Society for Pediatric Interventional Radiology

Meeting Program Guide

Dear Colleagues,

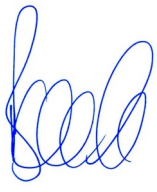
On behalf of the Board of Directors for the Society for Pediatric Interventional Radiology, welcome to SPIR 2020. This year, our meeting is online for the first time. Thank you for your support and encouragement in making this happen. Your response has been incredible, with over 550 people registered for the meeting from 43 different countries. This confirms us as a truly international organisation and one that is speaking to the needs of PIRs around the world. A special welcome to those who are new to SPIR – I hope you find a warm welcome here over the next two days and are inspired to explore of PIR and perhaps join our Society. We feel honored to share this meeting with you all.

The Board of Directors thanks all our speakers for contributing their time, efforts and presentations to make this meeting possible. The program is full of timely debates on subjects we each wrestle with in our daily practice and we're grateful for such an expert faculty to deliver this. The abstract submission process this year was as competitive as ever, with standards impressively high in all categories.

This meeting would not be possible without the hard work and efforts of many including the Board of Directors, scientific committee and, as always, our industry partners who have shown great generosity in their support of this meeting. A personal thank you to Susan Harned for her tireless work spent in the planning and organization of this meeting.

Please enjoy your time with us here and contribute via the Q&A to make this a lively, interactive and inclusive meeting for all. This is a unique meeting for our Society and I thank each of you for helping to make it happen.

Regards,



Alex Barnacle
SPIR President

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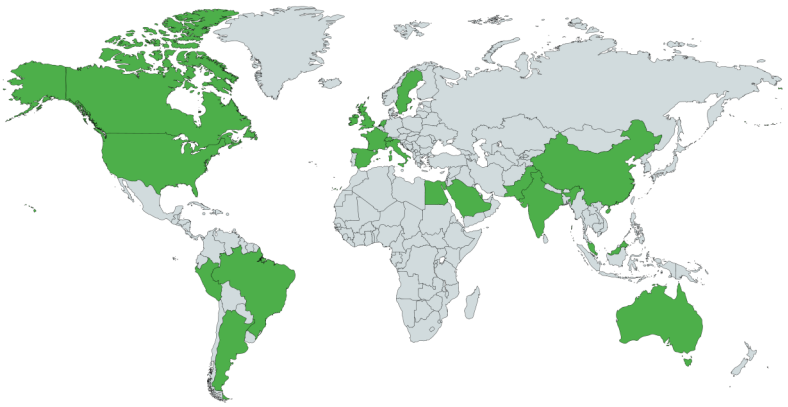

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2009 **Jim Donaldson**
2010 **Manrita Sidhu**
2011 **Manrita Sidhu**
2012 **Charles James**
2013 **Mark Hogan**
2014 **Derek Roebuck**
2015 **John Racadio**
2016 **Manraj K S Heran**
2017 **Roger Harned**
2018 **Manraj K S Heran**
2019 **Manish Patel**

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Those who purchased CME for this meeting will receive an email explaining how to access the CME credits on Saturday, October 24, 2020.

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Scientific Sessions Evaluations

Scientific Paper Session #1

https://forms.gle/cgZkLLhLcysz9cjg9

Challenging Case Session #1

https://forms.gle/hXbkmbLAwNGSM6ke9

Morbidity & Mortality Session #1

https://forms.gle/rKQo53ijJtJvpAdm7

Scientific Paper Session #2

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Challenging Case Session #2

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Morbidity & Mortality Session #2

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Educational Sessions Evaluations

Angiography: Tips & Tricks

https://forms.gle/D1FZwCSxvJDi3SD7A

Drains & Nephrostomies: How I do it

https://forms.gle/YKdMBFyupE98xtabA

IVC Filters: Should I do it?

https://forms.gle/GBtyoADzcxf375qM8

Oesophageal Intervention: Where are we going?

https://forms.gle/J6L2fipJzADo99Kk9

Venous Access: When to Tunnel

https://forms.gle/r8mb52cSwxnYBd2P8

Venous Stenting: Yes or No?

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

AGENDA

Thursday, October 22, 2020

All times are Eastern Daylight Time

1200 **Presidential Welcome**
SPIR President Alex Barnacle

1205 **Scientific Abstracts Session 1**
Moderated by Rush Chewning and Leah Braswell
Abstracts begin on page 16

1300 **Angiography: Tips and Tricks**
Moderated by Manish Patel
Presenters: Anne Marie Cahill, Premal Patel, Raju Heran

1330 **IVC filters: should I do it?**
Moderated by Michael Temple
Presenters: Abhay Srinivasan, Eric Monroe, Narayan Karunanithy

1400 **Vendor-Sponsored Break: Galt Video**

1430 **Challenging Cases Session 1**
Moderated by Sergio Sierre and Stéphanie Franchi-Abella
Abstracts begin on page 28

1530 **Drains & Nephrostomies: How I do it**
Moderated by Joao Amaral
Presenters: Janice McDaniel, Michael Acord, Murthy Chennapragada

1600 **Vendor-Sponsored Break: B.Braun Video**

1630 **Morbidity & Mortality Session 1**
Moderated by Craig Gibson and Siobhan Hoare
Abstracts begin on page 40

1700 **Film Quiz**
Quizmaster: Alex Barnacle

Old-Timers	**Young Upstarts**
Peter Feola	Kishore Minhas
John Racadio	Alexia Dabadie
David Lord	Jay Shah
Shellie Josephs	Sheryl Tulin-Silver

AGENDA

Friday, October 23, 2020

All times are Eastern Daylight Time

1200 **Scientific Abstracts Session 2**
Moderated by Deborah Rabinowitz and Fernando Gómez Muñoz
Abstracts begin on page 22

1300 **Venous Access: When to tunnel**
Moderated by Francis Marshalleck
Presenters: Allison Aguado, Aparna Annam, Kevin Wong

1330 **Venous Stenting: Yes or No?**
Moderated by C. Matthew Hawkins
Presenters: Anne Gill, Logan Dance, Patrick Warren

1400 **Vendor-Sponsored Break: Guerbet Video**

1430 **Challenging Cases Session 2**
Moderated by Rachelle Durand and Simon McGuirk
Abstracts begin on page 34

1530 **Oesophageal Intervention: Where are we going?**
Moderated by Derek Roebuck
Presenters: Aidan Shaw, Marcus Jarboe, Samantha Chippington

1400 **Vendor-Sponsored Break: BD Video**

1630 **Morbidity & Mortality Session 2**
Moderated by Carrie Schaefer and Gulraiz Chaudry
Abstracts begin on page 43

1700 **Pioneers Award Presentation**

1710 **Close of 2020 Meeting**

1715 **SPIR Annual Business Meeting (for members only)**

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:

2019: Ultrasound-Guided Inguinal Hernia Repair.
Jarboe M, Hirsche RB, Ladino-Torres M

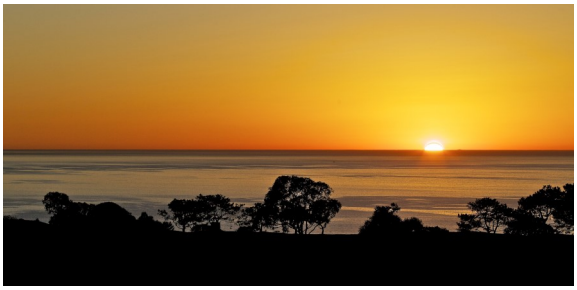
2018: Catheter-directed pharmacologic thrombolysis for acute submassive and massive pulmonary emboli in children and adolescents.
Shah J, Gill A, Ji D, Durrence W, Paden M, Patel K, Hawkins CM.

