INCLUDING A ONE DAY SYMPOSIUM ON Cardiovascular Imaging for Structural Heart Disease

JUNE 7–10, 2014
Marriott Chicago Downtown, Chicago, IL

The symposium is presented by the PICS Foundation in collaboration with Sidra Medical & Research Center, the Rush Center For Congenital & Structural Heart Disease and sponsored for CME credit by Rush University Medical Center.
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Dear Colleague,

The Pediatric and Adult Interventional Cardiac Symposium – PICS-AICS 2014 is being held at the Marriott Chicago Downtown Hotel, from June 7-10, 2014. This year we hope to expand on some of the successes of the last years meeting in Miami with evolution of the taped case sessions along with furthering the hand-on demonstrations that were so popular last year. We have endeavored to ensure the meeting continues to support open dialogue as well as visual learning, along with updates from all the relevant trials and societies, with real opportunities for networking and sharing global clinical and research experience. We will continue to provide a professional but relaxed atmosphere to support this fantastic learning opportunity with social gatherings to ensure friends can meet and enjoy catching up.

The live cases remain the focal point of the meeting this year. Although these have come under increased scrutiny, PICS-AICS is committed to supporting the immense learning opportunity this platform provides. Live cases will be beamed from multiple international venues with experienced operators that will demonstrate the latest in medical device technology using approved and investigational devices/valves/stents etc. The live cases this year will be transmitted live via satellites from Argentina, Saudi Arabia, Chicago, Detroit, Columbus, London, Denver and Los Angeles.

This years meeting will begin on Saturday, June 7 with an “Interventional Platform” session. This will include practical perspectives from interventional radiologists as well as interventional neurosurgeons ensuring that we learn from each other’s broader experiences. There will be a “Tips and Tricks” session with practical demonstrations from international experts on how to work with wires, stents, devices and sheaths as well as valves. This will be followed by an interactive taped case session with four cases for discussion. This year we have ensured that the oral abstract sessions are not competing with one another so that the true scientific endeavors of our colleagues are given the platform they deserve.

This year we are also providing a separate session on June 7th focused entirely on Imaging for Structural Heart Disease. This field is growing exponentially and the contribution of imaging to ensuring optimal outcomes through appropriate patient selection intra-procedural guidance will be stressed under the guidance of course director, Dr Roberto Lang.

On Sunday, June 8, following staggered live case demonstrations in the morning, there will be a session on Complications of Congenital Catheterization followed by a session focusing on Great Debate topics. There will be further breakout sessions for nurses and technologists and younger interventionalists who are establishing their practice as well as Aortic and Mitral Valve Therapies and Complex Structural Interventions and a continuation of the special breakout for our Spanish speaking attendees. Finally, “My Nightmare Case in the Cath Lab” will take place on Tuesday 10th and again the audience will choose the most deserved case. This will be followed by a final session on Clinical Case Perspectives, where a team of experts will comment on a range of real-life clinical scenarios with input from the attendees.

Poster Abstracts will be displayed throughout the meeting. We will continue to support younger interventionalists with the Young Leadership Program at PICS with the winner receiving faculty status and involvement in the meeting. We also wish to recognize those committed to research with The Charles S Kleinman, MD Scientific Scholarship Award in memory of our dear friend Dr Charlie Kleinman who was so close to the PICS family. The winner will receive a $5,000 grant towards their research endeavor.

We look forward to welcoming you to Chicago. Your participation is what makes the meeting the success that it is and we look forward to learning with and from you.

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Ziyad M. Hijazi, MD
John P. Cheatham, MD
Carlos Pedra, MD
Thomas K. Jones, MD

Course Co-Directors
Damien Kenny, MD
Ralf Holzer, MD
Clifford Kavinsky, MD
Giacomo Pongiglione, MD
John Carroll, MD

Director Emeritus
William E. Hellenbrand, MD
## INDEX

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acknowledgements / Exhibitors</td>
</tr>
<tr>
<td>5</td>
<td>Chicago Marriott Downtown Floor Plan</td>
</tr>
<tr>
<td>6</td>
<td>Exhibitor Floor Plan</td>
</tr>
<tr>
<td>7</td>
<td>General Information</td>
</tr>
<tr>
<td>8</td>
<td>Educational and Conference Objectives</td>
</tr>
<tr>
<td>9</td>
<td>CME, CNE, and ASRT Evaluation/Certificate</td>
</tr>
<tr>
<td>10</td>
<td>PICS-AICS Faculty</td>
</tr>
<tr>
<td>15</td>
<td>Cardiac Imaging Faculty</td>
</tr>
<tr>
<td>16</td>
<td>PICS Awards</td>
</tr>
<tr>
<td>18</td>
<td>Scientific Programs</td>
</tr>
<tr>
<td>33</td>
<td>Live Case Demonstrations</td>
</tr>
<tr>
<td>56</td>
<td>Oral and Poster Abstract Schedules</td>
</tr>
</tbody>
</table>
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PICS-AICS ALSO THANKS

- ADULT CONGENITAL HEART ASSOCIATION
- CHILDREN’S HEART FOUNDATION
- CONGENITAL CARDIOLOGY TODAY
- CATHETERIZATION & CARDIOVASCULAR INTERVENTIONS
- LIPPINCOTT, WILLIAMS & WILKINS
- THE SOCIETY FOR CARDIOVASCULAR ANGIOGRAPHY AND INTERVENTIONS (SCAI)

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- Utilize new interventional technologies and current strategies developed for the management of children and adults with congenital and structural heart disease.
- Incorporate into your practice the techniques for the proper placement of percutaneous valves, stents and devices for occlusion of septal defects.
- Initiate advances in diagnosis, evaluation and therapies for children and adults with congenital and heart disease.
- Utilize current management strategies and their expected outcomes for infants born with obstructive right and left heart lesions.
- Identify the important factors which affect the long-term outcomes and quality of life in children and adults with congenital heart disease.
- Incorporate alternative management strategies to transcatheater management for patients with congenital and structural heart defects.
- Utilize new clinical research advances in the care of children and adults with congenital heart disease.
- Incorporate demonstrated practical techniques related to interventional cardiac therapies in patients with structural and congenital heart disease.
- Utilize practical demonstrations and full interactive teaching to assist incorporating into practice the most up-to-date approaches for structural heart disease including imaging modalities, left atrial appendage closure and transcatheter mitral and aortic valve therapies.
PICS-AICS 2014 continuing education evaluations will be done online this year. After the conclusion of the meeting you will receive an email from the RUSH University office of Interprofessional Continuing Education. To qualify for credit, you must complete a program evaluation. Once you complete this survey, you will receive your certificate of participation within one week.

After successful completion of the online evaluation, you will receive a certificate of participation for a maximum of 35 CME or CNE credits, or 44 ASRT Category A credits. A certificate will be provided via email.

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The American Society of Radiologic Technologists has approved this activity for a maximum of 44 Category A credits. This activity is approved for credit by the ASRT.

A complete list of faculty conflict of interest statements can be found in your registration packet. They are also available for viewing at the Registration Desk.
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</tr>
</thead>
<tbody>
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Cardiovascular Imaging for Structural Heart Disease

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This award was developed to recognize excellence in early career interventionalists. We are proud to announce this year’s winner:

Shyam K. Sathanandam, MD

Shyam K. Sathanandam, M.D. is an assistant professor of pediatrics at the University Of Tennessee School Of Medicine in Memphis, TN. He trained as an orthopedic surgeon at Madras Medical College, India after completing medical school from Stanley Medical College in India. He, however, had a deep desire to treat children with congenital heart diseases which brought him to the United States of America for further training. He completed residency in pediatrics at SUNY Downstate Medical Center, NY and a fellowship in pediatric cardiology at Advocate Christ Medical Center, IL. He was trained by Dr. Jonathan Rome during his senior fellowship in interventional cardiology at the Children’s Hospital of Philadelphia. After completion of his training, he moved to Memphis, TN where he was offered tenure at the University of Tennessee, LeBonheur Children’s Hospital.

In Memphis, under the mentorship of Dr. B. Rush Waller, he has prospered into a well-rounded interventional cardiologist with vast clinical and investigative interests related to radiation reduction in children, advanced cardiac 3-D imaging including X-3DRA, neonatal and infant stenting techniques and fetal interventions. His research in numerous aspects of trans-catheter therapy in patients with congenital heart diseases has been published, the most recent of which included a novel technique to redistribute hepatic blood flow to both lungs in cyanotic patients affected by pulmonary AV malformations after Fontan. His current research interests are in the technical description of unzipping small diameter stents in vitro and in an animal model as a strategy to treat vascular stenosis in neonates and infants. In addition to his clinical and academic interests, Dr. Sathanandam is also an artist and has contributed to medical illustrations.

FINALISTS FOR THE CHARLES S. KLEINMAN SCIENTIFIC SCHOLARSHIP AWARD

This award was designed to recognize original scientific work in the field of interventional cardiology. This year’s finalists are:

Shyam K. Sathanandam, MD
University of Tennessee
LeBonheur Children Hospital
Memphis, TN

Ram Bishnoi, MD
Johns Hopkins Hospital
Baltimore, MD

Surendranath R Veeram Reddy, MD
UT Southwestern/Children’s Medical Center
Dallas, TX

These finalists work will be presented in abstract format at the Abstract Final Presentations on Monday June 9th at 1:10 pm. The winner will be announced at the PICS-AICS Dinner with presentation of a $5,000 grant to further their research endeavors.

Charles S. Kleinman Scientific Scholarship Award 2015

Applicants can apply through the standard abstract submission process and request they be considered for this. Applicants will also need to submit a paragraph outlining how the $5000 USD will be used to further their research.
Fixing a heart from birth through adulthood takes big teams working together. So we examined the needs of leading clinicians when designing our hybrid solutions. The result: our Infinix™-i with 5-axis positioners and low profile detectors, stays out of the way, but right where needed, providing the best possible access to patients. medical.toshiba.com

@ToshibaMedical
ONE DAY SYMPOSIUM
Cardiovascular Imaging for Structural Heart Disease

SATURDAY, JUNE 7

COURSE DIRECTORS
Roberto M. Lang and Ziyad M Hijazi
Marriott Ballroom 4th Floor

8:00-10:00 AM
MORNING SESSION
Moderators: Roberto Lang, Ziyad Hijazi, John Hibbeln
8:05-8:20 AM Why is Imaging Essential in Structural Heart Disease: An Interventionalist Viewpoint: John Carroll
8:20-8:40 AM Evolving Role of Imaging: Added Value of Fusion Imaging: Itzhak Kronzon
8:40-9:00 AM Morpho-Anatomy of the Mitral Valve: Roberto Lang
9:00-9:20 AM Aortic Valve and Root Morphology: Modeling in Normal and Pathological Cases: Steve Goldstein
9:20-10:00 AM Cases: Without Imaging I am Really Blind: Omar Khalique, Bijoy Khandheria, Steve Goldstein, Roberto Lang

10:00-10:30 AM Coffee Break: 4th Floor Foyer & 7th Floor Foyer

10:30 AM-1:00 PM Transcatheter Aortic Valve Replacement: The New Standard or Last Resort in Aortic Stenosis?
10:30-10:45 AM Preprocedural Assessment: Multi Modality Approach, Should ICE Be Considered?: Bijoy Khandheria
10:45-11:00 AM What Can CT Do Better Than Echocardiography in TAVR Patients: Amit Patel
11:00-11:15 AM Incidence and Prediction of Paravalvular Aortic Regurgitation in TAVR Patients: Steve Goldstein
11:15-11:35 AM Choosing the Appropriate Approach: Transapical, Transaortic, Conduits: Eric Sarin
11:35 AM-12:05 PM Aortic – Mitral Intervalvular Complex: Should We Consider Both Valves as a Single Unit?
11:35-11:50 AM Perspective of the Echocardiographer: Roberto Lang
11:50 AM-12:05 PM Perspective of the Interventionalist: John Carroll
12:05-12:25 PM Pre- and Post Procedural Complications: Steve Goldstein
12:25-12:55 PM Case Presentations: Something Went Really, Really Wrong…… Itzhak Kronzon, Ernesto Salcedo, Roberto Lang, Omar Khalique

1:00-2:00 PM Lunch Available: 4th Floor Foyer & 7th Floor Foyer
Lunch Breakout Session Available
AFTERNOON SESSION
Moderators: Steve Goldstein, John Carroll, Omar Khalique

2:00-4:00 PM
Interventions in Mitral Valve Disease

2:00-2:12 PM Mitral Regurgitation: Patient Selection for Percutaneous Mitral Valve Devices: Bijoy Khandheria
2:12-2:24 PM Who is Eligible for a Mitral Valve Clip? Clues from Imaging: Omar Khalique
2:48-3:00 PM Balloon Mitral Valvuloplasty: Does Imaging Have a Role?: John Carroll
3:00-3:12 PM Percutaneous Paravalvular Leaks Closure: Role of 3D TEE Echo in Procedure Success: Ernesto Salcedo
3:12-3:25 PM Advantages of Different Imaging Modalities. Is There a Place for ICE?: Ziyad M Hijazi
3:25-4:00 PM Cases: My Worst Nightmare Has Just Happened.....
   Steve Goldstein, Itzhak Kronzon, Bijoy Khandheria, Ernesto Salcedo

4:00-4:30 PM
Coffee Break: 4th Floor Foyer & 7th Floor Foyer

4:30-6:00 PM
Guiding Interventions in Ischemic Heart Disease

4:30-4:42 PM How Should We Assess LVAD Non-invasively: Top 10 Practical Tips: Bijoy Khandheria
4:42-4:54 PM LAA Closure Devices: Can Echocardiography Help?: Ernesto Salcedo
4:54-5:06 PM 3D MV Quantification as the Road Map for Mitral Valve Repair: Roberto Lang
5:06-5:18 PM Interventions in Ischemic Heart Disease: VSD Post MI and LV Pseudoaneurysm: Itzhak Kronzon
5:18-5:30 PM ASD Closure Devices in Adults: Value of Different Imaging Modalities: John Carroll
5:30-6:00 PM Cases, Cases and More Cases: Itzhak Kronzon, Roberto Lang, John Carroll, Ernesto Salcedo
6:30 AM-5:00 PM  **Registration Open:** Registration Desk 7th Floor
6:30-8:00 AM  **Breakfast Available:** 4th Floor Foyer & 7th Floor Foyer
10:00 AM-8:00 PM  **Poster Abstracts Displayed:** 7th Floor Foyer

**MORNING SESSION**
Moderators: John Cheatham, Carlos Pedra, Tom Jones
Grand Ballroom 7th Floor

8:00-10:30 AM  **Interventional Platform – Tips, Tricks and Application to CHD**
8:00-8:20 AM  Interventional Radiology: Bulent Arslan
8:20-8:40 AM  Interventional Neurosurgery: Demetrius Lopes
8:40-9:00 AM  Use of CTO Wires in CHD: JV de Giovanni
9:10-10:30 AM  Hands on Demonstrations (5th Floor Breakout Rooms)
    Sheaths: David Balzer  **(Scottsdale Room)**
    Transseptal: Frank Ing & Charles Mullins  **(Los Angeles/Miami Rooms)**
    Devices: Bharat Dalvi & Alex Javois  **(Denver Room)**
    Stents: Tom Forbes  **(Houston Room)**
    Valves: Kevin Walsh  **(Kansas City Room)**

10:30-11:00 AM  **Coffee Break:** 4th Floor Foyer & 7th Floor Foyer

11:00 AM-1:00 PM  **Taped Case Presentations**
Moderators: Neil Wilson and Damien Kenny
11:00-11:25 AM  1. Lee Benson
11:25-11:50 AM  2. Eric Horlick
11:50 AM-12:15 PM  3. Marc Gewillig
12:15-12:40 PM  4. Carlos Pedra
12:40-1:00 PM  **DISCUSSION**

1:00-2:00 PM  **Lunch Available:** 4th Floor Foyer & 7th Floor Foyer
Lunch Breakout Sessions Available
## LUNCH BREAKOUT SESSIONS

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
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<tbody>
<tr>
<td>1:10-2:00 PM</td>
<td><strong>Imaging for Interventions...When &amp; How</strong></td>
<td>Grand Ballroom 7th Floor</td>
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<td>Moderators: Girish Shirali and Craig Fleishman</td>
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<td>1:10-1:22 PM 3-D Multimodality Roadmapping for Congenital Interventions: Tom Fagan</td>
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<td>1:22-1:34 PM TTE to Guide Interventions in Small Infants: Craig Fleishman</td>
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<td>1:34-1:46 PM The Emerging Use of 3D Modeling to Plan Complex Hybrid Intervention: Evan Zahn</td>
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<td>1:46-2:00 PM DISCUSSION</td>
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<td>1:10-2:00 PM</td>
<td><strong>Best Recent Interventional Paper I Read</strong></td>
<td>Northwestern, Ohio, and Purdue 6th Floor</td>
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<td>Moderators: Lee Benson and John Moore</td>
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<td>1:10-1:22 PM 1. Dan Gruenstein</td>
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<td>1:22-1:34 PM 2. Lynn Peng</td>
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<td>1:34-1:46 PM 3. Dan Levi</td>
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<td>1:46-2:00 PM DISCUSSION WITH Q/A</td>
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<td>1:10-2:00 PM</td>
<td><strong>Anatomical Correlates</strong></td>
<td>Indiana, Iowa, and Michigan 6th Floor</td>
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<td>Moderators: Massimo Caputo and Zahid Amin</td>
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<td>1:10-1:21 PM ASD Closure: Zahid Amin</td>
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<td>1:21-1:32 PM LAA Occlusion: Mark Reisman</td>
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<td>1:32-1:43 PM Aortic Valvuloplasty: Chris Petit</td>
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<td>1:43-1:54 PM PDA Stenting From A Surgical Perspective: Massimo Caputo</td>
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<td>2:00-3:30 PM</td>
<td><strong>Oral Abstract Presentations</strong></td>
<td>Grand Ballroom 7th Floor</td>
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<td>Moderators: John Bass, Roberto Cubeddu, Michael de Moor</td>
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<td>3:30-4:00 PM</td>
<td><strong>Coffee Break</strong></td>
<td>4th Floor Foyer &amp; 7th Floor Foyer</td>
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<td>4:00-6:00 PM</td>
<td><strong>Oral Abstract Presentations</strong></td>
<td>Grand Ballroom 7th Floor</td>
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<td>Moderators: Alex Javois, Raul Rossi, Makram Ebeid</td>
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<td>5:00-6:00 PM</td>
<td><strong>Meet the Experts</strong></td>
<td>Northwestern, Ohio, &amp; Purdue 6th Floor</td>
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<td>Room 1: Mario Carminati, Charles Mullins, Larry Latson</td>
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<td>Room 2: Indiana, Iowa, &amp; Michigan 6th Floor</td>
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<td>Dietmar Schranz, Zahid Amin and Michael Tynan</td>
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<td>6:00-8:00 PM</td>
<td><strong>Welcome Reception: Exhibit Hall Open</strong></td>
<td>Chicago Ballroom 5th Floor</td>
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</table>
6:30 AM-5:00 PM  Registration Open: Registration Desk 7th Floor
6:30-8:00 AM  Breakfast Available: Chicago Ballroom 5th Floor
8:00 AM-6:00 PM  Poster Abstracts Displayed: 7th Floor Foyer

MORNING SESSION
Moderators: Ziyad M. Hijazi, John P. Cheatham, Thomas K. Jones, Carlos Pedra

Grand Ballroom 7th Floor

8:00-8:15 AM  Welcome
Ziyad M. Hijazi

8:15-8:25 AM  Live Case 2013 Update
Noa Holoshitz

8:25-9:50 AM  Live Cases (Argentina, Saudi Arabia)
Panelists: Jou-Kou Wang, Masood Sadiq, John Rhodes, Worakan Promphan, Ahmet Celebi

9:50-10:50 AM  Round Table Discussion: Impediments to Device Development for Pediatric Interventional Cardiology
9:50-10:05 AM  The Clinician’s Perspective: Dan Levi
10:05-10:20 AM  The FDA's Perspective: Nicole Ibrahim
10:20-10:35 AM  Industry Perspective: Jake Goble
10:35-10:50 AM  DISCUSSION

10:50-11:10 AM  MRI Catheterization is Better Than X-Ray
Why Aren't You Doing It?: Robert Lederman

11:10-11:30 AM  Coffee Break / Visit Exhibits: Chicago Ballroom 5th Floor

11:30 AM-1:00 PM  Live Cases (Argentina, Saudi Arabia)
Panelists: Jackie Kreutzer, Shyam Sathanandam, Yat Yin Lam, Yun-Chung Fu, John Bass

1:00-2:00 PM  Lunch Available / Visit Exhibits: Chicago Ballroom 5th Floor

LUNCH BREAKOUT SESSIONS

1:10-2:00 PM  Late Breaking Pre-Clinical and Clinical Studies
Moderator: Damien Kenny
Grand Ballroom 7th Floor

1:10-1:20 PM  Technology Preview: Purpose-Built Bioresorbable Elastomer-polymer Stent for Aortic Coarctation and Pulmonary Artery Stenosis: Kanishka Ratnayaka
1:20-1:30 PM  Long-Term Performance of Bioprosthetic Valves in the RVOT – Setting the Benchmark for Transcatheter Pulmonary Valve Replacement: Michel Ilbawi
1:30-1:40 PM  Percutaneous Bidirectional Glenn Shunt: Simple, Direct, Closed-Chest Approach Guided by MRI: Kanishka Ratnayaka
1:40-1:50 PM  Use of Stem Cell Tissue Engineering Strategies in CHD Surgery: Mending the Youngest Hearts: Massimo Caputo
**AFTERNOON SESSION**

**Moderators: Giacomo Pongiglione and Carlos Pedra**
Grand Ballroom 7th Floor

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</table>
| 2:00-3:45 PM | Complications of Congenital Cardiac Catheterization  
**Moderators: Ralf Holzer and David Nykanen**  
Grand Ballroom 7th Floor |
| 2:00-2:12 PM | Update on the IMPACT Registry: Adverse Event Rates and What We Have Learned So Far: Robert Vincent  
David Nykanen |
| 2:12-2:24 PM | Adverse Events Associated with Congenital Cardiac Catheterizations – Results of the CCISC Registry:  
David Nykanen |
| 2:24-2:36 PM | Adverse Event Capture Over the Pond: The UK Perspective (CCAD): Shakeel Qureshi |
| 2:36-2:48 PM | From Procedure Type to Weight, Hemodynamics, and Operator: Factors Impacting the Incidence of  
Adverse Event and Risk Adjustment: Lisa Bergersen |
| 2:48-3:00 PM | How Do We Define Quality in Congenital Cardiac Catheterization?: Thomas Doyle |
| 3:00-3:12 PM | Radiation Exposure: The ‘Unrecognized’ Complication of Cardiac Catheterization!: Ralf Holzer  
Lisa Bergersen |
| 3:12-3:24 PM | Quality Improvement in Congenital Cardiac Catheterization in ‘Real Live’: C3PO-QI: Lisa Bergersen |
| 3:24-3:45 PM | DISCUSSION |

**BREAKOUT SESSION #1**

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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</table>
| 2:00-3:45 PM | Complex and New Structural Interventions  
**Moderators: Roberto Cubeddu and Hideshi Tomita**  
Marriott Ballroom 4th Floor |
| 2:00-2:12 PM | Expanding the Indications for Renal Denervation. Is Technology There Yet?: Horst Sievert |
| 2:12-2:24 PM | New Approaches to Perforation of the Complex Interatrial Septum: Ted Feldman |
| 2:24-2:36 PM | Percutaneous Tricuspid Annuloplasty: Robert Lederman |
| 2:36-2:48 PM | Evolving Transcatheter Interventions for HOCM: Srihari Naidu  
Complex Structural Interventions Require Collaboration Between Congenital and  
Adult Interventionalists for Optimal Outcomes  
**Pro:** John Carroll  
**Con:** Saibal Kar |
| 3:45-4:15 PM | Coffee Break / Visit Exhibits: Chicago Ballroom 5th Floor |
**BREAKOUT SESSION #2**

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<tr>
<th>Time</th>
<th>Session</th>
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<tr>
<td>2:00-5:30 PM</td>
<td><strong>Nursing and Associated Professionals’ Breakout Session</strong></td>
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<td>Moderators: Sharon L. Cheatham, PhD, ACNP-BC, Kathleen Nolan, RTR</td>
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<td>Northwestern, Ohio, &amp; Purdue 6th Floor</td>
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<td>2:00-2:20 PM</td>
<td>How Do You Determine the Risk for An Intervention?: Lisa Bergersen</td>
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<td>2:20-2:40 PM</td>
<td>The Kicking Team …. Referring Patients for Intervention: Nancy King</td>
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<td>2:40-3:00 PM</td>
<td>Pre-Cath Huddle – The Cardiac Catheterization Safety Checklist: Grace Deyo</td>
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<td>3:00-3:20 PM</td>
<td>ECMO in the Cath Lab: Vince Olshove</td>
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<td>3:20-3:40 PM</td>
<td>Traditional Valve Therapies for CHD: Dan Gruenstein</td>
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<td>3:40-4:00 PM</td>
<td>New Valve Technology: Matt Gillespie</td>
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<td>4:00-5:00 PM</td>
<td>“Analyze This” – Interactive Session: Paul Lawrence &amp; Kathleen Nolan</td>
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<td>5:00-5:30 PM</td>
<td>Practical Session: Devices, Balloons, Stents, Valves, Hemostasis Techniques, Etc.: Sharon L Cheatham, Paul Lawrence, Kathleen Nolan</td>
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<th>Time</th>
<th>Session</th>
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<tr>
<td>4:15-6:00 PM</td>
<td><strong>Great Debates</strong></td>
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<td>Moderators: Tom Jones and Neil Wilson</td>
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<td>Grand Ballroom 7th Floor</td>
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<td>All Patients with Transannular Patch Repair of Tetralogy of Fallot Should Have a Pulmonary Valve Replacement by 10 Years of Age</td>
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<td>4:15-4:25 PM</td>
<td><strong>Pro:</strong> Lee Benson</td>
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<td>4:25-4:35 PM</td>
<td><strong>Con:</strong> Jamil Aboulhosn</td>
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<td>Deficiency of the Retroaortic Septum is the Cause of Erosion After Closure of ASD with the Amplatzer Septal Occluder</td>
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<td>4:40-4:50 PM</td>
<td><strong>Pro:</strong> Mark Galantowicz</td>
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<td>4:50-5:00 PM</td>
<td><strong>Con:</strong> John Moore</td>
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<td>Ductal Stent Implantation Should be the First Choice for All Newborn Infants with Reduced Pulmonary Blood Flow</td>
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<td>5:05-5:15 PM</td>
<td><strong>Pro:</strong> Evan Zahn</td>
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<td>5:15-5:25 PM</td>
<td><strong>Con:</strong> Michel Ilbawi</td>
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<td>Routine Diagnostic Cardiac Catheterization Prior to Planned Staged Surgical Palliation of Single Ventricle Patients Is Not Necessary</td>
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<td>5:30-5:40 PM</td>
<td><strong>Pro:</strong> Graham Derrick</td>
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<td>5:40-5:50 PM</td>
<td><strong>Con:</strong> Henri Justino</td>
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BREAKOUT SESSION #3

4:15-6:00 PM  
**Spanish Session**  
Moderators: Edmundo Clarindo Oliveira, Horacio Faella, Francisco Garay  
Indiana, Iowa, & Michigan 6th Floor

4:15-4:30 PM  
Intentional Stent Fractures in Structural and Congenital Interventions: **Henri Justino**

4:30-4:45 PM  
Is Fetal Valvuloplasty Effective to Achieve A Biventricular Circulation in Fetal Aortic Stenosis and Impending HLHS?: **Carlos Pedra**

4:45-5:00 PM  
Should we Review the Guidelines for Percutaneous Pulmonary Valve Implantation?: **Jose Luis Zunzunegui Martinez**

5:00-5:15 PM  
Warming up for the World Cup. Similarities between Interventional Cardiology and Soccer: **Carlos Zabal**

5:15-5:25 PM  
Ten Reasons for Percutaneous PM VSD Closure: **Joaquim Miro**

5:25-5:35 PM  
Ten Reasons for Surgical PM VSD Closure: **Jackie Kreutzer**

5:35-5:45 PM  
**REBUTTAL & DISCUSSION**

BREAKOUT SESSION #4

4:00-6:00 PM  
**The Left Atrial Appendage State of the Art**  
Moderators: Ted Feldman and Saibal Kar  
Marriott Ballroom 4th Floor

4:00-4:15 PM  
LAA Occlusion Taped Case: **Iqbal Malik**

4:15-4:30 PM  
Advanced Imaging Techniques to Guide Patient Selection – Tailoring the Device to the Anatomical Substrate: **Saibal Kar**

4:30-4:45 PM  
How Will the Presence of RCT Data Influence Approach in the US?: **Steve Bailey**

4:45-5:00 PM  
Defining Success Following Occlusion or Ligation and How to Deal with Residual Leaks: **John Carroll**

5:00-5:15 PM  
Evolving Device Designs: **Horst Sievert**

5:15-5:30 PM  
Concomitant Pulmonary Vein Ablation – The Electrophysiologists Perspective: **Brad Knight**

5:30-5:50 PM  
**Debate:**  
Transcatheter Therapy for Symptomatic Functional Mitral Regurgitation and Atrial Fibrillation Should be an Alternative to Surgery  
**Pro:** **Ted Feldman**  
**Con:** **Pat McCarthy**

5:50-6:00 PM  
**REBUTTAL AND DISCUSSION**

6:00 PM  
**PICS-AICS Award**  
Grand Ballroom 7th Floor
6:30 AM-5:00 PM  Registration Open: Registration Desk 7th Floor
6:30-8:00 AM  Breakfast Available: Chicago Ballroom 5th Floor
8:00 AM-6:00 PM  Poster Abstracts Displayed: 7th Floor Foyer

**MORNING SESSION**
Moderators: William Hellenbrand, Shakeel Qureshi, John Carroll
Grand Ballroom 7th Floor
8:00-10:15 AM  Live Cases (Chicago, Detroit, Columbus)
Panelists: Horacio Faella, Jae Young Choi, Mark Galantowicz, Alex Javois, Teiji Akagi
10:15-10:45 AM  Coffee Break / Visit Exhibits: Chicago Ballroom 5th Floor
10:45 AM-1:00 PM  Live Cases (Chicago, Detroit, Columbus)
Panelists: Elchanan Bruckheimer, Manolis Pursanov, Terry D. King, Eric Horlick, Miguel Granja
1:00-2:00 PM  Lunch Available / Visit Exhibits: Chicago Ballroom 5th Floor
1:10-2:00 PM  Oral Abstract Finals
Moderators: Alex Javois, Makram Ebeid, Michael de Moor
Grand Ballroom 7th Floor

**AFTERNOON SESSIONS**
2:00-6:00 PM  Moderators: David Balzer and Mario Carminati
2:00-3:45 PM  Updates
Moderators: Lynn Peng and Shyam Sathanandam
Grand Ballroom 7th Floor
  2:00-2:12 PM  Self-expanding Stents for the Dilated or Native RVOT: Ziyad M. Hijazi
  2:12-2:24 PM  Evolving Bare Metal and Covered Stent Designs: Peter Ewert
  2:24-2:36 PM  Worldwide Experience with the GSO for ASD Closure: John Rhodes
  2:36-2:48 PM  Bioabsorbable Stents for Pediatric Practice – Animal Studies and Clinical Trial Design: Damien Kenny
  2:48-3:00 PM  The Membranous VSD Occluder – Updated Worldwide Experience: Reda Ibrahim
  3:00-3:12 PM  Dealing with Calcium: Frank Ing
  3:12-3:24 PM  Holography for Congenital Interventions: Elchanan Bruckheimer
  3:24-3:36 PM  SAPIEN Pulmonic Update: Damien Kenny
  3:36-3:45 PM  DISCUSSION
3:45-4:15 PM  Coffee Break / Visit Exhibits: Chicago Ballroom 5th Floor
4:15-6:00 PM  **My Approach**  
*Moderators: Peter Ewert and Richard Ringel*  
*Grand Ballroom 7th Floor*


4:30-4:45 PM  *Interventional Treatment of Large Atrial Septal Defects: When Large Is Too Large?: Julie Vincent*

4:45-5:00 PM  *Interventional Treatment of Ventricular Septal Defects: Kevin Walsh*

5:00-5:15 PM  *Hybrid Approach in Diminutive Left Ventricles (or: Interventional Palliation in Diminutive Left Ventricles): Dietmar Schranz*

5:15-5:30 PM  *RVOT Stenting in Small Infants: JV DeGiovanni*

5:30-5:45 PM  *Interventional Treatment of Complex Aortic Arch Coarctation: Marc Gewillig*

5:45-6:00 PM  **DISCUSSION**

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**BREAKOUT SESSION #5**

2:00-5:30 PM  **PICES: Young Interventionalist Group**  
*Moderators: Brent Gordon, Jeff Delaney, Bryan Goldstein, Alex Golden*  
*Northwestern, Ohio & Purdue 6th Floor*

2:00-2:15 PM  Welcome

2:15-2:45 PM  Guest Speaker: Larry Latson  
**An Interventional Career is Like a Box of Chocolates**

2:45-3:15 PM  Case Presentation #1

3:15-3:30 PM  Break

3:30-4:00 PM  Case Presentation #2

4:00-4:20 PM  New/Old Business: *PICES Executive Committee*

4:20-4:40 PM  Research Update: Bryan Goldstein

4:40-5:00 PM  **OPEN FORUM** to pitch project ideas and discussion to the group
## BREAKOUT SESSION #6

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00-4:00 PM</td>
<td><strong>Mitral Valve Interventions</strong></td>
<td>Moderators: John Carroll and Pat McCarthy</td>
</tr>
<tr>
<td>2:00-2:20 PM</td>
<td>Transcatheter Mitral Interventions: Evolution and Current State of Treatments for Mitral Stenosis, Mitral Regurgitation, Paravalvular Leaks, and Bioprosthetic Degeneration</td>
<td>Ted Feldman</td>
</tr>
<tr>
<td>2:20-2:30 PM</td>
<td>Case Presentation of Congenital Mitral Stenosis and Balloon Commissurotomy</td>
<td>Matt Gillespie</td>
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<tr>
<td>2:30-2:40 PM</td>
<td><strong>Panel Discussion and Audience Q and A</strong></td>
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<tr>
<td>2:40-2:55 PM</td>
<td>Mitral Anatomy and Function</td>
<td>Mark Reisman</td>
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<tr>
<td>2:55-3:10 PM</td>
<td>Echocardiographic Characterization of the MV for Diagnosis and Treatment</td>
<td>Craig Fleishman</td>
</tr>
<tr>
<td>3:10-3:20 PM</td>
<td>Case Presentation of Mitral Regurgitation Treated with MitraClip</td>
<td>Saibal Kar</td>
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<tr>
<td>3:20-3:30 PM</td>
<td><strong>Panel Discussion and Audience Q and A</strong></td>
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<tr>
<td>3:30-3:45 PM</td>
<td>The Future is Now for Transcatheter Mitral Interventions: New Technical Approaches, Trial Design, and What Does the FDA Want to See</td>
<td>Gregg Stone</td>
</tr>
<tr>
<td>3:45-4:00 PM</td>
<td><strong>Panel Discussion and Audience Q and A</strong></td>
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</tbody>
</table>

### DISCUSSION

3:45-4:15 PM  Coffee Break: Chicago Ballroom 5th Floor

## BREAKOUT SESSION #7

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker/Details</th>
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<tbody>
<tr>
<td>4:15-6:00 PM</td>
<td><strong>TAVR</strong></td>
<td>Moderators: Roberto Cubeddu &amp; Ziyad M Hijazi</td>
</tr>
<tr>
<td>4:15-4:27 PM</td>
<td>Evolving Techniques for Proper Sizing of TAV Prosthesis: Understanding the AV Annulus</td>
<td>John Carroll</td>
</tr>
<tr>
<td>4:27-4:39 PM</td>
<td>Approaches to Minimizing and Managing Para-Valvular Regurgitation</td>
<td>Ted Feldman</td>
</tr>
<tr>
<td>4:39-4:51 PM</td>
<td>Techniques to Reduce TAVR-Associated Vascular Complications</td>
<td>Steve Bailey</td>
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<tr>
<td>4:51-5:03 PM</td>
<td>TAVR from the Femoral Vein — Trans-caval Approach</td>
<td>Adam Greenbaum</td>
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<tr>
<td>5:03-5:25 PM</td>
<td><strong>DEBATE:</strong> In 5 Years the Dominant TAVR Platform Will Be Balloon Expandable vs Self-Expandable</td>
<td></td>
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<tr>
<td>5:03-5:13 PM</td>
<td>Balloon Expandable Technology is the Future</td>
<td>Atman Shah</td>
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<tr>
<td>5:13-5:23 PM</td>
<td>Self-Expanding Technology is the Future</td>
<td>Horst Sievert</td>
</tr>
<tr>
<td>5:25-5:37 PM</td>
<td>Impact of TAVR on Quality of Life (Is Mortality the Right Metric)</td>
<td>Cliff Kavinsky</td>
</tr>
<tr>
<td>5:37-6:00 PM</td>
<td>A Forward Look at TAVR: Expectations for Future Decades</td>
<td>Martin Leon</td>
</tr>
</tbody>
</table>

7:00 PM  PICS-AICS Dinner at the Art Institute of Chicago
PICS-AICS 2014
Dinner Event

THE ART INSTITUTE
OF CHICAGO

Monday, June 9

6:30–6:50 PM
Trolley transfer to The Art Institute of Chicago
Meet in the hotel lobby

6:50–7:45 PM
View the Modern Art Gallery on 3rd Floor.
Considered one of the finest and most comprehensive in the world, the Art Institute’s extraordinary collection of modern art includes nearly 1,000 works by artists from Europe. The modern collection boasts some of the greatest icons of the period, including Picasso’s Old Guitarist, Matisse’s Bathers by a River, Brancusi’s Golden Bird; Magritte’s Time Transfixed; and Orozco’s Zapata.

6:50–8:00 PM
Cocktail Reception in Terzo Piano

8:00–9:30 PM
Dinner in Griffin Court

9:30–11:00 PM
Dessert Reception and Dancing in Terzo Piano
Trolleys will provide shuttles back to the Marriott
6:30 AM-5:00 PM  Registration Open: Registration Desk 7th Floor
6:30-8:00 AM  Breakfast Available: Chicago Ballroom 5th Floor
7:00 AM-5:00 PM  Poster Abstracts Displayed: 7th Floor Foyer

MORNING SESSION
Moderators: Carlos Pedra, Ziyad M. Hijazi, Eric Horlick
Grand Ballroom 7th Floor
8:00-10:15 AM  Live Cases (London, Denver, Los Angeles)
Panelists: Seong-Ho Kim, Edmundo Clarindo Oliveira, Maiy El Sayed, Thomas Forbes,
Nguyen Lan Hieu, Francisco Garay
10:15-10:45 AM  Coffee Break / Visit Exhibits: Chicago Ballroom 5th Floor
10:45 AM-1:00 PM  Live Cases (London, Denver, Los Angeles)
Panelists: Julie Vincent, Masood Sadiq, Jacek Bialkowski, Tarek Momenah,
Christopher Petit, Alejandro Peirone
1:00-2:00 PM  Lunch Available / Visit Exhibits: Chicago Ballroom 5th Floor
Exhibit Hall closes 2pm

AFTERNOON SESSION
Moderators: Tom Jones, John Cheatham, Ziyad M. Hijazi, Carlos Pedra
Grand Ballroom 7th Floor
2:00-3:30 PM  My Nightmare case in the Cath Lab
Moderators: Shakeel Qureshi & Eric Horlick
3:30-5:00 PM  Clinical Perspectives
Moderators: Giacomo Pongiglione & Damien Kenny
Panel of Experts: Kevin Walsh, Zahid Amin, Mario Carminati, Tom Forbes, Bryan Goldstein,
William Hellenbrand, Reda Ibrahim
Case 1 Transcatheter Fontan Fenestration: Frank Ing
Case 2 Aortic Arch Hypoplasia: Jamil Albouhlosn
Case 3 Complex Branch Pulmonary Artery Stenosis in a Small Infant: Felix Berger
Case 4 Transcatheter PVR in a Small Diameter Conduit: Mario Carminati

DISCUSSION
5:00 PM  Closing Remarks
Ziyad M. Hijazi
SAVE THE DATE
SEPT. 18-21, 2015
ARIA • LAS VEGAS
WWW.PICSYMPOSIUM.COM
LIVE CASE DEMONSTRATIONS
LIVE CASE SITES AND OPERATORS

Sunday, June 8

Private Hospital of Córdoba, Córdoba, Argentina (2 cases)
Alejandro Peirone, MD

KFSH&RC, Riyadh, Saudi Arabia (2 cases)
Mansour Al-Jufan, MD

Monday, June 9

Rush University Medical Center, Chicago, IL (2 cases)
Ziyad M. Hijazi, MD & Damien Kenny, MD

Nationwide Children’s Hospital, Columbus, OH (2 cases)
John P. Cheatham, MD & Ralf Holzer, MD

Detroit Children’s Hospital, Detroit, MI (2 cases)
Tom Forbes, MD & Daniel R. Turner, MD

Tuesday, June 10

Great Ormond Street Hospital, London, United Kingdom (2 cases)
Graham Derrick, MD

University of Colorado Hospital, Aurora, CO (2 cases)
John Carroll, MD

Cedars-Sinai Medical Center, Los Angeles, CA (2 cases)
Evan Zahn, MD & Saibal Kar, MD
Case #1 SUNDAY, JUNE 8

Live Case Operators:
Operator: Dr. Alejandro Peirone
Assistant: Dr. Adolfo Ferrero
Fellow: Dr. Lucrecia de Anquín
Echocardiographer: Dr. Alejandro Contreras
Anesthetists: Dr. Analía Priotto-Dr. León Salzano
Nurse: Enf. Pablo Pogonza
Technicians: Osvaldo Narciso, Sabrina Inama

History:
• 13 yr-old girl. Fatigue and mild dyspnea on exertion. Found to have a murmur recently.

