for recurrent or persistent PSP.

Methods: A retrospective chart review of three pediatric patients treated with glue pleurodesis at our institution for recurrent or persistent PSP was conducted.

Results: Three patients were treated: two patients (13yo M with Marfan syndrome and 16yo M), developed recurrent PSP after two previous VATS procedures, while a third (12yo F) patient with chronic systemic lupus erythematosus (SLE) lung disease had a prolonged air leak, unresponsive to thoracostomy drainage and talc pleurodesis. All 3 patients were treated with a novel fluoroscopically-guided catheter delivery technique. A 5Fr multipurpose catheter was advanced to the lung apex, and the existing chest tube was withdrawn. A glue mixture consisting of Histoacryl™ with contrast was injected over the lung apex, with simultaneous suction applied to the chest tube. The chest tube remained on water seal overnight and was removed the following morning. Complete resolution of pneumothorax was observed in all patients. There have been no PSP recurrences at 36, 12 and 5 months respectively.

Conclusion: This small series suggests that glue pleurodesis may be a viable treatment option for recurrent or refractory PSP. Increased experience and longer follow up is required.

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Laparoscopic-assisted enteroscopy: a favorable technique to treat complex small bowel pathology

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Purpose: Laparoscopy and endoscopy are techniques that can be used together for the treatment of uncommon pathologies, especially in the small bowel. We will present two difficult cases of small bowel pathology at the University of Puerto Rico Pediatric Hospital, where laparoscopic-assisted enteroscopy (LAE) was the key to provide definitive treatment of symptomatic small bowel intussusceptions and a bleeding arterial-venous malformation.

Methods: A retrospective chart review was performed to gather data pertaining to two different complex small bowel pathology cases treated via a LAE approach. This case series was approved by our institutional review board (IRB).

Results: Case #1 - A 20 year old female with factor VI deficiency and symptomatic lower gastro-intestinal bleeding. Extensive pre-operative workup revealed a hemangioma of the cecum. A laparoscopic right hemicolectomy was performed. Postoperatively, the patient continued with melena. Arteriogram failed to show the bleeding source. LAE with resection of a bleeding arterial-venous malformation in the jejunal mucosa resolved the patient’s issues. Case #2 - A 15 year old male patient with Peutz-Jeghers Syndrome and multiple symptomatic small bowel polyps known to have caused chronic non-obstructing intussusceptions. He was referred to the pediatric surgery service, laparoscopic reduction of intussusceptions, LAE with snare polypectomies and an additional enterectomy were performed. The patient had no post-operative complications and remains asymptomatic.

Conclusion: These cases demonstrate a technique that could potentially be used to identify/treat small bowel pathology not amenable to treatment by conventional endoscopic/endovascular approaches or laparoscopic/open surgery. The LAE combination offers a minimally invasive approach to a difficult problem.

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Fibrinolytics vs. surgical intervention for management of pediatric empyema

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Purpose: Empyema is a common complication in children with pneumonia. Management options include intrapleural fibrinolytic therapy (TPA) or video-assisted thoracoscopic surgery (VATS). Recently, the mucolytic agent dornase has been used in adults in addition to TPA. The purpose of this study is to compare outcomes of fibrinolytics vs. surgical intervention for empyema.

Methods: A retrospective chart review of children with empyema treated at Children’s Health in Dallas from 2009-2017 was completed. Presentation, treatments, and outcome data were collected and analyzed using the Wilcoxin test, one-way ANOVA, and Chi-square.

Results: 212 patients were treated for empyema during the study period. There were no significant differences in the demographics, maximum white blood cell count, or size of the effusion between the two groups. Oxygen requirement at presentation was higher in the fibrinolytic group. There was significantly less narcotic use and shorter duration of chest tubes in the surgical group, as well as less imaging and shorter duration of antibiotic use. The length of ICU stay and total hospital length of stay were shorter in the surgical group (p=0.02; p=<0.0001). In the fibrinolytic group, 5.9% of patients receiving TPA and 4.9% of patients receiving TPA+dornase ultimately required surgical intervention after failure of resolution with fibrinolytics.

Conclusion: Fibrinolytic therapy (with or without dornase) and VATS are options for the treatment of empyema in children. Patients have less narcotic use, shorter duration of chest tube, and shorter ICU and total length of stay with operative intervention.

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Dynamic YAP expression between the nucleus to the cytoplasm reduces proliferation in nitrofen-induced hypoplastic lung development and congenital diaphragmatic hernia

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Purpose: Congenital Diaphragmatic Hernia (CDH) is a developmental defect that prevents normal lung development and results in pulmonary hypoplasia. Transcription co-activator Yes-associated protein (YAP) is a core kinase in the Hippo pathway, which controls organ size by regulating cell proliferation. We hypothesized that disrupted expression of YAP is associated with abnormal lung development in the nitrofen model of CDH.

Methods: We induced abnormal lung development and CDH by gavaging nitrofen to dams on embryonic day (E) 9. Lungs were isolated at E15, E18 and E21 and processed for immunohistochemistry (IHC), immunofluorescence (IF), cell fractionation and Western blotting using anti-YAP.

Results: YAP was more expressed in nuclei of mesenchymal cells and airway epithelium of E15 control rat lung, whereas YAP was more expressed in the cytoplasm of these cells in E15 nitrofen-induced hypoplastic lungs. In E18 control rat lungs, YAP expression was higher in nuclei of the mesenchyme and airway epithelium and the cytoplasm of E18 nitrofen-induced hypoplastic lungs. In E21 control rat lungs, Yap was mostly expressed in the cytoplasm of the airway epithelium and mesenchymal cells.

Conclusion: In conclusion, mediating the activation of YAP at different stages of lung development has an important impact on normal lung growth. Our results suggest that there is disruption in regulation of YAP in the early stages of nitrofen-induced hypoplastic lung development. This might explain the observed decreased proliferation in lung hypoplasia. Later in lung development, Yap is activated, but this seems to be too late for nitrofen-induced hypoplastic lung development.

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High-frequency ventilation at the time of CDH repair might contribute to higher mortality and BPD rates: a case-control study

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**Purpose:** We use CMV and high-frequency ventilation (HFV), including jet and oscillatory for ventilation of congenital diaphragmatic hernia babies. The objective of this study was to compare the outcomes of death or BPD according to the mode of ventilation at the time of surgery.

**Methods:** We performed a retrospective case-control study of infants born with CDH (n=80) treated at our centre between 1990 and 2015. A statistical analysis was conducted using the t-test, chi-square, directed acycli graph and logistic regression.

**Results:** During surgery, 41 patients were on CMV and 39 were on HFV. Five patients (12.2%) on CMV had BPD or died compared to 21 patients (53.6%) on HFV (OR 8.4 (95% CI 2.72-25.94, p<0.001). Patients ventilated by CMV during surgery had fewer instances of severe pulmonary hypertension (33.33% vs 80%, p<0.01), required less sildenafil (2.44% vs 25.64%, p<0.01), vasoactive medications (60.98% vs 94.87%, p<0.001) and inhaled nitric oxide (iNO) (14.63% vs 69.23%, p<0.0001) compared to patients on HFV. Infants requiring HFV had larger defects, required more time to stabilize before surgery and had more non-cardiac congenital anomalies. After controlling for the effects of confounding variables, the mode of ventilation was an independent contributor to BPD or death.

**Conclusion:** HFV at the time of CDH repair is associated with higher rates of BPD or death. The mode of ventilation might contribute to BPD and death and like the VICI trial, we found that CMV might be better for ventilation during CDH repair.

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The presence of a hernia sac in patients with congenital diaphragmatic hernia is not associated with a lower rate of oxygen dependency at 28 Days or death: a retrospective cohort study

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**Purpose:** We conducted a retrospective cohort study of infants born with CDH (n=76) using an extensive and comprehensive database containing all children born with surgical congenital anomalies in our province since 1991. Statistical methods included were t-tests for continuous variables and chi-square tests for categorical variables comparing outcomes for hernia sac to no hernia sac.

**Methods:** We collected patient data for CPAM cases between 2005 and 2016 either from autopsy reports or surgical CPAM cases. CPAM and control lung tissues were obtained from our pathology department. Formalin-fixed, paraffin-embedded tissues were sectioned and stained with hematoxylin-eosin. Immunohistochemistry (IHC) and Immunofluorescence (IF) was performed with anti-Cadherin 26 Antibodies.

**Results:** At the time of surgery, 16 patients (21%) had a hernia sac and 60 patients (79%) did not. Patients who had a hernia sac required less time on cardiovascular medication (p<0.01) and fewer requirements for inhaled nitric oxide (NO) (p<0.01), but a longer course of inhaled NO after it was started (p<0.01). Patients who had a hernia sac were older at the time of repair (p<0.01) and had mothers with a higher maternal age (p<0.05) than patients who did not have a hernia sac. The development of oxygen dependency at 28 days or death was not different between the two groups.

**Conclusion:** Although patients with a hernia sac had fewer requirements for cardiovascular medications and NO, the presence of a hernia sac in patients with congenital diaphragmatic hernia was not associated with a lower incidence of oxygen dependency at 28 days or death.

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Epidemiology and one-year follow-up of neonates with CDH - data of health insurance claims in Germany

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**Purpose:** Congenital diaphragmatic hernia (CDH) is one of the major malformations causing death and long-term morbidity, though patients with an optimal treatment course have a good prognosis without disability. There is no CDH registry for Germany and therefore no data on larger patient groups are available. Use of data from statutory health insurance claims has been proofed suitable for several diagnoses in adult medicine.

**Methods:** This study evaluates data of statutory health insurance claims form patients diagnosed and treated with CDH over a five-year period (2009-2013). Main outcome measures were incidence of CDH, survival, complications and length of hospital stay. Duration of follow-up was 12 months.

**Results:** The study includes 276 cases with CDH. The incidence rate was 2.65 per 10,000 live-births. Overall mortality was 30.1% until 12 months of life. 89.2% of all fatalities occurred in the first 30 days of life and 74.9% before surgery. Patients admitted later than the first day of life (n = 20) had a higher mortality (65%, p< 0.01). 78 patients (28.3%) were treated with ECMO. In this subpopulation, mortality was 39.7% and the median time until death was 17 days compared to 2 days in in group of non-ECMO non-survivors. The median cumulative hospital-stay among one-year survivors was 40 days, and differs between ECMO- and non-ECMO-treated patients (86 vs. 31 days, p<0.01).

**Conclusion:** This is the largest cohort study of CDH patients presented from Germany. Data of statutory health insurance claims are suitable for follow-up studies in CDH patients. This unselected patient group with CDH carries a high mortality rate, which is comparable to other groups. The severely affected subgroup of patients, who underwent ECMO, show a significant higher mortality and longer hospital stay.

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Requirement and duration of tube feed supplementation among congenital diaphragmatic hernia patients

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Purpose: Achieving adequate oral feeds may be challenging for some congenital diaphragmatic hernia (CDH) infants. Tube feed (TF) supplementation may be required to support their fluid and caloric requirements, adding to the burden of care for parents and caregivers. The aim of this study was to determine factors for and duration of TF for CDH infants.

Methods: Single centre retrospective chart review was performed for CDH neonates treated from Jan. 1, 2000 to Dec. 31, 2013. Patient demographics, perinatal management and feeding status of patients with at least 1-year follow-up were reviewed.

Results: Of 160 CDH neonates, 32 (20%) were discharged on partial or complete TF; 5 (3.1%) patients started TF post discharge. CDH infants with TF were more likely to have initial pH; 7.25, patch repair, ECMO support, and prolonged ICU stay (Table 1). Time to TF discontinuation did not differ significantly between those partially or fully TF at discharge (1.78 vs.1.96 years); 23.8% of patients discontinuing TF subsequently experienced failure to thrive. Eleven patients (34.4%) continued TF into school.

Conclusion: High risk CDH patients are likely to require TF to support their nutritional intake. Parents and caregivers need to be informed and properly supported. Long-term monitoring of CDH patients’ oral intake, growth and development will be required.
Table 1. Prevalence of risk factors depending on tube feed status at discharge

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Tube Feeds</th>
<th>Oral Feeds</th>
<th>Sample Size</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prenatal Diagnosis</td>
<td>53.13%</td>
<td>38.21%</td>
<td>155</td>
<td>0.1589</td>
</tr>
<tr>
<td>Liver Up</td>
<td>43.33%</td>
<td>32.23%</td>
<td>151</td>
<td>0.2861</td>
</tr>
<tr>
<td>Patch Repair</td>
<td>56.67%</td>
<td>26.02%</td>
<td>153</td>
<td>0.0021</td>
</tr>
<tr>
<td>pH&lt;7.25</td>
<td>80.00%</td>
<td>53.66%</td>
<td>107</td>
<td>0.0209</td>
</tr>
<tr>
<td>ECMO support</td>
<td>13.33%</td>
<td>2.44%</td>
<td>153</td>
<td>0.0279</td>
</tr>
<tr>
<td>o/e LHR (median %)</td>
<td>45.4%</td>
<td>43.6%</td>
<td>155</td>
<td>0.5144</td>
</tr>
<tr>
<td>Gestational Age (median weeks)</td>
<td>38</td>
<td>38</td>
<td>152</td>
<td>0.2474</td>
</tr>
<tr>
<td>Birth Weight (median kg)</td>
<td>3</td>
<td>3.2</td>
<td>152</td>
<td>0.1020</td>
</tr>
<tr>
<td>Length of ICU Stay (median days)</td>
<td>28.5</td>
<td>11</td>
<td>152</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

* Mann Whitney-U Test performed for O/E LHR, gestational age, birth weight and lengths in days. Fisher’s Exact test performed for other risk factors.

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Treatment failure in children with empyema managed with chest tube insertion and fibrinolytics: what is the role of surgery?

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Purpose: Children with empyema are often treated with chest tube insertion and fibrinolytics. There is ongoing debate regarding the rate of treatment failure and the role of thoracoscopic decortication. The purpose of this study was to describe the frequency and type of additional drainage procedures in this patient population.

Methods: We conducted a prospective, observational study of children with empyema nested within a placebo-controlled, multicenter randomized controlled trial involving six Canadian children’s hospitals. We excluded children with non-infectious causes of empyema, chronic lung disease or other serious comorbidities, pneumothorax prior to chest tube insertion, or contraindications to fibrinolytics or investigational medications. All participants underwent chest tube insertion followed by intrapleural Tissue Plasminogen Activator 4 mg and Dornase 5 mg or saline once daily for three days.

Results: We recruited 96 children (mean age 5.1 years) with a diagnosis of empyema confirmed by imaging. The majority (n=90/96, 94%) were successfully treated with a single chest tube and fibrinolytics. Four children required insertion of a second chest tube (n=2) or thoracoscopic decortication (n=2). One of the remaining participants required two additional chest tubes and another underwent thoracoscopic decortication followed by insertion an additional chest tube. There were no cases of thoracotomy or death.

Conclusion: The majority of children with empyema are successfully managed with a single chest tube and fibrinolytics. Thoracoscopic decortication is rarely required. Further analysis is needed to determine whether the addition of Dornase affects length of stay or secondary outcomes.
Chest tube versus surgery for spontaneous pneumothorax in a pediatric population: a retrospective chart review

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Purpose: A spontaneous pneumothorax (SPTX) occurs when air leaks from the lung into the intrapleural cavity in the absence of thoracic trauma. Controversy exists regarding whether spontaneous pneumothorax should be treated initially with chest tube, reserving surgery for recurrence, or whether surgery should be performed at first presentation. We aimed to assess the risk of readmission following chest tube insertion versus surgical treatment of spontaneous pneumothorax in the pediatric population.

Methods: We performed an Institutional Review Board-approved retrospective chart review of patients presenting to our institution with primary spontaneous pneumothorax between January 1, 2002 and September 1, 2017. We performed descriptive statistical analyses, and compared rates of readmission using a Chi-squared test.

Results: We included 65 participants with a median age of 15.77 (interquartile range 14.49, 16.75) years. Patients received observation without chest tube (n = 12; 18.5%), chest tube only (n = 32; 49.2%), or surgery (n = 21; 32.3%) at initial presentation. Of 32 patients who were initially treated with a chest tube only, 13 (40.6%) were readmitted for recurrent SPTX on the same side; of 21 patients who initially had surgery, 2 (9.5%) were readmitted for recurrent SPTX on the same side (P = 0.05).

Conclusion: Pediatric patients treated with only chest tube for spontaneous pneumothorax have an approximate 40% chance of recurrence.

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**Right sided congenital diaphragmatic hernia: the role of prenatal predictors and perinatal characteristics on early outcomes: a fourteen-year prospective study**

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**Purpose:** Right sided (R) congenital diaphragmatic hernia (CDH) have been associated with poorer outcomes. Nonetheless, the role of prenatal predictors and perinatal characteristics of R-CDH patients on early outcomes have not been extensively investigated. Aim of the present study was to critically evaluate several pre and perinatal risk factors in predicting mortality in R-CDH.

**Methods:** A prospective study on all CDH infants treated between 2004 and 2017 in a tertiary care Center was performed. Patients were categorised based on side of the hernia, and possible risk factors were analysed. Fisher’s exact and Mann-Whitney test were used as appropriate.

**Results:** During the study period, 228 high risk-CDH were treated. Three bilateral CDH patients were excluded from the present analysis. Table summarized main findings.

