Disclosures

There are no disclosures.
3-D Echo: Overview

- Benefits and Advantages
- Challenges and Limitations
- Case examples
- Future direction
3-D Echo: Advantages

- Unique imaging planes – 3-D TEE, ICE
- Views not able to seen with standard 2-D imaging
- En face views of structures
- Valves - normal and abnormal
- Septal defects - ASD, VSD
- 3-D TEE correlates more closely with surgical findings than standard 2-D TEE, especially for MV pathology
3-D Echo: Advantages - MV
3-D Echo: Advantages

• Better understanding of anatomy and relationships of structures
• See this with other forms of 3-D technology
• Cath Lab - can lead to better planning of interventions
  – Selecting the best procedure – pre-procedure planning
  – Guiding the procedure - Ability to obtain 3-D images in real-time
  – Assessing post-procedure results
3-D Echo: Advantages

- 3-D technology and models:
  - Improve understanding of complex anatomy
  - Planning and testing various treatment strategies
  - Ability to assess a "virtual result"

[Image of a heart model]
3-D Echo: Advantages

Cheatham, Hor. NCH.
3-D Echo: Advantages - ASD

• 2-D imaging - not able to visualize all of an ASD or the rims from 1 view
• Often oval shaped - not circular
• 3-D TEE allows visualization in 1 view
• ASD size, shape, number of orifices, rims
• Spatial relationship of the defect and hardware to surrounding structures

3-D Echo: Advantages - ASD
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3-D Echo: Advantages - ASD
3-D Echo: Advantages - ASD
3-D Echo: Advantages - VSD

• Several studies shown that 3-D echo is useful for accurate sizing of VSDs
• Similar reasons to 3-D ASD, en face view of the VSD
• 3-D echo correlates better than 2-D with surgical findings of VSD size
3-D Echo: Advantages - VSD
3-D Echo: Advantages - VSD
3-D Echo: Advantages - VSD
3-D Echo: Advantages

Lang et al. JACC 2011
3-D Echo: Advantages - MV
3-D Echo: Advantages - MV
3-D Echo: Advantages - MV
3-D Echo: Advantages - MV
3-D Echo: Advantages - MV
3-D Echo: Advantages - AoV
3-D Echo: Advantages - AoV
3-D Echo: Advantages - TV

Lang et al. JACC 2011
3-D Echo: Advantages - TV
3-D Echo: Advantages - TV
3-D Echo: Advantages - TV
3-D Echo: Advantages - TV
3-D Echo: Advantages - PV

- PV is hard to image with 3-D
- Limitation of 3-D TEE
- PV anterior
- PV prior interventions - conduits, valves
- Artifact
- Role for ICE

Lang et al. JACC 2011
3-D ICE: Advantages - PV
3-D ICE: Advantages - ASD
3-D ICE: Advantages - ASD
3-D ICE: Advantages - ASD
3-D Echo: Limitations

- 3-D TEE probe is large - larger than adult probe
- >20 kg - size of 5-10 kg difference can change probe
- No 3-D TEE pediatric probe currently available!
- Especially important in small patients
- Larger probe may have compression on the LA or interfere with some ASD devices
3-D Echo: Limitations

- **Takes time** – can be slow, time consuming.
- Need real-time imaging in Cath Lab.
- Amount of time correlates with the quality of images and information returned.
- Communication key - helps make the imaging team aware of the greatest concern, so can focus the study.
3-D Echo: Limitations

- 3-D echo lower frame rates, especially color - less spatial and temporal resolution
- Cannot make good 3-D images from bad 2-D images
- Not all pts have good 2-D TEE images
- 3-D prone to artifacts – respiration/cardiac motion, arrhythmias
- Difficult to image the PV by 3-D TEE
3-D ICE: Strength/Weakness

**Strength**
- Better views of the inferior rim of ASD
- Better views of PV
- No compression of a large TEE probe on LA, airway

**Weakness**
- Limited sector width
- Continuous wave Doppler is not available for 3-D ICE
- Requires another sheath
- Expensive catheter, not re-usable
3-D Echo: Future

- Faster machines, processing
- Faster reconstruction times
- Higher frame rates, better resolution
- Smaller probes - able to use in smaller patients
3-D Echo: Future

• Still need more evidence that 3-D is helpful
• Does 3-D technology improve outcomes?
• Does 3-D decrease cath related complications?
• Does 3-D decrease procedure time?
• Does 3-D decrease radiation dose?
• Costs?
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