2017: The contribution of IR to the management of children with button battery ingestion injury.
Barnacle A, Rose E, Roebuck D, McLaren C.

SAVE THE DATE

SPIR 9th International Meeting

October 20 — 22, 2021
Hilton La Jolla Torrey Pines
La Jolla, California
Registration opening Spring 2021



PAST MEETINGS

2009 Napa Valley, California
2011 Scottsdale, Arizona
2013 Sante Fe, New Mexico
2015 London, United Kingdom
2017 Denver, Colorado
2018 Maui, Hawaii
2019 Amsterdam, Netherlands

SCIENTIFIC PAPER SESSION 1

Safety and efficacy of bleomycin sclerotherapy for treating low-flow vascular malformations in children. 10 year tertiary center experience

Deogaonkar G, Thulasidasan N, Diamantopoulos A, Flohr C, Greig A
Presented by Ganesh Deogaonkar

Purpose

This study was aimed to evaluate the safety and outcomes of bleomycin sclerotherapy in children.

Materials and Methods

Retrospective review of electronic patient records and radiological imaging of all sclerotherapy procedures performed exclusively with bleomycin for low-flow vascular malformations performed at Evelina London Children's Hospital.

Results

48 sclerotherapy procedures were performed in 33 children (16 male and 17 Female) with age between 42 days and 17 years 1month. 19 lymphatic, 9 venous and 5 mixed lymphatic-venous malformations were treated. 17 of the treated malformations location were cervico-facial, 3 were truncal, 10 were over the extremities while 3 were involving more than one body portion. Number of sclerotherapy sessions ranged from 1 to 6 (average of 1.45 sessions) per child. Bleomycin dose per session was between 500 to 17250 IU (Average 5148.9 IU). Mean follow-up was for 3.26 years. Excellent clinical response (complete or near complete resolution of symptoms) was noted in 13 children (39.4%), good response (significant reduction in symptoms) in 19 children (57.6%) while 1 child (3.0%) had poor response (unsatisfactory symptomatic improvement/ unchanged or worsening of symptoms). Transient minor complications were seen in 3 cases while there were no major complications.

Conclusion

Percutaneous bleomycin sclerotherapy is safe and effective in treatment of low-flow vascular malformations in children.

SCIENTIFIC PAPER SESSION 1

Image-guided core needle biopsy (IGCNB) of mediastinal lymphoma in pediatric patients: a retrospective review

Alam A, Maier P, Smitthimedhin A, Acord M, Cahill AM
Presented by Aisha Alam

Purpose

Evaluate the current yield and safety of IGCNB in mediastinal masses including lymphoma.

Materials and Methods

Retrospective review of IGCNB of mediastinal masses performed over 10 years at a single institution. Inclusion criteria: Patients <18 years old with final lymphoma diagnosis.

Results

Forty IGCNB procedures were reviewed with a cohort of 27 patients (15 male), mean age 15.4 years (IQR 12.14-16.49) and mean weight at diagnosis 56 kg (IQR 42-59 kg) that met inclusion criteria. The group consisted of 24 primary and 3 recurrent lesions. Lesion volume was available for 25/27 patients, mean 539 mL (IQR 360 -877 mL). Airway narrowing was documented at the trachea in 9/27, right main-stem bronchus 5/27, and left main-stem bronchus in 12/27. However, only 7 patients presented with pre-biopsy respiratory symptoms. Vascular compression was present in 16/27 patients (59.3%), Ultrasound guidance was used alone or in combination in all cases. Adjunctive imaging included CT in 2(7.4%) and fluoroscopy in 1(3.7%). IGCNB definitive diagnostic rate was 96.2% (26/27). Complications were rare (3.7%), including intra-procedural hypoxia and bradycardic arrest that responded to change in position. The non-diagnostic biopsy was secondary to absence of Reed-Sternberg cells within the specimen. A subsequent surgical biopsy resulted Hodgkin's Lymphoma.

Conclusion

When alternative sources of histologic material are unavailable IGCNB offers a safe and effective technique for the evaluation of suspected mediastinal lymphoma despite the presence vascular or airway compression.

SCIENTIFIC PAPER SESSION 1

Congenital spleno-mesenterico-renal shunt: plea for early closure- about a case series.

Franchi-Abella S, Campos A, Pommier R, Branchereau S, Gonzales E, Debray D, Guérin F
Presented by Stéphanie Franchi-Abella

Purpose

Congenital porto-systemic shunts are rare vascular malformations that can lead to severe complications especially cardiac failure (CF), porto-pulmonary (PPS) and hepatopulmonary syndrome (HPS), hepatic tumors (HT) and hepatic encephalopathy (HE). CPSS may consist in a direct communication between the spleno-mesenteric confluence and the renal vein directly or via an abnormal vessel (SMRS). The aim of this work was to present the natural history of this subtype of CPSS and to discuss management.

Materials and Methods

Retrospective and prospective study of 14 patients with SMRS from a cohort of 160 patients presenting CPSS and followed in our institution between 1996 and 2018.

Results

Circumstances for diagnosis were: prenatal screening (2), malformative syndrome (2), fortuitous (2), complications: EH (2), HN (4), PPS (2), HPS (4). Left heterotaxya was present in 9. Management was as follow: -Closure before 3 month-old (4 embolization, 1 surgical) with immediate restoration of the intrahepatic portal flow with no further complication; Closure > 1 yo (5 embolization, 1 surgical) with restoration of intrahepatic portal flow. Initial complications regressed in all for EH, 1/4 for HN, 3/4 for HPS and 1/2 for PPS. One patient died at 4 yo of acute severe PHS that revealed SMRS. Two were lost to follow-up. Two patients experienced post-operative adhesions.

Conclusion

Congenital spleno-mesenteric-renal shunts expose to severe complications. Left heterotaxia is frequently associated. Early closure, if possibly neonatal, allows immediate restoration of normal hepatopetal portal flow and prevent complication. Closure is possible and well tolerated in older patients and allows at least partial regression and prevention of complications.

SCIENTIFIC PAPER SESSION 1

Setting up a quality and research prospective database: a single center experience

Lewis S, Wong K
Presented by Kevin Wong

Purpose
Present a manner to create a quality and research database of IR cases that integrates into daily IR workflow

Materials and Methods
Review and explanation of process to design and implement a new quality and research database for IR procedures performed at a single institution. Manner of implementation, integration into daily IR workflow, types of cases, and number of cases documented were reviewed.

