TEE Imaging in the Cath Lab

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As a faculty member for this program, I disclose the following relationships with industry:

(GRS): Grant/Research Support (C): Consultant (SB): Speaker’s Bureau
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W.L. Gore Medical: C, Echo Core Lab
Topics to Address

- Complete evaluation of the heart
- Complications
- Real-time 3D TEE
- Micro-multiplane TEE
- Examples
  - ASD
  - Mitral Valve
## Complementary techniques

<table>
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<tr>
<th>ICE</th>
<th>TEE</th>
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<tbody>
<tr>
<td>• ASD and inferior rim in near field  &lt;br&gt;   – Other structures seen with less detail without catheter movement</td>
<td>• “Wide angle” view of heart  &lt;br&gt;   – Multiplane imaging  &lt;br&gt;   – Inferior rim difficult</td>
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<td>• Lack of multiplane requires frequent flexion/rotation for complete evaluation of intracardiac structures</td>
<td>• More complete evaluation  &lt;br&gt;   – Not always available prior to intervention  &lt;br&gt;   – Later review of echo</td>
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<td>• High quality imaging of defect, device, and other cardiac structures  &lt;br&gt;   – ? Better baseline for follow-up exams</td>
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Intracardiac Echo and TEE
Intracardiac Echo and TEE
TEE Monitoring in Children

- Why not TEE for every case? Logistics
  - Anesthesia
  - Echo
  - Timing
  - Scheduling
TEE Complications

- Intraoperative TEE
- 7200 patients
- 0.2% morbidity
  - Dysphagia most common (0.1%)

Kallmeyer IJ et al. Anesth Analg; 92:1126-1130
**TEE Complications - Children**

- **1650 patients**
  - Mean wt = 17.2kg
- **3.2% incidence overall**
  - 2.4% if failure to insert excluded
- **1% airway obstruction**
  - Mean wt = 5.9kg
- **0.7% change in ET tube position**
  - Mean wt = 7.15kg
- **No significant bleeding or esophageal injury**

Stevenson, JG J Am Soc Echocardiogr;12:527-532
Need for Additional Physicians - Echo

- Multitasking
  - Sedation
  - Teaching
  - ICE
  - And Device Deployment
- Additional staff allows Interventionalist to focus on procedure
  - Echocardiograph may bring something to the table
Real-Time 3D TEE – ASD/PFO Closure

- Real-time guidance
- Assessment of effectiveness
- Relationship to intracardiac structures
- Maximum diameter
- Shape of device

Real-Time 3D TEE – ASD Closure
Real-Time 3D TEE – ASD Closure

SVC
Real-Time 3D TEE – VSD
• Real-time 3D TEE (>20-25 kg)
• Mini-multiplane TEE (>3-4 kg)
• Micro-multiplane TEE (>2-2.5 kg)
Micro-Multiplane TEE Probe

- 32 element phased array
- 3.2 – 7.4 MHz
- 2D, Color, PW, CW
- MMode, Color MMode
Multiplane: Tip to Tip
Aneurysmal Atrial Septum
Case Example

• 12 y.o. with multifenestrated ASD
• Hx of cerebral palsy and severe scoliosis
• Left to right shunting with mild RV dilatation, but spinal surgery planned and desire for elimination of shunts
Case Example

- LSVC to coronary sinus
- Small coronary sinus ASD – 6.5 mm
- Secundum ASD with 3 fenestrations
  - Superior – PFO
  - Middle (10 mm inf to PFO) – 13 mm
  - Inferior (15 mm inf to PFO) – 4.5 mm
Case Example

- Coronary sinus ASD closed with 8 mm Amplatzer Septal Occluder (ASO)
- Secundum fenestrations closed with:
  - 14 mm ASO through middle fenestration
- Initial attempt with 25 mm Helex
  - 6 mm ASO through inferior fenestration
Mitral Valve Paravalvar Leak - Imaging

- TTE limited
  - Artifact from prosthetic MV
  - Inability to see MR
- TEE
  - LA and MR in near field
- 3D TEE
Paravalvar Leak - Imaging

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Paravalvar Leak - Imaging

- **TTE limited**
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- **TEE**
  - LA and MR in near field
- **3D TEE**
Paravalvar Leak – Real Time 3DTEE

- En face view of valve ring and leaks
  - Number
  - Size
Paravalvar Leak - TEE

- Describe dehiscence in relation to landmarks:
  - LA appendage
  - Aortic valve
  - Atrial Septum

- MR Severity:
  - Jet width
  - PISA
  - Systolic retrograde flow in pulm vein

Zamorano, JL et al JASE 2011;24:937-65
Paravalvar Leak – Periprocedural TEE

- Rule out thrombi or vegetations
- Guide catheters and wires
- Assess stability of device
- Assess residual leak
- Assess function of prosthetic valve
- r/o complications
  - Effusion
  - Air
Paravalvar Leak – Periprocedural TEE

TEE Imaging in the Cath Lab SCAI 2015
Optimal Views for Navigation

- Peri-valvar mitral leak
MV Intervention – Replacement

Max PG 31 mmHg
Mean PG 20 mmHg
MV Intervention – Replacement
MV Intervention – Replacement
MV Intervention – Replacement

Pre-Melody

Post-Melody
TEE – Conclusions

• Global view
• Minimal complications
• Real-time 3D (for older children and adults)
• Additional expertise
Thank You