

THE SPIR 12TH INTERNATIONAL MEETING

October 21 - 23, 2024 Toronto, Canada

at the Peter Gilgan Centre for Research and Learning at The Hospital for Sick Children



Presented in
partnership with
The Hospital
for Sick Children



Society for Pediatric
Interventional Radiology



Society for Pediatric Interventional Radiology

Dear Friends and Colleagues,

Welcome to the 12th International Meeting of the SPIR! We are thrilled to welcome each and every one of you back to Toronto.

Our Society for Pediatric Interventional Radiology was born here in Toronto several years ago during PIRS (biannual Pediatric IR Symposiums), where live cases happened and 30 to 40 pioneers in the field met to share their common challenges in general pediatric IR – *“which material to use for a PICC line in a premature baby? How to control the child’s temperature? How to reduce radiation exposure?...”* We have come a long way, and now our Society has more than 300 members and our Annual Meetings are a guaranteed success with Scientific and Educational Sessions, as well as sessions dedicated to subspecialized IR topics.

The 2023 Annual Meeting in Orlando was a tremendous achievement, “Illuminated” by great talks in wellness, practice management, and the holistic care of children in pediatric IR.

Our 2024 theme is **“Back to the Roots, Looking into the Future”**. It is an opportunity to honor our past but, most importantly, not stagnate and look forward to the future. We will learn from experts about Artificial Intelligence and Robotics, how fast these areas are developing and how they are being integrated into the IR practice. In addition, we will have sessions dedicated to the latest procedures in multiple organ systems such as Liver, Chest, Neuro, Kidneys, GI tract and Bone/Soft tissues. We will also focus on specific problems that may involve multiple organ systems such as Oncology, Vascular Anomalies, Lymphatic, and Venous Interventions. By popular demand, we will have two entire sessions devoted to M&Ms. Yes, we will have cases... but this time, the emphasis will be on how to cope with these challenging situations and how to start a Peer support group. Clinical insights from other specialties, how Pediatric IR is practiced all over the World and the current Research in Pediatric IR will be highlighted in separate modules. Our Scientific Sessions and Educational Posters will showcase new boundaries that our colleagues are pushing to advance Pediatric IR. Finally, we will have a session with words of wisdom from some of our colleagues with greater experience, and a new session called “Extreme IR” where presenters will share and “show off” some of their exceptional cases and solutions.

This year, I am very proud that we will be offering for the first time a Satellite Symposium for Nurse Practitioners, Physician Assistants, Nurses and Medical Radiation Technologists, our invaluable colleagues and partners that help us deliver the best care to our patients. They will have the chance to network and discuss some of their challenges and accomplishments in a separate and dedicated forum.

Finally, I am very grateful for all your support to SPIR this year. Thank you to the Board of Directors, Scientific Committee, Invited Faculty, Moderators, all who submitted their Scientific or Educational work, Presenters, Administrative Team and Industry partners for their contributions to this Annual Meeting. And a special thank you to Susan Harned, our Executive Director, for all her dedication and help.

Enjoy the 12th International Meeting of the SPIR and enjoy Toronto!!!

Joao Amaral

SPIR President, on behalf of the entire Board of Directors

Society for Pediatric Interventional Radiology
12h International Meeting
October 21 - 23, 2024
Toronto, Canada

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All attempts have been made to ensure information contained in this program is current. There may be substitutions/additions that occurred after this program was sent to print.



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*Thank you to **The Hospital for Sick Children** for
partnering with the SPIR in presenting the
SPIR 12th International Meeting*



The Hospital for Sick Children (SickKids), affiliated with the University of Toronto, is Canada's most research-intensive hospital and the largest centre dedicated to improving children's health in the country.

With passionate and dedicated staff, SickKids is much more than a hospital. We work each day to provide the best in child and family-centred care, create ground-breaking clinical and scientific advancements, and train the next generation of experts in child health.

SickKids operates on the traditional land of the Huron-Wendat and Petun First Nations, the Seneca, and most recently, the Mississaugas of the Credit River. We are committed to working toward new relationships that include First Nations, Inuit, and Métis peoples, and are grateful for the opportunity to share this land in caring for children and their families.

SickKids is committed to being a safe space for all of our patients and families, staff, learners and volunteers, where everyone can feel seen, heard and valued as part of our equity, diversity and inclusion efforts.

SickKids is a founding member of Kids Health Alliance, a network of partners committed to advancing excellence and expertise in the delivery of paediatric care in Ontario.

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Monday October 21, 2024

07:00 - 08:00 **Registration Check-In**

07:00 - 08:00 **Continental Breakfast** (Exhibitor Hall)

07:50 - 08:05 **Welcome & Announcements** (Joao Amaral & Birgit Ertl-Wagner)

08:05 - 09:00 **Liver - Biliary Module**

Moderators: Murthy Chennapragada, Elena Violari

Internal-external biliary drainage in children (Lisa Kang)

External biliary drainage in children - The Paris Protocol (Stephanie Franchi-Abella)

Biliary Stents in children: When, which and how? (Paolo Marra)

Surgical redo biliary anastomosis when percutaneous interventions fail (Blayne Sayed)

09:00 - 09:05 **Platinum Vendor Video Spotlight**

09:05 - 10:00 **Chest Module**

Moderators: Samantha Chippington, Amir Pezeshkmehr

Pulmonary AVMs - Plugs or coils? (Manish Patel)

Mediastinal biopsies (Sheryl Tulin-Silver)

Airway Interventions in Children (Ashley Robinson)

Intercostal nerve ablation (Shankar Rajeswaran)

10:00 - 10:20 **Networking Break** (Exhibitor Hall)

10:20 - 11:20 **Scientific Session 1**

Moderators: Shellie Joseph, Vaz Zavaletta

Abstracts begin on page 28

11:20 - 12:00 **Extreme IR**

Moderators: Rush Chewning, David Rea

Abstracts begin on page 46

12:00 -13:00 **Lunch & Learn featuring Seimens-Healthineers** (Auditorium)

Boxed lunches will be provided

13:00 - 13:55 **Robotics/ Augmented Reality in IR**

Moderators: Jared Green, John Racadio

CT guide biopsies with a patient-mounted robot (Agnieszka Witkowska)

Real-time fused Holographic visualization extended reality surgical navigation (Charles Martin III)

Robotics in angiography (Vitor Pereira)

Robotics in Pediatric Interventional Radiology: Review of current and future applications (Joao Amaral on behalf of Ganesh Krishnamurthy)

13:55 - 14:00 **Platinum Vendor Video Spotlight**

14:00 - 15:15 **Neuro Module**

Moderators: Manraj Heran, Prakash Muthusami

Indications and Technique of Cerebral Angiography (Amanda Baker)

Extracranial Embolizations and Dangerous Anastomoses (Karen Chen)

The spectrum of brain vascular malformations: Do not Treat vs Treatable lesions (Todd Abruzzo)

Endovascular Treatment of Neurovascular Trauma (Prakash Muthusami)

Pediatric Arterial Ischemic Stroke and EVT (Manraj Heran)

Spine Interventions in Children (Neil Johnson)



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Booth #4



Monday October 21, 2024

15:15 -15:30 **Networking Break** (Exhibitor Hall)

15:30 -16:10 **Gastrointestinal Module**

Moderators: George Chiramel, Sheena Pimpalwar
Esophageal Interventions in Children (George Chiramel)
Post piloric occlusion for G tube insertion (Rachelle Durand)
GJ tube Intussusception: When to reinsert the tube? (Michael Acord)

16:10 - 17:30 **Global Practice in Pediatric IR**

Moderators: Anilawan Fleury, Sarah Khoncarly
PIR in USA (Kamlesh Kukreja)
PIR in Singapore (Luke Toh)
PIR in Australia (Murthy Chennapragada)
PIR in Europe (Stephanie Franchi-Abella)
PIR in Canada (John Donnellan)
PIR in Saudi Arabia (Youssef Abdul-Aziz Alghamdi)
PIR in Brazil (Airtton Moreira)
SPIR Global Outreach (Anilawan Fleury)

18:00 - 20:00 **Welcome Reception**

Rooftop Café, The Hospital for Sick Children,
22nd Floor, Patient Support Center
All attendees and guests are welcome to join us.

