3D Echo:
Guidelines for Acquisition and Imaging

Stephen H. Little, MD

John S. Dunn Chair in Cardiovascular Research and Education,
Associate professor, Weill Cornell Medicine

shlittle@houstonmethodist.org

@slittlemd

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DEBAKEY HEART & VASCULAR CENTER

Disclosures

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- Personal research support: Abbott Structural Heart; Medtronic
- Institutional support: Abbott, Medtronic, Edwards, Boston Scientific

European Heart Journal – Cardiovascular Imaging (2012) **13**, 1–46
doi:10.1093/ehjci/jer316

EAE/ASE RECOMMENDATIONS

EAE/ASE Recommendations for Image Acquisition and Display Using Three-Dimensional Echocardiography

Roberto M. Lang, MD, FASE*‡, Luigi P. Badano, MD, FESC†‡, Wendy Tsang, MD*, David H. Adams, MD*, Eustachio Agricola, MD†, Thomas Buck, MD, FESC†, Francesco F. Faletra, MD†, Andreas Franke, MD, FESC†, Judy Hung, MD, FASE*, Leopoldo Pérez de Isla, MD, PhD, FESC†, Otto Kamp, MD, PhD, FESC†, Jaroslaw D. Kasprzak, MD, FESC†, Patrizio Lancellotti, MD, PhD, FESC†, Thomas H. Marwick, MBBS, PhD*, Marti L. McCulloch, RDCS, FASE*, Mark J. Monaghan, PhD, FESC†, Petros Nihoyannopoulos, MD, FESC†, Natesa G. Pandian, MD*, Patricia A. Pellikka, MD, FASE*, Mauro Pepi, MD, FESC†, David A. Roberson, MD, FASE*, Stanton K. Shernan, MD, FASE*, Girish S. Shirali, MBBS, FASE*, Lissa Sugeng, MD*, Folkert J. Ten Cate, MD†, Mani A. Vannan, MBBS, FASE*, Jose Luis Zamorano, MD, FESC, FASE†, and William A. Zoghbi, MD, FASE*

2D *vs* 3D Echocardiography

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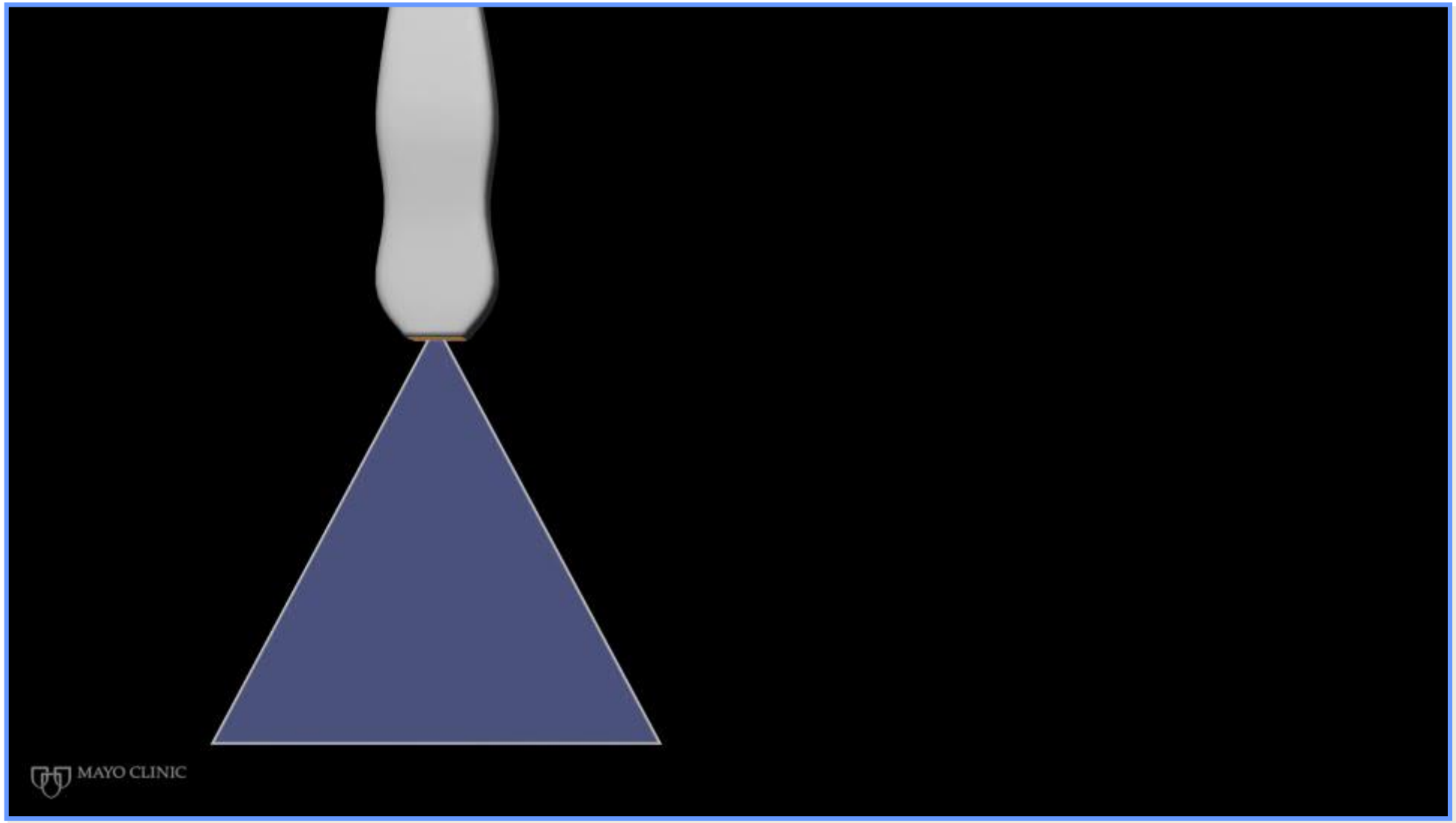

Courtesy of J. Maalouf

Good 2D Equals Good 3D

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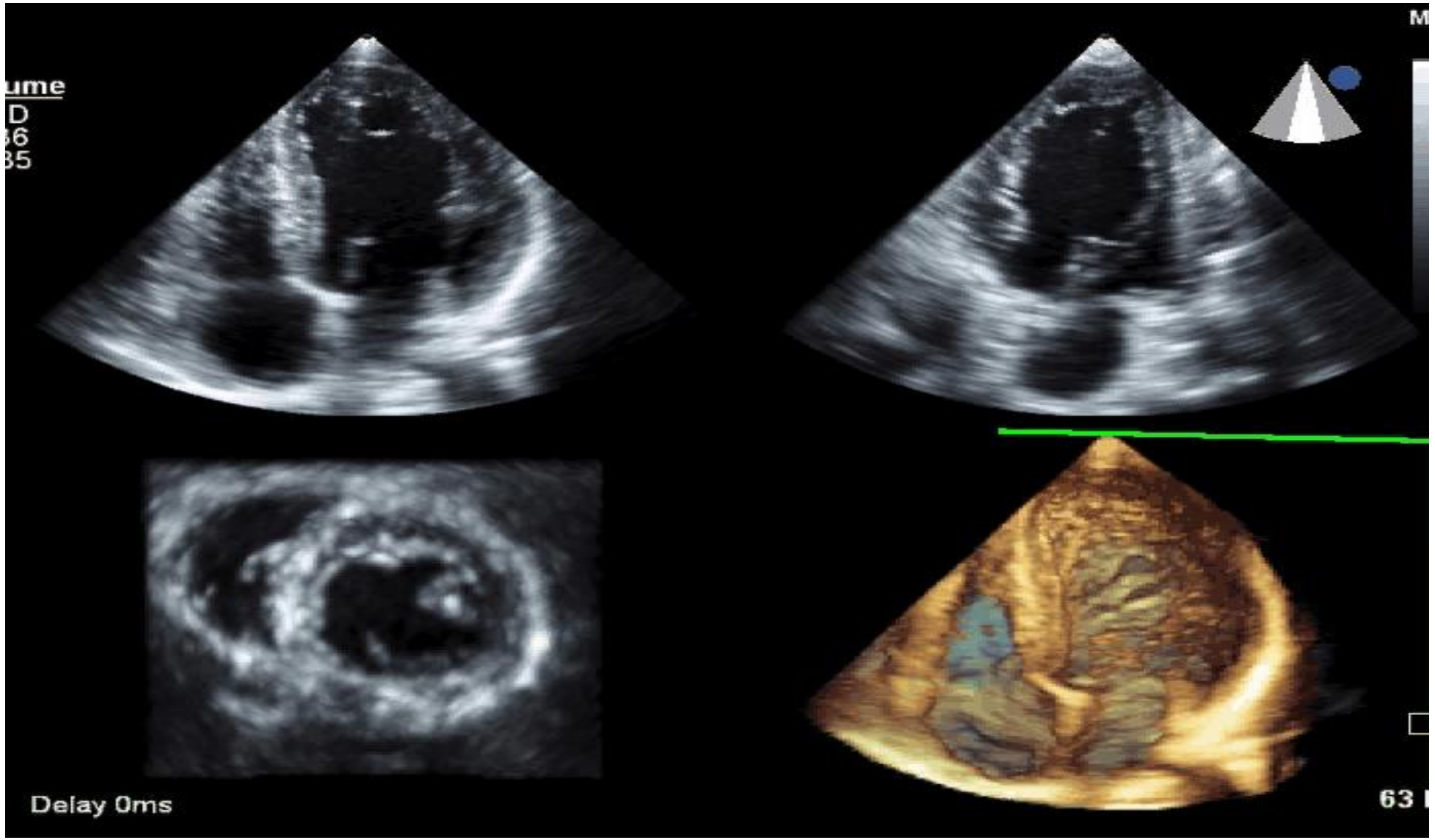

Modes of Acquisition

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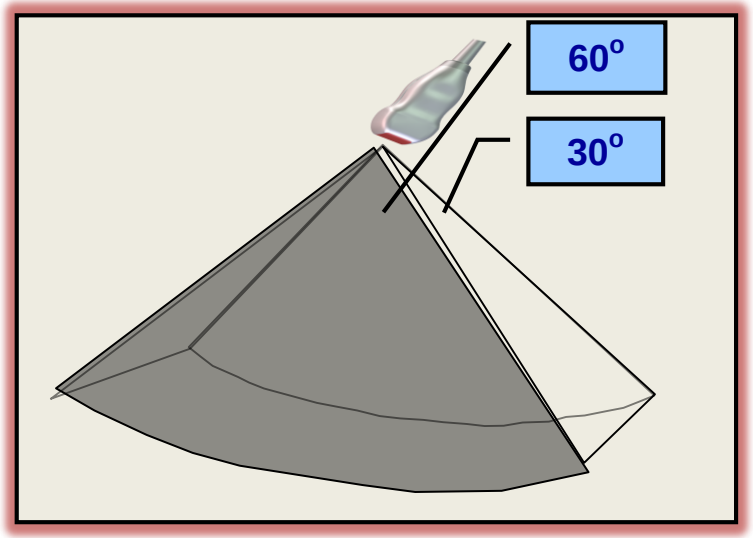
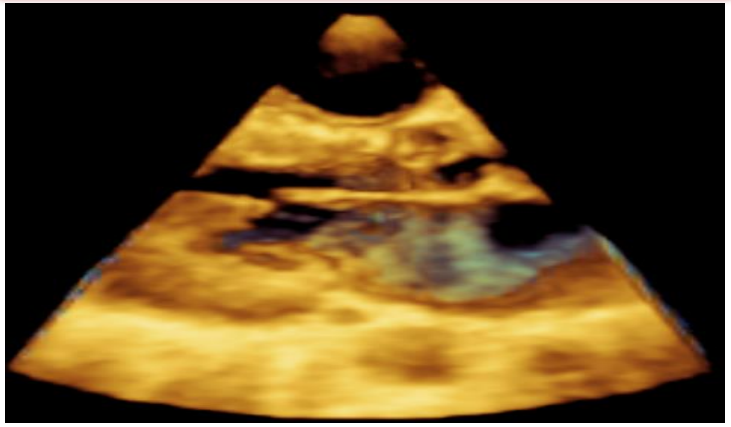
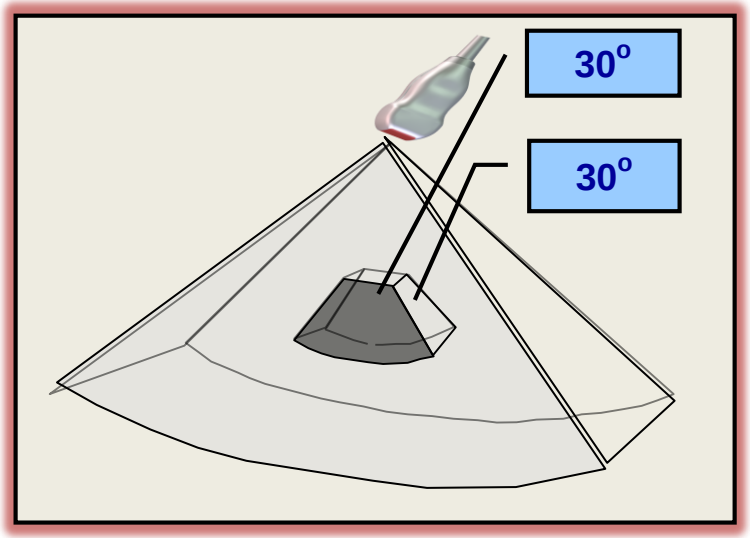
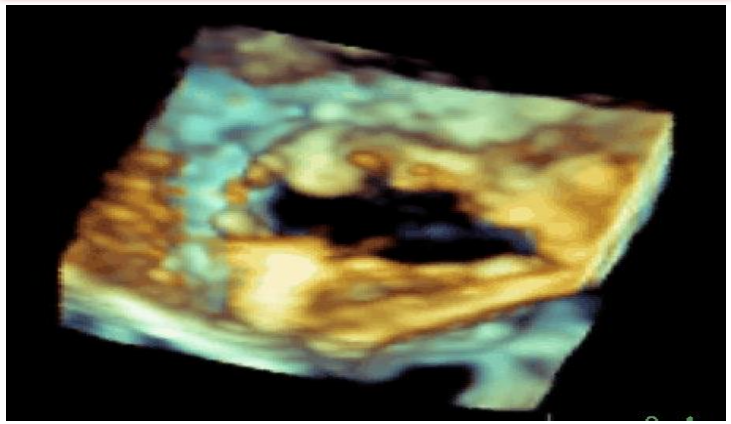
Narrow volume



