ILLUMINATE

SPIR 11th International Meeting
October 2 - 4, 2023
Orlando, Florida

Society for Pediatric Interventional Radiology

Society for Pediatric Interventional Radiology

Dear Friends and Colleagues,

Welcome to the 11th International Meeting of the SPIR! We are thrilled to welcome each and every one of you here. Our 2022 gathering in Galway, Ireland, was a successful return to a predominantly in-person meeting. As we continue to adjust to new normal routines through the pandemic, we look forward to networking together once again.

Our society was born out of the desire to work collectively in the interest of the children and families that we serve. Pediatric interventional radiologists, whether in Sydney or Atlanta, Madrid or Singapore, face similar challenges and successes in patient care and practice building. We all want to answer the questions “How do you do that? How can we do it better? Where are the pitfalls? What gets you excited to go to work in the morning?” And of course, we have the mutual goal of advancing our field for the future, so that our investments in training pay dividends for decades to come.

The theme for this year’s scientific program is “Illuminate.” Sessions will challenge us to define and clarify our individual and collective goals in our practices. Cutting-edge care for complex problems such as venous thrombosis/pulmonary embolism and portal hypertension and shunts will be highlighted. We will offer a glimpse into PIR around the world, with spotlights on practitioners from diverse backgrounds. There will be sessions dedicated to practice building, training and education concerns, wellness, and the patient experience from start to finish. We will shine a light on the experiences of our wise membership with the return of our “Pearls in Practice”. And on the final day of the meeting, we are excited to present a dedicated block of M&M presentations. Of course, no meeting is complete without Scientific Abstract sessions, with selections from the best of the best submissions. Finally, we are proud to present Educational Exhibits for the first time.

There are so many people who contribute to this Society and its Annual Meeting. Thank you to the entire Board of Directors, Scientific Committee, our Invited Faculty, all who submitted scientific and educational work, and of course our industry partners. A special thanks is always in order for our Executive Director, Susan Harned.

Whether this is your first or your 11th SPIR meeting, enjoy your time in Orlando!

Leah Braswell
SPIR President, on behalf of the entire Board of Directors

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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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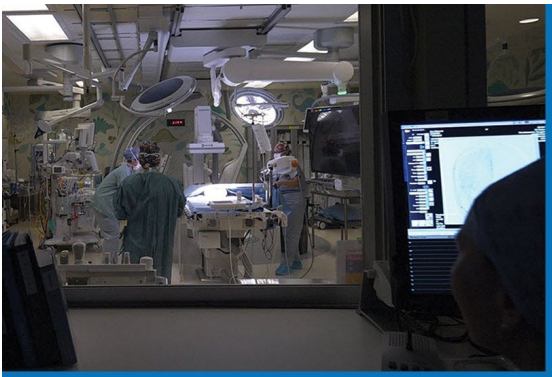

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2023 EMERITUS MEMBERS

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

Dr. James S. Donaldson
Ann & Robert H. Lurie Children's Hospital of Chicago

PHYSICIAN ACCREDITATION

Accreditation Statement

In support of improving patient care, this activity has been planned and implemented by Amedco LLC and Society for Pediatric Interventional Radiology. Amedco LLC is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

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To claim ACCME credit, learners must complete an evaluation form to receive a certificate of completion. Chosen sessions must be attended in their entirety. Partial credit of individual sessions is not available. Learner notification information will be provided after the meeting closes to those attendees that elected to obtain CME.

SPEAKER EVALUATIONS

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

SPIR Around the World: Who are we?

Deep Venous Thrombosis & Pulmonary Embolism

Scientific Publications

Patient Perspective

Pearls Session

Portal Hypertension and Portosystemic Shunts

Arc of a PIR Career

Practice Management

Urgent and Emergent

M&M Debrief

Take Care

Scientific Paper Session #1

Scientific Paper Session #2

M&M Cases Session #1

M&M Cases Session #2

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)

GOLD MEDAL RECIPIENT

Josée Dubois, MD, FRCPC, MSc

Dr. Josée Dubois received her MD from the University of Sherbrooke in 1984 and her Specialist's Certificate in diagnostic radiology from the RCPSC in 1989. She sub-specialized in pediatric diagnostic and interventional radiology and MRI at Hôpital Necker-Enfants Malades in Paris (1989-1991). She also has a master's degree in biomedical sciences (with optional medical research) from the University of Montreal (2006).

In 1991, Dr. Dubois began her career in pediatric diagnostic and interventional radiology at CHU Sainte-Justine (mother and child university hospital center), where she is still practicing. She acts as Head of the Interventional Radiology Section since 1991. She has been acting as the Head of the Medical Imaging Department from 2008 to 2017. She has extensive clinical experience in the field of vascular anomalies and has widely published on a range of issues related to that topic. She is in charge of the vascular anomaly's clinic at CHU Sainte-Justine since 1991.

Dr. Dubois is Full Professor of radiology in the Department of Radiology, Radio-oncology and Nuclear Medicine at the University of Montreal. She has been Director of the Diagnostic Radiology Residency Program (UofM) from 1998 to 2008 and she has also been Vice-Dean, Postgraduate Medical Education (UofM) from 2011 to 2015.

She has been principal investigator or co-investigator in many funded research projects. She is also author or co-author of more than 35 book chapters, 190 peer-reviewed articles and 460 research abstracts. She serves on different medical and university committees and on different organizations' Board of Directors.

Dr. Dubois is a Founding member of the SPIR.

GOLD MEDAL RECIPIENT

William "Bill" Shiels, DO

Born and raised in Cincinnati, OH, Bill was the youngest of four boys in a family of 11 children. He pursued his education with dedication, earning both a BS and a master's degree in biology from Villanova University, and a doctor of osteopathic medicine degree from the Philadelphia College of Osteopathic Medicine in 1983.

Bill's illustrious career started with the United States Army, where he completed a diagnostic radiology residency at Tripler Army Medical Center in Hawaii in 1988. Following this, he undertook a 2-year pediatric radiology fellowship at Cincinnati Children's Hospital Medical Center, where he was mentored by Dr. Donald Kirks and Dr. Diane Babcock.