Monday October 21, 2024

Satellite Symposium for Nurse Practitioners, Physician Assistants, Nurses, and Medical Radiation Technologists (Event Room 2A/2B)

08:00 - 09:00 **Nurse Practitioner/ Physician Assistant Module**

Moderators: Dalia Bozic, Jessica Ho
Role of Nurse Practitioners in IR at Sick Kids and the Impact in Patient Care (Jessica Ho, Dalia Bozic, Laura Willis)
Role of Nurse Practitioners in the G tube program (Silvana Oppedisano, Samantha Ciccirella, Rita Wong)

09:00 -10:00 **Nursing Module**

Unique Nursing Roles in Interventional Radiology (Michelle Cote & Darlene Murray)

10:00 - 10:20 **Networking Break (Exhibitor Hall)**

10:20 - 11:20 **Medical Radiation Technologists Module**

Moderators: Evan Kitamura, Vanessa Rea
Experience with Hysteroscopy (Courtney George & Shantiel Kennedy)
Y-90 - What is needed? MRT perspective (Natalie Bisnaught-Williams)
MR Guidance in Pediatric Interventional Radiology (Sabina Volodina)
The Role of a Hybrid Technologist in Interventional Radiology (Lee Ann Kitamura)

Ultrasound Gastrostomy

- Radiation Free
- ONE Stick ANTEROGRADE Approach

PUMA-G
PEDIATRICS



Oct. 21st

10:20 AM to 11:20 AM

Scientific Session 1:

CHOP Clinical Team
presents NIH first-in-
human study data

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Booth #15



COAPTECH

Tuesday October 22, 2024

- 07:00 - 08:00 **Registration Check-In**
- 07:00 - 08:00 **Continental Breakfast** (Exhibitor Hall)
- 07:55 - 08:00 **Announcements**
- 08:00 - 09:00 **M&M Session 1**
Moderators: Craig Gibson, Dimitri Parra
Case 1: Procedure related complication (Kevin Fung)
Case 2: Medication related complication (Janice McDaniel)
Case 3: Process related complication (Dimitri Parra)
The Hospital MM chair expectations and tips on how to implement recommendations (Olivia Ostrow)
Round Table: Share your experience (Dimitri Parra & Craig Gibson)
- 09:00 - 09:05 **Platinum Vendor Video Spotlight**
- 09:05 - 10:00 **M&M Session 2**
Moderators: Craig Gibson, Dimitri Parra
Case 4: Severe procedure related complication (Leah Braswell)
What happens to us when we experience a traumatic clinical event and how we can manage it (Claire De Souza)
Lessons learned from The SickKids Peer support group. Tips on how to start your own peer support group (Gino Somers)
Round Table: Share your experience (Dimitri Parra & Craig Gibson)
- 10:00 - 10:20 **Networking Break (Exhibitor Hall)**
- 10:20- 11:20 **Scientific Session 2**
Moderators: Francis Fortin, Siobhan Hoare
Abstracts begin on page 34
- 11:20 - 12:15 **Keynote Address: Dr. Julius Chapiro MD/PhD, Yale School of Medicine**
Walk Before You Can Run: Baby Steps Towards AI in Pediatric Interventional Radiology
- 12:15 - 12:30 **Delegate Photo** (Grand Staircase)
- 12:30 - 13:15 **Lunch/SPIR Annual Business Meeting**
Boxed lunches will be available outside of the General Session hall.
SPIR Members please join us in the General Session hall for the annual business meeting
- 13:15 - 14:00 **Renal Module**
Moderators: Aisling Carroll Downey, Joseph Reis
Renovascular hypertension: endovascular treatment (Anne Marie Cahill)
Aortic dilatation - when and how (Premal Patel)
Endovascular AV Fistula: WavelinkQ (Dheeraj Rajan)
- 14:00 - 14:05 **Platinum Vendor Video Spotlight - GE Healthcare**

Tuesday October 22, 2024

14:05 - 15:20 **Lymphatic Module**

Moderators: Mohamed Shahin, Gali Shapira-Zaltsberg
MR Lymphangiography in children (Sheena Pimpalwar)
CT Lymphangiography in children (Dario Teplisky)
Plastic Bronchitis Treatment (Abhay Srinivasan)
Protein Losing Enteropathy treatment: Endoscopic Approach (Deborah Rabinowitz)
Bleomycin for Lymphatic Malformations Treatment - Indications, Precautions, Complications (Gulraiz Chaudry)
Medical therapies for lymphatic malformations (Manuel Carcao)

15:20 - 15:40 **Networking Break (Exhibitor Hall)**

15:40 - 16:30 **Venous Module**

Moderators: Sudhen Desai, Martin Errea
Portal vein recanalization (J. Alberto Hernandez)
Venous stenting: SVC, IVC and Iliacs (Frederic Bertino)
Portal venous stenting in liver transplant: long-term outcome (Aline Cavalcante)

18:00 - 22:30 **SPIR Awards Banquet**

Art Gallery of Ontario
Cocktail Reception, Dinner and Program

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Wednesday October 23, 2024

- 07:00 - 08:00 **Continental Breakfast** (Exhibitor Hall)
- 07:55 - 08:00 **Announcements**
- 08:00 - 09:00 **Artificial Intelligence in IR**
Moderators: Seth Vatsky, Nghia-Jack Vo
Basic principles in AI (Farzad Khalvati)
ChatGPT in Interventional Radiology (Jay Shah)
AI for IR (Sebastian Malfeld)
AI-aided biopsy pathway selection (Martin Wagner)
- 09:00 - 09:05 **Platinum Vendor Video Spotlight**
- 09:05 - 10:00 **Clinical Insights for Pediatric IR**
Moderators: Sean Pfaff, Fabiola Weber
Precision Child Health for Individualized Care (Ronald Cohn)
Bleeding risk - pre and perioperative management (Mark Mcvey)
Anticoagulation management post procedure: When and how (Leonardo Brandao)
Pain management during and post procedure (Deepa Kattail)
- 10:00 - 10:20 **Networking Break (Exhibitor Hall)**
- 10:20 - 11:20 **Scientific Session 3**
Moderators: Ulrich Amendy, C. Matthew Hawkins
Abstracts begin on page 40
- 11:20 - 12:00 **Pearls of Wisdom**
Moderators: Mohammad Danish Barakzai, Viet Le
The Art of No (Peter Feola)
Dear Fred (Alex Barnacle)
Navigating Innovation (Anne Marie Cahill)
The answer is "YES" (Shellie Joseph)
Eat the Frog (Roger Harned)
Adapt or Die (Mark Hogan)
Joy, Pain, Joy (Francis Fortin on behalf of Josée Dubois)
Bake a Bigger Pie (John Racadio)
- 12:00 - 12:45 Lunch (PGCRL Foyer & Exhibitor Hall)
- 12:45 - 13:45 **Vascular Anomalies - AVM Module**
Moderators: Stacey Bass, Maria Fernanda Dien Esquivel
Radiological diagnosis of AVMs: pitfalls and how to avoid them (Aparna Annam)
AVM angiographic Classification (Siobhan Flannagan)
Advanced Endovascular Techniques for the treatment of AVMs (Ahmad Alomari)
Syndromes associated with AVMs (Alessandro Gasparetto)
Genetic Based therapies for AVMs (Taizo Nakano)
- 13:45 - 13:50 **Platinum Vendor Video Spotlight**

Wednesday October 23, 2024

13:50 - 15:20 **Oncology Module**

Moderators: Siobhan Hoare, Vicente de Oliveira
Pediatric Precision Oncology and Integration with Interventional Radiology (Anita Villani)
Oncopharmacology in Pediatric IR (Junaid Raja)
Radioembolization in Children (Allison Aguado)
Liver Microwave Treatment in Children (Anne Gill)
Lung Nodules Cryoablation in Children (Michael Temple)
Thyroid Radiofrequency Ablation: General principles and Adult experience (Auh Whan Park)
The Role of Interventional Radiology in Pediatric Thyroid Cancer (Fernando Escobar)

15:20 - 15:35 **Networking Break (Exhibitor Hall)**

15:35 - 16:15 **Soft Tissue Module**

Moderators: Kumar Shashi, Bhupender Yadav
Cryoablation in Soft Tissue Lesions in Children (Mohamed Shahin)
Bleomycin Electrosclerotherapy of Vascular Malformations in Children (Moritz Wildgruber)
Salivary Gland Alcohol Ablation (James Murakami)

16:15 - 17:00 **Research at SPIR**

Moderators: Michael Temple, Avnesh Thakor
IPIRRC Update (Michael Temple)
Data Capture through Standardize Reporting (Eric Monroe)
Intellectual property considerations for medical device commercialization (Ihor Boszko)

17:00 - 17:15 **Pioneer Award Presentation, Closing Remarks, Meeting Adjourned**

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2024 EMERITUS MEMBERS

*Congratulations to the following SPIR member who is retiring this year.
Thank you for your many years of service to
Pediatric Interventional Radiology.*

Dr. Manrita Sidhu
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SPEAKER EVALUATIONS - Education Sessions

Thank you for taking the time to evaluate our presenters. We appreciate the feedback as do the presenters.