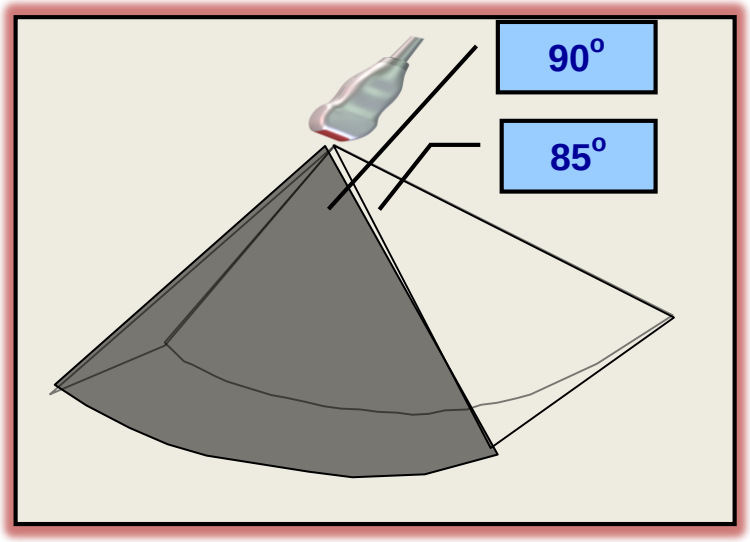


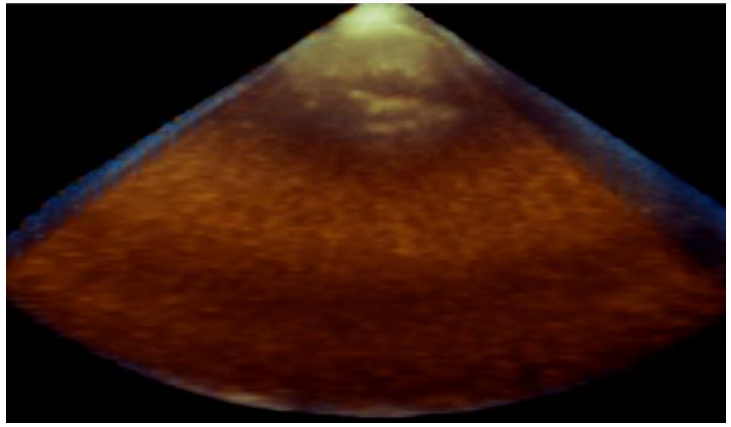
3D Zoom





Wide angle/Full volume





Narrow Volume

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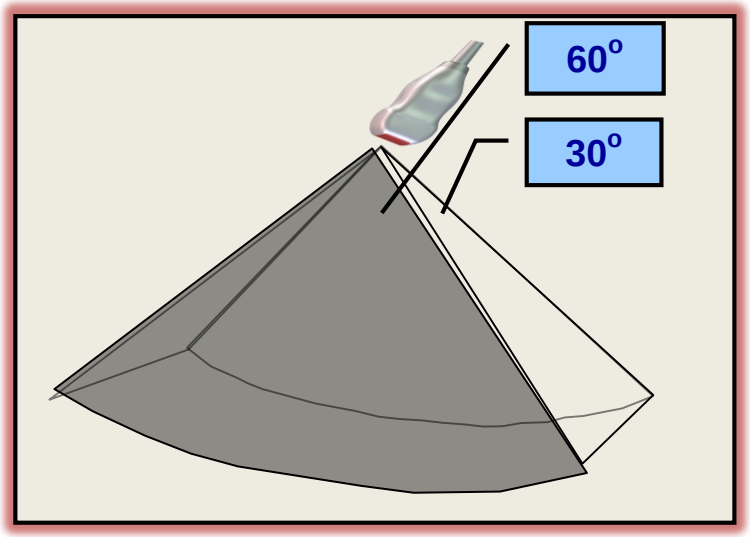

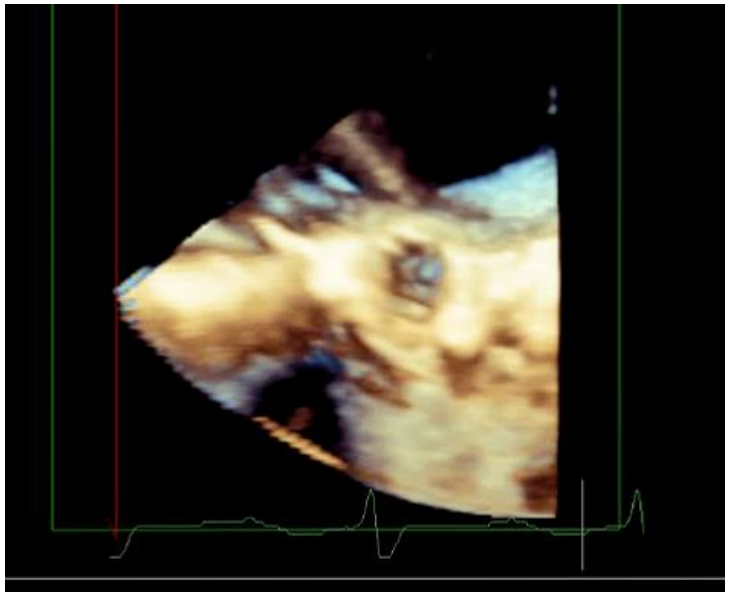

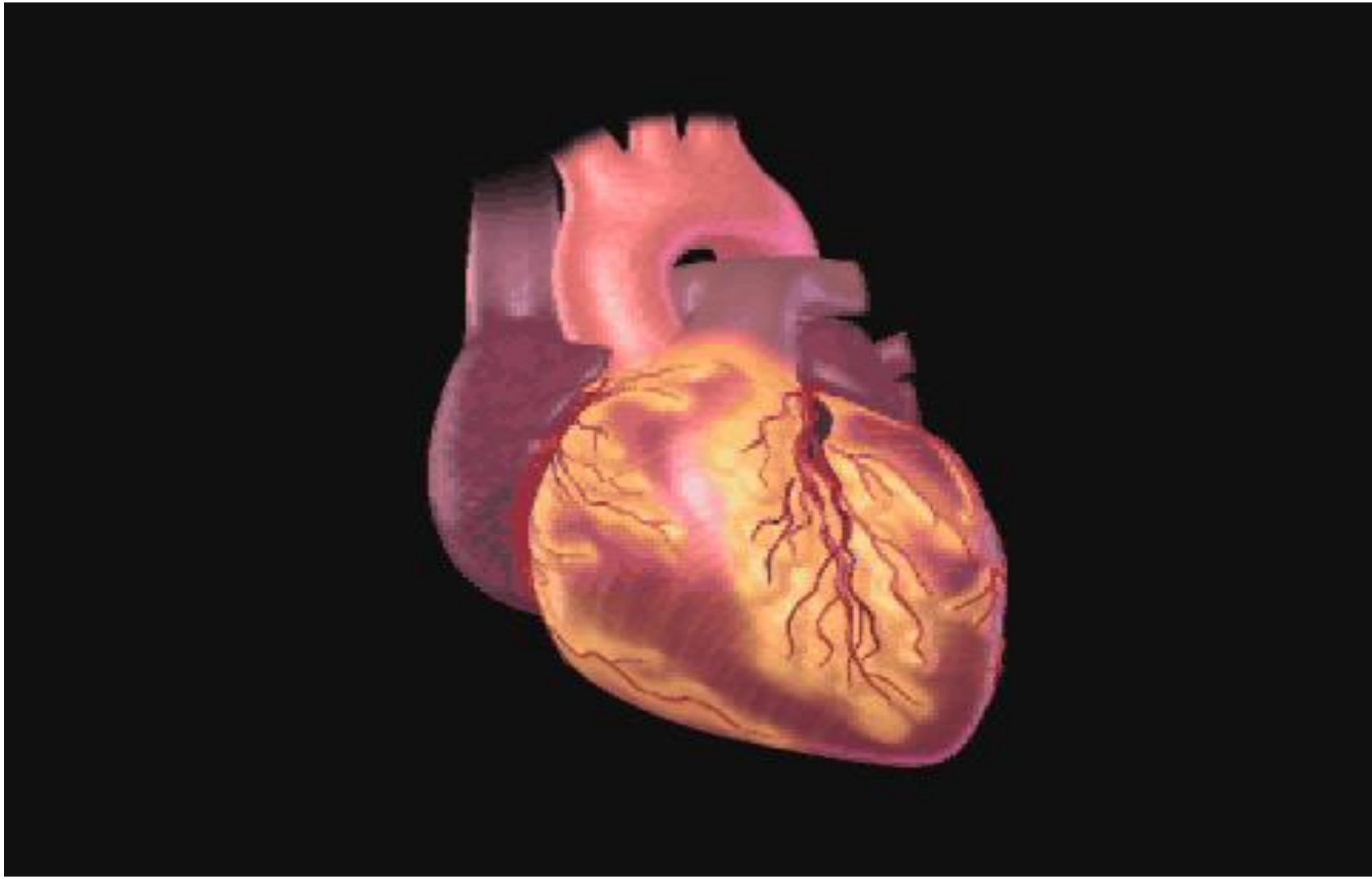

Zoom Mode a.k.a. “pre-cropped”

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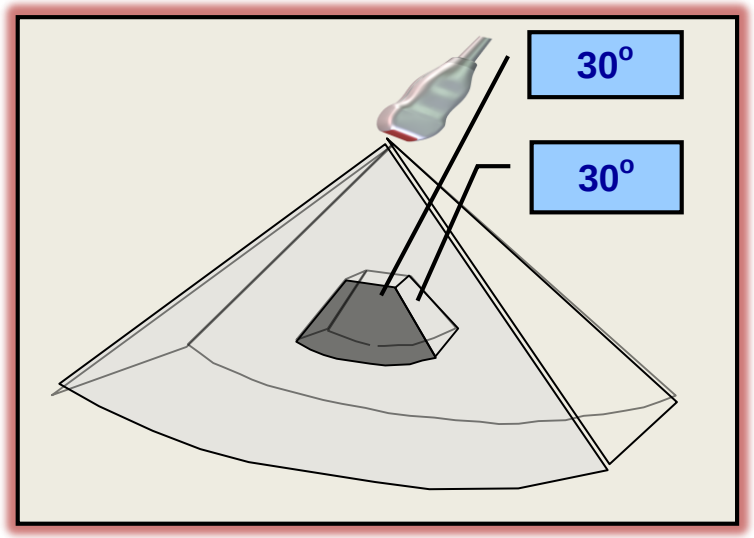

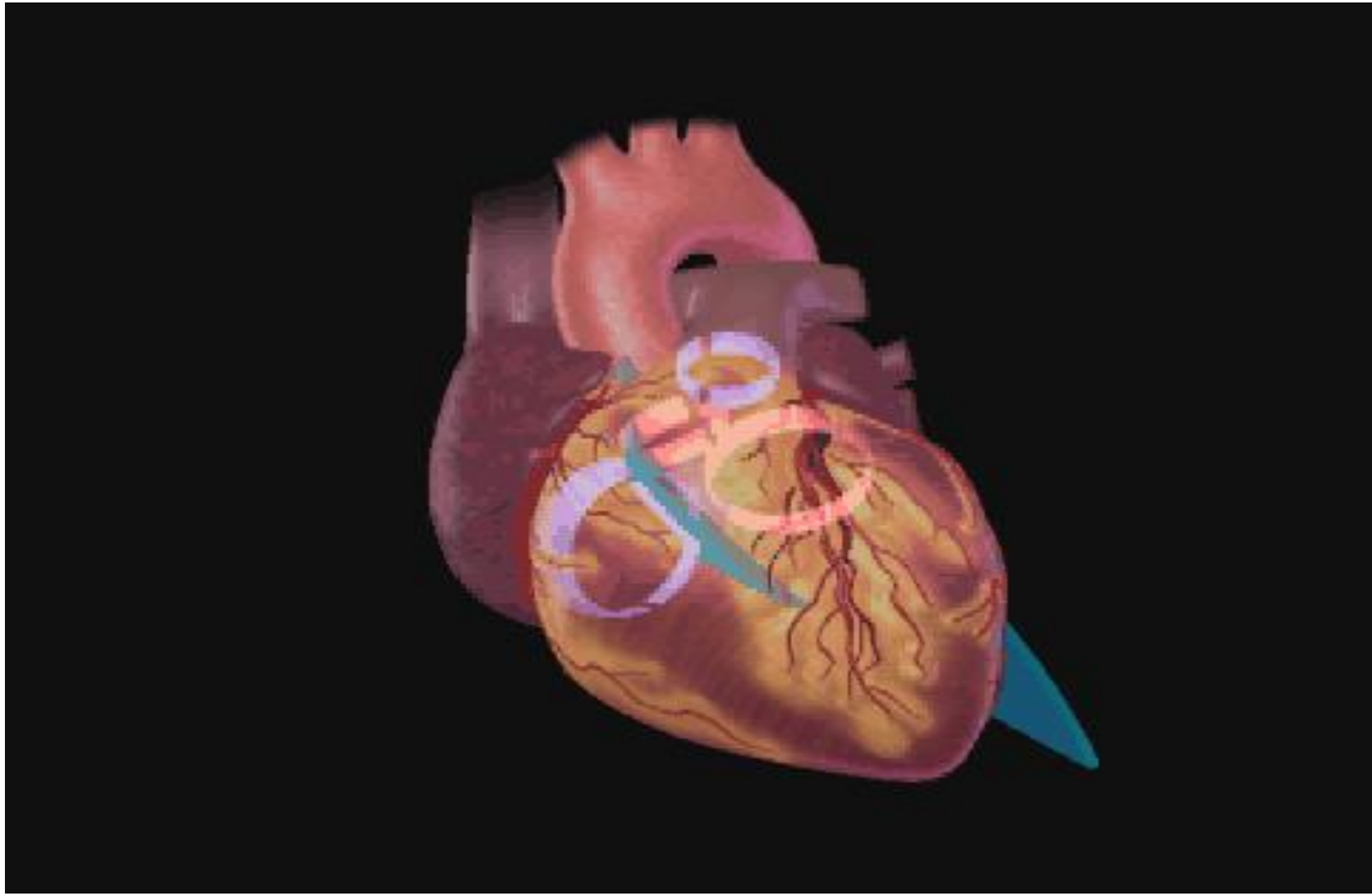

Zoom Mode

- Indications:
  - Prolapse
  - Flail
  - Perforation
  - Stenosis
- Less prone to artifacts
- Beware of losing spatial orientation