In 1996, after fulfilling his military commitment, Bill moved to Columbus, OH, to develop and lead the Department of Radiology at Columbus Children's Hospital, later known as Nationwide Children's Hospital. Over the next two decades, he dedicated himself to providing excellent imaging and care for pediatric patients. Bill was known for his forward-thinking and relentless pursuit of excellence, driving the growth and development of the program.

Throughout his career, Bill made significant contributions to pediatric radiology, with 60 peer-reviewed publications, 20 book chapters, and over 500 lectures worldwide. His passion lay in treating infants and children with vascular malformations, bone lesions, embedded foreign bodies, and head and neck abnormalities. He pioneered non-surgical therapies for bone cyst and tumor ablation and received a grant from the Department of Defense for training Army physicians in minimally invasive techniques.

Bill received numerous awards and recognitions, including the 2015 Society for Pediatric Radiology Pioneer Award, the 2012 Golden Stethoscope award, and the 2011 Patients' Choice Award, among others.

His patients adored and trusted Dr. Shiels, and his team continues to tell stories of his devotion up until his last days. He was a decisive leader with a sparkle in his eye.

Beyond his professional achievements, Bill cherished his role as a father to his daughters Courtney and Moira.

He is deeply missed for his unwavering commitment to patients and his endless optimism in his work as a healing physician for children worldwide.

KEYNOTE SPEAKER

Eric J. Keller, MD, MA

Dr. Eric Keller is an IR/DR resident at Stanford University who founded the Applied Ethics in IR Working Group to develop practical solutions to salient ethical issues faced in IR practice. Dr. Keller attended medical school at Northwestern University where he also completed a masters in Medical Humanities & Bioethics with a focus on medical tribalism and turf wars. He has also served as a volunteer legal guardian and is on the board of directors of The Interventional Initiative, a not-for-profit organization devoted to awareness, access, and advocacy for minimally invasive image-guided procedures. His keynote talk will consist of a case-based discussion of salient ethical issues facing pediatric IR where the audience is invited to comment of a hypothetical case prior to sharing data and guidance on the underlying ethical issues being highlighted in each case. His discussion-based talks have been well received at multiple IR conferences over the last few years.

Society for Pediatric Interventional Radiology

SPIR Scholarship Fund

The SPIR Scholarship Fund was created to provide our Members-in-Training and Sponsored General Members financial assistance so that they may attend the SPIR's annual scientific meeting. SPIR thanks all the members who have generously donated to the SPIR Scholarship Fund and looks forward to your continued support in the future. Donate today!

https://spir.wildapricot.org/Scholarship-donation-form

Donations are not tax-deductible but are greatly appreciated

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:

2022: **Image-guided Interstitial Bleomycin Injections to Treat Challenging Vascular Malformations**
GIII 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.

Monday October 2, 2023

06:30 - 07:00 **Sunrise Wellness Session: Guided meditation with Erica Braswell**
(Contemporary lobby near pool entrance)

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

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

07:50 - 08:00 **Welcome & Announcements** (Leah Braswell)

08:00– 09:00 **SPIR Around the World: Who are we?**
Moderators: Anne Marie Cahill, Janice McDaniel
Panelists: Mohamed El Ghobashy, Kevin Fung, Alessandro Gasparetto, Dario Teplisky

09:00– 10:00 **Deep Venous Thrombosis and Pulmonary Embolism**
Moderator: Patrick Warren
IR Approach to PE (Patrick Warren)
A Hematologist's View (Riten Kumar)

10:00 - 10:30 **Networking Break** (Exhibitor Hall)
Featuring Platinum Level Sponsor Siemens Healthineers

10:30 - 11:30 **Scientific Publications**
Moderators: Shellie Josephs, Sean Pfaff
Successful Manuscript Preparation (Shellie Josephs)
How to Review Well (Andrew Trout)
Elements of a Successful Journal Club (Abhay Srinivasan)

11:30 - 12:30 **Scientific Papers Session 1**
Moderators: Rachelle Durand, Raja Shaikh
Abstracts start on page 23

12:30 - 13:30 **Lunch** (Fantasia Ballroom)
All medical students, residents, and fellows are welcome to gather at designated tables for this networking opportunity.

13:30 - 15:00 **Patient Perspective**
Moderators: Roger Harned, Craig Johnson
Child Life in IR (Arleen Karczewski)
Anesthesia in IR (Joshua Uffman)
Care of the Complex Child (Garey Noritz)
Patient Experience (Fabiola Weber, Ella Doherty)

15:00 - 15:30 **Networking Break** (Exhibitor Hall)

15:30 - 16:30 **Pearls Session**
Moderators: Horacio Padua, Seth Vatsky
Feed the Birds (Frederic Bertino)
The future role of venture capital / private equity in changing the future of healthcare economics (Roger Tomihama)
Keeping Score: Methods and Metrics of Measuring Program Performance in Pediatric Interventional Radiology (Seth Vatsky)
Building a program from the ground up (Eric Monroe)
With Age Comes Experience (For Better OR Worse) (Mark Hogan)

19:00 - 21:30 **Welcome Reception** (Porte Cochere)
Fireworks and a special guest will welcome you all to the SPIR.
All attendees and guests are welcome to join us. This is a kid-friendly event.