**Liver - Billiary
Module**



**Chest
Module**



**Robotics/Augmented
Reality in IR**



**Neuro
Module**



**Gastrointestinal
Module**



**Global Practice
In Pediatric IR**



**M&M
Session 1**



**M&M
Session 2**



**Renal
Module**



**Lymphatic
Module**



**Venous
Module**



**Artificial Intelligence
In IR**



**Clinical Insights
For Pediatric IR**



**Pearls of
Wisdom**



**Vascular Anomalies -
AVM Module**



SPEAKER EVALUATIONS - Education Sessions

**Oncology
Module**



**Soft Tissue
Module**



**Research at
SPIR**



SPEAKER EVALUATIONS - Abstract Sessions

Scientific Session 1



Scientific Session 2



Scientific Session 3



Extreme IR



SPEAKER EVALUATIONS - Satellite Symposium

**Nurse Practitioner/
Physician Assistant Module**



**Nursing
Module**



**Medical Radiation
Technologists Module**



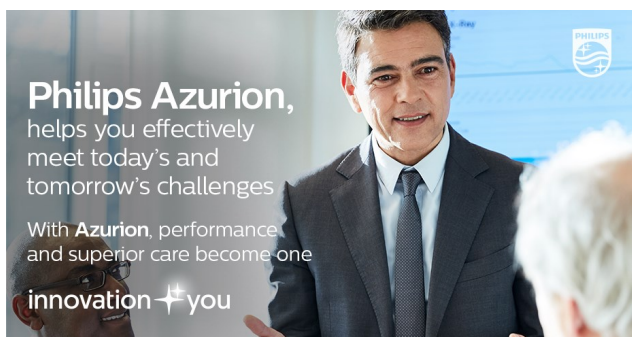
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Youssef Abdul-Aziz Alghamdi King Abdullah Specialized Children's Hospital SA
Ahmad Alomari Boston Children's Hospital US
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GETTING PATIENTS BACK TO
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GOLD MEDAL

The Gold Medal is the highest honor accorded to a member of the SPIR. The recipient must meet at least one of the following:

- Substantial contributions to the specialty of pediatric interventional radiology through clinical excellence, education, mentoring and research.
- Extraordinary contributions to enhance the development and/or stature of pediatric interventional radiology, including service to the Society.
- Outstanding lifetime service to pediatric interventional radiology



Past Gold Medal recipients:

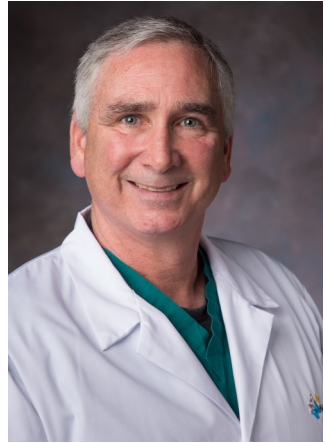
Dr. Bairbre Connolly (2017)
Dr. Danièle Pariente (2017)
Dr. Philip Stanley (2018)
Dr. James S. Donaldson (2019)
Dr. Richard Towbin (2019)
Dr. Dennis W W Shaw (2020)

Dr. Patricia Burrows (2021)
Dr. Derek Roebuck (2021)
Dr. Charles James (2022)
Dr. Josée Dubois (2023)
Dr. William Shiels (2023)

GOLD MEDAL RECIPIENT

Mark J. Hogan, MD, FSIR, FACR

Mark is a Cincinnati native. He graduated from The Ohio State University receiving Tau Beta Pi honors in Chemical Engineering. Mark then attended the University of Cincinnati Medical School, graduating Alpha Omega Alpha and receiving the Carl Wiehl Award in pediatrics. He started a categorical residency in Pediatrics at Cincinnati Children's with the intent of becoming a Pediatric Cardiologist with an interest in Electrophysiology. However, exposure to Pediatric Radiology, and in particular Pediatric Interventional Radiology, led him to see the "dark" and change to a Radiology residency with the goal of being a "procedural" Pediatric Radiologist. He completed his residency at the University of Cincinnati and his Pediatric Radiology fellowship at Cincinnati Children's with emphasis on PIR.



After finishing his training, Mark was recruited to Columbus, Ohio to develop a Pediatric IR program at Nationwide (then Columbus) Children's Hospital as Section Chief. He has spent his entire career at NCH and built the section into one of the largest in North America; active in clinical care, education, and research to include his latest interests in gene therapy. He is a Professor of Radiology at The Ohio State University. Mark has over 120 academic publications, regularly teaches educational content at national/international meetings, and has been an invited lecturer for multiple societies. He has served on committees for his institution, the SPR, and has been the head of the Pediatric section for Standards in SIR. He has been honored as a "Best Doctor" in America for over 13 years.

Mark was an inaugural member of the Society for Pediatric Interventional Radiology, The SPIR BOD, and is a Past President. He helped write the original bylaws establishing the society and has served on multiple committees. The Society is truly the highlight of his academic career.

Mark is blessed with the support and love of his wife Helen, son Luke and his wife Yiran, and daughter Hailey.

Mark is blessed with the support and love of his wife Helen, son Luke and his wife Yiran, and daughter Hailey.


PIONEERS AWARD

This is awarded for the best scientific paper presented at the annual meeting in honor of pioneering innovators of pediatric interventional radiology.


Past Pioneers Award recipients:

- 2023: **Cervical intranodal lymphangiogram in pediatric cardiac patients; Technique, safety and clinical applications**
Shahin M, Shashi K
- 2022: **Image-guided Interstitial Bleomycin Injections to Treat Challenging Vascular Malformations**
Gill A, Shah J, Hawkins M
- 2021: **Safety and efficacy of the Cryoablation of pulmonary and pleural metastases in pediatric patients**
Prajapati HJ, Proctor K, Patel PN, Agrawal V, Maller V, Talbot L, Gold R, Zoltan P
- 2020: **Minimally invasive treatment for unicameral bone cysts with chemical sclerosis and bone graft substitute: A preliminary report.**
Rajeswaran S, Khan A, Samet J, Donaldson J, Attar S, Green J
- 2019: **Ultrasound-Guided Inguinal Hernia Repair.**
Jarboe M, Hirsche RB, Ladino-Torres M
- 2018: **Catheter-directed pharmacologic thrombolysis for acute submassive and massive pulmonary emboli in children and adolescents.**
Shah J, Gill A, Ji D, Durrence W, Paden M, Patel K, Hawkins CM
- 2017: **The contribution of IR to the management of children with button battery ingestion injury.**
Barnacle A, Rose E, Roebuck D, McLaren C.



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EDUCATIONAL EXHIBITS

The following Educational Exhibits are available for viewing on the SPIR 2024 Meeting Website. The passcode for this page was provided to all registered members via email.

Micro-GJ tube fractures and impact to practice

Katz D, Bascand S, Zavaletta V, Harned R, Annam A

The value of biliary manometry in the management of post-transplant biliary strictures in children.

Maria N, Ong E, McGuirk S

Biliary strictures and paediatric liver transplant: a survey of current practice

Maria N, McGuirk S

A Modified Double-Incision Technique to Place Tunneled Central Lines in Children

Bancroft A, Karim S, Kukreja K

Interventional Consultation and Reconnaissance Ultrasound (ICARUS): Automated Image Upload and CPT Code Generation for Enhanced Clinical and Financial Outcomes

Monroe E, Swanson JO, Koepsel EMK

Balloon-assisted embolization of pediatric peripheral arteriovenous malformations using the Scepter Mini

Eysenbach L, Shivaram G, Reis J, Forst D, Bogart A

Dislodgment and Verification of Enteral Feeding Tubes: A Collaborative Approach

Loveland D, Norgrove H, Enns J, Wong R, Cicciarella S, Oppedisano S

Vascular Anomaly Mimics

Patel PA, Ahmed S, Barnacle A, Chippington S, Minhas K, Stuart S, Davda S



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Scientific Paper Session 1

Embolisation of medically refractory hepatic haemangioma in neonates and infants - A 20-year retrospective review

Fung K, Rutten C, Ackermann O, Guerin F, Le Cam S, Franchi-Abella S

Presented by Kevin Fung

Introduction

Congenital and infantile hepatic haemangioma (CHH and IHH) can be life-threatening if the child is unresponsive to medical treatment. This retrospective study aims to review the technical feasibility, clinical efficacy and safety of embolisation of hepatic haemangioma in neonates and infants

Materials and Methods

Single-institution retrospective review of medical records between 2003 to 2023 found 30 symptomatic patients with medically refractory CHH and IHH who underwent embolisation. Outcomes include technically successful embolisation of supplying artery or portosystemic shunts and clinical improvement. Univariate analyses were used to assess risk factors associated with 90-days mortality and reintervention.

Results

Mean patient age was 45.4 days (range 1 – 131 days).

Technical success rate of initial embolisation was 96.7% (29/30). 27 patients underwent transarterial embolisation with 50% histoacryl:lipiodol mixture and 2 underwent transvenous embolisation with coils. Umbilical artery was accessed in 5 neonates, femoral artery in 22 infants and internal jugular vein in 2 infants.

80% (24/30) had clinical improvement with 4 patients requiring second embolisation. 20% (6/30) died due to multi-organ failure. The 90-day mortality rate of patients aged \leq 30 days was significantly higher than those aged $>$ 30 days (85.7% vs 5.9%, $p = 0.001$). Residual shunts was associated with re-intervention ($p = 0.002$).

There was no access-related complication. Non-target embolisation of splenic artery occurred in 1 patient which resulted in self-limiting splenic infarction.

Discussion

Embolisation is a safe and effective treatment for medically refractory CHH and IHH in neonates and infants, with higher 90-day mortality rate observed in patients aged \leq 30 days.

Scientific Paper Session 1

Percutaneous portal vein recanalization in pediatric patients with non-cirrhotic extrahepatic portal vein obstruction

Marra P, Muglia R, Carbone FS, Dulcetta L, Sironi S

Presented by Paolo Marra

Introduction

Portal hypertension resulting from extrahepatic portal vein obstruction (EHPVO) in children has been managed primarily through surgical intervention involving Meso-Rex shunt creation, but only 30-50% of patients have a viable Rex vein, which is required by surgery. The aim of the study is to report a preliminary series of patients who underwent interventional radiology attempts at portal vein recanalization (PVR) prior to consider any type of other intervention.