3D Full Volume Acquisition

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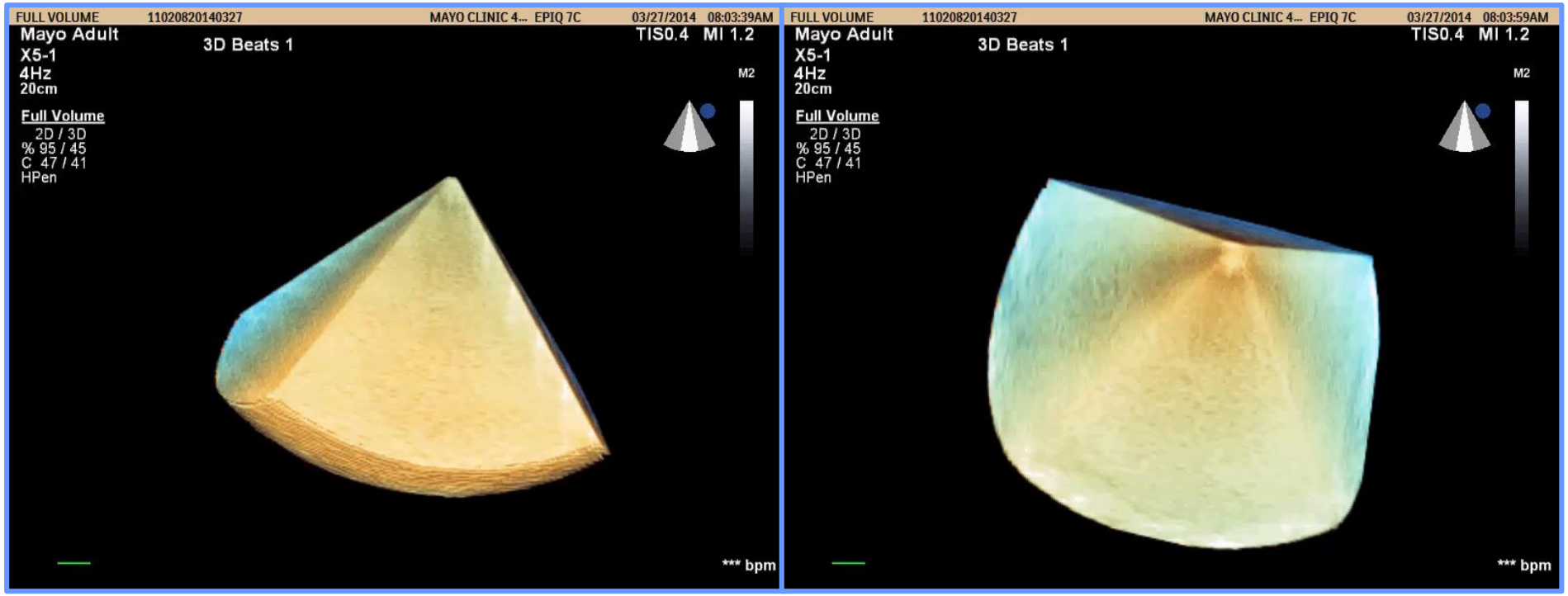
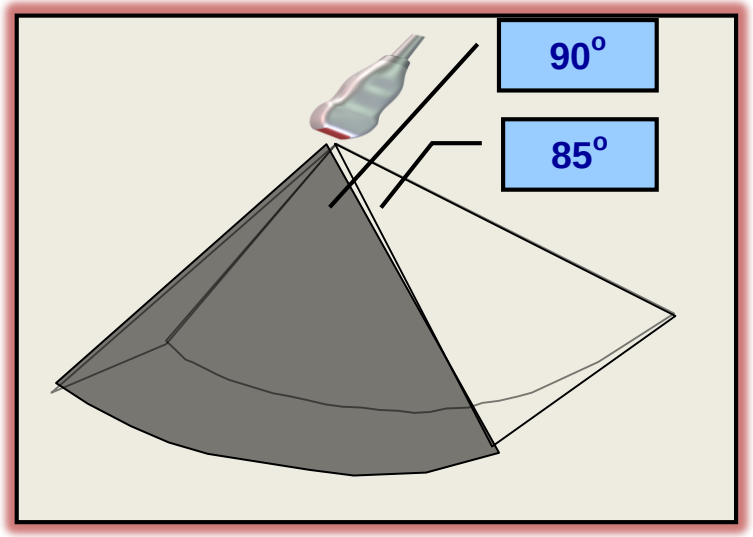
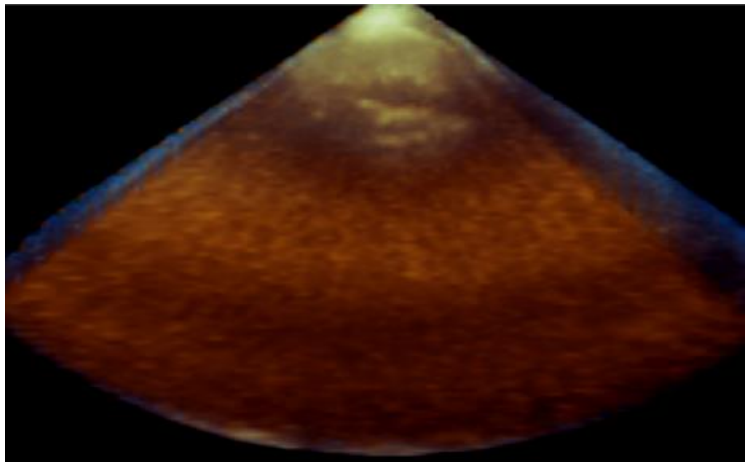
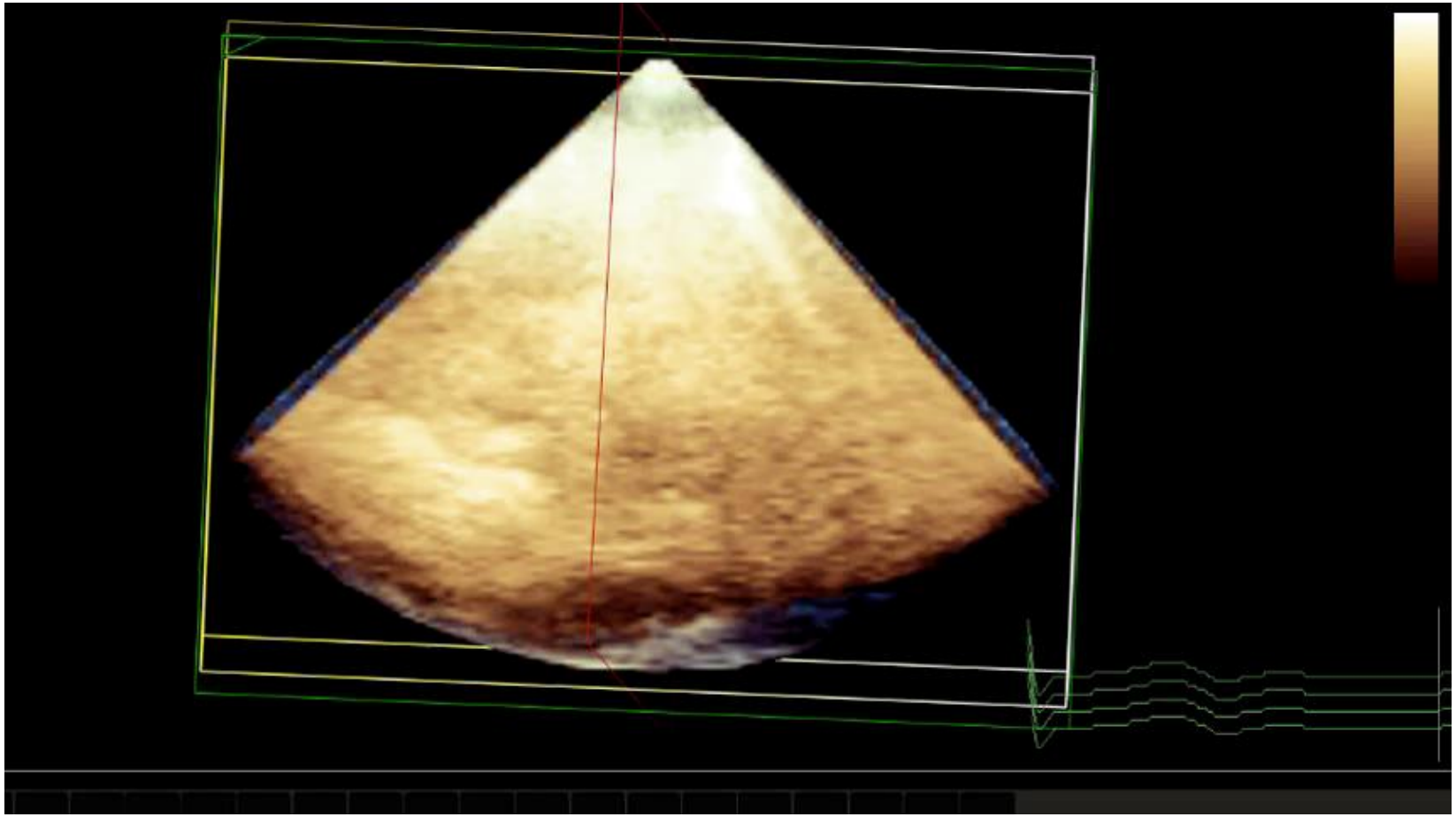


Wide Angle/Full Volume Cropping







Single Beat VS Multi-Beat

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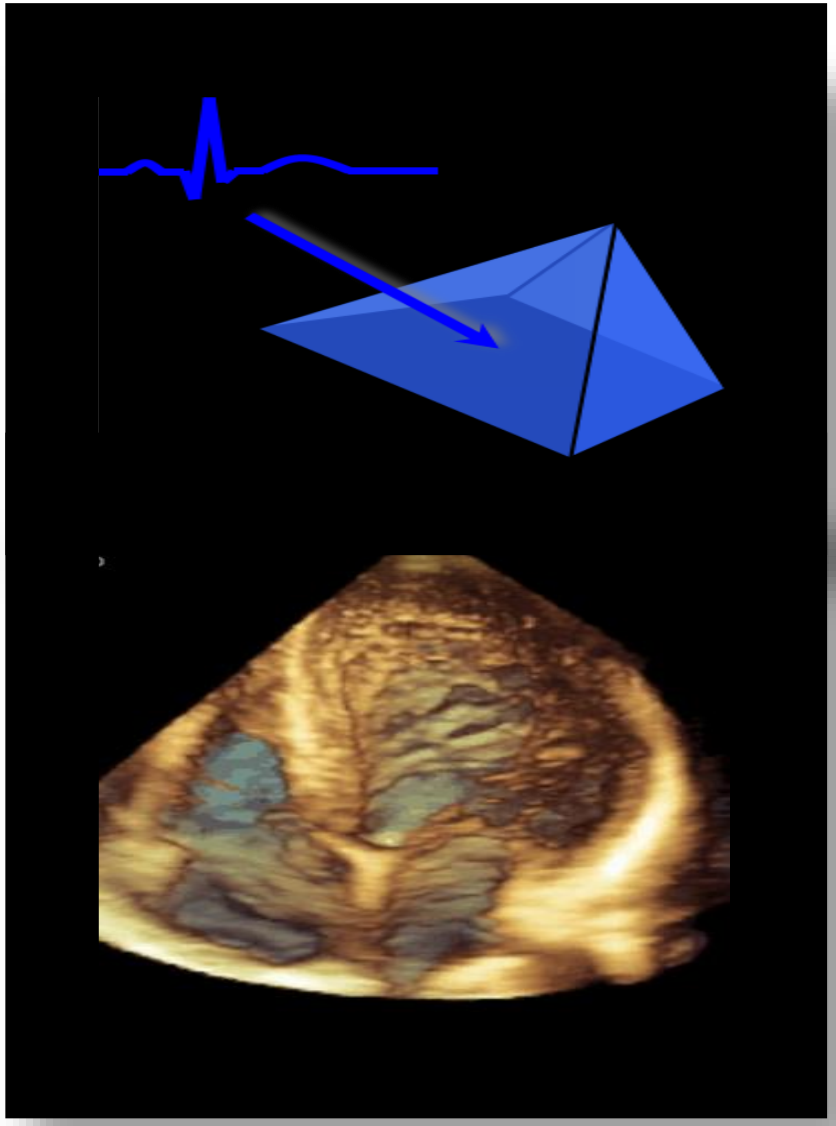

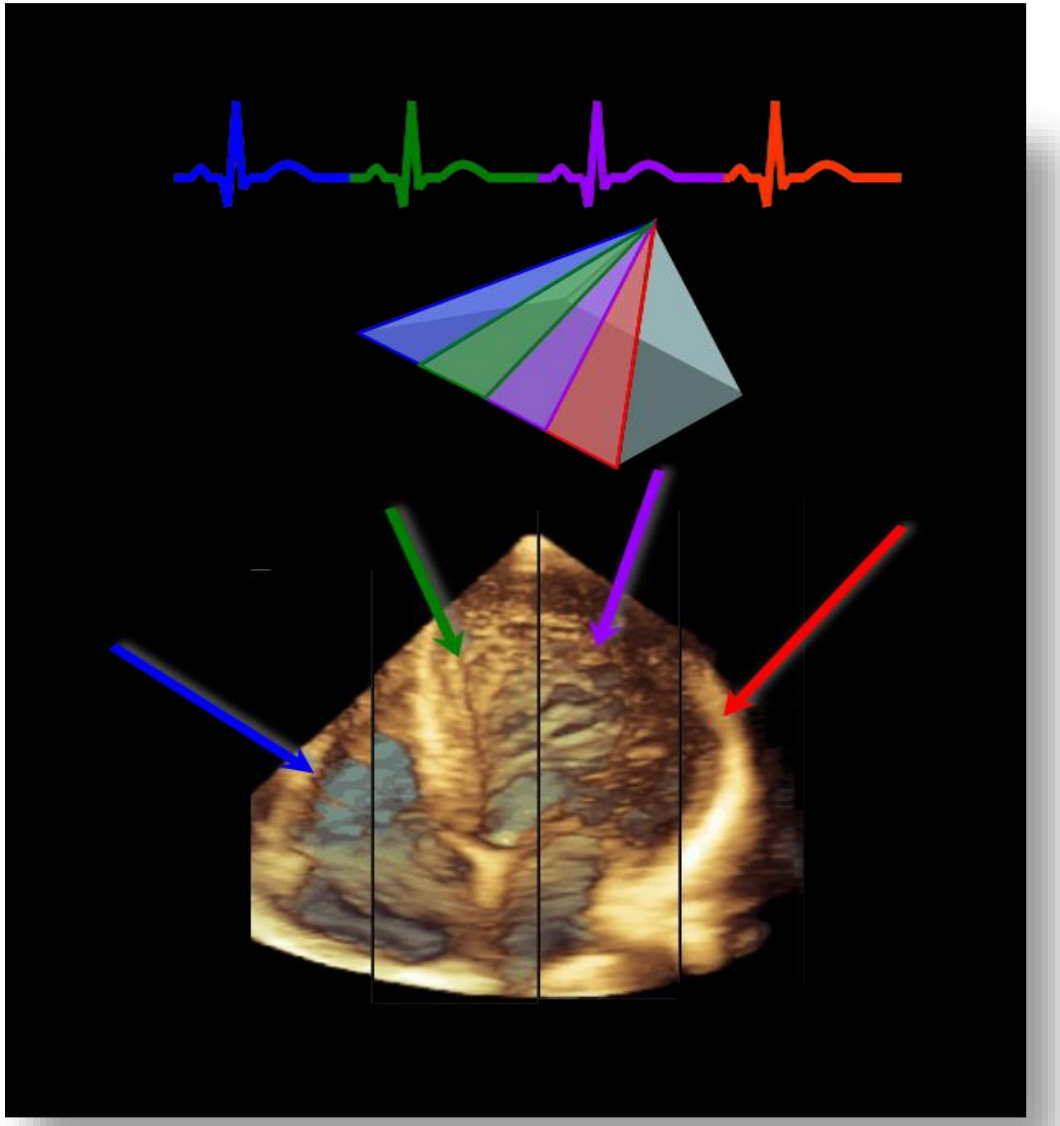

Multi-beat Acquisition

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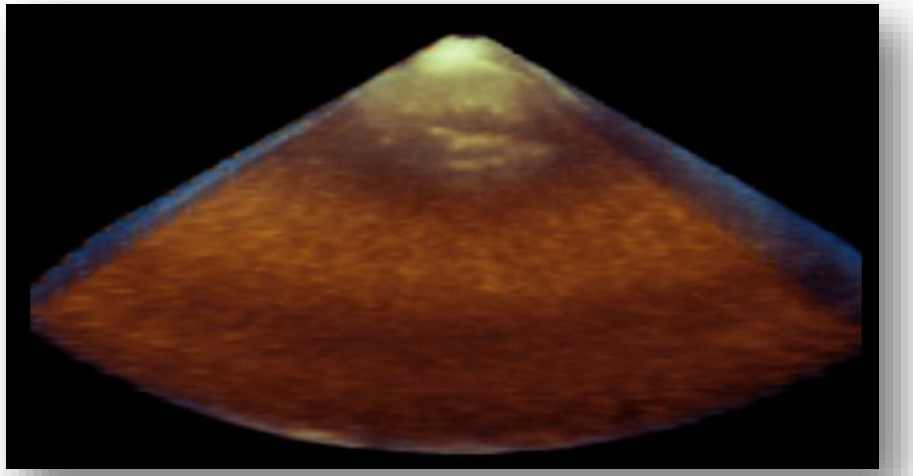
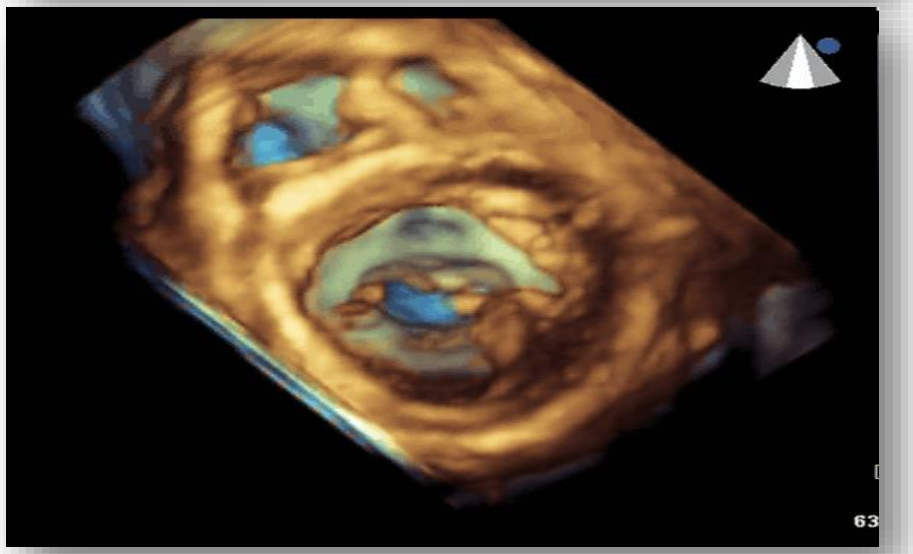
- Large Volume
- Density (Med-Low)
- Chamber Quantification
- Higher Frame Rate
- *Beware of Stitch Artifacts*