Physical Findings:
• Weight 41 kg. BP 96/59. Mild II/IV systolic ejection murmur at the upper left sternal border, fixed splitting of the 2nd heart sound with mildly increased pulmonary component.

Family History:
• mother ASD (tx surgery)
• 25 yr-old brother ASD (tx surgery)
• 22 yr-old sister ASD (tx surgery)
• 8 yr-old sister multiple ASD’s (tx surgery)

Pertinent Tests:
EKG:
• SR, HR 90 x min, PR interval 0.27 sec, QRS axis + 10º, first degree AV block, incomplete RBBB.

Chest X-ray:
• Mild cardiac enlargement, increased pulmonary vascular markings.

Echo (TEE):
• Multiple ostium secundum type ASD’s: largest defect measuring approximately 15mm and smaller defect measuring 4mm (with a 4.5mm separation each other). RA and RV enlargement. Normal PA pressure.

Intended Intervention:
• Percutaneous multiple ASD’s closure using the pfm Nit-Occlud ASD-R (reverse) device.
Case #2  SUNDAY, JUNE 8

Live Case Operators:
Operator: Dr. Alejandro Peirone  
Assistant: Dr. Adolfo Ferrero  
Fellow: Dr. Lucrecia de Anquín  
Anesthetists: Dr. Analía Priotto-Dr. León Salzano  
Nurse: Enf. Pablo Pogonza  
Technicians: Osvaldo Narciso, Sabrina Inama

History:
- 2½ yr-old girl. History of recurrent upper respiratory tract infections and slow weight-gain. Referred recently for evaluation of a heart murmur.

Physical Findings:
- Her weight is 13.6 kg. BP 80/37. Grade III/V continuous murmur best heard at the upper left sternal border (infraclavicular area). Bounding peripheral pulses. Clear lungs. No hepatomegaly.

Pertinent Tests:
EKG:
- SR, HR 110 x min, QRS axis + 85º, biventricular hypertrophy.

Chest X-ray:
- Mild cardiac enlargement, increased pulmonary vascular markings.

Echo (TEE):
- Moderate-large size PDA with a minimal lumen diameter (PA end) 3.5mm, LA and LV enlargement.

Intended Intervention:
- Percutaneous PDA closure using the pfm Nit-Occlud PDA-R (reverse) device.
Case #3  SUNDAY, JUNE 8

Live Case Operators:
Operator: Dr. Alejandro Peirone
Assistant: Dr. Adolfo Ferrero
Fellow: Dr. Lucrecia de Anquín
Echocardiographer: Dr. Alejandro Contreras
Anesthetists: Dr. Analía Priotto-Dr. León Salzano
Nurse: Enf. Pablo Pogonza
Technicians: Osvaldo Narciso, Sabrina Inama

History:
• 13 yr-old male. Asymtomatic. Found to have a murmur recently.

Physical Findings:
• Weight 32 kg. BP 89/46. Mild II/IV systolic ejection murmur at the upper left sternal border, fixed splitting of the 2nd heart sound.

Pertinent Tests:
EKG:
• SR, HR 82 x min, QRS axis + 110º, incomplete RBBB.

Chest X-ray:
• Mild cardiac enlargement, increased pulmonary vascular markings.

Echo (TEE):
• Single ostium secundum type atrial septal defects measuring approximately 14 x 13 mm in diameter with deficient anterosuperior rim. RA and RV enlargement. Normal PA pressure.

Intended Intervention:
• Percutaneous ASD closure using the pfm Nit-Occlud ASD-R (reverse) device.
Case #1 SUNDAY, JUNE 8

Live Case Operators:
Dr. Mansour AlJufan

History:
• 17 years old girl, SP TOF repair with trans-annular patch (1997). She is Symptomatic with dyspnea functional class 2, had palpitations, improved after starting Beta blockers. Patient is on Lasix 40mg, Atenolol 25mg & Enalapril 2.5mg. RVOT stented with 30mm balloon Nov 2013.

Physical Findings:
• HR: 72
• BP: 123/62mmHg
• Ht: 161cm
• Wt: 52kg
• BSA: 1.53m²
• CVS: S1, S2 +diastolic murmur 2/6 LSB.

Pertinent Tests:

Exercise Test:
• The patient exercised BRUCE for 08:10 min, test stopped due to fatigue, no ST segment changes or arrhythmia.

EKG:
• Sinus bradycardia @ 59BPM, RBBB, QRS 132msec.

Holter:
• 45 MIN, 72 AVG, 143 MAX, frequent PVCs, no V tach.

Echo:
• Ejection Fraction = >55%
  RV is moderately dilated, Severe PR.

MRI:
• RV EF 55%, RVEDV 151 mL/M²
  Pulmonary regurgitation fraction 51%, RVOT 25mm.

Intended Intervention:
• RVOT re-stenting and PPVI size 29mm.
Case #2  SUNDAY, JUNE 8

Live Case Operators:
Dr. Mansour AlJufan

History:
• 33 years old lady S/P TOF repair with trans-annular patch 1987.
• Followed with severe PR, asymptomatic, mother of 4 kids on atenolol 25mg BID, lasix 20mg Daily
• RVOT stenting on 30mm balloon Jan 2014.

Physical Findings:
• Wt: 62Kg
• Ht: 158cm
• BSA: 1.63m2
• HR: 77BPM
• BP: 101/59mmHg
• Cardiac examination showed normal S1 & S2 with diastolic murmur grade 2/6 LS8.

Pertinent Tests:
EKG:
• Sinus rhythm with RBBB, QRS duration 154msec

Echo:
• Interrupted IVC, LV systolic function is low normal. Flattened septum is consistent with RVVO. Dilated RV and mildly reduced fxn, Moderate PR.

Exercise Test:
• The patient exercised according to the BRUCE for 8:04 mins, stopped because of Fatigue.

MRI:
• RVEF = 47%, RVEDV = 148 cc/sq m
• PR fraction 50%

Intended Intervention:
• PPVI size 29mm.
Case #3 SUNDAY, JUNE 8

Live Case Operators:
Dr. Mansour AlJufan

History:
• 18 years old girl, S/P TOF repair, (Transannular patch was not used) with surgical valvotomy. She is asymptomatic, not on any medications.

Physical Findings:
• HR: 78/m
• BP: 108/74mmHg
• Wt: 55Kg
• Ht: 171cm
• BSA: 1.63m2
• CVS: Showed diastolic murmur grade 2/6 LSB.

Pertinent Tests:
EKG:
• Sinus rhythm, RBBB, QRS duration of 154msec.

Echo:
• Free pulmonary regurgitation.
• Good size pulmonary artery branches, Mild TR peak velocity of 2.3 m/sec.
• Dilated RV with mildly depressed systolic function, with abnormal septa motion.

MRI:
• RVEF 48%, RVEDV 154ml/m2, good size PAs
• PR fraction: 64%

Intended Intervention:
• RVOT stenting.
Case #4 SUNDAY, JUNE 8

Live Case Operators:
Dr. Mansour AlJufan

History:
- 18 year old male, S/P TOF repair with trans-annular patch (1997), now with decreased stamina while playing soccer and father report dyspnea on exertion.

Physical Findings:
- Ht: 164
- Wt: 44 kg
- BSA: 1.44 m²
- HR: 67 BPM
- BP 118/62mmHg
- Normal Heart sounds, 2/6 diastolic murmur at LSB, No hepatomegally.

Pertinent Tests:
EKG:
- NSR, RBBB, QRS duration of 172 msec.

Chest X-ray:
- Mild cardiomegally

Holter:
- Rare PVCs.

Echo:
- Severe PR. Aneurysmal dilatation of RVOT. Moderate to severely dilated RV with mildly reduced function.

Exercise Test:
- BRUCE for 10 min, test was stopped due to fatigue.

MRI:
- Dilated RV with global hypo kinesis, RVEF 42%.
  RVEDD = 156 ml/m², severe PR, but due to artifact, quantification of PR fraction was not possible.

Intended Intervention:
- S/P RVOT stenting x 2 Andra stent 43mm on, 30mm balloon, for; PPVI, 29mm valve.
**Case #5** SUNDAY, JUNE 8

**Live Case Operators:**
Dr. Mansour AlJufan

**History:**

**Physical Findings:**
- Wt: 70Kg
- Ht: 168cm
- BSA: 1.78m²
- HR 68 BPM
- BP: 106/62mmHg
- NS1 + NS2 + systolic & diastolic murmur III/VI LUSB.
  No lower limb oedema.

**Pertinent Tests:**

- **CXR:**
  - Mild cardiomegaly,
- **EKG:**
  - NSR, RBBB, QRS 132 msec.
- **Holter:**
  - HR; Min 49, max 142, rare PVCs
- **Echo:**
  - RV is moderately dilated with mildly reduced function
  Mild TR.
- **Exercise Test:**
  - Exercised according to the BRUCE for 5:33 mins.
  The exercise test was stopped due to dyspnoea.
- **MRI:**
  - RV EF of 55%. The RV end-diastolic volume index to
  body surface, looks high, exact number could not be
  calculated due to heavy trabeculation artifacts.

**Intended Intervention:**
- RVOT stented with 30mm balloon, for; Restenting and PPVI, 29mm valve.
Case #1 MONDAY, JUNE 9

Live Case Operators:
Damien Kenny, MD, Qi-Ling Cao, MD,
Ziyad M Hijazi, MD, MPH, MScAI

Transcatheter Implantation of a Bioresorbable Scaffold Designed for Pediatric Practice into the Pulmonary Artery and Aorta

Pediatric Bioresorbable Scaffold
This PLLA-based Polymer stent is a pre-mounted balloon expandable stent based on an extended design of the DESolve Bioresorbable Coronary Scaffold System (Elixir Medical, Sunnyvale, California). The original coronary scaffold is designed to resorb within 1 to 2 years, based on in vitro degradation studies and confirmed by preclinical in vivo degradation studies. The 20mm long pediatric scaffold is mounted on a 6mm balloon and is deliverable through a 5Fr sheath.
Case #2 MONDAY, JUNE 9

Live Case Operators:
Damien Kenny, MD, Qi-Ling Cao, MD,
Ziyad M Hijazi, MD, MPH, MSCAI

Transcatheter Implantation of a Novel Self-Expanding Percutaneous Stent-Valve into the Native Right Ventricular Outflow Tract

P Venus Valve

The Venus Pulmonary Valve (Venus Medtech, Shanghai, China) is a self-expandable Nitinol multi-level support frame with a tri-leaflet porcine pericardial tissue valve with a 14–22 Fr delivery catheter. The entire stent is covered (except the distal cells) by porcine pericardial tissue. The valve tissue is fabricated from three equal sections of porcine pericardium that have been preserved in low concentration solutions of buffered glutaraldehyde to fully crosslink the tissue, while preserving its flexibility and strength.

A flared uncovered outflow end secures anchoring at the distal (pulmonary artery bifurcation) end with radiopaque markers indicating the distal anchoring position and the valve location. The proximal end is also flared but covered allowing conformability with the dilated RVOT. Stent valve diameters range from 20 to 32mm (in 2mm increments) with each diameter available in 20 and 30mm straight sections lengths. The crimper is a non-patient contacting, compression device that symmetrically reduces the overall diameter/profile of the bioprosthesis when loaded inside the catheter. Once crimped in ice-water, the valve maintains its shape and is loaded onto the delivery system which varies from 14 to 22 Fr depending on valve size, and deployed with a controlled release handle.
Case #1  MONDAY, JUNE 9

Live Case Operators:
John P. Cheatham, MD and
Sharon L. Cheatham, PhD, ACNP

History:
- 4 y/o female who is p/o repair of sinus venosus ASD
  and baffle repair of partial anomalous right upper
  pulmonary venous drainage Sept. 2013. On f/u TTE on
  4/16/2014, SVC obstruction noted with – 10mmHg
  mean gradient. Pulmonary veins appear ok

Physical Findings:
- Wt 16.6 Kg Ht 106.9cm, BP 90/58, Pulse 80
- Acyanotic, normal cardiac exam, and no facial swelling

Pertinent Tests:

EKG:
- Sinus rhythm, RVCD…no change

TT Echo:
- Moderate SVC obstruction with mean gradient of
  10mmHg
- No residual ASD
- Pulmonary veins appear to have normal flow
- Normal biventricular size and function

Intended Intervention:
1  R & L hemodynamic cath and angiography
2  TEE
3  3DRA
4  IVUS
5  BA/CBA of SVC stenosis & assess impact on
  R pulmonary venous baffle
6  ? Stent therapy
7  Demonstrate new Dose Tracking System (DTS)
Case #2  MONDAY, JUNE 9

Live Case Operators:
Ralf J. Holzer, MD and John P. Cheatham, MD

History:
• 17 y/o female with a h/o TOF repair in 1997 who subsequently had bilateral PA stents placed in 2003 (two 25mm Genesis XD stents), and then in December 2012 underwent placement of a 20mm CORMATRIX valved conduit + intraoperative balloon expansion of the stents (10mm) + partial resection of stent mesh-work. On f/u evidence of dehiscence of valve leaflet (prolapsing into RVOT) with free PI, as well as evidence of stenosis going into the bilateral PA stents.

Physical Findings:
• Wt 37.7 Kg, BP 114/70, Pulse 89, Acyanotic, 2-3/6 SEM, soft DM

Pertinent Tests:
EKG:
• Sinus rhythm, RBBB, QRS 126ms

TT Echo:
• Valve dehisced (prolapsing into RVOT)
• Severe pulmonary regurgitation
• Flow acceleration at level of both branch PAs (difficult to visualize)
• Peak Continuous Doppler velocity to distal PA/PA branches 3.7ms

CT:
• Limited study (motion artifact)
• MRI not possible (cochlear implant)
• Conduit narrowing just at PA bifurcation (8*14mm)
• LPA 7*8mm, RPA 7*9mm
• Mild RAE and RV enlargement, normal RV function

Intended Intervention:
1 R & L hemodynamic cath and angiograph, ICE
2 Expansion of RPA and LPA stents (+/- additional PA stents)
3 Evaluation for Melody valve, coronary evaluation, compliance testing
4 Implantation of 3110 Palmaz XL stent into conduit / PA bifurcation (flower blossom)
5 Melody valve implantation
Case #1 MONDAY, JUNE 9

Live Case Operators:
Daniel R. Turner, MD, Srinath Gowdagere, MD, Daisuke Kobayashi, MD, and Thomas J. Forbes, MD

History:
• Patient KB is a 7 month old infant who has been followed with a moderate sized PDA. Initially presented in mild congestive heart failure for which she was treated with diuretic therapy. She’s grown along normal parameters for her age.

Physical Findings:
• AF is in no acute distress with no current symptoms of heart failure. HR 123, RR 26, BP 84/34, Wt 5.6 kg. Lungs CTA without retractions. Heart regular rate with normal S1 and S2. Grade III/VI continuous murmur noted at LMSB radiating to proximal pulmonary fields. Grade I/VI diastolic flow rumble noted in apical region. Bounding pulses in upper and lower extremities.

Pertinent Tests:
EKG:
• NSR, borderline LVH

Echo:
• Moderate sized, restrictive PDA with left-to-right shunting present. Enlarged LA and LV with normal biventricular systolic function. Widely patent aortic arch with no evidence of branch PA stenosis.

Intended Intervention:
• Antegrade closure of PDA with the PFM Nit-Occlude device. 3 Fr Mongoose pigtail catheter to be used for arterial angiography.
Case #2 MONDAY, JUNE 9

Live Case Operators:
Daniel R. Turner, MD, Srinath Gowdagere, MD, Daisuke Kobayashi, MD, and Thomas J. Forbes, MD

History:
- KF is a 39 yo AA male who developed tricuspid valve endocarditis requiring TVR at 9 years of age. In the same setting had primary closure of a perimembranous VSD and secundum ASD. Secondary to stenosis, underwent replacement of his prosthetic TV using a 31mm bioprosthetic valve in 1993. Development of atrial flutter with subsequent performance of an ablation and placement of a DDD PM in 2000. Over past 12 months, progressive TV stenosis and regurgitation noted. May 2014 Balloon valvuloplasty with 20mm balloon angioplasty catheter and conversion of ventricular PM lead to CS lead was performed. Nearly free TVR noted.

Physical Findings:
- KF is in no acute distress with moderate symptoms of right heart failure. HR 86, RR 16, BP 123/76, Wt 123.6 kg, O2 saturation 91%. Lungs CTA without retractions. Heart regular rate with normal S1 and S2. Grade II/VI systolic murmur LLSB. Liver 4cm below right costal margin. No peripheral edema.

Pertinent Tests:
EKG:
- NSR, RBBB

Echo:
- Severe TVR with prolapse of the anterior leaflet of the TV. Severe dilation of the RA. Small intra-atrial communication with right-to-left shunting present. Moderate to severe pulmonary hypertension.

Intended Intervention:
- Placement of Melody valve on 22 mm Ensemble delivery catheter in the tricuspid valve position. Possible closure of the small ASD using the Gore Helex device.
Case #1 TUESDAY, JUNE 10

Live Case Operators:
Graham Derrick, MD, Sachin Khambadkone, MD, and Robert Yates, MD

History:
MH dob 25th August 2001
• Coarctation of aorta, hypoplastic aortic arch; aberrant right subclavian.
• 2001: Neonatal end to end repair of coarctation.
• 2002: Subsequent balloon dilation.
• 2005: Supramitral membrane and mitral stenosis evident.
• 2009: Repeat balloon dilation.

Physical Findings:
• Well, reduced right brachial pulse, good volume carotid and left brachial pulses, reduced femoral pulses. Normal heart sounds, soft ejection systolic murmur at left sternal edge. No diastolic murmur and no signs of heart failure.

Pertinent Tests:

EKG:
• sinus rhythm, normal QRS axis, normal depolarisation and repolarisation

Echo:
• Good ventricular function, mild residual mitral stenosis, mean 7mmHg. Trileaflet aortic valve without stenosis. Concentric LVH.
• Ascending and transverse aorta previously enlarged.
• Coarctation distal to left subclavian artery, flow acceleration and flow extension into diastole. Post stenotic dilatation but small abdominal aorta.
• Normal right heart with no measured PHT (TR jet 2.6m/s)

CT/MR:
• Residual coarctation, post stenotic dilation, LVH, disconnected RSA (aberrant) supplied from vertebral artery.

Intended Intervention:
• Cardiac Catheter, angiography.
• Stent implantation into residual coarctation site.
• Covered stent or bare?
• Discuss technique, single balloon, subsequent moulding etc.
Great Ormond Street Hospital for Children NHS Trust, London, United Kingdom

Case #2 TUESDAY, JUNE 10

Live Case Operators:
Graham Derrick, MD, Sachin Khambadkone, MD, and Robert Yates, MD

History:
MM dob 15th December 2001
• 2002: Repair of truncus arteriosus, VSD closure and RV-PA conduit (12mm Contegra conduit).
• 2012: Low platelets, ?ITP.
• 2013: Exercise intolerance with breathlessness and fatigue, increasing stenosis of RV-PA conduit.
• 2013: Awake Magnetic Resonance Scan

Physical Findings:
• Well looking, pink, normal pulses, RV heave, systolic thrill, systolic and diastolic murmurs at the left sternal edge. No clinical signs of heart failure.

Pertinent Tests:

CPET:
• 60% predicted workload, peak VO2 27.5ml/kg, VE/VCO2 30. Normal BP response

EKG:
• Sinus rhythm, RBBB, RVH

Echo:
• Good ventricular function, normal left heart. Proximal stenosis of RV-PA conduit, patent PA branches. Free ‘pulmonary incompetence’. Mild ‘AR’, no ‘AS’; patent arch.

CT/MR:
• Calcific stenosis proximally (7 x 14mm), distal conduit/MPA good sized (17 x 21mm). Conduit regurgitant fraction 20%. Mild RPA hypoplasia, RPA:LPA 41:59%. Truncal valve mildly incompetent.

Intended Intervention:
• Left and right heart catheter
• Assess coronaries
• Stent angioplasty of conduit (covered), to relieve stenosis
• Implant of Melody valve
• Assess RPA
Case #1 TUESDAY, JUNE 10

Live Case Operators:
John D. Carroll, MD Interventional Cardiologist
Michael Kim, MD Interventional Cardiologist
Per Sommer, MD Interventional Cardiology Fellow
Ernesto Salcedo, MD Echocardiographer

History:
- 56 yo male referred for transcatheter closure of a residual LAA leak s/p AtriClip device during a hybrid MAZE and EPS/PVAI procedure in 2012 using bilateral thoracoscopy.
- Paroxysmal atrial fibrillation since 2009 that has been associated with debilitating symptoms of dizziness and near syncope.
- Prior ablation procedures had failed. After surgery had atrial flutter successfully ablated (right-sided) in September 2013.
- No recurrent afib/flutter but the referring electrophysiologist will not stop anticoagulation (XARELTO, rivaroxaban) due to finding residual LAA flow.
- No history of strokes or TIA.
- No history of major bleeding on warfarin or rivaroxaban, but bruises easily, has a labor intensive job, and reports falling and hitting his head a few weeks ago with significant hematoma.

Pertinent Tests:
Echo: 3D TEE:
- There was a small LA appendage which measures 0.4 x 1.5 cm. There was a 0.4 x 0.5 cm echodense mobile structure next to the LAA likely representing a suture from its closure. The right atrium is normal.
- Subsequently it was determined there were no sutures only the AtriClip device. Therefore it was felt there was a LA thrombus originating at the residual orifice into the remnant LAA. Aspirin was added to Xarelto and repeat TEE is planned prior to PICS. If thrombus persists, intravenous heparin will be used to dissolve.

Intended Intervention:
- Closure of Residual LAA leak with an Amplatzer Vascular Plug II with Image Guidance by an Integrated 3D TEE and Fluoroscopic System.
Case #2 TUESDAY, JUNE 10

Live Case Operators:
John Messenger, MD, John D. Carroll, MD, Arash Aghel, MD

Case Presentation:
William Pietra, MD, Pediatric Transplant Cardiologist

History:
• This is a 20 year old female with history of HLHS, coarctation of aorta, mitral stenosis, and VSD with transplant coronary arteriopathy.
• She was transplanted on 10/03/1994 and is now 19 years and 7 months s/p cardiac transplant.
• There have been two rejection episodes. The first one was on 04/08/1995 and she was treated with IV steroids. The second one was 05/10/2011 where she was also diagnosed with CAD. She was treated with IV steroids, ATG, and IVIG. This rejection episode was very difficult for her as she had not required hospitalization since infancy.

Physical Findings:
• Unremarkable

Cath with Coronary Angiography (4/28/2014)
• Normal right heart hemodynamics. LVEDP of 6mmHg. Cardiac output by thermodilution low, but likely not accurate secondary to significant tricuspid regurgitation.
• Coronary Angiography:
  LCA: Diffuse mild coronary artery disease in throughout the left main, proximal stenosis of ramus branch, probable stenosis of the proximal circumflex.
  RCA: Discrete lesion (new) of approximately 90% in the mid-right coronary, as well as diffuse disease throughout branches of RCA.

During administration of 12mcg adenosine for CFR, patient became hypotensive and bradycardic, requiring CPR and one dose of epinephrine with return of spontaneous circulation.

Pertinent Tests:

Recent RV Endomyocardial Biopsy:
• No evidence of acute cellular rejection: ISHLT Grade 0). Diffuse endocardial fibrosis, diffuse myocyte hypertrophy, and C4d Immunostain negative.

Recent Cyclosporine level:
• 210 ng/ml.

EKG:
• Sinus Tachycardia. RBBB

Echo:
• Normal biventricular function. Mild to moderate tricuspid regurgitation

Exercise Stress Test:
1 Achieved 80% of maximum predicted heart rate. The study was terminated due to dyspnea. Patient experienced nausea, vomiting at peak exercise.
2 The ECG component of the study was nondiagnostic given abnormal baseline.
3 Perfusion images were negative without evidence of ischemia or infarction.
4 Normal left ventricular systolic function, LVEF 73%.

Intended Intervention:
Percutaneous Coronary Intervention of Discrete Transplant Arteriopathic Lesion
• Utilizing multiple techniques and technologies to optimize PCI while minimizing radiation dose in a young patient with a life-long history of multiple medical imaging studies.
Live Case Operators:
Tom Fagan, MD, Pediatric Interventional Cardiologist
John D. Carroll, MD, Adult Interventional Cardiologist
Per Sommer, MD Adult Interventional Cardiology Fellow
Ernesto Salcedo, MD, Echocardiographer

History:
• This 64 yo woman was referred for ASD closure for limiting symptoms of dyspnea with moderate physical activities.
• “Small” ASD known for several years, evaluated in Florida in 2011 with cardiac MRI which indicated a QpQs of 1.33 associated with a 6.4 mm x 5.7 mm ASD in anterior location, atrial septal aneurysm, and normal right sided chamber dimensions.
• She moved to Colorado in 2011 and noticed DOE. She had recently stopped smoking.

Physical Findings:
• Normal splitting of second heart sound

Outside TEE from 2013
• Multi-fenestrated atrial septal defect (ASD) with three separate defects
  First: 2mm
  Second: 4-5mm
  Third: 9mm and about 2cm away from others
• Bidirectional shunting

Intended Intervention:
• Closure of Multiple ASD’s with Image Guidance by an Integrated 3D TEE and Fluoroscopic System
Case #1 TUESDAY, JUNE 10

Live Case Operators:
Evan Zahn, MD and Saibal Kar, MD
Cedars-Sinai Medical Center, Los Angeles, California

**Case #2** TUESDAY, JUNE 10

Live Case Operators:

Evan Zahn, MD and Saibal Kar, MD
ORAL AND POSTER ABSTRACT SCHEDULES
## ORAL ABSTRACT SCHEDULE

**GRAND BALLROOM 7TH FLOOR**  
**Moderators: John Bass, Roberto Cubeddu, Michael de Moor**

<table>
<thead>
<tr>
<th>Time</th>
<th>Abstract #</th>
<th>Title</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00-2:09 PM</td>
<td>0014</td>
<td>Ten year experience with transcatheter closure of perimembranous ventricular septal defects using the amplatzer asymmetric perimembranous ventricular septal defect occluder in children: A multicenter study.</td>
<td>Basil Thanopoulos</td>
</tr>
<tr>
<td>2:10-2:19 PM</td>
<td>0027</td>
<td>Role of balloon pulmonary valvuloplasty in tetralogy of fallot with diminutive pulmonary annulus in preventing transannular patch at repair: Mid term follow-up.</td>
<td>Saadeh Jureidini</td>
</tr>
<tr>
<td>2:20-2:29 PM</td>
<td>0037</td>
<td>The melody valved stent is more vulnerable for endocarditis than homografts or Contegra conduits in RVOT.</td>
<td>R. Heying</td>
</tr>
<tr>
<td>2:30-2:39 PM</td>
<td>0040</td>
<td>Which plane is radiation intensive in biplane systems? Implications for pediatric cardiac catheterization laboratories.</td>
<td>Abhay Divekar</td>
</tr>
<tr>
<td>2:40-2:49 PM</td>
<td>0049</td>
<td>Aortic stent fractures in the Coarctation of the Aorta Stent Trial (COAST).</td>
<td>Ram Bishnoi</td>
</tr>
<tr>
<td>2:50-2:59 PM</td>
<td>0054</td>
<td>Transcarotid balloon valvuloplasty (TCBV) for critical aortic valve stenosis (AS) utilizing continuous transesophageal echocardiographic (cTEE) guidance: A 22 year single center experience from the cath lab to the bedside.</td>
<td>Howard Weber</td>
</tr>
<tr>
<td>3:00-3:09 PM</td>
<td>0057</td>
<td>Long-term outcomes and reinterventions following balloon aortic valvuloplasty in pediatric patients with congenital aortic stenosis: a single-center study.</td>
<td>Patrick M Sullivan</td>
</tr>
<tr>
<td>3:10-3:19 PM</td>
<td>0060</td>
<td>The LifeValve project – First results of a stented completely tissue-engineered pulmonary valve replacement for transcatheter implantation in an intermediate term sheep model.</td>
<td>Boris Schmitt</td>
</tr>
<tr>
<td>3:20-3:29 PM</td>
<td>0064</td>
<td>Efficacy and safety of catheter-based rheolytic and aspiration thrombectomy in children.</td>
<td>Athar M. Qureshi</td>
</tr>
</tbody>
</table>

(0# represents listing order in syllabus)
**ORAL ABSTRACT SCHEDULE**

**SATURDAY, JUNE 7**
**4:00-6:00 PM**

**GRAND BALLROOM 7TH FLOOR**
*Moderators: Alex Javois, Raul Rossi, Makram Ebeid*

<table>
<thead>
<tr>
<th>Time</th>
<th>Abstract #</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:00-4:09 PM</td>
<td>0099</td>
<td>Effect of unzipping small diameter stents on blood vessels of a growing piglet model: A strategy to treat vascular stenosis in neonates and infants.</td>
<td>Shyam Sathanandam</td>
</tr>
<tr>
<td>4:10-4:19 PM</td>
<td>0074</td>
<td>Multicenter experience with the Amplatzer Vascular Plug II device to occlude different types of patent ductus arteriosus in pediatric patients.</td>
<td>Daniel Aguirre</td>
</tr>
<tr>
<td>4:30-4:39 PM</td>
<td>0082</td>
<td>Immediate postoperative catheter intervention across suture lines.</td>
<td>Christopher Petit</td>
</tr>
<tr>
<td>4:40-4:49 PM</td>
<td>0091</td>
<td>Left heart discharge under extracorporeal membrane oxygenation: transcatheter atrioseptostomy is safe and efficient in adults and children.</td>
<td>Luc Morin</td>
</tr>
<tr>
<td>4:50-4:59 PM</td>
<td>0098</td>
<td>Percutaneous transcatheter device closure of congenital VSDs; own experience without permanent complete heart block.</td>
<td>Ahmet Celebi</td>
</tr>
<tr>
<td>5:00-5:09 PM</td>
<td>0104</td>
<td>Radiation exposure of 3-dimensional rotational angiography use during trans-catheter melody valve implantation in the pediatric cardiac catheterization laboratory.</td>
<td>Hoang Nguyen</td>
</tr>
<tr>
<td>5:10-5:19 PM</td>
<td>0114</td>
<td>The melody valve…. Not just for conduits: A single center experience.</td>
<td>Nadeem Nimri</td>
</tr>
<tr>
<td>5:20-5:29 PM</td>
<td>0119</td>
<td>Ductal stenting: Is it time to redefine the palliative strategy in patients with pulmonary atresia with intact ventricular septum and critical pulmonary stenosis?</td>
<td>Kiran Mallula</td>
</tr>
<tr>
<td>5:30-5:39 PM</td>
<td>0128</td>
<td>A multi-centre trial of the safety of the Occlutech® ACCELL® Flex II septal occluder for transcatheter closure of secundum atrial septal defects in patients.</td>
<td>Amal El Sisi</td>
</tr>
<tr>
<td>5:40-5:49 PM</td>
<td>0129</td>
<td>Balloon angioplasty for native aortic coarctation in infants.</td>
<td>Juan Pablo Sandoval</td>
</tr>
<tr>
<td>5:50-5:59 PM</td>
<td>0139</td>
<td>Early clinical experience with a novel self-expanding percutaneous stent-valve in the native right ventricular outflow tract.</td>
<td>Damien Kenny</td>
</tr>
</tbody>
</table>

*(# represents listing order in syllabus)*
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001</td>
<td>Support of Two Tertiary Care Pediatric Cardiac Centers for the Establishment of New Successful Pediatric Cardiac Care Unit in a Developing Country.</td>
<td>Amjad Mehmood</td>
</tr>
<tr>
<td>0002</td>
<td>The New Occlutech® PDA Occluder: Initial Human Experience.</td>
<td>Abdelbasit Mohammed Ahmed Elbashier</td>
</tr>
<tr>
<td>0003</td>
<td>Simultaneous Right Coronary Artery Ostial Stening and Device Closure of Large ASD with a Self Fabricated ASD Fenestated ASD Device – In a Patient with Ischemic Cardiomyopathy.</td>
<td>Sumanta Shekhar Padhi</td>
</tr>
<tr>
<td>0004</td>
<td>Heart Catheterization for Residual Pulmonary Artery Obstructive Lesions in d-TGA Following Arterial Switch Operation.</td>
<td>Alejandro Torres</td>
</tr>
<tr>
<td>0005</td>
<td>Retrieval of Tumor Embolism from a Right Atrial Myxoma Which Lead to Acute Right Heart Failure After Surgery and Atrial Septal Patch Dehiscence.</td>
<td>Anil Kumar Singh</td>
</tr>
<tr>
<td>0006</td>
<td>Transcatheter Closure of Pulmonary Artery to Right Atrial Tunnel.</td>
<td>Anil Kumar Singh</td>
</tr>
<tr>
<td>0007</td>
<td>Single Center Experience of Pulmonary Vein Stenosis Transcatheter Intervention.</td>
<td>Mushail Binobaidan</td>
</tr>
<tr>
<td>0008</td>
<td>Right Ventricular Outflow Tract Stenting in the Cyanotic Infant with TOF Morphology.</td>
<td>Mushail Binobaidan</td>
</tr>
<tr>
<td>0010</td>
<td>As an Alternative to Surgical Shunts in Tetralogy of Fallot Early and Medium Term Results of Pulmonary Balloon Valvuloplasty.</td>
<td>Elnur Imanov, Elnur Hasanov</td>
</tr>
<tr>
<td>0011</td>
<td>Premature Infants with Aortic Coarctation Have an Increased Risk of Severe Intraventricular Hemorrhage.</td>
<td>Michael D. Seckeler</td>
</tr>
<tr>
<td>0012</td>
<td>Transcatheter Fontan Fenestration and Serial Dilation of a Goretex Tube to Facilitate Stent Delivery Across a Restrictive Native Atrial Septum: Late Complication of Fontan Operation.</td>
<td>Michael R. Recto</td>
</tr>
<tr>
<td>0013</td>
<td>Transcatheter Closure of Ventricular Septal Rupture in Stemi with ASD Device.</td>
<td>Selvarani Mathuram</td>
</tr>
<tr>
<td>0015</td>
<td>New Biplane 3D Data Fusion Prototype with Multiple Visualization Techniques for 3D Enhanced Guidance in Congenital Heart Disease Catheterizations.</td>
<td>Yoav Dori</td>
</tr>
<tr>
<td>0016</td>
<td>Transcatheter Closure of VSD with NIT Occlud® Coils.</td>
<td>Jesus Damsky Barbosa</td>
</tr>
<tr>
<td>0017</td>
<td>Isolated Hypoplasia of the Apical Portion of the Left Ventricle. A New Congenital Heart Disease.</td>
<td>Roberto Mijangos</td>
</tr>
<tr>
<td>0020</td>
<td>Prediction of Pulmonary Regurge and RV Function in Asymptomatic Repaired Tetralogy of Fallot Patients in Developing Countries; A Comparison to Cardiac MRI.</td>
<td>Hala Agha</td>
</tr>
<tr>
<td>0021</td>
<td>Balloon Atrial Septostomy in Pulmonary Arterial Hypertension: A Single Institution Experience.</td>
<td>Joanne Chiu</td>
</tr>
<tr>
<td>0022</td>
<td>Large Volume Detachable Coils for Transcatheter Occlusion of Vascular Structures in the Congenital Cardiac Catheterization Laboratory.</td>
<td>Gregory Fleming</td>
</tr>
<tr>
<td>0023</td>
<td>Percutaneous Closure of Congenital Coronary Artery Fistulae: 12 Year Experience at the National Institute of Cardiology, Mexico City.</td>
<td>Cecilia Britton</td>
</tr>
<tr>
<td>0024</td>
<td>Closure of a Moderate-Large Major Aorto-Pulmonary Collateral (MAPCA) in a Patient with Pulmonary Atresia VSD with Pulmonary Overcirculation with Amplatzer Vascular Plug IV.</td>
<td>Michael Recto</td>
</tr>
<tr>
<td>0028</td>
<td>Transcatheter ASD Closure with the Figulla Septal Occluder.</td>
<td>François Godart</td>
</tr>
<tr>
<td>0029</td>
<td>Increase of a RV-to-PA Non-Valved Goretex Tube by Implantation of the Edwards Sapien Valve.</td>
<td>François Godart</td>
</tr>
<tr>
<td>0030</td>
<td>The Utility of Intracardiac Echocardiography in Melody® Transcatheter Pulmonary Valve Implantation.</td>
<td>Wendy Whiteside</td>
</tr>
<tr>
<td>0041</td>
<td>Transcatheter Valvuloplasty in Congenital Pulmonary Stenosis Complicated by Infective Endocarditis.</td>
<td>Tarif Choudhury</td>
</tr>
<tr>
<td>0042</td>
<td>Utilization and Barriers to Adoption of Smart Technology for Communication in the Congenital Cardiac Catheterization Laboratory: Results of a PICES Survey of Senior Interventional Cardiologists.</td>
<td>Michael D. Seckeler</td>
</tr>
<tr>
<td>0067</td>
<td>Eliminating Stent Slippage: Use of a Novel Combined Balloon Sheath Assembly System to Deliver Stents.</td>
<td>Shreepal Jain</td>
</tr>
<tr>
<td>0094</td>
<td>Quality of Life of Patients with Adult Diagnosed Congenital Heart Disease.</td>
<td>Mary Heitschmidt</td>
</tr>
</tbody>
</table>

(0# represents listing order in syllabus)
0025  Intermediate and Long Term Follow Up of Device Closure of Patent Arterial Duct with Severe Pulmonary Hypertension – Factors Predicting Outcome. Masood Sadiq

0031  Closure of Uncommon Congenital and Acquired Pathological Communication with New Nitinol Wire Mesh Occluders. Mateusz Knop

0033  Catheter Closure of Atrial Septal Defects Using the Cocoon Septal Occluder: A European Multicenter Study. Basil Vasilios Thanopoulos

0034  Percutaneous Coronary Arteries Interventions in Pediatric Population: A 15 Years Single Center Experience. Zakaria Jalal

0035  A New Percutaneous Pulmonary Valve Implantation Technique for Complex Right Ventricular Outflow Tracts: the “Folded Melody Valve.” Zakaria Jalal

0036  Growth of the Atrial Septum After Amplatzer Device Closure of Atrial Septal Defects in Children. Jeffrey Gossett

0038  Follow-Up After Melody Revalvulation: “Aggressive” Prestenting Has Nearly Abolished Stent Fractures; Endocarditis is a Concern. Ruth Heying

0039  Results of Balloon Angioplasty and Stent Implantation in Patients with Pulmonary Artery Stenosis. Malgorzata Sz Kutnik

0043  Implantation and Intermediate Term Follow-Up of the Bard Valeo Stent in Pulmonary Artery Stenosis. Vikram Kudumula

0044  Unusual Deformity of a Figulla Flex II ASD Occluder After Closure of a Secundum ASD and Subsequent Retrieval. Heike Schneider

0045  Initial Experience in Transcatheter Closure of Aortopulmonary Window in Children at National Institute of Cardiology At Mexico. Roberto Teodoro De Jesus