Materials and Methods

A cohort of consecutive patients presenting with EHPVO at our institution from 2021-2024 was retrospectively collected. After a preliminary transjugular wedge hepatic venography to evaluate the patency of the native intrahepatic portal system, or in the same session, a percutaneous transhepatic and transsplenic portal venography was carried out to recanalize the native portal vein. Patients who failed recanalization were listed for meso-portal bypass, if feasible, or considered for other shunts including TIPS. Clinical and procedural data, technical and clinical success, complications and follow up data were recorded. Technical success was considered at least the partial revascularization of the native portal system.

Results

Twelve patients (7 males; median age 8 years) with severe portal hypertension due to EHPVO underwent 16 percutaneous transhepatic (n=1), transsplenic (n=12) or simultaneous transhepatic/transsplenic (n=3) attempts at portal vein recanalization. Rex vein was patent in 4/12 (33%). Successful recanalization was achieved in 6/12 patients (50%), 2/6 with obliterated Rex vein. No major adverse events were observed. After successful angioplasty, 5/6 patients required metal stenting to obtain sustained patency. None of the failed patients was considered suitable for Meso-Rex shunt creation and underwent TIPS (n=2), splenectomy (n=1), surgical shunt (n=1). Two patients were followed-up without further interventions. After a median follow-up of 4.5 months patency of the main portal vein was demonstrated for all the patients who achieved PVR, without clinical and laboratory improvement of portal hypertension.

Discussion

Our preliminary experience suggests that 50% of children with EHPVO can restore the portal flow by endovascular treatment, even when the Rex vein is obliterated and Meso-Rex surgery unfeasible. In EHPVO, thanks to its low invasiveness, percutaneous recanalization of the portal vein may be regarded as the primary intervention, before considering the meso-portal bypass.

Scientific Paper Session 1

Safety and efficacy of portal vein angioplasty post pediatric liver transplantation

Kim T, Anwar U, Amareh M, Chaudry G, Alomari A, Padua H, Shaikh R, Kim K
Presented by Usama Anwar

Introduction

To determine the efficacy and safety of portal vein angioplasty in a clinical post-liver transplant pediatric population

Materials and Methods

The clinical data of pediatric liver transplant patients who underwent portal vein angioplasty between 2011 and 2022 were analyzed. Technical success was defined as gradient across portal vein stenosis less than 5 mmHg. In cases without pressure measurements, this was defined by pre-and post-angioplasty percent stenosis as measured from venography images. Statistical analysis was performed using paired t-test. Clinical success was defined as improvement or resolution of indication for the study on follow-up imaging or laboratory results. Post-procedural complications were also analyzed.

Results

26 procedures were performed on 18 patients (9 male, mean age of 7.7, range [10 months, 24 years]). Indications included ascites (26.1%), splenomegaly (7.7%), laboratory abnormalities (i.e. thrombocytopenia or elevated liver function tests, 17.4%), or imaging findings of stenosis (60.9%). For one case, pressure measurements and imaging were not available.

Pre- and post-angioplasty measurements were present in 19 cases. Mean pre-angioplasty gradient was 8.4 mmHg and mean post-angioplasty gradient was 2.3 mmHg, with a mean difference of 6.1 mmHg ($p=0.0001$). In the remaining 6 cases, the mean percent pre-angioplasty stenosis was 59.3%, which decreased to a mean 22.3% post-angioplasty, for a mean difference of 37.0% ($p=0.01$). Technical success rate was 92.3%. Clinical success was present in 84.6% of cases.

Two post-procedural complications were recorded (8.6%) – one case of bacterial peritonitis and one case of self-resolved bleeding at access site.

Discussion

Portal vein stenosis is a rare but detrimental complication after liver transplantation. While vascular complications are more common in the early post-transplant phase, later findings of vascular compromise occur. This may manifest as clinical symptoms, laboratory findings, or imaging abnormalities. Compared to the adult population, clinicians may choose to take a more proactive approach to portal vein stenosis treatment given the increased life expectancy of pediatric post-transplant patients.

Scientific Paper Session 1

TIPS in pediatric patients: comparison between the standard transjugular approach and hybrid percutaneous techniques

Marra P, Carbone F, Muglia R, Dulcetta L, Sironi S

Presented by Paolo Marra

Introduction

To compare technical success, safety and clinical outcomes of TIPS performed with conventional technique or assisted by percutaneous approach in pediatric patients and young adults with altered anatomy.

Materials and Methods

From January 2019 consecutive pediatric patients or young adults with native liver or split liver grafts undergoing TIPS were retrospectively reviewed. Patients were retrospectively allocated to group A if they underwent TIPS through a standard transjugular approach; to group B if they underwent TIPS aided with a percutaneous approach, either transhepatic or transplenic, including the gun-sight technique. Technical success in terms of correct TIPS placement, safety in terms of complications and clinical outcomes in terms of bleeding and ascites control were assessed and compared between groups.

Results

Sixteen patients underwent TIPS placement due to portal hypertension and variceal bleeding (n=10), portal vein thrombosis (n= 4), Budd-Chiari syndrome (n=1) or refractory ascites (n=1). Out of 6 patients with portal vein thrombosis, 4 were affected by chronic portal vein thrombosis and cavernous transformation, who failed percutaneous portal vein recanalization or surgical meso-*rex* shunt. In 2 cases TIPS was a bridge to liver transplant. In group A, 8 patients (n= 4 with regular anatomy; n=3 with cavernoma; n=1 with Budd-Chiari) successfully underwent TIPS with septic shock in 1 patient with cavernoma and portal biliopathy. In group B, 8 patients (n=4 with regular anatomy; n=4 with cavernoma) successfully achieved TIPS creation with severe bleeding and precipitating liver failure in 1 case that was managed with urgent liver transplantation. No technical failures were recorded. Clinical outcome was good in all patients. Despite the median age did not differ between groups, group B included 3 patients with the lowest age (1, 2 and 4 year-old) and a higher prevalence of altered anatomy.

Discussion

Hybrid percutaneous techniques for TIPS creation provide high technical and clinical success rates with a complication rate comparable to the standard approach. In pediatric patients and altered anatomy transhepatic- and transplenic-assisted TIPS may be considered.

Scientific Paper Session 1

Transcatheter arterial embolization for acute nonvariceal upper gastrointestinal bleeding in children: a single-center retrospective study

Zhan TH, Zhang R, He JF, Cai TH, Chen K, Chen DX

Presented by Teng Hui Zhan

Introduction

To evaluate the approach and timing of transcatheter arterial embolization (TAE) for children with acute nonvariceal upper gastrointestinal bleeding (NVUGIB) and share our center's experience.

Materials and Methods

The children with NVUGIB treated with TAE from February 2022 to April 2024 were retrospectively analyzed. Data on demographics, clinical manifestations, diagnostic and therapeutic procedures, intraoperative findings, and follow-up results were collected.

Results

Out of 266 NVUGIB cases, 14 (5.26%) were treated with TAE. There were 10 males and 4 females, with an average age of 7.21 ± 4.77 years and an average hospital stay of 13.14 ± 8.69 days. Clinical signs included hematochezia or hematemesis. Three cases (21.42%) had previous *Helicobacter pylori* infections, 2 (14.29%) had lymphomas, and 1 (7.14%) each had immune disorders, gastroenteritis, and fever. The mean preoperative minimum hemoglobin level was 57.85 ± 21.25 g/L. All cases underwent gastroenteroscopy before TAE, revealing duodenal bulb ulcers in 10 cases (71.43%), duodenal ulcers in 3 cases (21.43%), and multiple ulcers in the gastric antrum in 1 case (7.14%). Bleeding was visible on endoscopy in 6 cases (42.86%). TAE timing averaged 4.29 ± 4.53 days. The responsible vessel was identified as the gastroduodenal artery in 7 cases (50%) and the pancreaticoduodenal artery in 7 cases (50%). A pseudoaneurysm was found in 2 cases (14.29%). Embolization was performed in all cases, with spring-coil alone in 8 cases and spring-coil combined with gelatin sponge in 6 cases. Follow-up averaged 13.69 ± 8.77 months, with no recurrence detected.

Discussion

TAE is a suitable treatment for children with acute NVUGIB. However, further study is needed on the timing of TAE, embolization technique, and choice of embolizing agent.

Scientific Paper Session 1

First-in-children experience with a novel pediatric ultrasound guided gastrostomy method using the PUMA-G Pediatric System

Schoeman S, Barasch N, Tropello S, Srinivasan A, Cahill AM

Presented by Sean Schoeman

Introduction

The PUMA-G Pediatric System, which uses solely ultrasound imaging for gastric access in percutaneous G/GJ placement, was designed to potentially eliminate the need for ionizing radiation use which poses long-term cancer risk to children. To assess safety and feasibility of the device, an NIH-funded, first-in-children, clinical trial is underway for children ≥ 5 kg.