Low Frame Rate

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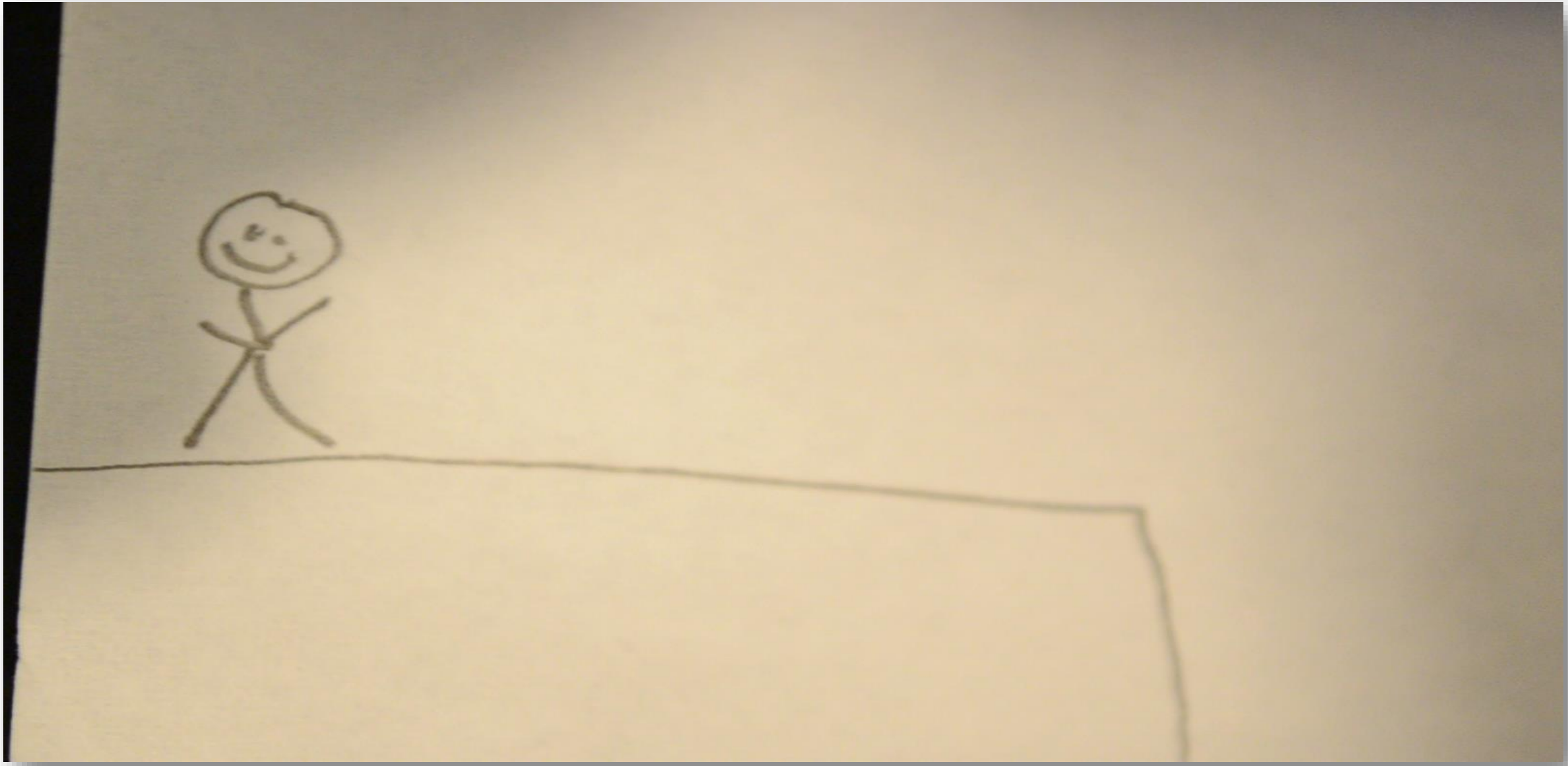

High Frame Rate

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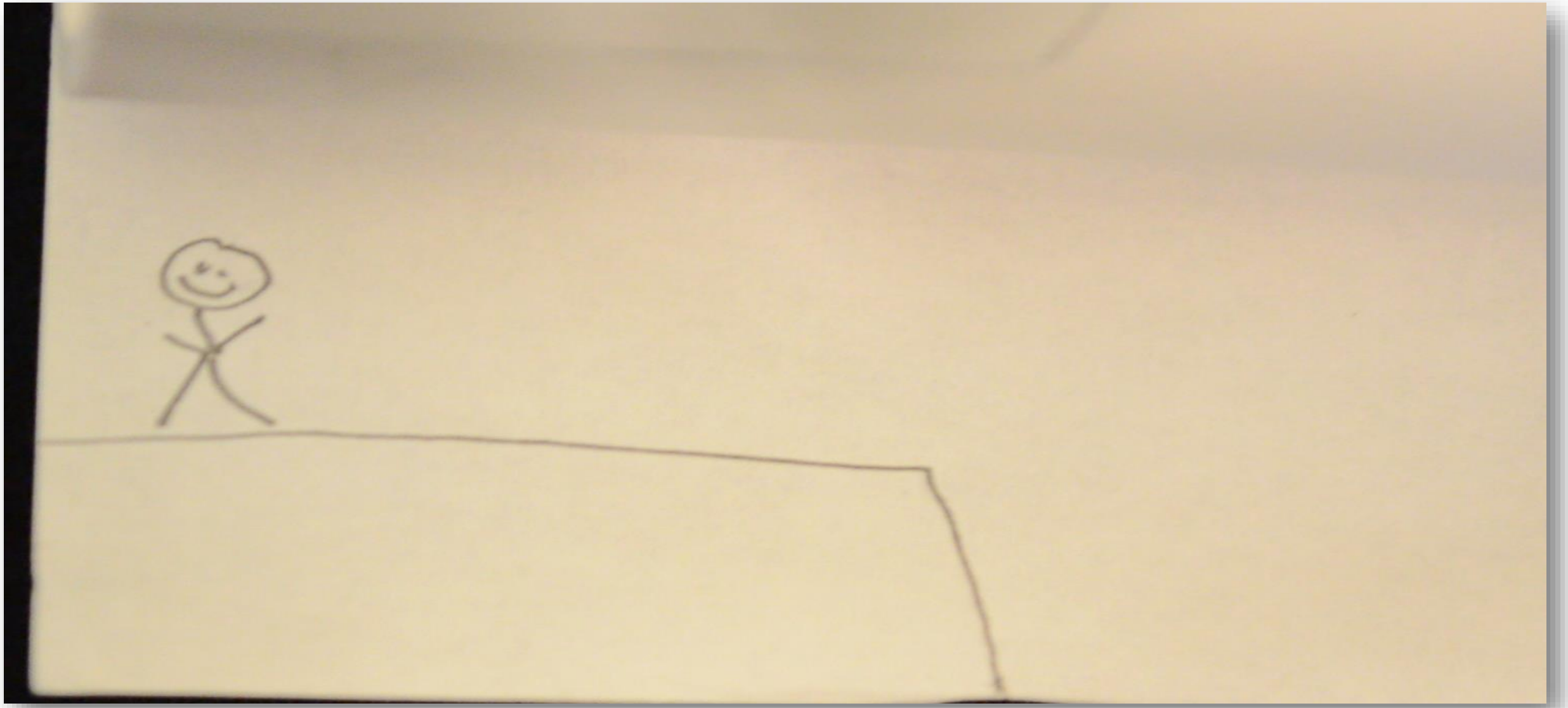

↑ Number of Sub-volumes = ↑ Frame Rate

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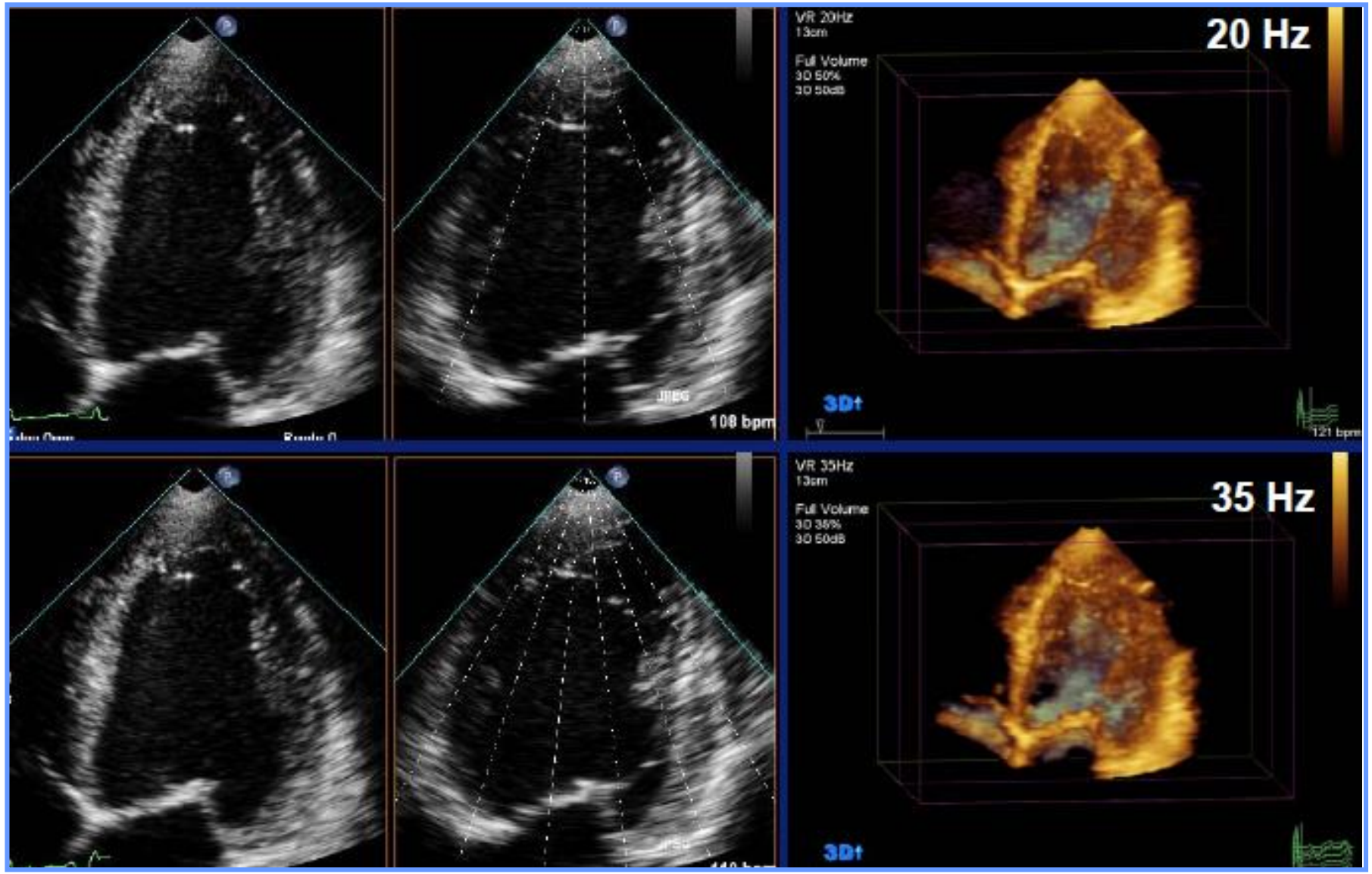

↑ Number of Sub-volumes = ↑ Frame Rate

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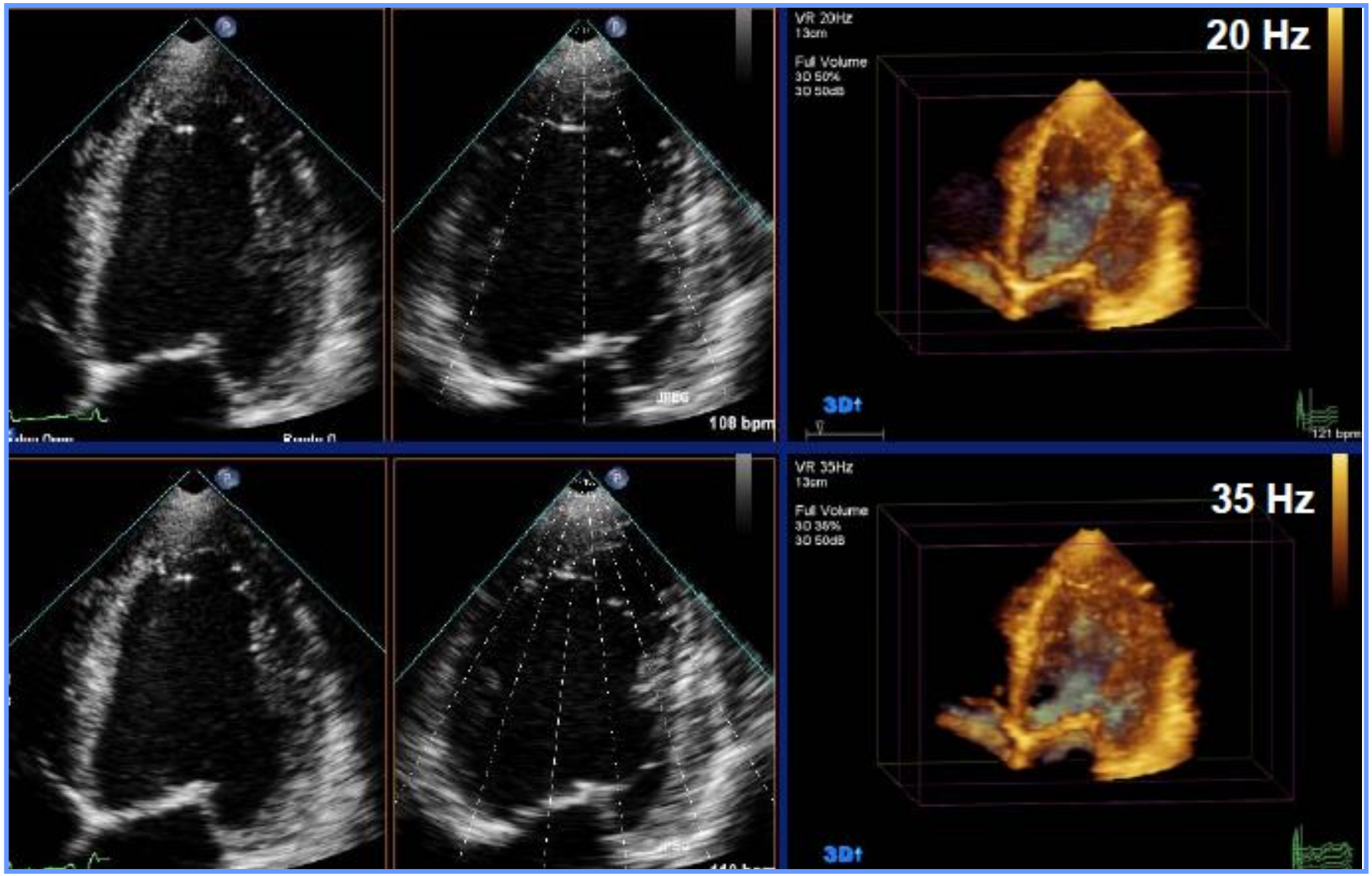

↓ Depth = ↑ Frame Rate

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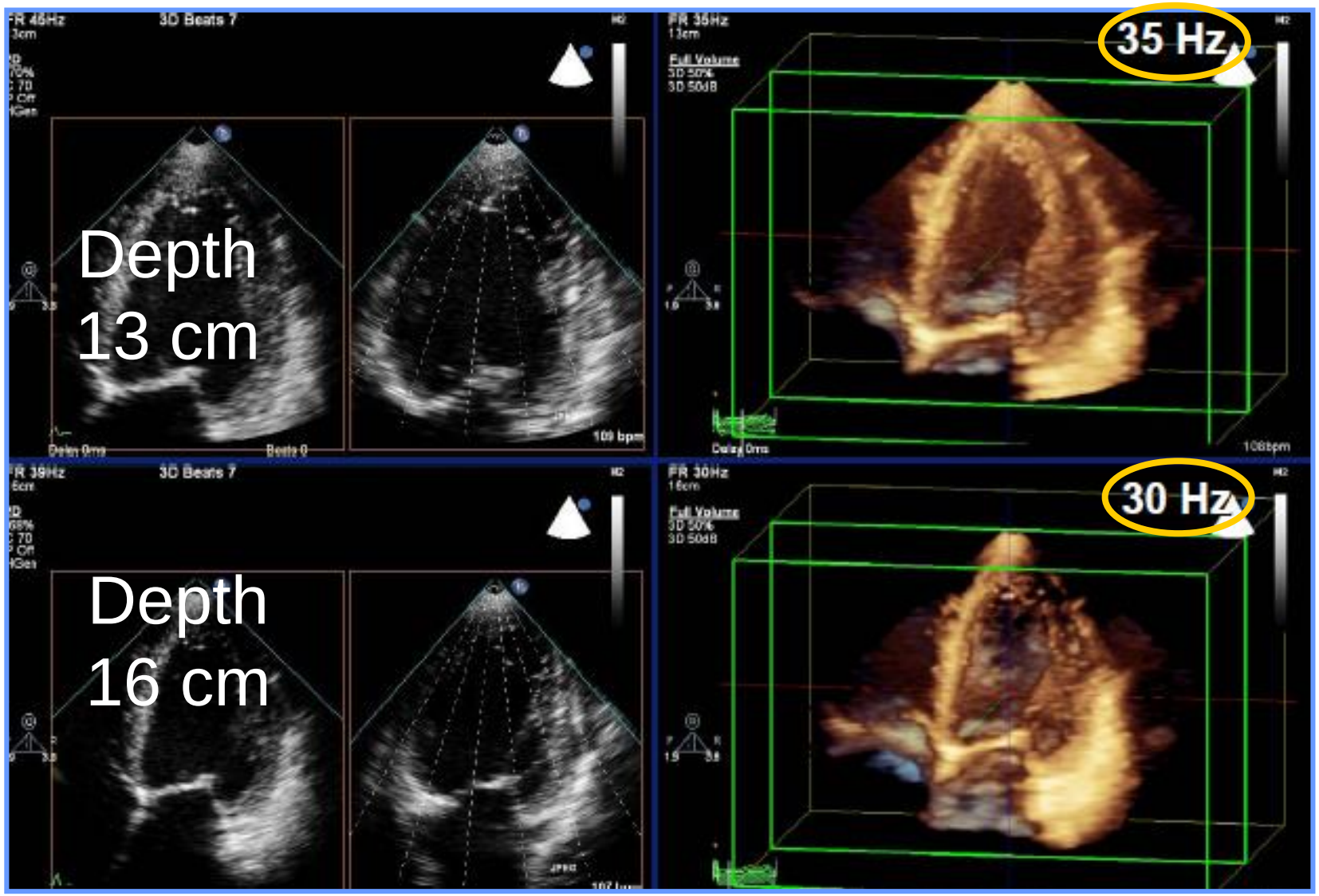