Tuesday October 3, 2023

06:30 - 07:00 **Sunrise Wellness Session: Morning Stretch** (Location TBD)

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

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

07:55 - 08:00 **Announcements**

08:00– 09:00 **Keynote Address: Dr. Eric J. Keller, MD, MA, Stanford University**
What is a Pediatric IR: Characterizing our Unique Professional Identity and Ideal Training Pathways

09:00– 10:00 **Portal Hypertension and Portosystemic Shunts**
Moderators: Aparna Annam, Eric Monroe
CPSS: Organized Approach (Rachelle Durand)
Under Pressure: Pediatric Portal Recanalization, Bypass & Diversion (Eric Monroe)
Imaging of abdominal shunts (Jebb Baker)

10:00 - 10:30 **Networking Break** (Exhibitor Hall)
Featuring Platinum Level Sponsor Provincial Health Services Authority - BC Children's Hospital

10:30 - 11:30 **Arc of a PIR Career**
Moderators: Michael Acord, Charles James
Training and Starting Out (Samantha Lee)
Making it Work in the Middle Years (Douglas Rivard)
The Later Chapters (Charles James)

11:30 - 12:30 **Scientific Papers Session 2**
Moderators: Aparna Annam, Moritz Wildgruber
Abstracts start on page 29

12:30 - 12:45 **Delegate Group Photo** (Location TBD)

12:45 - 13:45 **Lunch** (Fantasia Ballroom)

13:45 - 15:15 **Practice Management**
Moderators: Jared Green, Lavi Nissim
Building an interventional MR program from scratch (Erica Knavel)
The IR Department, from the day to day business to hospital politics (Manish Patel)
IR Manager Perspective (Laura Dickman)
Nurse Practitioners in IR (Raimie Lewis, Stacey Smetzer)
Panelists: Brienne Cummings, Jenny McKinney, Dan Tillet, Don Turne Katharine Willen

15:30 - 16:00 **SPIR Committee Meeting**
All are welcome who are interested in learning about the following committees: Global IR, Education & Training, Research & Registries, Communications. We will be meeting in the General Session Hall.

18:00 - 24:00 **SPIR Awards Banquet** (Sorcerer's Apprentice Ballroom)
Cocktail Reception & Banquet Dinner followed by dancing. Cash bar will be available after 9:00pm.

Wednesday October 4, 2023

06:30 - 07:00 **Sunrise Wellness Session: Run/Walk with Seth Vatsky**
(Contemporary lobby near pool entrance)

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

07:55 - 08:00 **Announcements**

08:00– 09:00 **Urgent and Emergent**
Moderators: Amir Pezeshkmehr, Brenton Reading
IR in Pediatric Trauma (Amir Pezeshkmehr)
Pediatric IR in the ICU (Hasmukh Prajapati)
Retained equipment (Sheryl Tulin-Silver)

09:00– 10:00 **M&M Session 1**
Moderators: Shellie Josephs, Dimitri Parra
Abstracts start on page 35

10:00 - 10:30 **Networking Break** (Exhibitor Hall)
Featuring Platinum Level Sponsor Philips Healthcare

10:30 - 11:30 **M&M Session 2**
Moderators: Raja Shaikh, Kumar Shashi
Abstracts start on page 38

11:30 - 12:30 **M&M Debrief**
Moderator: Anne Gill
Picking Yourself Up (Anne Gill)
IR M&M (Joao Amaral)
System Review (Matthew Hawkins)

12:30 - 13:30 **SPIR Business Meeting & Lunch**
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.

13:30 - 15:00 **Take Care**
Moderators: Lisa Kang, Sheena Pimpalwar
Finding Joy: Leading a Congruent Life at Work and Home (Ellen Chung)
Executive Coaching (Meg Stacy)
Professional well-being is good for patient care (Nghia-Jack Vo)
Making a (Big) Change (Lisa Kang)

15:00 - 15:30 **Networking Break** (Exhibitor Hall)

15:30 - 16:30 **JeopIRdy**
Hosts: Janice McDaniel, Nathan Fagan
Team Donald Duck: Dhara Kinariwala, Michael Collard, Mesha Martinez
Team Goofy: Anne Marie Cahill, Christopher Baron, Sarah Khoncarly

16:30 - 16:40 **Pioneer Award Presentation**
Closing Remarks
Meeting Adjourned

Educational Exhibits

The following Educational Exhibits are available for viewing on the SPIR 2023 Meeting Website. The passcode for this page was provided to all registered members via email.

CT-Guided Percutaneous Needle Fenestration for Non-Healing Ischial Tuberosity Avulsion Fractures

Malavia M, Reading B, Rivard D

Management Options for Pediatric Venous Thromboembolism

Mitta P, DiFatta J, Mahler C, Oser R, Huang J, Gunn AJ, Wilson H, Raja J

Percutaneous Biopsy of Subcentimeter Splenic Lesions

Nissim L, Desai S, Willard S

Percutaneous Transhepatic Cholecystocholangiography

Mabrouk A, Russell E, Plunk M, Woods M, Monroe E

Primary insertion of a low profile feeding tube

Chiramel GK

Starting and streamlining a Paediatric Interventional radiology service - A UK perspective

Arshad W, Igwe C

Techniques to Assist with a Challenging Pediatric Percutaneous Biopsy

Lee S, Cajigas-loyola S, Gaballah M, Acord M

Scientific Paper Session #1

Cervical intranodal lymphangiogram in pediatric cardiac patients; Technique, safety and clinical applications

Shahin M, Shashi K
Presented by Mohamed Shahin

Introduction
Inguinal intranodal lymphangiogram and MRL using water soluble contrast in right to left shunt patients sometimes not effective in opacification of the thoracic duct or the source of chylous effusion. Cervical intranodal lymphangiogram is a promising solution in these challenging cases. It has diagnostic and therapeutic applications to visualize the terminal thoracic duct for retrograde cannulation and treat anomalous lymphatic channels causing chylous effusion in cardiac patients with right to left shunt.

Materials and Methods
The medical records, imaging studies and procedure details were retrospectively reviewed for five patients who underwent diagnostic and therapeutic cervical intranodal lymphangiogram for chylous effusion.

Results
Five procedures were performed on five patients (0.3-8 years) who initially underwent inguinal intranodal lymphangiogram and MRL with failure to opacify thoracic duct or source of chylous effusion. The inguinal lymphangiogram and MRL were performed using water soluble contrast due to risk of paradoxical emboli in right to left shunt patients. The five patients had successfully underwent intranodal cervical lymphangiogram with opacification of terminal thoracic duct in three out of five patients (60%). The other two patients showed ectatic anomalous lymphatic channels that were leaking into pleural space without thoracic duct opacification. Three patients underwent retrograde cannulation of thoracic duct via transvenous approach with subsequent coil embolization of thoracic duct. Two patients underwent direct glue embolization through cervical lymph nodes with Glue propagation into the anomalous lymphatic channels that were leaking into pleural spaces. All Five patients have resolved chylous leakage into pleural spaces with removal of chest tubes in one week without complications.