**Conclusion:** Although mortality rate was significantly higher in R-CDH infants, prenatal predictors of CDH severity were similar between R-CDH and left (L) CDH patients. In our large cohort of patients R-CDH present higher rate of associated malformations and cardiac anomaly, in comparison to L-CDH, and larger diaphragmatic defects.
<table>
<thead>
<tr>
<th></th>
<th>CDH left</th>
<th>CDH right</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>191 (84)</td>
<td>34 (15)</td>
<td></td>
</tr>
<tr>
<td>LHR median; IQ range</td>
<td>1.8 (1.4-2.4)</td>
<td>1.6 (0.92-2.4)</td>
<td>0.12</td>
</tr>
<tr>
<td>O/E LHR median; IQ range</td>
<td>46.3 (35.3-59.5)</td>
<td>41.3 (35.5-54)</td>
<td>0.5</td>
</tr>
<tr>
<td>Prenatal diagnosis, n°(%)</td>
<td>184 (96)</td>
<td>32 (94)</td>
<td>0.7</td>
</tr>
<tr>
<td>Fetal plug, n°(%)</td>
<td>6 (3)</td>
<td>1 (3)</td>
<td>1</td>
</tr>
<tr>
<td>GA at birth, median; IQ range</td>
<td>38 (37-39)</td>
<td>37.5 (37-38)</td>
<td>0.069</td>
</tr>
<tr>
<td>Survival, n°(%)</td>
<td>134 (70)</td>
<td>15 (44)</td>
<td>0.005</td>
</tr>
<tr>
<td>Associated malformation, n°(%)</td>
<td>30 (16)</td>
<td>12 (35)</td>
<td>0.01</td>
</tr>
<tr>
<td>Cardiac Anomaly, n°(%)</td>
<td>17 (9)</td>
<td>8 (24)</td>
<td>0.03</td>
</tr>
<tr>
<td>Liver up, n°(%)</td>
<td>66 (35)</td>
<td>30 (88)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Defect type C/D, n°(%)</td>
<td>69 (36)</td>
<td>21 (62)</td>
<td>0.007</td>
</tr>
</tbody>
</table>

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Management preferences in ECMO mode for CDH

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Purpose: Identify individual management preferences that may exist in the care of infants with CDH receiving ECMO with emphasis on VV-ECMO.

Methods: A survey was created to measure treatment preferences during regarding ECMO use in CDH. The survey was distributed to all APSA and ELSO/Euro-ELSO members via email. Survey results were summarized using descriptive statistics.

Results: The survey had 230 respondents. The survey participants were surgeons (75%), neonatologists/intensivist (23%), and “other” (2%). The mean annual center volume was 11.6 (? 9.6) CDH cases and the average number treated with ECMO was 4.5 (? 6.4) cases/yr. The most agreed upon criteria for ECMO initiation were preductal O2 saturation < 80% refractory to ventilator manipulation and medical therapy (89%), oxygenation index>40 (80%), severe air-leak (79%), and mixed acidosis (75%). Over 60% of respondents agreed the VV-ECMO would be optimum for average risk neonates, however this preference diminished as the pre-ECMO level of cardiac support increased. When asked about why each respondent would choose VA-ECMO over VV-ECMO, the responses varied significantly between surgeons and non-surgeons (Figure 1).

Conclusion: While there seem to be areas of consensus among practitioners, such as criteria for initiation of ECMO, this survey revealed substantial variation in individual practice patterns regarding the use of ECMO for CDH.
Figure 1. Reason for selecting VA-ECCMO as initial mode varies between neonatologists/intensivists (a) and surgeons (b). Proportion of respondents that answered moderately important, important or very important compared with chi-square test.

- **Size of neck veins**
- **Lack of institutional experience with VV ECMO**
- **Availability of VV cannulas at my institution**
- **Concern that converting may be harmful**
- **Prior bad experience with VV ECMO**
- **Lack of personal experience with VV ECMO**
- **Our ICU team does not like VV ECMO**
- **Our nurses/perfusionist do not like VV ECMO**

* p = 0.05
* p = 0.01
* p = 0.06
b)

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Congenital diaphragmatic hernia associated with congenital heart disease: a systematic review of the literature

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Purpose: To evaluate the impact that congenital heart disease (CHD) has in infants with congenital diaphragmatic hernia (CDH).

Methods: Using a defined search strategy (PubMed, Cochrane, Embase and Web of Science MeSH headings), we searched all studies reporting the incidence, management and outcome of CDH infants born with an associated CHD. Case reports and animal studies were excluded. CHD cases were classified as ductal dependent (DD) and non-ductal dependent (NDD) and compared using Fisher’s exact test.

Results: Of 834 abstracts screened, 9 full-text articles (all retrospective) met the search criteria (n=1286 live births, n=25 stillbirths or pregnancy terminations). Incidence: Overall, 14% of CDH cases had a CHD. In stillbirths and pregnancy terminations, the CHD incidence was 28%. Management: ECMO was used in 28% of cases. CDH repair was performed in 73% infants, and cardiac surgery only in 11%. Outcome: Overall, survival of live-birth infants to discharge was 49% (47% in ECMO infants; p= n.s). Infants with DD lesions had lower survival (35%) than those with NDD lesions (54%; p<0.0001).

Conclusion: CHD, especially duct-dependent lesions, influence management and outcome of infants with CDH. However, only few non-prospective studies report data on CDH infants born with CHD. Prospective, multicenter studies are needed to address prognosis and management guidelines for this fragile cohort of CDH infants.
### Table 1: Incidence and survival of the main types of CHDs associated with CDH

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Live births (n=1263)</th>
<th>Survived to discharge (n=621)</th>
<th>Survival rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ductal dependent lesions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interrupted Aortic Arch or Coarctation</td>
<td>154</td>
<td>64</td>
<td>42%</td>
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<tr>
<td>Transposition of Great Arteries</td>
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<tr>
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<tr>
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<tr>
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<td>584 (46%)</td>
<td>333 (54%)</td>
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Prenatal prediction of survival in congenital diaphragmatic hernia: an audit of postnatal outcomes
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Purpose: Proper measurement of prognostic indices in CDH is vital for effective antenatal counselling. This quality improvement initiative audited the accuracy of observed/expected lung-head ratio (LHR) and total fetal lung volume (TFLV) measurements with postnatal outcomes at two tertiary pediatric referral centers.

Methods: With REB approval, prenatal LHR and TFLV for all CDH patients treated between 2006 and 2016 were retrieved. Study inclusion required at least one LHR or TFLV measurement between 24 and 32 weeks gestational age. These were linked to postnatal outcomes (death, need for ECLS, patch repair) abstracted from the Canadian Pediatric Surgery Network (CAPSNet) database and local chart review. Data were non-parametric. Continuous variables were analyzed via Wilcoxon rank sum test. Categorical data were compared using Chi-square. P-values <0.05 were significant.

Results: Of 122 eligible CDH patients, 83 (68%) met inclusion criteria. Overall cohort mortality, ECLS rates and patch repair were 33%, 12.5% and 45%, respectively. Lower LHR values correlated with increased rates of each outcome and persisted in the context of multiple measurements. However, these values were generally higher than those published in the literature. LHR values above 45% were most associated with survival, avoidance of ECLS and primary repair. TFLV values were generally lower than LHR measurements and only correlated with mortality and the need for patch repair.

Conclusion: This audit confirms that LHR and TFLV values can be used to predict CDH outcomes. However, the absolute values obtained need careful interpretation as they do not necessarily follow published parameters. Missing data continues to limit robust data analysis.
Use of pediatric endoscope for lower pouch identification in long-gap esophageal atresia

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Purpose: The dissection of the lower pouch can be difficult in cases of long-gap esophageal atresia. A metal probe can be inserted into the lower pouch, but this can be unreliable, as the probe can move and be difficult to find. We report our institutional experience using a flexible endoscope with light to direct dissection.

Methods: This is a retrospective case series of patients undergoing repair of long-gap esophageal atresia occurring between 2017 and 2018.

Results: Three children underwent right thoracotomy and attempted repair of long-gap esophageal atresia. One child was a re-do operation and had not been repaired until age four. The other two underwent repair between five and six months of age. Dissection in these patients was difficult and the pouches were in an unexpected position. In two cases, a metal probe had first been inserted through the gastrostomy tube site, but several attempts intraoperatively failed to visualize the lower pouch. Only after insertion of the lighted endoscope, was identification of the lower pouch successful. In the third case, the pediatric endoscope was used from the start. With both tactile and visual sensation heightened, the lower pouch was much easier to find. All patients were able to undergo a primary repair of their esophageal atresia.

Conclusion: We report the usefulness of this technique to avoid injury to mediastinal structures during blind dissection. We suggest this be used to assist in identification of lower pouches during repair of long-gap esophageal atresia.

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Management of ovarian lesions diagnosed during infancy

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Purpose: Prior studies of infant ovarian cysts have recommended intervention for those larger than 4 cm. We reviewed the natural history of these lesions and identified characteristics that increased the likelihood of surgical intervention.

Methods: A retrospective study was undertaken of patients under 1 year of age with ovarian lesions found between 2000 and 2014. Ultrasound features of patients who underwent operative intervention were compared to those who were successfully managed non-operatively.

Results: Forty patients with ovarian masses were identified. Twenty-eight patients (70%) underwent operative management, while 12 patients (30%) were managed conservatively, including one that was aspirated. The mean age at time of surgery was 125 days. All but one patient (96%) had evidence of antenatal torsion intra-operatively or on final pathology. All resected lesions were benign. Ultrasound findings more common in those undergoing surgery included cystic debris (p<0.001), fluid-fluid or fluid-debris levels (p=0.002), solid components (p=0.04), and calcifications (p=0.001). Patients managed non-operatively had an average diameter of 2.5 cm, compared to 5.1 cm in the operative group (p<0.001). Three of the lesions managed without an operation had a diameter over 3.5 cm (mean 5.1 cm) and were followed for an average of 153 days until resolution.

Conclusion: The majority of ovarian lesions in infants were excised, although none were malignant. A quarter of the infants managed without an operation were comparable in size to resected lesions. Ovarian cysts in this age group should be given greater consideration of non-operative management and closely followed.

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Defining quality indicators for paediatric surgical oncology: a review of outcomes from Alberta Children’s Hospital

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Purpose: Although resource constraints and patient expectations have led to increased research into measurement of surgical quality for adult patients, little is known about how to assess surgical quality in paediatric surgery. We elected to study paediatric surgical oncology and identify key points in the paediatric surgical oncology care pathway where potential exists to improve outcomes.

Methods: A 10 year retrospective chart review of paediatric surgical oncology patients treated at Alberta Children’s Hospital between 2007-17 was performed. In addition to patient demographics, diagnosis, and stage, several aspects of the patients intra- and perioperative course were measured. Our primary outcome was length of stay in hospital and post-operative complications (both major and minor). Significant associations were tested using chi-square, t-test, and multivariate logistic regression.

Results: A long hospital stay was defined using the median (5 days or more) and significantly associated with 1) preoperative infection (OR 5.010, p-value 0.0284 and 2) long case duration (2.8 hours or more) (OR 5791, p-value <0.0001). The need for post-op PICU care was significantly associated with 1) older age (OR 0.341, p-value 0.0409); 2) the presence of more than 2 staff surgeons in the OR (OR 7.419, p-value 0.0173; and 3) blood loss (OR 4.568, p-value 0.0063).

Conclusion: We have identified several aspects of the perioperative course for paediatric surgical oncology cases that may represent meaningful quality indicators. If validated these may enable paediatric surgeons to identify modifiable patient and operative variables that could be leveraged to measurably improve surgical quality.

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Comparison of pediatric and adult gastric adenocarcinoma: a National Cancer Database study

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Purpose: Though more common in adult populations, gastric adenocarcinoma is rarely described in children. We aimed to compare the presentation, management, and outcomes in gastric adenocarcinoma cancer for pediatric and adult patients.

Methods: Using the 2004 to 2014 National Cancer Database (NCDB), patients aged 21 years (pediatric) were retrospectively compared to older patients (adult). Chi-squared tests were used to compare categorical variables and Cox regression was used to estimate hazard ratios (HR) for survival differences.

Results: Of the 129,024 gastric adenocarcinoma cases identified, 129 (0.09%) occurred in pediatric patients. Compared to adults, fewer pediatric patients were male (50% vs. 64%, p<0.001), fewer were Caucasian (45% vs 67%, p<0.001), and more were Hispanic (31% vs 10%, p<0.001). Pediatric cases presented with more advanced disease including poorly differentiated tumors (67.4% vs 55%, p=0.014), and stage 4 disease (50% vs 35%, p=0.002). Signet ring adenocarcinoma comprised 45% of cases in the pediatric group as compared to 20% of cases in the adults (p<0.001). Similar proportions in both groups underwent surgery, however near-total gastrectomy was more common in the pediatric group (15.5% vs 6.1%, p<0.001). The proportion of patients with negative margins, nodal examination, and presence of positive nodes were similar. There was no overall survival difference between the two age groups (HR 0.91, 95% Confidence interval 0.69-1.21).

Conclusion: While gastric adenocarcinoma in pediatric patients present with a more advanced stage and aggressive signet ring histology compared to adults, outcomes appear to be comparable.
Long-term growth outcomes of neonates with necrotizing enterocolitis

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Purpose: Necrotizing Enterocolitis (NEC) is the most common surgical emergency in neonatal intensive care unit (NICU). NEC’s relationship with poor neurocognitive outcomes is established, however additional longitudinal outcomes remain limited, especially for non-surgical NEC. The aim of this study was to explore the association of NEC and long-term growth outcomes.

Methods: Retrospective matched cohort study of newborns admitted to a level 4 NICU from January 1989 through December 2007. Infants diagnosed with NEC and controls matched on birth year, birth weight, and gestational age were included. Demographic and clinical data were reviewed. The primary outcome was growth. Infants that had at least one follow-up visit after NICU discharge were included. Growth data were obtained from well-child check visits from age 1-28 years. Chi-square tests and t-tests were used in bivariate comparisons of variables. Logistic regression with an offset was used to test the change in heights and weights, from birth to most recent well-child check visit, while adjusting for the different lengths of follow-up.

Results: 528 neonates were included: 294 with NEC; 234 controls. During their NICU stay, infants with NEC had more surgical procedures (p=0.03), comorbidities (p<0.0001), and a longer length of stay (p<0.0001). In follow-up, subjects with NEC had a lesser amount of growth, in terms of height, (p<0.0001) and weight gain (p<0.0001) compared to controls.

Conclusion: Being diagnosed with NEC as an infant has a significant negative long-term effect on growth throughout childhood, adolescence, and even adulthood. Further research is being conducted to evaluate longitudinal gastrointestinal morbidity in infants with NEC.

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Intestinal injury is prevented by amniotic fluid stem cell administration before the onset of necrotizing enterocolitis

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3Department of Surgery, University of Toronto, Toronto, Ontario, Canada

Purpose: Amniotic fluid stem cells (AFSCs) can attenuate necrotizing enterocolitis (NEC) when administered during experimental NEC, but it is unknown if this effect is preventative or therapeutic. This study will examine the effects of AFSCs on the prevention of intestinal injury during experimental NEC.

Methods: NEC was induced in 5-day old C57BL/6 mice by gavage feeding hyperosmolar formula, hypoxia, and oral lipopolysaccharide (4mg/kg) for 4 days (AUP32238). On postnatal days 4 and 5 prior to NEC induction, mice received intraperitoneal injections of PBS (n=6) or 2x106 AFSCs (n=6). Breastfed pups served as control (n=6). At P9, distal ileum was harvested. Severity was analyzed blindly using a NEC scoring system and by assessing inflammation with RT-qPCR (Il-6). Epithelial proliferation (Ki67) and intestinal stem cell levels (Lgr5) were also assessed. Data is presented as mean ± SD and compared using one-way ANOVA.

Results: Administering AFSCs before NEC induction decreased NEC severity (A) and inflammation (Il-6, B), while increasing intestinal proliferation (Ki67, C) and stem cell activation (Lgr5, D), indicating maintenance of epithelial homeostasis.

Conclusion: These data proves that amniotic fluid stem cell administration can prevent intestinal injury induced by necrotizing enterocolitis and prompts epithelial growth. Further investigation should be done using these stem cell products as a prevention strategy for infants at risk of necrotizing enterocolitis.
A  **NEC Severity Score**  

![Graph A: NEC Severity Score](image)

B  **Inflammation**  

![Graph B: Inflammation](image)

C  **Proliferation**  

![Graph C: Proliferation](image)

D  **Intestinal Stem Cells**  

![Graph D: Intestinal Stem Cells](image)

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A retrospective review examining the safety of mucous fistula refeeding in neonates with short bowel syndrome

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2 McMaster Pediatric Surgery Research Collaborative, McMaster University, Hamilton, Ontario, Canada

Purpose: Mucous fistula (MF) refeeding of stoma effluent in neonates after small bowel resection can promote nutrient absorption and prevent atrophy of unused distal bowel. This study aimed to assess the efficacy and safety of this practice in neonates.

Methods: A single-center retrospective chart review of all patients admitted to the neonatal intensive care unit (NICU) in a 7 year period (2009-2015) who underwent a laparotomy with creation of an enterostomy (excluding colostomy) and MF. Patients were eligible if they were refed proximal stoma effluent into the MF.

Results: A total of 23 patients were identified that were refed. Mean gestational age at admission was 32+4.9 weeks; mean birthweight was 2239+1075 grams. Indications for stoma creation included combinations of atresia (30%), necrotizing enterocolitis (35%), gastroschisis (9%) and bowel perforation (57%). Patients were refed for an average of 44.9+25.8 days, with a mean weight increase from 2661g (+892) to 3566g (+739) from beginning to end of refeeds. Total parenteral nutrition (TPN) was administered for an average of 56.9+35.6 days, with 5/23 (22%) patients developing cholestasis, and 17/23 (74%) reaching full feeds before discharge. 7/23 (30%) of patients were able to be taken completely off TPN during refeeding. 22/23 (96%) of patients were re-anastomosed before hospital discharge. There were no major complications (perforations, strictures, death) related to refeeding.

Conclusion: This technique is safe and leads to significant weight gain and less total parenteral nutrition required during hospitalization. This technique requires an increase in nursing time and expertise, but is a good bridging procedure before patients have their stomas closed.

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Remote ischaemic conditioning as a novel therapeutic intervention for experimental NEC

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Purpose: Necrotising enterocolitis (NEC) continues to be a cause of significant morbidity and mortality in preterm infants. We hypothesised that remote ischaemic conditioning (RIC) may be a useful novel therapeutic intervention for infants with NEC and aimed to evaluate the efficacy of RIC in an experimental NEC model based on intestinal ischaemia reperfusion injury (IRI).

Methods: With ethical approval, rat pups (10-13 days old) were anesthetised and underwent laparotomy with occlusion of the superior mesenteric artery (SMA) for 40 minutes followed by 90 minutes of reperfusion. Control animals underwent laparotomy and exposure of the SMA without occlusion. RIC was applied by occluding hind limb blood flow for 3 cycles of 5 minutes immediately prior to anaesthesia. Intestinal injury was assessed by blinded microscopic analysis using the Chui-Park scoring system.

Results: As anticipated animals undergoing IRI had a severe intestinal injury compared to controls. This intestinal injury was partly ameliorated in animals pre-treated with RIC (Table).

Conclusion: As anticipated animals undergoing IRI had a severe intestinal injury compared to controls. This intestinal injury was partly ameliorated in animals pre-treated with RIC (Table).