ECG-Gating

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Stitch Artifact

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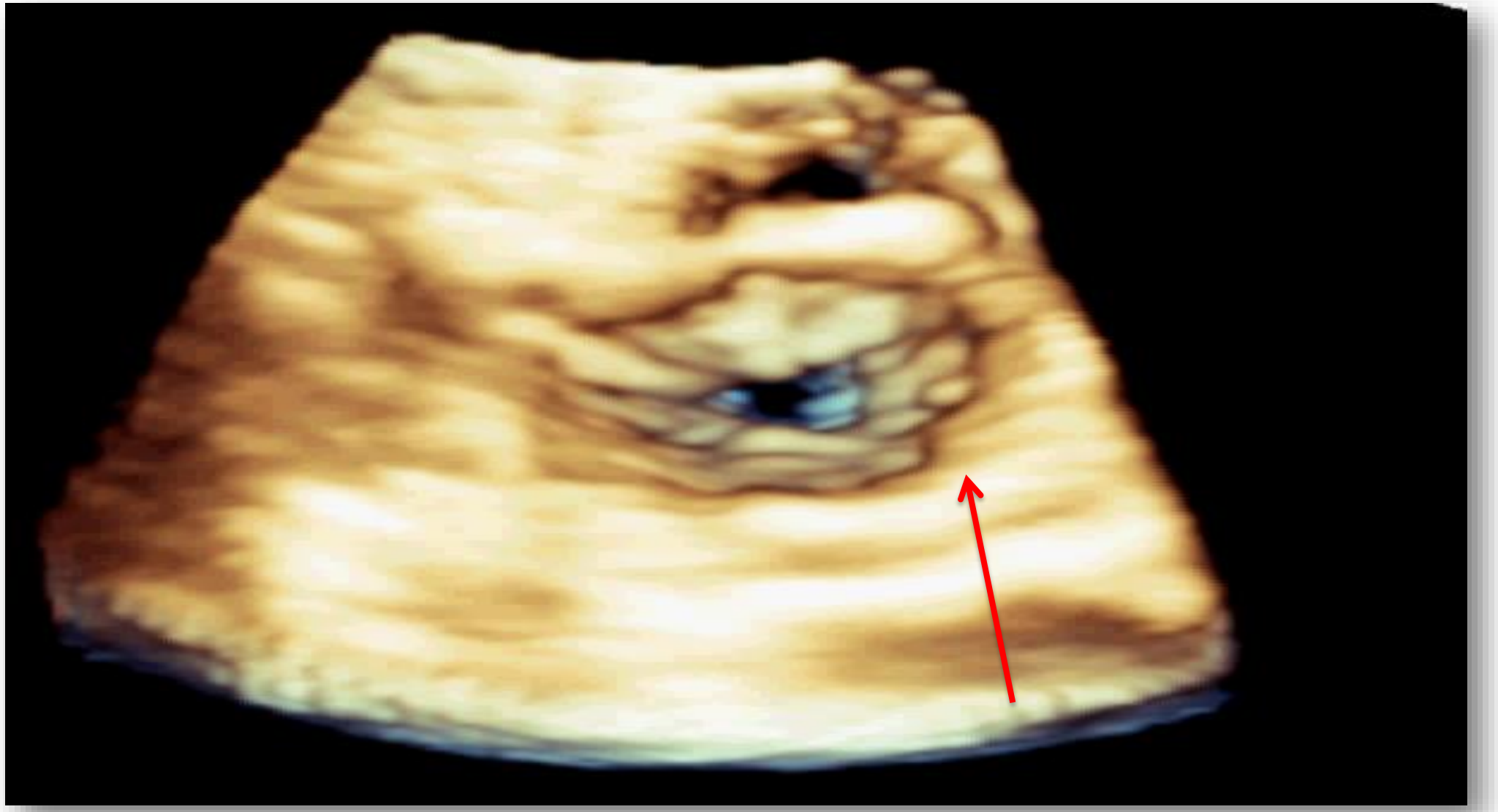

3D-Gain

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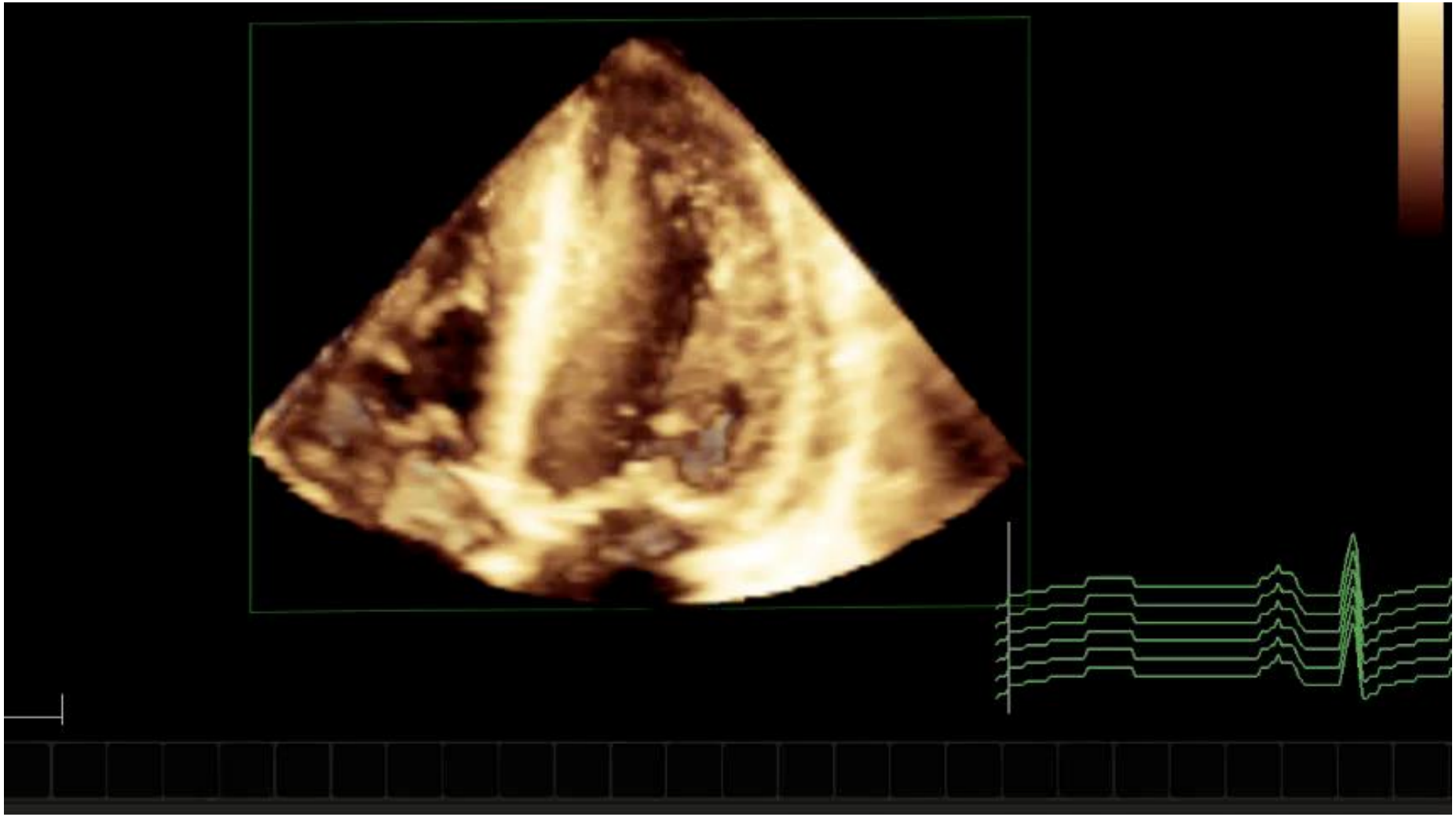
↙ **Drop-out**

↗ **Snow Storm**



Display Object of Interest

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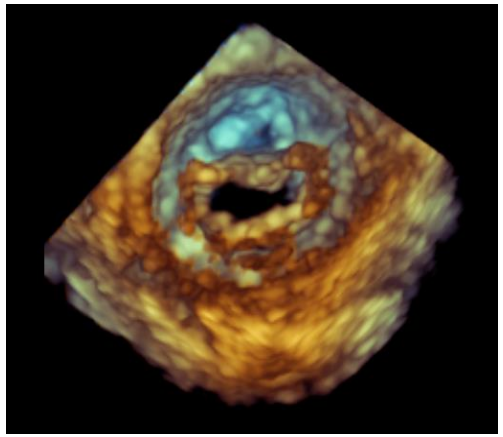
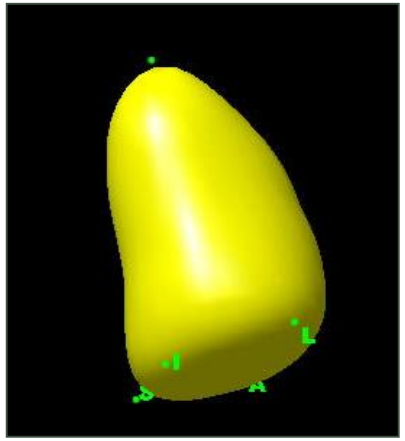
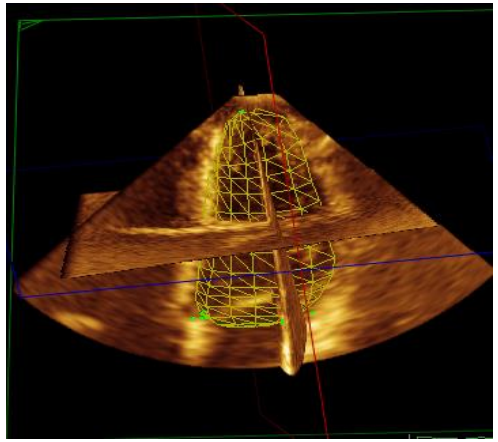
Volume Rendering



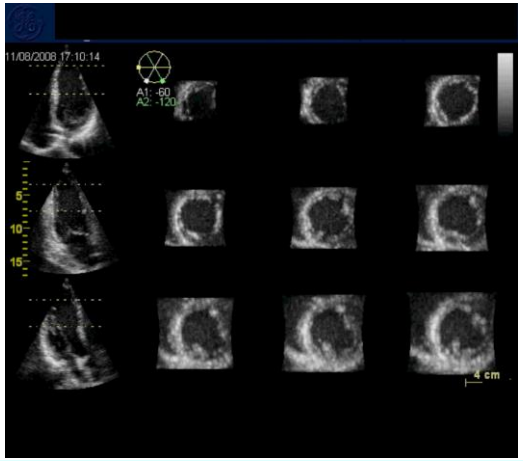
Surface Rendering



Wire-Frame



2D Tomographic Slices



3D TEE Acquisition

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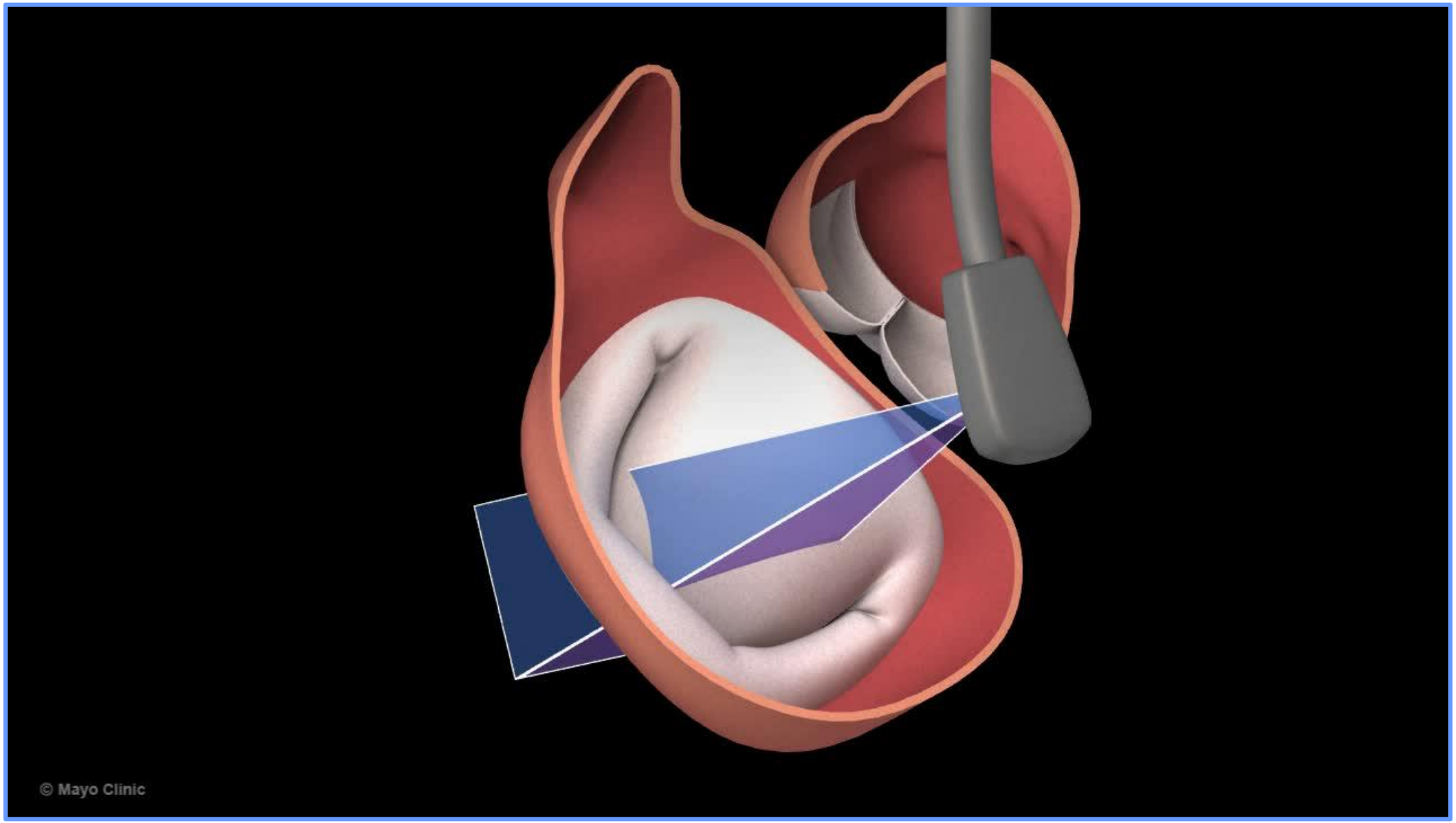

