3D Assessment of the Cardiac Valve: Learn the Views and Anatomy

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Outline

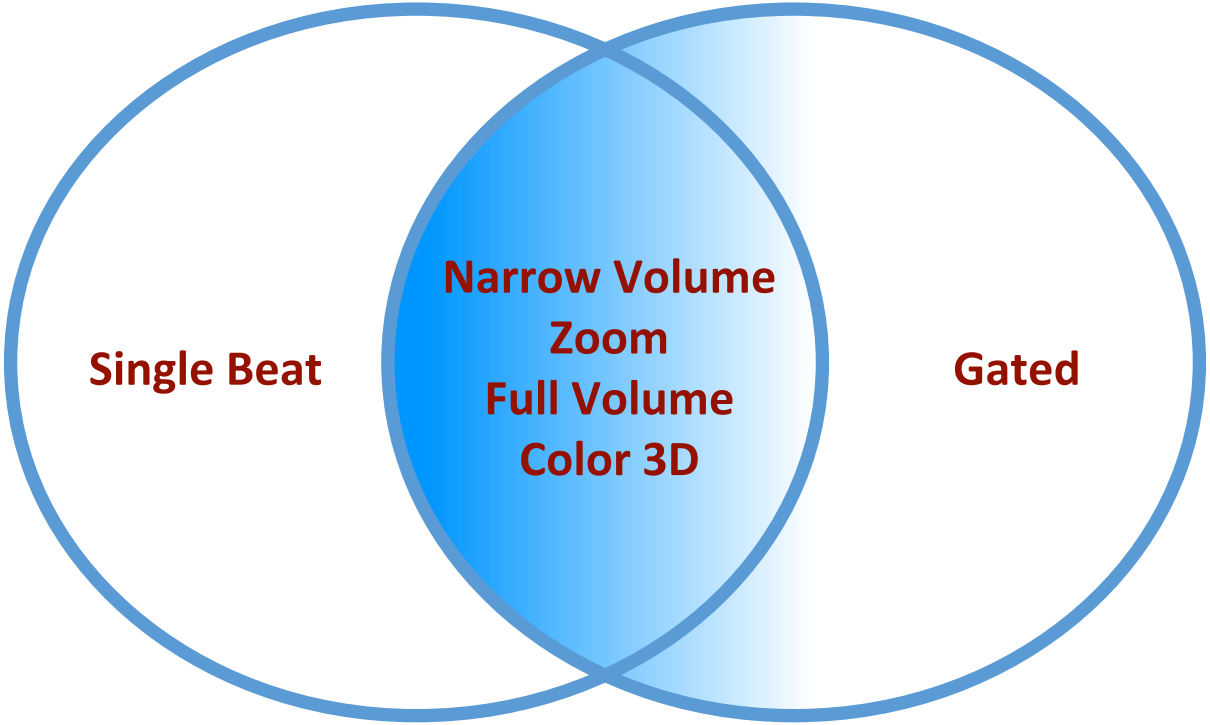
- Acquisition

- 3D Assessment of Each Valve
  - Mitral Valve
  - Tricuspid Valve
  - Aortic Valve
  - Pulmonic Valve

When is 3D Helpful?

- Determining exact pathology - clefts, commissural disease, perforations, in addition to prolapse/flail
- Determining origin of multiple regurgitant jets
- Visualizing all valve leaflets/scallops at one time
- Changes in valve geometry and annular pathology
- Quantifying Regurgitant Jets

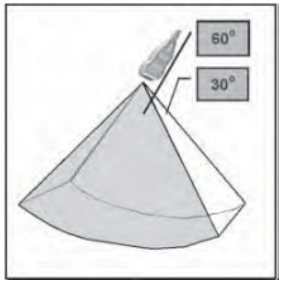
Acquisition



Acquisition

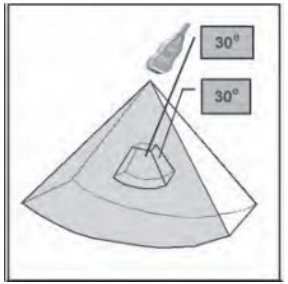
Narrow Volume/Live 3D

- 60 x 30 dataset at depth of Initial 2D image
- Good temporal and spatial resolution