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Contemporary outcomes of necrotising enterocolitis: a systematic review

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Purpose: Necrotising Enterocolitis (NEC) continues to contribute significant morbidity and mortality. Accurate outcome data are important to inform parental counselling, clinical care and research agendas. We aimed to generate accurate contemporary data by performing a systematic review of recent large cohorts studies.

Methods: Using a systematic search strategy we identified studies reporting NEC outcomes from January 2010 to January 2018. Only studies reporting national, regional or multicentre outcomes of NEC in high income countries were included. Outcomes were mortality, neurodevelopmental outcome and intestinal failure.

Results: Of 1,369 abstracts, 13 articles were included. Time at which death was recorded varied. Overall mortality (Table) from NEC is approximately 20%, but higher in infants undergoing surgery (29-34%) and in smaller/less mature infants. Longer term studies show that around 15% of deaths occur after the neonatal period/first hospital admission. Just 3 studies reported neurodevelopmental outcome with a significant risk of neurodisability (24.8-37.6%) among NEC survivors. Just 2 studies reported intestinal failure rates (35% - 42%) defined as PN-dependence at 90 days.

Conclusion: These contemporary data are useful to inform clinical care and justify ongoing research efforts. All infants with NEC should have long-term neurodevelopmental assessment. Limited data exist on the long-term risk of intestinal failure. Standardised outcome reporting would facilitate comparability between studies.

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Laparoscopic Ladd procedure for the management of malrotation and volvulus

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Purpose: Our purpose was to evaluate the safety and efficacy of the laparoscopic Ladd procedure for malrotation in the presence of volvulus and in low-weight children, as well as the rate of recurrent volvulus.

Methods: A retrospective review of patients undergoing operation for malrotation at a freestanding children's hospital from 2008 to 2018 was performed. 110 patients were included, with 43 managed laparoscopically and 53 open. Values are reported as mean or medians with interquartile ranges. Continuous data were compared with a t-test and proportions with a chi-square test with p<0.05 considered significant.

Results: The conversion rate from laparoscopy was 12.7% (n=14). Patients approached laparoscopically were older (15.7 vs 0.8 months, p=0.0) and larger (10.4 vs 3.8 kg, p=0.0008) than those managed open. There was no difference between management strategies in recurrent volvulus (4.7 vs 1.9%, p=0.59%), post-operative complications (11.6 vs 18.9%, p=0.4), complication requiring reoperation (9.4 vs 11.6%, p=1.0), or total parenteral nutrition dependency longer than 30 days (2.4 vs 7.6%), p=0.38. Including cases converted from laparoscopic to open in either group did not influence the significance of these outcomes. All five cases requiring bowel resection were entirely managed open. Volvulus was present in 34.5% (n=38) of which 23.6% (n=9) were managed laparoscopically, 73.7% (n=28) open, and 21.1% (n=7) were converted. There was no difference in any of the outcome variables between laparoscopic and open management of volvulus.

Conclusion: Laparoscopic management of malrotation, even in the presence of volvulus, is safe and effective, with low rates of recurrent volvulus and complications.

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Pick the PICC: prolonged use of peripherally inserted central venous catheters in children with intestinal failure

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**Purpose:** Prolonged central vascular access is a source of significant morbidity in children with intestinal failure (IF). In an effort to decrease morbidity, our multidisciplinary intestinal failure team has primarily used peripherally inserted central catheters (PICC) in this patient population. We examined our outcomes with this approach.

**Methods:** A review of all children with intestinal failure managed over a 12-year period (2006-2018) was conducted. Inclusion criteria were total parenteral nutrition duration > 42 days or small bowel length < 25\% of total for gestational age. Clinical details regarding bowel status, duration of vascular access, incidence of complications per 1000 catheter days, and resource utilization (catheter replacements and catheter-related hospital admissions) were extracted.

**Results:** Thirty-five patients underwent PICC placement as primary vascular access. In this cohort, 167 PICCs were utilized, accounting for 8,849 catheter days. The median number of PICCs per patient was 4 (range 1-20). The median duration of central venous access via PICC was 182 (range 29 - 1497 ) days. Incidences of central line associated blood stream infection and venous thrombosis were 2.94 and 0.23 per 1000 catheter days, respectively. Seven patients (20\%) eventually underwent Broviac catheter placement at a median duration of 22.8 months (range 77 days - 5.6 years) after initial PICC placement. There were 9 catheter-related hospital admissions during the study period.

**Conclusion:** Peripherally inserted central venous catheters provide adequate prolonged vascular access for children with intestinal failure. This practice is associated with low complication rates, and significantly prolongs the period before traditional vascular access via Broviac is necessary.
Multifocal hepatoblastoma: what is the risk of recurrent disease in the remnant liver?

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Purpose: Multifocal hepatoblastoma (HB) is often treated with total hepatectomy and transplantation due to concerns of surgical resectability, local recurrence and/or metachronous tumor development in the remnant liver. We aimed to review HB patients to determine risk of local recurrence in multifocal disease.

Methods: We undertook retrospective cohort analysis of all HB patients at a single tertiary referral centre between 2010-2015. Demographics, diagnostic features, operative details and outcomes were analyzed.

Results: Of 26 patients with HB, 18 had unifocal disease and 8 had multifocal disease. Patients underwent a median of 4 cycles of neoadjuvant chemotherapy. Of multifocal patients, 2 underwent liver transplantation, 5 underwent anatomic resections (1 right hepatectomy, 3 left hepatectomies, 1 left lateral segmentectomy) and 1 underwent right hepatectomy with two left wedge resections. No patient with multifocal disease experienced local recurrence or metachronous tumor development; one unifocal disease patient experienced local recurrence. Two patients with multifocal disease had distant (lung) recurrences – 1 liver transplant patient and 1 right hepatectomy patient - both had initial lung metastases that regressed with neoadjuvant chemotherapy. One patient with unifocal disease experienced distant (lung) recurrence. At the end of follow-up (median: 43 months), overall survival was 100% for unifocal patients and 75% for multifocal patients.

Conclusion: In this series, multifocal HB was not associated with local recurrence in the setting of complete resection and chemotherapy. This data does not support the contention that all patients with multifocal HB require a total hepatectomy and transplantation to reduce the incidence of local recurrence and/or metachronous tumor development.

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A national transition to discipline curriculum for pediatric surgery residents: evaluation of the 2017 pilot pediatric surgery “boot camp”

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Purpose: Boot camps seek to enhance learning, orientation and preparation for individuals entering new roles. We sought to evaluate how the knowledge, skills, and confidence of in-coming pediatric surgical trainees were impacted by a 3-day pediatric surgery boot camp.

Methods: A curriculum was developed addressing key aspects of pediatric surgery (e.g. nutrition, physiology, congenital anomalies, trauma/resuscitation) using interactive lectures, small group discussions and simulation. With REB approval (Project #1022572), participant demographics were collected. Pre- and post-tests addressed knowledge acquisition and trainee confidence. An open-ended exit survey of trainees and Faculty assessed the need for future course revisions. Standard comparative statistics and a multivariate analysis of variance were performed.

Results: Eight trainees from Canadian pediatric surgery training programs participated. Five completed general surgery training in North America and 6 had no pediatric surgery exposure for at least 1 year prior to the boot camp. All participants expressed increased confidence with course material after boot camp completion; performance also improved significantly between pre- and post-tests (50.5% vs. 63.4%; p=0.019). MANOVA between Faculty and trainees demonstrated agreement on the value of individual sessions [F (9,2) = 0.667; p=0.73]. Neonatal bowel obstruction, gastrostomy tube complications, and pediatric legal and informed consent considerations rated most useful. Exit surveys suggested adding sessions on ultrasound, patient/family communication, difficult patient management, and advanced resuscitation.

Conclusion: Both trainees and teaching faculty considered the boot camp very valuable. Trainees demonstrated significant improvements in both core knowledge and confidence at its completion. The first pediatric surgery boot camp shows promise in facilitating the transition to discipline for new trainees.

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Improvement in resident wellness from a trainee perspective

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**Purpose:** Physician wellness has become an increasingly important topic with mounting evidence to support the notion that burnout can take a toll on both patients and providers. Trainee physicians, in particular surgeons, have been identified as being at high risk for stressors that lead to burnout. Our department created a surgical resident wellness program in 2011 to address this concern. As part of a recent survey, we asked our surgical trainees for practical improvements to reduce burnout.

**Methods:** Using an open-ended survey format, surgical trainees were asked for suggestions on how burnout could be alleviated by themselves, their colleagues, the wellness program, and the residency. Residents were also asked to rate their level of burnout on a ten-point scale.

**Results:** 25 trainees (PGY1-5) responded to the survey (response rate 70%). Overall, residents rated themselves neutrally on a ten-point scale of burnout (Mean=4.83). Responses to the open-ended questions were coded independently into categories and focused on several key points: For themselves, trainees emphasized changes in physical habits (e.g., diet, exercise). For colleagues, they focused on emotional/social support. And, for the wellness and residency programs, trainees requested improved mentorship.

**Conclusion:** Trainees within our general surgery residency judge themselves as being overall neutral in terms of burnout. However, when asked for ways to reduce or alleviate burnout, trainees were vocal and fairly uniform in their practical suggestions. Opportunities for improvement within physical wellbeing (own behaviors), social wellbeing (peers), and professional wellbeing (program) were identified. These responses offer potential targets for wellness initiatives within our residency.

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Incidence and prevalence of congenital anomalies in low-and middle-income countries: a systematic review

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2 McGill University, Montreal, Quebec, Canada
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Purpose: In the absence of robust data from low- and middle-income countries (LMICs) most disease burden estimates and related resource allocation is based on historic Western demographics. This study summarizes incidence and prevalence data for surgically correctable congenital anomalies in LMICs, comparing it to Western literature data.

Methods: Multiple online databases were systematically searched for studies reporting incidence and prevalence data on surgically correctable congenital anomalies in LMICs between 2007-2017. Two independent reviewers reviewed titles and abstracts, with a third adjudicating discrepancies. Selected studies were systematically abstracted and analyzed.

Results: After reviewing titles/abstracts of 10,129 articles, 98 articles were extracted for full-text review, and 45 were included representing 21 LMICs and 16 conditions. Study methodology included community surveys (44%), prospective (16%) and retrospective (16%) multi-site data, registries (9%), single-site data (9%), and systematic reviews (4%); collection periods were 1-10 years. The pooled reported epidemiological data varied apparently systematically from extant literature (selected pediatric surgical conditions shown in table). Incidence data was generally higher in the study compared to the literature for low-mortality, high-morbidity conditions, and lower for high-mortality conditions. Prevalence data reflected not only disease mortality but also unmet surgical burden.

Conclusion: Epidemiological data in resource-constrained countries is sparse and significantly influenced by surgical capacity and access to care. Appropriate surgical resource allocation will require improved, systematic data collection.
Pilot results of the global assessment in pediatric surgery (GAPS), an evidence-based pediatric surgical capacity assessment tool for low-resource settings

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Purpose: Global surgical capacity development requires reliable capacity assessment tools (CATs) to measure existing gaps, identify priorities, and monitor improvements in care. We report the piloting of the Global assessment in pediatric surgery (GAPS), a comprehensive, evidence-based CAT specifically designed for pediatric surgical centers in low- and middle-income countries (LMICs).

Methods: GAPS was developed through a systematic literature review of relevant CATs with their strengths and limitations. Data items were included by consensus through a Delphi process, using a 34-person multi-disciplinary expert panel. The tool was piloted in person in multiple LMIC contexts for feasibility and ease of use.

Results: GAPS is based on eight surgical CATs and five surgical resource guidelines. It is designed to evaluate all hospital-based care levels through 150 mutually exclusive questions with categorical multiple-choice responses, organized in five sections: Human Resources, Material Resources, Outcomes, Accessibility, and Education. GAPS was piloted in 14 institutions in 8 LMICs (selected items in table). The response rate over 90% for human resources, material resources, accessibility, and education, but under 50% for outcome data. The tool captured well all information and was easy to use.

Conclusion: The global assessment in pediatric surgery is a multi-dimensional evidence-based pediatric surgical capacity assessment tool designed for low-resource settings which is feasible for use in prioritizing and monitoring global surgical capacity development efforts.
<table>
<thead>
<tr>
<th>Item</th>
<th>Basic Care (n=11)</th>
<th>Advanced Care (n=14)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric general surgeon</td>
<td>6 (42.9%)</td>
<td>9 (81.8%)</td>
<td>0.099</td>
</tr>
<tr>
<td>Other pediatric surgical subspecialists</td>
<td>3 (21.4%)</td>
<td>8 (72.7%)</td>
<td>0.017*</td>
</tr>
<tr>
<td>Pediatric / Neonatal Anesthesiologist</td>
<td>2 (14.3%)</td>
<td>7 (63.6%)</td>
<td>0.017*</td>
</tr>
<tr>
<td>Pediatric / Neonatal Intensive Care Capabilities</td>
<td>4 (28.6%)</td>
<td>10 (90.9%)</td>
<td>0.004*</td>
</tr>
<tr>
<td>Pediatric Bronchoscopy</td>
<td>1 (7.1%)</td>
<td>6 (60%)</td>
<td>0.009*</td>
</tr>
<tr>
<td>Research</td>
<td>2 (15.4%)</td>
<td>8 (80%)</td>
<td>0.003*</td>
</tr>
</tbody>
</table>

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Are circular RNAs a new biomarker for abnormal lung development and congenital diaphragmatic hernia?

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Purpose: Circular RNAs (circRNAs) are RNAs that regulate gene expression. CircRNAs are more stable and function as biomarkers. We hypothesized that circular RNAs are differentially expressed during nitrofen-induced abnormal lung development in congenital diaphragmatic hernia (CDH).

Methods: We profiled circRNAs and induced lung hypoplasia and CDH by gavaging 100 mg nitrofen to rat dams on embryonic day (E) 9. We collected three control and three nitrofen lungs at E15 and E21 and isolated total RNA. We performed circRNAs microarray hybridization to determine the global circRNA profiles between nitrofen and control lungs. A t-test identified circRNAs with fold changes 2.0 and p-values 0.05. These were selected to perform pathway analysis using KEGG and Ingenuity Pathway Analysis. We validated the circRNAs with the highest and lowest fold change with Basescope in situ hybridization.

Results: Hierarchical clustering showed a total of 36 altered circRNAs, including 15 up-regulated and 21 down-regulated circRNAs in nitrofen lungs (Figure 1; FC>=2, p<=0.05). CircRNA_31436 (FC=9.8, p=0.02) and circRNA_007475 (FC=12.3, p=0.04) were the most up- and down-regulated in the nitrofen lungs. In situ hybridization showed that circRNA_31436 was expressed higher in the mesenchyme and airways of the nitrofen lungs. We observed lower expression of circRNA_007475 in the nitrofen lung mesenchyme and the expression shifted from the mesenchyme to the airway epithelium.

Conclusion: Nitrofen lungs had a characteristic circRNA profile and specific epithelial-mesenchymal expression for the most up- and down-regulated circRNAs. This suggests an important role for these circRNAs in the interaction between the epithelium and mesenchyme during abnormal lung development in CDH.
High expression of epithelial cell marker Cadherin-26 in cystic lesions of CPAM lungs

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Purpose: Congenital pulmonary airway malformations (CPAM) consist of different types of cystic or adenomatous lung lesions due to abnormal pulmonary development. The underlying pathogenesis is poorly understood. Our goal was to create a biobank of CPAM and age-matched control lung tissues and subsequently perform molecular studies on different samples. Cadherins are critical for cell-cell adhesion and thereby essential for structuring the airway epithelium. We therefore aimed to examine the expression of Cadherin-26 in CPAM tissues and compared it to healthy controls.

Methods: We collected patient data for CPAM cases between 2005 and 2016 either from autopsy reports or surgical CPAM cases. CPAM and control lung tissues were obtained from our pathology department. Formalin-fixed, paraffin-embedded tissues were sectioned and stained with hematoxylin-eosin. Immunohistochemistry (IHC) and Immunofluorescence (IF) was performed with anti-Cadherin 26 antibodies.

Results: A total of 36 patients (18 CPAM and 18 age-matched controls) were included in our biobank. The age of the patients ranged from 26 weeks of gestation to 12 years (mean 2.3 ± 3.7). Histological subtypes were CPAM Stocker Type I and II in 26% and 74% of cases, respectively. We observed an increased expression of Cadherin-26 within epithelial cells in CPAM lesions compared to corresponding areas in control lungs.

Conclusion: We established a unique human CPAM biobank for 18 CPAM patients and age-matched controls. Immunological staining shows that Cadherin-26 is higher expressed in cystic structures in CPAM tissues compared to control samples. We are validating these findings with RT-qPCR.

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Cerebral oxygenation in early life and neurodevelopmental outcome in congenital diaphragmatic hernia survivors

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Purpose: Neurodevelopmental delay (NDD) represents a significant morbidity in congenital diaphragmatic hernia (CDH) survivors. CDH patients are at high risk of hypoxic episodes that may contribute to NDD. Our aim was to analyse the correlation between cerebral oxygenation, measured using near infrared spectroscopy (NIRS) during the first days of life and neurodevelopmental outcome in CDH survivors.

Methods: CDH survivors treated between 2011 and 2015, with early NIRS recordings and 6 and 12-months follow-up were included in the study. NIRS is a new non-invasive and well-tolerated technique to monitor tissue perfusion and oxygenation. In present study, cerebral regional saturation (CrSO2) recorded during the first week of life (before operation) was correlated with 6 and 12-months neurodevelopmental outcome defined with the Bayley-III scale. Results are median (interquartile range), Spearman test was used and p<0.05 was considered statistically significant.

Results: Fifteen patients were included in the study. Age at NIRS measurement was 2 (1-4) days. CrSO2 was 80 (65-85) %. At 6 months follow-up Bayley scores were 98 (90-101) and 100 (89-111) for cognitive and motor scale, respectively. At 12 months follow-up Bayley scores were 105 (100-110) and 94 (85-103) for cognitive and motor scale, respectively. We found a significant correlation between early CrSO2 and 12-months follow-up Bayley scores in both cognitive (r=0.5720; p=0.0259) and motor (r=0.5619; p=0.0293) scales.