0046  Patent Ductus Arteriosus Closure Using Occlutech Duct Occluder, Experience in South Africa. Lungile Pepeta

0047  Experience in Mexico with Transcatheter Closure of Postinfarction Ventricular Septal Defect Closure with Amplatzer Occluders. Joan Johnson

0048  Innovative Transvenous Ductus Stenting in Patients with Large Ventricular Septal Defect and Pulmonary Atresia: Safety and Efficacy at 6 Months Follow-Up. Bhavesh Thakkar

0051  Percutaneous Melody™ Valve Implantation in ‘Tricuspid’ Position in a Patient with a Fontan-Björk Modification. Heike Schneider

0052  Hemodynamic Effects of Dexmedetomidine in Pediatric Cardiac Transplantation Recipients During Cardiac Catheterization. Margie Tucker

0053  Ductal Origin of a Pulmonary Artery – Combined Catheter-Based and Surgical Treatment. Regina Bokenkamp

0056  Percutaneous Carotid Arterial Access in Infants < 3 Months of Age. Swati Choudhry

0059  Is Amplatzer Duct Occluder II Ideal for Closure of Gerbode’s Defect? I.B. Vijayalakshmi

0061  Usefulness of Amplatzer Duct Occluder II in infantile Hepatic Hemangiendothelioma. I.B. Vijayalakshmi

0062  Novel Technique of Closure of Pseudoaneurysm of Common Iliac Artery by Amplatzer Duct Occluder II. I.B. Vijayalakshmi

0063  Challenges of Transcatheter Interventions for Congenital Heart Diseases in Dextrocardia. I.B. Vijayalakshmi

0065  Short and Mid-Term Outcomes of Premounted Stents in Pulmonary Artery Rehabilitation for Patients with Tetralogy of Fallot. Brian Boe

0066  The Incidence of Acute Occlusive Arterial Injury in Infants Following Cardiac Catheterization Using Ultrasound Guided Arterial Access: A Single-Center Cohort Study. Shyam Sathanandam

0068  Balloon Aortic Valvotomy in Adults and Adolescents: Is the Palliation Worth It. S Radhakrishnan

0069  Tackling the Medusa Head in Cath Lab. S Radhakrishnan

0100  Tetralogy of Fallot with Excluded Pulmonary Artery: Right Ventricle Outflow Tract Stenting As a Bridge for Biventricular Repair: Case Report. Juliana Neves

0101  Collapsed Advanta V12 Stent After Treatment of Severe Aortic Coarctation: Case Report. Juliana Neves

0112  Case Report: Stent-Graft to Handle Blalock-Taussig Shunt Stenosis with Aneurysms. Juliana Neves

0113  Description of the Fetal Type Patent Ductus Arteriosus and the Choice of Transcatheter Occlusion Device. Shyam Sathanandam

(0# represents listing order in syllabus)
<table>
<thead>
<tr>
<th>#</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>0019</td>
<td>Transcatheter Device Closure of Partial Anomalous Pulmonary Venous Return (Papvr) with “Intrapulmonary Duplicating Drainage” – A Newly Described Entity and a Single Center Experience.</td>
<td>Howard Weber</td>
</tr>
<tr>
<td>0032</td>
<td>Comparison of Efficacy And Safety of 4 Different Types Nitinol Wire Mesh Occluders in Atrial Septal Defect Closure.</td>
<td>Roland Fiszer</td>
</tr>
<tr>
<td>0050</td>
<td>Hybrid Palliation for Interrupted Aortic Arch with VSD.</td>
<td>Tessa Commers</td>
</tr>
<tr>
<td>0070</td>
<td>Transcatheter Closure of Coronary Artery Fistulas: Single Center Experience in 6 Years Period.</td>
<td>Ahmet Celebi</td>
</tr>
<tr>
<td>0071</td>
<td>Transcatheter Device Occlusion of Anomalous Perimembranous Ventricular Septal Defects using the Amplatzer Vascular Plug IV: Initial Experience.</td>
<td>James Kyser</td>
</tr>
<tr>
<td>0072</td>
<td>Dilatable Pulmonary Artery Band: Results of Interventional Dilatation and Clinical Outcome.</td>
<td>Sophie Malekzadeh-Milani</td>
</tr>
<tr>
<td>0073</td>
<td>Transcatheter Rehabilitative Procedures on Pulmonary Arteries Complementing Surgical Palliation in Children with Pulmonary Atresia and VSD.</td>
<td>Rajasekaran Prem Sekar</td>
</tr>
<tr>
<td>0075</td>
<td>Transcatheter Device Closure of Secundum Atrial Septal Defects in Small Children using the Gore HELEX® Septal Occluder.</td>
<td>Darren Berman</td>
</tr>
<tr>
<td>0077</td>
<td>Use of Three Dimensional CT and MRI Guidance in the Cardiac Catheterization Laboratory for Patients with Congenital Heart Disease and Acquired Pulmonary Vein Stenosis.</td>
<td>Patcharapong Suntharos</td>
</tr>
<tr>
<td>0078</td>
<td>Efficacy and Safety of Transcatheter Device Closure of Perimembranous VSD Using ADO I: A Prospective Multi-Centre Observational Study.</td>
<td>Bhavesh Thakkar</td>
</tr>
<tr>
<td>0079</td>
<td>Life-Threatening and Inoperable Pulmonary Arterial and Bronchial Obstruction Due to External Compression in a Patient with Chronic Mycoplasma Avium Infection (MAI). Successful Therapy with Bronchial and Pulmonary Artery Stent Implantation.</td>
<td>Matthias Ambrose</td>
</tr>
<tr>
<td>0080</td>
<td>Risk Factors for Right Ventricular Outflow Tract Disruption During Percutaneous Pulmonary Valve Implantation (PPVI).</td>
<td>Matthew Ambrose</td>
</tr>
<tr>
<td>0083</td>
<td>Transcatheter Pulmonary Valvotomy in Neonate with Pulmonary Atresia with Intact Ventricular Septum: A Single Center Experience.</td>
<td>So Yeon Kang</td>
</tr>
<tr>
<td>0084</td>
<td>Extended Application of the Hybrid Procedure in an Evolving Facility.</td>
<td>Anas Taqatqa</td>
</tr>
<tr>
<td>0086</td>
<td>Utility of Transapical Closure of Paravalvular Mitral Leaks.</td>
<td>Hussam Suradi</td>
</tr>
<tr>
<td>0087</td>
<td>Hydrogel Expandable Coils for Vascular Occlusion in Congenital Heart Disease.</td>
<td>Kenji Baba</td>
</tr>
<tr>
<td>0088</td>
<td>Transcatheter Closure of Very Large Atrial Septal Defects: Feasibility and Safety in a Large Adult and Pediatric Population.</td>
<td>Alban-Elouen Baruteau</td>
</tr>
<tr>
<td>0089</td>
<td>Tracheal compression following Hybrid procedure in an infant with Hypoplastic Left Heart Syndrome (HLHS).</td>
<td>Federica Sidoti</td>
</tr>
<tr>
<td>0092</td>
<td>Hybrid Trans-Apical Closure of Paravalvular Mitral Leaks Using a New Device.</td>
<td>Sebastian Goreczny</td>
</tr>
<tr>
<td>0093</td>
<td>Transcathether Closure of a Right Pulmonary Artery to Left Atrial Fistula Using Amplatzer Muscular Ventricular Septal Defect Occluder.</td>
<td>Abdurrahman Uner</td>
</tr>
<tr>
<td>0096</td>
<td>Transcatheter Closure of Perimembranous and Muscular VSD with Cardiofix Muscular VSD Occluder.</td>
<td>Abdurrahman Uner</td>
</tr>
<tr>
<td>0102</td>
<td>Three Dimensional Rotational Angiography in the Assessment of Left Pulmonary Artery and Bronchial Compression in Pre-Fontan Patients.</td>
<td>Sharon Borik</td>
</tr>
<tr>
<td>0103</td>
<td>Long Term Coronary Angiography of Giant Coronary Aneurysms after Kawasaki Disease in Mexican Children.</td>
<td>Luis Martin Garrido-Garcia</td>
</tr>
<tr>
<td>0105</td>
<td>Combination Therapy in Severe Pulmonary Artery Hypertension in adults with congenital Atrial Septal Defect.</td>
<td>Pan Xin</td>
</tr>
<tr>
<td>0106</td>
<td>Transcatheter Closure of Tortuous Aorto-Right Atrial Fistula.</td>
<td>Abdurrahman Uner</td>
</tr>
<tr>
<td>0115</td>
<td>Percutaneous Treatment of Failing Fontan Due to Pulmonary Stenosis and Additional Antegrade Pulmonary Blood with a Single Covered Stent.</td>
<td>Ahmet Celebi</td>
</tr>
<tr>
<td>0116</td>
<td>Percutaneous Transcatheter Closure of VSD and ASD in a Case with BIFID Cardiac Apex.</td>
<td>Ahmet Celebi</td>
</tr>
</tbody>
</table>
POSTER ABSTRACT SCHEDULE

TUESDAY, JUNE 10
7:00 AM-5:00 PM

7TH FLOOR FOYER

0076  The Lost Art of Bronchography: What is the Role of this Imaging Modality in a Modern Pediatric Cardiac Catheterization Laboratory? Lauren Bolin

0095  Results of Endovascular Stenting of Sano Conduit Stenosis in Hypoplastic Left Heart Syndrome. Alejandro Rodriguez Ogando

0097  Percutaneous Treatment of Residual Lesions in Postoperative Pediatric Cardiac Surgery Infants Receiving Extracorporeal Membrane Oxygenation Support. Alejandro Rodriguez Ogando

0107  Transcatheter Melody Valve Implantation in Native Ventricular Outflow Tracts. Jose Luis Zunzunegui Martinez

0108  Transcatheter Occlusion of Patent Ductus Arteriosus (PDA) in Low-Weight Pre-Term Neonates (< 2000 g) with Amplatzer Occluder II Additional Size (ADO-II-AS). Fernando Ballesteros Tejerizo

0109  Catheterization Performed in the Early Postoperative Period After Congenital Heart Surgery in Children: Security and Efficacy. Nuria Gil Villanueva

0110  Reduction in Radiation Dose During Percutaneous Pulmonary Valve Implantation: A Quality Improvement Initiative. Patcharapong Suntharos

0111  A Novel Method to Prevent Recurrent Balloon Rupture During Dilatation of Heavily Calcified Conduits in Preparation for Transcatheter Pulmonary Valve Placement. Anas Abu Hazeem

0117  The Application of 3D Rotational Angiography and Intravascular Ultrasonography to Pediatric Congenital Heart Disease: Report of Two Cases. Atsuko Kato

0118  Transcatheter Stenting of the Systemic – Pulmonary Shunt: A Seven Year Experience From a Single Tertiary Center. Kiran Mallula

0120  Factors Influencing the Patency of a Percutaneously Created Fontan Fenestration. Meghna Patel

0121  Resolution of Inferior Baffle Leak associated with Total Venous Occlusion Using a Bare Metal Stent and the Gore Excluder® Aortic Extender After Mustard procedure for Transposition of the Great Arteries. Michael Ros

0122  New Modified Balloon-Assisted Technique to Provide Appropriate Deployment in the Closure of Large Secundum Atrial Septal Defect Using Amplatzer Septal Occluder in Children. Nazmi Narin

0123  Antegrade and Retrograde Transcatheter Closure of Two Residual Ventricular Septal Defects Using Amplatzer Duct Occluder II Following Surgical Repair of Tetralogy of Fallot. Nazmi Narin

0124  Pressure Wire Use in Pediatric Congenital Heart Disease. Toby Rockefeller

0125  Cardiac Catheterization Following Lung Transplantation. Toby Rockefeller

0126  Percutaneous Closure of Patent Ductus Arteriosus in Infants as Small as 2 Kg. Grace Deyo

0127  Comparison of Self-Expandable and Balloon Expanding Stents for Hybrid Ductal Stenting in Hypoplastic Left Heart Syndrome. Sebastian Goreczny

0130  Percutaneous Closure of Atrial Septal Defect (ASD) with Occlutech Figulla Device. Edmund Oliveira

0131  Intervention Catheterization in Special Situations. Edmund Oliveira

0132  Successful Over-Dilation of Right Ventricular to Pulmonary Artery Conduits During Melody Valve Implantation. Mary Hunt Martin

0133  High Incidence of Coronary Artery Compression During Evaluation for Melody Valve Candidacy. Margaret Keane

0134  Percutaneous Closure of Patent Ductus Arteriosus with NIT Occlud Coil an PDA RA Novel Device for All Anatomic Variants: A Single Center Experience. Liliana Maria Ferrin

0135  Reestablishment of Flow to LPA Through Classic Left BT Shunt Nine Years After Documented Complete Occlusion. Mary Porisch

0136  Case report: Advanta V12 to Rescue Stenotic Aortic Bypass Used to Treat Atretic Coarctation. Juliana Neves

0138  Melody Transcatheter Pulmonary Valve Implantation in Patients without Conduits or Bioprostheses. Jeremy Asnes

0140  Impact of Genetic Polymorphisms and Haematological Factors on Acetylsalicylic Acid and Clopidogrel Response Variability in Patients Presenting with Acute Coronary Syndrome. Emre Yalcinkaya

0141  Coronary Intravascular Ultrasound as Routine Surveillance for Coronary Graft Vasculopathy in Children Following Heart Transplant. Carlos Miranda

0142  Single Center Comparison of Outcomes of Surgical versus Transcatheter Pulmonary Valve Replacement. Suhail Kazmouz

0143  A Novel Technique for Extracardiac Fontan Fenestration Using the Safesept Transeptal Guidewire and Snare-Controlled Diabolo Covered Stent Placement. Joseph Casadonte

(0# represents listing order in syllabus)
Support of Two Tertiary Care Pediatric Cardiac Centers for the Establishment of New Successful Pediatric Cardiac Care Unit in a Developing Country

Amjad Mehmood1, Masood Sadiq2, Maad Ulla3
1Army Cardiac Centre, CMH LMC, Lahore, Punjab, Pakistan; 2The Children Hospital, Lahore, Punjab, Pakistan; 3AFIC, Rawalpindi, Punjab, Pakistan

Background: Establishment of a new pediatric cardiac unit is a major hurdle at all levels in developing countries. To maintain the functional standards of this facility there is always need for support by highly skilled professionals for guidance and continuing improvement.

Objectives: To analyze the results of professional support by established centre in the development of a new pediatric cardiac program.

Methods: Army Cardiac Centre Lahore was primarily raised as an adult cardiology unit. Pediatric Cardiac programme was started simultaneously with the support of the already established programme in the same city, the Children's Hospital / ICH, Lahore (Pakistan) and Armed Forces Institute of Cardiology at Rawalpindi (Pakistan), we developed this paediatric cardiology programme. This unit is now providing the facilities of paediatric cardiology like consultations, transhoracic, transesophageal and fetal echocardiogram. Pediatric cardiac diagnostic and interventional procedures. Our pediatric cardiac surgery unit is performing open and closed heart surgeries. It provides cardiac care for neonates and children for all social classes. There are however challenges like paucity of skilled personnel, limited resources, lack of pediatric and neonatal ICU and certain shortage of specialized equipment.

Results: This program was started at army cardiac centre in Feb 2011. The problems faced included recruitment of trained staff and equipment and lack of resources for ongoing financial needs. So far we have performed 1980 consultations, 53 interventions and 53 diagnostic procedures with no mortality. Our cardiac surgery data shows surgery of 60 children, with an overall mortality of 7%. The cost for the open heart surgery is about US $3000 and for a closed heart surgery is US $1500. Many patients are children of army personnel afforded by government, rest has to arrange finances themselves. Patients booked for surgery and interventions are addressed on priority due to less workload so currently there is comfortably manageable less waiting list for operative and interventional procedures.

Conclusion: The support of two well established centres has made it practically possible to build a pediatric cardiology programme. With continued development and philanthropic support, progress can be made in developing this paediatric cardiac care program.

The New Occlutech® PDA Occluder: Initial Human Experience

Abdelbasit Mohammed Ahmed Elbashier1, Mazeni Aul1, Geetha Kandavei2, Marisham Che Mood2, Hasri Samion2, Ziyad Hijazi1
1Institute Juntung Negara, Kuala Lumpur, Malaysia

Background: To evaluate the feasibility, safety, and efficacy of the Occlutech® PDA occluder for closure of patent ductus arteriosus (PDA). The Occlutech® PDA occluder is a novel device that underwent two design modifications.

Methods & Results: A prospective, non-randomized pilot study was started in November 2011. Forty-five patients were included until April 2013. Patients weighing less than 6kg or those with associated cardiac anomalies that required surgery were excluded. All patients were followed up by transthoracic echocardiography at 24 hours, 30, 90, 180 and 360 days after implantation. Residual shunt, left pulmonary artery (LPA) and descending aortic velocities were recorded using Doppler as well as parameters measured. All occluders were delivered via 6F-8F long sheaths and PDA closures were performed following standard techniques. Forty-five patients (30 female/15 male), with a median age of 2 years (6-month-38 years), and median weight of 9.2kg (6.3-69.2kg) were included. The narrowest median PDA diameter was 2.7mm (1.8-5.8mm). The occluders were successfully implanted in 43 patients. In 8 patients, PDAs were closed with Version 1, 2 patients with Version 2, and 33 patients with Version 3. Twenty-two patients (51.1%) had immediate and complete closure on angiography. Within 24 hours, color Doppler revealed complete closure in 33 patients (76.7%); 41 patients (95%) at 30 days, and in 100% of patients at 180 days. All patients with a large PDA had immediate residual shunt which was closed at the 180 day follow-up. There was no device embolization, hemolysis, or obstruction to the LPA or descending aorta.

Conclusion: The new Occlutech® PDA is safe and effective. In patients with a large PDA complete closure tended to take more time.
Transcatheter Closure of Pulmonary Artery to Right Atrial Tunnel

Anil Kumar Singh1, Anbarasu Mohanraj1, Janakiraman Ezhilan1, Sivakumar Kothandam1

1Madras Medical Mission, Chennai, India

A 54 year old lady was diagnosed to have multiple right atrial myxoma from the fossa ovalis (Figure 1A) which showed calcifications on fluoroscopy. The fossa ovalis with the tumor was excised (Figure 5-7) and the surgically created defect was closed with a pericardial patch closure. She had persistent postoperative breathlessness and evidence of tricuspid regurgitation (Figure 8), moderate pulmonary hypertension and right ventricular dysfunction. A lung perfusion scan showed complete lack of perfusion of the right lower lobe (Figure 9) and D-dimer levels were markedly elevated. Two weeks after the surgery, she worsened with sudden hypoxia and severe cyanosis with metabolic acidosis. After ventilator support, transoesophageal echocardiogram showed a patch dehiscence of the atrial septum with a 22 mm residual ASD (Figure 10,11) and bidirectional shunt. Cardiac catherization showed elevated atrial and right ventricular end diastolic pressures, moderate pulmonary hypertension, marked right to left shunt across the atrial septal defect. A large filling defect with calcific specks suggestive of tumor embolus was identified in the right lower lobe pulmonary artery (Figure 12) and snared to the lower end of inferior vena cava (Figure 13). After closure of the residual atrial septal defect with a 24 mm Amplatzer septal occluder (St. Jude Medical, MN), oxygen saturations improved to normal and right pulmonary angiography (Figure 14) showed normalization of pulmonary blood flows. A Tracheal inferior vena cava filter (Cordis Corporation) was placed above the tumor below the renal vein drainage through a contralateral femoral venous access. The 5 cm long bulky tumor mass could not be pulled beyond the common iliac vein for a surgical retrieval through the groin. Angiogram through the groin veins showed good flows in iliac veins and inferior vena cava.(Figure 15.) She went back home comfortably after three days on oral anticoagulants. We hypothesized that part of the tumor mass embolized into the right pulmonary artery during cardiopulmonary bypass and resulted in elevated right ventricular filling pressures. This caused initial breathlessness and subsequent patch dehiscence to result in right to left shunt through the atrial septum.

Transcatheter Closure of Pulmonary Artery to Right Atrial Tunnel

Anil Kumar Singh1, Sivakumar Kothandam1

1Madras Medical Mission, Chennai, India

A seven month old baby boy with Trisomy 21 presented with growth failure (weight 5.1 kg) and respiratory symptoms. He had normal oxygen saturations, a long systolic murmur in the right sternal border, normal splitting of the second sound along with anticoagulants. We hypothesized that part of the tumor mass embolized into the right pulmonary artery and resulted in elevated right ventricular filling pressures. This caused initial breathlessness and subsequent patch dehiscence to result in right to left shunt through the atrial septum.

0007
Single Center Experience of Pulmonary Vein Stenosis Transcatheter Intervention

Masial Binobaidan1, Jassim Abdulhameed1

1Prince Sultan Cardiac Center, Riyadh/Riyadh, Saudi Arabia

Introduction: Pulmonary vein stenosis (PVS) is a fascinating yet frustrating and difficult to manage condition with an exceptionally high mortality rate. Until recently, the disease was seen almost exclusively in young children with or without various forms of congenital heart disease. PVS is a relatively rare condition. Patients with the pediatric form of PVS, either primary or secondary, have a very guarded prognosis without treatment.

Method: Over the period from 1999 to 2010, 11 patients presented with PVS either primary or secondary required interventional procedure in prince Sultan Cardiac Center (PSCC,Riyadh). Formal consent were taken, 8 were under GA and 3 with to –0.5 (-2.1 to 0.2). There were no complications. Seven patients have undergone successful repair. There were no immediate or early deaths.

Conclusion: Debate exists as to which treatment strategy is superior (surgical or transcatheter techniques) for the management of PVS. Transcatheter stenting or balloon angioplasty outcomes would seem to be unknown. Our experience of transcatheter PV balloon angioplasty and/or stent implantation, though small number, is promising.

0008
Right Ventricular Outflow Tract Stenting in the Cyanotic Infant with TOF Morphology

Masial Bin obaidan1, Jassim Abdulhameed1

1Prince Sultan Cardiac Center, Riyadh/Riyadh, Saudi Arabia

Background: The Debate continues regarding the initial management of cyanotic infants especially those patients with pulmonary artery hypoplasia. While surgery can and has been performed in these patients, it is associated with increased morbidity.

Objective: We review the effectiveness of right ventricular outflow tract (RVOT) stenting in cyanotic infant with TOF morphology.

Methods: Clinical, echocardiographic, angiographic and hemodynamic data were reviewed for 23 patients who underwent 26 RVOT stenting procedures from June 2007 to December 2013.

Results: There were 12 girls and 11 boys with median age 3 month and weight 3.5 kg. The pulmonary valve was hypoplastic in all patients Median pulmonary valve diameter 3.1mm (range 2.7–5.2), Z-score –5.5 (range –8.9 to –4.4) RVOT stenting improved arterial oxygen saturation from a median of 60% (55–66%) to 91% (82–94%). Median Z-score for the left pulmonary artery increased from –4.2 (–7.2 to –2.9) before stent implantation to –1.8 (–4.6 to –0.8) at time of surgery. Median Z-score for the right pulmonary artery increased from –3.1 (–6.2 to –2.1) to 0.0 (0.0 to 0.5) at time of surgery. There were no complications. Seven patients have undergone successful repair. There were no immediate or early deaths.

Conclusions: In the cyanotic young infant with TOF morphology, who abandoned surgery for any reason or at high risk stenting of the RVOT provides a safe and effective management strategy, improving arterial oxygen saturation and encouraging pulmonary artery growth.

0009
Inconsistent with Heavy Total Thmean Correction in Cyanotic Congenital Heart Disease and Symptomatic Palliative Treatment of Interventionsal

Elmir Imanov1, Elnor Hasanov1, Fuad Ablbudayev2, Faik Mirzal2

1Scientific Center of Surgery named after M.A.Tocupbashov, Pediatric Cardiac Surgery and Neonatal Surgery Center, Baku, Azerbaijan

Introduction: Pulmonary arterial structure or because of age are not eligible for total repair of cyanotic congenital heart disease in patients with symptomatic and clinical correction and palliative interventional cardiac catherizations performed in order to gain time will be presented.
Case 1: A 13-year-old woman patient with a diagnosis of TOF severe cyanotic when you contact us and exercise capacity was low. 1.4 Angiography catheter in the pulmonary index found. Surgery to repair total was not available on the council. After this time, even when the shunt was thought that the development of the pulmonary artery. Valvular pulmonary stenosis is added at the forefront of the proximal right and left pulmonary arteries had discrete stenosis may be termed, the right hilum was expanding relatively. In patients with annulus diameter of 14mm to 16mm x 3cm in size in the first session with a balloon catheter dilatation palliative pulmonary balloon valvuloplasty was performed. Before the procedure, which resulted in 66% oxygen saturation increased to 81%. Then 10mm x 2cm in size Cordis right and left pulmonary artery with a balloon catheter, peripheral balloon angioplasty was performed. Finally, oxygen saturation increased to 94%. There was no complication in both processes. In the first days after the procedure in the follow-up has hovered around 95% oxygen saturation.

Case 2: With a history of frequent cyanotic spells, 5 month old male patient was diagnosed with TOF. Pulmonary index 1.5, annulus diameter was 5.2mm. 7mm x 2cm in size Tyshak palliative pulmonary balloon valvuloplasty with balloon catheter was performed. Pulmonary balloon valvuloplasty before the oxygen saturation of 78% to 92% increased. Short-term follow-up has disappeared spell seizures, decrease in oxygen saturation was observed.

Case 3: TOF first time admitted with a diagnosis of hypoplastic pulmonary arteries, which was a 18 year old male patient. Pulmonary index 1.35, diameter 13mm was annulus. Patient 15mm x 4cm in size Tyshak palliative pulmonary balloon valvuloplasty with balloon catheter was performed. Before the procedure, oxygen saturation of 64%, which rose to 80%. Complications occurred.

Results: Total unfit for repair of congenital heart disease with cyanosis in heavy palliative rather than palliative surgery can be invasive procedures. Good results are seen in the early stages. Long-term results should be monitored. Treatment may be permanent. Pulmonary index due to low total shunt destination can be in the form determined.

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Between May 2011 and January 2014 the ages of 5 month and 13 years old patients with TOF underwent palliative pulmonary balloon valvuloplasty (PBV) to evaluate the effectiveness and usefulness of PBV. Oxygen saturation (SO2) <70% to be severe hypoxia or cyanotic spells history with SO2 < 75% and pulmonary artery index (PI) Impairment young age, or coronary abnormalities due to the surgical correction according to the non-surgical shunts candidate FT to cases of palliative PBV made We investigated the efficacy and usefulness of methods. Effectiveness as a criterion Postprocedural SO2 in the ≥ 10% higher and 24 hours over the continuing usefulness as a criterion of 6 months for a longer spell without the SO2 ≥ 70% watching and surgical palliation without the need of total repair destination can be in the form determined.

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Case Report: 67 years old male was referred from nearby GH with diagnosis of VSR following ACS STEMI Anterior wall, lysed with Streptokinase. He was referred on second day (22.10.13) since his haemodynamic status worsened. He is a smoker, not a diabetic or hypertensive. He presented to us with hypotension (80/60) with signs of left ventricular failure. On auscultation there was a pansystolic murmur. ECG showed sinus rhythm with ST elevation in anterior leads. Echocardiogram showed VSR in apex with adequate rim. There was severe systolic dysfunction with grade III diastolic dysfunction. Since surgery and post operative mortality rates are high we wanted to proceed with TCC of VSR. Coronary angiogram showed 50% lesion in mid LAD. LV angiogram showed the defect of 10 mm size . It was decided to proceed with TCC of VSR with ASD device. An arteriovenous loop was formed between RFA and RT UV across the defect by an exchange guidewire using JR guiding catheter and snare. 18mm coacoan ASD device was deployed across the defect by delivering antegradely through RT UV using 10F sheath. PTCA to mid LAD was done. Patient showed dramatic improvement in his haemodynamic status. Systolic function improved well from severe to mild systolic dysfunction. Patient IS on follow up.

CONCLUSION: VSR following STEMI can be treated percutaneously successfully not warranting surgery in anatomically suitable defect even in acute phase. Results with ASD device are comparable with dedicated VSR closure devices when the septum is thinned out.

0014

Ten Year Experience with Transcatheter Closure of Perimembranous Ventricular Septal Defects Using the Amplatzer Asymmetric Perimembranous Septal Defect Occluder in Children: A Multicenter Study

Basil Thanopoulos1, Michael Rigby1, Evangelos Karanasis1, Nicholas Eleftherakis1, Nico Blom2
1 Iatrikion Medical Center, Athens, Greece; 2 Royal Brompton Hospital, London, UK;
*Agia Sophia Children’s Hospital, Athens, Greece; *Agia Sophia Children’s Hospital, Athens, Greece; *University Medical Center, Leiden, The Netherlands

Introduction: We present 10 year experience with 78 patients (pts) with perimembranous ventricular septal defects (PMVSDs) who underwent transcatheter closure at 4 different Institutions with the Amplatzer asymmetric PMVSD occluder.

Methods: The age of the pts ranged from 0.3 to 15 years. During the study period 31 other patients were excluded from transcatheter closure because they did not fulfill the patient selection criteria (distance less than 2mm from the PMVSD to the aortic valve, size of VSD in relation to patient’s age).

Results: The PMVSD diameter ranged from 5 to 15mm (mean 7.8 ± 2.5mm). The device size ranged from 6 to 16mm (mean 9.3 ± 2.5mm). The devise was permanently implanted in 72/78 patients. Complete occlusion of the communication at six month, one-year, and 2-year follow-up was observed in 93%, 97%, and 97% patients, respectively. Main complications included: Early. Were observed in patients less than one year (body weight < 8 Kg) and included: a. Device embolization (3 patients-catheter and surgical removal), respectively, b. severe procedural bradycardia (5 pts) and c. Mobilt II and complete heart block heart in 3 in 1 patients respectively. (sinus rhythm after device removal). Late (follow-up 2-10 years). Complete heart block was developed in one patient 4-year old with Down syndrome. No other patient developed heart block during the follow-up. Three patients developed mild aortic regurgitation. In one of them the regurgitation was not seen at the 1-year follow-up. No other complications were observed. Conclusions: Transcatheter closure using the Amplatzer APMVSD occluder is as a safe and effective nonsurgical alternative that should be offered in properly selected patients with PMVSDs. It should be noted, however, that with the current design of the occluder-delivery system the procedure carries an increased risk in small patients less than one-year of age. Finally, due to anatomic reasons, this therapy cannot be offered to significant number of patients with these defects.

0015

New Biplane 3D Data Fusion Prototype with Multiple Visualization Techniques for 3D Enhanced Guidance in Congenital Heart Disease Catheterizations

Tanja Kurzendorfer1, Erin Girard1, Kevin Gralewski1, Atilla Kiraly2, Norbert Strobel1, Yoav Dor1
1 Siemens AG, Healthcare Sector, Forchheim, Germany; Cardiology, Children’s Hospital of Philadelphia, Philadelphia, Pennsylvania, USA; *Imaging and Computer Vision, Siemens Corporate Technology, Princeton, New Jersey, USA

Background: Fluoroscopically guided catheterization procedures can benefit from integrated visualization of current fusion systems in limited visual fields and data input options and allow fluoror overlay only for a single plane. Here we present a new biplane 3D fusion prototype capable of handling multiple 3D data inputs and more elaborate visualization features (Siemens, Forchheim, Germany).

Methods: We retrospectively reviewed data from 20 consecutive prospectively enrolled patients undergoing X-ray magnetic resonance fusion (XMRF) in our institute. Registration was performed using manual visual matching of 3D data to biplane X-ray projections using internal markers. The prototype can accept DICOM or multiple stl files and overlays volume rendered or multiple surface rendered models. Multiple visualization techniques and tools were incorporated, such as contour and solid rendering and surface carving, as well as to facilitate a clear presentation of complex 3D anatomy. Surface models were generated by segmentation of high-resolution MRA sequences.

Results: The max segmentation time was 10 min (range 2-10 min) and max registration time was 30 sec (range 10-30 sec). Registration was performed without the need for contrast or additional radiation exposure. In phantom experiments the registration accuracy was measured at 0.6 ± 0.3mm in the AP projection and 0.3 ± 0.2mm in the lateral projection. In contrast to volume rendering, solid rendered surfaces provided a clear view of internal structures, such as vessel ostia, when using a carving feature (figure). Contour rendering alone was not suitable for complex over anatomical structures due being incomplete AV block the most severe one and with haemolysis the most important ones. In October 2011, Le VSD Nit Occlud® coil arrives to Argentina for perimembranous and muscular VSD closure. There is no rhythm disorders described with this device, especially complete AV block that is the most feared complication, but the most important one is haemolysis (5-7% depending on the publication).

Objective: Short and medium term follow up of VSDs closed with PDA and Le VSD Nit Occlud® coils.

Materials and Method: Since October 1st 2011 23 patients (p) have had a transcatheter VSD closure. X age: 7,5 years (from 1y to 41y). X weight: 30 kg (from 10,8 to 70kg). Gender: 14 Females 8 males. 21/23p had a pulmonary to systemic flow ratio (Qp/Qs) >1,5. 2/23p had Qp/Qs ratio of 1.3 but had history of infective endocarditis. 17/23p (73,91%) had perimembranous VSD with aneurysm and 6/23p muscular VSD: 3p high muscular VSD, 2p midventricular VSD (1p postsurgical residual VSD). All the procedures were guided by transesophageal echocardiography except one that was done under transfemoral guidance. Follow up was done immediately after the procedure, at 24hs, 1week, 1 month, 3 months, 6 months and 1 year, and after that annual control. Follow up included analysis of: residual shunt, haemolysis, rhythm disorders (complete AV block as the most important complication) and device migration. All of the clinical controls included E.K.G., chest x-ray and transthoracic echo. Every patient who may have had an electric alteration on the E.K.G. had a Holter done.

Results: X follow up: 18,3 months (7 to 29 m). X age: 7,5 y (1,4 to 45 y). X weight: 30,7 Kg (11 to 70 kg). VSD types: perimembranous 70%, muscular 30 % (2 high muscular 2 y mediventricular, 1 of them postaspirating). Coils types: 18 p Le VSD Nit Occlud (2 p PDA Nit Occlud after 48 hs). 1 p PDA Nit Occlud, 1 p Le VSD Nit Occlud and 1 PDA Nit Occlud coil in the same procedure. Fluoroscopy time: X: 25’ (18 to 40’). Complicaciones: 3 haemolysis (13%): 1 mild 2 severe (needed another cath and closure with PDA Nit Occlud coil). 1 embolization (128 changed for a 148 in the same procedure). There were no arrhythmias during the follow up. Residual shunt: all mild immediately after the procedure: 34,78% (8/23p). At 24hs: 34,78%, 1m: 17,3% (4/23 p), 3m and 6m: 4,34% (1/23p). This last patient has still residual shunt.
after 2 years follow up (different VSD). 1 p developed moderate to severe tricuspid stenosis after 3 month (possibly the subvalvular apparatus was intertwined). There was no complete AV bck registered during the follow up. Conclusion: Transcatheter closure of VSD is feasible. Minimal residual shunt was detected during follow up and no tricuspid stenosis. Haemolysis was the most frequent complication evidenced immediately after the procedure. There was no complete AV bck registered during the follow up.

0017

Isolated Hypoplasia of the Apical Portion of the Left Ventricle: A New Congenital Heart Disease

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Congenital heart malformations of the left ventricle include: Hypoplastic Left heart syndrome, non-compact left ventricle, left ventricle aneurysm, congenital diverticulum of left ventricle, apical hypertrophy of the left ventricle.

Isolated hypoplasia of the apical portion of the left ventricle is a very rare entity of recent knowledge, of which very little is known (pathogenesis, evolution and treatment). Due to the extremely rare incidence, we present a case of a 17 year old patient, who was completely asymptomatic (cardiovascular), on physical examination it was found with a systolic left parasternal murmur. She underwent cardiac catheterization with the following findings: a left truncated ventricle, with absence of the apical portion, with the right ventricle surrounding the distal portion, forming the cardiac apex. Additional findings where a left ventricular end diastolic pressure of 17mmHg.

Even though the pathogenesis of this pathology is unknown, it has been proposed that is due to a deficient dilation of both ventricles during fetal life during the normally ventricular septation. It characterizes for having a truncated left ventricle, with a certain grade of systolic dysfunction and an elongated, and normally functional right ventricle that surrounds the distal portion of the left ventricle. The absent portion is substituted by adipose tissue. This myocardiopathy was first described in the year 2004, by Fernandez-Valis et al, in a series report of 3 cases. Due to the extremely rare incidence of this type of myocardiopathy, we decided to publish this case.

0018

Anomalous Origin of Pulmonary Branches from the Ascending Aorta: A Report of Five Cases

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1Instituto Nacional de Cardiología “Ignacio Chávez”, Mexico City, Mexico

Anomalous origin of pulmonary branches is a rare entity where, either the right or left pulmonary artery arises from the ascending aorta in the presence of separately aortic and pulmonary valves. The clinical manifestation usually occurs in the infant or, more rarely, in the newborn as respiratory distress or congestive heart failure due to increased pulmonary resistance.

The survival in the Indian series was 94% with the death of one patient with Fallot tetralogy. In a 20 year period we have treated five patients with this congenital heart disease. The survival was 80% and in all cases that survive, the systolic pressure decreases significantly in the catheterization. In our series of cases, we have demonstrated that timely correction and without complexity, improve the prognosis and survival. Most of our patients had severe pulmonary hypertension with a median of 74 mmHg (rank 50 to 90mmHg). It is relevant to affirm that in following patients, there is reduction of the pulmonary hypertension after corrective surgery.

We can affirm that in patients with anomalous origin of the pulmonary artery, the prognosis is better in patients that are operated early in the course of the disease, in patients without other congenital cardiac abnormalities and in patients which their pulmonary systolic pressure decreased to normal values.

0019

Transcatheter Device Closure of Partial Anomalous Pulmonary Venous Return (PAPVR) with “Intrapulmonary Duplicating Drainage”: A Newly Described Entity and a Single Center Experience

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Background: Transcatheter closure of extra pulmonary PAPVR, either ‘scimitar vein’ or ‘vertical vein’ type, has been reported (Figure 1A). We describe our experience with non surgical closure of “intrapulmonary duplicating pulmonary venous return” (Figure 1B).

Technique: Hemodynamics and selective pulmonary angiography was performed with and without temporary balloon occlusion of the anomalous pulmonary veins. Balloon occlusion reverse wedge pulmonary vein angiography was also performed if a single pulmonary vein was considered not to have dual supply from the affected lung segment. Device closure of the anomalous vein(s) was undertaken only when dual supply was present.

Results: From 2004 -2013, 4 patients underwent cardiac catheterization and embolization therapy for PAPVR. Table 1 shows the clinical and intervention summary. The diagnosis remained undetected via MRI but was delineated in the catheterization lab using various angiographic techniques and successfully treated by device embolization.

<table>
<thead>
<tr>
<th>No.</th>
<th>Age at Cath (yr)</th>
<th>Type of PAPVR</th>
<th>Op/Qs</th>
<th>Follow up (months)</th>
<th>Devices</th>
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<tbody>
<tr>
<td>1</td>
<td>37</td>
<td>RUPV to SVC. RMPV and RLPV veins have dual pulmonary venous drainage</td>
<td>2.46</td>
<td>1.25</td>
<td>2</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 and 14mm AVP-II</td>
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<tr>
<td>2</td>
<td>15</td>
<td>Left VV with dual pulmonary venous drainage</td>
<td>1.73</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12mm AVP-II</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Left VV with dual pulmonary venous drainage</td>
<td>1.27</td>
<td>1</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8mm AVP</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>RUPV to SVC. RLPV vein has dual pulmonary venous drainage</td>
<td>1.52</td>
<td>1</td>
<td>96</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6, 8, 10 and 12mm AVP</td>
</tr>
</tbody>
</table>

AVP, Amplatzer Vascular Plug; VV, Vertical vein.

Figure 1A

Figure 1B
A Single Institution Experience
Balloon Atrial Septostomy in Pulmonary Arterial Hypertension:
Doppler imaging.
Keywords: dysfunction in asymptomatic repaired TOF patients.

Prediction of Pulmonary Regurge and RV Function in Asymptomatic
Repaired Tetralogy of Fallot Patients in Developing Countries: A
Comparison to Cardiac MRI
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Background: Although the long-term outcome of Tetralogy of Fallot (TOF) surgi-
cal repair in developing countries is still unknown, pulmonary regurgitation (PR)
remains the most important post repair lesion influencing earlier morbidities.