Materials and Methods

In this IRB-approved prospective clinical trial, with retrospective comparative cohort, patients scheduled for primary G/GJ tubes with IR were screened. Gastric apposition to the anterior abdominal wall is achieved through magnetic coaptation of an internal magnet contained within a fluid-filled gastric balloon catheter and an external magnet. This system achieves percutaneous gastric access under ultrasound localization of the gastric balloon (target); the remaining procedural steps are performed per institutional standard of care. Procedural time, fluoroscopic radiation exposure, and adverse events were documented until discharge or 30 days.

Results

7 patients with median age and weight of 5 years (range: 0.6-17 years) and 24.5 kg (range: 7.9-51.7kg) were enrolled, completing phases 0 & 1. All procedures were successful, with no device-related adverse events. Median fluoroscopic time and skin dose were 1.3min (range: 0.1-9.2) and 0.19 mGy (range 0-6.6). Mean fluoroscopic time and skin dose were 90% and 97% less, respectively, than weight-based controls. One antegrade G tube procedure did not require any fluoroscopy.

Discussion

First-in-children initial experience with the PUMA-G Pediatric System suggests it is safe for gastric access in G/GJ placement and has the potential to reduce fluoroscopy usage.

Scientific Paper Session 2

Stenting of Tracheobronchomalacia in Children Under 2 Years Old

Ahmed S, Patel P, Chippington S, Davda S

Presented by Premal Patel

Introduction

Severe Tracheobronchomalacia (TBM) in young children is congenital or acquired. Treatment is non-invasive ventilation, surgical 'pexy' or tracheostomy. Stenting aids ventilator dependent TBM children or TBM unmasked following airway reconstruction. We evaluated the technique, complications and clinical course of children under 2 undergoing stenting for TBM.

Materials and Methods

Retrospective analysis in single centre of children under 2 undergoing airway stenting by IR for TBM from April 2019 to April 2024. Data presented as median (range).

Results

Stent insertion in 14 children (11 male, 3 female), aged 4 months (18 days - 23 months) with weight 6.0 kg (2.6 -13.4 kg). Indication was ventilator dependency in 7 and TBM following airway reconstruction in 7. 13/14 children (93%) had emergency stenting; two intra-operative, the remainder from intensive care. 1 child (7%) had an urgent elective stent. 5 biodegradable, 3 retrievable nitinol and 6 bare metal stents were placed. Complications occurred in 2 (14%) including stent migration and undersizing. Ongoing intervention for TBM in 12 children (86%), including dilatation for granulation in 9 children (64%) and repeat stenting in 6 children (43%). One child required two repeat stents. Repeat stenting for temporary stent exchange in 4 children and stent upsizing in 2 children. Following stenting, discharge from ICU was 13 days (2 to 181 days) and home at 28 days (12 to 200 days).

Discussion

Stenting for TBM in children under 2 in extremis has a high technical success rate and can aid discharge from intensive care and home. However ongoing intervention is required to manage TBM.

Scientific Paper Session 2

Bronchopleural Fistula (BPF) in Patients with Necrotizing Pneumonia

Anwar U, Amarneh M, Gregory J, Chaudry G, Padua H, Alomari A, Shaikh R, Kim K
Presented by Usama Anwar

Introduction

To determine the incidence and risk factors associated with bronchopleural fistula (BPF) in patients with necrotizing pneumonia.

Materials and Methods

This retrospective study evaluated 119 patients admitted for necrotizing pneumonia at a tertiary care pediatric hospital between March 2000 and July 2023. Data reviewed included demographics, diagnostic information, and treatment details. Chest CT scores (range= 5-25) were calculated from the earliest scans. BPF was recorded if an air leak persisted for more than 24 hours.

Results

Out of 119 patients (average age 6.8 ± 6.1 years, 72 males), 27 (22.7%) developed BPF. Among patients with pneumothorax, 52.9% had BPF ($p < 0.001$). A significant association was found between high chest CT scores and BPF development (OR = 1.3, $p = 0.002$). BPF incidence was 9.8% for CT scores below 10 and 42.2% for scores 10 or higher. Patients with BPF required longer chest tube placement (15 ± 7 days vs. 7 ± 7 days, $p < 0.001$). BPF resolved spontaneously with chest tube placement and antibiotics in 24 (88.9%) patients while 2 (7.4%) required VATS and 1 (3.7%) required pleurodesis. BPF incidence was higher with intrapleural fibrinolytics (30.4% vs. 14.5%, $p = 0.038$), and in complicated effusions/empyema cases ($p = 0.057$). ICU stays were longer for BPF patients (25 ± 19 days vs. 11 ± 14 days, $p < 0.001$), as were IV antibiotic durations (mean difference = 11 days, $p < 0.001$).

Discussion

Clinicians should anticipate longer chest tube durations for BPF patients, establishing realistic timelines, and consider management changes if no improvement is seen after 3-4 weeks. Patients with high CT scores, complicated effusions, or receiving fibrinolytics require careful monitoring for BPF. Prolonged ICU stays and extended antibiotic treatments highlight the need for preventive strategies to improve outcomes and reduce healthcare costs.

Scientific Paper Session 2

C-arm Cone Beam CT (CBCT) Guided Transbronchial Biopsies of Solid Lung and Mediastinal Lesions in Children

Racadio J, Bozkanat KM, Towe C, Cabatingan K, Hayes D Jr, Burg G, Wallingford A, Hysinger E

Presented by John Racadio

Introduction

Percutaneous needle biopsy of pulmonary lesions in children carries risk of pneumo/hemothorax and hemorrhage. Standard fluoroscopy assisted transbronchial biopsy (TBBX) decreases that risk but diagnostic yield is low (30%). Advanced imaging and navigational capabilities of an angio/interventional system to improve accuracy may increase positive diagnostic yield. We evaluated the feasibility, safety, and efficacy of a combined IR/Pulmonology procedure utilizing CBCT and augmented fluoroscopy guidance for TBBX of solid lung and mediastinal lesions in children.

Materials and Methods

A retrospective review including positive diagnostic yield and complications was performed on all children who underwent CBCT and augmented fluoroscopy guided TBBX of solid lung or mediastinal lesions from 01/01/2018-04/01/2024.

CBCT of the chest was performed in a hybrid OR. Pulmonary lesions were immediately segmented by an interventional radiologist and superimposed over live fluoroscopy in 3D space to visualize the orientation of the bronchoscope and biopsy device with respect to the lesion under various fluoroscopic obliquities of the c-arm to guide the TBBX.

Results

There were twelve patients with mean age 12.5 yrs (range 2-21) and avg pulmonary lesion size 2.2 cm (range 0.5-4.9). Histological diagnosis was positive in 9/12 (75%) patients: 4 malignancies, 2 organizing pneumonias, 2 infections, and 1 acute alveolar injury. Mild hemorrhage was observed in 9 cases. No pneumothoraces occurred.

Discussion

A collaborative IR/Pulmonology procedure utilizing CBCT and augmented fluoroscopy guided TBBX of solid lung and mediastinal lesions in children of all ages is feasible, safe, and efficacious.

Scientific Paper Session 2

Securing central venous catheters using a subcutaneously anchored securement system to prevent catheter dislodgment in children: the SECURED randomized controlled trial.

Kleidon T, Schults J, Roebuck D, Gibson V, Royale R, Ware R, Byrnes J, Ullman A

Presented by Derek Roebuck

Introduction

Catheter dislodgement is a common complication for children with tunneled or peripherally inserted non-cuffed central venous catheters (nc-CVCs). We aimed to compare the effectiveness of a subcutaneous anchored securement system (SASS) with a sutureless securement device (SSD) to prevent CVC dislodgement.

Materials and Methods

Multicenter randomized controlled trial (June 2020 to July 2022) at two Australian quaternary pediatric hospitals, Queensland Children's Hospital, and Perth Children's Hospital. Patients aged neonate to 18 years requiring a peripherally inserted or tunneled, non-cuffed CVC were included. Randomization was 1:1, stratified by device type. The primary outcome was dislodgement. Secondary outcomes included partial or complete dislodgment, catheter-associated skin impairment, dwell time, healthcare costs, and patient, and staff satisfaction. Prospectively registered, Australia New Zealand Clinical Trials Registry, ACTRN12620000783921, Hospital (HREC/20/QCHQ/62034) and University (2020/368) ethics approval.

Results

Of 310 randomized patients, 307 (median [IQR] age, 48[16-120] months; 175 males [56%]) had a device inserted, 153 (49.8%) SASS and 154 (50.2%) SSD and were included in the intention to treat analysis. Device dislodgement was lower with SASS (8 [5.2%]) compared to SSD (35[22.7%]); risk ratio [RR], 0.23; 95% confidence interval [CI], 0.11-0.48; $P < 0.001$. The per protocol analysis were consistent with intention to treat. Partial dislodgement accounted for most dislodgement events 6 [3.9%] SASS vs 33 [21.4%] SSD; RR, 0.18; 95% CI, 0.08-0.42, contributing to fewer complications during dwell in SASS (37 [24.2%]) vs SSD (60 [39.0%]; RR 0.62, 95% CI, 0.44 to 0.87). Staff reported greater difficulty removing SASS (mean [standard deviation], 29.1[31.3]) vs. SSD (5.3[17.0]; mean difference 23.8; 95% CI, 16.7 to 31.0), however use of SASS resulted in lower healthcare costs AU\$36.60 per participant; 95% credible interval, AU\$4.73 to AU\$69.85.