Results
A REDCap database (HIPPA compliant, web based) was created for capturing all cases performed in IR (reviewed from May 8, 2020-August 26, 2020). Instruments (number of entries) included demographics (420), central line (147), enteric tube (130), drain (56), biopsy (61), spine intervention (65), joint aspiration/injection (27), DVT treatment (4), and generic/other (90). Fields were populated by coordinating nurse, technologists, and clinical nurses before, during, and after procedures. The populated fields were reviewed by the IR MD at time of dictation and then used to generate a dictation note. Any additional dictation by the IR MD was then placed in REDCap database during the dictation. Follow up was and will be performed by members of the IR team during downtime using administrative budgeted time.

Conclusion
Creating a comprehensive database of all IR procedures is resource intensive. By sharing the work among the entire IR team and integrating the data into daily workflow and dictation is a potentially manageable way to capture information for a prospective quality and research database. This could also facilitate national registry or multi-institution projects.

SCIENTIFIC PAPER SESSION 1

PERCUTANEOUS TESTICULAR BIOPSY IN CHILDREN: DIAGNOSTIC ACCURACY AND SAFETY

Minhas K, Roebuck D, Patel P
Presented by Kishore Minhas

Purpose

Traditionally, testicular biopsy is performed using an open surgical approach. Percutaneous ultrasound (US) guided biopsy is a less invasive alternative and can be performed in children. This study reports technique and outcomes of this approach.

Materials and Methods

16-year retrospective review of all US guided testicular biopsies at a single paediatric institute. This study was registered with the audit department and exempt from specific ethical approval. Data sources include an Interventional Radiology database, electronic patient records and PACS. Percutaneous biopsies were performed, following multi-disciplinary team review and parental consent, under US guidance using a semi-automated side notch needle (Temno EvolutionTM). Data are quoted as median (range).

Results

9 US guided testicular biopsies were performed in 9 patients. Patient age was 3 years (4 months – 11 years 2 months) and weight 20.9 kg (8.36 kg – 35 kg). Volume of the testicular lesion biopsied was 4.4 mm3 (1.2 mm3 – 17 mm3). Co-axial technique was used for 8/9 biopsies, with absorbable gelatin sponge tract embolization in 4, and non-co-axial technique in 1/9. Technical success was 100% and 3 (2 – 6) cores were obtained. Diagnostic yield was 88.9%, with 1 biopsy yielding insufficient material for a definitive diagnosis. Histological diagnoses included leukemic infiltration (6), normal testicular tissue (2) and juvenile granulosa cell tumour (1). 1 complication of a mild, self-resolving, scrotal haematoma occurred.

Conclusion

Early experience suggests US guided testicular biopsy can be performed safely, has a high diagnostic rate, and avoids major surgical procedures thus helping recovery and management of complex patients.

SCIENTIFIC PAPER SESSION 1

Paediatric aortic trauma management in a tertiary major trauma centre.

Puppala S, Nicholas N, Tingerides C, Troxler M, Shaw D
Presented by Sapna Puppala

Purpose

To appraise the imaging and treatment options in paediatric traumatic aortic injury (pTAI).
To identify the challenges in the diagnosis and endovascular management of acute pTAI and assess the feasibility and limitations of such techniques.

Materials and Methods

Review of prospectively maintained database of pTAI from 2008 to 2020.

Results

Eight cases of pTAI were identified between the age range of 7-16 years. Seven had blunt TAI due to road traffic collision or sports. One was a penetrating injury. In 87.5%(7/8), the diagnosis was made with a Computed Tomography scan at presentation. One patient had an evolving injury which required repeat imaging in 24-hours.

All cases were discussed at a multidisciplinary meeting before embarking on definitive management. 3/8 were thoracic TAI, 4/8 abdominal, and 1/8 had an injury at the diaphragmatic hiatus. 62.5%(5/8) had grade-3 injuries as per SVS criteria.

Endovascular treatment was performed in four(4/8) patients. Self-expanding stent-graft in 1/4, a balloon mounted stent-graft in 2/4 and aspiration thrombectomy in 1/4. 1/8 was a penetrating aortic injury between the SMA and the renal artery, treated with open surgical repair. Three cases managed conservatively.

In the five who underwent intervention, there was one type-1 endoleak detected intra-procedure which was treated with Palmaz stent. One stent compression discovered on follow-up with no flow compromise. Open repair patient needed revision surgery for graft infection.

Conclusion

pTAI is a rare and challenging entity. It is best managed in multidisciplinary setting with all options considered. Conservative, endovascular and surgery all have a role.

SCIENTIFIC PAPER SESSION 2

IR therapy of parapneumonic effusion: a prospective study on a standardized tPA clinical pathway

James C, Lewis S, Moore M, Wong K, Roberson P, Pezeshkmehr A, Ashton D
Presented by Charles James

Purpose

Evaluate fidelity of IR physicians on a clinical pathway for parapneumonic effusion fibrinolysis; evaluate changes in IR referrals and patient outcomes.

Materials and Methods

Background: SIR clinical practice standards report 7-17% chest tube failure in pediatric empyema.

A hospital wide clinical pathway for parapneumonic effusion was introduced (1 or 2 mg tPA BID based on pleural ultrasound grade), then prospective data collection was performed May 2017-February 2020. Data collection included: demographics, co-morbidities, PICU admission, pleural ultrasound grade, daily dose average, BID dose days, days of skipped dose, pleural therapy days, need for 2nd IR procedure, need for surgical drainage and length of hospital stay. This data was compared to IR patients treated January 2013-April 2017.

Results

63 patients were treated before and after pathway implementation. IR referrals increased from 1.2/month to 1.9/month after clinical pathway ($p = 0.015$), included higher co-morbidities ($p=0.003$) and more PICU patients ($p=0.03$). Mean doses/day increased from 1.4 to 1.9 ($p<0.001$), BID dose days increased from 38% to 79% ($p<0.0001$) and mean pleural therapy days decreased from 4.1 to 2.8 days ($p=0.001$); patients with any skipped dose days decreased from 25% to 11% ($p=0.04$). No IR patients needed surgical intervention. 3 established and 3 new IR physicians participated over the 2.8 year prospective study period. No statistical differences were observed for demographics, ultrasound grade, need for 2nd IR procedure and hospital stay.

Conclusion

IR physician standardization improved on a clinical pathway for fibrinolysis of parapneumonic effusion. Despite higher patient complexity, pleural therapy duration decreased and need for surgical intervention was eliminated.

SCIENTIFIC PAPER SESSION 2

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
Presented by Shankar Rajeswaran

Purpose

Unicameral bone cysts (UBCs) are benign lesions that primarily occur in childhood and are often asymptomatic and self limiting; however, UBCs can present with pain, pathologic fracture and growth disturbance. Existing treatment approaches for the management of UBCs are highly variable and recurrence is not uncommon. This study seeks to evaluate an image-guided, minimally invasive combination of chemical sclerotherapy and synthetic grafting as a novel outpatient management treatment option for UBCs.

Materials and Methods

Retrospective evaluation of twelve pediatric patients, ages 5-14 years, undergoing treatment for a UBC, at a single institution. All UBCs were treated in a single, minimally invasive, image guided procedure using percutaneous needle access into the UBC followed by chemical sclerotherapy and injection of regenerative synthetic graft. Patients were followed clinically, and with serial radiographs, to evaluate for healing and complications, with an average follow-up of 9.2 months.