Surgeon's View

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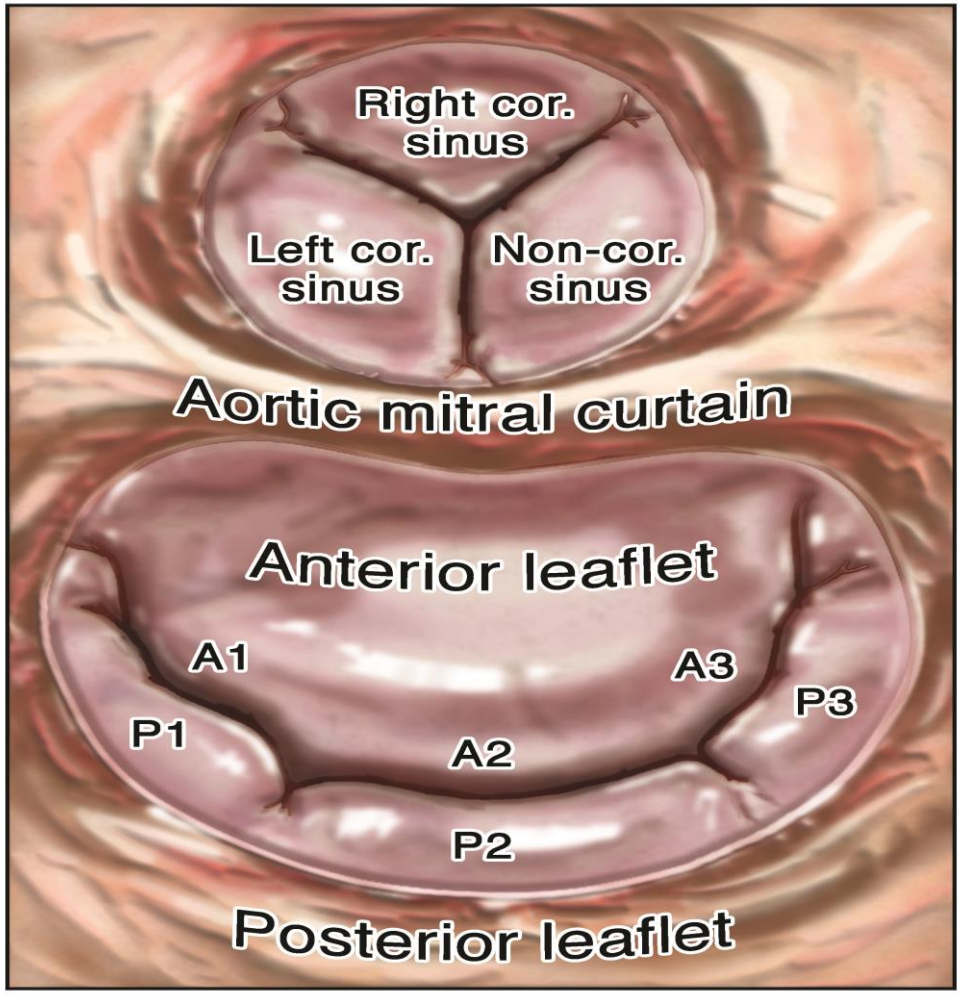

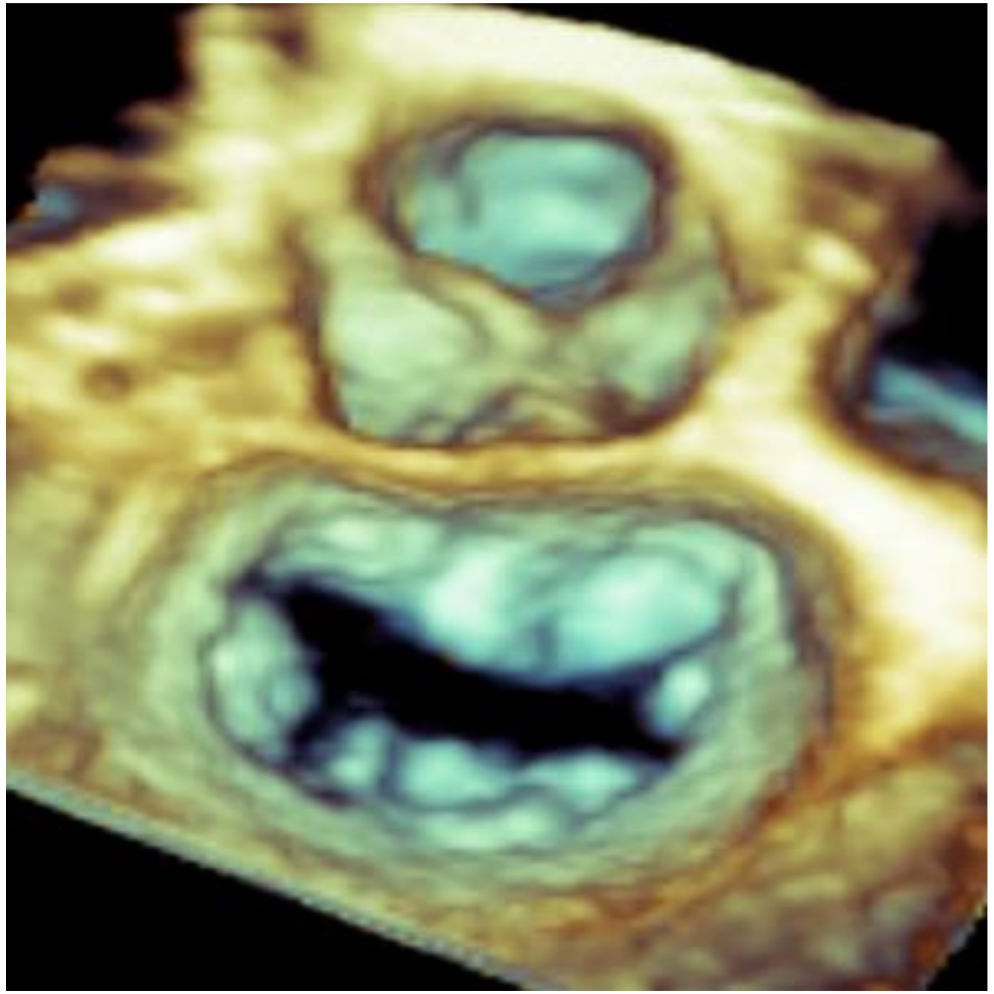

Lang RM, Tsang W, Weinert L, Mor-Avi V, Chandra S. J Am Coll Cardiol 2011 November 1;5 8(19):1933-1944.

3D TEE Mitral Valve Imaging

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3D TEE Aortic Valve Imaging

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Remember Orientation

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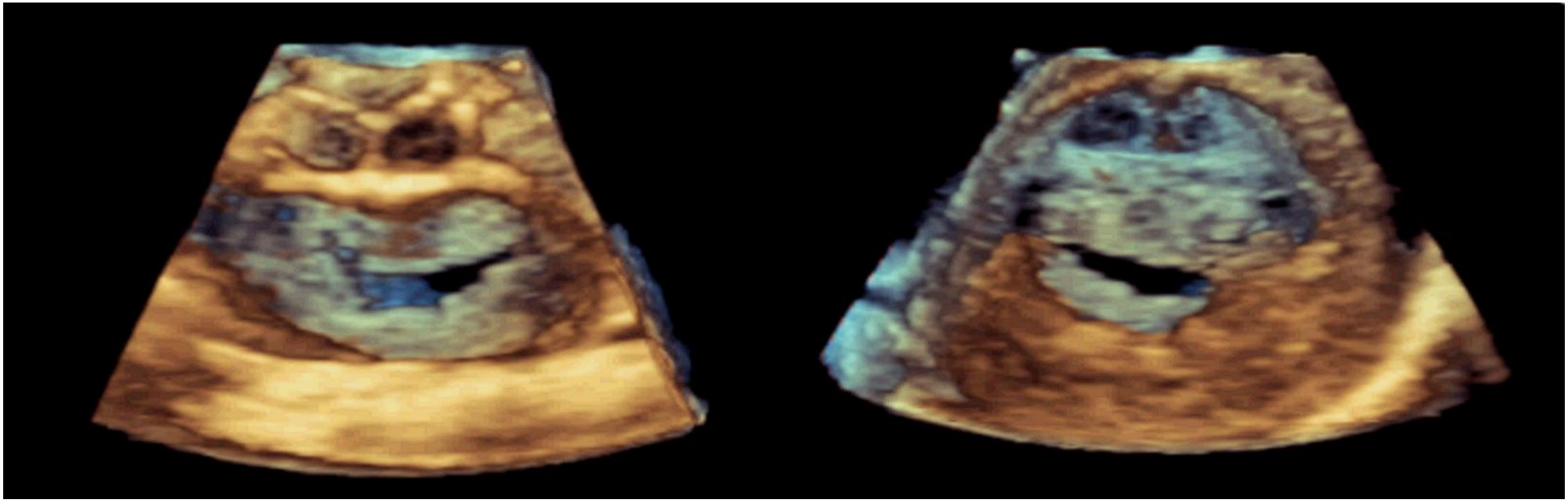

LA view

LV view

Guidance of Paravalvular Repair

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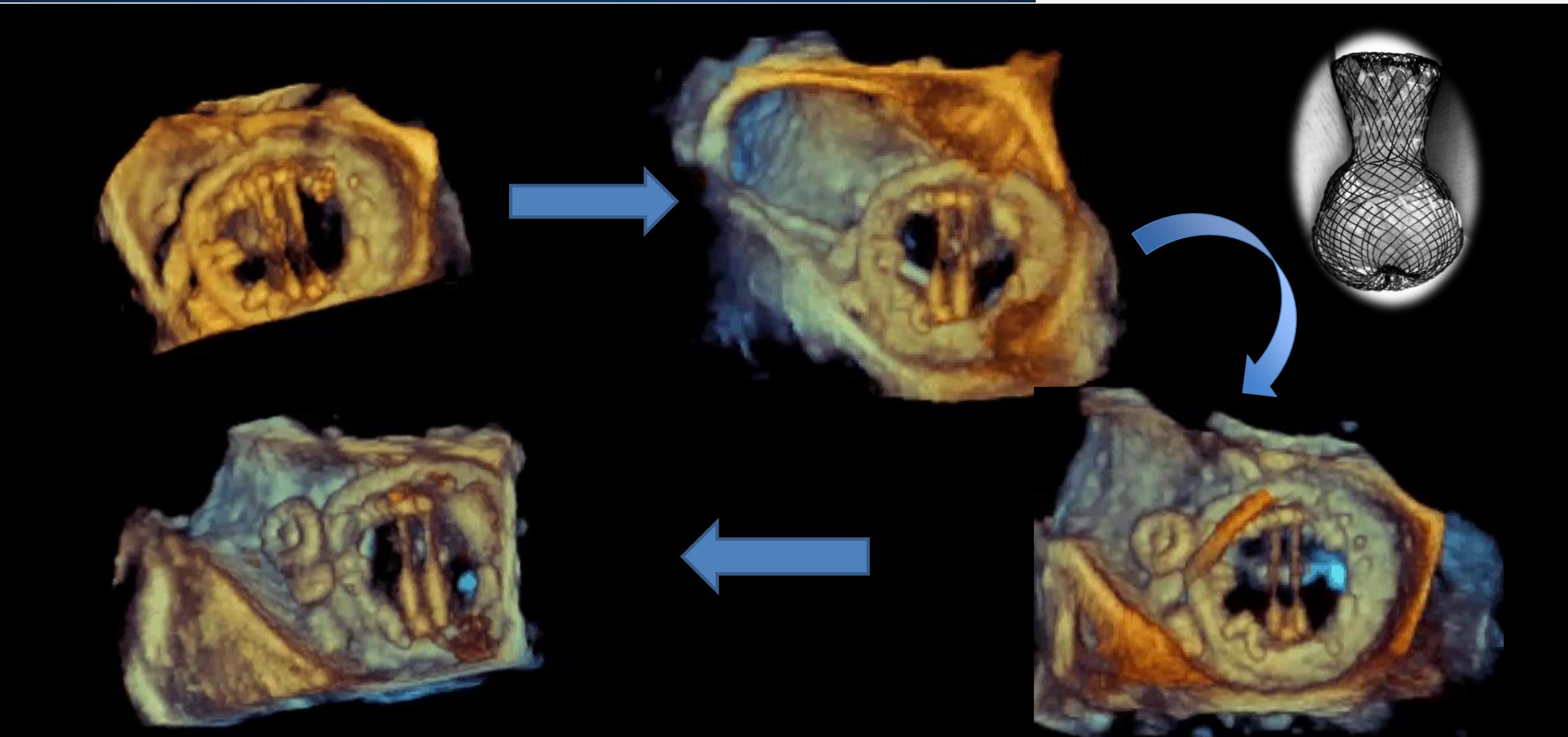

The Final Result

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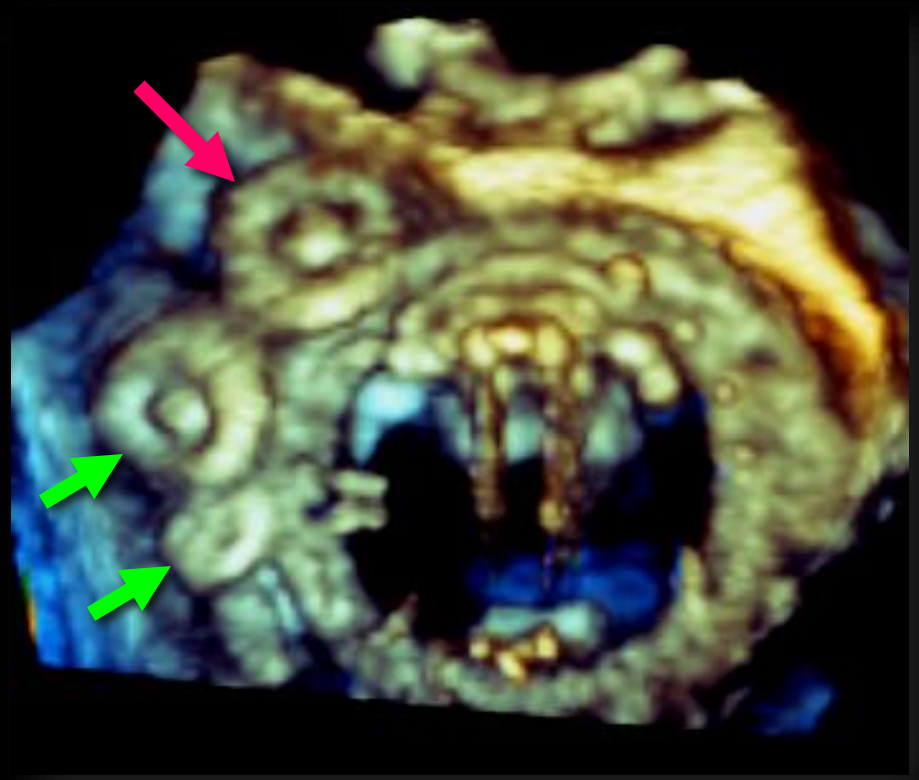
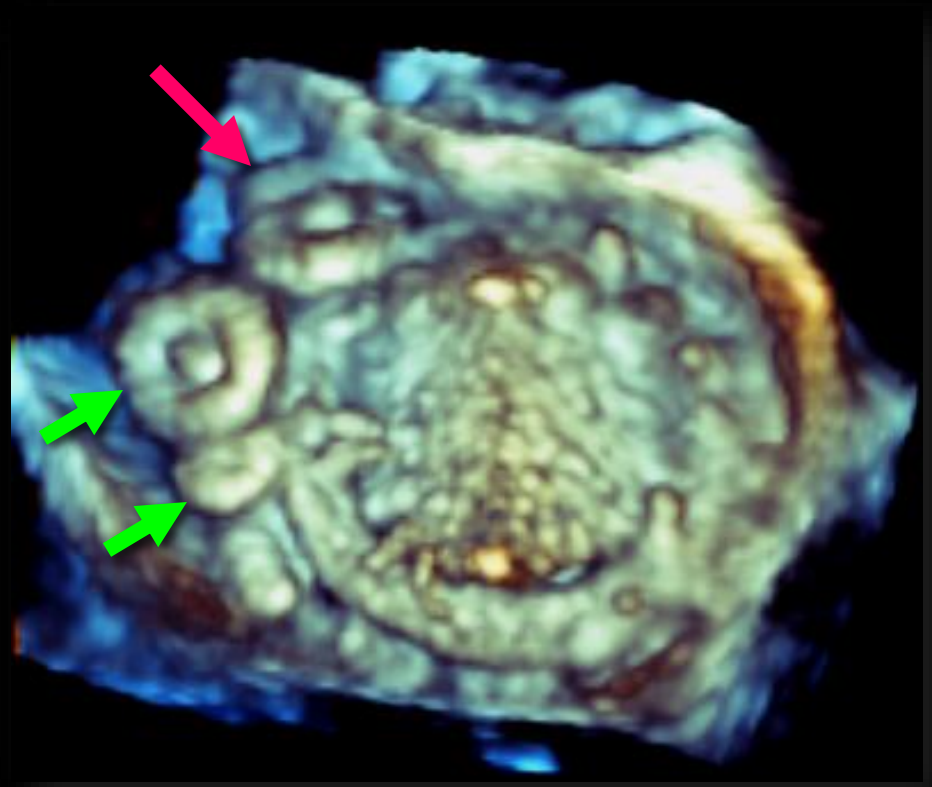
Diastole



Systole



Case

Valve-in-Valve BioMVR

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- 46 yr male, ESRD on HD for 8 yrs.
- Edwards Pericardial (27mm) MVR.
- Concern for non-compliance with anticoagulation.
- Chronic severe prosthetic MV stenosis with respiratory failure.
- Intubated for 2 weeks with refractory pulmonary edema.