Discussion

In this pediatric, multicenter, randomized controlled trial, we demonstrated a significant reduction in nc-CVC dislodgement with SASS securement compared to SSD standard care. SASS's greater strength, achieved by deep tissue adherence, ensures securement against environmental challenges like moisture or sweat. Our results have immediate implications for maintaining CVC function in children with severe diseases, as dislodgement is the greatest threat to catheter survival in pediatrics. Additionally, SASS securement reduced CLABSI rates and local infections compared to SSD, aligning with findings from previous studies. Despite staff reporting increased difficulty in removing SASS, the securement method resulted in significant cost savings and potential for greater efficiency in larger healthcare facilities.

Further research should focus on staff education and dedicated implementation and evaluation of this novel securement product, particularly in generalist healthcare systems.

Scientific Paper Session 2

Making it stick: A quality improvement project using tissue adhesive to improve central vascular access device insertion site hemostasis & dressing integrity in paediatrics

Gallie SE, Murray D, Rea V, Kang E

Presented by Darlene Murray

Introduction

Central venous access device (CVAD) dressings post-insertion can be easily compromised by poor hemostasis. Evidence-based standards advise changing dressings immediately if integrity is disrupted – in this case, presence of moisture from bleeding and lifting. This quality improvement project evaluated the use of a medical-grade cyanoacrylate adhesive on hemostasis and dressing integrity following CVAD insertion in paediatric patients.

Materials and Methods

Retrospective (February-April 2023) data collection of 110 eligible CVAD insertions evaluated site hemostasis and dressing integrity to Day 7. Education was provided to CVAD inserters to apply tissue adhesive upon insertion. From May to August 2023, 137 eligible CVAD insertions where tissue adhesive was applied were followed (in-person observation or chart review) for site hemostasis and dressing integrity to Day 7. Outpatients CVAD insertions and inpatients discharged prior to Day 7 were excluded.

Results

Retrospective data revealed 81% of patients had bleeding at 24 hours post-insertion and 82% of early dressing changes occurred due to blood or adherence issues. In comparison, when tissue adhesive was used, these figures decreased to 51% and 56% respectively. This resulted in a 30% improvement in site hemostasis and 26% fewer early dressing changes overall. Additionally, when early dressings were required, they occurred closer to Day 7 with tissue adhesive than without.

Discussion

Improved hemostasis and dressing integrity have positive implications for patient outcomes and nursing practice. Fewer dressing changes not only avoids CVAD complications but also the associated trauma for paediatric patients. Nursing time returned to care and cost savings of product usage impact practice. With positive results and learnings from phase one, this quality improvement project will expand scope to include reapplication of tissue adhesive for subsequent dressing changes. Continued work will aim to decrease risks of central line complications, such as dislodgment, CVAD-associated skin impairments and bloodstream infections.

Scientific Paper Session 2

MANAGEMENT OF POST-TRANSPLANT PORTAL VEIN COMPLICATIONS IN CHILDREN: TECHNIQUE AND OUTCOMES

Good H, Parra D

Presented by Hayley Good

Introduction

Children undergoing liver transplant are at risk of vascular complications including portal vein stenosis or thrombosis, which may ultimately lead to graft failure. Management options include angioplasty, stenting, and Meso-rex bypass, however evidence is limited. Few studies suggest guidelines for post-procedure anticoagulation, an important factor in maintaining portal vein patency following intervention. Therefore, we aimed to determine the presentation, management, and course of patients undergoing interventional management of vascular complications, with emphasis on post-procedure anticoagulation.

Materials and Methods

Single center, retrospective study was performed of pediatric patients with portal vein complications post-liver transplantation who were referred for interventional management between 2002 and 2023. Clinical and imaging history, procedure details and post-intervention follow up were collected.

Results

Of the 17 patients included, average age at transplant was 3.2 years, with biliary atresia as the most common indication (n=13, 76.5%). Intervention for portal vein complications occurred at a mean of 2.19 years post-transplant. The most common complication was stenosis managed using angioplasty (n=14, 82.4%), with a mean number of 1.87 procedures per patient. Of these, 8 (57.1%) patients had long term patency. Of patients who failed angioplasty, two required stenting and one a Meso-rex bypass. Different approaches to anticoagulation were observed and included the use of heparin or antiplatelet agents.

Discussion

Management of pediatric vascular complications post-transplant is critical for the long-term graft and patient survival. Here, we show that portal vein stenosis is a common vascular complication, for which angioplasty is an effective treatment option. Further analysis is required to establish post-procedure anticoagulation guidelines.

Scientific Paper Session 3

Safety and Effectiveness of Ultrasound-Guided Percutaneous Large-Bore Vacuum Suction Biopsy for Pediatric Soft Tissue Tumors: A Five-Year Retrospective Study

Balu AR, Rajeswaran S, Wadhvani NR, Gelarden I, Sokol E, Lautz T, Baker JB

Presented by Abhinav Balu

Introduction

The two primary methods of tissue sampling for pediatric soft tissue tumors are open surgical biopsy and minimally invasive image-guided percutaneous core needle biopsy (PCNB). Percutaneous large-bore vacuum suction biopsy (LBVSB) is an innovative alternative adapted from biopsy of breast lesions that may require fewer passes to obtain greater tissue volume with improved pathologic adequacy compared to PCNB. This study reviews our experience using this modality for pediatric soft tissue tumors.

Materials and Methods

A retrospective review of all children undergoing LBVSB between 2019 and 2024 was performed. Operative notes, pathology reports, and clinical follow-ups were analyzed to determine tissue adequacy and diagnosis/prognosis.

Results

Twenty-five children underwent ultrasound-guided LBVSB. Biopsy was performed most often with a 10g needle (84%). The median number of passes was 5 (IQR: 3-7) and core sizes ranged from 0.2-2cm with a median diameter of 0.3cm (IQR: 0.3-0.4). Biopsy was able to accurately confirm the final diagnosis in all 25 cases and tissue samples were adequate in obtaining immunohistochemistry staining 60% of the time and molecular fusion transcripts in 30% of cases. The median procedure time was 27 minutes (IQR: 21-37.5). There were no complications associated with the biopsy procedures; median blood loss was 1.5mL (IQR: 0-3mL). Re-biopsy was not required for any patient.

Discussion

Our experience demonstrates that image-guided percutaneous LBVSB is a safe, accurate, and efficient way to biopsy pediatric soft tissue tumors. LBVSB was diagnostic in all our patients, allowing for immunohistochemistry and fusion analysis without any complications or need for repeat biopsy. LBVSB should be considered as an initial diagnostic tool for certain pediatric soft tissue tumors.

Scientific Paper Session 3

Gastropexy Efficacy Using the Perclose ProStyle for Pediatric Gastrotomies in a Swine Model

Abdelhalim S, Amaral JG

Presented by Suhaila Abdelhalim

Introduction

Traditional gastropexies for pediatric gastrotomies use metal retention sutures that may remain retained, risking various complications. This study investigates the feasibility of performing gastropexies with metal-free sutures using the Perclose ProStyle (PS).

Materials and Methods

Eight 1 month-old piglets underwent a gastrotomy and PS gastropexy. In Group 1 (n=4), one PS suture was deployed through the same access as the G-tube. In Group 2 (n=1), two sutures were deployed 60° apart through the same G-tube access. In Group 3 (n=3), three sutures were deployed in a triangular distribution, with the G-tube inserted centrally. Sutures were tied with buttons and vests were applied. Piglets were monitored for 7-14d and then euthanized. Tract samples were harvested for histological analysis.

Results

In all piglets, PS needles were visualized in the gastric lumen on fluoroscopy. Sutures were seen apposing the stomach and abdominal walls on fluoroscopy in all groups. Group 2's subject developed the largest intra-procedural pneumoperitoneum. There were no instances of peritonitis. On gross tissue examination, a tract formed in all piglets, and Groups 2 and 3 demonstrated apposition of the abdominal and stomach walls. No sutures were identified in the lumen.

Discussion

Multi-suture PS gastropexies seem to successfully appose the stomach and abdominal walls during piglet gastrotomies and look promising as an alternative to metal gastropexy devices. This study requires confirmation from histological analysis and additional Group 2 experiments.

Scientific Paper Session 3

Managing Pediatric Intraparenchymal Fibromuscular Dysplasia not Amenable to Intervention

Morse H, Schoeman S, Levy-Erez D, Kogon A, Fairman A, Cahill AM, Meyers KE
Presented by Sean Schoeman

Introduction

To increase awareness of angiography in identifying intra-renal deep disease in pediatric renovascular hypertension secondary to fibromuscular dysplasia (FMD).

Materials and Methods

In this IRB-approved retrospective study, we evaluated patients without systemic vasculopathy (e.g., NF-1; Williams), who underwent renal angiography with no interventional treatment for deep vascular disease - defined as disease beyond the limits of endovascular therapy.

Results

Twelve patients (7 female) with angiography-confirmed FMD were included. Median age was 5.7 yrs (0.1 – 14.6) with median initial SBP and DBP percentiles at 99th (IQR: 99 – 99 and 98-99), respectively. All started oral antihypertensives; median of 2 agents, predominately ACE inhibitors (n=8).