Results

11 of 12 (91.7%) patients showed healed cysts at their most recent follow-up and there was one case of recurrence noted at 3 months. Patients were pain-free and returned to normal physical activity on average within 2.2 months, and all patients remained asymptomatic at the most recent follow-up. There were no complications related to the procedures.

Conclusion

Image guided chemical sclerosis and bone grafting is a minimally invasive treatment option for unicameral bone cysts and compares favorably to other existing treatment options. Given the high efficacy and low morbidity of this treatment approach, the preliminary findings of this technique are promising as a novel management option for UBCs.

SCIENTIFIC PAPER SESSION 2

Risk factors and outcomes of bronchopleural fistula in children with pleural empyema treated with an image guided chest tube: A Case-Control Study

Davda S, Amirabadi A, Bickford S, Thakor A, Rea D, Cohen E, Connolly B
Presented by Sunit Davda

Purpose
Community-acquired pneumonia may become complicated by parapneumonic effusion (PPE), necrotizing pneumonia and abscess formation. Management of symptomatic PPE includes pleural drainage, with/without fibrinolytics. Peripheral pulmonary necrosis can progress to bronchopleural fistula (BPF). The purpose was to compare children with PPE and BPF to children with PPE without BPF, to identify predictors for BPF.

Materials and Methods
Cases and Controls were identified from children with PPE who required drainage by interventional radiology. Cases were children who developed BPF, were date-matched (1:2) to Controls who were children without BPF. Demographics, clinical signs, laboratory results, imaging findings (ultrasound, chest radiograph), management (drain size, fibrinolytics, suction) and temporal metrics were analysed.

Results
Between 2000-2018, 374 children with PPE had chest tube placement by interventional radiology. There were 49 Cases and 98 Controls. Univariate analysis demonstrated no significant difference in demographics, laboratory findings, organisms or drain management between Cases and Controls. Patients with radiographs demonstrating pneumatoceles or mediastinal shift ($p<0.001$; $p=0.010$), ultrasound demonstrating necrosis or echogenic fluid ($p<0.001$; $p=0.008$), and aspirating serosanguinous fluid ($p=0.018$), were significantly more likely to develop BPF. Multivariable analyses found Cases were 3.8 times more likely to have necrosis, 4.3 times more likely to have mediastinal shift and 6.4 times more likely to have pneumatoceles than Controls ($p=0.038$, $p=0.031$, $p=0.010$ respectively). Cases had significantly prolonged drain dwell time, drainage to discharge time, and length of stay.

Conclusion
Predictors of include pneumatoceles, mediastinal shift and sonographic necrosis. BPF is associated with significantly prolonged temporal metrics. These results enable informed discussions with clinicians and parents.

SCIENTIFIC PAPER SESSION 2

Port-a-catheter (port) infections in children

Badar Z, Amaral J, Bickford S, Alshehri H, Temple M, Parra D, Muthusami P
Presented by Zain Badar

Purpose

Evaluate the incidence of port removals due to infection and the risk of reinfection after port reinsertion.

Materials and Methods

IRB approved retrospective review of children with port removals secondary to infection between 2014 to 2019. Data collected: age at diagnosis, primary diagnosis, incidence of infection within the first 30 (early) and after 30 (late) days post port insertion, Antibiotic therapy, culture results (line/peripheral, tip, wound swab) and number of colonies from each site, bridge vascular access device utilized or not, date of port reinsertion, incidence of port reinfection and correlation with time of reinsertion.

Results

1044 ports inserted in 973 patients over 5 years. 87 Ports (8.3%) removed secondary to infection (41% in Acute lymphocytic leukemia (ALL) patients). 33 positive catheter tips (mostly in ports removed within 30 days of insertion), with Staphylococcus Aureus the most common organism. 57 patients had a bridge vascular access device. 42 ports were reinserted and 7 got reinfected. There was no correlation between time of reinsertion post infection and reinfection.

Conclusion

Port infections occurred in 8.4% of patients. No correlation was established between risk of reinfection and time of reinsertion.

SCIENTIFIC PAPER SESSION 2

Establishing IR Capabilities in Tanzania: A Pediatric Perspective

Behbahani K, Mei Chan S, Khoncarly S, Solomon N, Rukundo I, Mbuguje E, Minja F
Presented by Keywan Behbahani

Purpose

Absence of training opportunities has created an unmet demand for interventional radiology (IR) in Tanzania, where children under age 15 comprise more than 40% the population. Road2IR, established as a multi-national effort to create the first self-sustaining IR training program in East Africa, opened the possibility of minimally-invasive procedures to over 19 million pediatric patients in Tanzania.

Materials and Methods

From October 2018 to February 2020, 14 teaching teams of 14 IR faculty, 16 technologists, 14 nurses, 9 residents, and 9 medical students traveled to Tanzania from North America on two-week teaching trips. A two-year Master of Science in IR was established at the nation's main academic teaching institution, modeled on current IR training curricula in the United States.

Descriptive statistics were used to characterize procedures specific to patients ≤18 years old.

Results

To date, the first Tanzanian IR service performed a total of 408 procedures, of which 7.6% (31/408) were performed on 29 patients under 18 years old. 100% (31/31) procedures were non-vascular procedures and technically successful. 96.8% (30/31) were complication-free; while 3.2% (1/31) had an SIR Class A complication. 71.0% (22/31) were overseen by visiting IR faculty; 29.0% (9/31) were performed independently by Tanzanian trainees without a visiting team present.

Conclusion

Herein we provide a training model to address demand for pediatric IR in a resource-limited setting, resulting in a high rate of complication-free treatments. Further work is needed to support growth through sustainable equipment sourcing and increasing educational opportunities.

SCIENTIFIC PAPER SESSION 2

Use of handcrafted multi-perforated balloon is feasible for topical deliverty of Mitomycin-C in pediatric patients with refractory esophageal strictures

Cardarelli-Leite L, Hoang T, Avinashi V, Heran M
Presented by Manraj Heran

Purpose

To demonstrate the technical feasibility of delivering topical MMC in a safe fashion via an alternative, handcrafted, multi-perforated balloon (HMB) in pediatric patients with esophageal strictures

Materials and Methods

We conducted a retrospective chart review of 6 patients who underwent topical application of Mitomycin-C using the HMB for treatment of esophageal strictures since March 2017 after obtaining Ethics approval. Numerous pinpoint holes were created in a readily available 2 cm long Tyshak balloon of different diameters using a 30 gauge needle. A "sandwich" technique of Omnipaque contrast-MMC-Omnipaque injection was done for drug administration at the site of therapeutic balloon dilation. Clinical variables were reviewed, including patient age, number of previous/subsequent dilation procedures, and underlying etiologies were reviewed, as were radiographic/fluoroscopic information.

Results

Successful delivery of full planned MMC dose using the HMB was accomplished in all 6 patients without complication or technical issues. The majority of patients (4/6, mean age 8 months) had previously repaired tracheoesophageal fistulas, with strictures recalcitrant to traditional treatment methods. 2/6 patients (mean age 10 years) had eosinophilic esophagitis and ectopic gastric mucosa. 5/6 patients had marked improvement following HMB-aided MMC application, with no additional dilations required and relief of clinical symptoms (mean follow up 20 months).