Objectives: To quantify the degree of PR by conventional echocardiography
and the right ventricular (RV) functions by tissue Doppler imaging (TDI) and
to compare these indices with data obtained by quantitative approach of cardiac MRI (CMR).

Methods: 25 asymptomatic corrected TOF patients using trans-annular patch (9.2 ± 4
years of age) were compared with 20 age and sex-matched healthy children.
RV functions were assessed by myocardial performance index (MPI) and myocardial
tissue velocities (S', E' and A') obtained by TDI. Echocardiographic measurements
were used to quantify PR: (1) PR jet width /PA diameter, (2)Pulmonary pressure half
time (3) Pulmonary regurgity index (PRI); ratio of PR duration to diastole duration,
(4) No flow time; diastole duration – PR duration and (5)Diastole Systole Time
Velocity Integral ratio (DSTVI). Results: RV myocardial velocities in TOF patients
were significantly lower, while E'/E ratio and MPI were significantly higher than
in normal controls. S' correlated significantly with RV MPI in TOF patients
(ρ= -0.4
value 0.008). CMRI parameters of RV functions were; RV end-diastolic volume
(RVEDV) = 108 ± 58ml, RV end-systolic volume (RVESV) = 50 ± 27ml, RV stroke
volume (RVSV) = 59.8 ± 33.23ml. These indexes were significantly higher than normal
control values. By logistic regression, PRI and no flow time had the best prediction
for severity of PR. ROC curve analysis for PRI using RF % as gold standard parameter,
showed an area under the curve (AUC) of 0.924 (sensitivity = 86.36%, specificity =
100% and cut-off value = 0.8), while no flow time had an AUC of 0.894 (sensitivity
= 81%, specificity = 100% and cut-off value = 64msec). These parameters were used
to distinguish between cases with RF<20% and RF>20%; mild and more than mild
degree of PR respectively.

Conclusion: Echocardiographic continuous wave Doppler derived indices (PRI and
no flow time) can offer a readily available, non-invasive and accurate complementary
option in select patients.

0020

Large Volume Detachable Coils for Transcatheter Occlusion of
Vascular Structures in the Congenital Cardiac Catheterization
Laboratory
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Background: Transcatheter technological advances from non-cardiac specialties can
be offered to the congenital cardiac catheterization laboratory (CCL) to allow
vascularization to non-conventional techniques. Large vessel occlusion using
through a 0.020” lumen microcatheter are approved for use for occlusion of cerebral
and peripheral arterial aneurysms. We report our experience using these coils for
transcatheter vascular occlusion in the CCL.

Methods: Single center, retrospective review of all transcatheter vascular oc-
cclusions performed in the CCL using Penumbra Ruby or Coil 400 large volume
detachable coils.

Results: Large volume detachable coils were used in a total of six CCL procedures.
The median weight of patients was 15.6 kg (range 3.7-144 kg), and the median
age was 50.3 months (range 4.2-219.6 months). Indications for use included:
difficult access of target vascular structure using standard (4-Fr) catheters (n=3);
large vessel diameter with concern for incomplete occlusion using standard coils
or devices (n=2), and a perceived high risk of coil displacement using free release
coils (n=1). All collateral vessels were accessed with a 0.020” lumen microcatheter and
a 0.014” wire. A total of 18 Penumbra coils were deployed with multiple coils
used in 5/6 cases (83.3%). The sizes of coils ranged from 4mm diameter by 15 cm
length to 16mm diameter by 60 cm length. Coils were deployed in palliated single
ventricle patients for occlusion of veno-venous collaterals (N=2) or aortopulmonary
collaterals (N=3), and a large arteriovenous malformation to a lung sequestration
in a patient with Scimitar syndrome (N=1). Complete or near complete immedi-
ate occlusion was documented in all interventions. There were no complications
including no coil misplacement.

Conclusion: In our experience, large volume detachable coils, developed for neuro-
interventional and peripheral interventional procedures, are a safe and effective
option for transcatheter occlusion of complex vascular structures in the CCL.
These coils are available in numerous diameters and lengths, allow tight packing
of a large volume of coil, and provide a good option for occlusion of large and
tortuous vascular structures that may be difficult to access and safely occlude with
more conventional catheters, coils, and devices.

0022

Percutaneous Closure of Congenital Coronary Artery Fistulae: 12
Year Experience at the National Institute of Cardiology, Mexico City
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Roberto Mijangos1, Jorge Guevara1

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Coronary artery fistulae (CAF) are abnormal connections between a coronary artery
and a cardiac chamber, more often right sided, which represents 4% of all con-
genital cardiac diseases. Most are congenital in nature, and in some cases
asymptomatic, nevertheless some pediatric patients develop heart failure secondary
to the volume overload resulting from left to right shunting. Awareness of this
fistula is important and its correction is indicated because of the high prevalence
of late symptoms and complications. Transcatheter closure of a CAF has become an
important therapeutic option and indications for occlusion include symptoms of
congestive heart failure, failure to thrive, and evidence of ischemia. We performed a
retrospective analysis of patients who underwent percutaneous CAF closure over

0023

Conclusions:
PAPVR with intraluminal (duplicating) pulmonary venous drainage is a
ever seen entity which is probably underappreciated on cardiac MRI. Cardiac cath-
terization with selective pulmonary artery and pulmonary vein angiography can
effectively delineate this unique physiology. Transcatheter closure of such PAPVR
within the pulmonary venous drainage can be considered a safe non-surgical
option in selected patients.
the last twelve years (between 2002 and 2014) at the National Institute of Cardiology Mexico City. Patients with symptomatic CAF were included (e.g. failure to thrive and/or clinical evidence of heart failure). A total of 6 patients were included. The mean age at catheterization was 13.9 years (range 2 months - 71 years). Mean body weight was 24.5kg (ranged 3.70kg). Coronary artery fistulae origin was 50% from the left coronary artery (75% from anterior descending artery, 25% from circumflex artery) and the other 50% from the right coronary artery. The fistulas drained most commonly into the right ventricle (66.6%), 16.6% to the pulmonary artery and 16.6% to the right atrium. An amplatz vascular plug II (AVP II) was used in four patients, and an ADO was used in other patient. In one patient an amplatz muscular VSD occluder and coil devices where used to occlude multiple fistulas. The procedure was successful in all cases. In one patient a vascular plug II was retrieved before deployment observing significant shunting through the dispositive and a larger size was selected and delivered without complications. Our youngest patients (2 and 7 months) where discharged from the cath lab to the intensive care unit intubated and with adrenaline support for 24 hours due to extensive blood loss during the procedure. At mean follow up of 3.7 years all of our patients have remained asymptomatic, and under antiaggregation therapy. Selected cases percutaneous closure of CAF is safe and effective, is a feasible therapeutic in young children in which the complications are minimal and manageable.

0024

Closure of a Moderate-Large Major Aorto-Pulmonary Collateral (MAPCA) in a Patient with Pulmonary Atresia VSD with Pulmonary Overcirculation with Amplatzer Vascular Plug IV

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Background: Since 2004 Amplatzer Vascular Plugs (AVP) I & II have been utilized to occlude arterial & venous vessels in patients with congenital heart disease (CHD). The major limitation of these devices is that they require delivery through 5-9 French (F) guiding catheters. Recently the AVP IV (St. Jude Medical) was FDA approved for use in small & difficult to access peripheral blood vessels. The advantage of this device is that it can be delivered through a 4 French 0.038 inch standard diagnostic catheter.

Methods: A 6 month old baby with PA VSD MAPCAS underwent surgical placement of a 4 mm central shunt from the ascending aorta to native main pulmonary artery. Post-op the baby developed congestive heart failure & pulmonary over circulation. Cardiac catheterization was performed through a 4 F Sheath in the right femoral artery (RFA). ACT was maintained over 200 on Heparin to mitigate the risk of shunt thrombosis during angiography. Selective angiography of each of the MAPCAS was performed to determine which pulmonary artery segments had dual blood supply - blood supply from the native main pulmonary artery and blood supply from the MAPCA. There was one moderate-large MAPCA measuring 6mm originating from the descending aorta draining into the distal native right pulmonary artery with dual blood supply. Test occlusion of the MAPCA was performed with a 4 F wedge catheter, which was successful in saturation. After consulting with the surgeon, the 6mm MAPCA supplying the right upper lobe was occluded with an 8mm AVP IV delivered through a 4 F Perfora Berenstein catheter. Hand injection of contrast 10 minutes after device occlusion demonstrated complete occlusion even with a therapeutic ACT (>200).

Conclusions: An 8mm AVP IV was safely utilized in a 6kg. Infant with PA VSD MAPCAS to occlude a moderate-large MAPCA with dual blood supply utilizing a 4 F catheter. After the procedure the 4 F sheath in the RFA was removed without vascular compromise. Pulmonary edema resolved and patient was extubated on 4 F catheter. After the procedure the 4 F sheath in the RFA was removed without complications. Pulmonary edema resolved and patient was extubated the next day. Until now this device was primarily utilized by interventional radiologists.

Background: In patients with large PDA severe PAH, the natural history of progression of PAH is extremely variable. Whether to close or not to close is often a difficult decision, as there are no established hemodynamic parameters predicting reversibility following closure.

Methods: Forty-five patients, median age 10.6(range 2-27) years, with large PDA severe PAH were considered. Various hemodynamic variables were assessed in air, 100% O2 and post-occlusion. The follow-up was by echocardiography whilst 4 patients with persistent severe PAH underwent re-catheterization.

Results: Device closure was successful in 43(96%) patients. The average PA systolic and mean pressures decreased from 82+3mmHg to 61+3mmHg (p<0.001) and 61+2mmHg to 46+2mmHg(p<0.001, respectively. At a mean follow-up of 59+4(17-127) months, significant PAH persisted in 40(9%) patients. Multivariate analysis showed pulmonary vascular resistance index (PVRI) in O2 <60u.m2, PA systolic pressure in O2 <75mmHg and PA mean pressure in O2 <55mmHg as having 97.8% predictive value for regression of PAH (p<0.001) in long-term. Following closure, PA pressures (systolic <65mmHg, mean <55mmHg;p<0.001) were also associated with regression of PAH.

Conclusions: Device closure of large PDA severe PAH with Amplatzer devices is safe and effective. PAH may not regress in all patients. Systolic and mean PA pressure and PVRI in O2 are important prognostic variables predicting regression of PAH.

0026

The Clinical Application of Amplatzer Vascular Plug II in Treating Perimembranous Ventricular Septal Defects

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Objective: To discuss the feasibility of using Amplatzer Vascular Plug II to occlude perimembranous ventricular septal defects (VSD).

Methods: Transcatheter closure by using Amplatzer Vascular Plug II was carried out in 5 patients with perimembranous VSD. There were 3 girls and 2 boys, with an age range of 3 to 6 years (3.8±1.3) and the body weight range from 11.8 to 22.0 kg. The vascular plug was released after angiographic and echocardiographic confirmation of its position. Each patient underwent an echocardiographic examination and performed pulmonary angiography 24 hours after closure, before discharge from the hospital, and at 1, 3, 6 month thereafter.

Results: The echocardiogram and angiogram showed that the diameter of VSD was 6.4-9.0 mm in the left ventricle side with aneurysmal transformation and 2.4-2.8 mm in the right ventricle side. The distance from the upper rim of VSD to aortic valve was 2.1-3.8mm. Transcatheter deployment of the device was successful in all patients. The size of deployed device was 8-10mm. Post occlusion angiography and echocardiogram revealed that the defect was successfully occluded except one patient had only a trivial residual shunt at the lower rim of the device. The residual shunt disappeared one month later. At follow-up, no patient has developed bundle branch block or atrioventricular block. The device position continues to be steady. Five patients just only had trivial tricuspid valve regurgitation.

Conclusion: Transcatheter closure of perimembranous ventricular septal defects, especially in those with long-tube type aneurysmal transformation, by using Amplatzer vascular plug II is a safe and effective method.

0027

Role of Balloon Pulmonary Valvuloplasty in Tetralogy of Fallot with Diminutive Pulmonary Annulus in Preventing Transannular Patch at Repair: Mid Term Follow-Up

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Background: Transannular patch repair (TAP) in Tetralogy of Fallot (TOF) is practiced in (30-70%) when the pulmonary annulus (PA) is small (Z-score < -2). TAP carries disadvantages including chronic pulmonary insufficiency, right or biventricular dysfunction and the need for multiple valve replacements. In 2008 we initiated balloon pulmonary valvuloplasty (BPV) in such patients, to enhance PA growth by improving forward flow and thus avoid the need for TAP at repair. Objectives: To demonstrate effectiveness of BPV in patients with TOF and diminutive PA in avoiding TAP at repair and provide follow up results.

Methods: We reviewed the catherization, echocardiographic and medical records of all patients with TOF who underwent BPV.

Results: Between October 2008 and January 2014, 20 patients with TOF and diminutive PA were studied. They had surgical shunts or ductus like flow. They underwent BPV at age 2-5 months (median=5), weight 2.8 - 7 kg (median-6), using balloon to

Conclusion: Balloon pulmonary valvuloplasty improves forward flow in TOF with diminutive PA.
valve ratio closest to 140%. The PA measured 2.5 to 7 mm (median=5.5), Z-score -8.2 to -3.5 (median -4.2) at BPV. Based on these measurements, all the patients would have required TAP if they underwent repair at this age. Improvement in pulmonary and systemic saturations ranged from 10 to 24%, P<0.01, reflecting modest improvement in pulmonary forward flow. Significant growth of the PA was demonstrated by serial echocardiography and at surgical repair, three months after BPV in all (Z-score +2 to -4.8, median -4, paired T test p<0.001). Twelve of 15 patients (3 are awaiting surgery) whose PA Z-score was larger than -5.2 at BPV did not require TAP, and had PA Z-score -1.5 to +1, at repair (75% reduction in predicted TAP rate). Only one patient required repeat BPV, 3 months after repair. The 5 patients, who had PA Z-score at BPV smaller than -5.5, required TAP. Doppler postoperative follow up (4-60 months), in the 12 patients without TAP, was consistent with mean velocities predicting <20 mm Hg pulmonary valve gradients and +1 to +2 pulmonary regurgitation.

Conclusions: Our results in this cohort of TOF with diminutive PA suggest: 1. BPV may have an important role in improving forward flow and growth of PA to avoid TAP at repair. 2. Sufficient time lapse (3 months) should be permitted between BPV and surgical repair to allow for growth of PA to avoid TAP. 3. Freedom from reintervention at mid-term follow up is acceptable.

0028
Transcatheter ASD Closure with the Figulla Septal Occluder
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The aim of this study is to report one tertiary center experience in transcatheter ASD using the Figulla Septal Occluder (FSO) (Occlutech). From September 2008 to February 2014, 48 patients (27 female and 21 males) underwent ASD closure with the FSO. Closure was mostly realized under general anesthesia and transseptal-geal echocardiography control. Choice of the device diameter was established after balloon sizing and calculation of the stretched diameter. Mean age of the patients was 37.6 ± 24 years (4 months – 88 years). The stretched diameter was 19.5 ± 5.2 mm (9 – 33 mm) and device dimension 20.1 ± 5.7 mm (9 – 36 mm). Fluoroscopic time was 4.4 ± 2.2 minutes and dose of radiation was 15.1 ± 13.8 Gy.cm2. Implantation succeeded in all patients: 2: one because of deficient posterior rim and the other due to complete AV block that resolved after extraction of the device. Absent anterior rim was not a limiting factor for implantation. No other device related complication occurred. During follow-up (up to 52 months), all but one had no residual shunting on control Doppler echocardiography. One had a tiny residual shunt without right ventricular overload. No late complication was reported. Transcatheter ASD occlusion with the FSO is a safe and effective procedure. Among all the new devices, the Figulla Septal Occluder appears as a real therapeutic alternative. Long-term results are mandatory to confirm these results.

0029
Increase of a RV-to-PA Non-Valved Goretex Tube by Implantation of the Edwards Sapien Valve
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A case report of Edwards Sapien valve implantation is mentioned within a Goretex tube. A patient with common arterial trunk has been repaired in neonatal period with a 14mm conduit. At the age of 9 years, this valve was replaced by a 20mm Goretex tube with no valve. With time, dilatation of the RV was noticed due to the free pulmonary valve regurgitation. At the age of 18 years, MRI revealed a RV end diastolic volume of 148 ml/m2. Pulmonary revaluation was thus decided.

This was performed in two steps. Dilatation of the R.VOT was realized first with a 20mm balloon catheter with simultaneous aortography to confirm absence of any coronary artery compression during the dilatation. After this, a 34mm long EV3 stent was implanted over a 20mm balloon Z-med balloon catheter. Three months later, implantation of the 23mm Edwards Sapien valve was realized. The Goretex tube could be dilated up to 23mm without any problem. Control angiography showed no significant pulmonary leak. Patient left the hospital under low dose of aspirin.

This case report illustrated different points: 1. possibility of over-dilatation of right ventricular to pulmonary artery Goretex tube; 2. successful implantation of the Edwards Sapien valve within a non-valved tube. This procedure was safe and effective and a real good alternative to surgery.

0030
The Utility of Intracardiac Echocardiography in Melody® Transcatheter Pulmonary Valve Implantation
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Background: Intracardiac echocardiography (ICE) is being used increasingly in percutaneous cardiac interventions. At our center, ICE is routinely utilized to evaluate valve function following Melody® transcatheter pulmonary valve implantation, but the utility of this practice remains unclear.

Methods: A retrospective review of all Melody® valves placed in the right ventricular outflow tract from 4/2010 to 9/2013 was performed. Standard descriptive statistics were used to evaluate whether the use of ICE altered clinical management, and to correlate ICE data with traditional hemodynamic and angiographic data.

Results: Fifty-eight Melody® valves were implanted in 57 patients at a mean age of 23 ± 10 years. ICE was performed in all but 4 patients and provided excellent Melody® valve visualization. ICE changed clinical management in 1 case in which angiography showed severe catheter-induced Melody® insufficiency but subsequent ICE did not show any insufficiency, preventing the need for additional angiography. ICE assisted in 1 case to better characterize the mechanism of a residual gradient. Although ICE did identify 2 trivial perivalvar leaks and 4 cases of trivial to mild valve insufficiency not seen by angiography, these were of no clinical consequence and did not alter management. The mean ICE gradient post-valve placement better approximated peak catheterization gradient (mean difference of 0.5%) compared with peak ICE gradient (mean difference of 76%). There were no known complications related to the use of the ICE catheter. The total charges per case for ICE were $8300.

Conclusions: ICE provides excellent visualization of the Melody® valve and can be performed safely. It rarely provides information that leads to a change in management, however, and is associated with significant expense. Selective use of ICE in cases with more than expected valve insufficiency or larger than expected residual gradients, may reduce overall costs while maintaining optimal clinical outcomes.

0031
Closure of Uncommon Congenital and Acquired Pathological Communication with New Nitinol Wire Mesh Occluders
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Background: Transcatheter closure of many congenital and structural heart defects became treatment of choice. For such purposes most frequently have been used nitinol wire mesh occluders – Amplatzers. Recently new very similar (but cheaper) occluders were introduced into clinical practice.

Aim: To evaluate efficacy of new nitinol wire mesh occluders (from Cardio-O-Fix and Cera family) in the closure of uncommon congenital and acquired pathologi- cal communication.

Material and Method: In the years 2010-2013 in 16 patients with different uncommon pathological cardiac or vascular communications Cardio-O-FIX and Cera PDA or ASD occluders were applied. In all cases important shunt through communica- tion was not end. There were closed: in 6 cases ruptured sinus of Valsalva aneurysm (RSOVA) with duct occluder (DO), in 3-postinfarction ventricular septal defect (PVSD) with atrial septal occluder (ASO), in 2-additional left-sided VCS (with DO), in 1-coronary artery fistula to RV (with DO), in 1-perimembranous VSD (with DO), in 2-pulmonary arteriovenous fistula (with DO), in 1-surgically created ASD in posttransplanted heart (with ASD).

Results: In all treated patients (pts) occluders were successfully implanted without any problems. In all cases, but one pt with PVSD, total occlusion was achieved with important clinical improvement. In one pt with PVSD residual shunt through additional defect was observed. In follow-up no device related complications were observed.

Conclusion: The use of above mentioned Chinese nitinol wire mesh occluders is an effective and safe therapeutic procedure also in the closure of uncommon pathological communications.
Comparison of Efficacy and Safety of 4 Different Types Nitinol Wire Mesh Occluders in Atrial Septal Defect Closure

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Background and Purpose: Interventional closure of atrial septal defects (ASD) became a standard treatment in the past two decades. It was achieved thanks to new nitinol wire mesh occluders – Amplatzer. In recent years however – other very similar occluders were introduced into clinical practice. We aim to compare efficacy and safety of 4 different nitinol wire mesh occluders – Amplatzer Septal Occluder, Cardio-O-Fix, Figulla and Life Tech devices in simple ASD closure.

Material: Between the years 1997-2013 – 963 patients diagnosed with single ASD had had interventional closure performed in our center. There were 806 patients closed with Amplatzer, 77 with Figulla, 55 with Cardi-O-Fix and 25 with Life Tech (Cera and Heart).

<table>
<thead>
<tr>
<th>Implant Type</th>
<th>Age (y)</th>
<th>Weight (kg)</th>
<th>ASD(mm)</th>
<th>Dev-Size(mm)</th>
<th>Fluo (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amplatzer</td>
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<td>44.7</td>
<td>13</td>
<td>17.6</td>
<td>4.6</td>
</tr>
<tr>
<td>Figulla</td>
<td>34</td>
<td>55.2</td>
<td>16</td>
<td>22.5</td>
<td>3.2</td>
</tr>
<tr>
<td>Cardi-O-Fix</td>
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<td>55.2</td>
<td>13.9</td>
<td>18.8</td>
<td>3.37</td>
</tr>
<tr>
<td>Cera+ Heart</td>
<td>30.6</td>
<td>56.8</td>
<td>13.8</td>
<td>17.5</td>
<td>3.7</td>
</tr>
</tbody>
</table>

*All data in mean values

Results: In all 963 patients ASD was closed. There were 8 early implant embolization – 7 Amplatzer and 1 Figulla devices – mainly in the early years of procedure experience. There were no significant differences between patients ASD size in TEE, implant size and fluoroscopy time in all type of implants. In the Amplatzer group the age and the weight of the patients were lower. No serious complications in follow-up were noted in any patient (as wall erosions, fracture of the device or thrombus formation).

Conclusion: The use of all types of nitinol wire mesh occluders has the same effectiveness and all implant can be used exchangeable. The only advantage of smallest sheath sizes may promote Amplatzer in the closure of ASD in small children.

Catheter Closure of Atrial Septal Defects Using the Cocoon Septal Occluder: A European Multicenter Study

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Objectives: In a prospective nonrandomized multicenter study we investigate the safety and efficacy of the Cocoon septal occluder (CSO) for closure of atrial septal defects (ASD) in 71 patients.

Methods: The median age of the patients was 10.5 (range 3-65 years) and the median weight was 25 kg (range 13-65 kg). Five of the patients had history of Nickel allergy. The device used is an improved next generation double disc (DD) design made of Nitinol wire mesh. The two discs are connected by a waist with diameter ranging from 6 mm to 40mm with 2mm increments. The device is covered with platinum using NanoFusion technology for preventing Nickel leaking into the blood stream in the heart and the corrosion of Nitinol wire frame in long term implants. In addition, it is the softest and lightest device with a less metal to septum ratio than the other currently available DD occluders.

Results: The mean ASD diameter was 21.7 mm (range 14-35mm). The mean device diameter was 24.8 mm (range 14-40mm). The CSO was permanently implanted in all 71 patients. Complete echocardiographic closure of the defect at the 1 and 3 month follow-up, was observed in all 71 patients (100%). No device-related complications or allergic reactions to Nitinol were observed during the procedure or at sort-term follow-up (range 3-6 months).

Conclusions: The CSO with its design characteristics is a useful addition to our armamentarium for catheter of ASDs. Further studies are required to document its efficacy, safety and long-term results in a larger patient population.

Percutaneous Coronary Arteries Interventions in Pediatric Population: A 15 Years Single Center Experience

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Background: Catheter intervention in coronary artery lesions is generally performed in adult patients with ischemic heart disease and has provided satisfactory results. However, the reported experience in pediatric population is relatively limited.

Methods: Medical records of all infants and children who underwent cardiac catheterization in intention to treat coronary artery lesions at our institutions since 1998 were reviewed for demographic, anatomic and procedural datas. Diagnostic procedures including coronary angiograms were excluded.

Results: Between 1998 and 2014, a total of 43 coronary arteries percutaneous interventions were performed in 38 patients (mean age=4,3yo (range: 3 days-15 years), mean weight=17 kg (range: 2.5 to 46 kg)). Procedures included closure of coronary artery fistulae (CAF) (groupe 1, n=30 procedures in 26 patients) and coronary stenosis and/or thrombosis treatment (groupe 2, n=13 procedures in 12 patients). Of the group 1 patients, 25 were asymptomatic, 4 had severe heart failure and 1 had tricuspid valve endocarditis; 2 procedures were performed in emergency. Successful closure occurred immediately in 27 procedures with no residual flow in 71% and trivial residual flow in 29%. Of the 3 failed procedures, 1 CAF was percutaneously closed successfully one year later, 1 has been operated and 1 was lost of follow up. 3 procedural complications occurred (coronary spasm with transient ischemia). After a mean follow up of 37 months, no death or reintervention occurred. Follow up angiography was not systematic. Of the group 2 patients, the most common underlying disease was transposition of great arteries (n=7). Five patients had heart failure, 3 had ischemic symptoms, 3 had positive stress test and 2 were asymptomatic. Seven procedures were performed in emergency. Primary success rate was 69% (9/13) with 5 transluminal balloon angioplasties and 4 stent implantations. One procedural complications occurred (femoral false aneurysm). After a mean follow up of 25 months, 2 patients died (1 due to multiple coronary emboli with failing thrombectomy, 1 due to refractory heart failure after cardiac transplantation), 2 patients were operated (one left coronary ostia plasty and one coronary bypass graft).

Conclusion: Percutaneous coronary arteries interventions can be performed safely in infants and young children without severe procedure-related complications and with satisfactory results in selected patients including CAF. Balloon angioplasty and stenting are an option for treating coronary stenosis.

A New Percutaneous Pulmonary Valve Implantation Technique for Complex Right Ventricular Outflow Tracts: The “Folded Melody Valve”

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Background: Percutaneous pulmonary valve implantation (PPVI) has been validated as a valuable therapeutic option for the management of patients with dysfunctional right ventricular outflow tracts (RVOT). However, complex and unfavorable RVOT anatomy continues to limit the indications for PPVI.

Methods and Results: Between April 2012 and November 2013, PPVI was performed in 10 patients (mean age = 16,3 ± 5 years old) using a new modification of the Melody valve consisting in a manual shortening of the Melody by folding the 2 extremities of the stent. We reviewed the results of this technique. Indications were short RVOT in 3 patients, prevention of retrosternal compression in 2 patients, bioprosthetic valves in 4 and coronary arteries proximity in one. No complication occurred during procedures. All patients had excellent hemodynamic results (mean post PPVI RV-PA gradient was 14±6 mmHg, 3 patients had trivial pulmonary regurgitation (PR) and the remaining had no PR). After a mean follow up of 8 months (range 2-18 months), no patient had reintervention. No valve dysfunction or stent fracture were observed.

Conclusion: The “Folded valve technique” is a safe modification of the Melody valve. By shortening the valve this technique allowed PPVI in short and complex RVOTs with vulnerable neighbourhood.
0336

Growth of the Atrial Septum After Amplatzer Device Closure of Atrial Septal Defects in Children
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Background: Transcatheter closure of ostium secundum atrial septal defects (ASD) with the Amplatzer Septal Occluder (ASO) device is safe and effective, but concern over the erosions has increased. No cause has been identified for erosion, but device and rim size may be related. Devices are routinely placed in growing children but how the atrial septum grows after placement of ASOs is unknown. A better understanding of the relationship of the device to the cardiac structures as a child grows has the potential to inform choices about optimal device sizing, and may help us better understand the risks of erosion.

Aim: We sought to define 1) the effect of somatic growth on the size of the septal dimensions after ASO placement and 2) the change in the distance of the device from the surrounding cardiac structures at time points prior to and after closure with ASO.

Methods: Data was collected from retrospective chart review. Echocardiograms were reviewed: prior to placement of ASO, immediately post placement of ASO, and at the most recent follow-up. Baseline data collected included: age at placement of ASO, size of ASD per baseline echocardiogram and per catheterization. Data collected at the most recent follow-up included: age at follow-up, size of ASD after ASO placement, and position of device, size of ASO placed. At each time point patient height, weight, BSA, and septal dimensions were obtained.

Results: Data for 33 patients was analysed. Median age at closure was 4.5 yrs (0.4-12.2) with a median length of follow-up of 3.9 yrs (0.02-8.1). Change in BSA predicted increase in superior (p=0.014) and IVC rims size (p=0.005). Thirty-one of 33 patients had an aortic rim of zero (contact of device to root) after ASO placement, and all of these remained zero at most recent follow-up. The mean size of all septal rims decreased after closure with ASO, and the mean size of all septal rims increased at the most recent follow-up, but this trend did not reach statistical significance. No episodes of erosion occurred during this study.

Conclusions: The vast majority of ASOs in these young children were not central in the septum, but rather proximate to the aorta. After ASO the device remained in close proximity to the aorta in most instances. With growth of the patient the septum grew asymmetrically, and the device position relative to the aorta remained constant. Our study was not powered to detect a serious adverse event such as erosion, but it is informative that the aortic rims were consistently zero and yet no events occurred.

0337

The Melody Valved Stent is More Vulnerable for Endocarditis than Homografts or Contegra Conduits in RVOT
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Background: All RVOT conduits are vulnerable for infective endocarditis (IE) which influences conduit longevity and clinical outcome. The incidence of IE of the Melody valved stent needs to be compared with other RVOT conduits.

Patients and Methods: Retrospective study including all patients in the database of a tertiary center with an implantation of a homograft (European Homograft Bank), Contegra TM graft or Melody TM conduit in RVOT.

Results: Between 1989 and 2013, 577 homografts were implanted in 517 patients (age 13.3±17.6y, range 3d-60y); IE occurred in 14 pts (2.4%) during follow-up of 6.5±9.2y (0.1-17.5y). 54 Contegra TM grafts were implanted in 53 patients between 2000 and 2002 (9.9±13.4y, range 8d-47y); 11 (20.4%) had IE during follow-up of 8.8±7.7y (range 0.3-10.5y). 106 Melody TM valved stents were implanted in 106 pts (14.3±10.1y, range 4-80y) in 8 (7.4%) pts during 2.6±2.4y (range1.1-3.6y). The bacteria in the Melody group were Corynebacterium pseudodiptherithecium (1), HACEK3, Staphylococcus aureus (1), Streptococcus viridans (2), Streptococcus sanguinis (1); inadequate prophyaxis had been present in at least 2 patients.

Survival free of endocarditis by Kaplan-Meier was for homografts 98.7% at 5y and 97.3% at 10y; Contegra 87.8% at 5y and 77.3% at 10y; Melody 84.9% at 5y (p<0.001).

The Melody conduit was sterilized successfully after 6 weeks IV antibiotics in 6 out of 8 cases; 2 valves were obstructive at presentation: 1 valve was overstented at presentation (IE not diagnosed at that moment) and 10 months later revalvulation with a new Melody valve; 1 valve had PS 42 mmHg, the other 4 valves functioned well after medical cure (PS <25 mmHg, PR ≤ 2/4).

Conclusions: The Melody valved stent and the Contegra conduit are significantly more vulnerable for endocarditis than a homograft. Optimal prophyaxis might reduce the incidence of IE and adapted strategies will be required to obtain adequate longevity.

0308

Follow-Up After Melody Revalvulation: “Aggressive” Prestenting Has Nearly Abolished Stent Fractures; Endocarditis is a Concern
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Introduction: Long term function of the Melody valve depends on stent integrity and freedom from residual gradients. Follow-up days beyond 1 year are rare. Prestenting has been put forward to reduce stent fractures. Patients and Methods: Prospective ongoing interim analysis of PPVI: single center; Melody implants since 2006; systematic follow-up with dedicated database. Leaflet function analyzed by Doppler velocity across the valve or regurgitation. Chest X-ray at 6 and 12 months and thereafter annually to look for stent fractures. The registry was screened for the event of endocarditis.

Results: 109 Melody valves were implanted in 108 patients in 2006-2013; mean age 18.4 years (4.5-81.6); follow-up 2.4 years (31 days – 6.9 years). In the first 8 patients no prestenting of the RVOT was performed (label recommendation). In the next 95 patients prestenting was always performed prior to or at the time of PPVI. 125 prestents were implanted until the outflow tract became a rigid tube without relative motion nor winging; 78 pts had 1 prestent, 16 pts had 2, 5 pts received 3 prestents; Covered CP stents (n=56), Andrastent XXL (n=48), Max LD Instrastent (n=17) and Genesis (n=4). The PPVI was dilated to 22 mm in 71 pts, to 20 mm in 28pts and in some younger kids to 18mm (n=6). During follow-up stent fractures were observed in 48 non-prestented and 2/100 prestented group (p=0.005); no recompression. There was no relevant increase in peak RVOT velocity (≤0.2 m/s at 3y, 0.5 ms at 5y); pulmonary regurgitation showed minimal change (at implantation 0.5/4 at 3y; 0.5/4; at 5y: 1/4). In 7 patients endocarditis occurred; freedom from endocarditis was 77% at 5 years. All were sterilized with antibiotic treatment, 2 patients had residual increased gradient, which in 1 pt required restenting and delayed re-PPVI.

Discussion: Aggressive prestenting of the RVOT before revaluation offers good stent support which nearly abolishes stent recompression or fracture. Maximal dilation leads good leaflet survival. The Melody valve is vulnerable for endocarditis which is a major threat for conduit longevity.

0339

Results of Balloon Angioplasty and Stent Implantation in Patients with Pulmonary Artery Stenosis
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Aim: To evaluate efficacy of balloon angioplasty (BAP) and stent implantation (SI) to dilate pulmonary artery stenosis (PAS).

Material and Methods: Between 1999-2013 108 patients (pts) with PAS were treated interventionaly in our center – 69 by BAP and 39 by SI. In BAP group mean age of treated pts was 7.0 (0.5-27) years, 64 were after previous surgery (20 pts after arterial switch op, 25 after TOF correction, 5 after Rastelli op, 4 after correction of common trunci, 3 after Fontan op and 7 after other types of surgery) and 5 with native PAS (3 cases with Williams syndrom). Stenosis was localized in 27 pts in LPA, in 17 in RPA, in 7 in LPA and RPA and in 18 in PA trunk. In SI group mean age was 12.2 (1.5-63) y, 34 were with post-surgical PAS (19 pts after TOF correction, 5 after arterial switch op. 9 after corrective surgery of common ventricle, and one after correction of common trunci. Stenosis was localized in 27 pts in LPA, in 3 cases in RPA and in 8 cases in both PA branches. Indication for the procedures was significant stenosis of the vessel. The procedure was considered as succesfull when diameter of stenosed place increased > 50%.

Results: No death related with procedure occurred in any patient. In BAP group procedure was effective in 26/69 pts (37.7%). The mean stenotic place increased from (1-12) to 6.4 (1.9-14) mm. In 25 pts high pressure balloons were used, in 2 cutting balloons. In 3 cases rupture of the balloon during procedure occurred in another 3 pts rupture of the vessel (in one case with hemotorax). In 9 pts in follow up SI was performed. In SI group procedure was effective in 37/39 pts (94.5%) – in comparison with BAP group p = 0.001. The mean stenotic place increased from 4.2 (1-10) to 10.3 (4-20) mm. In 2 pts migration of the stent occurred, in 4 cases rupture of the balloon was observed, in one case after SI to LPA in that lung transient pulmonary oedema occured. In follow-up in 2 another pts circ-ular fracture of the stent was observed treated successfully with another SI in 1 of them.

Conclusions: Stent implantation is much more effective in the treatment of pulmonary artery stenosis than balloon angioplasty, though this technique (SI) can be applied only in selected patients.
Which Plane is Radiation Intensive in Biplane Systems? Implications for Pediatric Cardiac Catheterization Laboratories
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Background: Children with congenital heart disease are at risk of deterministic effects of radiation. Studies in adult patients undergoing cardiac catheterization have demonstrated that tube angulation influences patient and operator radiation exposure. In addition, steep left anterior oblique projections have been shown to be radiation intensive.

Objective: Compare the total (TL), Fluoroscopic (FL), and cine angiographic (CA) radiation exposure between the frontal plane (A) and lateral plane (B) during pediatric cardiac catheterizations (PCC).

Methods: This retrospective study was approved by our IRB. All patients receiving biplane FL and CA exposure during PCC between April 2010 and January 2014 were included. The TL, FL, and CA air kerma area product (PKA, μGym2) for A and B were compared as raw data and indexed to time and weight (μGym²/min/kg). The time spent in B plane was compared among diagnostic and interventional groups. Continuous variables are reported as median (interquartile range). Non-parametric tests were used to test for statistical significance.

Results: Biplane FL and CA radiation exposure data for 731 patients was analyzed; 416 (57%) were male with a median age 4.76 yrs (0.57-13.78) and median weight 17.3 kg (7.09-48.9). Greater time (minutes) was spent in A compared to B; TL [11.13 (6.62-18.75) vs 2.5 (1.10-5.17)], FL [10.60 (6.26-18.25) vs 2.13 (0.72-4.80)], and CA [0.41 (0.25-0.63) vs 0.37 (0.22-0.54)] (p<0.0001). No difference was identified in TL PKA [237 (83-725) vs 213 (67-770)] between A and B, however when indexed to time and weight TL PKA [1.42 (0.95-2.22) vs 5.28 (2.78-11.41)], FL PKA [0.74 (0.55-1.1) vs 6.17 (3.07-19.96)], and CA PKA [16.02 (10-24.79) vs 24.28 (15.62-40.35)], a statistically significant difference was appreciated (p<0.0001). A greater proportion of time was spent in B plane when performing interventions for right ventricular outflow tract, pulmonary artery, and coronary pulmonary valve pathology (p<0.0001). The average TL time in A is 3.19 times that of B with the majority accounted for by FL time. Similarly, the average indexed TL PKA for B is 7.42 times that of A with the majority of the exposure from FL PKA.

Conclusion: This is the first pediatric report to show that radiation exposure in B plane is higher than in A plane. Strategies to minimize overall radiation exposure the majority of the exposure from FL PKA.

Utilization and Barriers to Adoption of Smart Technology for Communication in the Congenital Cardiac Catheterization Laboratory: Results of a PICES Survey of Senior Interventional Cardiologists
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Background: We previously reported that use of smart technology (ST) for communication and consultation was highly prevalent among early career congenital interventional cardiologists. For this study, we sought to evaluate the exposure to ST consultation among senior congenital interventional cardiologists providing remote advice.

Methods: A 13-question web-based survey (www.surveymonkey.com) was distributed to 40 leading senior interventionalists to assess their use, satisfaction with and perceived barriers to use of ST for providing advice to colleagues about planning and executing diagnostic and interventional congenital catheterizations.

Results: There were 19 respondents (48%) to the survey. Respondents have been in practice for a median of 20 (9-40) years. Thirteen (68%) have received ST communication about procedures. ST communication has been from a partner/local colleague (67%), remote colleague (100%), cardiology surgeon (33%) and patient’s family (25%). Of remote colleagues, 42% were former partners and 67% were former trainees. Information received included still images of angiograms (83%), cineangiograms (50%), echo images (67%), CT/MRI images (58%) and hemodynamic/case data (67%). Privacy precautions were used in 75% of communications, but patients were only consented for 25% of communications. Image quality was felt to be adequate for providing advice in 58% of communications and 58% were comfortable giving advice via ST communication. Impressively, 75% of communications potentially changed the planned intervention with 50% of users performing an intervention for the first time based on ST communication. Compared with conventional methods, ST was felt to have improved communication speed for 82% of respondents. Perceived barriers to ST use: concern for patient privacy and unfamiliarity or unavailability with the necessary technology.

Conclusion: Receipt of ST is frequent and prevalent among senior congenital interventional cardiologists, many of whom are comfortable providing advice with this technology, and have even guided colleagues through interventions not previously performed. Given the prevalence of ST use in congenital catheterization, further exploration of the associated patient privacy, technologic and legal implications is necessary.