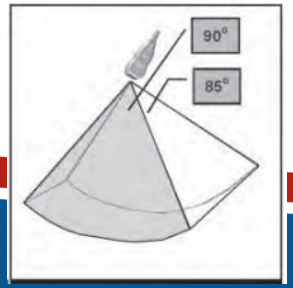
Zoom

- 30 x 30 dataset
- Good temporal and
- spatial resolution



Wide-Angle/Full Volume

- Wider dataset (90 x 85)
- Lower frame rate because of size



Hung et al. 2007. JASE 20 (3), pg 213-233

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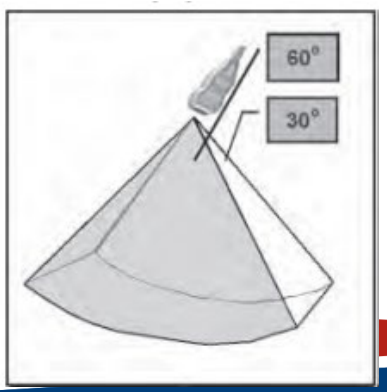
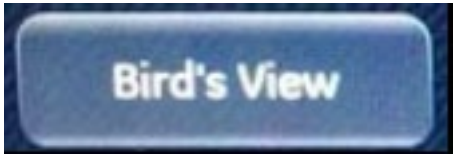


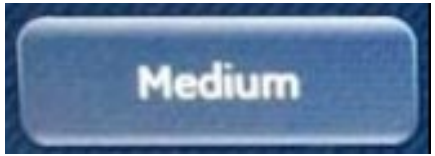
Philips

Epiq

IE33

GE





Hung et al. 2007. JASE 20 (3), pg 213-233

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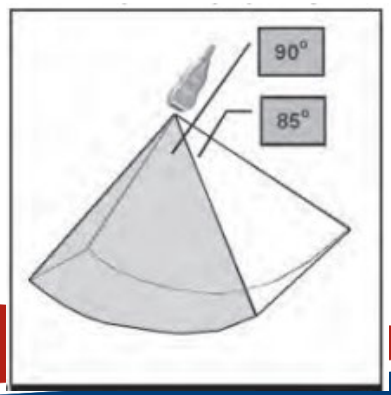

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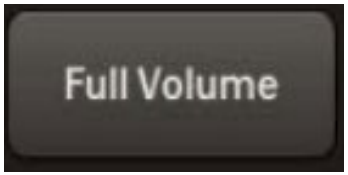

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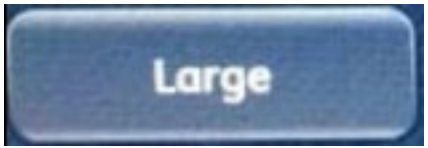

Hung et al. 2007. JASE 20 (3), pg 213-233

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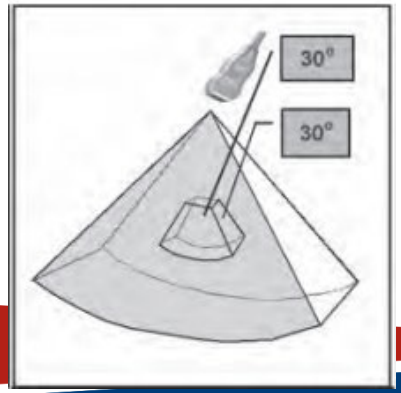

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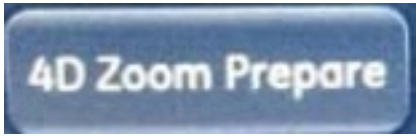

Hung et al. 2007. JASE 20 (3), pg 213-233

Which “View” to Use?

- The acoustic window from which the valve is best visualized with 2D is usually used to acquire a 3D dataset.
- There is not one “standard view” to obtain a 3D dataset from.