Conclusion

We demonstrate a relatively simple modification of a readily available balloon to allow successful fluoroscopic and/or endoscopic circumferential delivery of topical MMC circumferentially in pediatric patients with recalcitrant esophageal strictures.

CHALLENGING CASES SESSION 1

Percutaneous Endovascular Arteriovenous Fistula Formation for Haemodialysis Access in a Paediatric Patient

Wijesinghe H, Evans E, McCarthy L, Stephens S, Jones R, McGuirk SP
Presented by Haren Eranga Wijesinghe

In 1966, the Cimino-Brescia Arteriovenous Fistula (AVF) shifted paradigms in haemodialysis access. Despite improvements to surgical fistula formation, results remain suboptimal, especially in the paediatric population.

We present a case of percutaneous endovascular AVF formation in a 14-year-old boy, requiring haemodialysis for a failed renal transplant following chronic renal failure. Initial ultrasonographic imaging and venography demonstrated a complete occlusion of the right brachiocephalic vein, variant left-sided superior vena-cava. Discussion at the multi-disciplinary renal access meeting opted for an endo-AVF as he was not a suitable surgical candidate.

The procedure was performed under general anaesthetic with a supraclavicular nerve block. Venous access was achieved in the basilic vein, which was used to navigate into the medial brachial vein with venography demonstrating patent central venous drainage. Ulnar artery was accessed for inflow. After the arterial (ulnar trunk) and venous (ulnar vein) catheters were aligned using magnetic coaptation, the everlink-Q endo-AVF system was used to form the AVF.

Arterialisation of superficial veins was promoted by endovascular coil occlusion of the lateral brachial vein. Technical success was demonstrated with good venous outflow through the fistula. No complications were encountered.

Post-procedural ultrasound demonstrated fistula patency. However, there was persistent venous stenosis of the cephalic vein precluding maturation. This was treated by a subsequent venoplasty and embolisation of a large collateral vein four weeks following fistula formation. The success of this procedure demonstrates the value of endo-AVF formation in complex cases, allowing more children to benefit from a non-surgical AV fistula and avoid further haemodialysis lines.

CHALLENGING CASES SESSION 1

Superselective retrograde lymphatic duct embolization for the management of post-operative right chylous pleural effusion

Prajapati H, Maller V, Agrawal V, Proctor K, Gold R
Presented by Hasmukh Prajapati

A 17 yo male with history of diffuse large B-cell lymphoma developed chylous right pleural effusion after surgical open mediastinal lymph node biopsy before 5 months from the first lymphangiogram procedure. After biopsy, he developed right chlylous pleural effusion. No malignant cells were seen in the aspirated fluid. Lymphagiogram was performed via bilateral groin intranodal injection with total of 4 cc of lipidol oil + 1 cc of iodinated contrast injected very slowly over a period of 90 minutes. Cone beam CT images were obtained after 3 hours. No leak was identified from the thoracic duct. It didn't opacify cisterna chyle (Image 1). Next, frequency of thoracocentesis increased from once in 2 weeks to once in 10 days and the fluid became cloudier. So, the group decision was taken to perform thoracic duct embolization. Initially, ultrasound of left neck was performed and thoracic duct was marked on the left side of neck in AP view. A 22G needle was placed at the marker site which helped to access the thoracic duct with the use of a 5F Kumpe catheter via left brachial vein was access (image 2). Next, 2.4F Prograde and 0.018" glidewire were coaxially advanced through the 5F Kumpe catheter into the thoracic duct. Lymphangiogram was performed once the tip of the microcatheter was in the thoracic duct at T4 level revealed a leak (Image 3). Around T10 level, the thoracic duct was embolized with 6 mm x 2 cm microcoils. The part of the thoracic duct from the T7-T10 was embolized with 1 cc of glue; ratio of 1:1 (glue: Ethiodol oil) (Image 4). Pleural effusion resolved after the procedure. 5 months post procedure, X-ray chest was clear.

CHALLENGING CASES SESSION 1

Six year old girl with massive lower GI bleed due to sacral neuroblastoma metastasis invading the rectum, managed by transarterial embolization and transrectal endoscopic-guided percutaneous nBCA embolization (with additional intra-arterial Amphotericin B infusion for treatment of mucormycosis colitis)

Heran M, Cardarelli-Leite L, Maroo S, Dix D, Barker C
Presented by Manraj Heran

A six year old girl with advanced Stage IV neuroblastoma presented with recurrent significant lower gastrointestinal hemorrhage, refractory to medical therapy. CT imaging demonstrated a metastatic deposit in the sacrum invading the adjacent rectum, as was seen on direct lower endoscopy. "Classical" transarterial embolization of the sacral metastasis was first performed using a combination of polyvinyl alcohol particles, coils, and Gelfoam slurry, with 90% reduction in the degree of tumour blush. However, some residual arterial supply remained not felt amenable to transarterial embolization. With the right common femoral arterial sheath sutured in place, the patient was turned into a left lateral decubitus position. Transrectal endoscopic visualization of the metastasis invading the rectum was provided by the gastroenterology service. Direct percutaneous endoscopic guided embolization of the tumour was then done using a 33% nBCA:Lipiodol mixture (total 3 mL), performed using a 22 gauge 5" spinal needle advanced coaxially through a vascular dilator. The patient was re-positioned supine, with repeat angiography demonstrating further reduction in the residual tumour blush. At the time of preembolization angiography, a rare variant of the inferior mesenteric artery was encountered, seen to supply the entire colon, including the iliocolic and middle colic branches. Given the known mucormycosis colitis, and concerns of worsening nephrotoxicity with systemic administration of anti-fungal medications, 100 mg of Liposomal Amphotericin B was administered intra-arterially into the IMA to enhance first-pass efficacy of therapy. Post-treatment, the patient has had further GI bleeds, with her colitis also having resolved.

CHALLENGING CASES SESSION 1

Endovascular management of portal hypertension following meso-Rex shunt

Bishay M, Sharif K, Hartley J, McGuirk S
Presented by Mark Bishay

A 3 year old girl was referred to our quaternary hepatology service with upper gastrointestinal bleeding from oesophageal varices which were treated endoscopically. She was found to have an idiopathic portal cavernoma.
She had persistent large varices and breakthrough bleeds despite endoscopic treatment. She was not jaundiced but had persistently raised transaminase levels.
Retrograde hepatic venography was performed, which confirmed portal hypertension and demonstrated patency of the Rex vein, as well as continuity of the right and left intrahepatic portal veins. Liver biopsy demonstrated features of portal biliopathy.
She underwent a meso-Rex shunt (mesenterico-left portal vein bypass) procedure. This was complicated by haemorrhage requiring a re-laparotomy the following day. She subsequently made a good recovery, ultrasound confirmed shunt patency, and she was discharged one week post procedure.
She presented 8 months later with a further large upper gastrointestinal bleed. CT angiogram demonstrated stenosis at the proximal and distal ends of the meso-Rex shunt, and arterial fistulous communication with the shunt.
Trans-splenic portal venography, trans-hepatic portal venography and superior mesenteric angiography were performed. These demonstrated arterio-portal fistula at the caudal end of the meso-Rex shunt, with multiple, further arteriovenous fistulae through the mesenteric arcade;
anastomotic stenosis of the meso-Rex shunt at both ends; discontinuity of the ileocolic vein from the remainder of the SMV and left portal venous system; portal cavernoma with portal hypertension and gastric varix.
What would you do next?