Discussion
Options are limited in cardiac kids with right to left shunt and refractory chylous effusion that is resistant to conservative management. Using classic lymphangiogram and MRL may not opacify the thoracic duct or identify the source of the leak in these cases with limited options. Cervical lymphangiogram is easy and efficient tool to add to our toolbox when classic approaches fail. Intranodal cervical lymphangiogram in cardiac patients is safe and effective procedure to diagnose and treat chylous effusion.

IRB Statement
IRB exempt

Scientific Paper Session #1

Outcome of Children with Transjugular Intrahepatic Portosystemic Shunt – a meta-analysis of individual patient data

Deniz S, Monroe E, Horslen S, Srinivasa RN, Oecal O, Seidensticker M, Wildgruber M
Presented by Moritz Wildgruber

Introduction

To investigate outcome after pediatric Transjugular Intrahepatic Portosystemic Shunt (TIPS) with respect to survival.

Materials and Methods

After searching for studies on TIPS in children in Ovid, Medline, Embase, Scopus and Cochrane published between 2000 and 2022, individual patient data were retrieved from five retrospective cohorts. Overall survival (OS) and Transplant-free survival (TFS) were calculated using Kaplan-Meier analysis and log-rank test and compared to the indication (ascites vs variceal bleeding) as well as to the location of obstruction (pre-hepatic vs hepatic vs post-hepatic). Additionally, TIPS patency was analyzed.

Results

n=135 pediatric patients were included in the final analysis. Indication for pediatric TIPS creation was heterogeneous among the included studies. TIPS patency decreased from 6 to 24 months, subsequent pediatric liver transplantation was performed in 22/135 (16.3%) of cases. The presence of ascites was related with poorer TFS (HR 2.3, p=0.023) and a trend towards poorer OS (HR 2.9, p=0.069), while variceal bleeding was not associated with impaired survival. Analysis of the cause of obstruction (pre-hepatic, hepatic, post-hepatic) showed a trend towards reduced OS for post-hepatic obstruction (HR 3.2, p=0.092) and TFS (HR 1.3, p=0.057). There was no difference in OS and TFS according to age at time of TIPS placement.

Discussion

Presence of ascites associates with impaired survival after TIPS in children, with no differences in survival according to the age of the child. Interventional shunt procedures can be considered feasible for all ages.

IRB Statement

IRB waived

Percutaneous Drainage of Pediatric Pulmonary Abscesses: An Effective First-Line Therapy

Baker JB, Balu AR, Rajeswaran S, Patel SJ, Goldstein SD, Donaldson JS
Presented by Abhinav R. Balu

Introduction
Pulmonary abscesses are primarily managed via conservative antibiotic therapy with percutaneous drainage considered relatively contraindicated/reserved for those who fail medical management. Despite little evidence exploring the efficacy of percutaneous drainage as first line treatment, this approach is routine practice at our institution. The purpose of this study was to review our experience.

Materials and Methods
The medical records of children diagnosed with lung abscess and treated with percutaneous drainage from October 2005 through February 2023 were reviewed. Patient clinical parameters, follow-up imaging and clinical outcomes were evaluated.

Results
Results: Percutaneous drainage under imaging guidance was performed for 28 children with lung abscesses. A single catheter (8–12 Fr) was deployed and remained for a median of 6 days (IQR: 6-8 days). The median hospital stay was 10 days (IQR: 8.8-14.8 days). The success rate for percutaneous drainage of primary abscesses was 100% (26/26). Two children were later diagnosed with secondarily infected congenital pulmonary airway malformations, which were surgically resected and thus excluded from our analysis. The abscess cavities resolved in all 26 patients and catheters were removed upon clinical, radiographic, and laboratory improvement (both CRP and WBC levels decreased significantly following drainage, $p<.001$). Complications included the development of 1 intra-procedural pneumothorax and 3 bronchopleural fistulas, which required extended pleural chest tube drainage.

Discussion
Percutaneous drainage of pulmonary abscesses is an effective therapeutic option in children and should be considered as first-line treatment. Bronchopleural fistula can occur, but at a lower frequency than feared/previously reported.

IRB Statement
IR 2023-6115

Scientific Paper Session #1

Endovascular Management of Pediatric Dialysis Access: A Retrospective Study

DiFatta J, Mahler C, Mitta P, Oser R, Huang J, Gunn A, Raja J
Presented by Jake DiFatta

Introduction
To investigate whether pharmaco-mechanical intervention can be safe and effective in the maintenance of pediatric dialysis access fistulas and grafts.

Materials and Methods
A retrospective analysis of 75 interventions performed on 17 pediatric patients with dialysis access-maintenance interventions was conducted. Frequency of use of angioplasty, stenting, advanced techniques (e.g. rotational thrombolysis devices), and thrombolytic agents such as tissue plasminogen activator (tPA) were recorded across interventions. Total number of interventions per patient and time between reinterventions were measured. The safety, technical success, and clinical success of these therapies was then assessed according to the SIR complication guidelines.

Results
The application of pharmaco-mechanical intervention demonstrated a favorable safety profile and high success rates across all categories. Notably, no major complications were observed during or after the procedures. Among the 75 interventions, angioplasty was the most frequently employed technique (n= 63, 84.0%), followed by thrombolysis (n= 32, 42.7%), advanced therapies (n= 13, 17.3%), and stenting (n= 10, 13.3%).

Discussion
The use of endovascular techniques for dialysis access maintenance in pediatric patients including angioplasty, stenting, thrombolysis, and advances therapies can be safely and effectively performed. Notably, no major complications were reported in any of the 75 interventions performed on 17 patients, primary technical success was achieved in 97.3% (73/75), and average time to reintervention was 135 days for the 15 patients who underwent more than one procedure.