If you can see it, you can 3D it

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  - Mitral Valve
  - Tricuspid Valve
  - Aortic Valve
  - Pulmonic Valve

Mitral Valve

Mode & Views

Anatomy & Orientation

When is 3D Helpful?

Mitral Valve

Mode

- **Narrow Volume**
- **Zoom**
- **Wide-Angle/Full Volume**
- **Color 3D**

Views

TEE

- **Mid-esophageal 4C**
- Mid-esophageal mitral comm
- Mid-esophageal 2C
- Mid-esophageal LAX
- Transgastric 2C

TTE

- **Parasternal LAX**
- **Apical 4C**
- Apical 2C
- Apical 3C
- Subcostal 4C

Mitral Valve

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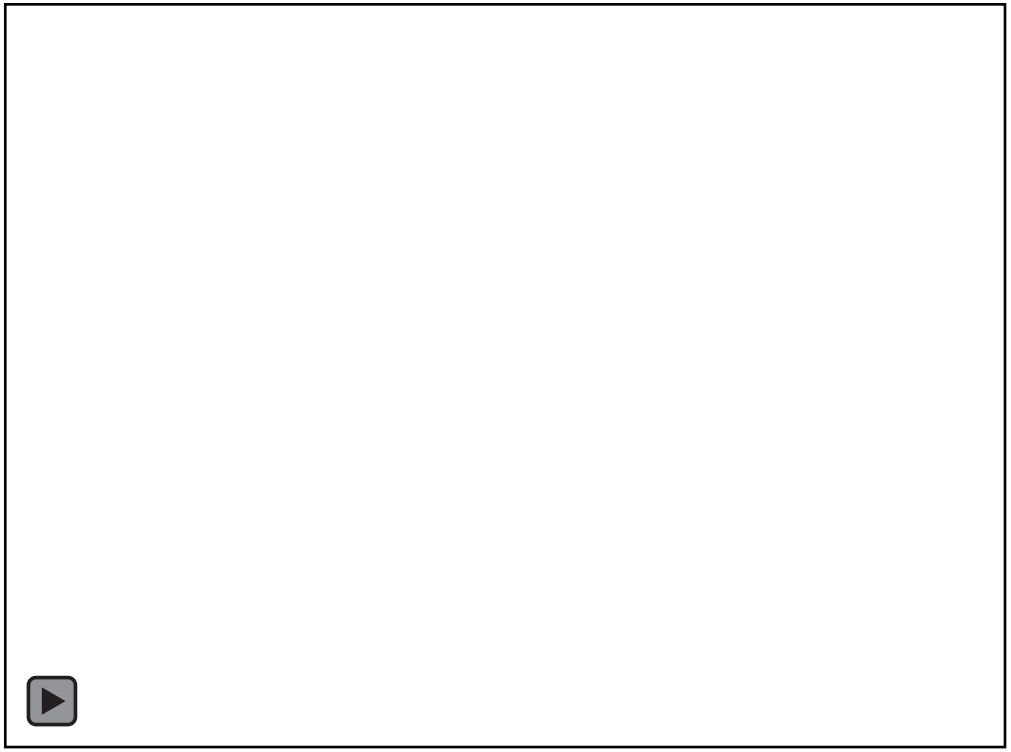

Mode & Views

Anatomy & Orientation

When is 3D Helpful?