Transcatheter Valvuloplasty in Congenital Pulmonary Stenosis Complicated by Infective Endocarditis
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We present the case of a neonate with severe pulmonary valve stenosis. Initial echocardiogram revealed a peak instantaneous gradient of 96-121mmHg, moderate right ventricular hypertrophy and enlargement. She was taken to the cardiac catheterization lab on DOL 8 for balloon dilation of her pulmonary valve. Pre-dilation angiography demonstrated a thickened, doming pulmonary valve with suprasystemic right ventricular systolic pressure (RVSP) and a pulmonary valve annulus size of 8mm. Valvuloplasty was undertaken with a 10mm x 2cm Tyshak balloon followed by significant improvement in RVSP, valve excursion and angiographic improvement of flow across the main pulmonary artery. Patient was discharged home and six days later presented with fever and tachycardia. Repeat 2D echo revealed vegetations on the tricuspid and pulmonary valve. The tricuspid valve vegetation was initially 4mm x 9mm and mobile without tricuspid stenosis or regurgitation while the PV vegetation was initially 4mm x 5mm and without pulmonary stenosis and mild pulmonary regurgitation (likely related to the prior balloon dilation). There was no pericardial effusion and biventricular function was normal. Blood culture grew MRSA within the next 12 hours and remained persistently positive for the next two days. The patient remained on IV antibiotics for 4 days with serial echocardiograms demonstrating progressive growth of the vegetations refractory to initial medical therapy. Due to significant tricuspid and pulmonary valve destruction, she was converted to a single ventricle via the Starnes procedure. To our knowledge, this is the first case of transcatheter pulmonary valvuloplasty complicated by endocarditis soon after the procedure.

Implantation and Intermediate Term Follow-Up of the Bard Valeo Stent in Pulmonary Artery Stenosis
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Objectives: To evaluate the performance of the Bard Valeo stent in pulmonary artery stenoses.

Background: The premounted Valeo stent requires only 6-7 French access and can be post-dilated to 20mm on bench testing. Although it appears ideal for implantation in pulmonary artery stenoses in children, it has been unclear whether it has sufficient radial strength to prevent vessel recoil and stent collapse.

Methods: Twelve stents were implanted in 10 patients aged 1.2-19.9 years (weight 9.9-54kg). Implant results were assessed retrospectively.

Results: All implants were successful with no complications. The stent tracked easily and was readily visible on fluoroscopy. The median (range) diameter of the pulmonary artery stenosis increased from 4.9 (1.8-7.4) mm to 9 (6-10.6) mm (P<0.0001), the median peak to peak systolic pressure gradient across the pulmonary artery stenosis decreased from 16 (11-66) mmHg to 6 (0-10) mmHg (P=0.02), and the right ventricle to systemic blood pressure ratio fell from 0.72 (0.54-1.1) to 0.54 (0.28-0.69) (P=0.004). Median stent recoil was 5.5 (0-21%). Jailed side branches remained patent. Nine stents were assessed fluoroscopically on 11.5 (0-30) month follow-up. There were no stent fractures. 6 stents were not distorted, 2 had minor distortion and 1 stent, implanted in a highly resistant lesion, had moderate distortion.

Conclusions: The Valeo stent is low profile, conformable and easy to deliver, even in small children. It has adequate radial strength to stent pulmonary artery stenoses with minimal recoil. It maintains its geometry on medium term follow up in compliant lesions. Resistant stenoses may distort the stent.
Unusual Deformity of a Figulla Flex II ASD Occluder After Closure of a Secundum ASD and Subsequent Retrieval

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Interventional closure was intended for a secundum ASD in a 12-year-old girl. TEE confirmed an ASD with a deficient aortic rim, balloon-sizing showed a size of 18mm. A 21mm Figulla Flex-II-ASD-ocluder (FFO) was chosen and positioned without problems. Upon opening of the right atrial (RA) disc, it did not completely reconfigure to its original shape, but remained rounded and not flat at its superioir rim while still attached to the delivery cable. No change was observed after recapture and repositioning. Because Amplatz septal occluder (ASO) often reconfigure well after the tension of the delivery cable is released, the FFO was detached. However, no change was observed. With different catheters, it was tried to push the RA disc flat against the septum without success. After 4 days, the RA disc still was malconfigured despite good position and no residual shunt. The FFO was retrieved with a biotome, the defect closed successfully with a 24mm ASC. After removal, the FFO continued to exhibit its rounded shape of the RA disc, and after 1 hour it flattened. Inspection of the device demonstrated a slight bent of a Nitinol wire. The company examined the device and found reproducibly that after pushing the device out of the sheath with opening of the RA disc, that the RA disc deformity recurred. They confirmed a slightly bent wire of the RA disc. This had not been previously described of a FFO RA disc. Twisting of the wires may occur during loading or within the sheath. A FFO should therefore not be left in place if this deformity is noted. It should be retrieved while still attached to the delivery cable, a new device should be used instead.

Experience in Mexico with Transcatheter Closure of Postinfarction Ventricular Septal Defect Closure with Amplatzer Occluders

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Background: Postinfarction ventricular septal defect (PIVSD) is a rare and life-threatening complication with high risk of both surgical and medical treatment. Current guidelines from the American College of Cardiology and the American Heart Association for the treatment of PIVSD recommended immediate. Percutaneous closure of PIVSD initially reported in patients who are considered too high risk for surgical repair. In addition, patients referred for percutaneous closure have generally been rejected by surgical closure because of major risk factors. Percutaneous closure is also used in patients with residual leakage and ultimately as primary treatment.

Objective: Describe the initial experience in a single-center with the use of the Amplatzer occluders for Postinfarction ventricular septal defect closure.

Method: We performed a retrospective analysis in patients that underwent percutaneous closure with the Amplatzer occluders for Postinfarction ventricular septal defect closure at our institution (Mexico) between 2003 and 2013.

Results: A total of 12 patients (female=8) were included for review: 12 patients with Postinfarction ventricular septal defect. Mean age was 63 ± 0.5 years, mean weight was 72 ± 5.6 kg. The procedure was performed between 2 and 3 weeks after myocardial infarction. The average size was 14.6 mm PIVSD. Four different types of Amplatzer occluder devices were used, with the CIV 24mm device the most frequent. The overall success rate of device implantation was 100%. Only two patients with VSR suffered device displacement/embolization that required retrieval and repositioned for closures. The survival of the 12 patients at 30 days was 75%, with three deaths (25%). After the procedure, all patients were discharged on transthoracic echocardiography examination and the following six months, transthoracic echocardiography revealed adequate device position in all patients with no residual shunt.

Conclusions: In conclusion, VSR can be treated by percutaneous closure and with low mortality is safe and Effective, which could allow for stabilization of hemodynamic status, a bridge to surgical repair, an alternative to repeat surgery for patients with residual shunts, or as primary treatment.

Innovative Transvenous Ductus Stenting in Patients with Large Ventricular Septal Defect and Pulmonary Atresia: Safety and Efficacy at 6 Months Follow-Up

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Aims and Objectives: Though transaortic ductal stenting is emerging as percutaneous palliative intervention, vascular access and the vertical ductus morphology are major challenges while accomplishing the successful stent delivery. We aimed to study the safety and efficacy of transvenous femoral approach to overcome the limitations and complications of transarterial (femoral/axillary) approach in patients with subaortic VSD.

Methods: Data regarding ductal closure using Occlutech Ductal Occluder was reviewed and prospectively collected following ethics clearance. Demographics, haemodynamic and angiographic characteristics including ductal size; device to close the duct and closure approach; screening time; complications and outcomes were documented.

Results: From March 2013 to February 2014; 31 patients (21 females and 10 males) were assigned to percutaneous closure of the PDA using Occlutech Ductal Occluder. The median age of the patients was 19 months (range, 1 month-300 months), and the median weight was 11.8 kg (range 2.5 kg-78 kg). The pulmonary artery systolic mean was 41.45 mmHg (SD±21.47); with a mean pulmonary artery index of 9.65 (SD±14.8). The Qp:Qs ratio mean was 2.39 (SD±1.45); with a pulmonary vascular resistance mean of 2.6 WU (SD±2.0). Thirteen patients had Krickenko Type A duct (42%); 4, type C (13%); 4, type D (13%) and 10, type E (32%). The ductal size mean was 3.15 mm (SD±1.99 mm). The screening duration mean was 16.62 minutes (SD±9.07). Nine patients were occluded using size 3.5 x 5; with 3.5 x 5, 1 with 4 x 6; 5 with 5 x 7; 1 with 5 x 7; 3 with 6 x 8; 2 with 6 x 8; 1 with 8 x 10; 4 with 8 x 10L, and 2 with 10 x 12L. In one patient, the device dislodged to the descending aorta immediately following deployment with successful retrieval. A larger and longer device was deployed successfully. Complete ductal occlusion was achieved in all (100%) patients (n=31) before discharge (day one).

Conclusion: The Occlutech Ductal Occluder is a safe and effective device for closure of ducts in appropriately selected patients. Due to its large aortic disk and delivery system (6F), this device is not capable of closing PDAs in small infants.
Hybrid Palliation for Interrupted Aortic Arch with VSD

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Background: Cardiac artery access in infants with complex congenital heart disease (CCHD) undergoing cardiac catheterization has been well described. This has historically been achieved via a surgical cut down. There is a paucity of information regarding routine percutaneous cardiac artery access in infants less than 3 months.

Methods: A retrospective review of all infants <3 months of age undergoing cardiac catheterization was performed after IRB approval. Between January 2012 and December 2013 a total of 8 patients (pts) underwent 10 procedures (mean age 37 days; range 17-77, mean weight 2.98 Kg; range 2.0-3.8 Kg) using percutaneous carotid artery access. Procedures performed included PDA stenting (5), balloon aortic valvuloplasty (3), and balloon angioplasty of coarctation (2).

Results: Percutaneous access was obtained with help of a Doppler needle under ultrasound guidance into the right (8) and left carotid artery (2). Sheath size used was a 4 Fr (7) and 5 Fr (3). The mean time to insertion of sheath was 9 minutes (range 2-20 minutes). The total procedure time ranged from 90-196 minutes. In all 10 cases, percutaneous access was obtained successfully with no conversion to cut down. All procedures were technically successful. There were no major procedural complications. One patient developed hypotension requiring blood transfusion during the procedure. Another patient with tricuspid atresia, pulmonary atresia, and PDA dependent circulation developed PDA spasm, but had successful placement of a stent. Hemostasis was achieved in all patients in a mean of 13 mins (9-20mins). Post procedure patency of the carotid artery was documented by MRI (3), ultrasound (4), follow up angiography (2), and Doppler (1). There were no documented arterial occlusions. One patient had a local hematoma with no compromise to flow when remained stable on follow up imaging. Head ultrasound showed no new changes in 7 patients with MRI showing no abnormal findings in 2 pts. No imaging was obtained in one patient.

Conclusion: This initial experience suggests that percutaneous carotid artery access in infants <3 months of age is safe and feasible with preserved vascular patency and no neurological adverse events.

0050

Percutaneous Melody™ Valve Implantation in ‘Tricuspid’ Position in a Patient with a Fontan-Björk Modification

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A 47 year-old woman presented with symptoms of a ‘failing’ Fontan circulation. Her underlying anatomy was a severe Ebstein’s like anomaly of the tricuspid valve with near atresia of the tricuspid valve. After initial palliation with a classic Glenn anastomosis, a modified Fontan operation ‘Fontan-Björk’ was performed for absent right atrio-ventricular connection using a Hancock conduit (22mm) between the right atrium and the right ventricular outflow tract at the age of 13 years. Cardiac catheterisation demonstrated mild obstruction of the calcified Hancock conduit with moderate insufficiency, as well as a stenosis of the left pulmonary artery left pulmonary artery, a massively dilated right atrium and biventricular dysfunction. After stent implantation in the left pulmonary artery, it was decided to percutaneously implant a ‘tricuspid valve’ with a Melody™ valve after assessment for coronary artery compression. Melody™ valve implantation could be done without technical difficulty from the femoral vein with a 22 mm Ensemble delivery system without prestenenting. The small gradient was relieved and there was only trivial residual insufficiency of the Melody™ valve. Pulsatile flow could be demonstrated in the left pulmonary artery. Despite initial clinical improvement in the first month, this intervention could not prevent further deterioration of the patient’s clinical status although proper function of the Melody valve was documented in repeat catheterization. The patient was then listed for cardiac transplantation which could successfully be performed 6 months later.

0052

Hemodynamic Effects of Dexmedetomidine in Pediatric Cardiac Transplantation Recipients During Cardiac Catheterization

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Background: Dexmedetomidine (DEX) has been an adjective sedative during cardiac catheterizations due to its minimal respiratory depressant effects. The sedative effects of DEX are centrally mediated; however, the denervated transplanted heart is removed from central autonomic control. There is limited data regarding the hemodynamic effects of DEX in pediatric heart transplant recipients undergoing procedural sedation in the cardiac catheterization laboratory.

Materials and Methods: Between November 2012 to Jan 2014, duct dependent hypoxic patients with large subaortic VSD, pulmonary atresia and vertical duct feeding the confluent hypoplastic pulmonary branches on CT pulmonary angiography were enrolled into the prospective study. Patients were followed up at 3 months intervals with SpO2, patent stent and PA branch sizes on echocardiography and/or CT angiography.

Result: Twenty two patients (15 male), with median age of 24 days (1day-1.6year) and weight of 2.45kg (1.1-7.2kg) underwent successful ductal stenting. Eight neo-nates were prostaglandin dependent. The echocardiographic diagnosis included TEF (n=14) and DORV (n=8). Mean baseline SaO2 was 68.4±7.99%. Median right and left pulmonary artery Z-scores were -1.425 (-4.04 to 1.1) and -0.945 (-7.91 to 3.11). Total 25 stents were deployed. Post-stenting mean SaO2 increased to 88.8±5.19%. Mean fluoroscopy-time was 17.76±11.66min (7-56min). Post-procedure ICU-stay was 3.7±1.2days. At median follow up of 7 months (6days-14mon), mean SaO2 reduced to 75.5±7.18%. At median follow-up, right pulmonary artery and LPA Z-scores were 0.35 (-2.75 to 2.34) and 0.61 (-1.18 to 3.9) respectively. Four patients required reintervention (angioplasty-2, BT shunt-1). Two patients died, one due to sepsis and one possibly due to acute stent closure after 3 months.

Conclusions: Transvenous ductal stenting confers safe and effective short-term palliation in patients with large subaortic VSD and pulmonary atresia while obviating the inherent complications and limitation of tranluminal approach.

0049

Aortic Stent Fractures in the Coarctation of the Aorta Stent Trial (COAST)

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Introduction: Large “biliary” and other endovascular stainless steel stents have been used off-label as a effective treatment option for coarctation of the aorta (CoA) in teens and adults for >15 years, yet little information is available on the structural durability of these devices when used in this manner. Even though catheterization physics are aware that these stents can fracture, the incidence of this when used to treat CoA is poorly characterized. As part of the prospective Coarctation of the Aorta Stent Trial (COAST) fluoroscopic examination of the study device (the NuMED Cheatham Platinum (CP) Stent) has been performed on a scheduled basis and probed for stent fracture to assess CP stent durability when used to treat CoA.

Methods: In a prospective, multi-center, single-arm clinical study 105 patients received Bare Metal CP Stents for treatment of CoA, using a uniform protocol. Biplane cine-fluoroscopic examination was obtained at 12 and 24 months post implant. Whether stent fractures were present was determined by manual compression during the procedure. Another patient with tricuspid atresia, pulmonary atresia, and PDA dependent circulation developed PDA spasm, but had successful placement of a stent. Hemostasis was achieved in all patients in a mean of 13 mins (9-20mins). Post procedure patency of the carotid artery was documented by MRI (3), ultrasound (4), follow up angiography (2), and Doppler (1).

Results: Percutaneous access was obtained with help of a Doppler needle under ultrasound guidance into the right (8) and left carotid artery (2). Sheath size used was a 4 Fr (7) and 5 Fr (3). The mean time to insertion of sheath was 9 minutes (range 2-20 minutes). The total procedure time ranged from 90-196 minutes. In all 10 cases, percutaneous access was obtained successfully with no conversion to cut down. All procedures were technically successful. There were no major procedural complications. One patient developed hypotension requiring blood transfusion during the procedure. Another patient with tricuspid atresia, pulmonary atresia, and PDA dependent circulation developed PDA spasm, but had successful placement of a stent. Hemostasis was achieved in all patients in a mean of 13 mins (9-20mins). Post procedure patency of the carotid artery was documented by MRI (3), ultrasound (4), follow up angiography (2), and Doppler (1).

Conclusion: This initial experience suggests that percutaneous carotid artery access in infants <3 months of age is safe and feasible with preserved vascular patency and no neurological adverse events.
Results: 271 charts were reviewed with 158 patients meeting inclusion criteria. DEX was given to 101 patients (64%). Other sedative agents were used in addition to dexmedetomidine in 60 patients (59%). The two groups were similar in pre-procedural blood pressure and shortening fraction. In patients who received DEX, the mean age was lower (12.5 yrs vs 15.2 yrs, p=0.001) and the mean pre-procedure heart rate was higher (108 vs 99 bpm, p=0.001). Decrease in heart rate greater than 20% from baseline was more likely in those who received DEX (p=0.001). The incidences of receiving a rescue medication, bradycardia, and hypotension were similar in both groups.

Conclusion: Patients receiving DEX for procedural sedation demonstrated decreases in heart rate greater than 20% compared to baseline. However, this was not associated with hemodynamically significant bradycardia or hypotension warranting clinical intervention. DEX is a very good alternative sedative agent that can be used for procedural sedation in the cardiac catheterization laboratory in pediatric heart transplant patients.

0053

Ductal Origin of a Pulmonary Artery – Combined Catheter-Based and Surgical Treatment

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Ductal origin of a pulmonary artery in absence of structural heart disease is an uncommon anomaly. After unilateral involvment of the proximal part of the 6th branchial arch the pulmonary artery arises from the base of the innominate artery contralateral to the side of the aortic arch.

Case Report: A boy presented after term delivery with a weight of 3.1 kg. APGAR 9/10. The prenatal diagnosis of a right aortic arch with a left arterial duct and an abnormal pulmonary bifurcation was confirmed postnatally. Echocardiography showed the ducral origin of the left pulmonary artery, a PFO and a small rightsided duct. Prostaglandine 0.025 ug/kg/min was given to guarantee the perfusion of the left lung. In order to postpone the surgical reconstruction of the pulmonary bifurcation it was decided to implant a stent into the left-sided duct. Angiography demonstrated a pin-point stenosis at the pulmonary end of the ductus and a small (4 mm) LPA with normal branching pattern. A PRO-Kinetik 3.0 x 15 mm coronary stent (Biotronic, Bülach, CH) was implanted retrogradely on a 0.014 in BMW-wire (Abbott vascular, Illinois, USA). Antiplatelet therapy was initiated with acetylsalicylic acid 2/ mg/kg/d and clopidogrel 0.3 mg/kg/d. After having reached a weight of 5.5 kg an end-to-side anastomosis of the left pulmonary artery to the pulmonary trunk was performed on CPB. The stented ductus was clipped and divided and the PFO was closed directly. The postoperative course was uneventful. The last echocardiography at 7 months of age (8 kg) showed normal dimensions and flow patterns of both pulmonary arteries and a normal right ventricle.

0054

Transcatheter Balloon Valvuloplasty (TCBV) for Critical Aortic Valve Stenosis (AS) Utilizing Continuous Transesophageal Echocardiographic (cTEE) Guidance: A 22 Year Single Center Experience from the Cath Lab to the Bedside

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Background: cTEE guidance during the procedure allows real time hemodynamic assessment which might influence early and late outcomes. Methods: From 1992 to date, 30 consecutive critical AS pts with adequate left ventricular size underwent TCBV with cTEE guidance. Critical AS was defined as neonates presenting with ducral dependent systemic circulation, LV systolic dysfunction or systolic gradient ≥100mmHg with hypoperfusion. Results: The median age at intervention was 4 days (range 1-54 days). 19 (63%) patients required PGE1, 8 (27%) had reduced shortening fraction and 3(10%) had a gradient ≥100mmHg. Initial 15 pts (50%) were performed in the cath lab (fluoro time: 10±8 min) and subsequent 15 pts were performed at the bedside without fluoroscopy and all with cTEE guidance. The mean aortic valve Z score was -1.2±1.3. The peak systolic gradient decreased from 70±31 to 24±16mmHg (p<0.001). Five patients (17%) developed moderate AI. There were 4 (13%) early deaths likely secondary to associated cardiac anomalies including severe MS (n=3), CoA (n=2), severe MR (n=2). One patient developed severe AI immediately post intervention. During a mean follow-up of 10.7 yrs (range: 3-17yrs), there were 15 additional aortic valve interventions (50%). Seven (23%) pts had a Ross procedure, 4(13%) patients had a primary aortic valve repair, 2(7%) patients had aortic valve replacement and 2(7%) had repeat BAV. All surviving patients underwent duplex vascular imaging of the right carotid artery (RCA) at 6.4±4.9 yrs. (range: 1-11yrs.). Five patients (17%) developed occlusion/stenosis of RCA without clinical consequences. Freedom from aortic valve reintervention and actuarial survival rate curves of this cohort is delineated above. Conclusion: TCBV with cTEE guidance at the bedside is effective palliation in neonates with critical AS, allowing continuous hemodynamic assessment and avoiding exposure to ionizing radiation. Our results appear comparable to surgical aortic valvotomy.

0055

New Minimally Invasive Treatment for Plastic Bronchitis Based on Insights from MR Lymphangiography

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Background: Plastic bronchitis (PB) is an often-fatal complication of Fontan physiology with a poorly understood etiology and limited treatment options. Here we report on lymphatic abnormalities in this disease as determined by MRI lymphatic imaging and a new novel minimally invasive treatment option.

Methods: We retrospectively reviewed data from 8 patients in our institution with PB who underwent T2 lymphatic mapping. Five of the patients underwent dynamic contrast MR lymphangiography. Two of these 5 patients underwent a lymphatic embolization procedure that involved antegrade transabdominal thoracic duct (TD) access and selective embolization of dilated lymphatic vessels supplying retrograde lymph flow to the lung (figure).
0056  Percutaneous Carotid Arterial Access in Infants < 3 Months of Age
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Background: Carotid artery access in infants with complex congenital heart disease (CHD) undergoing cardiac catheterization has been well described. This has historically been achieved via a surgical cut down. There is a paucity of information regarding routine percutaneous carotid artery access in infants less than 3 months.

Methods: A retrospective review of all infants < 3 months of age undergoing cardic catheterization was performed after IRB approval. Between January 2012 and December 2013 a total of 8 patients (pts) underwent 10 procedures (mean age 37 days; range 1-77 days, mean weight 2.98 Kg; range 2.0-3.8 Kg) using percutaneous carotid artery access. Procedures performed included PDA stenting (5), balloon aortic valvuloplasty (3), and balloon angioplasty of coarctation (2).

Results: Percutaneous access was obtained with help of a Doppler needle under ultrasound guidance into the right (8) and left carotid artery (2). Sheath size used was a 4 Fr (7) and 5 Fr (3). The mean time to insertion of sheath was 9 minutes (range 2-20 minutes). The total procedure time ranged from 90-196 minutes. In all 10 cases, percutaneous access was obtained successfully with no conversion to cut down. All procedures were technically successful. There were no major procedural complications. One patient developed hypotension requiring blood transfusion during the procedure. Another patient with tricuspid atresia, pulmonary atresia, and PDA dependent circulation developed PDA spasm, but had successful placement of a ductal stent. Hemostasis was achieved by manual compression in all patients in a mean of 13 mins (9-20mins). Post procedure patency of the carotid artery was documented by MRI (3), ultrasound (4), follow up angiography (2), and Doppler (1). There were no documented arterial occlusions. One patient had a local hematoma with no compromise to flow which remained stable on follow up imaging. Ultrasound showed no new changes in 7 patients with MRI showing no abnormal findings in 2 pts. No imaging was obtained in one patient.

Conclusion: This initial experience suggests that percutaneous carotid artery access in infants < 3 months of age is safe and feasible with preserved vascular patency and no neurological adverse events.
Is Amplatzer Duct Occluder II Ideal for Closure of Gerbode's Defect?
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Background: Gerbode defects are rare (0.08%), with left ventricular to right atrial communication. They are usually congenital but rarely are acquired. They are traditionally closed surgically with high incidence of complete heart block. For the first time, we report transcatheter closure of five cases of Gerbode's defects with newer Amplatzer duct occluder II (ADO II).

Materials and Results: Five male patients with Gerbode defect, age ranging from 10 months to 13 years formed the material. The weight ranged from 6.5 kgs to 34 kgs. Two patients had failure to thrive, one had recurrent respiratory infections and the other two older asymptomatic children were referred for cardiac murmur detected in school health check up camp. The size of the defect ranged from 4 to 6 mm on transthoracic echocardiography (TTE). The left ventricular angiogram done in AP, RAO view with 10 0 cranial angulation illustrated the contrast from LV opacifying the right atrium (RA). The defect was crossed by over the wire technique by 0.025" Terumo guide wire through the retrograde approach from aorta. 4F Cooks Shuttle sheath was passed over the guide wire. The distal retention skirt was released in RA and the whole system was pulled under fluoroscopy and TEE guidance. The devices were deployed in all the patients by releasing the middle lobe at the defect and the proximal disc in LV. The defects were successfully closed with various sizes of ADO II 46 in 2 cases,3X4, 5X6 in one case each. Only one patient had transient complete heart block needing temporary pacing for 48 hours and steroids for 5 days. He made a complete recovery. The fluoroscopic time was 6.2 +1.4 min. No tricuspid regurgitation or residual shunt in any of the patients on 3 months to 2 years follow up.

Discussion: Spontaneous closure of Gerbode defects are extremely rare and essentially surgical closure is recommended to avoid progression of tricuspid regurgitation and occurrence of infective endocarditis. The soft low profile, easily track able ADO II appears to be tailor made for the Gerbode defect, as the central cylinder fits in the defect and the soft regurgitation discs without polyester material does not impinge on the mitral or tricuspid valve. To the best of our knowledge this is the first series of Gerbode defects to be closed by ADO II, however number is very small.

Conclusions: ADO II is safe, effective and an attractive alternative to surgical closure of Gerbode defects. The success rate is very high with very low complication rate and on short-term follow-up results are favourable.

The LifeValve Project – First Results of a Stented Completely Tissue-Engineered Pulmonary Valve Replacement for Transcatheter Implantation in an Intermediate Term Sheep Model
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Background: Many congenital heart defects require pulmonary valve replacement in early childhood and reoperation due to valve-to-body mismatch during adolescence. Thus a pulmonary valve replacement with growth potential is desirable.

Methods: Over the last 4 years a European consortium produced a decellularized tissue-engineered heart valve (dTEHV) on base of a bioreorbable polymeric scaffold sown into a selfexpandable stent. For transcatheter implantation a catheter delivery system was designed and custom made.

15 adult sheep underwent computed tomography prior to implantation for assessment of native valve and vessel diameters. At implantation angiography and intracardiac echocardiography were performed via jugular vein access to monitor native pulmonary valve function and size. The same access was used to advance the dTEHV stent to the pulmonary valve position after clipping and loading it into the novel delivery system. After deployment intracardiac echocardiography and angiography were applied again to report on position and function of the dTEHV stent. Animals were grouped for 8, 16 and 24 week survival. During that period computed tomography and intracardiac echocardiography for morphology and function were repeated on a 4 week interval.

Results: The prototype delivery system worked at first attempt in 75% of the implantations. For the rest minor changes were required. In all animals the stented dTEHV was implanted successfully. Nevertheless only approx. 25% of the valves were fully competent directly after implantation. The main part of the valves showed mild insufficiency and beginning with aggravation over time. Three dimensional scaffold respectively valve design and active ongoing changes in the tissue structure caused by recipients' cell invasion seemed the major cause for valve failure.

Conclusion: Transcatheter implantation of a self-expanding completely tissue-engineered pulmonary valve replacement using a newly designed delivery system was feasible. However, heart valve design needed redefinition due to regurgitation. So a second valve design was constructed and is currently implanted with very promising intermediate results (no transvalvular gradient, no regurgitation).

Usefulness of Amplatzer Duct Occluder II in Infantile Hepatic Hemangioendothelioma
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Background: Amplatzer duct occluder II (ADO II) is specially designed for long, tubular ducts in infants.ADO II in non ductal positions like VSD is reported in literature. For the first time we are reporting ADO II used in non cardiac position, to close successfully, infantile hepatic hemangioendothelioma.

Case: 15 days old neonate with stormy postnatal period was referred for intractable congestive cardiac failure. Transthoracic echocardiography (TTE) showed multiple vegetations on all the four valves, noncompaction of left ventricle with multiple vascular channels in left lobe of liver. Computed tomography angiogram showed 58x29x50 mm markedly enhancing lesion in left lobe of liver suggestive of infantile hepatic hemangioendothelioma. The neonate was treated for bacterial endocarditis. Later through 4F Cooks Shuttle sheath, 6x6 Amplatzer duct occluder II was parked in hepatic vein, then gel foam and polyvinyl chloride particles were injected into the tumor (Fig 1A,B,CD). Cardiac failure resolved with marked regression of lesion. CT angiogram done after 3 months showed significant reduction in the size of the mass from 58x29x50 mm (before procedure) to 25 x 10 x 20 mm (Figure 2A and B) and complete obliteration of the hepatic vein.

Discussion: Infantile hepatic hemangioendothelioma is a rare anomaly causing heart failure in neonate causing death in up to 70% of untreated infants without adequate regression of lesion. IHHE is characterized by multifocal benign vascular dilatations involving the liver. The clinical course depends on tumor size, localization and complications. Therefore aggressive treatment is warranted. For the first time in the world, we report a case of IHHE in a neonate, with vegetation on all four valves, successfully treated by combination of transcatheter deployment of Amplatzer duct occluder II to occlude the venous end and hand injection of gel foam and polyvinyl chloride particles from the arterial end to close the feeder artery.

Novel Technique of Closure of Pseudoaneurysm of Common Iliac Artery by Amplatzer Duct Occluder II
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Background: The aneurysm of isolated common iliac artery is extremely rare. The incidence is only 0.008–0.03 % of cases of abdominal aortic aneurysm in autopsy series. The aneurysms were closed either by coils or by endovascular stents or surgery in the past. For the first time we report a cost effective closure of aneurysm of common iliac artery by 2 Amplatzer duct occlude II (ADO II).

Case: 7year old boy presented with severe ischemic pain in right lower limb, after a fall from a bullock cart. After CT angiogram, the vascular surgeon was not willing for surgical correction of the complex aneurysm with 2 openings (one at the tip of aorta at bifurcation). There was no landing zone for the endovascular stent. Hence the child was treated with transcatheter closure with two ADO II. After the aortic angiogram with pigtail catheter, 4F Judkin's right catheter, the aneurysmal sac was entered using J tipped 0.01800 Terumo guide wire. Then the guide wire was exchanged with 0.03500 Teflon coated guidewire. After confirming the location...
of the feeding mouth, 3x6mm ADO II device was deployed into the aneurysm and the guiding catheter was slowly withdrawn to the mouth of the pseudoaneurysm cavity to release the cylindrical middle portion of the device and the proximal disc was carefully released in the aorta. The check angiogram showed partial obstruction at the bifurcation of aorta.

Over 0.032 x 260 ‘J’ Terumo guide wire, 8 x 40 mm TYSHAK II balloon was introduced into the aorta and a low pressure, gentle inflation device was pushed into the proper position. Then a 5x4mm ADO II device was released into the aneurysmal pouch. On follow-up pain in the limb and bruit disappeared To the best of our knowledge this is the first case of pseudoaneurysm, treated with ADO II.

Conclusion: This is a cost effective, novel technique for endovascular management of traumatic pseudoaneurysm especially of type A or in cases involving the bifurcation of aorta where there is no landing zone for the placement of endovascular stent.

0063
Challenges of Transcatheter Interventions for Congenital Heart Diseases in Dextrocardia
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Background: Several challenges are faced by interventionists while performing various percutaneous interventions for congenital heart disease (CHD) in patients with dextrocardia. The anatomical alterations in dextrocardia especially the lie of the interventricular septum (IVS) can cause impediment for device closure of ventricular septal defect (VSD) closure of interventricular septum (IAS) for puncture. Aim: The aim of our study is to evaluate the challenges, feasibility and efficacy of transcatheter interventions in children with CHD in dextrocardia.

Materials and Results: Out of 60 patients of CHD with dextrocardia catheterized, only 9 patients (15%) underwent transcatheter interventions. The age was 4 months to 16 years (mean 5.4 years), weight ~ 4.1 to 40 kg (mean 8.4 kg). 3 cases underwent successful device closure for patent ductus arteriosus (PDA). 2 cases of midmuscular VSD (MVS) were closed. One had to be closed with Amplatzer ventricular septal occluder through the jugular approach and the other with Amplatzer duct occluder II (ADO II). There was a difficulty in puncturing IAS during balloon valvuloplasty for mitral stenosis in a case of right-sided May Thurner Syndrome (MTS). Balloon valvuloplasty was done in one infant with severe pulmonary stenosis by flipping the cine image. One very sick patient with inferior vena cava web died after cavoplasty and stenting.

Conclusion: The catheter interventions in CHD with dextrocardia though difficult is feasible. The device closure of PDA and MVS is not difficult especially with ADO II. The balloon mitral and aortic valvuloplasty in the complex cardiac anatomy of syitus inversus totalis is feasible and safe. Rarely right-sided MTS may cause problem for right femoral access during transcatheter procedure.

0064
Efficacy and Safety of Catheter-Based Rheolytic and Aspiration Thrombectomy in Children
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Background: Vascular thromboses can be a significant cause of morbidity and mortality in children. Data in children regarding the safety and efficacy of catheter based rheolytic and aspiration thrombectomy systems are limited.

Methods: The cardiac catheterization database at Texas Children’s Hospital was queried for all patients (pts) having undergone thrombectomy for vessel occlusions between 11/2006- 11/2013 using one or a combination of the following devices: AngiojetTM thrombectomy system (Bayer Healthcare, Indianapolis, IN), Fetch catheter (Bayer Healthcare, Indianapolis, IN), Helix™ Clot Buster™ Thrombectomy Device (e.V3, Plymouth, MN) and/or Pronto™ thrombectomy catheter (Vascular Solutions, Minneapolis, MN). Pts who underwent clot aspiration using standard catheters only, or balloon angioplasty for clot maceration only were excluded. IRB approval for the study was obtained.

Results: A total of 18 pts were identified, median age 1.9 mo (8 days-18 yrs), median weight 4.3 (1.1- 67.9) kg. The involved vessels included iliac arteries (n=2); pulmonary arteries (n=3); and systemic veins (SVC, innominate vein, iliac vein) (n=13). Thrombectomy was performed using the following systems: Angiojet (n=6), Helix Clot Buster (n=3), Fetch catheter (n=2) and/or Pronto catheter (n=1) and Angiojet with a combination of systems (n=6). Adjunctive therapy was performed in 17/18 (94%) pts; this included tPA administration and angioplasty/stent placement. Successful thrombectomy was achieved in 15/18 (83%) pts. There were 4 (22%) complications: persistent bradycardia/hypotension (with Angiojet) leading to asystole requiring CPR (n=2), pulmonary embolus (possibly related to the procedure, resolved with medical therapy) (n=1) and right iliac vein clot from access site (n=1). Transient bradycardia/ hypotension was observed in Angiojet 4 pts. All Angiojet related hemodynamic instability occurred when thrombectomy was performed for > 5 seconds. There were 2 late deaths, unrelated to the procedure. At a median follow up of 2 yrs (2 wks- 6.5 yrs) all the successfully treated vessels are patent, with 7/15 (47%) pts requiring reintervention with angioplasty/stent placement.

Conclusions: Catheter based thrombectomy systems are an important adjunctive tool in the treatment of children with thrombotic vessel occlusions. Similar to the adult experience, bradycardia and hypotension are seen in children when using the Angiojet system. Operators should be cognizant of this potential complication which may be minimized when thrombectomy is performed over short durations.

0065
Short and Mid-Term Outcomes of Premounted Stents in Pulmonary Artery Rehabilitation for Patients with Tetralogy of Fallot
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Background: The low profile design of premounted stents (PST) allows for the treatment of vascular stenosis in small patients, including pediatric patients with congenital heart disease. Our aim was to describe the short and mid-term outcomes of PST for pulmonary artery rehabilitation in patients with tetralogy of Fallot (ToF).

Methods: All PST placed within the pulmonary arteries (PAs) of patients with ToF at our institution were evaluated retrospectively. Patient characteristics and stent implantation data were collected during the initial stent implantation. Follow-up data on surgical and catheter-based re-interventions were collected to determine risk factors for re-intervention.

Results: PST were placed in 21 PAs of 16 patients at a median age and weight of 2.9 years (interquartile range (IQR) 1.5-7.4) and 12.9 kg (IQR 10.6-26.2), respectively. The success rate was 95%, with one unsuccessful implant due to stent embolization. Over a median follow-up period of 3.6 years (IQR 2.6-5.3), surgical intervention was not performed in any patient. A total of 14 PAs in 10 patients had follow-up catheterizations, with 12 PAs (8 patients) requiring re-intervention at a median time of 11.2 months (IQR 10-32.8). Although not reaching statistical significance, patients requiring re-intervention tended to be younger (median age 1.9 vs 10 years) and smaller (median weight 12 vs 26.2 kg) at initial implant. Of the 12 PAs with recurrent stenosis, the mechanism of recurrent stenosis was in-stent stenosis (ISS) in 11 (91%); Thus, the overall rate of ISS for the entire PST is 7/15 (47%). Hypotension was observed in 9 (75%). Thus, the overall rate of ISS for the entire cohort was 43% at a median time of 10 months (IQR 6.6-11.2) post-implant. Previous surgical augmentation was associated with the development of ISS (100% vs 58%, p=0.045). Having a stent to vessel size ratio >1, or “oversizing the stent,” was not associated with the development of ISS.

Conclusions: The use of PST within PAs of patients with ToF may be effective in delaying, if not preventing, surgical intervention of these vessels. Previous surgical augmentation is a risk factor for ISS. Smaller and younger patients may be at risk for recurrent stenosis, and a larger cohort might elucidate this. Routine follow-up catheterization should be considered to evaluate for ISS, as it developed in nearly half of patients with PST and in all patients with prior surgical augmentation.

0066
The Incidence of Acute Occlusive Arterial Injury in Infants Following Cardiac Catheterization Using Ultrasound Guided Arterial Access: A Single-Center Cohort Study
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Background: Acute occlusive arterial injury (AOAI) or loss of arterial pulse is a known complication in infants (<1 year of age) following arterial access for cardiac catheterization. In the modern era of using ultrasound guided arterial access (UGAA), the incidence of AOAI in infants has not been described. Based on current studies that did not employ UGAA, the incidence of AOAI in this age group ranges between 20% and 35%.
**Objectives:** To describe the incidence of and identify risk factors for AOAI in infants who had UGAA during cardiac catheterization.

**Methods:** We adopted the use of UGAA for all pediatric cardiac catheterizations in February 2003. A retrospective cohort study including all cardiac catheterizations using femoral arterial access in infants between February, 2003 and June, 2013 was performed. Case status was defined by > 1 of the following: exam consistent with AOAI, documented AOAI by radiologic imaging or use of an anticoagulant within 48 hours of catheterization to restore and maintain patency of the artery.

**Results:** Ultrasound guided, femoral arterial access was obtained in 415 catheterization procedures on 330 infants. AOAI was identified in 45 cases for an overall incidence of 10.84%. Multiple logistic regression was performed to identify independent risk factors. Infants < 3kg were at higher risk for AOAI: odds ratio (OR) 3.6 (95% CI: 1.2-10.6), P=0.02. Age < 1 month, per se was not a significant factor: OR=0.22 (95% CI: 0.16-1.2), P=0.09. Other factors contributing to AOAI included: larger arterial sheath size (OR=2; P=0.02), access of the left femoral artery (OR=2; P=0.04), and low oxygen saturation (p=0.03). Procedure length, prior arterial access, activated clotting time, cardiac output, number of arterial sheath exchanges, and hemoglobin level were not found to be significant factors.

**Conclusions:** The AOAI incidence of 10.84% in this study is lower than previously reported incidences in studies that did not employ UGAA. Weight < 3kg, large arterial sheath, lower oxygen saturation and access of left femoral artery, were found to increase the risk for developing AOAI. This study may promote the routine use of UGAA in all pediatric cardiac catheterization laboratories and help identify the high risk infants.