All underwent imaging work-up: US (n=12), CT(A) (n=11) and angiography (n=12). Pre-angiography, US and CTA findings were abnormal in 8 patients, with no US studies and 3 CTA studies (25%) aligning with deep angiographic disease.

Despite seven patients undergoing angioplasty for concomitant non-deep disease, all patients remained medication dependent – median of 1 agent (range: 1-2). BP control was achieved, with median final SBP and DBP percentiles 78th (IQR: 52 – 97) and 63rd (IQR: 20 – 75) in the angioplasty group, and 70th (IQR: 53-78) and 49th (IQR: 46-52) in the non-angioplasty group. Median follow-up was 55 months (IQR: 33-75).

Discussion

Our findings raise awareness of “deep” or intraparenchymal FMD and the utility of angiography in prognosticating disease severity in pediatric renovascular hypertension. Angioplasty of coexistent non-deep disease doesn’t obviate the need for oral antihypertensive therapy. Patients with deep disease achieved BP control through medical management, without referral for vascular surgery or transplant consideration.

Scientific Paper Session 3

The role of catheter-directed therapy at the initial diagnosis of venous thoracic outlet syndrome in children.

Kristeva M, Ushinsky A, Kavali P

Presented by Mariya Kristeva

Introduction

Thoracic outlet syndrome is a rare condition that involves compression of blood vessels and nerves that pass through a space between the clavicle and a cervical or anomalous first rib. Venous thoracic outlet syndrome is caused by compression of the axillary and subclavian veins with abrupt development of swelling and venous engorgement with or without thrombosis requiring urgent treatment. Incidence of thoracic outlet syndrome is high in young, athletic, and otherwise healthy individuals. Pathology in this patient population has significant implications for quality of life. Acute presentation includes disabling pain, swelling, numbness, tingling, and sometimes extremity weakness. Anticoagulant treatment of acute deep venous thrombosis aims to prevent recurrent venous thromboembolism. Paraclavicular decompression can provide a successful long-term treatment option for patients with venous thoracic outlet syndrome. However, preoperative catheter-directed therapy with early restoration of venous patency can potentially decrease operative time, number of re-operations, and late interventions in addition to decreasing post-thrombotic morbidity.

Materials and Methods

We performed a retrospective, single-center review of 37 patients who had undergone venography with catheter-directed thrombolysis or thrombectomy and balloon angioplasty between 2018 and 2024. The study population was derived from patients referred to the Washington University Center for Thoracic Outlet Syndrome. All patients underwent paraclavicular thoracic outlet decompression with complete first rib resection. Some patients underwent axillary-subclavian vein reconstruction and patch angioplasty of bypass grafting. We assessed the clinical presentation, operative findings, and surgical treatment outcomes for axillary-subclavian vein thrombosis due to venous thoracic outlet syndrome in the pediatric population (age < 18 years) and the role of catheter-directed therapy in pre-operative evaluation and management as a bridge to surgery. The clinical outcomes were compared between groups who underwent catheter-directed treatment at the initial diagnosis and those who had not.

Results

Of the 37 patients, eight were female, and 29 were male. All patients had a history of spontaneous arm swelling at a mean age of 16.5 ± 1.2 years (range 13-18 years). The timing of critical presentation was acute (<15 days) for 11 patients (30%), subacute (15-90 days) for 11 patients (30%), and chronic for 14 patients (40%). Venography with catheter-directed thrombolysis or thrombectomy was performed in 4 patients (10%), balloon angioplasty alone in 9 patients (24%), thrombolysis/thrombectomy and angioplasty in 14 patients (38%), and contrast venography without intervention in 10 patients (28%). The median interval between symptom onset and surgery was 78 days. After para clavicular thoracic outlet decompression and external analysis, eight patients (22%) had persistent right upper extremity swelling noted on clinical follow-up. Patients undergoing catheter-directed therapy at the initial diagnosis were 60 % less likely to have arm swelling at follow-up.

Discussion

Prompt catheter-directed therapy at the initial diagnosis can improve patient outcomes of paraclavicular decompression. Further work is needed to determine whether pre-operative venograms with or without catheter-based interventions correlate with operative time, number of re-operations, and late catheter-based interventions.

Scientific Paper Session 3

Use of seated positioning device (Smoltap) for ultrasound-guided infant lumbar punctures

Lee S, Miller J

Presented by Shimwoo Lee

Introduction

50-60% of infant lumbar punctures are initially unsuccessful. Such cases prompt request for image-guided LPs. Conventionally in our practice, LPs had been performed in lateral decubitus position with US or fluoroscopic guidance. Patients were often manually held in position due to high anesthesia risk. To reduce struggling, we began using Smoltap, a device that stabilizes infants in seated position. We report our experience performing US-guided LPs with Smoltap, first in the literature.

Materials and Methods

We retrospectively reviewed image-guided infant LPs from 6/2023-6/2024. Per IFU, Smoltap was used for infants of height 45-57 cm. Topical lidocaine cream was applied pre-procedurally. Patients were secured to Smoltap with head/torso straps. A 22-gauge spinal needle was used to access the thecal sac under US guidance.

Results

18 infants underwent LPs with Smoltap. Their average age was 15 days and weight 3.6 kg. None were sedated. CSF was obtained in all but one, who subsequently underwent a successful LP under anesthesia in lying position. Average CSF volume was 3 cc. 8 taps were bloody (RBC > 1000/ μ L). Average procedure duration was 18 minutes. 15 infants underwent conventional LPs (lying position under US/FL guidance), where 3 were unsuccessful and 4 were bloody. There were no complications.

Discussion

Studies indicate sitting is superior to lying position for infant LPs. Oulego-Eroz et al. found sitting position increases interspinous process distance and subarachnoid space on spinal US. A randomized controlled trial by Marshall et al. showed sitting position was associated with higher procedural success rates and fewer desaturations. Our early experience demonstrates that consistent sitting position during US-guided LPs is achievable through Smoltap.

Scientific Paper Session 3

Sclectosing and Bone Grafting Aneurysmal Bone Cysts with Adjunctive Techniques

Rajeswaran S, Balu A, Baker J, Ness J, Variyam D, Peabody T, Attar S
Presented by Shankar Rajeswaran

Introduction

Aneurysmal Bone Cysts (ABCs) are locally aggressive benign tumors with high recurrence rates often requiring multiple interventions. The purpose of this study is to evaluate the safety and efficacy of sclerosing and bone grafting ABCs in combination with adjunctive techniques of mechanical disruption and/or cryoablation.

Materials and Methods

A retrospective evaluation from February 2020 through February 2024 was performed evaluating patients that underwent ABC sclerosis and bone grafting with adjunctive techniques. All cysts underwent mechanical needle disruption with needles and/or osteoplasty to disrupt septae. Cryoablation was also performed when cortically based subcentimeter cysts were identified. Calcium and Magnesium based regenerative grafts were utilized. 23 patients were evaluated.

Results

Average age was 10.9 years with an average follow up of 15.8 months. Average cyst size was 4.8 cm. Cryoablation was performed in 12 patients, with 6 patients also undergoing osteoplasty. 5 out of 23 patients needed retreatment on average at 8.6 months and 18 out of 23 patients have not required repeat intervention with an average follow up of 14.3 months. 21/23 patients were initially followed with radiographs. There was one major complication of a phalanx skin injury requiring skin grafting.

Discussion

Sclerosing and bone grafting is utilized in the treatment of unicameral cysts; however, this is not commonly utilized in treating ABCs due to septations. With the addition of adjunctive techniques of mechanical disruption and/or cryoablation, this approach compares favorably to existing techniques. In this retrospective study, patients require less frequent interventions compared to previously published trials and can often be followed with radiographs as opposed to cross sectional imaging.

CERVICAL MR AND FLUOROSCOPIC LYMPHANGIOGRAPHY. A NOVEL TECHNIQUE FOR DIAGNOSIS AND TREATMENT OF CHYLOUS PLEURAL EFFUSION

Celii F, Malkawi I

Presented by Francis Celii

Clinical History

9-month-old premature twin male with heterotaxy, and multiple congenital heart abnormalities notable for surgical history of s/p MPA banding followed by TAPVR repair and reimplantation of the LUPV to the RA. Post op course c/b right chylous pleural effusion requiring right chest tube placement with significant output not responding to conservative therapy and leading to respiratory failure and mechanical ventilation.

Solution

An MR Lymphangiogram was performed via cannulation of the bilateral inguinal lymph nodes and right cervical LN, showing agenesis of TD and a lymphatic leak into right pleural space from anomalous channel draining the right cervical lymph nodes. Under ultrasound and fluoroscopic guidance, a 25-Gauge needle was advanced into right supraclavicular lymph node and contrast was injected to confirm the location within the lymphatic system. A Dyna-CT was performed which showed opacification of the right cervical lymph nodes chains with leakage into right pleural space. A glue/ lipiodol mixture (20% concentration) was injected through the access needle opacifying the leak. This was repeated at two additional right cervical lymph nodes. A post-embolization Dyna-CT was performed which showed glue distribution in the right neck which extends into leakage area at right lung apex.