Severe Bioprosthetic Mitral Valve Stenosis

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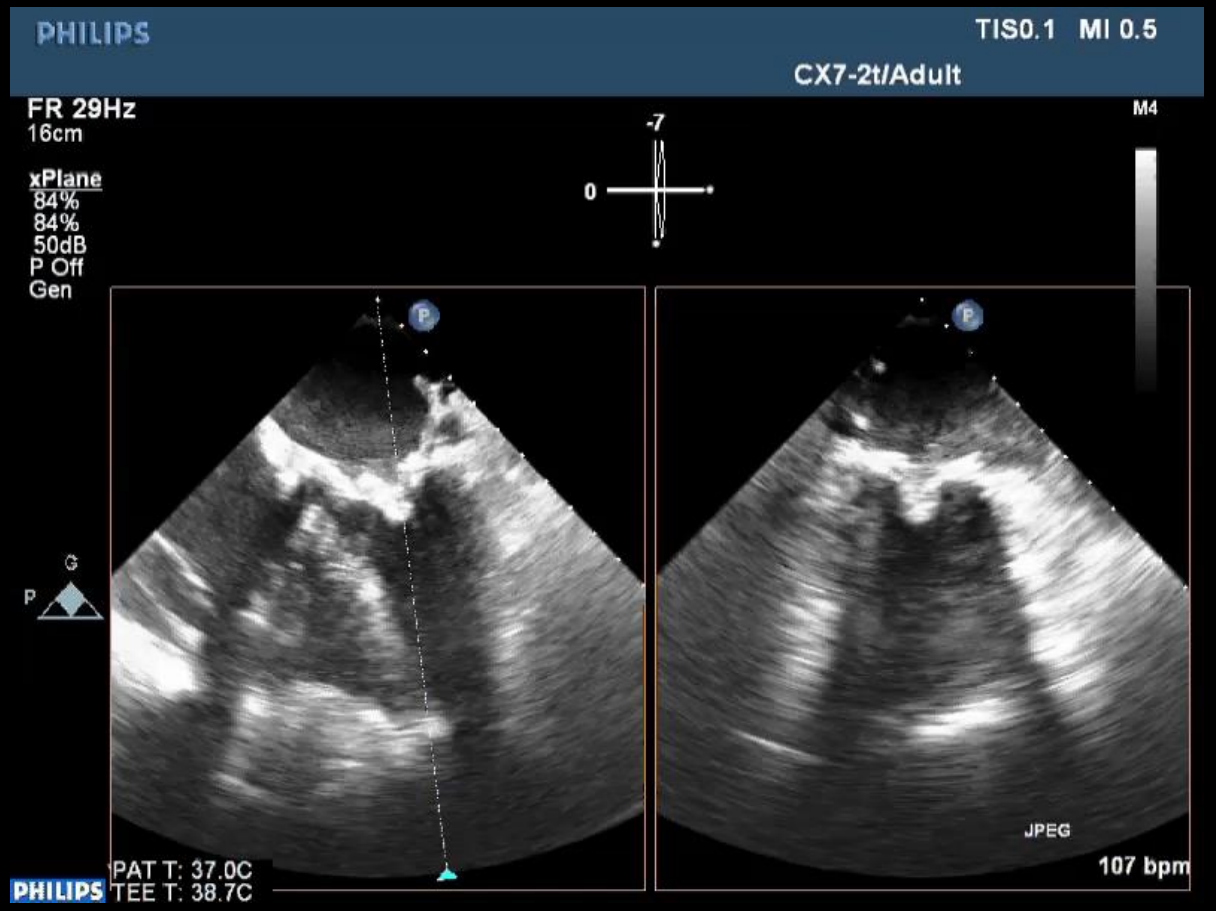

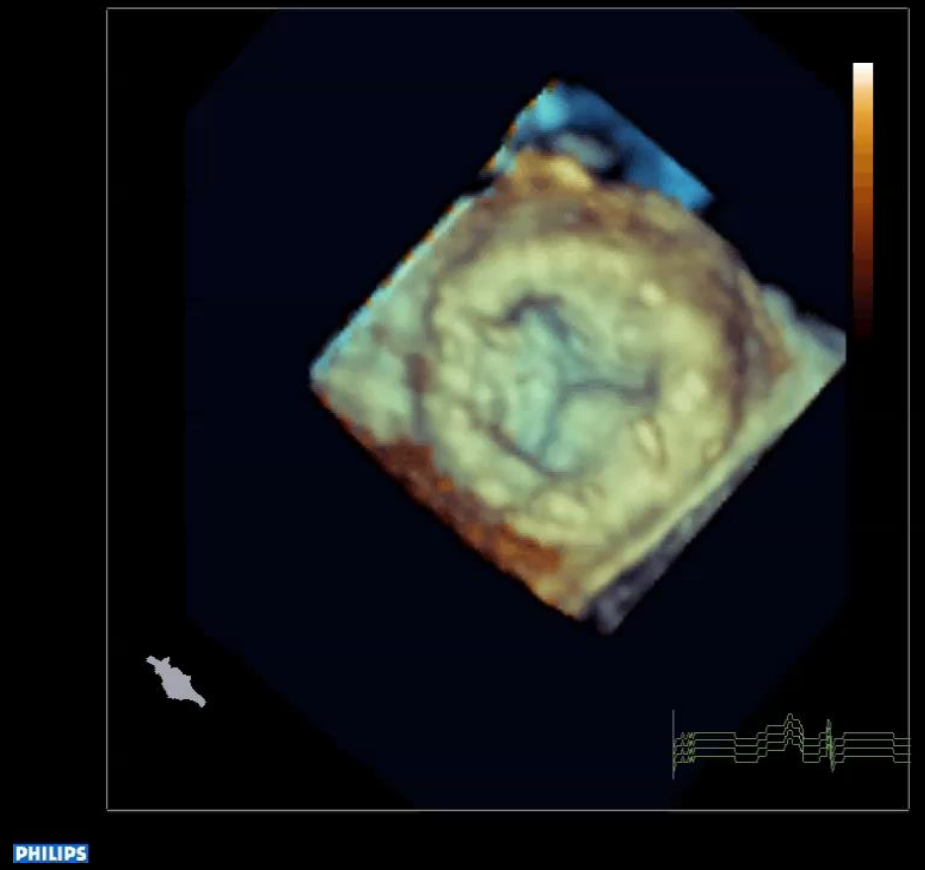

27mm Edwards Pericardial Valve

Severe Bioprosthetic Mitral Valve Stenosis

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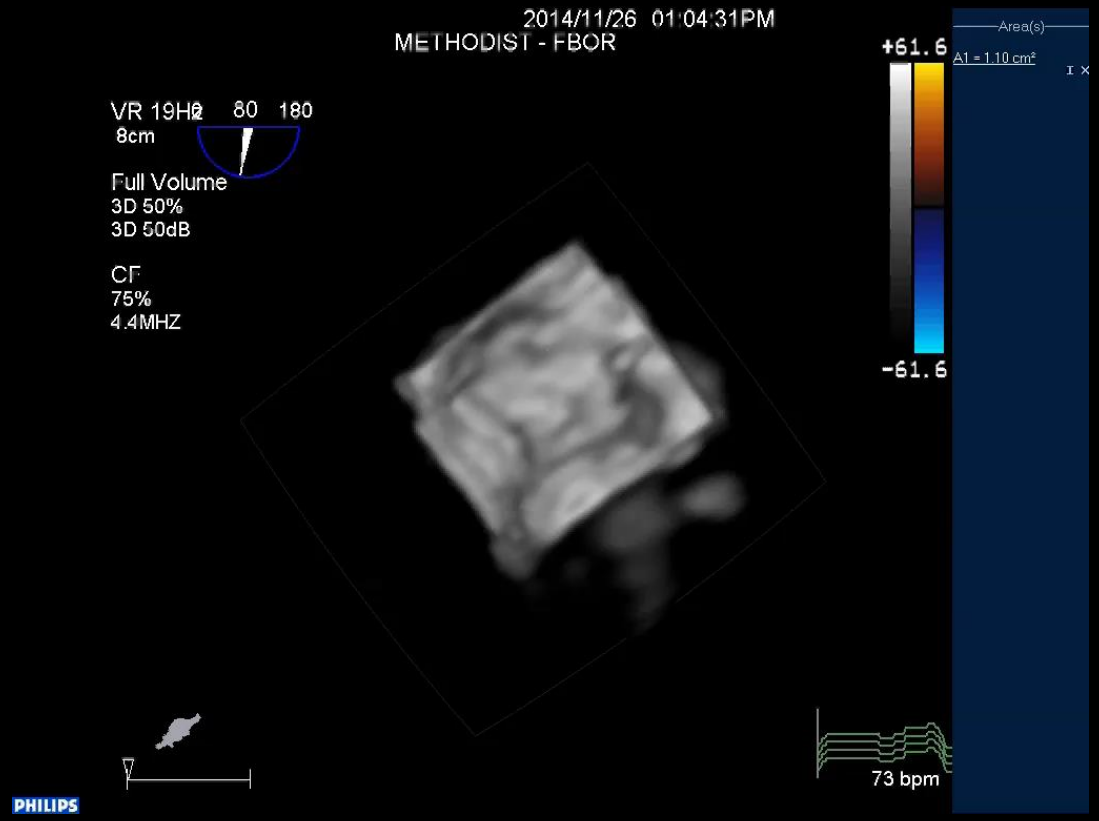
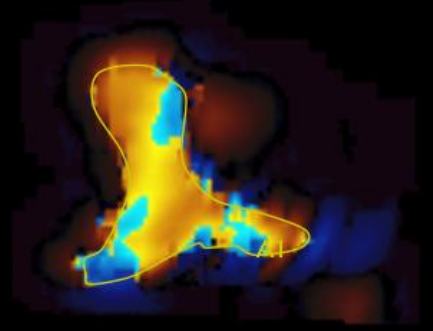
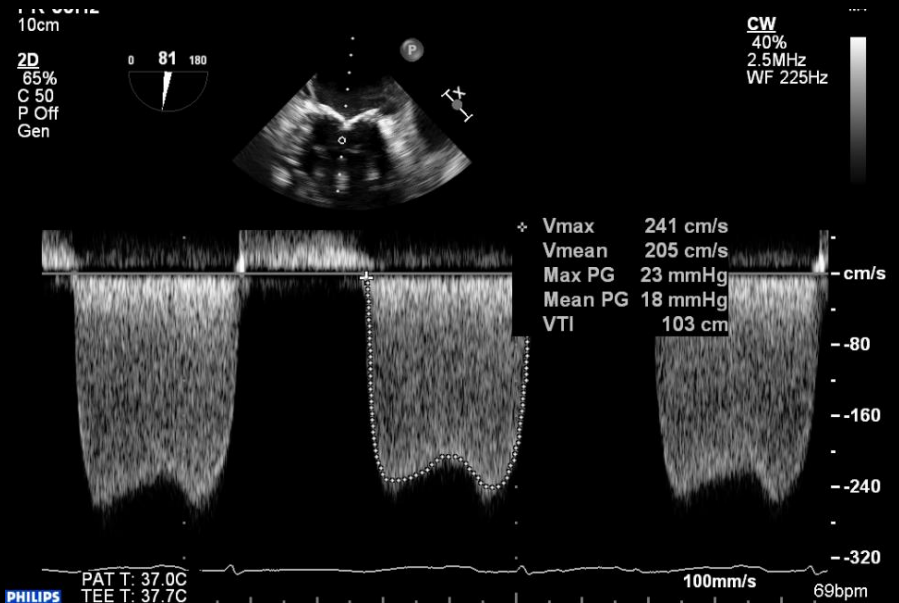
3D Color Doppler



Diastolic Area 1.1 cm^2



Mean Diastolic Gradient 18 mmHg



Trans-septal Mitral V-in-V

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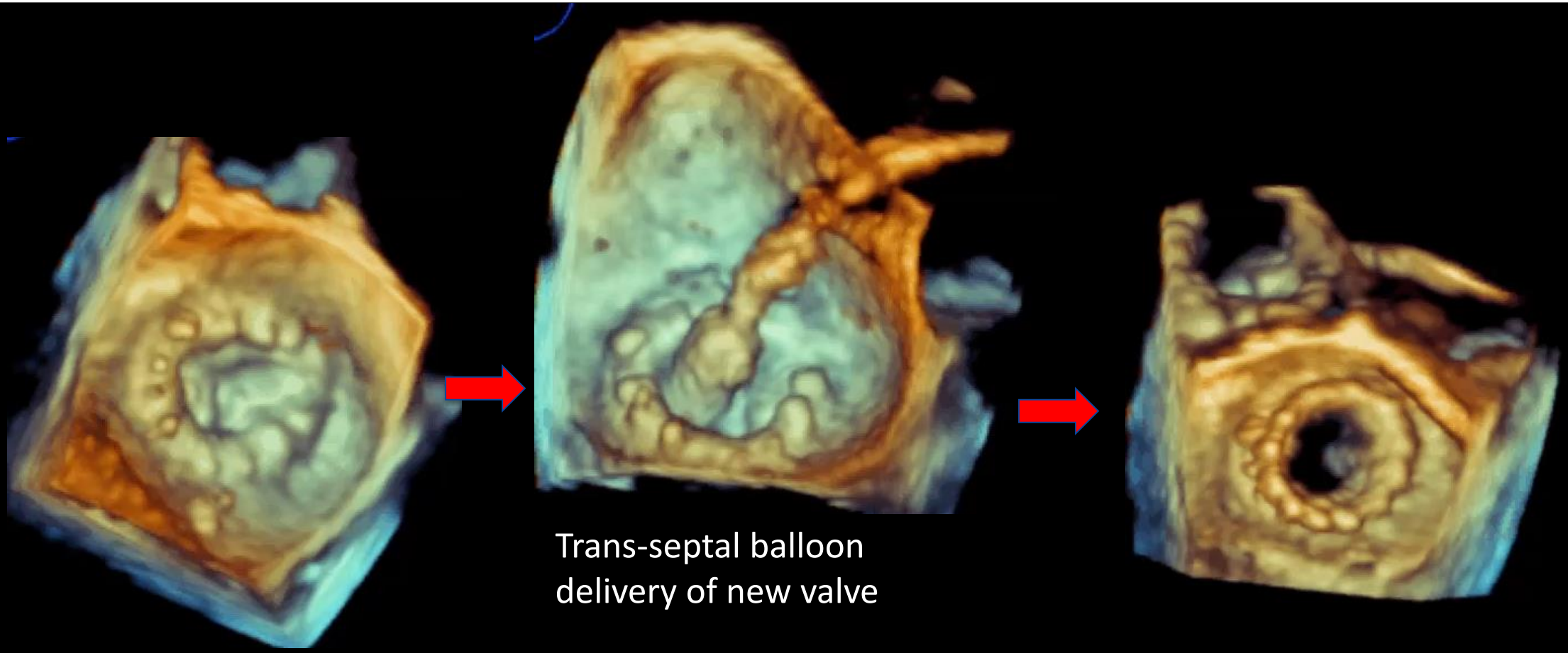