**0067 Eliminating Stent Slippage: Use of a Novel Combined Balloon Sheath Assembly System to Deliver Stents**

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**Introduction:** Percutaneous stent placement has become a mainstay of transcatheter treatment of vascular stenosis & coarctation. Larger stents are usually hand crimped onto the balloon in vitro, and advanced into the stenosis through previously placed long sheaths. Stents can slip off the balloon during its introduction through heart or vessels with tight corners that distort or kink the sheath or rarely through the hemostatic valve of the sheath. The stent has to be then retrieved, repositioned or remounted thereby prolonging the procedure. Surgical removal may be necessary in some cases. Despite advances in balloon and catheter technology and delivery techniques, this complication persists. We describe a novel method of stent delivery that eliminates stent slippage using a front loaded all in one stent-in-balloon sheath assembly delivery system.

**Methods:** 16 patients (age 5-25 years) underwent stent implantations to relieve pulmonary artery (PA) stenoses (n=7) and/or pulmonary valve replacement (n=9) and for relief of coarctation (n=1). After failing to deliver a stent for pulmonary artery stenoses over a conventional balloon-in-balloon catheter due to slippage, the novel sheath-balloon system was used to deliver the stent successfully. The procedure was repeated successfully in other cases. The stent, front loaded on the balloon (19-22 mm) covered by the sheath, permitted movement of the stent-in-sheath as one system.

**Results:** Multiple non-sustained arrhythmias occurred during the passage of the sheath system through the right ventricle (RV) without other serious complication. Despite significant force used to advance the sheaths through the RV and into the pulmonary artery, the stents remained on the balloon, and were deployed successfully. In one patient where 2 stents were deployed to relieve PA stenosis, one of the stent embolized into the right hepatic vein, 12 hours after successful deployment.

**Conclusion:** Stent slippage is eliminated using the front-loaded all-in-one balloon sheath assembly system. Secondary benefits include shortening of procedure time as well as morbidity related to stent migration and retrieval. Furthermore, this system is ideal to rescue an unexpected arterial tear or perforation during angioplasty. A larger cohort of patients treated by conventional as well as the novel technique of stent delivery will further affirm the benefit of this all-in-one system.

**0068 Balloon Aortic Valvotomy in Adults and Adolescents: Is the Palliation Worth It?**

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**Objective:** To evaluate long term results of aortic valvoplasty beyond adolescence

**Design:** Retrospective follow up study.

**Setting:** Tertiary referral centre.

**Patients:** 146 consecutive patients (0–35 years), were divided into 2 groups: Group1: those above 12 years of age (n=65) and Group 2: ≤ 12 years (n=81). The characteristics of both the group were compared. The follow up period was up to 14 years (median 5.3 patient years).

**Outcome Measures:** Restenosis, aortic insufficiency, cusps disruption, surgery, death, and valvoplasty failure. Results: The immediate mortality rate was 2.1% (n = 3) and the incidence of significant AR was 12% in group 1 and 8% in group 2. The re-stenosis rate was 10.7% (n=7) for group 1 and 17.2% (n=14) for group 2. Surgery was needed in 2.1% (n = 3, in group 1 and 2 in group 2), and “valvoplasty failure” occurred in 30% patients. Mean (SEM) survival probability 14.4 years after the procedure was 0.89 (0.02) and mean (SEM) probability of surgery-free survival was 0.50 (0.08).

**Conclusion:** Results of balloon aortic valvotomy in adults and adolescents showed good event free survival after the episode of an average of 5 years. Statistically significant number of population had re-intervention in follow up.

**0069 Tackling the Medusa Head in Cath Lab**

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A 25 years old female started complaining of easy fatigability, breathlessness, lower limb swelling, facial puffiness and excessive sweating. On examination she was found to be in cardiac failure with tachypnea, tachycardia and hepatomegaly. Echocardiogram showed huge right coronary artery with continuous signal in right atrium (RA) and the suspicion of coronary artery fistulae to RA. This was confirmed and was at a local center and was referred to us for further management. She was taken up for the coronary artery fistula closure after initial stabilization. PDA device 20/18 was deployed under fluoroscopic guidance retrogradely after arteriovenous loop was formed. In view of residual shunt the patient was taken up for closure of the additional channel which was done using a 9/10 device. In follow up it was observed that the shunt was still persistent on echo, chest xray showed the device had migrated to the lungs. CT Scan was again reviewed and finally the fistulae was plugged with additional Amplatter Vascular plugs II (20 mm x 16mm & 22 mm x 18mm) respectively. The case highlights the need for proper evaluation of the coronary artery fistule and how multiple tracts and openings can cause difficulty in such a case.

**0070 Transcatheter Closure of Coronary Artery Fistulas: Single Center Experience in 6 Years Period**

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**Introduction:** Recently, transcatheter closure of CAFs has emerged as an alternative to surgery. We present our experience with CAF’s between 2007 and 2013.

**Method:** 21 patients aged between 2 months - 67 years (median 7 years) underwent to cardiac catheterization. The procedure was performed preferably with retrograde and antegrade way in 12 and 3, respectively. Complete occlusion was achieved in cath lab in 12 immediate after, in 14 after 24 hours. Only residual shunt was another very small fistula that was left untreated in the same patient. 6 coils, 9 vascular plugs (1, 2 and 4) and 4 duct occluders were used. A patient suddenly died four days later probably due to thrombosis in huge and slow filling coronary arteries since the reciprocal competitive flow after closure. There were huge dilated RCA and CX artery communicating with each other acting as multiple feeding arteries and opening into the RV with an acute angle after short course from the RCA origin. It was caused by a vascular plug just distal to the orifice. Other patients are well without recanalization during the median 25 months of follow-up.

**Conclusion:** CAF’s may present in a great variety in morphology. It is not uncommon to see multiple feeding arteries and especially multiple distal openings. Effective and safe percutaneous transcatheter closure is possible in majority of cases but it is not free of complications.
0071
Transcatheter Device Occlusion of Aneurysmal Perimembranous Ventricular Septal Defects using the Amplatzer Vascular Plug IV: Initial Experience

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Objective: To demonstrate that transcatheter closure of aneurysmal perimembranous ventricular septal defects (pmVSD) with the Amplatzer Vascular Plug IV (AVP4) is a safe and effective treatment option.

Background: Perimembranous ventricular septal defects are the most common congenital heart lesion and while we now routinely and safely close muscular VSDs, pmVSDs continue to be a more of a challenge. The Amplatzer perimembranous VSD occluder (AmplVSDO) has been shown to be effective in closing pmVSDs, but there remains an unacceptably high incidence of complete atrioventricular block (CAVB) after device occlusion. Additionally, the AmplVSDO requires at least a 7 French sheath, relatively stiff delivery catheter and precise rotation of the device during deployment making delivery even more challenging in smaller patients. Between 2004 and 2011, the pediatric cardiology group from University of California San Francisco (UCSF) utilized a modified approach to transcatheter closure of pmVSDs targeting ventricular septal aneurysmal tissue as the landing platform for closure devices in order to avoid contact with the conduction system (Landman, Kipps, Moore, Teitel & Meadows, 2013). The newer AVP4 (FDA approval 8/18/2012) is a relatively soft device that is 11mm in length and comes in sizes 4mm to 8mm in 1mm increments that can be delivered through 0.038” compatible soft guide catheters. Its size and flexibility allows the device to be easily positioned on the aneurysmal tissue, ideally reducing the likelihood of CAVB.

Methods: We conducted a retrospective review, identifying patients who underwent transcatheter device closure of aneurysmal perimembranous VSDs using the Amplatzer Vascular Plug IV between August 2012 and November 2013. Demographic data, procedural success rate, complications and follow-up studies were investigated.

Results: A total of 10 patients underwent closure of aneurysmal perimembranous ventricular septal defects using the Amplatzer Vascular Plug IV during the specified time period. The patients ranged in age from 12 months to 17 years 5 months (median: 7 years 5 months-old), and their weights ranged from 8.8kg to 77kg (median: 22.8kg). The average pre-procedure Qp:Qs ratio was 1.32:1. Half of our patients received the 6-mm AVP4 device, while the other half required the 8mm device. Mean follow-up time was 4.4 months (range: 0-13 months). Complete occlusion at 24 hours was documented in 70% (7/10) of patients. The remaining three patients had tiny (<1mm) residual shunts at 24 hours. One of these patients was lost to follow-up upon hospital discharge. The remaining two patients demonstrated continued residual leaks at 30 days, with one patient demonstrating complete resolution of his residual leak at his six month follow-up in December of 2013. No serious intra-procedural complications occurred. No patients acquired any new heart block (one patient had a history of second-degree AV block secondary to prior surgical patch VSD repair). There was no new or significant increase in tricuspid, mitral or aortic valve regurgitation post-device placement. There was no device embolization in any cases, and no patients required device removal for any reason.

Conclusion: The Amplatzer Vascular Plug IV is a promising, safe and effective device in the transcatheter occlusion of aneurysmal perimembranous ventricular septal defects. Future studies would benefit from a larger patient population and a longer follow-up data collection period.

0072
Dilatable Pulmonary Artery Band: Results of Interventional Dilatation and Clinical Outcome

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Pulmonary artery (PA) banding is performed in various conditions: as a destination therapy for congenitally transposed coronary (CCTGA), as a palliative procedure for multiples ventricular septal defect (VSD) or as a transient stage before debanding. The aim of banding is to reduce the blood perfusing the lungs through the native pulmonary confluence versus the blood perfusing the lungs through Major Aortopulmonary collateral arteries (MAPCA). Recruitment and rehabilitation of these MAPCA’s in such a fashion so as to enhance the flow in the main pulmonary arteries and thereby encourage somatic growth while preserving normal pulmonary arterial pressure, is the strategy followed in these children.

We present the cases of two children who presented to us in late infancy with the diagnosis of pulmonary atresia with vusd and severely hypoplastic pulmonary confluence and MAPCA’s. Both underwent various transcatheter procedures involving balloon dilatation and embolisation of the MAPCA’s at appropriate period, stent angioplasty of branch pulmonary arteries and stent redilatations, in conjunction with surgical procedures to finally achieve normal sized pulmonary arterial confluence for their body weight and surface area at 5 and 10 years follow-up. We conclude that judicious, appropriately timed transcatheter interventions which complements staged surgical procedures in this group of complex cardiac pathology offers a good outcome in the long term by unifocalising the pulmonary blood flow, preservation of the pulmonary vascular bed and protection against pulmonary artery hypertension.

0074
Multicenter Experience with the Amplatzer Vascular Plug II Device to Occlude Different Types of Patent Ductus Arteriosus in Pediatric Patients

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Transcatheter closure of patent ductus arteriosus (PDA) is a well-established treatment modality. Amplatzer Vascular Plug II (AVP II) is a modified vascular occlusion device to occlude different angiographic PDA types in pediatric patients.

Procedures were performed in three pediatric cardiovascular centers in Santiago, Chile from April 2008 to January 2014. The cases were performed with the usual routine for PDA device closure under general anesthesia or conscious sedation. Device size was selected according to the PDA size and morphology on aortic lateral angigram and choosing a device size that could fit into the ductus or aortic annulus, and at least twice the diameter at the pulmonary end. The devices were implanted through a sheath either in the femoral vein or artery.

In 294 pediatric patients (197 female) AVP II was used for PDA occlusion. Median age of 16.5 months (1–168) and mean weight of 13.2+10 kg (3–76). Morphologic classification according Kirchenko was; The morphological PDA classification was type A in 109 (37%), type C in 45 (15%), type D in 26 (10%) and type E in 112 (38%). The narrowest PDA diameter was mean 2.6 (1.1–7.7) and the largest PDA diameter was 7.0+1.8 mm (2.3–12.8). The implanted devices were 4mm in 41 patients (14%) 6mm in 123 patients (42%), 8mm in 97 (33%), 10mm in 26 (9%), 12mm in 7 (2%) and 4mm in 2 patients (5%). The implanted device size was mean of 2.6+0.7 times the ductus narrowest diameter. The mean fluoroscopy time was 12.6+8.0 min (1-37). There was no device related aortic obstruction. Complications: 1 case left pulmonary artery severe stenosis occurred and device was uneventfully
retrieved. 4 device embolizations occurred, 2 uneventfully retrieved and changed for a bigger device and 2 patients sent for surgical closure. The closure rate was 100% at echocardiographic evaluation 24 h after the procedure. During the follow up period mean of 20±5.4 months (1–70) no complications have been reported. The AVPII is an effective and safe device for PDA closure. It permits to deal with different PDA types and can be used in small infants. The AVPII should be considered an alternative in the device armamentarium for PDA closure.

**0075**

**Transcatheter Device Closure of Secundum Atrial Septal Defects in Small Children using the Gore HELEX® Septal Occluder**

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**Background:** The Gore HELEX® Septal Occluder (GSO) was FDA approved in 2006 for transcatheter closure of secundum atrial septal defects (ASD). Closure of isolated sASD is rarely necessary in small children and thus limited data exists regarding the safety and efficacy of this procedure in this population.

**Methods:** A retrospective review from two centers of all patients <12kg who underwent transcatheter device closure of sASD using the GSO. Data reviewed included hospital charts, echocardiograms, cath reports and images.

**Results:** Between 1/2000-10/2013, 12 patients (7 male) were identified who met inclusion criteria. Median age and weight was 1.5yrs (4mos-2.5yrs) and 1.9kg (5.5-11.1kg), respectively. Ten pts had no additional cardiac defects, one had a patent arterial duct and one had congenital mitral regurgitation. Indication for closure included: right ventricular volume overload in 11 pts associated with chronic lung disease with recurrent lower respiratory tract infections (n=3) and failure to thrive (n=4); and paradoxical emboli to lower extremity in 1 pt. All cases were done under general anesthesia with TEE guidance in 8 and TTE in 4. GSO balloon-sizing using stop flow technique was performed in 10 cases with a median sASD size = 1.9mm (7-16.5 mm). Successful closure was achieved in 11/12 pts. Device size used was: 15mm (2), 20mm (5), 25mm (4) and median device size/GSO diameter ratio was 2.0 (1.6-2.5). Intra-procedural echo revealed: no residual shunt (n=5), trivial to small residual shunt (n=6). One unsuccessful closure occurred in an 8.7kg pt with a 16.5mm sASD who had a moderate residual shunt after deployment of a 25mm HSO. The device was removed uneventfully in the cath lab and then underwent uneventful elective surgical closure. A single serious adverse event occurred in 1 pt; transient complete heart block during deployment of a 25mm HSO. That device was removed, heart block resolved, and a 20mm HSO was placed successfully. In follow-up (median = 1yr (1Month-9yrs)), all pts were clinically well with no residual shunt in 7, trivial to small residual shunt in 4, and no device impingement on any cardiac structures or any evidence of device fracture, migration or erosion.

**Conclusions:** While rarely indicated, transcatheter device closure of sASD using the GSO has been performed safely and effectively. In follow-up, there have been no device-related complications and trivial to small residual shunts resolve in most patients.

**0076**

**The Lost Art of Bronchography: What is the Role of this Imaging Modality in a Modern Pediatric Cardiac Catheterization Laboratory?**

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**Background:** Patients (pts) with congenital heart disease may also have clinically relevant tracheobronchial abnormalities. Although bronchography is a simple and potentially useful imaging modality, it is seldom used, and data are lacking regarding its utility in children. We sought to evaluate the role of bronchography to characterize the tracheobronchial tree and its relationship to surrounding vessels.

**Methods:** From 11/23/05 to 3/7/14, 8 pts underwent 9 bronchographies at a large tertiary children’s hospital, at the age of 5wks–17 yrs (mean 9.5 yrs) and weight 10.9kg (5.1-24.2kg). From 11/23/05 to 3/7/14, 8 pts underwent 9 bronchographies at a large tertiary children’s hospital, at the age of 5wks–17 yrs (mean 9.5 yrs) and weight 10.9kg (5.1-24.2kg). Failure to thrive (n=3); and failure to thrive (n=4); and paradoxical emboli to lower extremity in 1 pt. One unsuccessful closure occurred in an 8.7kg pt with a 16.5mm sASD who had a moderate residual shunt after deployment of a 25mm HSO. The device was removed, heart block resolved, and a 20mm HSO was placed successfully. In follow-up (median = 1yr (1Month-9yrs)), all pts were clinically well with no residual shunt in 7, trivial to small residual shunt in 4, and no device impingement on any cardiac structures or any evidence of device fracture, migration or erosion.

**Conclusions:** While rarely indicated, transcatheter device closure of sASD using the GSO has been performed safely and effectively. In follow-up, there have been no device-related complications and trivial to small residual shunts resolve in most patients.

**0077**

**Use of Three Dimensional CT and MRI Guidance in the Cardiac Catheterization Laboratory for Patients with Congenital Heart Disease and Acquired Pulmonary Vein Stenosis**

Patcharapong Suntharos1, Sharon Bradley-Skelton1, Lourdes Prieto1
1Cleveland Clinic Children’s Hospital, Cleveland, OH, USA

**Background:** Cardiac catheterization in patients with congenital heart disease is rarely necessary in small children and thus limited data exists regarding the safety and efficacy of this procedure in this population.

**Methods:** A retrospective review from two centers of all patients <12kg who underwent transcatheter device closure of sASD using the GSO. Data reviewed included hospital charts, echocardiograms, cath reports and images.

**Results:** Between 1/2000-10/2013, 12 patients (7 male) were identified who met inclusion criteria. Median age and weight was 1.5yrs (4mos-2.5yrs) and 1.9kg (5.5-11.1kg), respectively. Ten pts had no additional cardiac defects, one had a patent arterial duct and one had congenital mitral regurgitation. Indication for closure included: right ventricular volume overload in 11 pts associated with chronic lung disease with recurrent lower respiratory tract infections (n=3) and failure to thrive (n=4); and paradoxical emboli to lower extremity in 1 pt. All cases were done under general anesthesia with TEE guidance in 8 and TTE in 4. GSO balloon-sizing using stop flow technique was performed in 10 cases with a median sASD size = 1.9mm (7-16.5 mm). Successful closure was achieved in 11/12 pts. Device size used was: 15mm (2), 20mm (5), 25mm (4) and median device size/GSO diameter ratio was 2.0 (1.6-2.5). Intra-procedural echo revealed: no residual shunt (n=5), trivial to small residual shunt (n=6). One unsuccessful closure occurred in an 8.7kg pt with a 16.5mm sASD who had a moderate residual shunt after deployment of a 25mm HSO. The device was removed uneventfully in the cath lab and then underwent uneventful elective surgical closure. A single serious adverse event occurred in 1 pt; transient complete heart block during deployment of a 25mm HSO. That device was removed, heart block resolved, and a 20mm HSO was placed successfully. In follow-up (median = 1yr (1Month-9yrs)), all pts were clinically well with no residual shunt in 7, trivial to small residual shunt in 4, and no device impingement on any cardiac structures or any evidence of device fracture, migration or erosion.

**Conclusions:** While rarely indicated, transcatheter device closure of sASD using the GSO has been performed safely and effectively. In follow-up, there have been no device-related complications and trivial to small residual shunts resolve in most patients.

**0078**

**Efficacy and Safety of Transcatheter Device Closure of Perimembranous VSD using ADO I: A Prospective Multi-Centre Observational Study**

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**Background:** Though transcatheter closure of perimembranous VSD (PMVSD) is an alternative to surgery, unpredictable occurrence of complete heart block (CHB) remains a major deterrent. One of the postulated mechanisms for CHB is the exertion of a clamp force which is inherent to the conventional PMVSD device with a disclike disk design. Some have postulated that Amplatzer duct occluder I (ADO I) which has only one retention disc, is unlikely to cause CHB. This current study is aimed at assessing this hypothesis and also evaluate the efficacy and safety of ADO I in the closure of PMVSD.
Materials and Method: This is a prospective, multi-center, non-randomised observational study using ADO I deployed in an antegrade fashion. The recruitment period is for 2 years starting January 1, 2013 and the follow up period is for two more years after the last recruitment i.e. up to December 31, 2016. The inclusion criteria were: 1) Age > 6 months and weight >8kg, 2) Symptomatic status with repeated respiratory tract infections and failure to thrive and/or hemodynamically significant shunt, and 3) PMVSD size ≤ 12mm and separated from the aortic valve by ≥ 4mm. The exclusion criteria were 1) those with severe PAH (PAP > 75% of the systemic pressure), significant aortic valve prolapse with or without aortic regurgitation and pre-existing conduction disturbance. Use of oral/IV corticosteroids before during and after the procedure was left to the discretion of the individual operators. All the patients following PMVSD closure with ADO I were monitored in the ICU for 24 hours and then for another 24 hours on the floor before being discharged on Aspirin 81mg/kg/day for 6 months. They were subjected to predischarge ECG and echocardiography. The further follow up is after 1 and 6 months and then every one year till the end of the study period. The primary objective is to evaluate efficacy by determining the closure rate and freedom from conduction abnormalities immediately after the procedure and during the follow-up period. The secondary objective is to evaluate safety based upon the freedom from all complications during the follow-up period.

0079
Life-Threatening and Inoperable Pulmonary Arterial and Bronchial Obstruction Due to External Compression in a Patient with Chronic Mycoplasma Avium Infection (MAI). Successful Therapy with Bronchial and Pulmonary Artery Stent Implantation
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We report on a 2 years old patient with immunodeficiency and massive general lymphadenopathy due to chronic MAI infection. Mediastinal lymphadenopathy led to complete obstruction of the left main bronchus and the left pulmonary artery (LPA). Interventional techniques were successfully applied to address bronchial and vascular stenosis before the patient was referred for bone marrow transplantation (BMT).

Methods: After the anatomy was delineated by bronchography, a pre-mounted Palmaz Genesis biliary stent (PB1570 PSS, diameter 7 mm) was introduced into the proximal left main bronchus over the wire and implanted with 10 atm. Further obstruction of the left bronchus was confirmed by flexible bronchoscopy through the stent lumen, therefore two more stents (PB1650 PSS) were implanted telecosopically.

Results: Bronchography and bronchoscopy confirmed complete restoration of the lumen of the left main bronchus. After the airway was restored, the proximal LPA was stented with a PG1910 XD crimped on a 9 mm OPTA balloon catheter. Complete patency of the proximal LPA was confirmed by angiography. The patient was extubated in the catheterization laboratory and monitored in the ICU for 24 h to exclude reperfusion edema of the left lung. Follow-up x-ray and clinical examinations showed immediate ventilation of the left lung after stenting. The patient was discharged home 36 hours after the procedure. Antithrombotic therapy was initiated with Aspirin and anti-inflammatory inhalation therapy with budesonide. The patient was then referred for BMT and after 12 months follow-up is doing well

Conclusion: Inoperable patients with life threatening bronchial and pulmonary arterial compression secondary to mediastinal lymphadenopathy unresponsive to medical therapy can effectively be treated in the catheterization laboratory by endobronchial and endovascular stent implantation.

0080
Risk Factors for Right Ventricular Outflow Tract Disruption During Percutaneous Pulmonary Valve Implantation (PPVI)
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Introduction: PPVI is now a reality for the treatment of dysfunctional right ventricular outflow tract (RVOT) conduits. The RVOT in these patients is frequently stenotic requiring high-pressure balloon angioplasty and/or stent implantation prior to PPVI; this can cause conduit disruption (CD) with potentially life-threatening consequences. This study aims to determine the risk factors for disruption of the RVOT during PPVI.

Methods: PPVI performed between 6/2010-12/2014 were reviewed. Demographic and procedural variables were compared between groups with and without CD using Chi-squared and binomial regression analysis. CD was graded as 0: none, 1: ≤ 2 mm outside lumen, 2: ≤1/2 diameter of lumen, 3: ≥1/2 diameter of lumen, 4: uncontained.

Results: Eighty patients underwent PPVI. 63.8% were male, age range 5.4–56.5 years (mean 23.1±12.6 years), mean BSA 1.6±0.4 m². A total of 41% of patients had CD: 16.3% grade 1, 18.8% grade 2, 6.3% grade 3, 0% grade 4. CD ≥ grade 2 was associated with RVOT calcification >1/3 of the circumference (14/19 vs. 29/61, P=0.023), higher peak-to-peak RVOT gradient (37.5±20.7 vs. 24.7±18.1 mmHg, P=0.010), echo mean gradient (30.4±13.9 vs. 22±15.2, P=0.022), smaller stenotic diameter (7.5±2.52 vs. 9.1±3±63 mm/m², P=0.028), retrosternal RVOT course (12/19 vs. 17/61, P=0.003), largest balloon size/conduit implant diameter (1.0±0.17 vs. 0.9±0.16, P=0.008), and stenotic diameter/conduit implant diameter (0.5±0.17 vs. 0.6±0.20, P=0.041). There was no association between CD and demographic data, type of RVOT conduit, pre-stenting, or PPVI size/conduit diameter.

Conclusions: A significant percent of patients experience CD during PPVI, however only a minority of CD are clinically significant. Patients with extensive calcification, severe stenosis by pressure gradient or angiographic narrowing, retrosternal conduit course, and larger increase from stenotic diameter to final diameter were at greatest risk of CD during PPVI.

0081
Feasibility Study to Evaluate a Novel Biodegradable Stent in a Porcine Model of Aortic Coarctation
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Background: There are presently no biodegradable stents (BDS) available to treat coarctation of aorta (CoA). A BDS that will relieve aortic obstruction, and ultimately disappear, allowing for growth and preservation of aortic wall elasticity would be ideal. A novel double opposed helical (DH) coil design BDS manufactured with poly-l-lactic-acid to sizes with the potential to treat CoA have been fabricated.

Objectives: 1. Create a CoA model in a growing pig. 2. Evaluate feasibility of DH BD stent implantation to treat CoA and 3. Assess short term vessel/stent patency and vessel inflammation at 2 weeks and 1 month follow-up (FU).

Methods: 8 infant Sinclair minipigs (13-15 kg) underwent surgical CoA creation with aortic banding (group 1, n=4) and elliptical resection (group 2, n=4). 8-mm diameter DH BDS were implanted 4-6 weeks after CoA creation. CoA stents were delivered with angiography, intravascular ultrasound (IVUS) and histopathology at 2 weeks & 1 month FU.

Results: 6/8 animals (3 of each model) survived CoA creation. Angiography and IVUS showed moderate-severe CoA in group 1 and trivial CoA in group 2. There was 1 procedural death. The remaining 5 had successful trans-femoral BDS implantation. Residual CoA persisted in group 1 following high pressure angioplasty (22 ATMS). There was no residual CoA in group 2. FU evaluation at 2 weeks and 1 month in group 1 showed stable residual CoA and no CoA in group 2. There was luminal stent patency and complete endothelialization of stent material at 1 month FU.

Conclusions: Modification to the CoA creation method is required. It is feasible to deliver a novel BDS in this animal model to treat CoA. Further studies are needed to evaluate long term vessel/stent patency and assess risks associated with stent fragment embolization during the degradation process.

0082
Immediate Postoperative Catheter Intervention Across Suture Lines
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Background: Early postoperative cardiac catheter intervention is regarded as high-risk, particularly when a dilation intervention across a fresh suture line is performed. There are little data available demonstrating the safety of such interventions. The purpose of this study was to examine the outcomes of catheter dilation interventions upon surgical anastomotic sites in the immediate postoperative period.

Methods: All catheter dilation interventions performed within 30 days after congenital heart surgery between August 2005 and November 2013 were retrospectively reviewed. Values are reported as median and interquartile range (IQR). Our primary endpoint was procedural success, which was defined as an increase in vessel diameter of >75% of the adjacent normal vessel or 50% increase over pre-dilation diameter.
Results: Fifty-three patients, median age 0.15 years (IQR 0.03 - 0.51 years), weight 4.1 kg (IQR 3.1 - 6.4 kg), underwent 62 interventional procedures on median postoperative day 7 (IQR 3 - 13 days). At time of intervention, 46 patients were receiving intravenous inotropic support and 10 patients were receiving extracorporeal membrane oxygenation support. Among the intervention interventions at surgical anastomotic areas, were 30 stent and 32 balloon angioplasty procedures. There were 3 major complications including: umbilical arterial perforation (n=1), intimal tear of a pulmonary artery requiring covered stent placement (n=1), and a procedural mortality due to pulmonary artery avulsion during angioplasty (n=1). There were 12 deaths (22%) prior to hospital discharge. One year postoperative survival was 68% (36 patients). For stenting procedures, the median ratio of stent diameter to initial stenosis diameter was 2.62 (IQR 2.27 - 3.73). For angioplasty procedures, the median ratio of balloon diameter to initial stenosis diameter was 2.27 (IQR 1.84 - 2.94). There was no difference in overall complication rate between those who underwent stent placement versus balloon angioplasty (p=0.70). Stent placement was associated with a greater degree of initial stenosis (p=0.04), demonstrated by a mean stenosis-to-distal diameter ratio of 0.41 (± 0.19) compared to 0.51 (± 0.18) in those who underwent a balloon angioplasty. Despite this association, stent placement was more likely to result in procedural success (OR 2.1; 95% confidence interval 1.6 - 2.8).

Conclusions: Though caution is paramount, early postoperative catheter dilation intervention across fresh suture lines can be performed safely in small, critically ill children.

0083
Transcatheter Pulmonary Valvotomy in Neonate with Pulmonary Atresia with Intact Ventricular Septum: A Single Center Experience
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Objective: To review the safety and efficacy transcatheter pulmonary valve perforation (PVP) using simple guidewire technique in patient with pulmonary atresia with intact ventricular septum (PA-IVS).

Methods: A retrospective review was performed for 57 patients with PA-IVS who underwent transcatheter pulmonary valve perforation using simple guidewire technique between January 2000 and December 2012 in Asan Medical Center.

Results: Forty-six (80%) patients were achieved technical success with transcatheter intervention. The mean age at intervention was 8.0±12 days. The mean weight was 3.16±0.45 kg. Tricuspid valve annulus was 9.53±2.19mm (z-score -1.71±1.19), right ventricular pressure fell from 99±24mmHg to 50±14mmHg. Mean fluoroscopic time was 27±17 (9.0-38.0) minutes. There was no procedure related mortality. Tachyarrhythmia occurred in 2 patients during procedure. 14 (24%) patients underwent no subsequent intervention, whereas 32 (56%) of them needed an additional source of flow to support the pulmonary circulation. 21 patients needed second catheter-based valvuloplasty, 8 underwent right ventricular outflow relief surgery, 8 had surgical shunt, 3 had arterial duct stenting and one had BCS. There was no significant risk factors for additional pulmonary intervention.

Conclusions: Transcatheter intervention using simple guidewire technique shows favorable outcome for patients with PA-IVS. Catheter-based valvotomy is safe and effective and avoid surgery in first month of life. Subsequent surgical and/or transcatheter intervention may be necessary in some patients.

0084
Extended Application of the Hybrid Procedure in a Evolving Facility
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Background: The hybrid approach has developed into an alternative to early Norwood surgery for initial palliation of hypoplastic left heart syndrome (HLHS). Application of this innovative procedure to palliate an extended array of cardiac anomalies may be valid. We describe our experience in utilizing the hybrid procedure in a variety of congenital cardiac anomalies in an evolving surgical institution.

Methods: Retrospective review of patient demographics and procedural and follow-up data on all hybrid procedures (banding of the pulmonary artery with PDA stenting) between 2008 and 2013 at our institution.

Results: Ten patients underwent a hybrid procedure in the timeframe listed: typical HLHS (n=3); unbalanced atrioventricular canal defect (n=3); double outlet right ventricle with hypoplastic transverse aortic arch (n=2); transposition of the great arteries (n=1) and one patient with borderline hypoplastic left ventricle. The hybrid procedure was performed at a median age of 9 days (range 2 - 46 days). Median weight at the time of hybrid procedure was 3.5 kg (range 1.8–4.6 kg). Nine patients had one stent in the PDA; however one patient needed two stents. There were no intraprocedural complications. Median intubation length post procedure was 4 days (range 1-30 days). Median hospital stay post procedure was 42 days (range 15-270 days). Overall survival through further surgical palliation was 80%. One patient died suddenly at home 3 weeks post hybrid procedure and the other died 6 months post Norwood procedure due to severe sepsis. Median time to subsequent surgery was 4 months (range 1-5 months). Subsequent reparipalliation included successful biventricular repair (transverse aortic arch reconstruction and arterial switch operation) (n=3), comprehensive stage 2 (n=3) and Norwood procedure (2 Sano and 1 BT shunt) (n=3). On median follow-up of 24 months, none of the patients required cardiac re-intervention on the branch pulmonary arteries; however one patient required right pulmonary artery arterioplasty.

Conclusions: The hybrid procedure may be used successfully in an evolving variety of settings to palliate complex congenital cardiac lesions. This approach may be particularly attractive to evolving surgical centers with good success rates.

0086
Utility of Transcapular Closure of Paravalvular Mitral Leaks
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Background: Paravalvular leak (PVL) may complicate cardiac valve replacement surgery. Transcatheter PVL closure has become a valid alternative to reoperation however a number of anatomical conditions may prove technically challenging for transcatheter access. We intended to verify the utility of transcapular access in such settings.

Methods and Results: We report a prospective series of 6 patients with mitral PVLs who underwent transcatheter PVL closure (TPVLC) using lateral minithoracotomy approach. Under 3D transoesophageal echocardiographic and fluoroscopic guidance, patients underwent implantation of either muscular Ventricular Septal Defect Occluder (mVSD) or Amplatzer Vascular Plug II(AVPII) devices. Percutaneous repair of paravalvular defects was attempted in 6 patients (age, 63±7 years; Male, 100%) with heart failure, hemolytic anemia, or both who were deemed high risk for open surgery. Devices were implanted in 11 defects (7 mVSD, 4 AVPII) including 2 patients with multiple defects. Procedural and fluoroscopy times mean were 131 and 38 minutes respectively. Overall, successful closure (defined as <1 residual regurgitation) was achieved in all 6 patients and resulted in a reduction in heart failure symptoms and hemolysis. No procedure related complications occurred.

Conclusions: TPVLC is an efficient and safe alternative for transcatheter approach for mitral TPVLC with excellent success rate and potentially less procedural and fluoroscopic times and may be considered as an initial therapeutic option.

0087
Hydrogel Expandable Coils for Vascular Occlusion in Congenital Heart Disease
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Background: The hydrogel-coated expandable embolization coil has been widely utilized in the treatment of intracranial aneurysm. The AZUR peripheral hydrocoil embolization system (hydrocoil) has recently begun to be applied in the field of congenital heart disease.

Methods: We retrospectively reviewed all patients undergoing vascular occlusion using hydrocoils between June 2013 and December 2013.

Results: Twelve patients underwent vascular occlusion using hydro coils. All patients had cyanotic congenital heart disease and had undergone Bidirectional Glenn or Fontan procedures. The median age was 2.6 years (range 1.8-11.5 years) and median weight was 10.5kg (range 4.2-23 kg). A total of 71 hydro coils were placed in 13 vessels. The target vessels included eleven (85%) aortopulmonary collaterals and two (15%) veno-venous collaterals. The mean number of coils placed was 6 (range 1-9) per target vessel. Complete occlusion was achieved in 100% of patients in the catheterization laboratory. Only one complication associated with hydro coil was unravelling coil, which occurred when pulling it back into the case after the preparation with steam. Unravelling coil was deployed at proper position by using a coil pusher. The total complication rate was 1.4% (1/71).

Conclusions: Hydro coils are safe and effective devices that can be utilized for vascular occlusion in patients with congenital heart disease.
Transcatheter Closure of Very Large Atrial Septal Defects: Feasibility and Safety in a Large Adult and Pediatric Population

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Purpose: Data are needed on safety and efficacy of device closure of large atrial septal defects (ASDs).

Methods: Between 1998 and 2013, 336 patients (161 children <15 years) with very large, isolated, secundum ASDs (balloon-stretched diameter ≥ 34mm in adults or echocardiographic diameter >15mm² in children) were managed using the Amplatzer device in our center. Transthoracic echocardiographic guidance was used starting in 2005 (n=219, 65.2%). Balloon-stretched diameter was >40mm in 36 adults; mean values were 37.6±3.3mm in other adults and 26.3±3.3mm² in children.

Results: Amplatzer closure was successful in 311 (92.6%, 95CI:0.89-0.95) patients. Superior and posterior rim deficiencies were more common in failed than successful procedures (superior, 24.0% versus 4.8%, P<0.001; posterior, 32.0% versus 4.2%, P<0.001). Device migration occurred in 4 adults; in the 21 remaining failures, the device was unreleased and withdrawn. After a mean follow-up of 6.7±3.2 years, all patients were alive with no history of late complications.

Conclusions: Closure of very large ASDs using the Amplatzer device is safe and effective in both adults and children. Superior and posterior rim deficiencies are associated with procedural failure. Closure can be performed under transthoracic echocardiographic guidance. Long-term follow-up showed no deaths or major complications.

Tracheal Compression Following Hybrid Procedure in an Infant with Hypoplastic Left Heart Syndrome (HLHS)

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The hybrid approach has evolved into a viable alternative to Norwood Stage I surgery for hypoplastic left heart syndrome. A 4-month-old female with DiGeorge syndrome and unbalanced atroventricular canal with hypoplastic left ventricle and aortic valve underwent a hybrid procedure with bilateral branch pulmonary artery banding and placement of a 7x20mm Formula 418 stent (Cook Medical, Bloomington, IN) in the PDA. Two months later, following an upper respiratory infection, she developed ventricular dysfunction thought to be secondary to ductal stent narrowing and consequently underwent further stenting of the proximal and distal PDA segments with a 7x16mm and 7x12 Formula stents (Cook Medical, Bloomington, IN) respectively. Despite this procedure she had three acute failed extubation attempts and bronchoscopy revealed a severe stenosis above the vocal cords with 80-90% collapse of the airway as well as strong pulsation of the anterior wall, concerning for vascular compression. With attention to radiation dose, a subsequent CT angiogram confirmed marked compression of the trachea by the PDA stent and the aorta anteriorly and by a right aberrant subclavian artery posteriorly. Specifically, the stented PDA was having mass effect on the aortic arch, which was compressing the trachea. Consequently, the baby underwent comprehensive stage II Norwood repair with arch reconstruction and bilateral bidirectional Glenn, PDA stent and PA banding takedown and relief of tracheal compression. She was extubated eight days later and has had no further airway issues.

Vascular stent mass effect has been described but may be under-recognized in complex congenital heart lesions. As less invasive options to palliate these conditions become more common, evaluation of potential airway compression with advanced imaging should be considered. It is unclear if self-expanding stents may exert less compressive effect on surrounding structures in the setting of the Hybrid procedure for hypoplastic left heart syndrome.

Closure of Tubular Patent Ductus Arteriosus with the Amplatzer Vascular Plug IV: Feasibility and Safety

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Objectives: to assess safety and efficacy of Amplatzer Vascular Plug IV (AVP IV) for tubular PDA closure.

Methods: From 2009 to 2013, 22 patients (15 infants, 3 adults) underwent PDA closure with the AVP IV in our center.

Results: PDA morphology was a Type E in 16 patients (72.7%) and a Type C in the 6 (27.3%) others. PDA closure occurred in 15 infants (68.2%) at a mean age of 9 ± 4.9 months (range: 3-19 mo) and a mean weight of 7 ± 1.7 kg (range: 4.1-10.9kg). A past history of prematurity and very-low birth weight was found in 14 (63.6%) of them. Six patients had pulmonary hypertension. Mean Plug IV diameter was 5.5 ± 0.8 mm larger than the mean maximal PDA diameter. Early complete closure of the ductus was obtained in all patients. Undersized AVP IV migration occurred in 1 patient and was suitable for percutaneous device retrieval. After a mean follow-up of 2.8 ± 1.5 years, all patients are alive and asymptomatic, no late complication occurred.

Conclusions: Transcatheter closure of tubular PDA with the AVP IV is safe and effective with a 100% early closure rate. This device, suitable for a 4-French sheath, is a new alternative for tubular PDA closure in low-body-weight infants. AVP IV migration may occur if undersized and remains suitable for percutaneous device extraction. Neither PDArecanization nor late adverse event occurred at last follow-up.

Left Heart Discharge Under Extracorporeal Membrane Oxygenation: Transcatheter Atrioseptostomy is Safe and Efficient in Adults and Children

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Introduction: Veno-arterial Extracorporeal Membrane Oxygenation (VA-ECMO) can lead to increased left atrial pressure and severe acute pulmonary edema.

Methods: From August 2008 to August 2013, 174 patients were assisted with peripheral VA-ECMO in our center. Twenty-eight of them (1 month to 72 years old, mean age: 32 years, 6 children and 22 adults) needed left heart discharge and had a percutaneous atrioseptostomy performed with a transseptal puncture and inter-atrial septum dilation using a 25 to 28mm inoue balloon.