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- **Determining exact pathology**
- Determining origin of multiple regurgitant jets
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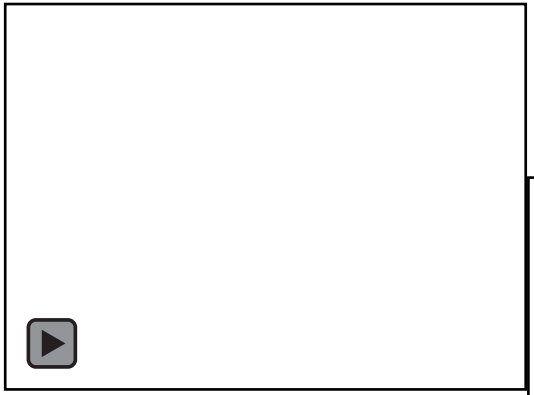
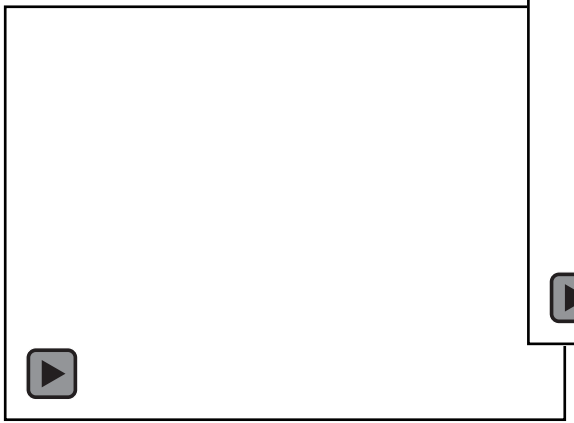
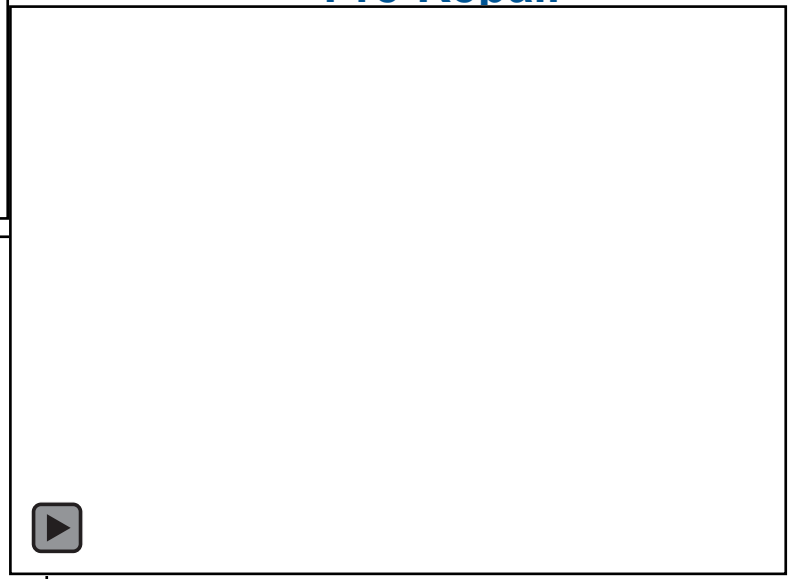
Case 1