Conclusion: In CDH survivors, cerebral oxygenation during the first days of life correlates with medium term neurodevelopmental outcome. Early NIRS may help identifying patients at higher risk of NDD, therefore requiring stricter monitoring and more intensive support.

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Post-operative non-invasive ventilation and complications in esophageal atresia-tracheoesophageal fistula

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Purpose: This study examines the impact of post-operative assisted ventilation strategies on clinically relevant outcomes in esophageal atresia-tracheoesophageal fistula (EA-TEF) patients.

Methods: A single center retrospective chart review was conducted on all EA-TEF neonates undergoing primary repair from 1986 to 2016. Exclusion criteria were death prior to surgical repair, severe pulmonary disease, and severe pulmonary hypertension. Primary outcomes were: survival, anastomotic leak, stricture, pneumothorax, and mediastinitis. Statistical significance was determined using Chi-square test for p less than 0.05.

Results: We reviewed 79 patient charts, including 10 (12.6%) patients with long gap esophageal atresia. Three (3.8%) infants required high frequency oscillatory ventilation (HFOV) postoperatively, 76 (96.2%) conventional ventilation postoperatively, and 22 (27.8%) were bridged with post-extubation non-invasive ventilation (continuous positive airway pressure (CPAP), Non-invasive positive pressure ventilation (NIPPV) or high-flow nasal cannula (HFNC)). Survival was 76 (96.2%), incidence of stricture 32 (40.5%), anastomotic leak 16 (21%), pneumothorax 12 (15.2%), and mediastinitis 4 (5%). Eleven (13.9%) infants were on CPAP post-operatively. CPAP statistically correlated to stricture and death. Two (2.5%) infants were on NIPPV post-operatively. NIPPV statistically correlated to death. Six (7.6%) infants were on HFNC post-operatively. HFNC statistically correlated to anastomotic leak. Long gap was statistically correlated to leak, stricture, mediastinitis, pneumothorax, and pneumonia.

Conclusion: Continuous positive airway pressure ventilation is associated with a significantly higher rate of esophageal stricture, and high-flow nasal cannula ventilation is associated with a significantly higher rate of anastomotic leak following repair of esophageal atresia-tracheoesophageal fistula. Further prospective research is needed to guide post-operative ventilation strategies in this patient population.
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Enhanced recovery following surgery for oesophageal atresia

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Purpose: To reporting outcomes of esophageal atresia (EA) with enhanced recovery.

Methods: Ethically approved (15/WA/0153), single-centre, retrospective review of consecutive infants undergoing primary repair of Type C EA 1994-2014. Enhanced recovery comprised routine use of trans-anastomotic tubes (TAT), early enteral and oral feeding, no routine esophageal contrast study or chest drain. Results are median (IQR); preterm defined as 37 weeks gestation.

Results: One-hundred-nineteen infants were included. TAT was used in 115 in whom enteral feeds started on postoperative day 2 (2-3) and reached full enteral feeds by day 4 (4-7). In term infants, oral feeds started on day 4 (4-6) and in preterm infants on day 6 (4-15). Elective post-operative contrast studies were avoided in 117/119 cases (98%). There were 8 anastomotic leaks (7%); 3 presented clinically within 7 days and 1 on elective contrast study at 7 days. The remaining 4 presented clinically at 10-14 days; 2 had started oral feeds, 2 had not. Total length of stay was 10 days (9-14) in term and 23 days (12-61) in preterm infants. All infants survived.

Conclusion: Early enteral feeding via TAT and orally without routine contrast study is safe. Enhanced recovery does not adversely affect clinical outcomes, reduces need for central venous access and radiation exposure, and allows early discharge home.

M:F Pre-term (<37w) Gestational Age BW Spitz Type 1
67%:33% 29 (24%) 39w (37-40) 2800g (2370-3170) 107 (90%)

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GMP-grade extracellular vesicles derived from clinically compliant human amniotic fluid stem cells regenerate the lung epithelium in a model of pulmonary hypoplasia

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Purpose: Pulmonary hypoplasia is recognized as the main determinant for poor outcomes in babies with congenital diaphragmatic hernia (CDH). We previously demonstrated that rat amniotic fluid stem cells (rAFSCs) secrete extracellular vesicles (EV) that promote lung growth in experimental CDH. Herein, we investigated if human AFSC-EV (hAFSC-EV) obtained following good manufacturing practices enter lung epithelial cells and have a beneficial effect on an in vitro model of pulmonary hypoplasia.

Methods: hAFSC-EV isolation: Conditioned medium (CM) was collected from cKit+ hAFSC harvested during amniocentesis following ethical approval (REB:08/0304). CM was ultracentrifuged to obtain EV and EV-depleted fractions. For vesicle tracking, hAFSC-EV were fluorescently labeled with PKH26. In vitro model: Human alveolar basal epithelial (A549) cells were injured with nitrofen (80uM) for 18h, and treated with hAFSC-EV or EV-depleted CM. Uninjured and untreated cells served as control. Proliferation and apoptosis rates were assessed after 24h. Statistics: One-way ANOVA (Tukey post-test).

Results: PKH26+EVs enter A549 cells (Fig.1A) and rescue proliferation and apoptosis rates back to control levels (Fig.1B-C). The EV-depleted CM fraction does not have the same beneficial effect.

Conclusion: For the first time, we have shown that AFSC isolated from human amniocentesis secrete EV with regenerative potential on lung epithelium. EV prepared following clinically compliant protocols represent a novel therapy for pulmonary hypoplasia secondary to CDH.
Control
Nitrofen
Nitrofen + AFSC-EV
Nitrofen + EV-depleted CM

PKH26 + hAFSC-EV/DAPI/Calcein-AM

A

B

C

% Proliferation
% Cell Death

***
ns
*
***
ns
ns

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Prenatal echocardiography (ECHO) in assessment of structural heart defects in congenital diaphragmatic hernia patients: is early postnatal ECHO necessary for ECMO candidacy?

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Purpose: The purpose of this study was to determine the accuracy of fetal echocardiogram (ECHO) for detecting structural anomalies that may impact ECMO candidacy in CDH patients.

Methods: A retrospective review was performed on fetuses diagnosed with CDH from January 2007 - June 2017. All were evaluated for structural heart defects. Inclusion criteria was to be inborn and have at least one prenatal and postnatal ECHO. Chi-square and descriptive statistics were used for data analysis. A p-value <0.05 was considered significant.

Results: We identified 131 patients having at least one fetal and postnatal ECHO. Mean gestational age of fetal ECHO was 26.6±5.5 weeks. The median time to postnatal ECHO was 1[0–30] day(s) and 53% had a structural heart defect. Fetal ECHO was found to have 93% accuracy, 75% sensitivity, 100% specificity, 100% positive predictive value, and a 91% negative predictive value. Fetal and postnatal ECHO was 100% concordant for the diagnosis of major defects (Table-1). Fetal ECHO had 90% accuracy for visualization of at least one pulmonary vein on the unaffected side. Thirty-five percent of patients required ECMO of which 58% had an associated cardiac anomaly. All ECMO patients had an accurate structural fetal ECHO, excluding ASD.

Conclusion: Fetal ECHO is sufficient for identifying major structural heart defects and may be used to guide clinical management, particularly regarding ECMO candidacy.
Table 1. Diagnostic Test Evaluation of Fetal Echocardiography in CDH

<table>
<thead>
<tr>
<th>Condition</th>
<th>Diagnostic Accuracy</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>NPV</th>
<th>PPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventricular Septal Defect (VSD) (n=22)</td>
<td>94%</td>
<td>73%</td>
<td>98%</td>
<td>95%</td>
<td>89%</td>
</tr>
<tr>
<td>Double Outlet Right Ventricle (DORV) (n=4)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Hypoplastic Left Heart Syndrome (HLHS) (n=3)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Tetrology of Fallot (ToF) (n=6)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Coarctation of the Aorta (n=4)</td>
<td>97%</td>
<td>50%</td>
<td>98%</td>
<td>98%</td>
<td>50%</td>
</tr>
<tr>
<td>Visualization of pulmonary veins (1 or more)</td>
<td>90%</td>
<td>91%</td>
<td>81%</td>
<td>97%</td>
<td>54%</td>
</tr>
<tr>
<td>Presence of any structural heart defect</td>
<td>93%</td>
<td>75%</td>
<td>100%</td>
<td>92%</td>
<td>100%</td>
</tr>
</tbody>
</table>

NPV = negative predictive value, 
PPV = Positive Predictive value 
Accuracy (proportion of correct assessments) = \( \frac{\text{True Positives} + \text{True Negatives}}{\text{Number of all assessments}} \)

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Heritable disorders of fibrous connective tissues in patients with congenital diaphragmatic hernia: the relevance of genetic evaluation

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Purpose: Congenital Diaphragmatic Hernia (CDH) is a congenital abnormality affecting diaphragm and lung development. CDH may occur as an isolated defect, but 40% of CDHs are in the setting of a genetic syndromes or associations. Etiology of CDH is largely heterogeneous, since multiple monogenic and chromosomal disorders are diagnosed in patients with CDH. The purpose is to evaluate the incidence of heritable disorders of fibrous connective tissues in CDH patients referring to Bambino Gesu’ Children Hospital follow-up program between January 2016 and December 2017.

Methods: All our CDH patients undergo to a scheduled follow up every six months. In the last two years we planned a genetic evaluation in all CDH patients, including clinical-phenotypical examination, 2-Dimensional color-Doppler echocardiography, renal ultrasound examination, ophthalmological and audiometric examination. Patients with clinical suspect of Marfan or Ehlers-Danlos syndrome underwent specific genetic testing (targeted Next Generation Sequencing).

Results: 52 CDH patients had a genetic counseling in follow up program. Five/52 (9.6%) had clinical features of Marfan (or Marfan-like) syndrome, 6/52 (11.5%) of Ehlers-Danlos. Mean age at clinical diagnosis was 5-year for both groups. In one patient with Marfan-like syndrome a heterozygous c. T variant (Pro326Ser) in FBN2 gene has been identified, genetic testing is ongoing in the additional patients.

Conclusion: These results are underlining the need of clinical and genetic screening for disorders of fibrous connective tissues in patients with CDH, in order to perform specific follow up and prevention.

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Does creating a dome reduce recurrence in congenital diaphragmatic hernia following patch repair?

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Purpose: To determine if a dome patch repair for congenital diaphragmatic hernia (CDH) is associated with a decreased rate of recurrence.

Methods: We conducted a review of all neonates evaluated at our institution from February 2004–August 2017 with left and right-sided CDH with at least 6 months of follow-up after CDH repair. Patch use, operative repair techniques, post-operative imaging and postnatal outcomes were analyzed. Neonates with a patch repair were divided into two groups based on the presence of a dome. Using postoperative chest radiographs, the presence of a dome was classified as having a vertical-to-horizontal diaphragm-ratio greater than 20%.

Results: We identified 192 neonates who met our inclusion criteria. Cohort survival was 96.4%, recurrence rate was 14.6%, 78.1% had a left-sided CDH, 54.2% received a patch repair, of which 57.7% had a type C defect. Of the 104 patch repairs, the recurrence rate was 22.1% (n=23) at a median age of 6.4 months (IQR: 3.7,17.3). Although neonates with a dome repair had larger defect sizes and were more likely to require ECMO, their recurrence rate was 52% lower than those with a non-dome repair (13.6% vs 28.3%, p=0.07, Table 1).

Conclusion: Dome repair may reduce recurrence following patch repair of congenital diaphragmatic hernia. A larger, multi-institutional study is needed to statistically validate this clinically significant observation.

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The effects of tracheal occlusion on Wnt signaling in a rabbit model of congenital diaphragmatic hernia

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Purpose: Tracheal occlusion (TO) reverses the pulmonary hypoplasia associated with congenital diaphragmatic hernia (CDH), but its mechanism of action remains poorly understood. Wnt signaling plays a critical role in lung development but only a handful of studies (including our group) have demonstrated changes in CDH animal lungs. The purpose of our study was a) to confirm that our CDH rabbit model produced pulmonary hypoplasia which was reversed by TO and b) the effects of CDH +/- TO on Wnt signaling.

Methods: CDH was created in fetal rabbits at 23 days, TO at 28 days and lung collection at 31 days (Term~32 days). Lung-body weight (LBWR) and mean terminal bronchiole density (MTBD) were determined. mRNA expression was determined in the left lower lobe.

Results: Nineteen does produced 222 fetuses: 58 CDH and 17 CDH+TO were created. Fifteen CDH, 15 CDH+TO and 15 controls survived. LBWR was significantly lower in CDH while CDH+TO was similar to controls (p=0.003). MTBD was significantly higher in CDH fetuses and restored to control levels in CDH+TO (p<0.001). House Keeping Genes (HKG) TOP1, SDHA and ACTB were consistently expressed within and between treatment groups. Finally, Wnt2 mRNA was increased in CDH and CDH+TO (p<0.001, p=0.02). BMP4 and Lgl1 expression was unaffected by CDH+/-TO.

Conclusion: CDH+TO reverses pulmonary hypoplasia in the fetal rabbit model of CDH. HKGs demonstrated stable expression amongst all groups, and Wnt2 was altered in CDH rabbits but BMP4 and Lgl1 were unaffected.

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Demographic factors affecting parental attitudes to clinical research in paediatric surgery: a pilot study

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²Department of Pediatric Surgery, KK Women’s & Children’s Hospital, Singapore

Purpose: We evaluate demographic factors impacting parental attitudes to clinical research in general paediatric surgery.

Methods: An ethically approved prospective survey was administered to parents/legal guardians accompanying their children in the paediatric surgical outpatient clinic or day surgery using convenience sampling in September-November 2017. We modified a previously published survey employing Likert scale responses. Questions included demographics, parental willingness to enroll children in specified types of research and beliefs regarding conduct of research. Logistic regression analysis was used to identify significant factors, and reconfirmed by Chi-squared tests with p<0.05 significance levels.

Results: Eighty-four parents were surveyed of 100 approached (Table). No demographic factors significantly predicted research participation involving sample collection (urine, saliva, blood) or research requiring follow-up (phone, email, appointment, diary). However, mothers were less likely to agree to studies using common medications (p=0.049) or common surgical procedures(p=0.013); and less likely to agree to randomisation involving surgery (assigning to common surgical procedure, p=0.012; assigning to surgery vs no surgery, p=0.031). University graduates were less likely to agree to randomisation to either surgery or no surgery (p=0.02). Beliefs regarding conduct of research were similar in all categories, except for concerns regarding privacy where non-university graduates were more likely to believe that privacy would be compromised (p=0.003).

Conclusion: This study indicates behavioural and attitude differences in caregivers and can inform strategies for recruitment amongst researchers.
Table: Characteristics of respondents

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</table>

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Removal of tunneled central venous catheters using the traction technique without cuff dissection: a single-centre review of long-term

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Purpose: Tunneled central venous catheters (HL) are removed via cuff dissection or traction alone. Traction technique doesn't require general or local anesthesia, but typically results in retained cuff material. Late complications associated with retained cuffs are unknown.

Methods: We retrospectively reviewed pediatric oncology and hematology patients who underwent HL removal via traction technique at our center from 2009-2015. Baseline characteristics of patients with and without post-procedural complications were compared using Wilcoxon rank sum tests. Survival analysis for late complications was conducted using Cox regression.

Results: 278 HL were removed in 266 patients using the traction technique resulting in 204 cuffs retained (75%). Four complications (1.5%) occurred at the time of removal: cuff extrusion (1), persistent leakage from exit site (2), tunnel tract extruding from exit site(1). Fifteen late complications (5.4%) were described: skin irritation at the exit site (3), cosmetic/cuff irritation (3), cuff infection (2), cuff extrusion (5), and removal at the request of oncologist (2). Mean time from insertion to late complications was 2.5 years. Patients experiencing late complications had the HL in situ significantly longer compared to those who did not (mean 9.1 versus 7.3 months, p=0.039). Cox regression suggested that body mass index (BMI) (HR 1.10 95% CI 1.032-1.204 , p=0.005) and removal on admitted patient (HR 4.40, 95% CI 1.243-15.691, p=0.036) were also predictive of late complications.

Conclusion: Traction removal of HL was associated with a late complication rate of 5.4%. The majority of these were related to cuff retention. Traction removal has an acceptable complication rate and can avoid the need for additional general or local anesthesia in most cases.

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Comparing outcomes and complication rates of traditional percutaneous endoscopic gastrostomy and laparoscopic-assisted gastrostomy tube insertion in low birth-weight infants: a two-centre retrospective review

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Purpose: Percutaneous endoscopic gastrostomy (PEG) insertion facilitates enteral nutrition for certain pediatric patients. Infants weighing less than 5kg are at high risk for procedure-related complications. Laparoscopic-assisted PEG (LA-PEG) has been suggested as an alternative due to a theoretical reduction in risk, as well as the advantage of a lower profile device. This study compares outcomes and complications related to traditional PEG (T-PEG) and LA-PEG insertion in infants weighing less than 5 kg.

Methods: This is a two-centre retrospective review of patients under 5kg who underwent T-PEG or LA-PEG insertion between January 1, 2009 and February 1, 2017. A total of 129 infants were eligible in the T-PEG group and 29 were eligible in the LA-PEG group. Outcome data were collected for at-least 16 weeks post-procedure. Ethics approval was obtained at each centre.

Results: Demographic data revealed similar populations. Median weight at insertion was 4055g (2410-4925) for LA-PEG and 3800g (950-4970) for T-PEG. Post-operative complications were more common in the LA-PEG group compared with the T-PEG group (26.1% vs 7.8%, p=0.0185). Of these, superficial surgical site infection was the most common, with higher rates in LA-PEG (17.4%) vs T-PEG (4.8%; p=0.045). The T-PEG group reported one instance of gastrocutaneous fistula, gastrocolic fistula, and retained foreign body requiring endoscopic management. Small sample size precluded assessment of the significance of these. No procedure-related mortalities occurred.

Conclusion: Laparoscopic-assisted percutaneous endoscopic gastrostomy insertion is associated with a higher risk of early post-procedure complications than traditional percutaneous endoscopic gastrostomy. This study is limited by its small sample size.
Evolution and outcomes of a Canadian pediatric bariatric surgery program

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Purpose: Our hospital established a multidisciplinary obesity management program in 2007, including bariatric surgery for selected patients. We report the evolution of surgical management within the program and outcomes of patients who underwent surgery.