IRB Statement
300011474

Transfemoral, transcaval liver biopsy in pediatric patients; a single-center experience

Malavia M, Le V, Rivard D, Kaine S, Romans R, Rockefeller T, Fischer R, Reading B
Presented by Mira Malavia

Introduction
Transjugular liver biopsy is commonly used when a percutaneous approach is contraindicated. Recently, the transfemoral, transcaval (TFTC) approach has been employed when hepatic veins cannot be cannulated. Pediatric patients with Fontan-associated liver disease (FALD) develop hepatic fibrosis due to increased venous pressure from Fontan circulation 6. Liver biopsies for FALD evaluation are often performed concurrently with cardiac catheterizations to reduce sedation time and anesthetic exposure. A transvenous approach is indicated due to cardiac procedure anticoagulation and a transfemoral approach allows avoidance of postsurgical vasculature. While feasibility of TFTC liver biopsies has been studied in adults, it has not been described in pediatric patients to our knowledge. Our purpose is to describe our experience of TFTC liver biopsies in pediatric patients

Materials and Methods
Retrospective chart review was performed on 11 TFTC liver biopsies from September 2022 to July 2023. Demographics, pre- and post-biopsy clinical data and procedural data were collected. The patient cohort included 11 patients with FALD (5 female, 6 male) mean age of 15 years (range 10-22). Vital signs were obtained within one hour of procedure start and after at least four hours post.

Results
All biopsies were diagnostic, and all patients remained hemodynamically stable with at least 4 hours of post procedure observation. One minor complication occurred with nontarget biopsy of lung tissue. No patient showed signs of hemorrhage or experienced major complications.

Discussion
TFTC liver biopsies are feasible, effective, and safe in pediatric patients.

IRB Statement
STUDY00002766

Scientific Paper Session #1

Technical Feasibility and Clinical Efficacy of Iliac Vein Stent Placement in Adolescents and Young Adults with May-Thurner Syndrome

Bertino F, Hawkins CM, Woods GM, Shah JH, Variyam DE, Patel KN, Gill AE
Presented by Frederic Bertino

Introduction
To report the technical feasibility, safety, and clinical efficacy of iliac vein stent placement in young patients with May-Thurner Syndrome

Materials and Methods
Single-institution retrospective review between 2014-2021 found 63 symptomatic patients (F=40/63; mean age 16.1y, 12-20y) who underwent left common iliac vein (LCIV) stent placement for treatment of LCIV compression from an overriding RCI right common iliac artery, or equivalent (n=1, left IVC). 32/63 (50.7%) patients presented with non-thrombotic iliac vein lesions (NIVL). 31/63 (49.2%) patients presented with deep vein thrombosis of the lower extremity and required thrombolysis after stent placement (tMTS). Outcomes include technically successful stent placement with resolution of anatomic compression and symptom improvement. Stent patency was monitored with Kaplan-Meier analysis at 3, 6, 12, 24, and 36 months. Anticoagulation and antiplatelet (AC/AP) regimens were reported.

Results
Technical success rate was 100% for both groups. 74 bare-metal self-expanding stents were placed in 63 patients. Primary patency at 12, and 24-months was 93.5%, and 88.9% for the NIVL group and 84.4% and 84.4% for the tMTS group for the same period. Overall patency for the same time intervals was 100%, and 95.4% for the NIVL group and 96.9%, and 96.9% for the tMTS group. Procedural complication rate was 3.2% (2/63) with no thrombolysis-related bleeding complications. Clinical success was achieved in 30/32 (93.8%) and 29/31 (93.5%) patients with NIVL and tMTS groups respectively.

Discussion
CIV stent placement in the setting of tMTS and NIVL is technically feasible and clinically efficacious in young patients with excellent patency rates and a favorable safety profile. Stent durability in young patients parallels outcomes in comparable studies in the adult population and outperforms comparable studies in younger patients. A pediatric venous thromboembolism program with vigilant patient surveillance and multidisciplinary care between IR, hematology, and ICU is a mainstay of clinical success in these patients.

IRB Statement
IRB Approved, Retrospective Chart Review Cohort Study

The Landscape of Pediatric IR Services in U.S. Children's Hospitals: A Geospatial Analysis and Correlation with NICU Level, Pediatric Trauma Level, and Number of Beds

Lin J, Issa C, Miller Z
Presented by Jack Lin

Introduction
Pediatric interventional radiology (IR) has been recognized as a vital tool for diagnosing and treating a variety of conditions in children. Its provision is a significant indicator of a hospital's advanced pediatric care capabilities. This study aims to provide an in-depth analysis of the availability of pediatric IR services across children's hospitals in the United States. It further evaluates the relationships between the presence of pediatric IR and factors such as hospital location, Neonatal Intensive Care Unit (NICU) level, pediatric trauma level, and bed capacity.

Materials and Methods
Data for this study were collated from public sources, including official hospital websites and direct phone calls to appropriate departments in all 224 children's hospitals across the United States. The compiled data incorporated information on pediatric IR services, hospital location, NICU level, pediatric trauma level, and the total number of hospital beds.

Hospitals were classified based on the availability of pediatric IR services. Further categorization of the hospitals was done based on NICU Level (3 or 4), Trauma Level (1 or 2), and the total number of beds (> 50, 50-150, and >150).

The collected data was organized and analyzed using ArcGIS, a mapping and spatial analytics software. ArcGIS was employed to visualize the geographic distribution of pediatric IR services in children's hospitals. Pediatric demographic data, sourced from the Institute for Child, Youth and Family Policy at the Heller School for Social Policy and Management at Brandeis University, was integrated into the ArcGIS framework. This enabled the overlay of pediatric IR services with regional pediatric population data, highlighting areas of potential unmet need.

Results
The analysis showed distinct differences in the distribution of pediatric IR services across children's hospitals. Characteristics are as follows for hospitals with a pediatric IR service and those without: NICU level 3 (55 vs 49 hospitals), NICU level 4 (54 vs 19), Trauma level 1 (63 vs 13), Trauma level 2 (17 vs 17), </=50 beds (0 vs 15), 50-100 beds (41 vs 50), >/=100 beds (74 vs 12), min number of beds (50 vs 12), max number of beds (250 vs 973).