Pre-Repair







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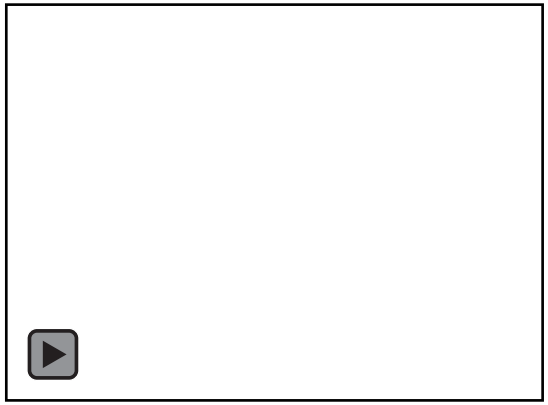
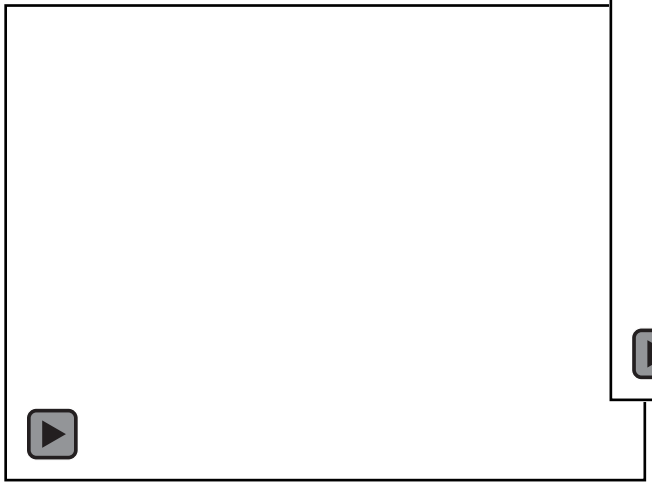
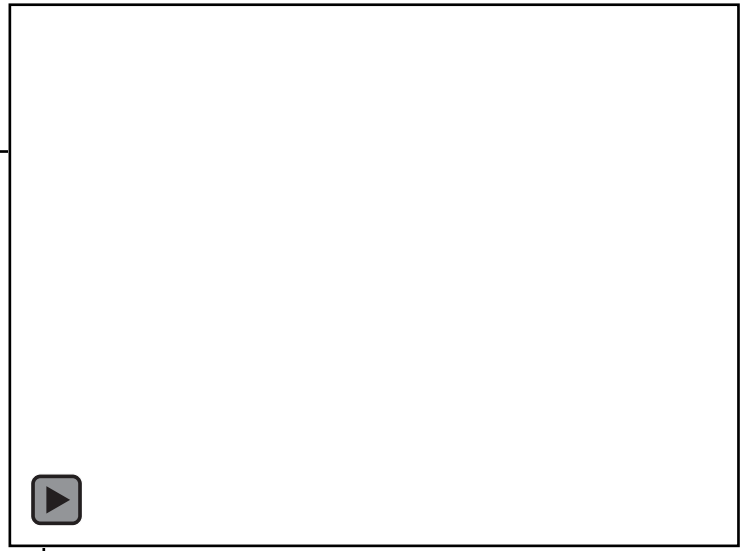