Results: Intractable heart failure was due to acute myocarditis (n=5), dilated cardiomyopathy (n=12), acute coronary syndrome (n=4), post-operative myocardial dysfunction (n=4) or right heart failure due to pulmonary hypertension (N=3). Atrioseptostomy was performed under local anaesthesia in 10 patients (35.7%). Median delay from ECMO to atrioseptostomy was 62 hours (quartiles: 26-120 hours). No procedure-related complication was reported. Left atrial pressure significantly decreased after atrioseptostomy, from 21.5mmHg +/- 9.4mmHg to 9.5mmHg (+/- 4.4mmHg), p<0,001. Clinical improvement was observed in 4 of 6 patients with pulmonary haemorrhage and 24 of 28 patients with pulmonary oedema (85.7%, 95CI(72.7%-98.7%)). A atrioseptostomy was successfully weaned from ECMO, 4 patients had implantation of a left ventricular assist device, 10 were transplanted and 11 patients died under VA-ECMO.

Conclusion: Percutaneous atrioseptostomy is a safe and efficient strategy to discharge the left heart in pediatric and adult patients under peripheral VA-ECMO.

Hybrid Trans-Apical Closure of Paravalvar Mitral Leaks Using a New Device

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Background: Periprosthetic paravalvar leak can be associated with significant morbidity. With posterior or septal location of mitral valve periprosthetic leak, transapical access can be superior to trans-septal percutaneous access and pose less risks compared to surgical closure.

Objective: We sought to evaluate the feasibility and efficacy of hybrid transapical closure of paravalvar mitral leak using a new device in patients with congestive heart failure and hemolytic anemia.

Methods: All procedures were performed via a small left apical thoracotomy and apical purse-string. A single apical sheath (11, 14, 16 F) was used in all but one patient where two apical sheaths (12 and 14F) were used. Occlutech PVL devices, designed specifically for paravalvular leak closure, were used in all cases. All procedures were performed with fluoroscopic and 3-D TEE guidance. RESULTS: Four patients (3 males) aged 66.2 ± 7.5 years, in NYHA class III ≥ 0.82 with moderate surgical risk (Euroscore 7.14; median sternotomies 2.5, STS morbidity risk 29%, prolonged ventilation risk 17.9%; re-operation risk 11%) underwent transapical closure of 6 significant paravalvar leaks. In total, 6 devices were used: two “square” 16 mm Occlutech PVL Occluders, 3 “rectangular” 21 x 19mm Occlutech PVL Occluder and one 12 mm Amplatzer Vascular Plug II. The median procedural and fluoroscopy times were 130 min (80-140) and 20 min (18-23) respectively. Immediate post-implant 3D-TEE...
showed complete occlusion of 3 leaks and significant reduction of the remaining 3. In one patient a square PVL device interfered with the single tilting disk of the prosthetic mitral valve and the patient underwent surgical leak closure. None of the patients required prolonged intubation (>24 hours) and median hospital stay was 12 days (range 9–15). Discharge echo showed no leak in 2 patients and a trivial leak in one. At follow-up, all three patients had improvement in NYHA class and resolution of haemolysis.

Conclusions: Apical hybrid closure of paravalvar mitral leaks is an efficacious and feasible alternative to high risk surgical or challenging transeptal closure. The larger, rectangular Occlutech PVL devices allow larger, crescentic paravalvar leaks, for which other occluders are not particularly suited, to be attempted. The possibility of prosthetic valve impingement must be considered.

0093
Transcatheter Closure of a Right Pulmonary Artery to Left Atrial Fistula Using Amplatzer Muscular Ventricular Septal Defect Occluder
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A right pulmonary artery (RPA)-to-left atrial fistula is a very rare cyanotic congenital heart defect and is characterized by cyanosis and normal auscultation of the heart. Interventional closure of the fistula using occluder devices and coils have been rarely reported. We report the successful closure of a RPA-to-left atrial fistula using an Amplatzer muscular ventricular septal defect occluder in a child with cyanosis. The two-dimensional echocardiogram with bubble contrast study demonstrated the communication between right pulmonary artery and left atrium. Computerized tomography confirmed the diagnosis and delineated the anatomy.

0094
Quality of Life of Patients with Adult Diagnosed Congenital Heart Disease
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Background: Annually over 100,000 previously healthy young/middle aged adults learn for the first time that they have congenital heart disease Little is known as to the impact a diagnosis of congenital disease (e.g. atrial septal defect [ASD]) requiring interventional repair has on their quality of life (QOL). Using Ferrans QOL conceptual model, the purpose of this study was to identify for adults with ASD the influence the diagnosis of ASD and interventional repair has on the domains of QOL including Health and Functioning, Psychological/Spiritual, Social and Economic and Family.

Methodology: A qualitative design with five email interviews was used to assess QOL in each domain. Weekly for approximately 4 weeks, participants received an email with three open-ended questions related to selected elements within one of the domains. Each QOL domain has 4-14 elements for a total of 33 to select from. Eligibility criteria included: >21 years; had ASD repair in the past year; and had access to a computer. Of the 23 patients approached 5 (4 females, 1 male) agreed and consented. Thematic analysis was utilized to code participant responses against each of the domain elements.

Results: Participants ranged in age from 41 to 64. There were two whites, one Hispanic and two of mixed races. All email responses were returned with an average of 71 days for participants to complete the interviews. A total of 26 of the 33 QOL elements were identified. The most frequently appearing elements for each domain were: own health, energy (fatigue), and stress or worries for Health and Functioning; happiness in general, peace of mind for Psychological/Spiritual; standard of living and financial independence for Economic; and family happiness and children for Family. Two new elements of quality of life that were indentified within select domains were related to cognition and mortality awareness.

Conclusions/Implications: With slight modifications the QOL domains and elements in Ferrans QOL conceptual model fit for persons with adult diagnosed congenital heart disease. Findings will be used to inform the development of a large survey study of the QOL of adults with ASD.

0095
Results of Endovascular Stenting of Sano Conduit Stenosis in Hypoplastic Left Heart Syndrome
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Introduction and Objective: There is a growing concern for the early development of conduit stenosis after Norwood procedure with Sano modification, resulting in increased cyanosis, increased oxygen desaturation, increased interstage morbidity, and death. We report our experience with endovascular stent placement for Sano conduit stenosis and compared the outcomes at stage-II surgery between stented and non-stented infants.

Methods: The medical records of all patients with hypoplastic left heart syndrome with Sano palliation between September 2003 and December 2013 were reviewed. The Preoperative anatomy, demographics, medical data, surgical variables, and outcomes after Norwood surgery and subsequent stage-II surgery were collected and compared between stented and non-stented infants. The pre and post-stent oxygen saturation, stenosis location, type and number of stents implanted, concomitant interventions, procedure related complications, and reinterventions were collected.

Results: Of the 74 children who underwent the Norwood procedure with Sano modification, 14 (19%) were treated with stent. The anatomy, demographics, weight/diut size ratio and outcome variables after Norwood surgery were similar between stented and non-stented infants. The age at catheterization was 70 +/-46 days and the weight was 4.4 +/-1.3 kg. The oxygen saturation increased from 78.9 +/-14.8% after intervention to 93.8% after stenting (p = 0.001). Early mortality, interstage and post-stage-II surgery mortality was similar in both groups. Age (Stented: 204 +/-49 versus Non-stented: 175 +/-49 days, p = 0.133), weight (6.6 +/-1.34 versus 5.8 +/-0.98, p = 0.061), and pre-stage II palliation echocardiographic variables were similar between the 2 groups. We found significant differences in the pre-stage-II oxygen saturation (Stented: 82.8 +/-3.3% versus Nonstented: 77.7 +/-4.5%, p=0.003 ), mechanical ventilation (0, 33 +/-0.52 days versus 7.87 +/-17.9 days, p=0.017), chest tube use (2.25 +/-0.5 days versus 7.16 +/-13.46 days, p = 0.05), and intensive care unit stay (4.85 +/-1.95 days versus 21.9 +/-58 days, p= 0.03).

Conclusion: Endovascular stent placement for Sano conduit stenosis after the Norwood procedure leads to higher levels of systemic oxygenation and prevents early performance of stage-II surgery without compromising stage-II outcomes.

0096
Transcatheter Closure of Perimembranous and Muscular VSD with Cardiofix Muscular VSD Occluder
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Background: The difference of Cardiofix muscular VSD occluder (mVSDO) from Amplatzer mVSDO having a shorter (7mm vs 5mm) connecting waist choices. Taking into consideration that the muscular septum is thinner in children and also rims of perimembranous VSD (pmVSD) having a short (4.5mm) is safe and efficacious. Shorter connecting waist than Amplatzer mVSDO is more convenient for muscular VSDs in children when regarding to septal thickness.

Material and Method: 37 Patients underwent transcatheter VSD closure with Cardiofix mVSDO in our clinic were analyzed. During the study period Cardiofix mVSDO was used in all muscular VSD and in some selected pmVSDs in the existence of septal aneurysm by inserting the left disc of the device into the aneurysm or if there is sufficient (> 4mm) subaortic rim by leaving the left disc at the LV side.

Results: The procedure was successful 35 of 37 (94%) patients. The age of patient from 1 to 34 years (median 7 years). Mean defect diameter was 8.4mm±3.1 (4.3-18mm) and mean Qp/Qs ratio was 1.86±0.60. The defect types were perimembranous in 17 and muscular in 18 patients. Twelve patients those pmVSDs (4.3-18mm) and mean Qp/Qs ratio was 1.86±0.60. The defect types were perimembranous in 17 and muscular in 18 patients. Twelve patients those pmVSDs from 1 to 34 years (median 7 years). Mean defect diameter was 8.4mm±3.1 (4.3-18mm) and mean Qp/Qs ratio was 1.86±0.60. The defect types were perimembranous in 17 and muscular in 18 patients. Twelve patients those pmVSDs were closed by left side, the mean distance between defect side and aortic valve (aortim rim) was 5.4mm±1.1 (4-8mm). The only significantly complicated patient who developed moderate tricuspid regurgitation and significant residual shunt even after device releasing was referred for elective surgery. Full occlusion rate was 94% on follow up. There was trivial non-progressive new onset aortic regurgitation in one patient. There was no permanent complete AV block during early and mid-term follow up.

Conclusion: VSD closure with Cardiofix mVSDO having a short connecting waist (5mm) is safe and efficacious. Shorter connecting waist than Amplatzer mVSDO is more convenient for muscular VSDs in children when regarding to septal thickness. On the other hand, it may be preferred in pmVSD closure with sufficient subaortic rim since the larger connecting waist than the eccentric pmVSDoccluder may cause lesser pressure to conducting pathway to reduce the risk of AV block.
Percutaneous Treatment of Residual Lesions in Postoperative Pediatric Cardiac Surgery Infants Receiving Extracorporeal Membrane Oxygenation Support

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Introduction and Objective: Residual lesions in cardiac surgery patients receiving ECMO support may result in incomplete recovery of cardiac function. The aim of this study was to examine the incidence and clinical outcomes of postoperative residual lesions of pediatric cardiac surgery patients who received ECMO support.

Methods: A retrospective observational study was undertaken to collect the pediatric cardiac surgery patients who received ECMO support within 14 days of surgery between 2003-2013. A hemodynamically significant cardiac lesion that required intervention for successful decannulation was defined as a residual lesion. Demographic data, complexity of the disease, surgical data, indications for ECMO support, interventions performed, and clinical outcomes were also examined.

Results: Residual lesions were evaluated in 64 of 88 postoperative patients placed on ECMO. The indications for ECMO were: off CBP (41%), low cardiac output (29%), cardiac arrest requiring cardiopulmonary resuscitation (28%) and arrhythmia (1.6%). Residual lesions were detected in 44 patients (68%), predominantly in branch pulmonary arteries (n=5), aortic arch (n=12), shunts (n=8) and coronary arteries (n=6). Echocardiography detected 14 residual lesions (31.8%) and cardiac catheterization detected 30 residual lesions (68.2%). Percutaneous intervention was performed in 34 patients (77%), and during the first 3 days on ECMO support in 14 patients (improve their rate of decanulation and ECMO duration, compared with later intervention (71%versus 35% and 6 days versus 8 days, p=0.037). In those who received surgical reintervention, 11 patients, the rate of decannulation was 36%.

Conclusions: In our experience residual lesions are present in about half of patients requiring ECMO support after cardiac surgery. All postoperative pediatric cardiac patients able to wean off ECMO successfully should be evaluated actively to find residual lesions. Earlier detection of residual lesions and percutaneous intervention are associated with improve clinical outcome.

Percutaneous Transcatheter Device Closure of Congenital VSDs; Own Experience without Permanant Complete Heart Block

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Introduction: Despite high closure rates achieved with VSD closure devices, higher rates of complete AV block compared to surgical closure resulted in abandonment of perimembranous VSD closure in many centers.

Patients and Methods: Patients undergoing transcatheter VSD closure in our clinic between 2007 and 2014 were reviewed. If there was associated septal aneurysm, device was deployed preferably into the aneurysm, if there is a 3-4mm aortic rim muscular VSD device was used and if it is not then an eccentric device was used with great effort not to oversize. 91 patients whose VSDs closed by devices, 65 of them have PM VSDs and 26 of were in muscular septum. Muscular VSDs were closed using muscular VSD occluders except one (ASD occluder) and leaving the left disc on LV side. 44 of the PM VSDs were closed from the left side using eccentric device in 25 and muscular VSD occluders in 19. In 21 patients the device was placed into the septal aneurysm using duct occluder 1 in 10, duct occluder II in 2, muscular VSD device in 6 and eccentric PM VSD occluder in 3. The closure rate of the patients with muscular defect was 100 % at 6 months. In PM VSDs closure rate was significantly higher in patient that were closed covering the LV side of the defect compared to the patient closed by placing the device inside the aneurysm 94% vs 67% at 6 months respectively (p=0.008). There was only one transient complete AV block in a patient with PM VSD in whom an Amplatzer duct occluder was placed inside the aneurysm. We thought that was related to trauma. The AV block persisted 48 hours after the procedure and disappeared with steroid treatment. There was trivial non-progressive aortic regurgitation in 4 patients. In one patient the muscular device placed within the aneurysm caused transient hemolysis due to residual shunt. One patient who developed moderate tricuspid regurgitation and significant residual shunt released was referred for surgical therapy. There was no permanent complete AV block during early and mid-term follow up.

Conclusion: Our experience suggests that we can continue transcatheter VSD closure in selected patients at proper age putting great emphasis on not to oversize and using eccentric VSD devices in patients with small aortic rim, muscular VSD devices in patients with aortic rims > 4mm, and also various off-label devices placing into the aneurysm but keeping in mind that there will be more frequent residual shunt.

Effect of Unzipping Small Diameter Stents on Blood Vessels of a Growing Piglet Model: A Strategy to Treat Vascular Stenosis in Neonates and Infants

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2Background: Small diameter stents can relieve stenosis of blood vessels in infants. However, as the child grows, it may result in refractory stenosis. If the implanted stent can be longitudinally fractured – “unzipped”, it can be re-dilated to the eventual adult vessel diameter. Initial feasibility, in vitro studies performed by us on several commercially available small diameter stents demonstrated that stainless-steel, coronary stents of a closed-cell design will unzip at twice their nominal diameter without significant shortening, when serially dilated.

Objectives: The objective of this study was to determine the feasibility and safety of unzipping stents implanted within blood vessels of piglets.

Methods and Results: Four neonatal piglets (2 weeks of age), with a median weight of 3.5Kg, underwent stent implantations. The right internal jugular vein and the right carotid artery were accessed in all piglets via cut-down under general anesthesia. A 7-French sheath was placed in the vein. The arterial sheath size was 5-French in two piglets and 6-French in the other two. Pre-mounted, coronary stents (n=26) and biliary stents (n=17), of median diameter 4.5mm (Range: 4mm – 9mm) were implanted in different vessels of the piglets (Median of 1 stents per piglet). The blood vessels that were stented include: 12 stents in the branch pulmonary arteries (3 stents per piglet – 9 coronary and 3 biliary stents), 19 stents in the aorta and iliac arteries (4-6 stents per piglet – 11 coronary and 8 biliary stents), and 12 stents in the inferior vena cava and iliac veins (2-4 stents per piglet – 6 coronary and 6 biliary stents). There were no procedural complications. The piglets were euthanized and the stented blood vessels were harvested for histology including morphometry and electron microscopy, pathology and immuno-histochemistry. Further results will be presented during the conference.

Conclusions: Small diameter stents can be safely unzipped in the blood vessels of piglets. Stainless-steel, coronary-stents of a closed-cell design are best suited for unzipping and may be ideal to treat vascular stenosis in neonates and infants.

Tetralogy of Fallot with Excluded Pulmonary Artery: Right Ventricle Outflow Tract Stenting as a Bridge for Biventricular Repair: Case Report

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The use of intravascular stents in children with congenital heart disease is well established; however the use of palliative percutaneous therapy instead of a conventional surgery remains uncertain. We present a special case of tetralogy of Fallot (TOF) which was confounded with a hemitruncus with three months old and submitted to a banding of left pulmonary artery (LPA) originated at the aortic arch at this age. The right pulmonary artery (RPA) was not identified at that moment. Three years after, he was sent to the cath lab because of worse of cyanosis, to measure LPA pressure. At this time, a right ventricle (RV) angiogram identified an obstructed RV outflow tract (RVOT) and tiny pulmonary valve and trunk (4mm) and a minimal RPA (2.8mm). The LPA measured 16mm, with effective banding near the aortic arch and its mean pressure was 36mmHg. It was decided to stenting the RVOT to improve flow across RPA and promote some degree of growth. Two stents of 6mm in diameter were deployed in RVOT, across the pulmonary valve and trunk with flow to RPA and pulmonary regurgitation. No problems occurred in eight months of follow up. A new cardiac catheterization showed RPA growth to 7mm. At this point the stents were diluted to 9mm. After one year it was performed successful repair of TOF with withdrawal of stents, transannular patch and reconstruction of LPA to pulmonary trunk. This is a rare variation of tetralogy of Fallot with exclusion of LPA which was supplied porbably by a patent arterial duct and hypoplastic main pulmonary artery and RPA in which RVOT stenting established adequate flow to RPA, allowed its growth and a posterior biventricular repair.
Coarctation: Case Report

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Some particular cases of coarctation of aorta have been treated with covered stents to protect the arterial wall from rupture or aneurysm formation due to aortic dilatation. We report a case of a 15 yo boy with a native and severe aortic coarctation, localized just below one dilated left subclavian artery and dilated ascending aorta in which it was performed successful implantation of an Advanta V12 covered stent. Angiograms after the procedure showed good flow across the stent, with residual gradient of 8mmHg, but the anterior wall of the stent was not well apposed due to dilated subclavian artery. The patient was discharged home two days after the procedure with no complaints and with losartan 50mg per day due to mild hypertension. In outpatient clinic one month after, he was hypertensive despite of medication and an echocardiogram showed a systolic gradient across the stent of 52mHg. An angiotomography was performed and showed down migration of the stent and collapse of the upper anterior wall of the stent. This complication was treated with a new cardiac catheterization and implantation of an uncovered stent with a good and knew radial strength (Palma stent 4014, Cordis) within the collapsed one. This rare complication had been reported recently and further discussion are necessary to clarify it causes, with focus on the correct apposition of the stent and better selection of patients.

Key words: coarctation of aorta; cardiac catheterization; stent

Three Dimensional Rotational Angiography in the Assessment of Left Pulmonary Artery and Bronchial Compression in Pre-Fontan Patients

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Background: The course of congenital heart disease patients undergoing single ventricle palliation is often complicated by left pulmonary artery (LPA) stenosis and airway narrowing, at times related to aortic coarctation. Three dimensional rotational angiography (3DRA) may be a helpful tool in evaluating the complex anatomy of this patient group, for diagnostic and interventional purposes, and in assessing the mechanism of this phenomenon.

Methods: Retrospective review of the clinical data and imaging of single ventricle patients undergoing pre-Fontan evaluation with 3DRA was performed. Angiography, 3DRA, and echocardiography were reviewed, including a qualitative 3DRA assessment of the vasculature and airways and measurements performed in all imaging modalities.

Results: Twenty five patients with a previous bidirectional cavopulmonary shunt (BCPS) were assessed prior to Fontan completion, at mean age 3.1±2.0 years and weight 13.5±3.8 kg, and measurements were made in two-dimensional angiography (n=16), echocardiography (n=21), and 3DRA (n=26). Thirteen patients had qualitative LPA-stenosis on 3DRA, having an LPA dimension of 6.9±2.5mm on angiography and 7.4±2.4mm on 3DRA (84% correlation), while echocardiography was often not able to demonstrate the LPA stenosis. 7/26 (26%) required LPA intervention. Of the cases with LPA stenosis, eleven (85%) also had bronchial stenosis, and the mechanism of narrowing appeared to be related to the aorta (n=6) or to the Hybrid ducital stent retained in surgical arch reconstruction (n=5). 5/6 (83%) patients who had under- gone Hybrid palliation for hypoplastic left heart syndrome displayed significant LPA and left bronchial stenosis, delineated by 3DRA vascular and airway reconstruction.

Conclusions: 3DRA is a valuable and accurate tool in assessment of LPA and bronchial narrowing in single ventricle patients after BCPS. 3DRA can also provide insight to the mechanism of the stenosis, which is often related to aortic compression or to the retained ducital stent.
Combination Therapy in Severe Pulmonary Artery Hypertension in Adults with Congenital Atrial Septal Defect

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Abstract: Pulmonary arterial hypertension (PAH) is a progressive disease with poor survival outcome. PAH is classified by the 2009 updated clinical classification of pulmonary hypertension and a major subgroup is PAH due to congenital heart disease (CHD) with systemic-to-pulmonary shunt. Atrial Septal Defect is the most common situation in adult CHD-PAH, which is a system of systemic-to-pulmonary atrial shunting and chronic increased flow that ultimately results in adaptations of pulmonary vasculature and endothelial dysfunction. With significant therapeutic advances in the field of pulmonary arterial hypertension, We sought to apply for PAH-specific medicine combination with interventional closure of septal defect, to evaluate the feasibility, effectiveness, safety, and the result after treatment at mid-term 3 years follow-up. Invasive hemodynamic and clinical parameters from 32 patients with open ASD detected by echo (size of defect >31±7.7mm) and PAH by right heart catheterization (RHC) (pulmonary vascular resistance [PVR], 7.8±5.3 Wood units (WU)=0.05); mean pulmonary arterial pressure, 34±12±2 mm Hg) were analyzed. All cases underwent successful ASD closure and continuous PAH-target therapy for 1-3 years. After initiation of treatment, we follow up 3 years clinical data from our group, RA and RV size by echo were 48±7.7 mm±45±6.4 mm and 34±5.7 mm respectively (P<0.05). PVR, 4.8±2.1 Wood units (P<0.05); mean pulmonary arterial pressure , 34±12 Hg (P<0.05); RA pressure, 6±1.5 mmHg(P<0.03); Cardiac Index, 2.7±0.3 l/min/m2(P<0.05) were checked by RHC. 6-minute walk test distance was 480±56 meters (P<0.05). NT-proBNP level was 1030±210 pg/ml (P<0.05).

Conclusion: Patients with severe ASD-PAH may benefit from substantial reductions in right side heart volume overload after transcatheter ASD closure while PAH-target medicine may reduce pulmonary vascular resistance in most cases who could relieve pulmonary artery pressures, led to a significant improvement in hemodynamic and clinical parameters.

Key Words: congenital, heart septal defects, hypertension, pulmonary artery, medicine

Transcatheter Closure of Tortuous Aorto-Right Atrial Fistula

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Congenital fistula between the aorta and right atrium is a rare congenital anomaly of the heart.

We report a new case of this unusual communication, which was successfully closed by transcatheter embolisation using an Amplatzer Duct Occluder II. A 7-year-old asymptomatic girl was referred to our institute for evaluation of a murmur. Echocardiography revealed intact septae and the right coronary sinus was dilated with a fistulous tract arising from the sinus and opening into the right atrium with continuous flow into the right atrium. Computerized tomography confirmed the diagnosis and delineated the anatomy.

Cardiac catheterization performed for confirmed the presence of a markedly tortuous and dilated aorto-right atrial fistula. Coronary angiography demonstrated normal coronary arteries arising from the respective sinuses. The fistula was closed antegrade using an Amplatzer duct occluder II (AGA Medical Corporation, Plymouth, MN, USA). The continuous murmur had disappeared the following day and an echocardiogram revealed no continuous flow across the fistulous tract. The patient remained well at follow up 2 months later.

Transcatheter Melody Valve Implantation in Native Ventricular Outflow Tracts

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Background: Percutaneous pulmonary valve implantation is now considered feasible and safe. Native ventricular outflow tract (OFT), without surgically implanted valved conduit, is currently considered off-label positioning for the Melody valve use.

Objective: To report the extended application of percutaneous melody valve implantation in right and left native ventricular OFT.

Methods: Retrospective review of melody valve implanted (MVI) in patients with conduit-free ventricle OFT, from 3 different centres.

Results: 16 patients. Ten females and six males, age range 1 to 32 years, and weight range 9-70 kg (median 35kg). Fourteen patients had undergone a surgical procedure involving Right Ventricle OFT. Ten had different Tetralogy variants, with previous surgical repair using a transannular patch (9) or infundibular patch (1). Two patients had dTGA, repaired via Jatene procedure. One patient ( Noonan Syndrome) had pulmonary stenosis (PS) resolved by surgical valvuloplasty. One patient had undergone a Kawashima procedure for correction of Double Right Ventricle OFT. One patient with one and a half physiology. Ten had severe Pulmonary Regurgitation(PR), 4 had severe PR and moderate PS, and 1 isolated severe PS. The last patient suffered severe aortic regurgitation in the context of Berlin-Heart ventricle-assistance-device waiting for transplantation. Sizing of the narrowest systolic diameter of the OFT was performed by angiography (15) or with AGA sizing-balloon (6); median diameter 15.85 mm (range 11-21.75 mm) correlation with previous MRI measurements was r=0.97. The procedure was performed via femoral vein(11), jugular vein(3), left thoracotomy and through left ventricle Berlin-Heart cannula(11). In all cases pre-stenting was performed (6 CP-ventents and 10 AndrostandeXI). Median fluoroscopy time was 37.6min. The implantation procedure was uneventful. ECMO was necessary in the patient with Berlin-Heart, but this patient died the day after procedure, non-procedure and non-valve related causes. During follow-up (24±30 months) freedom from relevant PR was 100% and from significant PR 90%. One patient had moderate stenosis with pseudoaneurysm of the pulmonary trunk, a valve-in-valve melody implantation was performed 6-months post-procedure.

Conclusion: PMVI in native ventricular OFT is feasible in selected patients. The OFT measurement accuracy with echo, angiography and MRI is mandatory.

Transcatheter Occlusion of Patent Ductus Arteriosus (PDA) in Low-Weight Pre-Term Neonates (< 2000g) with Amplatzer Occluder II Additional Size (ADO-II-AS)

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Background: Transcatheter treatment of PDA in very small infants is technically challenging and therefore often not considered as an alternative to surgery when medical treatment fails. However thoracotomy may cause pulmonary contusion and long-term sequelae as scoliosis.

Objective: To describe our institutional experience with transcatheter PDA closure with ADO-II-AS in symptomatic low birth weight pre-term infants.

Methods: Retrospective review of all low birth weight pre-term infants who underwent device closure of PDA from January 2011-December 2013 with ADO-II-AS. Cases were selected based on the hemodynamic and respiratory repercussion of PDA, medical treatment failure (> 2 cycles of intravenous Ibuprofen), and weight > 1000g. The procedure was done under anesthesia and tracheal intubation. Femoral vein access in all cases (4F sheath in 12 patients, 5F in 1 patient), arterial access was obtained in 6 patients inserting a microcatheter (2.7-F) into the femoral artery without sheath for aortic angiography. Immediate results were assessed by echocardiography before the device release.

Results: Thirteen infants. Median follow up was 3 months (range 1-17 months). Gestational age ranged from 24-32 weeks (27±2.34). The median weight at the time of procedure was 1536g (range 1000-1950g). Nine patients were receiving mechanical ventilation before intervention. Type-C duct was the predominant morphology. The narrowest PDA angiographic diameter range was 1.23-2.94 mm. All patients had a significant gradient (correlation coefficient with previous echo measurements of 0.95), descendant aorta size range was 2.65-3.60 mm, and PDA length range was 3.5-10.6 mm. The occluded device waist was 4 mm in all cases. Complete occlusion of the duct was instantly achieved in 10 patients, 3 patients had a small residual flow for 24 hours. Fluoroscopy time range; 5.6-27 min. Two major procedure complication arose, device embolization in the left pulmonary artery, successfully removed. Two patients had moderate left pulmonary stenosis post-implantation, resolved during follow-up. Of the nine patients who required mechanical ventilation, six were extubated in less than 10 days post-procedure.

Conclusions: The transcatheter closure of PDA with ADO-II-AS in carefully selected preterm infants, is a safe and reliable alternative to surgical ligation.
Catheterization Performed in the Early Postoperative Period after Congenital Heart Surgery in Children: Security and Efficacy

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Introduction: Although there is agreement of the importance of cardiac catheterization, especially interventional procedures, cardiac catheterization in postoperative critical care unit period is often debated and there are scarce data published. The purpose of this study was to examine the safety and efficacy of catheterization performed early after congenital heart surgery.

Methods: All catheterizations performed within six weeks after surgery between January 2011 and December 2013. Morphological, surgical and catheterization data, including mortality and reintervention were reviewed and analyzed.

Results: Sixty patients, median age 2.5 years, mean weight 10.65 kg (1.5kg to 43 kg) underwent catheterizations on median postoperative day 10. Catheterization procedures were either interventional (n=45) or non-interventional (n=15). Primary diagnoses were heterogeneous, but the majority had complex intra-cardiac anomalies, and 46.7% had functional univentricular physiology.

Indications for cardiac catheterization included: low cardiac output (55%), residual lesions by echo (16.7%) and persistent hypoxemia (15%). Nineteen children required extracorporeal cardiopulmonary support. Intervention procedures were: stent implantation (n=26), angioplasty (n=9) and vascular/septal occlusion (n=10). Most of these interventions (72%) involved a recently created suture lume. Eight catheterizations were associated with complications (acute renal failure, one stent migration, four arrhythmias and two superior caval vein perforation). Non-interventional catheterization (p=0.012) and patients with extracorporeal cardiopulmonary support (p=0.025) were risk factors for death. There was no procedural mortality. 40% of patients died during ICU postoperative period with an hospital discharge survival of 51.7%.

Conclusions: In our experience, transcatheter interventions can be successfully performed in the early postoperative period. Residual lesions after surgery are sometimes difficult to detect by echo; catheterization let us to identify and treat them, which may have a positive impact on patients outcome.

Reduction in Radiation Dose During Percutaneous Pulmonary Valve Implantation: A Quality Improvement Initiative

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Background: Radiation dose is one of the major concerns during cardiac catheterization, especially during a complex interventional procedure such as percutaneous pulmonary valve (Melody valve®, Medtronic Inc., Minneapolis, MN) implantation. As a part of a quality improvement initiative in conjunction with medical physicists, in September 2013, we developed a series of protocols based on patient weight and intended procedure to minimize radiation exposure while maintaining adequate image quality in our catheterization laboratory. These new algorithms include lower pulse and frame rates, lower detector dose requested, greater spectral filtration and higher peak kilovoltage. While these changes were made the interventional cardiologist provided instant feedback to the physicist regarding image quality.

Methods: Cleveland Clinic Children’s Hospital Cardiac Catheterization Database was retrospectively reviewed. All patients who underwent Melody valve® implantation in our cardiac catheterization laboratory (Arts Zee system, Siemens, Erlangen, Germany) from 3/1/2012 to 3/10/2014 were included. Patients were divided into two groups, those who had the procedure before 9/1/2013 (group A) and after 9/1/2013 (group B). Radiation exposure time and dose were analysed.

Results: A total of 27 patients were identified. 19 in group A and 8 in group B. There was no significant difference in age (31.3 ± 12.7 vs 32.3 ± 9.9 years, p = 0.84), weight (73.3 ± 22.1 vs 72.6 ± 18.3 kg, p = 0.94), height (166.3 ± 13.1 vs 167.6 ± 8.6 cm, p = 0.79) and BSA (1.81 ± 0.32 vs 1.81 ± 0.21 m², p = 1.00). There was no difference in radiation exposure time (70.90 ± 56.60 vs 72.20 ± 39.93 min, p = 0.92).

There was a 43% decrease in mean air kerma and 41% decrease in mean air kerma area product. These were not statistically significant (2205 ± 1382.05 vs 1259.13 ± 738.34 mGy, p = 0.08 and 211.64 ± 138.02 vs 124.98 ± 76.07 Gycm², p = 0.11), likely due to small sample size.

Discussion: Our new series of radiation algorithms remarkably reduced radiation dose during a complex cardiac intervention such as Melody valve implantation without compromising image quality.
Objective: The primary objective of this study was to describe and differentiate these "fetal type" or "Type F" PDAs from the other PDA types. The secondary objective was to determine the optimal transcatheter occlusion device for various types of PDAs.

Methods: We reviewed 100 consecutive patients who underwent transcatheter device closure of a PDA over a 2 year period. The PDA morphology was determined by a lateral aortogram. Children born prematurely and had PDA morphology that did not fit the classification by Krichenko et al., were described as Type F PDAs. The minimal luminal diameter (MLD), diameter at the aortic and pulmonary ends (AD & PD) and the length of the ductus (LD) were indexed to the body surface area (BSA) and to the descending aorta diameter (DA) just distal to the ductus.

Results: We classified 32 as Type A, 1 as Type B, 7 Type C, 2 Type D, 30 Type E and 28 as Type F. Type F PDAs were found in younger patients compared to types A and E (median age 11 vs.32 to 36 months, p <0.05; median wt 7.4 vs 12.5 vs. 16 kg, p<0.05). All patients with Type F PDAs were born premature (median 27.5 weeks); 3 patients with Type F and 2 with Type E were born premature. Even though type F PDAs were found in younger patients, they were disproportionately longer and larger than types A and E (MLD/BSA: 44.8 vs 11.5 vs 10.6, p<0.05; MLD/DA: 0.6 vs 0.34 vs.0.22, p<0.05). The choice of occlusion devices included: All Type A- Amplatzer duct occluders (ADO); Type B- Amplatzer vascular plug2 (AVP2); Type C-3 AVP2, 2 ADO; Type D- 1 AVP2, 1 AVP4; Type E- 4 AVP2, 4 AVP2 and the rest with detachable flipper coils. The first 8 Type F PDAs were occluded using ADOs. Since these patients were smaller, the retention disk protruded into the aorta. Hence, we have preferred the AVP in all Type F. Type F in children <2.5kg (n=4) were occluded with AVP4, since it can be delivered through a smaller catheter.

Conclusion: Infants born prematurely have relatively larger and longer PDAs. These "fetal type" PDAs are best classified differently. We chose to name them as Type F PDAs. The Amplatzer vascular plug must be considered in this unique patient population whilst appropriate type specific device selection is required.

Percutaneous Treatment of Failing Fontan Due to Pulmonary Stenosis and Additional Antegrade Pulmonary Blood with a Single Covered Stent

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Introduction: In this article we will present percutaneous treatment of failing Fontan due to overlooked pulmonary stenosis and recanalized antegrade pulmonary blood with a single covered stent.

Case: A 5 year old male diagnosed with DORV, remote VSD and PS, underwent Glenn operation at 2 years old and Fontan operation with extracardiac conduit at 5 years old. On the third postoperative month the patient admitted to our clinic with persistent pleural effusion. Echocardiographic study revealed antegrade pulmonary blood flow. For transcatheter closure of antegrade pulmonary blood flow the patient underwent catheterization. 6 F sheath was introduced in the right femoral vein and right jugular vein. While superior vena cava, inferior vena cava, right pulmonary artery pressures were 18 mmHg, distal left pulmonary artery pressure was 11 mmHg. Simultaneous right ventricle and superior vena cava angiogram revealed antegrade pulmonary blood flow with left pulmonary artery and bifurcation stenosis. We decided to treat both pathology by covered stent implantation. 28mm covered CP stent was mounted on a 15mm balloon catheter. Via femoral vein the stent was deployed at bifurcation, including proximal left and right pulmonary artery. Stent implantation was performed in a safe distance far from Glenn anastomosis. Control angiogram demonstrated no residual pulmonary antegrade blood flow, and pulmonary artery stenosis was relieved. The mean pressures in left pulmonary artery, right pulmonary artery and superior vena cava was 14mmHg after implantation. Pulmonary effusion improved in a few days and didn’t recur after stent implantation.

Result: Both peripheral pulmonary artery stenosis and pulmonary antegrade blood flow can cause failure of Fontan circulation. That’s why care must be taken while reconstructing the pulmonary arteries in staged operations. Because simple ligation of the main pulmonary artery can be associated with recanalization and reestablishment of pulmonary antegrade blood flow in Fontan patients, main pulmonary artery must be divided and sutured. When Fontan circulation fails due to pulmonary antegrade blood flow and pulmonary artery stenosis, both pathology can be treated by a single intervention with implanting a single covered stent.

Percutaneous Transcatheter Closure of VSD and ASD in a Case with Bifid Cardiac Apex

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Introduction: Bifid cardiac apex is rarely seen in otherwise normal human hearts or in association with congenital heart defects. This rare unique morphologic anomaly has been described previously in cases in the literature. Usually this anomaly goes with congenital heart defects like ASD, VSD, pulmonary stenosis. We will report percutaneous transcatheter closure of VSD and ASD in the same intervention in a case with ASD, VSD and bifid cardiac apex.

Case: The patient was a 25 years old woman who had a history of previous cardiac surgery due to VSD and ASD at 17 years old. At operation ASD was sutured primarily, right ventricle was seen hypoplastic and VSD couldn’t be found. Postoperatively by MR imaging she was diagnosed with bifid cardiac apex. On physical examination there was systolic murmur consistent with VSD. Echocardiography revealed a pouch between right and left ventricle. Between this pouch and right ventricle there was a VSD. Diameter of the defect was 5.5mm. LV-RV pressure gradient was 88mmHg. In addition 14mm secundum ASD, MVP and MY (mild) was observed. Primarily for the closure of the ASD patient underwent cardiac catheterization. If possible we planned to close VSD. Pulmonary to systemic flow ratio (Qp/Qs) was 2. Angiographic evaluation together with TEE revealed a 6mm VSD. VSD was crossed retrogradely and AV loop was established. VSD was closed with 8mm Amplatzer muscular VSD occluder antegradely via femoral vein. After VSD closure procedure, ASD diameter was evaluated with balloon sizing. Simultaneously with balloon inflation we tested if right atrium and IVC pressures were rising by an another venous line. When we figured out that there was no significant CVP rise, ASD was closed with 20mm ASD occluder. There were no residual shunts at both defects on evaluation with echocardiography just after procedure and after 24 hour.

Result: Bifid cardiac apex is a rare anomaly. In the literature percutaneous transcatheter closure of VSD and ASD accompanying bifid cardiac apex was not documented before. To the best of our knowledge this is the first case in the literature.
The Application of 3D Rotational Angiography and Intravascular Ultrasonography to Pediatric Congenital Heart Disease: Report of Two Cases

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Background: 3-dimensional rotational angiography (3DRA) has been frequently applied not only in interventional radiology, but also in paediatric interventional cardiology. Intravascular ultrasonography (IVUS) make it possible to visualize the vessel wall, which widely used in coronary interventions. We report two cases for whom catheter intervention was performed with help of both 3DRA and IVUS.

Case1: A 1-year-old boy with coarctation of the aorta. Catheterization revealed the pressure gradient across the isthmus was 60mmHg. We determined the best angle to demonstrate the narrowest isthmus by 3DRA, which was 4.3 mm, and dAo diameter of 7.3mm. After dilation of the lesion with a 8.0mm balloon, IVUS showed the residual stenosis without dissection. The isthmus was dilated with a 9.0mm balloon. Repeat IVUS showed a crack in the endothelium. The peak gradient after procedure was 40mmHg.

Case 2: A 2-year-old girl, after surgical repair of tetralogy of Fallot, with left pulmonary stenosis and persistent left superior vena cava (LSVC). Left pulmonary artery was stenosed immediately after the branch and the pressure gradient across the stenosis was 30mmHg. RV to LV pressure ratio (RV/LVp) was 0.61. 3DRA with contrast injected from the LSVC and main pulmonary artery, showed the LSVC curving along the anterior wall of the left pulmonary artery. The narrowest point was 1.0mm. IVUS with simultaneous test dilation of the left pulmonary artery with a 6.0mm balloon showed that the LSVC was more compressed but elliptically patent. A P180B stent preloaded on a 8.0mm balloon was implanted in the lesion. Repeat IVUS demonstrated the same findings. Post-intervention RV/LVp was 0.5.