The map generated by ArcGIS is displayed below:

Discussion
This study provides valuable insights into the availability of pediatric IR services in U.S. children's hospitals. Our findings indicate that pediatric IR services are more prevalent in hospitals with higher NICU levels, higher trauma levels, and larger bed capacity. This might suggest that larger and more specialized children's hospitals have better access to pediatric IR services. However, this also raises concerns about the limited availability of these essential services in smaller hospitals or those with less specialized pediatric care facilities. Further research is needed to assess the impact of these disparities on the health outcomes of pediatric patients and to guide strategies aimed at improving the distribution and accessibility of pediatric IR services across the U.S.

IRB Statement
IRB exempt

Scientific Paper Session #2

Image-guided abscess drainage in children with perforated appendicitis – can it wait for Monday?

Fernanda Dien Esquivel M, Belaghi R, Webster R, Shapira-Zaltsberg G
Presented by Maria Fernanda Dien Esquivel

Introduction
Image-guided drainage is the management of choice for perforated appendicitis with intra-abdominal abscess/es. However, there is paucity of data regarding the optimal time for intervention in children. The purpose of this study is to assess the relationship between the time from diagnosis of a drainable abscess to abscess drainage (delta time) and the clinical outcome in patients with complicated acute appendicitis.

Materials and Methods
This IRB approved retrospective study included 80 pediatric patients who had image-guided abscess drainage due to perforated acute appendicitis. Delta time was associated with clinical outcome including length of stay, catheter dwell time, need for additional interventions, and need for tissue plasminogen activator (t-PA).

Results
Mean age (SD) was 10.2 (3.8) years. Mean time between diagnosis and intervention (delta time) was 1.5 (1.2) days. There was no evidence that delta time effects the length of stay, catheter dwell time, need for t-PA, and need for additional interventions ($p>0.05$). However, there was an association between the number of collections and volume of the largest abscess with length of stay ($p=0.006$; $p=0.058$), catheter dwell time ($p=0.029$; $p< 0.001$) and need for additional interventions ($p=0.029$; $p=0.016$).

Discussion
Our results suggest that time between diagnosis of an appendicitis associated abscess and intervention is not significantly associated with need for tPA, need for additional intervention, drain dwell time, or length of stay.

IRB Statement
This retrospective study was approved by the institutional review board. IRB# 22/125X.

Scientific Paper Session #2

Comparing Outcomes of Fluoroscopic versus Portable Placement of Peripherally Inserted Central Catheters (PICCs) and Central Venous Catheters (CVCs)

Nguyen B, Harmon D, Krall S, Weber F, Yoo R,
Presented by Bao Nguyen

Introduction
PICCs and CVCs are frequently placed using fluoroscopic guidance to secure intravenous access in pediatric patients. There have been concerns about complications and infection when catheter placement is performed at patient's bedside using portable radiography. The objective of this study is to compare differences in outcomes of fluoroscopic and portable placement of central catheters.

Materials and Methods
We conducted a single-center, retrospective review of upper-extremity PICC placement (300 fluoroscopic cases and 60 portable cases) and lower-extremity tunneled CVCs (56 fluoroscopic cases and 82 portable cases) in patient ages 20 and under. We applied two samples t-test and Fisher's exact test as appropriate.

Results
Fluoroscopic PICC placement compared to portable PICC placement had a lower procedure time (43.3 vs. 57.9 minutes; P<0.001); radiation dosage (353 vs. 590 mGy*cm2; P<0.001); incidence of technical failure (0 vs. 3.33%; P=0.017); incidence of catheter malfunction (3.0% vs. 10.0%; P=0.025); and incidence of bloodstream infection (1.67% vs. 5.0%; P=0.133). Similarly, fluoroscopic CVC placement compared to portable CVC placement had a lower procedure time (42.6 vs 54.8 minutes; P<0.001); and radiation dosage (63.8 vs 405 mGy.cm2). No technical failures were found in either CVC groups and the difference was non-significant for catheter malfunction (0 vs 6.10%, P=0.220); and bloodstream infection (0 vs 2.15%, P=0.589). Overall, fluoroscopic placement (PICC and CVCs combined) had fewer complication events compared to portable placement (3.93% vs 12.68%, P<0.001).

Discussion
Fluoroscopic guidance reduces procedure time, radiation dosage, and adverse events of PICC and CVC placement compared to bedside portable radiography.

IRB Statement
1904192

Scientific Paper Session #2

Effect of regional anesthesia practice on pain outcomes within a pediatric interventional radiology suite: a preliminary analysis

Gaelen JI, Hajduk J, Samworth A, Rajeswaran S, Lazar A, Vargas A
Presented by Jordan Gaelen

Introduction
Our goal was to evaluate the analgesic utility of nerve blocks in pediatric patients undergoing outpatient sclerotherapy in the interventional radiology (IR) suite for bone cysts (BC), venous malformations (VM), or lymphatic malformations (LM).

Materials and Methods
Following IRB approval, retrospective data was collected for all patients who underwent sclerotherapy for BC, VM, or LM in the IR suite at a tertiary children's hospital between 01/2016 - 09/2022. Included patients had their medical records reviewed for procedure data, post-operative pain scores, and analgesic administration data.

Results
384 patients were included in final analysis with comparable characteristics between sub-groups. Opioids were required significantly less frequently intra-procedurally and post-procedurally for BC and VM patients. The proportion of patients receiving a block and having an opioid-free hospital course was significant across all sub-groups (block versus no-block): BC: 37.3% versus 0% ($p<0.001$); VM: 36% versus 3.5% ($p<0.001$); LM: 30% versus 1.3% ($p=0.005$). Maximum PACU pain scores were significantly lower in BC patients, with no difference in other sub-groups. There were no reported nerve block-related complications.

Discussion
Nerve blocks in pediatric BC sclerotherapy was associated with significant reductions in maximum PACU pain scores and demonstrated an opioid-sparing effect intra- and post-procedurally in BC and VM patients. Nerve block groups for VM and LM were not associated with a reduction in maximum PACU pain scores, however, there was a significant reduction in opioid use over the hospital course for both groups. Our findings are limited by small sub-group sample sizes, along with potential bias inherent to retrospective study designs.