CHALLENGING CASES SESSION 1

Gorham Stout- Mechanical disruption, sclerosis and grafting for recurrent right femur fracture

Rajeswaran S, Johnston A, Donaldson J, Green J, Reichek J
Presented by Andrew David Johnston

Gorham Stout Disease, which is also known as vanishing bone disease, is characterized by bone resorption secondary to massive osteolysis relating to underlying lymphatic abnormalities. Given the rarity of this disease, no standardized treatment option exists. For more localized disease, surgery and radiation therapy are often utilized; however, for more diffuse involvement, systemic therapies such as sirolimus has shown promising results.

Here we report a 14 year old male with Gorham Stout disease with diffuse involvement of his appendicular skeleton. Despite being on sirolimus there had been progression of his disease such that he often fractures bilateral upper and lower extremity long bones, which are managed conservatively, often with external fixation.

Due to continued disease progression and the patient's new found inability to walk, a novel treatment option was performed after a multidisciplinary conference. Using 7 different access needles ranging from an 8g to a 14g needle- multiple right femoral cysts were mechanically disrupted using curettes and balloons and the cystic spaces were sclerosed with doxycycline. Next, the right femur was grafted with a resorbable bone graft (Prodense). The patient was admitted to the ICU for pain control and was discharged 5 days later.

Follow-up radiographs at 5 months shows excellent healing of the right femur with increased sclerosis and cortical thickening. The patient has subsequently had the right tibia grafted. The plan is to graft the left lower extremity in the near future and then begin aggressive rehabilitation in an attempt to get the patient walking again.

CHALLENGING CASES SESSION 1

Persistent biliary leak following blunt abdominal trauma managed with glue embolization

Le V, Fagan N, Lin T, Kotagal M, Patel M
Presented by Viet Le

13-year-old male suffered blunt abdominal trauma following a handlebar injury. Initial CT demonstrated a grade IV liver laceration with subcapsular hemorrhage, managed non-surgically. The patient was discharged home and represented to the hospital seven days post injury with worsening abdominal pain and vomiting. Repeat CT showed diffuse abdominal ascites with evolution of the liver laceration. An IR drain was placed and drained 2200 mL of bile. Multiple ERCPs were performed and demonstrated the biliary leak with internal stent placement.

The patient was discharged home and returned to the hospital 2 weeks later with worsening abdominal pain. Repeat CT showed multiple loculated bilomas, all drained by IR, including a collection at the site of bile leak. The output from the drains, especially at the site of bile leak, persisted. A combination procedure with GI/ERCP and IR was performed.

ERCP again delineated the site of biliary leak. GI was unable to direct an endoscopic catheter to the site. IR was able to place a microcatheter through the ERCP catheter to the site of the biliary leak. Embolization of the biliary leak with n-Butyl Cyanoacrylate (n-BCA) was performed. Following the embolization, there was no further output from the drain at the leak site.

We present a case of successful glue embolization of the biliary tree for post-traumatic biliary leak in a previously healthy pediatric male.

CHALLENGING CASES SESSION 2

Threatened limb 1st day of life

Lewis S, James C, Moore M, Moursi M, Miquel-Verges F
Presented by Spencer Lewis

Term newborn born vaginally with shoulder dystocia, was noted to have a cool and discolored left upper extremity within hours after delivery. Doppler ultrasound reported absent left brachial artery waveform. IR was consulted and requested UAC placement prior to transport to our facility. Vascular Surgery recommended aggressive IR treatment for this threatened limb. IR staff sought SPIR list serve input during several hour patient transport and requested direct admission to the IR lab. List serve input included favoring umbilical artery access, tips to maximize intraprocedural progress, shorter lysis duration and tPA/heparin dose recommendations for this 3.6 kg newborn.
Neonatal service placed UAC in the IR lab while head ultrasound showed subtle echogenic abnormality of the right basal ganglia favoring ischemia over hemorrhage. Angiogram confirmed left brachial artery occlusion with limited collateral flow to the elbow. Guidewire manipulations and catheter aspirations were performed under roadmap fluoroscopy before and after lacing the brachial thrombus with 1.8 mg tPA via infusion catheter over 1 hour. Procedural follow-up angiograms showed improved brachial artery flow with radial artery flow to the wrist. Overnight infusion of tPA (0.1 mg/kg/hour) and heparin (10 units/kg/hour) ensued.
Hand perfusion was clinically improved the following morning. MRI showed right basal ganglia ischemia, right cortical watershed infarcts and right transverse sinus thrombus. Follow-up angiogram at 14 hours showed improved arterial flow in the forearm with good palmar arch supply to the hand. Thrombophilia labs were unremarkable. Neurology follow-up at 11 months showed normal function of the left upper extremity.

CHALLENGING CASES SESSION 2

Sharp Portal Vein Recanalization for idiopathic portal vein occlusion complicated by varices

Ashton D, Lewis S, Wong K
Presented by Daniel Ashton

9 year old otherwise healthy male with idiopathic portal vein occlusion with cavernous transformation and esophageal varices diagnosed at age 5. He had been undergoing serial prophylactic upper endoscopy and variceal banding with one episode of severe bleeding post endoscopy. He had been evaluated for a meso-rex shunt, but the family declined to proceed. Has had chronically low platelets (53 prior to procedure), slightly elevated ammonia (73), INR 1.3 and had required intermittent blood transfusions. After securing transplenic access, a portal venogram was performed with cone beam CT. Intrahepatic portal vein was then accessed percutaneously using needle guidance. A loop snare was deployed at the hepatic hilum via the transplenic approach and sharp recanalization was then performed via a 4 Fr sheath, 18 G x 10 cm Chiba, and a 22 G x 8 inch spinal needle. A wire was passed through the transhepatic needle, snared, and pulled back through the transplenic sheath to gain through and through access. The tract was then dilated and a 5 x 39 mm covered, balloon expandable stent was deployed. 7 months post procedure follow up and varices have resolved on upper endoscopy, plt count 73, ammonia 57 (normal).

CHALLENGING CASES SESSION 2

Subclavian vein stenting in a patient with Paget-Schroetter's syndrome

Shaikh R
Presented by Raja Shaikh

12 year-old female presented with right upper extremity DVT. On evaluation, she was found to have venous compression at the thoracic outlet. DVT was resolved with CDT. She underwent first rib decompression. Follow up venogram showed restenosis which was recanalized and angioplastied. Patient discharged on LMWH. She continued to present with recurrent DVT and restenosis. Recanalization and angioplasty was repeated thrice which was difficult each time. Options of venous reconstruction graft versus stent were discussed. A subclavian stent was eventually placed to establish long term patency. Patient was discharged on LMWH which was discontinued after 2 years. She remains asymptomatic on follow up at 5 years.