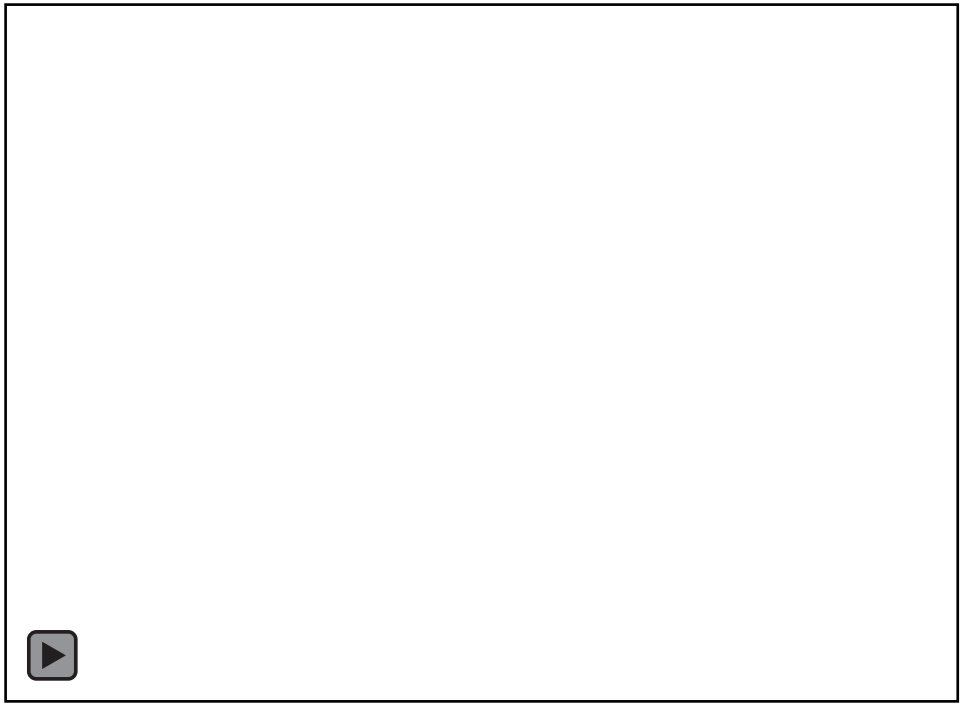


Post-Repair



Case 1

Post-Repair, 2nd CPB run



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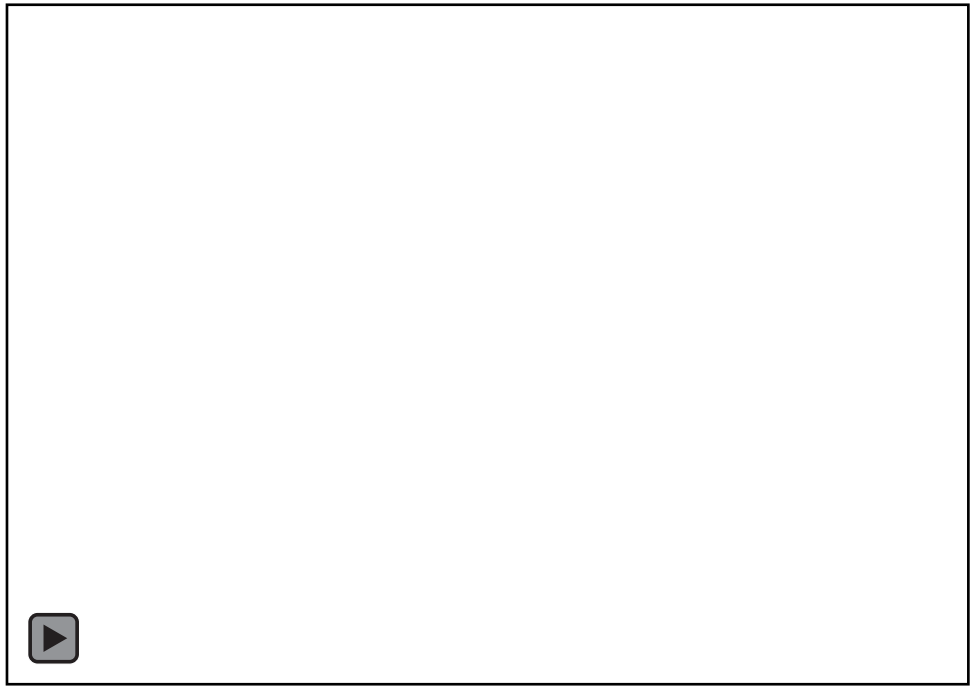
Case 2



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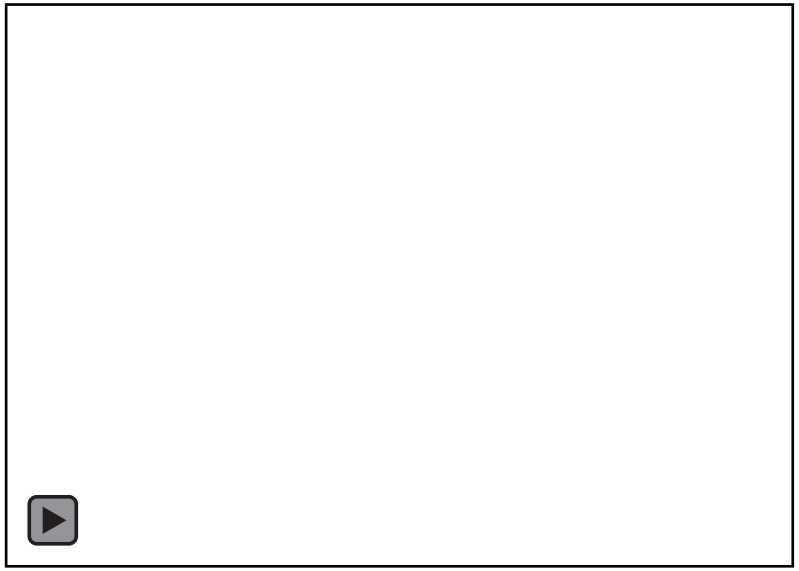

When is 3D Helpful?