Clinical Outcome

Post intervention, the patient had gradual decrease in chest tube output with resolution of chylous effusion and removal of the chest tube after a week with successful extubation and downgrade from CVICU to CVIMU. No complication or non target embolization. This case demonstrates successfully cervical MRL and Fluoroscopic cervical lymphangiogram, showing anomalous lymphatic drainage into right pleural space and successful glue embolization of the lymphatic leak.

Extreme IR Session

Post-liver transplant Meso-rex bypass reconstruction using a combined surgical-interventional radiology approach to manage recurrent portal vein obstruction in a pediatric patient

Good H, Parra D

Presented by Hayley Good

Clinical History

7-year-old boy with heterotaxy syndrome and polysplenia who underwent left lateral segment liver transplantation for end-stage liver disease due to biliary atresia. Cadaveric venous jump graft was used for SMV-portal vein anastomosis due to size discordance. Acute thrombosis of the conduit required early intervention. Despite repeated angioplasty, recurrent upper GI bleeding secondary to portal vein stenosis necessitated Meso-rex bypass. Ultrasound 11 months later revealed stenosis, which did not respond to conventional angioplasty. Thus, reconstruction of the Meso-rex bypass was planned.

Solution

Due to challenging anatomy, a combined surgical-IR approach was used. Access was obtained into the superior portal vein following laparotomy. Venogram showed stenosis of the Meso-rex bypass with opacification of splenic and portosystemic collaterals. After angioplasty, an uncovered stent was deployed across the stenosis. Subsequent venogram showed excellent patency with reduced splenic vein opacification.

Clinical Outcome

Excellent clinical outcome and stent patency on ultrasound was observed 2 years post-procedure.

Extreme IR Session

Emergency Revascularization for Acute Ischemic Arm

Heran M, Salhi S

Presented by Manraj Heran

Clinical History

A 13 year old boy with Inflammatory Bowel Disease suddenly developed tingling and pallor of his left hand with a weak pulse at his wrist. Ultrasound examination confirmed that the left brachial artery was occluded by blood clot at the elbow and there was no blood flow within the radial or ulnar arteries supplying the lower arm and hand, putting him at risk of losing his hand and wrist due to tissue ischemia.

Solution

Emergency mechanical thrombectomy was performed using stroke aspiration systems, with additional fasciotomies performed by the Pediatric Plastic Surgery service. Complete revascularization was achieved, with restored flow into the left hand, and visible perfusion into the previously ischemic forearm and digital territories. The patient was maintained on anticoagulation and milrinone post-procedure.

Clinical Outcome

The patient has done well with normal perfusion of his hand and no loss of function following the Interventional Radiology procedure. This was the first procedure of this type performed at BC Children's Hospital and among the first times in North America that this limb saving procedure has been performed on a pediatric patient.

Extreme IR Session

Innovative Solution for Persistent Chylous Effusion in Pediatric Lymphoma

Malavia M, Bolger-Theut S, Rivard D

Presented by Mira Malavia

Clinical History

A 12-year-old female with lymphoma presented with typical lymphadenopathy and left subclavian vein occlusion, accompanied by left chylous effusion.

Solution

Initial intervention involved thrombolysis of the subclavian vein thrombus, hypothesizing that the effusion would resolve with unobstructed thoracic duct drainage. However, this did not alleviate the chylous effusion. An MR lymphangiogram revealed a significant upper mediastinal node rupture with leakage into the pleural space. Utilizing a novel direct-stick glue embolization technique under ultrasound and fluoroscopic guidance, we targeted the leaking node.

Clinical Outcome

This innovative approach successfully resolved the effusion within three days, demonstrating a viable solution for complex cases of chylous effusion in pediatric lymphoma patients.

Extreme IR Session

Acquired Pelvic Arteriovenous Fistula and Hemorrhage from Osseous Metastatic Dehiscence

Williams D, Mahler C, Heng R, Oser R, Krisnasamy V, Huang J, Raja J
Presented by Junaid Raja

Clinical History

18-year-old female with neurofibromatosis type I presented with significant pelvic pain. Imaging demonstrated a large pelvic mass eroding into the sacrum and iliac bones biopsied to be high grade spindle cell sarcoma (malignant peripheral nerve sheath tumor). Several months later she presented with pelvic hemorrhage demonstrating osseous fragment dehiscence and laceration with consequent multiple arteriovenous fistulae formation between the right internal iliac artery and vein, with intratumoral hemorrhage. Selective angiography demonstrated a 3cm pseudoaneurysm of the right internal iliac artery with arteriovenous fistulization and active hemorrhage.

Solution

The fistulae were embolized with Onyx while multiple distal arteries from the internal iliac artery and L4 and L5 lumbar arteries supplying her large pelvic tumor were embolized with particles.

Clinical Outcome

Post interventional follow up demonstrated no recurrent hemorrhage or flow to pseudoaneurysm/fistula.

Extreme IR Session

Percutaneous Mesocaval Shunt creation in a Multivisceral Transplant Patient with GI bleeding

Rajeswaran S, Baker JB, Ness JR, Mouli S, Thornburg B, Variyam D
Presented by Shankar Rajeswaran

Clinical History

Patient had undergone a multivisceral transplant and concurrent surgical shunt creation of the recipient portal vein to the recipient IVC to decompress the stomach, pancreas and spleen prior to bowel/liver transplant. The patient presents with bleeding and severe anemia due to a large duodenal varix. Cross sectional imaging confirmed a large varix being fed by the recipient mesocaval system because of poor outflow due to occlusion cranially of the recipient IVC.

Solution

Improving outflow of the surgically created mesocaval system would decompress the varix. The recipient IVC was occluded inferiorly and cranially and stent recanalization would crush the donor intrahepatic IVC and compromise the graft. Trans-splenic approach into recipient IVC and RIJ approach into donor IVC obtained. Utilizing percutaneous gunsight, a wire was advanced and through and through access obtained. A covered stent was placed and connected the recipient mesocaval shunt and donor IVC.

Clinical Outcome

Resolution of GI bleeding and most recent Hgb is 12, previous baseline of 6.

Extreme IR Session

Primary Chylocolporrhea in an teenager treated by intranodal and direct puncture embolization

Santini P, Akahane H, Bacarin J, Tosi L, Campos H, Boim W, Taveira H
Presented by Pedro Santini

Clinical History

Female patient, 15 years old, referred from the gynecology service due to a history of persistent whitish ('milky') vaginal discharge since childhood, requiring daily use of multiple high-flow absorbents.

During gynecological speculum examination, vesicles containing pearly white content were noted on the vulva and vaginal walls, with the discharge of milky fluid. Samples were sent for analysis, revealing elevated triglyceride levels (1231 mg/dl).

Pelvic MRI showed several elongated, tortuous, confluent tubular structures occupying the periurethral space, vesico-vaginal recess, and recto-vaginal septum surrounding the urethra and vaginal cavity, extending into the depths of the pelvic cavity around the uterine cervix and posterior adnexal regions, consistent with diffuse lymphatic malformation."

Solution

After multidisciplinary discussion of the case, minimally invasive treatment was chosen involving percutaneous inguinal intranodal lymphangiography/embolization with Lipiodol and histoacryl injection. The procedure was performed under spinal anesthesia and sedation, beginning with ultrasound-guided puncture of bilateral inguinal lymph nodes using a 22-gauge spinal needle. Under fluoroscopy, 8 ml of Lipiodol was slowly and carefully injected into the left lymph node chain and 5 ml into the right, revealing dilations and tortuosity of lymphatic vessels along the left iliac axis with communication to the retrovaginal recess and significant retention of the contrast/embolic agent in this region. Lipiodol was chosen as the contrast medium due to its embolic and sclerosing effects, leading to an inflammatory reaction in adjacent tissues upon retention.

For additional treatment, adjunctive transvaginal ultrasound was performed, showing anechoic dilations without flow on color Doppler. Guided by fluoroscopy and ultrasound, Chiba needles (20 gauge) were used for puncture and direct embolization with injection of 2 ml of histoacryl and 4 ml of Lipiodol (1:2 ratio).

Clinical Outcome

The patient did not experience any complications related to the procedure and was discharged on the first postoperative day. She continues to receive outpatient clinical follow-up (18 months post-procedure) and has not reported any further abnormal vaginal discharge, continuing with her usual daily activities.

Extreme IR Session

Endovascular therapy for neonatal Budd-Chiari syndrome

Zhan TH, Zhang R

Presented by Rong Zhang

Clinical History

A 5-day-old male neonate was admitted due to prenatal (at 36 weeks of gestation) color Doppler ultrasound (CDUS) showing inferior vena cava hepatic segment atresia, poor appetite after birth, and postnatal CDUS showing inferior vena cava hepatic segment strong echo (probable thrombosis). Computed tomographic venography (CTV) of abdomen showed organized thrombosis in the hepatic segment of the inferior vena cava and the right renal vein, small inferior vena cava below the level of the left renal vein. He was diagnosed with Budd-Chiari syndrome.

Solution

He underwent endovascular treatment. Direct angiography through the vascular sheath showed that the lower segment of the inferior vena cava could be visualized, but not the middle and upper segments. After percutaneous transluminal angioplasty, the reexamination angiography showed unobstructed blood flow of inferior vena cava, and a small amount of filling defect could be seen locally.

Clinical Outcome

At one year follow-up, the abdominal CDUS indicators was normal.

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