IRB Statement
IRB 2022-5444

Transradial access for pediatric angiography and endovascular interventions: Safety & feasibility in 8- to 18-year-old patients

Garcia M, Muthusami P, Parra-Farina C
Presented by Maria Garcia

Introduction
Feasibility and safety of transradial access is not established outside the adult literature. There is uncertainty about whether radial arteries in children are prohibitively small for endovascular interventions, and at what age a transradial approach can be safely offered as an alternative to femoral access.

Materials and Methods
Retrospective analysis of consecutive cases of cerebral angiography and endovascular interventions planned via transradial access, from November 2019 to November 2022. Before access and after anesthesia induction, an ultrasound of the wrist was performed to measure the arterial diameters, and to assess for stenosis or variants of brachio-radio-ulnar anatomy. Intra and post-procedure complications were also obtained.

Results
Transradial access was planned in 105 procedures in 77 children. Mean age was 14.1±2.6 years [8-18 years]. 86% were diagnostic, and the remaining therapeutic. Upper extremity angiography was abandoned during initial on-table ultrasound in 4 cases (3.8%). Eight (7.9%) procedures had unplanned conversion to femoral access, because of radial artery stenosis. Mean corrected radial diameter on converted cases was 2.2mm [1.6-3.4mm] vs 2.6mm [1.7-3.6mm] on those not converted. 7 patients developed wrist tenderness and swelling post-procedure that prompt investigation with Doppler-US. Small thrombosed pseudoaneurysms were demonstrated in three, and one had a tiny thrombus in the radial artery. All adverse events were self-limited Clavien-Dindo grade 1.

Discussion
This is the first cohort of children as young as 8 years of age that shows safety and feasibility of a transradial approach. Given the paucity of data, this study is the logical step towards reaching out to a younger population that might yield the greatest benefits.

IRB Statement
1000079976

Scientific Paper Session #2

Recurrence Rates of Pediatric GJ Tube Intussusceptions

Abdelhalim S, Alonso Sanchez J, Amaral JG
Presented by Suhaila Abdelhalim

Introduction
GastroJejunal (GJ) tube-related intussusceptions have been reported in approximately 20% of patients with GJ tubes. Management includes tube removal with immediate reinsertion or removal with bowel rest before reinsertion. Evidence is lacking on which intervention is superior and under what circumstances. This study compares both treatments by assessing intussusception recurrence rates post reinsertion.

Materials and Methods
Clinical databases were retrospectively analyzed to identify patients 0-18 years who had an image-confirmed intussusception and required tube changing between Jan-2010 and Jul-2022. Demographics, interventions, and recurrences were recorded. There were 92 intussusceptions across 61 patients. Recurrence rates and mean days to recurrence were compared using a chi-squared test or t-test.

Results
Of 92 intussusceptions, 49 (25 male, 24 female) had their tubes reinserted immediately and 43 (19 male, 24 female) had bowel rest. 49% of the immediate reinsertion group experienced recurrence, averaging 158.7 days until recurrence (SEM=61.5), compared to 46.5% of the bowel rest group, who averaged 207.8 days (SEM=86.1). There was no significant difference in recurrence rates ($p=0.81$) or time to recurrence ($p=0.64$).

Discussion
Bowel rest often lasts over 24h, requires admission, and a secondary procedure. There was no significant difference in rates or time to recurrence, although data trended towards a longer delay after bowel rest. Thus, this intervention might only be considered for high-risk patients with intussusception history. Nevertheless, generalizations are limited, as this study doesn't investigate other clinical outcomes and wasn't randomized.

IRB Statement
Research Ethics Board Number: 1000080242

M&M Case Session #1

Acute iatrogenic Budd-Chiari Syndrome during hepatic vein dilatation.

Parra D
Presented by Dimitri Parra

Preparation
4-year-old patient. History of right extended hepatectomy due to hepatoblastoma. Post surgical stenosis of the hepatic vein managed with multiple angioplasties. Present for routine angioplasty 31 weeks from the most recent dilatation. Catheterization of the stenosis resulted in shock. Resuscitation started. Acute thrombosis of the hepatic vein observed. Once the patient was stable enough to continue, an emergency angioplasty was performed obtaining immediate response with hepatic vein flow restoration and rapid clinical improvement.

Avoidance
This is a rare complication, therefore is important for interventional radiologists to be aware about it. It is unclear if this event was preventable. The patient was asymptomatic, therefore there was no clinical indication to perform the procedure earlier, which may have resulted in a less critical stenosis at the time of the procedure.

Management
The event was managed with an emergency angioplasty. There is lack of evidence to support best practices in the management of recalcitrant hepatic vein stenosis. There is also lack of evidence to support the management of acute iatrogenic Budd Chiari syndrome, as the literature available are case reports.

IRB Statement
Internal review completed. There was consent from the legal guardians to discuss this case.

M&M Case Session #1

Recurrent In-Stent Thrombosis in May-Thurner Syndrome Complicated by Heparin-Induced Thrombocytopenia and Antiphospholipid Syndrome

Talluri T, Moudgil P, Pakray A, Dixit P
Presented by Tulasi Talluri

Preparation
Here, we describe recurrent in-stent thrombosis as a severe (grade 3) adverse event (AE) according to the SIR AE Classification due to marked escalation of care. A 17-year -old female with no past medical history or medications presented to the hospital after an 18-hour road trip with a pulmonary embolism (PE) and deep venous thrombosis (DVT) in the right iliac vein. She was started on heparin and underwent venous thrombectomy with angioplasty and stenting three times within three days due to recurrent in-stent thrombosis. Despite triple-antithrombotic therapy and therapeutic INR, she returned to the hospital ten days later with extensive right lower extremity DVT and complete re-thrombosis of the right iliocaval stent. Risk factors such as iliofemoral distribution, kissing stents, HIT, APS, long stent length, and small stent diameter increase the likelihood of acute thrombosis.

Avoidance
Since 10% dextran 40 has antithrombin effects, some propose this as an acceptable therapy for preventing platelet activation seen in HIT. Using a stent with wide lumen and shorter length also has a significant positive influence on patency rates. Another technique is to use a Zenith-stent at the iliocaval confluence rather than kissing stents to prevent “jailing” of the vessels.