Case 2

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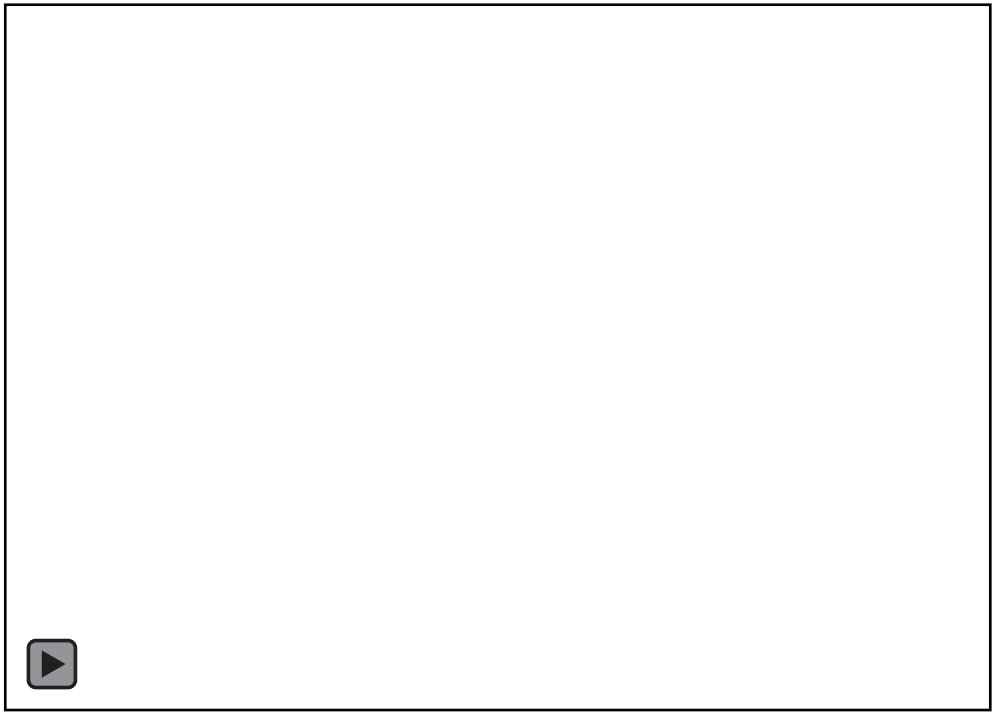


Tricuspid Valve

Mode & Views

Anatomy & Orientation

When is 3D Helpful?

Tricuspid Valve

Mode

- **Narrow Volume**
- **Zoom**
- **Wide-Angle/Full Volume**
- **Color 3D**

Views

TEE

- **Mid-esophageal 4C**
- Mid-esophageal RV I/O
- Mid-esophageal modified bicaval
- Deep Transgastric
- Transgastric RV I/O

TTE

- **Parasternal RV LAX**
- **Apical 4C**
- Subcostal 4C

Tricuspid Valve

Mode

- Narrow Volume
- Zoom
- Wide-Angle/Full Volume
- Color 3D

Views

TEE

- **Mid-esophageal 4C**
- Mid-esophageal RV I/O
- Mid-esophageal modified bicaval
- Deep Transgastric
- Transgastric RV I/O

