Imaging Guidance During Congenital and Structure Intervention & Its Limitations

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Cardiac Imaging Modalities

- Transthoracic ECHO
- Transesophageal ECHO
- 3 Dimensional Echo
- Intracardiac ECHO
- Fluoroscopy/Angiography
- MRI
ASE RECOMMENDATIONS FOR CLINICAL PRACTICE
Echocardiography-Guided Interventions

<table>
<thead>
<tr>
<th>Interventional Procedure</th>
<th>TTE</th>
<th>TEE</th>
<th>ICE</th>
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<tbody>
<tr>
<td>Transseptal catheterization</td>
<td>++</td>
<td></td>
<td>++ (radial or phased array)</td>
</tr>
<tr>
<td>PMBV</td>
<td>++</td>
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<tr>
<td>Transcatheter closure of ASD, ventricular septal defect, and PFO</td>
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<td>++</td>
<td>++ (phased array)</td>
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<tr>
<td>Alcohol septal ablation in HOCM</td>
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<tr>
<td>Percutaneous mitral valve repair</td>
<td>++</td>
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<tr>
<td>Percutaneous left ventricular assist device placement</td>
<td>++</td>
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<tr>
<td>Percutaneous stented aortic valve prosthetic placement</td>
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<tr>
<td>Balloon or blade atrial septostomy</td>
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<tr>
<td>Placement of LAA occlusion devices</td>
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<tr>
<td>Myocardial and intravascular biopsy</td>
<td></td>
<td>++</td>
<td>++ (phased array)</td>
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<tr>
<td>Congenital heart disease applications (completion of Fontan procedure, coarctation repair)</td>
<td>++</td>
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<tr>
<td>Placement of aortic endograft</td>
<td>++</td>
<td></td>
<td>++ (radial or phased array)</td>
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</tbody>
</table>

--, No documented role or benefit in the literature; +, anecdotal reports of use and benefit exist, but further study is needed to delineate; ++, advantages favor use when available; +++ clearly documented benefit or role.

EXPERT CONSENSUS STATEMENT

EAE/ASE Recommendations for the Use of Echocardiography in New Transcatheter Interventions for Valvular Heart Disease
Current Structural Heart Disease Interventions

- ASD Occlusion
- Balloon Atrial Septostomy
- Muscular VSD Occlusion
- Membranous VSD Occlusion
- Mitral valve balloon Valvuloplasty
- Periprosthetic Leak Occlusion
- Percutaneous Aortic Valve Sinus of Valsalva Fistula Occlusion
- Aortic Valvuloplasty
- Aortic Aneurysm Occlusion
- Prosthesis Implantation
- LA Appendage Occlusion
- Alcohol Septal Ablation
- PFO Occlusion
- Percutaneous Edge-to-Edge Mitral Valve Repair

Atrial Septal Defect

- Evaluation of Anatomy:
  - Shape, Location
  - Number of Defects
  - Size: Max & Min Diameter
- Rim Assessment
- ASD Suitable for Device?

Zahid Amin 2006
IntraCardiac ECHO - ICE

AcuNav
Interventional Cardiology

Patent Foramen Ovale – ASD Closure
More interventions .... VSD, MV, Ao

ICE in EP Studies
### Comparison Between ECHO Modalities

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantage</th>
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</thead>
<tbody>
<tr>
<td><strong>TEE</strong></td>
<td>- Low coast</td>
<td>- Not convenient to pat.</td>
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<tr>
<td></td>
<td>- Familiar to most Echocardiographers</td>
<td>- General Anesthesia</td>
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<tr>
<td></td>
<td></td>
<td>- Poor IVC Rim</td>
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<tr>
<td><strong>ICE</strong></td>
<td>- Convenient for patient</td>
<td>- Expensive</td>
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<tr>
<td></td>
<td>- Local anesthesia</td>
<td>- Single plane imaging</td>
</tr>
<tr>
<td></td>
<td>- No additional staff</td>
<td>- Additional venous access</td>
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<tr>
<td></td>
<td></td>
<td>- Catheter interference</td>
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<tr>
<td><strong>3DTEE</strong></td>
<td>- Easier detection / immediate understanding of anatomy and spacial relationship</td>
<td>- Same as TEE</td>
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<tr>
<td></td>
<td></td>
<td>- Learning curve</td>
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</tbody>
</table>
• Small Sample size
• Selected patients only
  • 44 pts. excluded out 84 pt.
• Single ASD and no multiple ASD’s

Retrospective study
• TTE in smaller age group
• TEE has more complex ASD
• ASD / Device ratio ??
Transthoracic ECHO during ASD device Closure

- X-Ray radiation exposure to Echo-cardiographer (in field of operation)
- Oversizing of ASD devices
- Wastage of Devices due to lack of accurate measurement

Available Resources
Charity Missions

45th Annual International Congress of the Egyptian Society of Cardiology
CardioEgypt 2018

www.cardioegypt.com
Available Resources

Debate: ASD Closure by TTE Vs TEE
### ASD Closure – TEE versus Transthoracic ECHO

<table>
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<tr>
<th>TEE</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td></td>
<td>Good Acoustic Window</td>
<td>Esophageal Pathology</td>
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<tr>
<td></td>
<td>Single View</td>
<td>General Anesthesia</td>
</tr>
<tr>
<td>Transthoracic ECHO</td>
<td>Esophageal Pathology</td>
<td>Cumbersome</td>
</tr>
<tr>
<td></td>
<td>Moderate Sedation</td>
<td>Poor Acoustic Window</td>
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<tr>
<td></td>
<td>Small Patient Size</td>
<td>Multiple Window</td>
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<tr>
<td></td>
<td></td>
<td>Complex ASD’s</td>
</tr>
</tbody>
</table>

### Transcatheter VSD Closure

- Chamber size
- Evaluation nearby structure
  - Aortic valve
  - A-V valves
- Measurement of defect:
  - End of the diastole
- Morphology of MVSD
- Multiple defects
- Device deployment
Septal Puncture

- MV Balloon Dilatation
- Para-valve Leak Occlusion
- Electrophysiological Studies – Ablation
- LA Appendage Occlusion

Mitral Valve Balloon Dilatation
Paravalvular Regurgitation (Leak)

- Dehiscence is best described in relation to internal landmarks:
  - Left atrial appendage
  - Aortic valve
  - Crux of the heart

Conclusion

- Advances in Device therapy for cardiac disease impose a great demand on imaging modalities

- Each modality has its own advantages and limitations

- Body wt. in children limit the choices for imaging modality