CHALLENGING CASES SESSION 2

Aorto-esophageal fistula in a child treated with placement of aortic stent graft

Josephs S, Young V
Presented by Victoria Young

Case Report:
Aorto-esophageal fistula in a child treated with placement of aortic stent graft.

Introduction:
A 22-month-old child with DiGeorge syndrome and complex congenital heart disease presented with repeated episodes of upper gastrointestinal bleeding (UGIB). Cardiac anatomy included pulmonary atresia and major aortopulmonary collateral arteries (MAPCAs) with prior surgical correction. Endoscopy demonstrated a linear tear in the esophagus with a visible surgical clip from MAPCA repair. Massive bleeding was noted with hemostatic clip placed. Immediate angiography was performed. Femoral arteries measured 3 mm in diameter. Five and 6 Fr sheaths were placed at each groin. IVUS confirmed the site of MAPCA clip at location of EGD clip. A 5 mm x 22 mm Atrium iCast undersized stent was deployed in the thoracic aorta at the level of suspected bleeding, held in place by an additional 5 mm diameter balloon from the contralateral groin. After some difficulty, the stent was over expanded by placement of a 10 mm x 20 mm balloon through the stent. No further bleeding occurred from this site.

Discussion:
Small femoral artery size required intentional under sizing of a covered stent to allow delivery through small femoral sheaths. This innovative approach required the use of various techniques of stent repositioning within the aorta to treat a life-threatening episode of bleeding. Aorto-esophageal fistula is very rare in a child but can be treated expeditiously with endovascular control.

CHALLENGING CASES SESSION 2

Ultrasound-guided snare retrieval of retained 1 French neonatal peripherally inserted central catheter (PICC) fragment

Lilly M, Tulin-SIlver S
Presented by Sheryl Tulin-Silver

Catheter fracture and embolization is an uncommon but clinically salient complication of peripherally inserted central catheter (PICC) placement. Percutaneous retrieval has been established as an effective and minimally invasive method for the removal of such intravascular foreign bodies. While many techniques exist, this procedure is typically performed with the use of fluoroscopic guidance. We present a case of ultrasound (US) guided percutaneous snare retrieval of a retained 1 French PICC fragment from the inferior vena cava (IVC) of a 14 day old 3.3 kg neonate with congenital heart disease. While fluoroscopy was used for sheath placement via right internal jugular (IJ) vein access, US was used to guide snare retrieval of the PICC fragment because the tip of the PICC was poorly visualized by fluoroscopy due to its small caliber and numerous overlying densities including defibrillator pads.

CHALLENGING CASES SESSION 2

Emergent Endovascular Treatment of Iatrogenic Vertebral-Venous Fistula in an Infant with Hemophilia

Badar Z, Muthusami P, Alshehri H
Presented by Zain Badar

Procedure Description: Iatrogenic vertebral-venous fistula treated emergently with vertebral sacrifice; recanalization of single-hole fistula via multiple feeders treated with EVOH liquid embolic for complete cure.

Technique/Approach:
Infant transferred from the neurosurgical operating room with packing for uncontrolled hemorrhage. Emergent cerebral angiography via 4Fr transfemoral access demonstrated a dissected segment of the vertebral artery in the V3 segment, with arteriovenous fistula (AVF) at the C1 level, shunting into the epidural venous plexus with paraspinal reflux and post-fistulous venous pseudoaneurysm under the packing material. Coil embolization performed across the fistula, in the arterial true lumen, approaching via ipsilateral caudad to form a coil basket and nesting this from contralateral access across the vertebrobasilar junction, to deconstruct the AVF.

Recanalization suspected on follow-up MRI in 6 months and confirmed on angiography to be resultant to luminal remodeling of the dissected segment. Complete closure of the AVF achieved with EVOH liquid embolic (Onyx-18 and Squid-12) through the coil mass, with balloon protection of the upstream vertebral artery below the PICA origin. Fistulous point and venous outflow completely casted, with reflux into multiple arterial feeders, achieving complete angiographic exclusion.

Outcome of Procedure:
Complete angiographic cure; no neuro-clinical deficits.

MORBIDITY & MORTALITY SESSION 1

Direct Intrahepatic Portosystemic Shunt (DIPS) with Gunsight Technique in Combination with IVC Stenting in a Patient with Budd-Chiari Syndrome, Complicated by Colonic Perforation and Shunt Thrombosis

Gemmete J
Presented by Amber Liles

10-year-old male presented with abdominal distension, found to have ascites and hepatosplenomegaly, diagnosed with Budd-Chiari syndrome. The patient had life-threatening malnutrition despite multiple hepatic venoplasties. IR was consulted for portosystemic shunt creation with a percutaneous approach planned. With a snare in the central right portal vein from percutaneous transhepatic portal vein access and another snare in the intrahepatic IVC, gunsight technique using an 18-gauge needle was used to create the shunt. Shunt creation was successful with an 8 cm 8-10 mm Viatorr TIPS Endoprosthesis dilated to 8 mm with the portosystemic gradient decreasing to 12 mmHg, previously 27 mmHg. During the procedure, thrombus formation was noted in the stent graft as well as the intrahepatic IVC despite continuous flushes and partial heparinization. Given extrinsic compression of the IVC from the caudate lobe as well as complete intrahepatic IVC thrombosis, the intrahepatic IVC was stented with a 16 mm x 6 cm Wallstent. Thrombus within the DIPS stent graft was treated with balloon maceration with improvement. Postprocedurally, the patient developed lactic acidosis, and an abdominal radiograph showed large volume intraperitoneal free air. He underwent exploratory laparotomy where a “pinpoint” hole was found at the hepatic flexure, treated with omental patching, in retrospect thought to be created by the gunsight access. Ultrasound one week later showed complete occlusion of the DIPS stent, and he underwent revision and thrombolysis with success. The patient had a 7-week hospital stay complicated by post-traumatic stress disorder but has otherwise done well with complete resolution of ascites.

MORBIDITY & MORTALITY SESSION 1

ENDOVASCULAR MANAGEMENT OF CONGENITAL PORTOSYSTEMIC SHUNT AND FOCAL NODULAR HYPERPLASIA WITH SEVERE COMPLICATIONS

Minhas K, Roebuck D, Chennapragada SM
Presented by Kishore Minhas

A 14-month-old presented with a 9x10x12 cm abdominal mass and was diagnosed with, biopsy proven, focal nodular hyperplasia (FNH) and an underlying congenital intrahepatic portosystemic shunt (PSS).

Following transfer to the national paediatric hepatobiliary centre it was agreed he would undergo embolisation of the FNH and endovascular closure of the PSS prior to surgical resection. The IR intervention was planned to take place immediately prior to surgery but, unexpectedly, took place on a Friday with surgery planned for the following Monday.

Using a transarterial approach, the FNH was embolised with 350-500 µm PVA particles. Using a transvenous approach, the PSS was closed with a 22 mm Amplatzer™ vascular plug (AVP).

Over the next 24 hours the patient had worsening abdominal distension and a rising serum lactate. CT scan showed the FNH, although devascularised, had increased in size. The arterial phase showed poor perfusion and the portal venous phase showed delayed enhancement of the solid abdominal viscera. The child was diagnosed with abdominal compartment syndrome and underwent emergent surgical decompression and resection of the FNH. On direct inspection the residual liver appeared well perfused.