Methods: Retrospective review of adolescents undergoing bariatric surgery between 2007-17. All cases were done by a pediatric surgeon and an experienced adult bariatric surgeon. BMI, co-morbidities, surgical details, post-operative outcomes, weight loss, and re-operation rates were recorded.

Results: There were 38 patients (79% female). Median age at entrance into the program was 16.5 (range 12.1-17.4) years and at the time of surgery was 17.4 (range 13.6-18.8) years. Between 2007-10, 8 patients had laparoscopic gastric banding (LGB), and between 2011-17, 18 had laparoscopic sleeve gastrectomy (LSG) and 12 had laparoscopic Roux-en-Y gastric bypass (RYGB). Outcomes are summarized in Table 1. There were no intraoperative complications or conversions. Postoperative complications included wound infection (2), bleeding requiring transfusion and re-exploration (1) and internal hernia (1). Of the patients who had LGB, 2 required surgical revision and 3 underwent subsequent removal (with conversion to LSG in 1 and RYGB in 1).

Conclusion: We conclude that adolescent bariatric surgery in the context of a multidisciplinary obesity management program is safe and effective. RYGB and sleeve gastrectomy are associated with superior weight loss and lower reoperation rates than gastric banding.
<table>
<thead>
<tr>
<th></th>
<th>LGB (n=8)</th>
<th>LSG (n=18)</th>
<th>RYGB (n=12)</th>
<th>p-value</th>
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<tr>
<td>BMI at entry into STOMP</td>
<td>55.1±10</td>
<td>49.6±9.0</td>
<td>47.5±5.2</td>
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<tr>
<td>BMI at time of surgery</td>
<td>51.3±7.7</td>
<td>50.6±7.5</td>
<td>45.4±4.9</td>
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<tr>
<td>Length of procedure (min)</td>
<td>115.9±50.3</td>
<td>107.6±33.65</td>
<td>145±33.1</td>
<td>0.033</td>
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<tr>
<td>Change in BMI at 6 months post-surgery</td>
<td>-3.9±4.2</td>
<td>-9.8±4.9</td>
<td>-11.6±3.3</td>
<td>0.016</td>
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<tr>
<td>Change in BMI at 12 months post-surgery</td>
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<td>-12.0±5.7</td>
<td>-14.0±4.4</td>
<td>0.315</td>
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<tr>
<td>Median length of follow-up (mo)</td>
<td>23 (11-32)</td>
<td>20 (3-36)</td>
<td>17 (11-25)</td>
<td>0.532</td>
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<td>Change in BMI at most recent follow-up</td>
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<td>-12.2±8.0</td>
<td>-13.9±4.1</td>
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</table>

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Laparoscopic versus open Kasai portoenterostomy for biliary atresia: a propensity score analysis

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Purpose: Laparoscopic Kasai portoenterostomy (Lap-Kasai) for treating biliary atresia is still a controversial topic. This study aimed to compare, using propensity score matching analyses, the short-term results of laparoscopic versus open Kasai portoenterostomy (Open-Kasai) in a single center of patients with biliary atresia.

Methods: Subjects were infants with biliary atresia who underwent Open-Kasai (n=57) or Lap-Kasai (n=20) between January 2004 and December 2016. Clinical data were retrospectively compared between Open-Kasai and Lap-Kasai. Propensity score matching was performed to reduce the effect of treatment selection bias and potential confounding factors. We set the possible confounders as sex, biliary atresia splenic malformation syndrome, weight and age at operation.

Results: After propensity score matching, 20 Lap-Kasai and 20 Open-Kasai patients were compared. The postoperative jaundice clearance rate was not significantly different between Lap-Kasai and Open-Kasai (65% vs 75%; p=0.73). Kaplan-Meier analysis demonstrated that the 1-year native liver survival rate was not significantly different between Lap-Kasai and Open-Kasai (65% vs 75%; p=0.46). The median blood loss was significantly less in Lap-Kasai than in Open-Kasai (23ml vs 32ml; p =0.018). However, the median operation time was significantly longer in Lap-Kasai than in Open-Kasai (314min vs 274min; p =0.001). Rates of major complications of Lap-Kasai were comparable to those of Open-Kasai (10% vs 5%; p=1). Similar results were observed when the analysis was not adjusted based on the propensity score.

Conclusion: This study suggests that laparoscopic Kasai portoenterostomy achieves an equivalent short-term outcome compared to open Kasai portoenterostomy.

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Timing of inguinal hernia repair in premature infants: a systematic review and meta-analysis

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Purpose: The timing of inguinal hernia repair (IHR) in premature infants is controversial as the risk of hernia incarceration is opposed to the risk of operative complications. There has been no meta-analysis evaluating the optimal timing for IHR in premature infants. The aim of this study was to compare outcomes of patients who had IHR before or after NICU discharge.

Methods: Original articles published between 1997 and 2017 were identified using the MEDLINE database. Randomized controlled trials and observational clinical studies comparing patient outcomes were included. The outcomes evaluated were hernia incarceration before repair, hernia recurrence, respiratory and other surgical complications. This meta-analysis was conducted using RevMan5.3.

Results: We identified three observational studies comprising of 82 infants operated before NICU discharge (2.3 weeks from diagnosis) and 129 infants operated after discharge (8.8 weeks from diagnosis). Incarceration occurred in 5.1% of infants operated before NICU discharge and similarly 3.4% of those operated after discharge; the hernia was always reduced before surgery. There were no significant differences in hernia recurrence, postoperative respiratory complications and surgical complications (Figure).

Conclusion: Hernia incarceration, recurrence or other postoperative complications are not affected by the timing of inguinal hernia repair. However, the quality of evidence supporting these findings is suboptimal, indicating the need of a prospective study.
### Recurrence

<table>
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<tr>
<th>Study or Subgroup</th>
<th>OPE before discharge</th>
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<th>Odds Ratio M-H, Random, 95% CI</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
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<td>33 100.0%</td>
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<td>61 100.0%</td>
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Heterogeneity: Not applicable
Test for overall effect: Z = 1.57 (P = 0.12)

### Respiratory complications

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<td>35 31.0%</td>
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Heterogeneity: Tau^2 = 1.10; Chi^2 = 3.10, df = 2 (P = 0.21); I^2 = 36%
Test for overall effect: Z = 1.40 (P = 0.16)

### Surgical complications

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<td>33 51.4%</td>
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Heterogeneity: Chi^2 = 0.00, df = 1 (P = 0.95); I^2 = 0%
Test for overall effect: Z = 0.26 (P = 0.79)

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Laparoscopy reduces the risk of surgical site infections in infants and children: a systematic review and meta-analysis

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2 Department of Pediatric Surgery, "Spirito Santo" Hospital, Pescara, Italy and “G d’Annunzio” University, Chieti-Pescara, Italy
3 Pediatric Surgery Unit, University of Padova, Padova, Italy

Purpose: The incidence of surgical site infections (SSI) following laparoscopy in the pediatric population remains unknown. Our aim was to determine whether infants and children undergoing laparoscopy are at lower risk of developing SSI than those undergoing laparotomy.

Methods: With a defined search strategy, comparative studies reporting the incidence of SSI following laparoscopy or laparotomy in infants and children were identified. Using RevMan 5.3, we conducted a meta-analysis on the incidence of SSI: 1) in all patients; 2) after appendectomy; 3) after clean intra-abdominal surgery.

Results: Of 13,938 titles/abstracts screened, 134 were comparative studies (570,600 pts), including 12 randomized controlled trials (RCT). Most studies (n=65; 550,787 pts; 97%) were on appendectomy. Overall: the SSI incidence following laparoscopy was 1.3%. SSI incidence was lower after laparoscopy than after laparotomy (p<0.00001). This was confirmed when assessing RCTs alone, where the SSI incidence was 1.2% following laparoscopy versus 3.7% following laparotomy (p<0.05, Figure). Appendectomy: the SSI incidence was lower following laparoscopy (1.1%) than open appendectomy (1.4%; p<0.00001). Clean intra-abdominal surgery: laparoscopy was associated with a lower SSI incidence (2.2%) compared to laparotomy (3.5%; p<0.00001).

Conclusion: Infants and children treated by laparoscopy are at lower risk of surgical site infections than those undergoing laparotomy. This is observed following various procedures, including appendectomy, and is supported by a high level of evidence.
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Conservative management of urachal anomalies

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2 University of Nebraska Medical Center, Omaha, Nebraska, USA

Purpose: To determine if conservative management of urachal remnants is safe and decreases resource utilization.

Methods: Based on our experience managing urachal remnants from 2000-2010 (reported in 2012), we adopted a more conservative approach, including pre-operative antibiotic use, avoiding use of cystourethrograms (VCUG), postponing surgery until at least six months of age, and considering non-operative management. A retrospective analysis of urachal anomaly cases was conducted (2011-2016) to assess trends in practice. IRB approval was obtained. Charts indicating anomalies of the urachus or urinary system were pulled and trends in management (conservative versus surgical treatment), VCUG use, and antibiotic usage were evaluated.

Results: Data from 2000-2010, 2011-2016, and 2013-2016 (the four years after our 2012 assessment) were compared. Our findings indicate care has shifted towards conservative management. A smaller proportion of patients from 2013-2016 was treated surgically compared to 2000-2010. Patients receiving nonoperative treatment exhibited lower rates of complication relative to surgically managed cases. VCUG’s were eliminated as a diagnostic tool for evaluating urachal anomalies. Use of pre-operative antibiotics increased significantly. No patients with a known urachal remnant presented later with an abscess or sepsis.

Conclusion: We find that a conservative approach to urachal management did not adversely affect overall outcomes. We recommend observing minimally symptomatic patients, especially those under six months of age.

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<tbody>
<tr>
<td>Surgically treated</td>
<td>72 (84.7%)</td>
<td>46 (67.6%)</td>
<td>20 (69.0%)</td>
</tr>
<tr>
<td>Patients experiencing complications under surgical treatment</td>
<td>13 (18%)</td>
<td>10 (21.7%)</td>
<td>4 (20%)</td>
</tr>
<tr>
<td>Attempted nonoperative management</td>
<td>13 (15.3%)</td>
<td>25 (36.8%)</td>
<td>10 (34.5%)</td>
</tr>
<tr>
<td>Patients experiencing complications under nonoperative management</td>
<td>0 (0%)</td>
<td>3 (12%)</td>
<td>1 (10%)</td>
</tr>
<tr>
<td>Surgical cases using pre-operative antibiotics</td>
<td>38 (52.8%)</td>
<td>41 (89.1%)</td>
<td>20 (100%)</td>
</tr>
<tr>
<td>Patients receiving a VCUG</td>
<td>17 (20%)</td>
<td>6 (8.8%)</td>
<td>1 (3.4%)</td>
</tr>
<tr>
<td>Patients Under 6 Months of Age</td>
<td>61</td>
<td>36</td>
<td>10</td>
</tr>
<tr>
<td>Surgically treated</td>
<td>49 (80.3%)</td>
<td>17 (47.2%)</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>Conservatively managed</td>
<td>12 (19.7%)</td>
<td>19 (52.8%)</td>
<td>6 (60%)</td>
</tr>
</tbody>
</table>

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Does triangular cord sign represent disease progression in biliary atresia?

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Purpose: The ultrasound triangular cord sign (TCS) is useful in the diagnosis of biliary atresia (BA), with a specificity of >90%, and sensitivity of 80%. Since TCS represents ductal fibrosis at the porta hepatis, we hypothesized that negative TCS in association with proven BA would correlate with younger age, less hepatic fibrosis and improved drainage after Kasai portoenterostomy.

Methods: An IRB-approved retrospective review of 69 BA patients between 1996 and 2014 was performed. TCS was positive in 54 patients (80% -TCP), and negative in 15 (TCN). We compared the following variables for TCP and TCN patients: age at diagnostic US and Kasai, preoperative and 3 months postoperative serum T-Bil, and grade of hepatic fibrosis (HF). Group comparisons using Student’s t-test or Mann-Whitney U test for continuous variables, and chi-square test for categorical variables was performed.

Results: Preoperative T-Bil was higher in TCP patients (10.09 ± 2.94 mg/dL vs 8.18 ± 1.95 mg/dL; p = 0.0218). However, there were no difference between groups for age at US (60.62 ± 31.96 days (TCP) vs 54.27 ± 25.86; p=0.48) or Kasai (70.37 ± 28.6 days (TCP) vs 66.20 ± 19.80; p=0.6), nor was there a difference in HF grade. Paradoxically, postoperative T-Bil was higher in TCN patients (median, 4.63; range, 0.46-24.12 mg/dL vs 0.94; range, 0.19-17.4 mg/dL; p=0.0211).

Conclusion: In our patients, TCS presence did not correlate with older age at Kasai, nor did it predict impaired postoperative bilirubin drainage. Negative and positive TCS might reflect etiologic differences in the development of BA

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The effectiveness of wedge resection versus Vandenbos procedure for the surgical management of ingrown toenail in children: a retrospective chart review

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2 Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada

Purpose: There exist two common methods of surgical management for ingrown toenail – wedge resection and Vandenbos procedure. We compared the complication and recurrence rates following these two procedures in pediatric patients.

Methods: We conducted an Institutional Review Board-approved retrospective review of patients who presented with ingrown toenail between 2009 and 2015. Patients who received surgical treatment outside of our institution or were over 18 years of age were excluded. We performed statistical analyses using Chi-squared tests without Yates’ correction (two-tailed) for categorical data and unpaired t-tests for continuous data.

Results: During this time period, there were 523 patients seen at our institution with ingrown toenail. Of these patients, 482 had sufficient data available to be included in this study, with a total of 929 ingrown toenails (left vs right and medial vs lateral aspects). Out of these, 333 (36%) were managed conservatively and 596 (64%) required surgical intervention; 373 (63%) had wedge resection performed and the other 223 (37%) had Vandenbos procedure. There was no difference in total complication rate between procedures (P = 0.095); however, wedge resection was associated with a significantly higher recurrence rate than Vandenbos procedure (P = 0.0001).

Conclusion: Vandenbos procedure is associated with a significantly lower recurrence rate than wedge resection.

<table>
<thead>
<tr>
<th></th>
<th>Wedge resection (n=373)</th>
<th>Vandenbos (n=223)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>13.4±2.6 years</td>
<td>13.1±2.3 years</td>
<td>0.3606</td>
</tr>
<tr>
<td>Sex</td>
<td>M: 133 F: 71</td>
<td>M: 79 F: 31</td>
<td>0.2319</td>
</tr>
<tr>
<td>Mean follow-up</td>
<td>197.3±312.7 days</td>
<td>240.9±249.3 days</td>
<td>0.2075</td>
</tr>
<tr>
<td>Total complications</td>
<td>78 (21%)</td>
<td>32 (14%)</td>
<td>0.0949</td>
</tr>
<tr>
<td>Recurrence</td>
<td>41 (11%)</td>
<td>5 (2%)</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Bleeding</td>
<td>3 (1%)</td>
<td>5 (2%)</td>
<td>0.1399</td>
</tr>
<tr>
<td>Pain</td>
<td>10 (3%)</td>
<td>5 (2%)</td>
<td>0.7407</td>
</tr>
<tr>
<td>Infection</td>
<td>13 (4%)</td>
<td>5 (2%)</td>
<td>0.3908</td>
</tr>
<tr>
<td>Other</td>
<td>11 (3%)</td>
<td>12 (5%)</td>
<td>0.1358</td>
</tr>
</tbody>
</table>

*Significant
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Laparoscopic versus open inguinal hernia repair in children: which is the true gold-standard? a systematic review and meta-analysis

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Purpose: Inguinal hernia repair is one of the most common operations performed in children. Traditionally, an open surgical approach has been utilized; however, laparoscopic repair has been gaining favor within the surgical community. We aimed to determine whether open or laparoscopic repair is optimal for pediatric patients by comparing recurrence rates and other outcomes.

Methods: We searched CENTRAL, MEDLINE, and EMBASE from 1980, including studies comparing laparoscopic and open repair for pediatric inguinal hernia. Institutional Review Board approval was not necessary. We calculated risk differences (RD) with 95% confidence intervals (CI) for dichotomous variables and mean differences (MD) with 95% CI for continuous variables.

Results: Our initial search yielded 345 unique citations. Of these, we reviewed the full text of 28, and included 21 in meta-analyses. Patients who underwent laparoscopic surgery were more likely to experience wound infection (RD -0.01, 95% CI -0.02 to 0.00, p=0.003), but less likely to experience ascending testis (RD 0.01, 95% CI 0.00 to 0.01, p=0.05) and metachronous hernia (RD 0.05, 95% CI 0.03 to 0.08, p=0.0002). There were no significant differences between groups in terms of in recurrence rates, surgical time, length of hospitalization, intra-operative injury, bleeding, testicular atrophy, or hydrocele.

Conclusion: Laparoscopic and open surgery are equivalent in terms of recurrence rates, surgical time, length of hospitalization, and a number of complications. Laparoscopic hernia is associated with decreased risk of ascending testis, and allows the opportunity to explore and repair the contralateral side, preventing metachronous hernia.

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Cystic fibrosis and portal hypertension: shunt or transplant?

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Purpose: The management of portal hypertension (PHT) in children with well compensated cirrhosis and cystic fibrosis (CF) is controversial. We present our experience with distal splenorenal shunt (DSRS) for the treatment of PHT as an alternative to liver transplantation (LT).

Methods: Data for CF patients who received a LT (n=9) was compared retrospectively to that of 5 children who had a DSRS. LT was reserved for patients with evidence of liver synthetic failure. Comparison between the two groups and within the DSRS group was done using a 2 tailed paired t test. 0.05 was considered significant.

Results: Mean PELD/MELD score in DSRS patients was significantly lower (3 vs 28) than in the LT group (p=0.00004). There was no significant difference in age at surgery between the two groups (10.9 vs 12.1 years). All 5 DSRS patients had grade III-IV varices. One bled prior to surgery. After DSRS, spleen size decreased from 8.4 ± 1.52 cm to 4.4 ± 1.82 cm (p=0.019). Mean platelet count remained stable (87.8 ± 48 to 91.8 ± 35, p=0.9). There were no postoperative complications. No DSRS patient experienced post shunt variceal bleeding. One DSRS patient died 15 months after surgery from pulmonary complications. Liver function tests remained stable in the DSRS group (mean follow up 4.5±2.3 years).

Conclusion: Patients with cystic fibrosis, well compensated cirrhosis and symptomatic portal hypertension can be palliated with distal splenorenal shunting and do not need liver transplants. These patients can undergo shunting with minimal morbidity.