Management
Venogram with IVUS showed left May-Thurner anatomy. Catheter-directed thrombolysis (CDT) with tissue plasminogen activator (tPA) resulted in complete clearance during both admissions. She continued to thrombose while on heparin, so she was switched to argatroban and hypercoagulability workup revealed antiphospholipid syndrome (APS) and heparin-induced thrombocytopenia (HIT). CDT with tPA was repeated with resolution of thrombus and improved patency of veins. Follow-up imaging is required to assess long-term patency.

IRB Statement
IRB decision pending for IRB waiver

M&M Case Session #1

Portal vein perforation with hemoperitoneum during TIPS creation

Acord M, Escobar F, Nadolski G, Srinivasan A
Presented by Michael Acord

Preparation
A 16-year-old with relapsed AML developed refractory ascites related to hepatic sinusoidal obstruction syndrome (SOS) following stem cell transplantation. After 120 days of hospitalization, she was referred for transjugular portosystemic shunt (TIPS) creation for symptom palliation and to facilitate discharge to home hospice. After multidisciplinary discussion, the patient and family wished to proceed, understanding the high risks associated with severe thrombocytopenia and neutropenia.

Avoidance
Use of diligent ultrasound guidance or ICE during portal vein puncture.

Management
A peritoneal catheter was placed at the beginning of the procedure to drain her ascites. Five needle
puncture attempts were made before successfully accessing the portal system. Initial portal venogram
demonstrated active extravasation from the extrahepatic portal vein, possibly from a prior access attempt. The TIPS stent graft was quickly deployed and dilated to 10 mm; however, repeat venography showed ongoing extravasation. Fresh blood was also observed draining from the peritoneal catheter.
Balloon tamponade was performed for 20 minutes, which successfully slowed the bleeding, and red
blood cell transfusion was initiated. To reduce the risk of future bleeding in the setting of ongoing
coagulopathy, a balloon expandable stent graft was deployed in the main portal vein. She was
discharged 13 days after the procedure and died at home 1 month later.
This case will discuss management of extrahepatic portal vein injury during TIPS creation, including the
use of a balloon expandable stent graft, an uncommonly used device in pediatric IR. We will also discuss the indication for palliative TIPS in the setting of chronic SOS.

IRB Statement
Waived

M&M Case Session #2

Duodenal Perforation after Placement of Low-Profile Gastrojejunostomy Tube in an Infant with Low Weight.

Schaefer C
Presented by Lavi Nissim

Preparation
An 8 month old female with complex medical history was referred to Interventional Radiology for conversion of a gastrostomy tube in mature stoma to a gastrojejunostomy tube, due to aspiration of gastrostomy feeds. Risk factors :
1. The patient weighed 7 kg. A low-profile feeding tube is recommended in these patients.
2. The patient had extensive history of congenital heart disease, which may place patient at greater risk for intestinal ischemia.
3. The procedure was performed with General Anesthesia, which may alter perfusion of intestines during the procedure.

Avoidance
1. Use of a low profile feeding tube, such as the AMT micro G-jet tube (Figure 1).
2. Selection of wire with floppy end, such as Bentson (Figure 2a).
3. Avoid excessive manipulation in small bowel and consider terminating procedure and leaving in a G-tube if this occurs.
4. Confirmation of proper tube position with contrast injection at end of procedure (Figure 2b).

Management
1. The patient was noted to have abdominal dissension and signs of sepsis days after the procedure. Imaging such as tube dye study or CT are warranted (Figure 3), in this case showing perforation of the distal duodenum with tube exiting into peritoneal cavity.
2. Prompt surgical exploration and repair of the intestinal perforation is necessary in most cases.
3. Higher risk of perforation from gastrojejunstomy tube placement has been reported in patient weighing < 10 kg (1). Patients weighing less than 6 kg or less than 6 mo of age may be at highest risk, and GJ tube placement in these patients may be contraindicated (2).

IRB Statement
IRB exempt.

M&M Case Session #2

Arteriovenous Fistula as Delayed Complication of Liver Biopsy in Patient with Fontan-Associated Liver Disease.

Nissim L, Desai S, Schaefer C, Willard S
Presented by Lavi Nissim

Preparation

A 12 year old presented for biopsy of the liver to stage Fontan-associated liver disease.
1. The liver biopsy was performed with a parenchymal tract selected in the mid right hepatic lobe, with Gelfoam embolization of the needle tract (Figure 1). Liver ultrasound performed 2 years later (Figure 2a) and subsequent MRI (Figure 2b) demonstrated an enlarging arteriovenous fistula at the site of the previous biopsy. This is categorized as SIR Adverse Event Severity 2 (Moderate).
2. Percutaneous liver biopsy in patients with prior Fontan is reported to have similar hemorrhagic risk compared with liver biopsy in non-Fontan patients (1)
3. Pulmonary arteriovenous malformation (AVM) is a known complication in patient with prior Fontan, in theory due to abnormal angiogenesis. However, arteriovenous fistula after liver biopsy has not been reported in this cohort (2).

Avoidance

1. Avoidance of biopsy near the central portion of the liver and use of Gelfoam embolization of tract may reduce incidence of post-biopsy arteriovenous fistula (1, 3).
2. The impact of hemodynamic status in Fontan patients, such as elevated central venous pressure, on development of post-biopsy hemorrhage or arteriovenous fistula is at this time unknown (1).

Management

1. Although asymptomatic, decision was made to refer this patient to Interventional Radiology for angiogram and possible embolization of the arteriovenous fistula due to gradual enlargement on serial imaging.
2. In a select cohort of patients, such as Fontan patients with altered hemodynamics, the risk for post-biopsy arteriovenous fistula may be greater and warrant use of color-doppler imaging at the time of ultrasound-guided biopsy. In addition, specific attention to the site of biopsy on subsequent ultrasound evaluation of liver disease should be considered.
3. Once identified, close surveillance of post-biopsy hepatic arteriovenous fistula with serial ultrasound imaging, as well as digital selection angiography for staging/ intervention, is recommended (3).

IRB Statement

IRB exempt.

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