Over the next 48 hours the child had worsening liver function tests. An abdominal radiograph showed the AVP had moved significantly, presumably during surgical handling. A re-look laparotomy showed the residual liver was ischaemic, presumed due to venous outflow obstruction, and the displaced AVP was removed.

The patient's hepatic function did not recover and he underwent a split liver transplant. He remains well at 1 year follow-up.

MORBIDITY & MORTALITY SESSION 1

Refractory hypertensive emergency: Intervening on neonatal renal artery thrombosis

Haber Z, Luhar A, Srinivasa R, Padia S
Presented by Zachary Haber

A 3-week-old full-term male had meconium aspiration at birth requiring intubation. Eight days after birth following removal of an umbilical artery catheter, he developed hypertensive emergency and hypertensive cardiomyopathy unresponsive to milrinone and nicardipine drips. Transthoracic echocardiogram demonstrated severe depression of biventricular function. Further investigation revealed partially occlusive left renal artery thrombosis.

Case description:
Aortogram was performed with a 3.3 French Mongoose catheter showing near occlusion of the left renal artery secondary to a large thrombus and minimal renal parenchymal staining. Access to the left renal artery was obtained utilizing an Echelon 10 microcatheter in combination with an 014 BMW microwire. Angioplasty was then carried out utilizing a 1.5 x 20 mm non-compliant balloon.

Complication: Post procedure angiogram demonstrated focal dissection of the left renal artery. Repeat angioplasty was performed with subsequent angiogram demonstrating resolution of left renal artery dissection, minimal improvement of luminal narrowing, and persistent large thrombus within the mid left renal artery.

Outcome: Four days later the patient had repeat left renal angiogram for persistent severe medically refractory hypertension with subsequent thrombolysis performed from the left renal artery ostium with 1mg tPA. Post thrombolytic infusion angiogram demonstrated mild improvement of clot burden with improved perfusion of the left renal parenchyma. Over the following days, the patient was weaned from anti-hypertensive drips, transitioned to oral anti-hypertensives, had improvement in cardiac function, and eventually transferred back to an outside facility in stable condition.

MORBIDITY & MORTALITY SESSION 2

Left superior gluteal arteriovenous fistula following biopsy of the left iliac bone

Weber J, Johnson N, Fagan N, Patel M
Presented by Jonathon Weber

A one-month old girl was diagnosed with the complex Kaposiform hemangioendothelioma/ lymphangiomatosis after biopsy of a skin lesion. Cross-sectional imaging was performed, which demonstrated diffuse bony lesions with a radiologically aggressive appearance. The IR service was consulted for image-guided osseous biopsy. A lesion in the posterior aspect of the left ilium was targeted for biopsy. CT-guided biopsy was performed with three satisfactory core samples obtained. No immediate complication was appreciated. Biopsy results reported as KHE morphology.
The patient continued routine imaging given burden of disease and to evaluate response to Sirolimus. At the age of 6, imaging demonstrated enlarging left iliac arteries and veins near the sacrosciatic notch, compatible with an arteriovenous malformation. With initial fear that this was related to the progression of the patient's disease, after review of all prior imaging and discussion at our vascular anomalies multidisciplinary conference, it was favored this was an arteriovenous fistula due to prior biopsy rather than primary disease. The imaging finding of the AVF was missed on all follow up studies for three years.
This case presentation will demonstrate the insidiousness of the complication of an AVF following bone biopsy. In this case, the AVF took years to recognize and was diagnosed because the patient was receiving routine follow up imaging. The AVF was treated with angiography and embolization which will also be described in this presentation.

MORBIDITY & MORTALITY SESSION 2

COMBINED IR AND UROLOGICAL MANAGEMENT OF A TRAUMATIC ARTERIO-VENOUS FISTULA, UNRELENTING MACROSCOPIC HAEMATURIA AND RETAINED BLADDER CLOT FOLLOWING TRANSPLANT KIDNEY BIOPSY

Minhas K, Chippington S, Patel P
Presented by Kishore Minhas

A 13-year-old male underwent an ultrasound (US) guided core needle biopsy of a left intraperitoneal transplant kidney due to elevated serum creatinine. Two 16-gauge cores were obtained from the interpolar region of the graft using a co-axial technique. The biopsy tract was plugged with Spongostan™ pledgets.

Several hours post-biopsy the child developed macroscopic haematuria and acute urinary retention. US demonstrated clot in the urinary bladder and mild pelvicalyceal dilatation. This was conservatively managed with urethral catheterisation and bladder irrigation.

Over the next week the patient had intermittent episodes of passing frank blood from the catheter. Repeat US demonstrated a small arteriovenous (AV) fistula in the interpolar region of the graft and a large volume of persistent clot in the urinary bladder.

On day 7 he passed a large volume of frank blood from his catheter. US demonstrated an increasing volume of clot in the urinary bladder, despite the in-situ urethral catheter, and increasing pelvicalyceal dilatation.

On day 8 he was taken to the Interventional Radiology suite where a catheter angiogram confirmed an AV fistula arising from an interpolar branch vessel. Using a microcatheter technique, the AV fistula was embolised with an Axium™ detachable coil. Following this, the urinary bladder was punctured under US guidance, the tract dilated, and a 30 Fr Amplatz sheath placed. With assistance from Urology, the extensive bladder clot was evacuated with a LithoClast™. A suprapubic catheter was left in-situ, as well as the urethral catheter, and bladder irrigation continued for several days. No further bleeding occurred.

MORBIDITY & MORTALITY SESSION 2

Complications from Transgluteal Drainage Catheter Placement for Deep Pelvic abscesses

Khoncarly S, McDaniel J
Presented by Sarah Khoncarly

Two companion cases of complications related to deep pelvic abscess drainage catheters placed via transgluteal approach are presented. In a span of two weeks, two pediatric patients presented to the emergency department with acute perforated appendicitis with associated deep pelvic abscess formation. Catheter drainage by Interventional Radiology (IR) was requested. In both cases, CT-guidance was utilized and percutaneous drainage catheters were successfully placed in the pelvic fluid collections via right transgluteal approach. After decreased output and clinical improvement, the drains were removed bedside. At the time of the removal, the first patient immediately complained of abdominal pain and lost consciousness. Code blue was called. Patient was found to have large volume hemoperitoneum on CT and required ICU observation and transfusion of one unit of pRBC. The second patient, immediately following drain removal, was noted to have brisk bleeding at the drain site accompanied with a complaint of severe abdominal pain. Direct pressure was applied for 20 minutes until hemostasis was achieved and a pressure dressing was applied. CT was obtained to evaluate for active internal bleeding and revealed a large volume hemoperitoneum and a 2 cm pseudoaneurysm along the piriformis muscle, likely off a branch of the inferior gluteal artery. Ultrasound guided injection of thrombin into the pseudoaneurysm was performed by IR. Color Doppler imaging showed no flow within the pseudoaneurysm following the injection confirming thrombosis. Both patients were discharged home with close clinical follow up.