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Incidental appendectomy during surgical intussusception reduction

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Purpose: To assess outcomes and recurrence rates for children undergoing incidental appendectomy during operative intussusception reduction.

Methods: After IRB approval, children <5 years old undergoing surgical reduction of intussusception from 2011-2017 were identified in the Pediatric Health Information System (PHIS) and at two tertiary care hospitals. The demographics, management, outcomes and complications were collected and analyzed using descriptive statistics, Wilcoxon rank-sum, chi-square and Fisher exact tests.

Results: Amongst the 2,091 cases of intussusception at the tertiary care hospitals, 4% underwent operative intervention. 71% of uncomplicated surgical cases received an incidental appendectomy. Children receiving surgical reduction alone compared to surgical reduction with incidental appendectomy showed a similar hospital (4 [2,5] vs 4 [3,5] days; p=0.82) and intensive care unit (ICU) length of stay (LOS) (2 [1.5,5] vs 4 [1,6] days; p=0.92), ICU admissions (8 (17%) vs 3 (16%); p=1.00), procedure times (59 minutes [37,75] vs 71 [45,102]; p=0.13), major complications (6 (13%) vs 2 (11%); p=1.00), recurrent intussusception (3 (7%) vs 0 (0%); p=0.55), and 90-day readmissions (3 (7%) vs1 (5%); p=1.00). Amongst the 4,142 patients with intussusception in the PHIS database, 5% received operative intervention and 41% of these had an incidental appendectomy. Hospital (3 [2,4] vs 3 [1,5] days; p=0.93) and ICU LOS (0 [0,0] vs 0 [0,0] days; p=0.81), ICU admissions (9 (11%) vs 14 (12%); p=0.84), readmissions (2 (2%) vs1 (1%); p=0.57), and costs (10 [6.8,14.7] vs. 9.5 [7.2,14.6] thousand US dollars; p=0.93) were similar.

Conclusion: Incidental appendectomy during surgical reduction of intussusception does not worsen outcomes, increase recurrence, or increase cost.

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Methodological issues in identifying sepsis events in pediatric surgery patients

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Purpose: Robust information on surgical associated sepsis in children is sparse. The purpose of this study was to describe surgical associated sepsis in children at a single Canadian institution.

Methods: Prospective cohort study was conducted at a single pediatric tertiary care center. Septic events during the 12-month study (July 1, 2015 - June 30, 2016) were identified by A) prospective screening with sepsis defined as suspected or confirmed infection plus organ dysfunction; and B) screening of patients identified through International Classification of Disease (ICD) -10 codes indicative of possible sepsis. We defined patients as “surgical associated” if they had undergone a surgical or interventional radiology procedure in the 7 days prior or 48 hours following sepsis onset.

Results: Overall 143 unique patients who experienced 156 septic events were identified. A subset of 16 (11%) patients and 18 (12%) septic events were categorized as surgical. In the surgical subset, mean age was 88 +/- 69 months and 8/16 (50%) were male. Pediatric Intensive Care Unit admission was required for 15/18 (83%) events and 2 (12%) of these patients died. Prospective screening and ICD -10 codes each independently identified 14 sepsis events, with 10/18 (55%) events identified by both methods. Surgery was performed prior to sepsis onset in 5 patients and after sepsis in 13 patients.

Conclusion: Only a small number of pediatric patients had sepsis develop after surgery. Using ICD -10 codes alone underestimated the number of children with surgical associated sepsis. Further work is needed to determine the most accurate and cost efficient way to identify sepsis in children.
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Non-tuberculous mycobacterial (NTM) lymphadenitis in children- a subtropical disease with diagnostic challenge

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Purpose: NTM lymphadenitis presents as a mass in the cervico-facial region in preschoolers which is difficult to differentiate from acute bacterial lymphadenitis. We aimed to define the value of microbiology in guiding surgical intervention.

Methods: Children undergoing surgery for NTM lymphadenitis between 1995 and 2015 were reviewed. Cases were analysed for age, sex, country of birth, ethnicity and area of residence (urban or rural). White cell count, BCG vaccination, Mantoux test results and follow up were documented. The number of surgical procedures required and the reasons were analysed. The patients with a positive tissue culture were assigned to group 1 and negative to group 2 where diagnosis was made on characteristic histology without evidence of other granulomatous infections. The outcome of the surgical treatment were compared. Patients without culture specimens were excluded from the two groups. Chi Squire test was used for categorised variables.

Results: There were 75 patients (annual average 3.6,76% female). Age ranged from 1-15 years (median-). Caucasians comprised 65% the rest being indigenous. All patients were born locally and none had received BCG. The Median time to surgery from onset of symptoms was 6.39 (range 1-28 weeks). Of the 75, 69 (90%) specimens were sent for culture and 57 (83%) were positive. None showed other bacterial growth. Second or more surgery was done in 41% of children in group 1 and in only 8.3% of children in group 2 (p=0.04).

Conclusion: The culture negative NTM leads to less surgical interventions than culture positive NTM although latter is definitive for diagnosis.

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Early versus delayed feeding protocols after uncomplicated intussusception reduction in children: a systematic review and meta-analysis of outcomes

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Purpose: Emergency department management of uncomplicated intussusception in children is commonly practised worldwide. Its success requires early tolerance of feeds for maximal time and cost benefit. We performed a systematic review and meta-analysis to compare outcomes between early and delayed feeding protocols.

Methods: Studies published in English up to Jan 2018 were searched from Medline, Embase, Google scholar and Cochrane databases, using a combination of the terms “intussusception”, “reduction” and “management”. A meta-analysis was performed of studies comparing outcomes after early (?2 hours) and delayed (>2 hours) feeding after successful intussusception reduction in children.

Results: One randomized controlled trials (RCT) was found but was excluded for poor quality data. Two observational studies (1 retrospective, 1 prospective) were included, comprising 113 early feeding patients and 133 delayed cases. There was no statistical difference in overall recurrence rate between early (8.8%) and delayed feeding (12.0%) [pooled odds ratio (OR)=0.74; 95% confidence interval(CI) 0.32 to 1.72; P=0.26; I²=21% ]. Length of stay appeared longer in the delayed group, but paucity of data did not allow statistical comparison. Methods of reduction were air or water-soluble contrast enema.

Conclusion: Early feeding less than 2 hours post uncomplicated intussusception reduction appears safe. However, selection of this time-point may be too early to result in significant outcome differences, and robust data is lacking in the published literature.

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Minimally invasive surgery versus conventional wide excision for pilonidal sinus: a systematic review and meta-analysis

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Purpose: To compare the efficacy and functional outcome of minimally invasive surgery (MIS) with conventional wide excision (WE) for pilonidal sinus.

Methods: MEDLINE, Embase and Cochrane databases were searched for randomized controlled trials (RCT) and observational cohort studies (OCS) comparing outcomes between MIS and WE procedures for pilonidal sinus. Outcomes evaluated included operative time, post-operative sick days and recurrence rate. The predicted 5-year recurrence rate was calculated by \[(\text{recurrence rate/follow-up time}) \times 5\] years.

Results: Six studies (1 RCT, 5 OCS) were included, comprising 424 cases of WE and 356 cases of MIS procedures. An endoscopic-assisted MIS was used in the RCT, while all MIS were performed without video assistance in all OCS. There was no difference in operative time between MIS and WE (pooled mean difference [MD]=5.62 minutes; 95% confidence interval [CI], -37.5 to 48.7; \(P=0.8, I^2=100\%\)), but post-operative sick leave was significantly shorter in MIS (MD=15.35 day; 95% CI 3.34-27.36; \(P=0.01, I^2=91\%\)). There was no significant difference in predicted 5-year recurrence rate between MIS (34%) and WE (20.5%) groups from all included studies (pooled odd ratio [OR]=0.59; 95% CI 0.32-1.08; \(P=0.09, I^2=66\%\)). However, among 5 OCS, MIS without video-assistance exhibited a higher recurrence rate (37.8%) compared to WE(18.9%) group (pooled OR=0.41; 95% CI 0.28-0.59; \(P<0.00001, I^2 =10\%\)).

Conclusion: Our study shows that minimally invasive surgery for pilonidal sinus is associated with shorter post-operative recovery. However, those without video-assistance may lead to higher recurrence. More randomized trials with longer follow-up are necessary to evaluate the efficacy of techniques in treating pilonidal sinus.

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An observational study of Smoflipid® versus Intralipid® on the evolution of parenteral nutrition associated liver disease in neonates with intestinal failure

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Purpose: SMOFlipid® has a better lipid profile over traditional Intralipid® and has become the standard lipid for patients in our intestinal rehabilitation program (IRP). Our objective was to compare outcomes in neonates with intestinal failure (IF) who received SMOFlipid® compared to Intralipid®.

Methods: Retrospective cohort study of neonates with intestinal failure (IF) with a minimum follow-up of 12 months between 2008-2016. Patients were stratified into two groups; Group 1 received SMOF-lipid® and group 2 was a historical cohort who received Intralipid®. Data collection on factors related to IF and parenteral nutrition (PN)pport. The primary outcome evaluated was liver function. Statistical analysis included the Mann-Whitney U and Chi-square with an alpha value of <0.05 considered significant. Approval was obtained from our institutional IRB.

Results: 37 patients evaluated (17 = SMOFlipid®, 20 = Intralipid®). SMOFlipid® patients were less likely to reach conjugated bilirubin 34 (24% vs 55%, p=0.05), 50umol/L (11.8% vs 45%; p=0.028) and did not require Omegaven® (0 vs 30%; p=0.014). Conjugated bilirubin level at 3 months after initiation of PN was lower in patients receiving SMOFlipid® (0 vs 36umol/L; p=0.01). Weight Z-scores were improved for patients on SMOFlipid® at 3 months (-0.932 vs -2.092; p=0.028) and 6 months (-0.633 vs -1.614; p=0.018).

Conclusion: There was no differences in PN support patients received or demographics between the two groups. SMOFlipid® patients had a lower proportion who reached CB levels 34 or 50umol/L. Use of SMOFlipid®’s improved lipid profile has resulted in an improvement in the progression of IFALD.
Impact of manometric guidance during laparoscopic Heller myotomy on quality of life and symptom severity for children with achalasia

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Purpose: High resolution manometry during laparoscopic Heller myotomy with fundoplication (mHeller) for achalasia allows tailoring of myotomy length and wrap tightness. Whether this technique results in long-term symptom amelioration in pediatric achalasia is unknown. The purpose of this study is to quantify both long-term post-operative symptom severity and quality of life using validated questionnaires.

Methods: Children ≤18 years with achalasia who underwent Heller myotomy with intraoperative manometry from 2010-2017 were surveyed following IRB approval (H-31798). Eckardt symptom score (ESS), achalasia severity questionnaire (ASQ), pediatric quality of life inventory (PedsQL), and pediatric GERD symptom and quality of life (PGSQ) questionnaires were administered. Scores for historical controls were obtained from prior survey instrument validation studies as comparison.

Results: Of 30 eligible patients, 12 (40%) completed the surveys. Mean age at time of surgery was 13±3 years. Assessment was performed at least 10 months after surgery with mean time elapsed of 3.6±2 years. Average pre-myotomy lower esophageal sphincter (LES) pressure, post-myotomy LES pressure, and post-fundoplication LES pressure was 30±10 mmHg, 14±6 mmHg, and 18±9, respectively. Measures of reflux symptoms, achalasia severity and quality of life for surveyed patients compared to historical controls are reported in Table 1.

Conclusion: Children with achalasia undergoing mHeller had sustained long-term symptom improvement and quality of life scores comparable to healthy patients.
<table>
<thead>
<tr>
<th>Surveys</th>
<th>Mean ± SD</th>
<th>Score range</th>
<th>Historical control: healthy patients/remission</th>
<th>Historical control: achalasia patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eckardt symptom score (ESS)</td>
<td>2.3 ± 1.0</td>
<td>0-12</td>
<td>≤3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>&gt;3</td>
</tr>
<tr>
<td>Achalasia severity questionnaire (ASQ)</td>
<td>39 ± 16</td>
<td>0-100</td>
<td>37.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>56.8</td>
</tr>
<tr>
<td>Pediatric GERD symptom and quality of life (PGSQ)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Symptom score</td>
<td>0.58 ± 0.4</td>
<td>0-4</td>
<td>0.2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.1*</td>
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<tr>
<td>Impact score</td>
<td>0.78 ± 0.6</td>
<td>0-4</td>
<td>0.1&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.8*</td>
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<tr>
<td>School score</td>
<td>0.40 ± 0.4</td>
<td>0-4</td>
<td>0.2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.8*</td>
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<td>Pediatric quality of life inventory (PedsQL)</td>
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<tr>
<td>Overall score</td>
<td>82 ± 15</td>
<td>0-100</td>
<td>84 ± 8&lt;sup&gt;d&lt;/sup&gt;</td>
<td>73 ± 17</td>
</tr>
<tr>
<td>Physical functioning</td>
<td>88 ± 11</td>
<td>0-100</td>
<td>91 ± 6&lt;sup&gt;d&lt;/sup&gt;</td>
<td>73 ± 20</td>
</tr>
<tr>
<td>Emotional functioning</td>
<td>72 ± 20</td>
<td>0-100</td>
<td>76 ± 14&lt;sup&gt;d&lt;/sup&gt;</td>
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<td>Social functioning</td>
<td>90 ± 18</td>
<td>0-100</td>
<td>92 ± 13&lt;sup&gt;d&lt;/sup&gt;</td>
<td>87 ± 13</td>
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<td>School functioning</td>
<td>78 ± 18</td>
<td>0-100</td>
<td>75 ± 12&lt;sup&gt;d&lt;/sup&gt;</td>
<td>64 ± 23</td>
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</tbody>
</table>

Table 1: Survey results. SD: standard deviation. GERD: Gastroesophageal reflux disease. <sup>a</sup>Eckardt et al (Gastroenterology 1992), <sup>b</sup>Frankhuisen et al (Diseases of the Esophagus 2008), <sup>c</sup>Kleinman et al (Journal of Pediatric Gastroenterology and Nutrition 2011), <sup>d</sup>Marlais et al (Journal of Paediatrics and Child Health, 2010). *PGSQ scores for patients diagnosed with GERD

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Factors associated with early peritoneal dialysis catheter dysfunction

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Purpose: Peritoneal dialysis (PD) catheter obstruction is a common complication that often leads to the need for surgical revision and may require consideration for transition to hemodialysis. The purpose of this study was to evaluate factors associated with the occurrence of early PD catheter obstruction.

Methods: A retrospective review of all PD catheter inserted between 2005-2018 at our institution was performed. There were 185 PD catheter placements in 123 patients. Factors potentially associated with early catheter obstruction were analyzed using the Chi-square analysis. A p value <0.05 was considered statistically significant.

Results: Mean age at PD catheter insertion was 6.9 years±7.1 and 45 patients were female (36%). Early catheter obstruction (defined as obstruction occurring less than 6 months from insertion) occurred in 42 cases (22.7%). Mean time to early obstruction was 34.9±29.8 days (range 3-118 days). Although the omentum was involved in 50% of catheter obstructions, omentectomy was not associated with reduction of early obstruction (p=0.078). Previous PD catheter placement (p=0.9) or prior abdominal surgery (p=0.89) was not found to be associated with the occurrence of obstruction. However, weight greater than 10 kg (p=0.011) and age greater than 1 year (p=0.048) were found to be associated with a significantly higher incidence of obstruction.

Conclusion: Early PD catheter obstruction appears to occur more often in older patients with a higher weight. These patients may benefit from catheter insertion using a laparoscopic approach to confirm appropriate catheter placement.

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Predictors of outcomes following Kasai procedure for biliary atresia

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Purpose: The purpose of this study was to review outcomes for children with biliary atresia (BA) undergoing a Kasai portoenterostomy (KP) at a tertiary care children’s hospital.

Methods: We reviewed BA patients undergoing a KP from 2000-2013. The primary outcome was success of the KP (defined as a conjugated bilirubin <0.2 at any time within 6 months). Clinical and outcome data were analyzed using descriptive statistics, Chi-Square and Fishers Exact tests; p<0.05 was considered significant. IRB approval was obtained.

Results: Of the 69 patients, 45/69 (65%) were female. The average age at time of KP was 62 days (range 14-133). There were 25 Hispanic, 51 White, 10 Black and 7 Asian patients. 8/67 pts (12%) were OHI type-1 (patent CBD). KP was successful in 71% of all patients. Transplant-free survival was 49% at 2 yrs and 42% 5 yrs post-KP. Seven died waiting for transplantation. 7/69 (10%) of infants had a KP performed at <30 days of age; 6/7 were successful (86% vs 69% if performed <30 days of age; p=0.26). Males and females had similar rates of success (67% vs 79%; p=0.13). 8/8 (100%) of patients with OHI Type-1 vs 39/59 (66%) with other anatomic variants had a successful KP (p=0.048). Isolated BA had a higher success rate than syndromic BA (n=12; 77% vs 42%; p=0.02).

Conclusion: Non-syndromic biliary atresia and OHI Type-1 were associated with improved outcomes after Kasai procedure. Further investigations need to be undertaken to determine if age <30 days at the time of KP may be shown to contribute to improved outcome.

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Necrotizing enterocolitis: one name, various disorders

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Purpose: Necrotizing enterocolitis (NEC) is typical of prematurity, although also patients with congenital heart diseases (CHD) may develop NEC. Our aim was to describe the characteristics of NEC associated or not to CHD, to highlight differences and similarities of these entities.

Methods: Retrospective study of patients with definite/advanced NEC consecutively treated between January 2010 and April 2017. Patients were identified using the ICD-9 codes, and divided in 3 groups: patients with CHD (group 1), with medically treated patent ductus arteriosus (PDA - group 2) and with “isolated” NEC (no CHD/no PDA - group 3). The groups were compared for demographic, anatomical, and clinical variables using ANOVA or X2 test; two-tailed p<0.05 was considered statistically significant. Results are medians (IQ range) or prevalence.

Results: Patients included: 108, 56 group 1, 17 group 2, 35 group 3. Surgical NEC: 19 (34%) patients in group 1, 10 (56%) in group 2, and 20 (57%) in group 3 (p=0.0460). Median follow-up was 26 months. Table shows main findings.