Implication: 3DRA and IVUS enable detailed evaluation of vascular stenoses, and can be used for paediatric patients to choose better interventional device as well as to avoid adverse events.

Ductal Stenting: Is It Time to Redefine the Palliative Strategy in Patients with Pulmonary Ateiesia with Intact Ventricular Septum and Critical Pulmonary Stenosis?

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Background: There is limited data on transcatheter ductal stenting (DS) in pulmonary atresia with intact ventricular septum (PAIVS) or Critical pulmonary stenosis (CPS) patients. We sought to assess the safety and efficacy of this procedure compared to surgical palliation with a systemic-pulmonary artery (SP) shunt in this specific cohort.

Methods: A retrospective review of all patients with PAIVS and CPS from Jan 2006 to Dec 2013 was performed. Demographic, procedural and follow up variables were collected. Impact on pulmonary artery (PA) growth on follow up, morbidity and mortality were the primary outcome variables.

Results: 24 patients with PAIVS and 5 patients with CPS were identified during this period. 16 underwent SP shunt and 13 underwent DS. SP group weighed 2.86+/-0.51 kg compared to DS group which weighed 3.3+/-0.38 kg (p=0.01). In the ductal cohort, 6 underwent radiofrequency perforation of the pulmonary valve and all except one underwent balloon pulmonary valvuloplasty (BPV). 10 patients underwent DS as a staged procedure after median 20(12) days after BPV. In the surgical cohort, 10 central shunts and 6 were right modified Blalock-Taussig (BT) shunts. Patients underwent cardiopulmonary bypass for the procedure. There was no differential effect noted on PA growth in either cohort (p=0.23). Mean length of stay in the ductal group was shorter than the surgical group (12.8+/-8.8 versus 35.8+/-33.7). Procedural success was 92.3% in the ductal cohort versus 87.5% in the surgical cohort. One patient in the ductal group required emergent BT shunt due to ductal closure during procedure. In the surgical group, acute complications included right hemidiaphragm paresis (n=1), arrhythmias (n=2), pulmonary overcirculation (n=1), shunt thrombosis (n=1), shunt stenosis (n=1) of which 5 patients needed reinterventions. Post discharge, there were 13 reinterventions in the DS group (7 balloon angioplasty of stent; 5 restenting and 1 BPV) and 3 reinterventions in the SP group (2 stenting of the BT shunt and 1 BPV). There were two deaths in the surgical cohort (1 unrelated to the procedure) and none in the ductal cohort.

Conclusion: In an era of excellent surgical outcomes, ductal stenting is a safe and effective alternative to surgical SP shunt in patients with PAIVS and CPS.

Factors Influencing the Patency of a Percutaneously Created Fontan Fenestration

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Background: Single ventricle patients with failing Fontan physiology undergo percutaneous creation of fenestrations in the cardiac catheterization lab for palliation. Variations in techniques, large lesion size, lesion location, and total cavopulmonary connections have been utilized for creation and maintenance of fenestrations with variable success. We aimed to evaluate which factors provided longer patency.

Methods: IRB approval was obtained to retrospectively identify and enroll all patients in whom Fontan fenestrations were created in our cardiac cath lab. Several factors, including hemodynamic conditions, technical details, stent use, and anti-coagulation, were evaluated. Success was defined as patency of the fenestration (>30days). Subgroups were defined by whether the initial fenestration creation remained patent or closed spontaneously.

Results: Fenestrations were created in 14 pts with a mean age of 9 yrs (range 2-25y). Indications were PLE (9), Plastic bronchitis (4), and pleural effusion (3). Stents were placed in 13 pts (15-22 mm length) with 3 pts receiving covered stents. Nine patients (65%) had their fenestration remain open for a median of 179 days (34-2702 days). Fenestrations closed spontaneously in 5 pts (35%) within a mean of 3 days (0-14 days). Four of these pts were returned to the lab for re-dilatation/stenting, all of whom had their fenestration remain patent for a mean of 318 days (79-767 days). Pre intervention Fontan pressures (9-22mmHg) and trans-pulmonary gradient (2-10) were similar in both groups (P=0.90, 0.50). There were no differences in post procedural anticoagulation (ASA (3), ASA/Plavix (3), ASA/Lovenox(2), coumadin(3), pradaxa(1)). The angle between the Fontan conduit and fenestration itself, stent length, and final diameter of the stented fenestrations were found to be significant. Creation of a fenestration with an angle greater than 130 degrees resulted in the successful patency (p=0.007). With angles less than 130 degrees, a greater than or equal to 4mm narrowest diameter of the stent was not maintained. Placement of a bare metal stent with length of <19mm also resulted in better patency (p=0.02).

Conclusion: Fenestrations created at >130 degree angles to the direction of blood flow with placement of a <19mm bare metal stent resulted in successful patency. Increased diameter of the stent with more acute angles may improve patency as well.
Resolution of Inferior Baffle Leak associated with Total Venous Occlusion Using a Bare Metal Stent and the Gore Excluder® Aortic Extender after Mustard procedure for Transposition of the Great Arteries

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Background: Systemic venous baffle stenoses and baffle leaks represent frequent complications after Senning or Mustard operations for Transposition of the Great Arteries. To our knowledge, this represents the first published report of use of the Gore Excluder® Aortic Extender in the setting of inferior venous baffle (IVB) leakage. We present a patient who had a total occlusion of their IVB and a large IVB leak. We report our approach using bare metal stenting and the Gore Excluder® Aortic Extender to successfully restore unobstructed IVB return while abolishing the baffle leak.

Methods: A woman with transposition of the great arteries underwent Mustard repair as a young child. She subsequently remained cyanotic and polycythemic after crossing the total occlusion and serially dilating the obstruction, a Palmaz (hemoglobin 20.7gm/dL, hematocrit 75%) secondary to a large IVB leak. Cardiac MRI demonstrated a large IVB leak measuring at least 15mm in diameter. During cardiac catheterization, she was discovered to have total IVB occlusion as well. After crossing the total occlusion and serially dilating the obstruction, a Palmaz Genesis® 1910 stent was implanted on a 16x3 Z-MED™ balloon. We then deployed two 23x33 mm Gore Excluder® Aortic Extenders, effectively eliminating the IVB leak. Attention was paid to minimize obstruction of the superior venous baffle, pulmonary venous return, and hepatic drainage. Her arterial oxygen saturation immediately increased from 76% to 93% with deployment of the first Excluder®. There were no immediate complications, however she developed third degree heart block requiring pacemaker insertion. At her 8 month follow-up appointment, her polycythemia has resolved (hemoglobin 15.4gm/dL, hematocrit 46.6%), and she is in predominantly sinus rhythm.

Conclusion: Percutaneous interventions continue to develop for the management of long term complications after Mustard and Senning atrial baffle procedures in patients with TGA. To our knowledge, this is the first case report describing use of the Gore Excluder® Aortic Extender in the setting of IVB leakage associated with total occlusion of the IVB. The Gore Excluder® Aortic Extender provides an existing covered stent option, which in combination with bare metal stents can provide effective treatment of sizeable leaks coexisting with significant obstruction.

New Modified Balloon-Assisted Technique to Provide Appropriate Deployment in the Closure of Large Secundum Atrial Septal Defect Using Amplatzer Septal Occluder in Children

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Background: Transcatheter closure of secundum atrial septal defects (ASD) is accepted as a safe alternative method to surgery. However the deployment of the device across the septum using the conventional method presents difficulties in large ASDs.

Methods: In the modified balloon-assisted technique (modified BAT) a T雅shk balloon (Numed, Inc. USA) is placed in one of the left pulmonary veins and a long sheath is placed in the right upper pulmonary vein. Through this sheath the Amplatzer septal occluder is deployed to its proper position with the help of the T雅shk balloon, which prevents the left atrial disc from prolapsing into the right atrium. This method was implemented in the treatment of patients with a large secundum ASD. In this study, the defect size which was measured minimum 15mm and above by transesophageal echocardiography was considered as large secundum ASD. Between June 2011 and September 2013, the modified BAT was used in the closure procedure of 30 (female/male: 18/12) patients with large ASDs. Between September 2003 and September 2013, 78 (female/male: 47/31) patients with large secundum ASD (group II) were treated with conventional methods. The results of both groups were compared.

Results: In the comparison of the results between group I and group II, there were no significant differences between mean maximal ASD sizes by transthoracic echocardiography, mean maximal ASD sizes by transesophageal echocardiography TEE, Qp/Qs ratios, mean diameter of devices, failure rate, incidences of embolization, residual shunt and fluoroscopy time. However there were significant differences in the mean ages, mean body weights, mean PAPs between group I and group II. After adjusting for age and body weight, in terms of process failure, the conventional method was found 5.6 times more risky, compared to modified BAT.

Conclusions: Large secundum ASD in children, transcatheter closure with ASD using the modified BAT is a simple quite useful method. In addition, this method seems to reduce the procedure failure rate.

Keywords: secundum atrial septal defect; transcatheter closure; Amplatzer; new technique; children.

Antegradely and Retrograde Transeatheter Closure of Two Residual Septal Ventricular Defects Using Amplatzer Duct Occluder II Following Surgical Repair of Tetralogy of Fallot

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Background: Surgical or interventional closure of postoperative residual ventricular septal defects is indicated when the defects are hemodynamically significant. The retrograde approach is usually used for the transcatheter closure of ventricular septal defects. The multipurpose guide wire use, perimembranous ventricular septal defect occluders are not optimal for the closure of perimembranous ventricular septal defects and consequently, interventionists may occasionally use other devices with different qualities. Herein we report a 7 years old patient with two residual septal ventricular septal defects (VSD). To treat the significant left to right shunting following surgical repair of tetralogy of Fallot, who underwent successful antegradely and retrograde transcatheter closures of the defects in the same session using an ADO II device. The patient underwent a cardiac catheterization with the aim of occluding the ventricular septal defects using transcatheter approach. The procedure was performed under general anesthesia. A sheath was inserted into both right femoral vein and left femoral artery. The administration of 100 IU of heparin was followed by two administrations of heparin each at a dose of 25IU in order to maintain the activating clotting time higher than 150 seconds during the procedure. The antimicrobial prophylaxis was provided by ampicillin given intravenously at a dose of 50 mg/kg. Transtracheal echocardiography (TTE) and transesophageal echocardiography were used during the procedure. Hemodynamic studies revealed a peak pulmonary artery pressure of 40 mmHg and a Qp/Qs ration of 1.7. Left ventricular angiography revealed two VSDs 3 mm and 3.5 mm in diameters. TEE revealed the perimembranous location of the defects and a grade I aortic valve insufficiency. The distance between the VSD in the upper location and aortic valve was measured as 5mm. At the stage of transcatheter VSD closure, first the antegradely closure of the 3mm-defect was performed. During the procedure, the cobra catheter was advanced from the left ventricle to the right ventricle through a teruma shaped guide. The cobra catheter was advanced to the pulmonary artery. The teruma guide wire was exchanged for a soft J-tipped 0.035 guide wire. The multipurpose catheter was introduced into the femoral vein and advanced into the pulmonary artery to form an arteriovenous loop. The procedure was performed. During the procedure, the cobra catheter was advanced from the left ventricle to the right ventricle through a teruma shaped guide. The cobra catheter was advanced to the pulmonary artery. The teruma guide wire was exchanged for a soft J-tipped 0.035 guide wire. The multipurpose catheter was introduced into the femoral vein and advanced into the pulmonary artery to form an arteriovenous loop.

Pressure Wire Use in Pediatric Congenital Heart Disease

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Background: Pressure guidewire technology has an established role in adult coronary artery procedures due to its ability to measure downstream pressures with minimal effect on hemodynamics while maintaining access for over-the-wire interventions.
These unique qualities also make pressure guidewires advantageous in the pediatric catheterization laboratory, but only a handful of studies have described its use in children.

**Methods:** After IRB approval, we performed a retrospective review of all patients in whom a pressure guidewire was used between August 2011 and May 2013.

**Results:** Forty-seven patients had a total of 59 catheterizations involving the use of pressure guidewires. The most common anomaly was hypoplastic left heart syndrome (n=20), followed by anomalous pulmonary venous return (n=7) and Tetralogy of Fallot (n=6). The pressure guidewire was most frequently used to evaluate hemodynamics within pulmonary veins (n=13), across pulmonary artery bands (n=12), Sano shunts (n=9), RV-PA conduits (n=6), and Blalock-Taussig shunts (n=4). In 59 catheterizations there were no complications related to the use of the pressure guidewire.

**Conclusion:** This is the largest case series describing the use of pressure guidewires in pediatric cardiac catheterization. The use of pressure guidewires in pediatric catheterization is safe and allows for the direct measurement of peak-to-peak pressure gradients across a multitude of anatomic and surgically created stenoses. In addition, pressure guidewires afford the unique advantage of performing interventions (e.g. test occlusions) without interrupting hemodynamic monitoring. Additional studies are needed to elucidate the potential differences between direct and indirect (i.e. pulmonary vein wedge) measurements of pulmonary arterial pressures as compared to surgical planning, but it is clear that this technology is improving the assessment of our most fragile patients.

0125

**Cardiac Catheterization Following Lung Transplantation**

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**Background:** Lung transplantation continues to be a challenging therapy for end-stage lung disease and is often complicated by significant post-operative morbidity. Current literature does not characterize the various catheter-based interventions or the frequency with which they are performed following lung transplantation.

**Methods:** After obtaining IRB approval, we performed a retrospective chart review of all lung transplantations performed at our institution since 1997.

**Results:** 272 grafts (248 patients) met criteria for inclusion in the cohort. 41 of 272 (15%) grafts received a total of 50 post-transplant cardiac catheterizations. 21 of the 41 grafts (51%) required catheterization within 60 days of transplant. 33 of 50 (66%) catheterizations resulted in intervention. Interventions included pulmonary angioplasty alone (n=15), pulmonary angioplasty with stenting (n=2), pulmonary venoplasty alone (n=10), pulmonary venoplasty with stenting (n=9), SVC venoplasty with stenting (n=1), and atrial septostomy (n=1). Graft freedom from intervention at 30 days, 60 days, 1 year, and 3 years was 96.6%, 95.4%, 91.9%, and 87.8% respectively. Using a Mantel-Cox log rank pairwise analysis, the factors leading to more interventions included age 6-12 months (p=0.004), pre-transplant diagnosis of pulmonary vein stenosis (p=0.001), and living-related grafts (p=0.018).

**Conclusions:** Cardiac catheterization following lung transplantation should be an expected occurrence in approximately 15% of grafts requiring catheterization. In approximately 2/3 of these interventions, the catheter will be catheterized within 60 days of transplant, and approximately 2/3 will involve intervention on the pulmonary arteries or veins. Factors leading to increased intervention include age 6-12 months, pre-transplant diagnosis of pulmonary vein stenosis, and living related grafts.

0126

**Percutaneous Closure of Patent Ductus Arteriosus in Infants as Small as 2Kg**

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**Objectives:** To describe the safety and efficacy of transcatheter patent ductus arteriosus (PDA) closure in infants weighing less than 6 kg. Background: Transcatheter therapy is the preferred modality for PDA closure. In clinical trials, infants <6kg were excluded. However, some patients, such as premature infants and ventilator-dependent, may benefit from this procedure. Methods: After IRB approval, retrospective chart review was performed with analysis of pre-, intra- and post-procedural data of all patients who underwent transcatheter catheterization for planned transcatheter PDA closure between 2002 and 2013. Patients <6 kg were identified and divided into 2 groups for analysis: Group 1: weight <3.5kg and Group 2: weight 3.5-6kg. Results: A total of 58 patients with a median age of 2.8 months (0.36-11 months) and a median weight of 3.8 kg (2.0-5.9kg) underwent attempted transcatheter PDA closure. Group 1: n=20 (34%); Group 2: n=38 (66%). The primary indication for PDA closure was a history of prematurity with inability to wean off ventilator support and/or oxygen in 34 patients, pulmonary over circulation in 15 patients, and failure to thrive of unclear etiology in 9 patients. Ductal morphology: Group 1 was primarily type C or C/E (n=16; 80%); Group 2 was primarily type A (n=17; 45%); and type C or C/E (n=15; 39%). Devices deployed: Group 1: AMPLATZER Vascular Plug (AVP)-II 16/20 (80%); AMPLATZER Duct Occluder (ADO) 3/20 (10%); coil 1/20 (5%); and no attempt in 1/20 (5%). Group 2: ADO 22/38 (58%); AVP-II 9/38 (24%); coil 3/38 (8%); AVP 1/38 (3%); no attempt in 3/38 (8%). Device retrieval post deployment: 3 patients (2/3 in Group 1) due to ductal length & obstruction of blood flow. Device embolization post release occurred in 2 patients in Group 1 and both underwent surgical ligation. Procedural successful device placement was 49/54 (91%). Only 1 patient had a persistent residual PDA shunt through the device (15%) and no attempt (AVP) which required surgical device removal and PDA ligation at 7 weeks.

All other patients had complete occlusion. Concomitant procedures: device closure of atrial septal defect: 4/5 successful, the 1 unsuccessful was in Group 1; balloon pulmonary valve: 2, both in Group 2.

**Conclusion:** Transcatheter PDA occlusion can be successfully performed in infants as small as 2kg. Care should be taken in infants <3.5kg with type C PDA and length >10mm.

0127

**Comparison of Self-Expandable and Balloon Expanding Stents for Hybrid Ductal Stenting in Hypoplastic Left Heart Syndrome**

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**Background:** Balloon expandable stents (BES) have been commonly used for ductal stenting during hybrid palliation of hypoplastic left heart syndrome (HLHS). Recently a self-expanding, nitinol Sinus-Superflex-DS (SSF) stent has become available. It has been specifically designed for use in HLHS.

**Objectives:** To compare the implantation and mid-term performance of the SSF and BES in patients undergoing hybrid palliation of HLHS.

**Methods:** A retrospective review of the patient characteristics, technical details and mid-term follow-up of 65 neonates who underwent hybrid ductal stenting from 12/2005 to 02/2014.

**Results:** We implanted 39 SSF stents in 24 neonates, 10 typical HLHS and 42 BES (Palmaz Genesis – 36, Palmaz Blue – 6) in 41 neonates, 21 with typical HLHS. Comparison of patients’ age, weight, procedural and fluoroscopy times showed no statistical difference. Patients in SSF group had significantly lower min (p=0.0069) and maximal (p=0.015) ductal diameter. Ductal length and final maximal diameter did not differ. Final minimal ductal diameter was bigger in BES group (p=0.026). Immediate stent post-dilatation was performed in 3 (12.5%) patients in the SSF group and 2 (5%) in the BES group (p=0.006). In SSF group 1 (4%) complication was stent related, whereas in the BES group 7 (17%) were stent related. Patients in BES group had longer ventilation (p=0.014) and intensive care unit stay (p=0.012). In the follow-up percutaneous intervention due to complications related to ductal stent was performed in 4 (16%) patients in SSF group and 3 (7%) patients in the BES group. In the SSF group there was 1 procedural (not related to ductal stenting) and 1 interstage death. Nine patients await surgical treatment, 9 had the next stage of palliation and 4 had biventricular repair. In the BES group there were 12 inhospital and 4 interstage deaths. Twenty three patients underwent the next stage of palliation and 2 had biventricular repair.

**Conclusions:** Although additional ductal interventions were more frequent with SSF stent, the complication rate and interstage mortality was significantly higher with balloon expandable rather than self expanding stents.

0128

**A Multi-Centre Trial of the Safety of the Occlutech® ACCELL® Flex II Septal Occluder for Transcatheter Closure of Secundum Atrial Septal Defects in Patients**

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**Background:** Device closure of secundum ASD has become routine practice. The Occlutech® Flex II ASD is currently used to close wide range of defects. Thrombus formation on secundum atrial septal occluder (SSAO) is a potential serious complication that could lead to an embolic event. A newer modification of this device (Occlutech® ACCELL® Flex II) has been designed to eliminate/reduce this potential complication. The aim of this study was to determine the safety of this device for transcatheter closure of secundum atrial septal defects.
Methods: A prospective, single-arm, open-label, multi-center non-randomized pilot study in an application for CE mark. Thirty two patients were included in this study from a single center. Procedure was performed according to a specific protocol approved by the institutional ethics committee. All patients received saline infuses anticoagulate dose post procedure for 6 months; patients were followed up to 30 and 90 days post procedure. Color Doppler echocardiography was performed to quantify residual shunt (trivial shunt: jet width<5mm; small shunt width 1-2mm; moderate shunt width 2-4mm and large shunt width > 4mm).

Results: Total number of patients enrolled were thirty two patients. 12 males (37.5%). Three patients (9-74 years old, m 42) were performed. Three patients (2.6%) were excluded due to ASD restrictions larger than 25mm. ASD size > 25mm was an exclusion criteria. The remaining patients underwent surgical coarctation repair. Only 1 patient in our series developed a small aortic aneurysm.

Conclusion: Balloon angioplasty of native aortic coarctation can be performed safely in infants. Repeat balloon dilation is effective in most patients with restenosis. Aneurysm formation is rare.

0129 Balloon Angioplasty for Native Aortic Coarctation in Infants
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Background: Balloon angioplasty to treat native aortic coarctation remains controversial in infants mainly due to high associated risk of restenosis and potential aneurysm formation at the site of coarctation dilation.

Objective: To examine the effectiveness and long-term effects of balloon angioplasty for relief of native coarctation in this group of patients. Methods: This is a retrospective, single institution review of infants between three months and one year of age that underwent BA over the last 25 years (between January 1989 and January 2014).

Results: Fifty four patients (female n=20) underwent balloon angioplasty at a median age of 6 months (3-12 months) and median weight of 7kg (range 3.6-12kg). Balloon angioplasty reduced peak systolic gradient across the coarctation from 36±14 (mean±SD) to 11±10mmHg (p<0.001) and resulted in a mean increase of minimum pulmonary artery pressure from 2.4±2.3 to 7.1±3.8 mmHg (p<0.001) and resulted in a mean increase of minimum pulmonary artery pressure from 2.4±2.3 to 7.1±3.8 mmHg (p<0.001).

Conclusion: Balloon angioplasty of native coarctation can be performed safely in infants. Repeat balloon dilation is effective in most patients with restenosis. Aneurysm formation is rare.

0130 Percutaneous Closure of Atrial Septal Defect (ASD) with Occlutech Figulla Device
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Background: Percutaneous treatment of ostium secundum atrial septal defect (ASD) is the preferred therapy in a majority of the cases. Several devices are available for this purpose, but the choice is limited in some cases due to ASD restrictions larger than 25mm. We report our experience with the Figulla ASD occluder, a device that has been successfully used even in patients with large defects.

Methods: Between July 2008 and December 2013, 113 procedures in 113 non-consecutive patients (9-74 years old, m 42) were performed. Three patients (2.6%) were treated under general anesthesia and the others under sedation. The transthoracic echocardiography monitoring was used in 3 patients, transesophageal echocardiography (TEE) in 58 patients. We used the Occlutech Figulla ASD occlude (first generation) in 55 patients (48.6%) and Occlutech Flex I in 58 (51.3%). Fifty eight patients were female. Fluoroscopy time was 10 minutes (range 4 to 16 minutes). Procedure was successful in 82 patients (77%). The remaining patients underwent surgical coarctation repair. Only 1 patient in our series developed a small aortic aneurysm.

Conclusion: Balloon angioplasty of native coarctation can be performed safely in infants. Repeat balloon dilation is effective in most patients with restenosis. Aneurysm formation is rare.

0131 Intervention Catheterization in Special Situations
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Introduction: The emergence of new technology and advances in percutaneous technical procedures have allowed for the treatment of numerous pathologies. Special and rare cases have been referred to the hemodynamic laboratory when conventional surgery doesn’t have good results resulting in a high mortality or morbidity. We report the treatment of cases of our experience in rare situations with adapted technicians, material or unusual vessels access.

Materials And Methods: Five patients with pulmonary arteriovenous fistulae, four with pulmonary sequestration and one patient with persistent left superior vena cava were treated with multiple devices including Amplatzer PDA occluder (type I and II), vascular plugs, coils, and glue. One patient with portal vein obstruction was treated with a CP stent through trans-hepatic and trans-splenic puncture. Another patient with univentricular physiology showing Fontan conduit fenestration was closed with an Amplatzer ASD occluder. All patients were treated under general anesthesia and received antibiotic prophylaxis. They were observed in the ICU and were discharged 24 hours after the procedure. The procedure was successful in all patients with cure or significant improvement in their functional class. There was no mortality or complications.

Conclusion: Increasing experience and the emergence of new technology are making the hemodynamic laboratory an option for treatment of rare diseases where surgery does not present good results. The percutaneous interventional treatment can be done safely with low morbidity and mortality in selected cases.

0132 Successful Over-Dilation of Right Ventricular to Pulmonary Artery Conduits During Melody Valve Implantation
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Objectives: To identify patients who underwent over-dilation of the right ventricular to pulmonary artery (RV-PA) conduit during Melody valve implantation, and to describe patient characteristics as well as short term outcomes.

Background: RV-PA conduit diameter at the time of surgical implantation (original diameter) can be a limiting factor when determining candidacy for Melody valve placement, as conventional teaching recommends not attempting to exceed 110% of the nominal conduit diameter in order to limit the risk of conduit rupture.

Methods: We retrospectively evaluated all patients at our institution that underwent Melody valve placement within an RV-PA conduit between 11/2011-2/2014. Patients who had their RV-PA conduit expanded to >110% of its original diameter were further evaluated. We excluded any patients in whom the original conduit diameter was unknown. The primary outcome was procedural success, defined as an increase in peak to peak gradients of >20mmHg and < mild pulmonary insufficiency. Echocardiographic data were recorded at the time of latest follow up.

Results: All 54 patients who underwent Melody valve placement within an RV-PA conduit were reviewed, and 7 (13%) had the conduit over-dilated to >110% of its original diameter. The mean age at Melody implantation was 13.5 years (5-1.23-45), time since latest conduit placement was 10.6 years (4.6-22.5). Types of conduit were as follows: 4 pulmonary homografts, 1 Contegra, 1 aortic homograft, and 1 Freestyle, with a mean original conduit diameter of 16.9mm (14-19). At Melody implantation, the minimum angiographic conduit diameter was 13.0mm (11-15). Time since latest conduit placement was 20.7mm (19-22), which was a mean of 122.6% (116%-135%) of the original conduit diameter. Procedural success occurred in all 54 patients. There were no major complications. At a follow-up of 0.8 years (0.1-2.4) all echocardiograms demonstrate RV-PA gradients ≤20mmHg (mean) and ≤ mild pulmonary insufficiency.

Conclusions: Over-dilation of RV-PA conduits during Melody valve implantation is both feasible and safe in select patients, with excellent short term outcomes. Larger studies are needed to further assess patient characteristics and safety.
High Incidence of Coronary Artery Compression During Evaluation for Melody Valve Candidacy

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Background: Coronary artery compression (CC) is a well-known risk associated with Melody transcatheter pulmonary valve implantation (TPV). The consequences of TPV associated (CC) are catastrophic, therefore, screening for CC by aortic or coronary angiography while balloon expanding the conduit has been practiced. The Melody TPV was approved in obstructed or regurgitant right ventricular outflow tract (RVOT) conduits in 2010. Since that time, limited published reports have suggested that the incidence of CC approximates 5-6%. Over the span of a year, we encountered a significantly higher incidence of CC and sought to report these findings.

Methods/Results: From November 2012 to September 2013, 12 patients, median age of 15 (6-30) years, underwent catheterization for intended Melody TPV. The indication for TPV were obstruction (n=11), regurgitation (n=1), and mixed (n=1). Original congenital cardiac defects of those patients included Tetralogy of Fallot (n=4), pulmonary atresia (n=3), tricus arteriosus (n=2), double outlet right ventricle (n=1), and aortic stenosis (n=1). Of the 12 included, 6 patients (50%) underwent successful Melody TPV with excellent outcomes, significantly reducing peak gradient (0-50 from 40-115) and eliminating regurgitation. Two patients (17%) were determined to be unsuitable candidates for reasons other than CC. Four patients (30%) had evidence of CC with simultaneous balloon angioplasty of RVOT conduit and aortic or coronary angiography. Three of the 4 CC patients showed evidence of left anterior descending compression, while one demonstrated compression of right coronary artery. Two of 4 patients with CC were evaluated by MRI prior to catheterization, but only one MRI was predictive for CC.

Conclusions: 1. Our high incidence of CC (30%) is unique, and may represent selection bias. More experience and possibly multicenter collaboration is needed to further our knowledge of CC. 2. Balloon testing for CC prior to Melody TPV is essential and remains the most reliable method.

Reestablishment of Flow to LPA Through Classic Left BT Shunt Nine Years After Documented Complete Occlusion

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Introduction: 41 year old female with Pulmonary Atresia/VSD/Right Aortic Arch and discontinuous pulmonary arteries who previously underwent a classic BT shunt to the LPA and a Waterston shunt to the RPA. In 2005, she had a CTA performed for long standing decreased O2 saturations (sats), which demonstrated complete occlusion of the Classic LBT shunt and no significant flow to the LPA. She was not considered a candidate for any further palliation at that time. Her O2 sats were at 70% at rest and decrease to the low 50’s with minimal exertion. Her Hgb was 23 and she had significant exertional symptoms. A recent MRI confirmed that the LBT shunt was occluded but there was bronchial flow to a small LPA. She therefore underwent a cardiac cath to further evaluate and attempt to re-establish flow to the LPA.

Methods: The patient was under anesthesia and a diagnostic cath was performed. Reverse pulmonary vein wedge angiograms demonstrated a small patent LPA which was backfilled to the LPA hilum. An angiogram of the shunt demonstrated tapering and complete occlusion at the distal end and 4.3mm at the proximal end. An 0.14 Pilot Wire was advanced through the occluded distal end into the LPA. A Contadora catheter was then advance over the wire thru the occlusion. An angiogram demonstrated the catheter tip in LPA. A 4.5mm Veriflex stent was fully inflated across the distal BT shunt occlusion.

Results: A repeat angiogram demonstrated the BT shunt was widely patent measuring 4.5mm with antegrade flow to all segments of the left lung. The O2 sats immediately increased from 70% to the low 80’s in the cath lab and have remained so for the past 3 months. The patient report significantly less exertional symptoms.

Conclusions: We demonstrated that a Classic BT shunt that was documented as occluded for at least 9 years could be safely crossed and a stent placed to re-establish flow to the LPA. The patient has had significant clinical improvement from this procedure and she may now be considered for further palliation given her LPA has now been recanalized. We believe that this is the first report of successful recanalization and stenting of a chronically occluded Classic BT shunt. This technique may be applicable to other chronically occluded vessels.
Melody Transcatheter Pulmonary Valve Implantation in Patients without Conduits or Bioprostheses

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Background: Transcatheter pulmonary valve implantation (TPVI) using the Medtronic Melody valve has become standard therapy for the treatment of right ventricle to pulmonary artery conduit failure in many patients with complex congenital heart disease. The approved US HDE protocol stipulates the presence of a circumferential RVOT conduit (CRVOTC) or BPV. This study has received a perspective to interpret clinical results to patients with bioprosthetic pulmonary valves (BPV). However, many patients present with clinical indications for TPVI who do not have CRVOTC or BPV. Here we review our experience with Melody implantation in patients without CRVOTC or BPV.

Results: After pre-screening a total of 50 patients underwent cath lab evaluation for TPVI at our institution between May 2011 and January 2014. Sixteen (median age 16.8 yrs; range 4.8-50.4 yrs; median weight 63Kg, range 18.6-84.4) had neither CRVOTC nor BPV – 13 transannular patch; 2 surgical valvotomy; 1 REV procedure. Multiplanar reconstruction of preprocedural cardiac MRI data was used to identify a potential landing zone (LZ). Rotational angiography with real-time 3D reconstruction was used to determine optimal gantry angulation and useful landmarks. Following hemodynamic assessment and angiography an appropriate size compliant balloon catheter was positioned across the selected LZ and inflated under low pressure to determine distensibility. In 5/16 patients the LZ offered no resistance and was deemed unsatisfactory. In 11 patients balloon sizing suggested adequate LZ rigidity and successful TPVI was performed in 9. In 1 patient bare metal pre-stenting was performed in further expansion of the LZ to a diameter felt to be too large for TPVI and in 1 patient the left coronary circulation was felt to be at risk. There were no procedural or post-procedural adverse events. At a median follow up of 0.6 yrs (range 0.1-1.8) 1 patient has mild valve insufficiency and the remaining 8 have not to trace. The median mean Doppler gradient is 12mmHg (range 8-14).

Conclusions: Melody TPVI can be safely and effectively performed in many patients without CRVOTC or BPV. Careful selection and distensibility testing of the intended landing zone should be performed. Short-term results are comparable to implantation in CRVOTC and BPV.

Impact of Genetic Polymorphisms and Haematological Factors on Acetylsalicylic Acid and Clopidogrel Response Variability in Patients Presenting with Acute Coronary Syndrome

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Objectives: We sought to investigate whether genetic polymorphisms and haematological factors influence acetylsalicylic acid and clopidogrel response variability in patients presenting with acute coronary syndrome (unstable angina pectoris – UAP, non-ST elevation myocardial infarction - NSTEMI, ST elevation myocardial infarction – STEMI).

Background: Administration of loading dose of dual antiplatelet therapy is the cornerstone of treatment for patients undergone angioplasty to reduce the risk of athrombotic complications. Variable responsiveness or reduced response to antiplatelet therapy associated with the genetic polymorphisms and haematological factors may affect platelets' responses and result in treatment failure, which could increase the risk of cardiovascular events.

Methods: We analyzed the data of 166 patients presenting with acute coronary syndrome who had undergone coronary angioplasty. Acetylsalicylic acid resistance was measured with VerifyNow Aspirin Test assay and clopidogrel resistance was measured with VerifyNow PRU Test assay after dual administration of 300 mg of acetylsalicylic acid and 300 - 600 mg of clopidogrel loading dose within the last 24 hours. VerifyNow Aspirin Test results were expressed in Aspirin Reaction Units (ARU) and PRU Test results were expressed in P2Y12 Reaction Units (PRU). ARU ≥ 550 and PRU ≥ 230 were defined as cut-off values in determining acetylsalicylic acid or clopidogrel resistance, respectively. Clinical data included assessments of genetic polymorphisms (angiotensin converting enzyme - ACE, Factor II, Factor V and methylene tetrahydrofolate reductase) and haematological factors (thrombin activatable fibrinolysis inhibitor - TAFI, von Willebrand Factor antigen - vWF-Ag, Factor VIII, protein S, protein C and antithrombin 3 – AT 3).

Results: A total of 166 patients constituted the study population (126 men, 75.9% and mean age was 64 ± 13 years). Of them, 42 (25.3%) were acetylsalicylic acid resistant and 49 (29.5%) were clopidogrel resistant. In multivariate regression analysis, ACE D/D polymorphism (p = 0.141, p = 0.044), TAFI levels (p = 0.343, p < 0.001) and vWF-Ag levels (p = 0.216, p = 0.002) were found as independent variables, which had statistically significant effects on clopidogrel resistance, and these effects were more pronounced in STEMI patients. In multivariate regression analysis, low-density lipo-protein levels (p = 0.318, p = 0.008) and AT 3 levels (p = 0.273, p = 0.021) were found as independent variables, which had statistically significant effects on acetylsalicylic acid resistance only in NSTEMI patients. In ROC curve analysis of STEMI patients, TAFI level ≥ 136 IU/UL measured had a 78% sensitivity and 95% specificity (area under curve, 0.876; 95% confidence interval, 0.766-0.987; p < 0.001); vWF-Ag level ≥ 122.5 IU/UL measured had a 65% sensitivity and 95% specificity (area under curve, 0.826; 95% confidence interval 0.704-0.954; p < 0.001) in predicting clopidogrel resistance.

Conclusions: Angiotensin converting enzyme gene D/D polymorphism was associated with clopidogrel resistance in acute coronary syndrome patients undergoing angioplasty. Despite normal values, vWF-Ag and TAFI plasma levels were significantly higher in clopidogrel resistant patients. These results add evidences for possible associations between ACE D/D polymorphism, TAFI levels, vWF-Ag levels and clopidogrel resistance. Therefore ACE D/D polymorphism, TAFI and vWF-Ag levels may be useful markers in predicting high loading dose clopidogrel resistance in acute coronary syndromes, particularly in STEMI patients.

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Coronary Intravascular Ultrasound as routine surveillance for coronary graft vasculopathy in children following heart transplant.

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Background: Coronary graft vasculopathy (CGV) is the leading cause of need for retransplantation in children who have received a heart transplant. Historically, CGV surveillance has consisted of annual coronary angiography. There are, however, evolving concerns that this modality lacks the sensitivity to detect and monitor progression of diffuse neointimal proliferation. We report our initial experience with coronary intravascular ultrasound (IVUS) as a routine surveillance tool for evaluating CGV.
Methods: Retrospective evaluation of all surveillance coronary IVUS studies in children following heart transplant at a single center. The Stanford scale was used for the assessment of maximal intimal thickening.

Results: Coronary IVUS was performed on 5 pediatric patients with a median age of 13 years (range 9-18). Median time from transplant was 7 years (range 5-11 years). All patients were clinically well with no history of recent rejection. All patients underwent a concurrent endomyocardial biopsy. A 5Fr femoral arterial sheath was used in all cases with initial selective coronary angiography followed by cannulation of the left anterior descending artery with a 0.014" coronary guide wire. Stanford scale for all patients did not exceed class I in any case. Median procedure time was 87 minutes (Range 62-136 minutes). The median fluoroscopy time was 17.8 minutes (range 11.1-47.3 minutes). There were no intra- or post-procedural complications.

Conclusions: Coronary IVUS as a surveillance tool for graft vasculopathy in children following heart transplant is safe and feasible. It provides detailed evaluation of neointimal proliferation that may not be defined by selective coronary angiography.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Transplant</th>
<th>Gender</th>
<th>Weight (kg)</th>
<th>Maximal Intimal Thickening</th>
<th>Time from Transplant to Catheterization with IVUS (years)</th>
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<td>M</td>
<td>94</td>
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<td>M</td>
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</table>

0142

Single Center Comparison of Outcomes of Surgical versus Transcatheter Pulmonary Valve Replacement

Suhaib Kazmouz, Damien Kenny, Syed Asif Masood, Nadeen Faza, Abdramin Aloud, Michel Ilbawi, Ziyad M. Hijazi
Rush University, Chicago, IL

Background: Although transcatheter pulmonary valve replacement (tPVR) is evolving, comparative studies with surgical pulmonary valve replacement (sPVR) are lacking. We present short and midterm outcome evaluation of patients undergoing both surgical and transcatheter pulmonary valve replacement at a single center.

Method: Retrospective data analysis of all patients who underwent tPVR or sPVR between April 2008 and December 2012. Patient demographics, pre-procedural investigations, clinical, echocardiographic and electrophysiology follow-up data and procedural cost were included. Data are presented as mean ± standard deviation.

Results: Sixty-three patients underwent pulmonary valve replacement (PVR, n=39, sPVR, n=24) during the study period. Patient demographics were similar between the two groups. Primary indication included: regurgitation (tPVR (n=6), sPVR (n=22)), stenosis (tPVR (n=15), sPVR (n=2)) or mixed (tPVR (n=18), sPVR (n=0)). There was a significant difference in the pre-procedural peak Doppler gradient across the pulmonary outflow (tPVR=43.58 ± 19.30mmHg, sPVR=19.55 ± 17.53mmHg, p<0.001). The length of the hospital stay was longer in the surgical patients (tPVR 1.36±0.67 days; sPVR 4.67±2.61 days, p<0.001). Comparative complications rates were higher in the surgical patients compared to transcatheter patients. At median follow-up of 17.67±16.27 months for tPVR, and 9.38±13.89 months for sPVR, mean pulmonary Doppler gradients were higher with transcatheter replacement (tPVR 15.59±10.58 mmHg; sPVR 9.79±7.51 mmHg, p<0.001). There was a trend towards a higher grade of PR in the surgical cohort (tPVR 0.86±1.11; sPVR 0.87±0.92, p=0.091). Over the follow-up period re-intervention was required in 4 of the transcatheter patients (10%) compared to 1 of the surgical patients (4%).

Conclusion: Good outcomes are achievable with both surgical and transcatheter pulmonary valve replacement. These cohorts often represent different dominant valvar pathology. Length of hospital stay was greater in the surgical group; however residual RVOT gradient was higher in the transcatheter group.
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