Stenotic Bioprosthetic Mitral Valve

Trans-septal balloon delivery of new valve

Sapien valve-in-valve

Normal Bioprosthetic Mitral Valve Function

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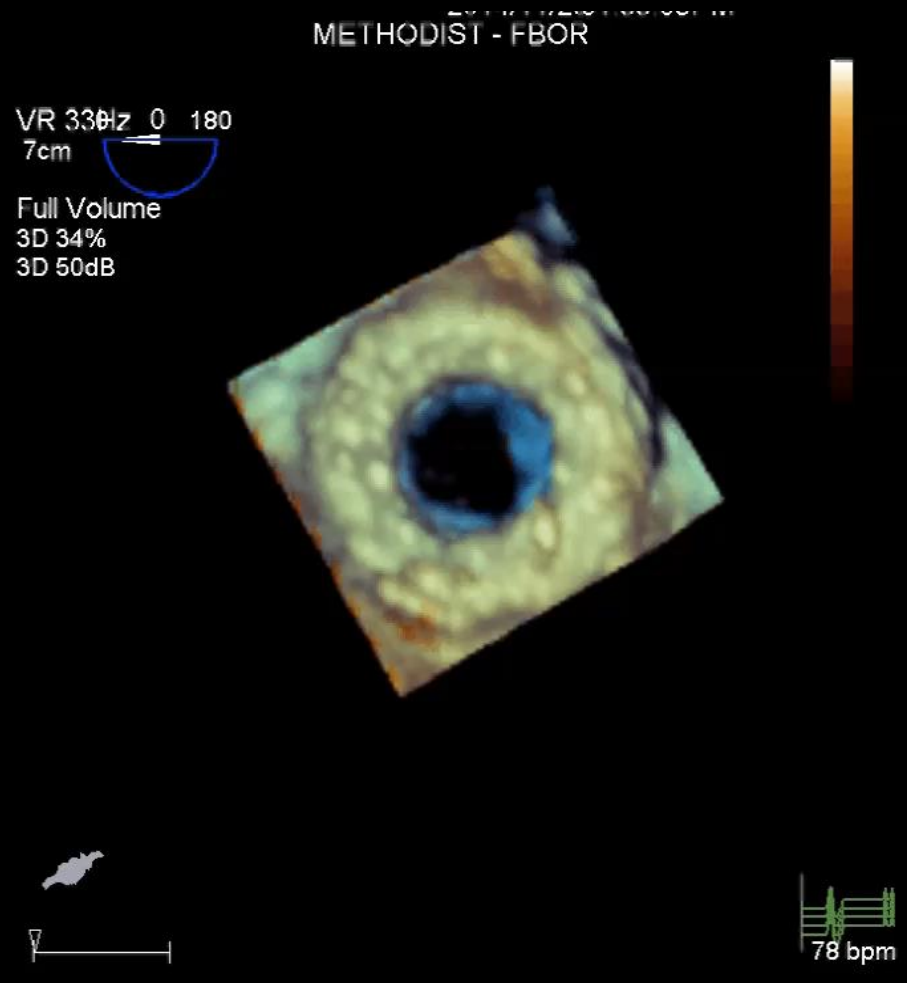
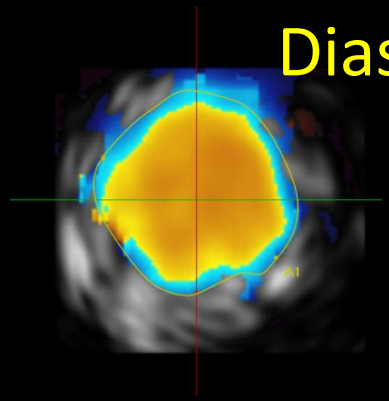
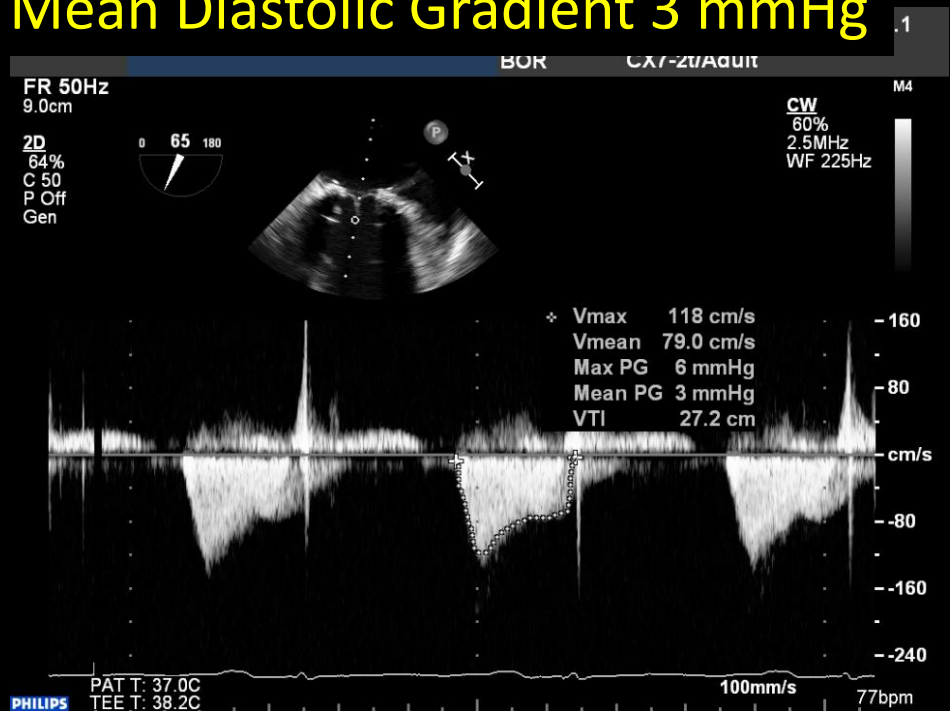
Sapien THV deployed



Diastolic Area 2.3 cm^2



Mean Diastolic Gradient 3 mmHg



Case 4:

43 yr male; 31 mm SJM MVR; Dyspnea

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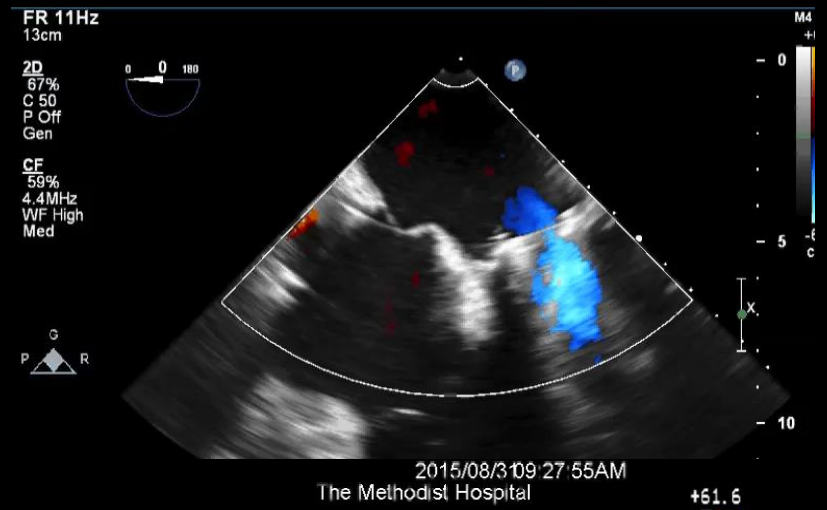
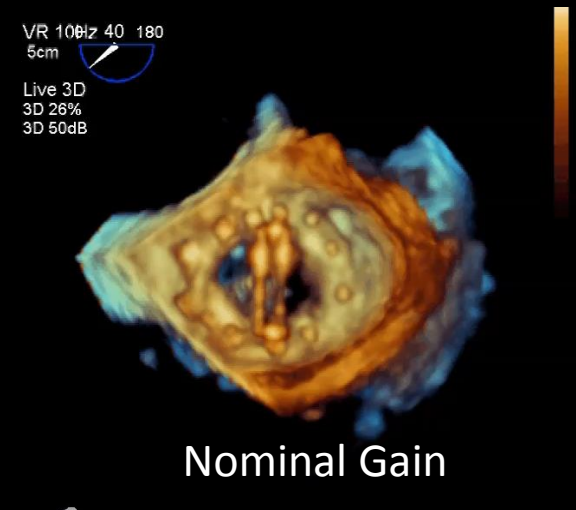
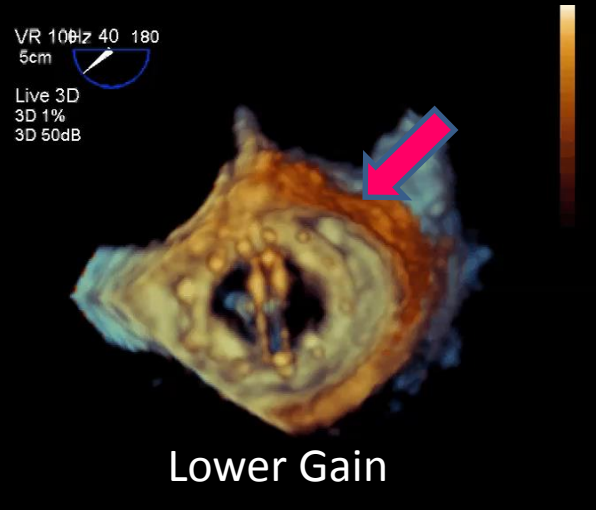
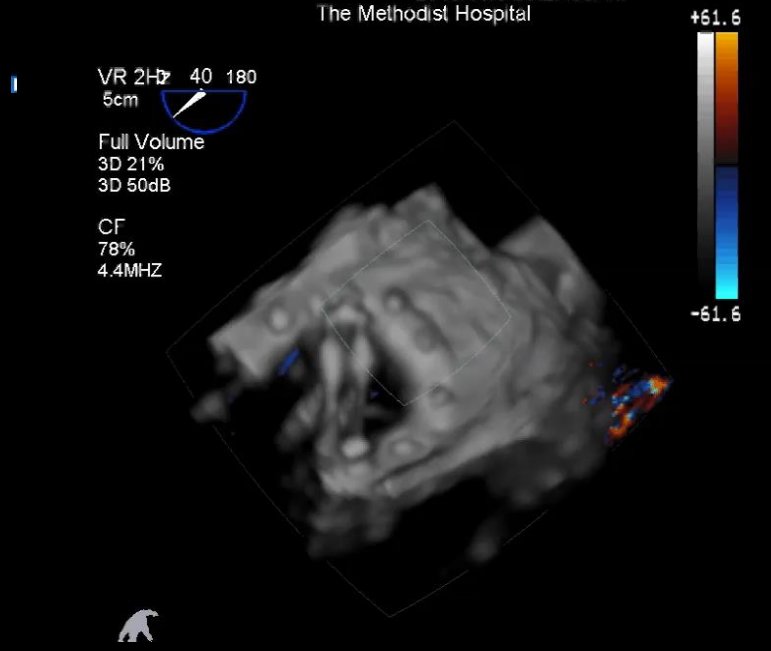


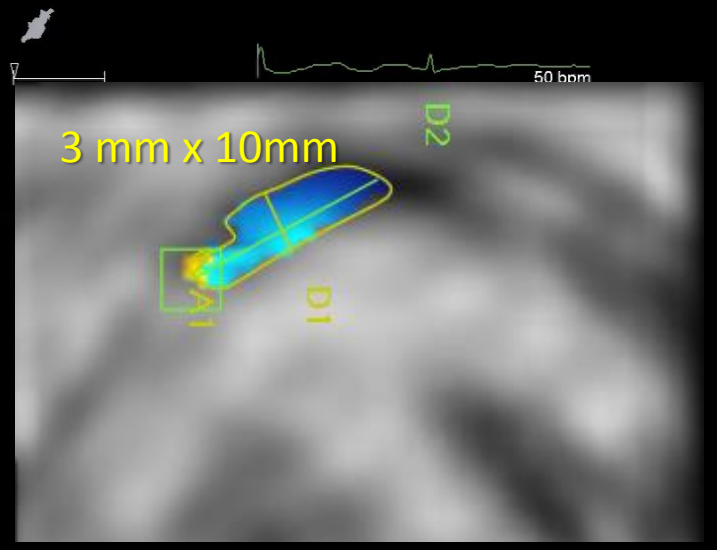


Nominal Gain



Lower Gain





3DTEE to Evaluate & Trouble Shoot

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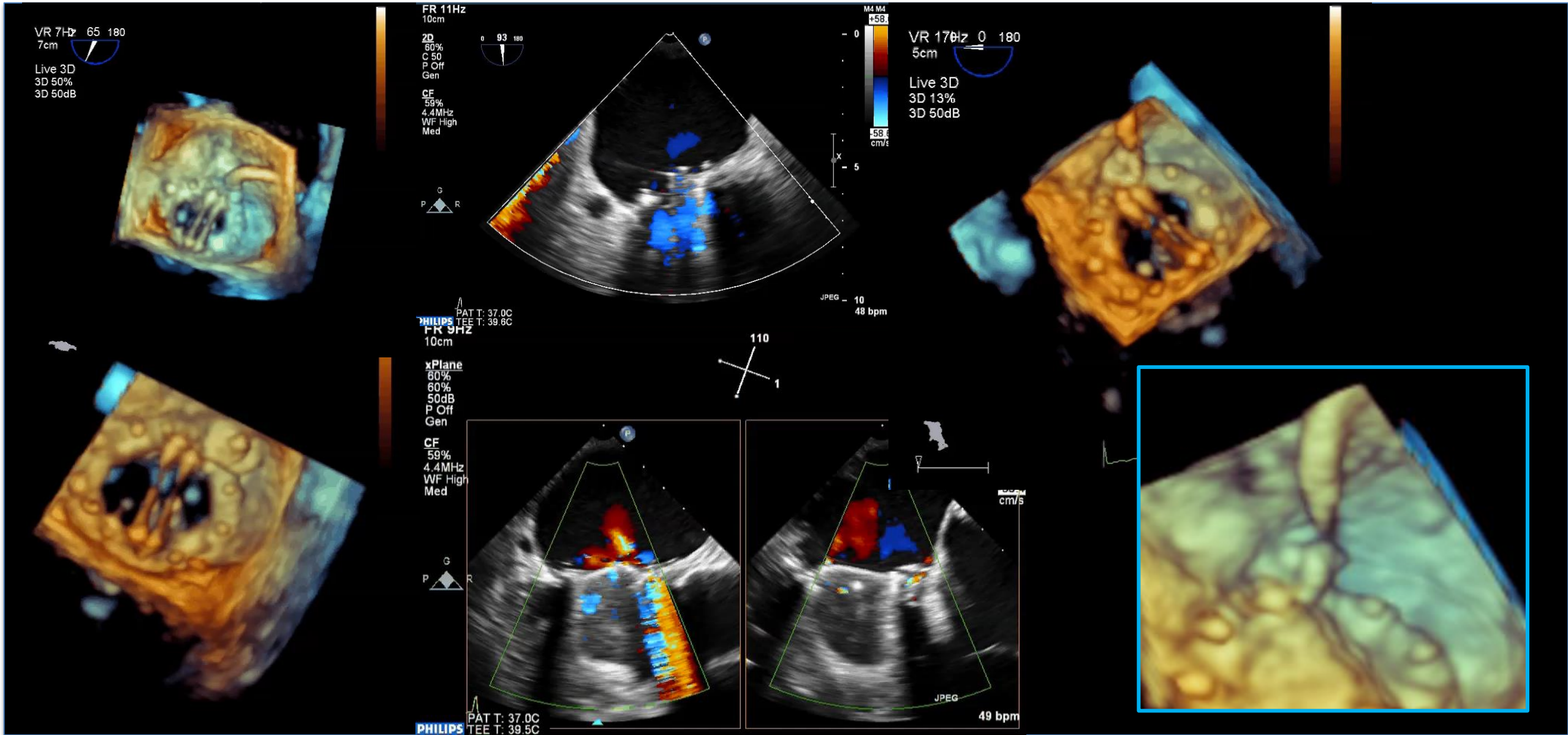

Take Home Points

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- Figure out what it is you are trying to accomplish with 3D echocardiography.
- Good 2D equates to good 3D.
- 3D echocardiography can help better assess valvular pathology.
- Simultaneously assess multiple imaging planes with 3D echocardiography.

Stephen H. Little, MD

shlittle@houstonmethodist.org

@slittlemd

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