Conclusion: Despite they share intestinal damage as a common feature, "isolated" NEC, that associated with a CHD, or following medical treatment of a PDA, represent distinct entities with different demographic, clinical and pathological features and long term outcome. These data may help identifying preventative measures to decrease morbidity and mortality, specific for each entity.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CHD (56 patients)</th>
<th>PDA (17 patients)</th>
<th>Isolated (35 patients)</th>
<th>Two-tailed p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational age (wks)</td>
<td>33 (27-38)</td>
<td>27 (26-29)</td>
<td>30 (26-33)</td>
<td>0.0010</td>
</tr>
<tr>
<td>Birth weight (g)</td>
<td>2.2 (1.3-2.8)</td>
<td>0.8 (0.6-1.1)</td>
<td>1.3 (0.9-1.9)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Associated syndromes</td>
<td>29%</td>
<td>12%</td>
<td>3%</td>
<td>0.0187</td>
</tr>
<tr>
<td>Breast milk</td>
<td>68%</td>
<td>36%</td>
<td>35%</td>
<td>0.0247</td>
</tr>
<tr>
<td>Colon involvement (% operated)</td>
<td>63%</td>
<td>13%</td>
<td>52%</td>
<td>0.0429</td>
</tr>
<tr>
<td>Survival</td>
<td>88%</td>
<td>77%</td>
<td>71%</td>
<td>0.3556</td>
</tr>
<tr>
<td>Short bowel</td>
<td>9%</td>
<td>12%</td>
<td>12%</td>
<td>0.8739</td>
</tr>
<tr>
<td>Neurological sequelae</td>
<td>27%</td>
<td>47%</td>
<td>23%</td>
<td>0.0978</td>
</tr>
<tr>
<td>Growth (centile)</td>
<td>25 (3-50)</td>
<td>50 (25-63)</td>
<td>50 (10-75)</td>
<td>0.0195</td>
</tr>
</tbody>
</table>
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Pediatric urologic and perineal trauma: a single institution experience

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Purpose: Urological and perineal trauma remains an understudied pattern of injury. The purpose of this study was to characterize the presentation, management and outcome of such trauma in an effort to inform practice patterns and identify areas for future research.

Methods: A single institution, retrospective chart review was completed to identify all patients who were treated for urologic or perineal injuries between 2006 and 2017 at a level 1 pediatric trauma center. Patients were identified according to ICD-9/10 codes. Demographics, mechanism, presentation, hospital course, and outcome were examined with data displayed as descriptive statistics to identify relevant trends.

Results: Forty patients were identified; 28 males and 12 females. Average age was 10 years. 67.5% of injuries were caused by blunt trauma. No cases involved sexual abuse. Injuries to the bladder and/or rectum occurred in 18 patients, while open wounds of the buttock and/or genitalia occurred in 22 patients. 70% of patients had at least one concurrent injury, the majority of which were pelvic fractures. Three patients had delayed identification of their injuries. Two-thirds of patients required operative intervention. The most common admitting service was pediatric surgery (72.5%) followed by urology (20%). Complex urologic injuries requiring long-term follow-up were noted in greater than 1/3 of patients, 3/4 of which were male.

Conclusion: Pediatric surgeons play a vital role in the diagnosis and management of urologic and perineal trauma. Further study of these complex injuries is vital to optimize outcomes and minimized long-term complications.

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A modified approach for perforated appendicitis in children

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Purpose: A 19% abscess formation rate has been reported following laparoscopic appendectomies for perforated appendicitis in children. We theorize that having a dry and bloodless peritoneal cavity, through thorough suctioning and avoiding irrigation, may reduce the rate of abscess formation.

Methods: Retrospective chart review of patients (less than 18 years old) that had a laparoscopic appendectomy for perforated appendicitis (DL-12 years/CO-5 years) using a suction-only technique without irrigation. All 4 quadrants were examined, fluid was completely removed, and hemostasis was confirmed. Perforation was defined by a visible hole or on the pathology report.

Results: One hundred thirty-two children underwent a laparoscopic appendectomy for perforated appendicitis 23 were excluded due to incomplete records, resulting in 109 (83%). Fifty-six percent were male. Average age was 9 years (range= 2-16 years) and length of stay (LOS) was 5.5 days (range= 2-16, median= 5 days). There were no conversions and drains placed. Two of the 109 (1.8%) patients developed abscesses by CT on postoperative day 7 and 14, both underwent US-guided drainage and intravenous antibiotics (LOS= 16 days, both). There were 5 readmissions within 30-days postop. Three had lysis of adhesions and two received febrile workups without an abscess on imaging. Broad-spectrum, perioperative antibiotics were given.

Conclusion: Postoperative abscess formation following laparoscopic appendectomy for perforated appendicitis increases morbidity, length of stay and cost in the pediatric population. We theorize that a dry and bloodless peritoneal cavity without irrigation, may have contributed to our lower abscess rate. A prospective, randomized trial is warranted to further study this approach.

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Outcomes of extra-corporeal, transumbilical, versus intra-corporeal laparoscopic appendectomy for acute uncomplicated appendicitis in children and adolescents: a retrospective observational cohort study

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Purpose: Three-port intra-corporeal appendectomy is widely used for the surgical treatment of acute appendicitis. A single, two or three-port extra-corporeal, transumbilical appendectomy has been proposed with the benefit of decreased operative times and improved cosmetic outcomes. There are few studies of these perceived benefits and post-operative complication between both approaches. This study assessed the 30-day peri-operative outcomes between both techniques for acute uncomplicated appendicitis in children and adolescents.

Methods: IRB approval was obtained for this retrospective cohort study of all laparoscopic appendectomies performed for acute uncomplicated appendicitis in children aged 4 to 17 between April 2014 and April 2017. Patients were grouped based on intra-corporeal (ICA) versus extra-corporeal (ECA) appendectomy. Operative time, length of stay, and complication rates were recorded.

Results: A total of 289 patients were included and of these 217 underwent ICA and 72 underwent ECA. Demographic characteristics were no different between groups. Operative time was significantly shorter in the ECA group (23 ± 10 min vs 40 ± 13 min, p=0.008). Length of stay was no different between groups (ECA 1.2 ± 0.95 days vs ICA 1.2 ± 0.78 days). Rates of superficial and deep surgical site infection, stump leak, readmissions, and reoperations were identical between groups. Median follow-up time was 31 days with 64 patients lost to follow-up (19 in ECA, 45 in ICA).

Conclusion: Extra-corporeal transumbilical laparoscopic appendectomy is associated with shorter operative times and no increased risk of 30-day post-operative complications in children and adolescents. This offers a new operative approach that may reduce hospital cost and resources.

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Utilization of a handheld telemedicine device in postoperative pediatric surgical care

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Purpose: To assess caregiver and physician satisfaction with using a handheld telemedicine (TM) device, in the postoperative care of pediatric surgical patients, within their homes and in the clinic.

Methods: The Dictum Health IDM100 tablet was used to provide HIPPA-compliant video/audio medical encounters using wireless broadband or 4G connections. We performed postoperative TM evaluations immediately prior to seeing the patients in clinic. In addition, we performed postoperative TM evaluations of patients using a device that was sent home with the caregiver, which were then compared the following day with “in person” evaluations. The caregivers and physician were surveyed about their overall satisfaction.

Results: Twelve postoperative patients (6 in-clinic and 6 in-home evaluations) that underwent a variety of general surgical operations, from gastrostomy tube placements to Nissen fundoplications. There were no changes to the plan of care following “in person” evaluations. Parental survey questions that evaluated both overall satisfaction and appropriateness of care were 3.9 ± 0.3 out of 4 (4 = very satisfied). Eleven of 12 parents responded that they would be comfortable with a TM-only post-operative evaluation in the future. The physician was able to easily obtain an appropriate assessment and plan of care using the device and comments were routinely very positive.

Conclusion: These preliminary data demonstrate high caregiver and physician satisfaction with utilizing this handheld TM device in evaluating postoperative pediatric surgical patients. Ongoing assessments will determine if these purported benefits are also seen with early “in home” postoperative visits and in the preoperative setting.

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Practice variation in the integration of advanced providers in pediatric surgery in North America

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Purpose: The shortage of physicians, resident work hour limitations and the positive impact of advanced providers on quality and efficiency have led to the integration of advanced providers in healthcare. The purpose of this survey is to evaluate the current pediatric surgical practices in North America with regard to variation in advanced provider coverage and function.

Methods: An online survey, approved by the APSA Outcomes and Evidence-Based Practice Committee, was distributed to all full APSA members (N=1189). The survey assessed practice characteristics of the responding surgeon, the presence of advanced providers and their impact on care. Results were assessed using descriptive statistics.

Results: A total of 266 pediatric surgeons completed the survey with 47.6% employed at free standing children's hospitals and 41.1% employed at a children's hospital within an adult hospital. Nearly all respondents (N=244, 91.7%) reported the presence of advanced providers in their practice, with NPs (N=216) and PAs (N=101) most commonly represented. Surgeons reported that advanced providers had a positive impact on clinical practice (96%) and patient satisfaction (95%). Free-standing children's hospitals were most likely to employ NPs (P<0.001); no differences were observed for PAs. NPs were more fully integrated in academic settings (85%) relative to private practice (76.5%) and hospital groups (76.4%). Despite minor region to region variation, no significant differences were observed across the U.S. and Canada (P=0.55).

Conclusion: Pediatric surgical practices of all types and regions are broadly utilizing advanced providers, who represent part of the solution to delivering quality care in current delivery systems.

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Impact of practice change on perforation risk for pediatric gastrojejunostomy tube placement

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Purpose: This study assessed the impact of an institutional practice change recommending a new, softer tip gastrojejunostomy tube (GJT) for children less than 10 kg on intestinal perforation risk.

Methods: We performed a single-center review of GJT placements among children <10 kg before (1/1/2010–12/31/2013) and after (7/1/2014–12/31/2016) the practice change. We collected intestinal perforation, nasojejunal tube (NJT) >30 days, and GJT replacement <60 days. Statistical analysis was performed with t-tests and ?2 analyses as appropriate (Stata 14).

Results: After the practice change, 60 GJT were placed (35 children, 54.3% male) compared to 147 GJT placed (77 children, 44.2% male; p=0.32) before. Average age was 17.2±9.0 months (before: 14.1±11.8 months; p=0.08) and weight 8.3±1.8 kg (before: 7.0±2.2 kg; p<0.001). A soft tip GJT was used in 19 placements (31.7%) after the practice change. There were 0 intestinal perforations (0%) versus 6 before (4.1%; p=0.11). NJT remained >30 days in 4 patients (19.0%) after the practice change (before: 7 (18.4%); p=0.96). After the practice change, replacement within 60 days was required for 18.4% with soft tip GJT and 52.6% with standard GJT (p=0.16).

Conclusion: Recommendation of a soft tip gastrojejunostomy tube for children less than 10kg reduced intestinal perforation among this high-risk cohort, despite moderate adherence. This was not explained by maintaining nasojejunal tubes for longer periods of time.
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The needs of a pediatric surgical safety checklist: a mixed methods review of barriers, facilitators and attitudes towards the checklist in a pediatric setting by clinicians, administrators and parents

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Purpose: Use of the Surgical Safety Checklist (SSC) is required for accreditation in Canadian pediatric surgical centers. Context-sensitive SSC modifications, strong implementation and stakeholder involvement are crucial to achieving clinician buy-in and improved patient outcomes. There is currently no standard pediatric SSC. Our mixed methods study explores barriers, facilitators and attitudes to SSC use, as well as unmet needs in a high-volume pediatric surgical center.

Methods: Survey and interview tools were developed, piloted and refined. OR nurses, anesthesiologists, surgeons, parents and administrators at Alberta Children’s Hospital were surveyed and interviewed. We collected information on barriers, facilitators and attitudes as well as unmet needs and suggestions to make the checklist more effective.

Results: 71 parent and 39 clinician surveys were obtained. 15 clinicians, 8 parents and 6 administrators were interviewed. Clinicians feel that the SSC improves patient safety (37/39) and team communication (37/39) but some (7/39) feel the SSC negatively impacts efficiency. Respondents indicate that debriefing is rarely completed (20/39). Thematic analysis revealed a shared belief that the SSC is important but incomplete knowledge and little involvement by administrators. Nurse-led audits are inaccurate due to expectations of compliance and work required to document non-compliance. Modification of the SSC for children and shorter cases is recommended. Team-training for implementation is supported. Both clinicians and parents indicate the importance of parental involvement in the SSC.

Conclusion: Pediatric SSCs are valued by users. The SSC may work more effectively through pediatric-specific modifications, improved efficiency and greater parental involvement. Improved implementation may be achieved through team-training and reliable feedback.

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Optimizing post-operative follow-up in pediatric surgery (OFIPS)

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Purpose: To determine variables associated with post-operative clinic follow-up in pediatric surgical patients and estimate clinical value versus patient and family costs.

Methods: Retrospective cohort study; patients followed-up after common pediatric general surgery procedures between July 1, 2016 and June 30, 2017. Patients were identified using the Operating Room Information System. Review of electronic charts provided demographics, operative note, discharge summary, pre-follow-up urgent care visits and clinic visits. Rates, patterns of and variables associated with follow-up were determined. Identification of any postoperative issue or intervention performed in clinic was a proxy measure of clinical value of the visit. Driving distance to hospital was a proxy measure of cost to the family.

Results: Six-hundred-ninety-three patients underwent ≥1 of 10 procedures. Sixty-one percent attended a follow-up visit ranging from 43% (circumcisions) and 61% (epigastric/umbilical hernias) to 88% (perforated appendicitis). Variables associated with follow-up included surgeon (p<0.001), driving distance to hospital <35km (p=0.0002) and having a definite post-operative order for follow-up (p=0.003). Patient age, known postoperative complications and early postoperative urgent care visits were not. Postoperative clinical value varied by procedure type: 11% for infant hernias, 7% for orchidopexies and ≤5% for all others. Most common intervention (58%) was arranging another follow-up. Average driving distance of those who attended follow-up was 34km. Ten percent drove >65km and 5% drove >118km.

Conclusion: Follow-up of common pediatric surgical procedure may have limited clinical value while coming at significant costs to families including time off school and work. Further research is needed to define optimal needs and means of follow-up.

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The burden of pediatric surgical disease at a remote referral hospital in southeastern Liberia

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Purpose: Liberia has just 11 surgeons serving a population of 4.7 million. Pediatric surgery is performed by general surgeons and visiting pediatric surgeons on short-term missions. The purpose of this study was to describe the burden of pediatric surgical disease at a remote referral hospital supported by Partners in Health.

Methods: We examined the case log of a Canadian general surgeon over a 6-month period between September 2017 and March 2018. Descriptive statistics were used to characterize patient demographics, diagnoses, procedures, and two-week outcomes for all patients <19 years old. Referral data were examined to identify cases transferred to tertiary facilities.

Results: 68 cases were performed on 36 patients, comprising 31.9% of the non-obstetric surgical volume. The mean age was 7.1 years and 3 patients were neonates <7 days. 69.4% of patients were male. 83.8% of cases were emergencies. 38.2% of cases were classified as pediatric general surgery, 35.3% burns and plastics, 14.7% orthopedics, 8.8% ENT, and 2.9% neurosurgery. Three operative patients were subsequently transferred to tertiary facilities, and an additional 10 children were transferred without surgical intervention. One patient (1.5%) developed a SSI. Three newborns, one with gastroschisis and two with imperforate anus, died.

Conclusion: There is a significant but undefined burden of pediatric surgical disease in Liberia. Until pediatric surgeons and physician anesthetists can be trained, general surgeons and nurse anesthetists will be required to perform pediatric surgery. Data gleaned from case logs can guide training to prepare surgeons and anesthetists for the breadth and volume of pediatric surgery encountered in practice.

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Laparoscopic pyloromyotomy technique variation in a low resource pediatric tertiary hospital post Hurricane Maria

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Purpose: Most pediatric centers have progressed to perform laparoscopic pyloromyotomies (LP) on their patients claiming they require less pain medication and have fewer episodes of emesis without any difference in length-of-stay or time to full-feeds. We present a modified approach to this procedure after most of our 3mm-instruments were decommissioned during the aftermath of Hurricane Maria. This study has been evaluated by our institutional review board (IRB).

Methods: The standard way to perform a LP was modified in the absence of a 3mm laparoscopic pyloromyotome, spreader and grasper. It was decided that an angled Debakey fine vascular clamp could be introduced percutaneously to stabilize the pylorus while a handheld cautery with an extension tip is used to score the pylorus and bluntly break some of the superficial hypertrophied muscularis fibers. A salvaged 3mm flat bowel-gasper or ENT peanut-grasper was used to extend the myotomy until the submucosa is seen, culminating the procedure.

Results: Six patients were evaluated at our ED in the first months after the direct hit from a category-5 Hurricane Maria. The patients had a pyloromyotomy performed with a modified technique tailored to our current environment. There were no complications, mean length-of-stay was 38hrs, mean time to full-feeds was 20 hrs, mean operative-time was 25 minutes.

Conclusion: A vascular clamp and cautery tip extension can be used as alternatives to the standard, expensive 3mm instruments. The procedure can be performed in a timely fashion with a length of stay and time to full-feeds comparable to both the standard laparoscopic and open procedures.

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Resident led initiative to improve surgery clerkship orientation

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Purpose: The transition from preclinical studies to clinical clerkship represent a stressful times during medical school, with studies reporting severe distress in up to 50% of students. A proper orientation is integral to reducing these tensions by outlining expectations and dispelling misconceptions. Well-oriented clerks demonstrate increased clinical responsibilities and are more prepared to learn. Residents are important role models and mentors who can mitigate these stressors. Our objective is to create a surgery clerkship orientation model incorporating resident input to facilitate ease of transition into clerkship.

Methods: A General Surgery orientation document for clerks was developed by the General Surgery residents in 2012. This document describes clerkship expectations for various clinical activities (ward, clinic, and OR). This document is accompanied by a resident-led presentation at the start of each rotation to highlight key points and to answer questions. Clerks are also provided access to an interactive calendar containing their assigned clinical activities, which allows a more balanced rotation and provides them with adequate time to prepare for clinical activities.

Results: Since the inception of this program, 100% of surgery clerkship orientation sessions have been attended by a resident. The orientation document has been expanded and formalized into a handbook titled “How to Succeed during Your Surgery Clerkship” with examples of various clinical documentations, including discharge summaries, consult notes, and progress notes. Separate orientation handbooks have been developed for each of our surgical subspecialties and regional rotations.

Conclusion: We have developed a resident-led, adaptable, and sustainable model for clerkship orientation that supports medical students through their first clinical encounters on a surgery rotation.

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Negative appendicectomy rates and cost implications with increased use of abdominal imaging in children with appendicitis

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Purpose: While traditionally taught to be based on clinical criteria, diagnosing appendicitis now relies heavily on imaging. We evaluate the impact of abdominal imaging utilization on negative appendicectomy rates in children with suspected appendicitis, and cost implications.

Methods: This is an ethically approved single institution retrospective study analyzing data collected via electronic medical records from 2013-2017. Cases of operated appendicitis were identified from operative logs. We did not include non-operated cases. Patient records were reviewed on whether ultrasound and/or computed tomography (CT) was performed. ‘True appendicitis’ was defined as histologically proven appendicitis. Cost of imaging modality was taken as private rate cost charged to patient: approximately 146 American dollars (USD) per abdominal ultrasound and USD703 per CT abdomen. Year on year trends were evaluated.

Results: A total of 826 children were included, with median age 10.98 years (range 2.33-16.52), 514(62.22%) male. There was an increasing trend in proportion of children with appendicectomy undergoing ultrasound and CT (Table). When analysed according to cost per true appendicitis diagnosed, this exceeded the cost per ultrasound in 2017. Overall, negative appendicectomy rates were stable.

Conclusion: Increased utilization of abdominal imaging did not lower negative appendicectomy rates but was associated with higher costs per true appendicitis. Surgeons and patients must be aware of the limitations of radiological investigations.
<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
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</thead>
<tbody>
<tr>
<td>Number of operated appendicitis (N)</td>
<td>232</td>
<td>229</td>
<td>214</td>
<td>200</td>
<td>183</td>
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<tr>
<td>Number of operated patients who had ultrasound, N (%)</td>
<td>174 (75.0)</td>
<td>182 (79.5)</td>
<td>173 (80.8)</td>
<td>183 (91.5)</td>
<td>172 (93.4)</td>
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<tr>
<td>Cost of ultrasound per true appendicitis diagnosed (USD146/scan)</td>
<td>111.76</td>
<td>123.42</td>
<td>127.39</td>
<td>145.80</td>
<td>147.52</td>
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<tr>
<td>Number of operated patients who had CT</td>
<td>8 (3.4)</td>
<td>7 (3.1)</td>
<td>4 (1.9)</td>
<td>17 (8.5)</td>
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<tr>
<td>Cost of CT per true appendicitis diagnosed (USD703/scan)</td>
<td>24.75</td>
<td>22.86</td>
<td>14.20</td>
<td>65.24</td>
<td>78.49</td>
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</tbody>
</table>

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The utility of intestinal fatty acid binding protein in guiding surgical decision making in infants with necrotising enterocolitis

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Purpose: To investigate the utility of urinary intestinal fatty acid binding protein (i-FABP) in guiding surgical decision making infants with necrotising enterocolitis (NEC).

Methods: Ethically approved (12/LO/1898), multicentre prospective study of infants with clinical/radiological diagnosis of NEC. Urine samples were collected pre-operatively in infants who underwent laparotomy or daily in infants treated non-operatively and assayed for urinary i-FABP (ELISA) and creatinine (Cr) concentration. Data (pg i-FABP/nmol Cr) are median (IQR). Between-group comparisons were made using Mann Whitney test, and ROC analysis.

Results: Twenty-nine infants were included; 17 treated surgically and 12 successfully managed non-operatively. i-FABP/Cr in groups treated surgically and non-operatively was similar (53 [12-98] vs 20 [6-51]; Figure A). In infants treated surgically, i-FABP/Cr was significantly higher in those found to have intestinal ischaemia/necrosis than those without (80 [38-474] vs 12 [6-92]; p=0.04; Figure B). In ROC analysis of cases without pneumoperitoneum, i-FABP/Cr was significantly associated with intestinal ischaemia/necrosis or perforation (AUC 0.87; p=0.004). An i-FABP/Cr threshold of 77pg/nmol detected with ischaemia/necrosis or perforation with a likelihood ratio of 12 and a specificity of 94% but a sensitivity of just 75%.

Conclusion: Raised urinary i-FABP is associated with advanced NEC (those with ischaemia/necrosis at surgery). A low sensitivity currently precludes it use in surgical decision making unless combined with other markers.
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Long-term outcomes of ultra-short bowel syndrome due to malrotation with midgut volvulus managed at an interdisciplinary pediatric intestinal rehabilitation center

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Purpose: To describe long-term outcomes of pediatric-onset ultra-short bowel syndrome due to midgut volvulus managed at an interdisciplinary intestinal rehabilitation center.

Methods: After IRB approval, patients with a history of malrotation and pediatric-onset midgut volvulus causing extensive bowel loss (<20% residual small bowel length expected for post-conception age) and treated between 2010-2017 were reviewed. Data are expressed as median (IQR).

Results: Twenty-three patients were identified, who had midgut volvulus at age 1 (0-21) day leading to 9 (8-12) percent predicted residual bowel length. Eight (35%) had gastroschisis. Follow-up was 8.5 (6.6-12.2) years from volvulus. Eighteen (78%) patients remained transplant-free, 7 of whom achieved enteral autonomy after 718 (682-1030) days of parenteral nutrition (Figure). Five (22%) patients underwent intestinal/multivisceral transplantation and all achieved enteral autonomy. Transplant-free enteral autonomy was achieved by 0/6 patients with gastroschisis, compared to 7/12 without gastroschisis (p=0.04). For the overall group, 18 (78%) patients had small bowel bacterial overgrowth and 7 manifested symptomatic D-lactic acidosis. We observed 2 mortalities, one awaiting transplant and one 4 years following transplantation.

Conclusion: Midgut volvulus due to malrotation with extensive bowel loss is associated with favorable long-term survival. Weaning from parenteral nutrition may be feasible even without transplantation, particularly in the absence of gastroschisis. These data help inform prognostic discussions with families and provide benchmarks for quality improvement.
Figure. Kaplan-Meier curve with 95% confidence interval illustrating achievement of enteral autonomy over time without transplantation (n=18).

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Duration of intestinal damage after experimental necrotizing enterocolitis

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Purpose: Necrotizing enterocolitis (NEC) remains the most severe intestinal disease in premature infants. However, there is no established experimental model to investigate the recovery of the intestine from NEC. We aimed to evaluate the duration of intestinal damage after NEC induction.

Methods: Following ethical approval, NEC was induced in mice by giving hypoxia, gavage formula feeding and lipopolysaccharide from postnatal day 5 (P5) to P9. Controls pups were breastfed and kept with their mother. After NEC induction, NEC pups were returned to their mother and received breast feeding. On postnatal day 14 and 21, pups were sacrificed and the ileum was evaluated for mucosal injury (HE stain) and inflammation (IL6 and TNF? mRNA by qPCR). Comparison was made between NEC and controls.

Results: On P14, mucosal injury and inflammatory cytokine expression were significantly higher in NEC compared to controls, suggesting that the intestinal damage was remaining (Figure A-C). On P21, there was no significant difference in mucosal injury score and inflammatory cytokines expression (Figure D-F).

Conclusion: Mucosal injury and inflammation continues for one week after NEC induction in spite of resuming normal breast feeding. The intestinal injury subsides after a further week of breast feeding. This study elucidates the healing process after NEC and provides the scientific platform to study the long term effects of novel treatment strategies.
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MicroRNAs in the pathophysiology of necrotizing enterocolitis and remote ischemic conditioning

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Purpose: Necrotizing enterocolitis (NEC) is an acute inflammatory intestinal disorder. Remote ischemic conditioning (RIC) is a therapeutic strategy for protecting distant organs against ischemic damage. RIC of the limb improves intestinal injury and inflammation during experimental NEC. However, the mechanism of action is unknown. MicroRNAs (miRNAs) are biomarkers that are variably regulated by ischemia. We aimed to investigate the expression of miRNA-21 in the ileum during experimental NEC and following conditioning with RIC.

Methods: NEC was induced by gavage feeding of hyperosmolar formula, hypoxia, and lipopolysaccharide between postnatal day 5 and 9 (AUP32238). RIC was applied via a tourniquet to the leg, through 4 cycles of occlusion (5 min) and reperfusion (5 min). Total RNA was extracted and MicroRNA assay was performed for expression of miRNA-21 in ileum of breastfed control, NEC, NEC+RIC and RIC alone pups. Data was reported as mean ± SD and groups were compared using one-way Anova.

Results: The expression of miRNA-21 was significantly elevated following induction of NEC. Administration of RIC caused a significant decrease in expression of miRNA-21 in both the NEC+RIC and RIC groups (Figure 1).

Conclusion: We conclude that miRNA-21 can serve as a potential biomarker for necrotizing enterocolitis and it is involved in the protective mechanism of remote ischemic conditioning.
Figure 1

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* P < 0.05
Outcome of children post serial transverse enteroplasty in the current era of intestinal failure management

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Purpose: The serial transverse enteroplasty (STEP) tapers and lengthens the gut to improve adaptation. Mortality has decreased with multidisciplinary intestinal rehabilitation programs (IRP) allowing more time to reach adaptive potential. We reviewed our STEP experience to compare surgical outcomes between early and late eras of our IRP.

Methods: Retrospective cohort study of all STEP patients managed by our IRP between Jan 2003-Dec 2016 (era 1 2003-2005, era 2 2006-2016). Data was collected retrospectively on patient demographics, operative data, complications, and outcomes. We performed univariate analysis between eras with nonparametric and Kaplan-Meier statistics. IRB approval was obtained.

Results: 36 patients received STEP (Era 1=12; Era 2=24) [median age 5mo; males 22/36 (61.1%)]. A higher proportion of patients in Era 2 had Gastrochisis (8.3% vs 58.3%); p=0.004). Patients in the later era had a shorter pre-STEP small bowel remnant (48 vs 111cm, p=0.001). The median increase in bowel length post STEP was 52.9%. Overall, 42% of patients reached enteral autonomy (Era 1 7/12 (58%) vs Era 2 8/24 (33%); p=0.15). Median time to PN discontinuation was shorter in Era 1 (259 vs 968 days, p=.208). Staple line complications were higher in Era 1 (16.7% vs 0%; p=0.040).

Conclusion: Presently, STEP is reserved for patients with extreme intestinal anatomy allowing 42% to wean off PN. STEP does have a role in autologous reconstruction, but it is only one tool to allow patients to reach their adaptive potential. It should be used under the umbrella of a multidisciplinary IRP.

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Factors influencing the incidence of Hirschsprung's associated enterocolitis

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Purpose: The aim of the study is to characterize risk factors for Hirschsprung’s associated enterocolitis (HAEC), and more specifically the association between timing of surgery and postoperative HAEC rates. We hypothesize that earlier pull-through surgery is associated with lower risks of developing postoperative HAEC.

Methods: Comparative study in 171 Hirschsprung patients treated from 1990 to 2016 in a tertiary center. Patients without HAEC were compared to patients with preoperative HAEC and those with postoperative HAEC. Results are presented as median[IQR] or frequency(%). Chi2 test and Wilcoxon rank sum test were performed with a significance level at p<0.05.

Results: Amongst the 171 patients identified, 25(15%) were diagnosed with preoperative HAEC and 33(19%) with postoperative HAEC. Age at first surgery was 7[3.20] weeks. Weight at birth and first surgery was 3.4[3.1,3.8]kg and 5.2[3.9,6.6]kg, respectively. Risk of developing preoperative HAEC was significantly associated with overall malformations (23% vs 11%, p=0.03). No association was found with syndromic forms. Birth weight was lower in patients with preoperative HAEC compared to those without HAEC (3.2[2.6-3.7] vs 3.4[3.2-3.8] kg, p=0.06). Intestinal obstruction after surgery significantly increased the risk of postoperative HAEC(p<0.001). Age and weight at first surgery were not associated with postoperative HAEC(p>0.05). Patients with preoperative HAEC had a 1.4 fold risk of developing HAEC post-surgery (OR 1.4 [95%CI 0.41,4.0].

Conclusion: Timing of surgery is not associated with the risk of developing pre- and postoperative HAEC. Predisposing factors for preoperative HAEC included associated malformations and low birth weight, whereas intestinal obstruction was the only risk factor found for postoperative HAEC.

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Bowel preparation for colostomy reversal in children

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Purpose: Pediatric mechanical bowel preparation (MBP) protocols vary with no identified standard of practice. The aim of this study is to determine practices at our institution to evaluate the impact of MBP on postoperative outcomes and hospital length of stay (LOS) in children.

Methods: This was a retrospective review of children ≥18 years old undergoing colostomy reversal at an academic children’s hospital between 12/2013-8/2017. Preoperative bowel regimens MBPs and outcomes were collected and analyzed using descriptive statistics, Wilcoxon Rank-Sum and Fishers Exact tests; 0.05 is considered significant. IRB approval was obtained. Continuous variables are presented as median [IQR].

Results: 61 children underwent colostomy reversal. 38 [62%] did not receive a preoperative MBP. Of the 23 [38%] who received a MBP, 19 [83%] were admitted one day prior to surgery, and 3 [13%] 2 days prior to surgery. 1 [4%] received a MBP at home and was excluded from analysis. The two groups (MPB vs. no MBP) were similar in age, gender and race. Three patients undergoing a MBP [13%] required additional doses due to an inadequate MBP. Time from admission to surgery (19 hours [17, 23] vs 3 [2, 3]; p=0.01) and LOS (6 days [5, 8] vs 5 [4, 6]; p=0.02), were both longer in the MBP group. However, complications (3 [13%] vs 5 [22%]; p=0.12) and readmissions (3 [14%] vs 6 [15%]; p=0.64) were similar.

Conclusion: There is substantial variation in the administration of pre-operative MBP in children undergoing colostomy reversals. Forgoing a MBP prior to colostomy closure decreases LOS without increasing the risk of post-operative complications.

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Sclerotherapy in the treatment of rectal prolapse in children: a systematic review

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Purpose: While rectal prolapse in children is often treated conservatively, resistant cases frequently proceed to intervention. Sclerotherapy is a commonly utilized option in this regard. This study systematically evaluates the effectiveness and complications of various sclerosing agents in treating pediatric rectal prolapse.

Methods: After protocol registration (CRD-42018088980), multiple databases were searched. Studies describing injection sclerotherapy in the treatment of pediatric rectal prolapse were included, with inclusion/exclusion and data abstraction duplicated. The methodological quality of included papers was assessed using the Methodological Index for Non-Randomized Studies (MINORS) score.

Results: 18 studies were identified, published between 1970 and 2010. 2 were North American. Most studies were single institution case series, with an average “N” of 54 and mean MINORS score of 0.63 (perfect score = 1). 964 patients of median age 3.9 years were accounted for: 38.7% female, most without comorbidities, and mean follow up length was 23.4 months. The most common sclerosing agent described was phenol in oil (56%), followed by hypertonic saline (22%). The mean number of treatments per patient was 1.1 (SD: 0.34). The overall reported success rate after a single sclerotherapy treatment was 83.4%. The overall complication rate was 25.7%, with no major complications recorded.

Conclusion: Injection sclerotherapy appears effective and low-risk in the treatment of pediatric rectal prolapse and should be considered before more invasive surgical options. The available evidence is of relatively poor quality; prospective comparative investigations are warranted.

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Is interval appendectomy necessary following initial non-surgical management of perforated appendicitis? a systematic review

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Purpose: Appendicitis is the most common pediatric surgical diagnosis. Approximately 30% of patients present with perforation and many surgeons initiate non-operative management (antibiotics and percutaneous drainage) in these cases; the need for interval appendectomy remains controversial. We reviewed the literature to determine complication rates associated with interval appendectomy, and recurrence rates without interval appendectomy, in pediatric patients.

Methods: Institutional Review Board approval was not required. We searched Medline, Embase and Cinahl; inclusion criteria comprised pediatric patients, with perforated appendicitis with abscess or mass, in whom non-operative management was used with or without subsequent interval appendectomy. Randomized trials, cohort studies and case-control studies were included. Cochrane ‘Risk of bias’ and MINORS tools were used to assess methodological quality. Due to differences in outcomes being assessed between treatment arms, meta-analysis was not feasible.

Results: 242 non-duplicate citations were screened, 89 full text articles were reviewed, and 12 articles comprising 1989 children were included in our analysis: 1 RCT, 4 cohort studies, 6 non-comparative cohort studies, and 1 case control study. 370 (19%) children underwent interval appendectomy while 1619 (81%) did not. In patients without interval appendectomy, 184 children (11.4%) had recurrent appendicitis (rates ranged among studies from 0-50%) and a total of 2 carcinoid tumors were detected (0.1%). Of children who had an interval appendectomy, 16 (4.3%) had a post-operative complication.

Conclusion: When offering interval appendectomy following successful non-operative management of perforated appendicitis in children, a recurrence rate of approximately 11% can be provided to families to facilitate an informed treatment decision.

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Preference for non-operative treatment or surgery for acute appendicitis amongst parents

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Purpose: There is increasing interest in non-operative treatment of children with acute uncomplicated appendicitis. We aimed to determine parental opinions regarding treatment preferences for non-operative treatment or surgery.

Methods: Parents attending children’s outpatients’ department over a 2 month period in 2017 were invited to complete a questionnaire that assessed their experience of appendicitis and preference for non-operative treatment (with antibiotics) or appendectomy. Short explanatory education sections were included to put the questions into context. Parental factors associated with treatment preference were explored.

Results: A total of 396 questionnaires were completed. There was high parental interest in non-operative treatment with 81% answering that they would “definitely” or “probably” consider it as treatment for their child whereas only 43% stated they would “definitely” or “probably” consider surgery. A preference in favor of non-operative treatment existed in 60% of respondents (223/375), in favor of surgery in 21%, and 19% no preference. No significant associations (p>0.05) were identified between age, gender or social mobility status of respondent, or previous experience (knowing someone) with appendicitis, and treatment preference. However, there was a significant (p=0.004) association between highest educational attainment and treatment preference such that a greater level of education was associated with a preference for non-operative treatment.

Conclusion: Most parents would consider non-operative treatment of acute appendicitis but would also not dismiss surgery as a treatment. A preference for non-operative treatment over surgery existed in over half of parents. Understanding treatment preference may assist in explaining treatments to parents in clinical practice and future research.

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