TTE

- **Parasternal RV Inflow**
- **Apical 4C**
- Subcostal 4C

Tricuspid Valve

Mode

- Narrow Volume
- Zoom
- Wide-Angle/Full Volume
- Color 3D

Views

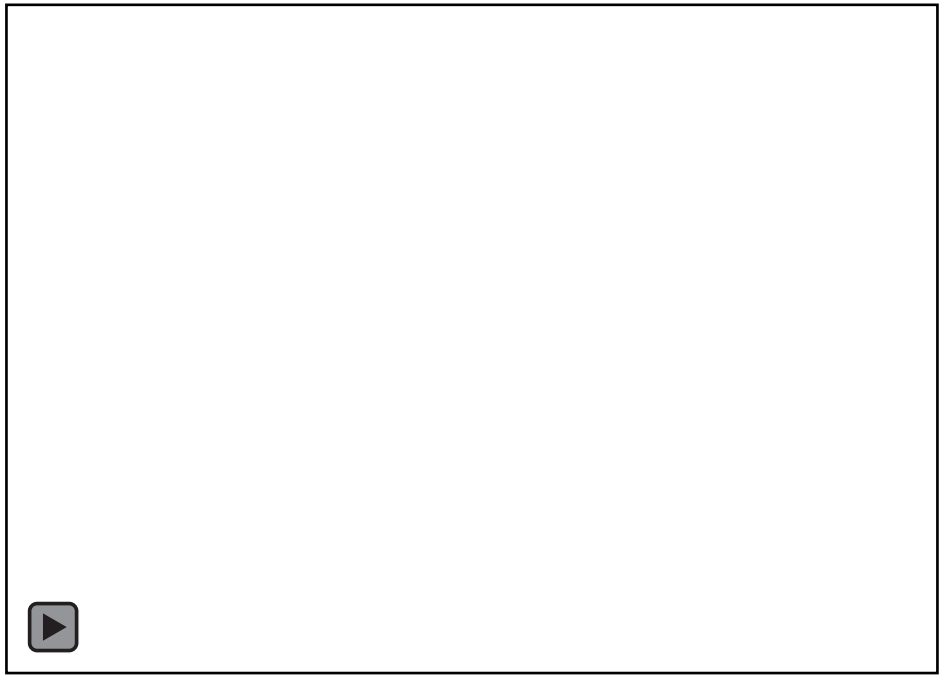
TEE

- **Mid-esophageal 4C**
- Mid-esophageal RV I/O
- Mid-esophageal modified bicaval
- Deep Transgastric
- Transgastric RV I/O

TTE

- **Parasternal RV LAX**
- **Apical 4C**
- Subcostal 4C

Tricuspid Valve

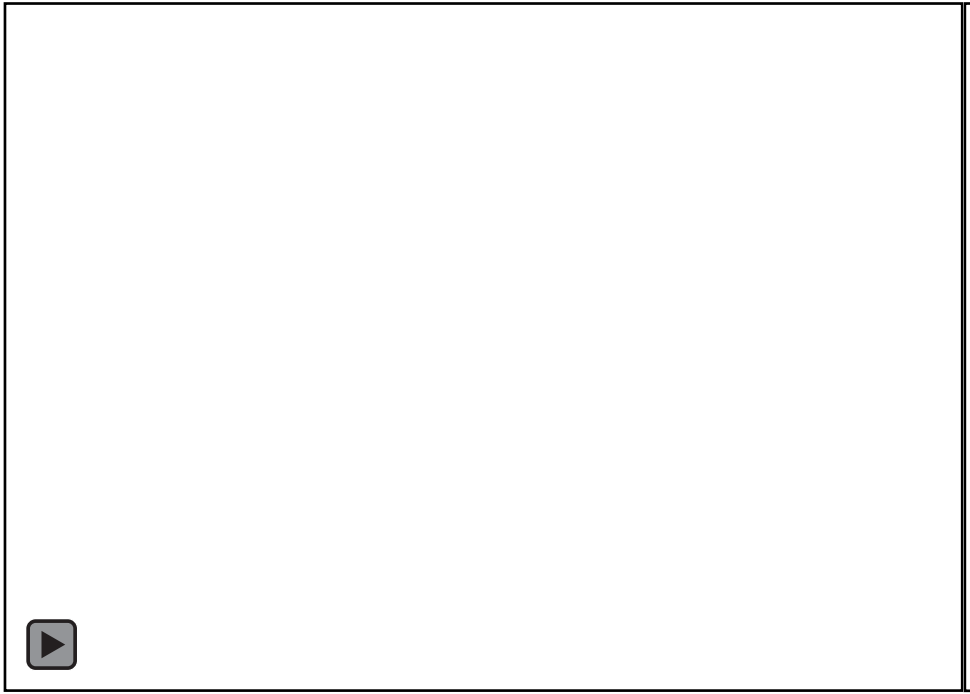


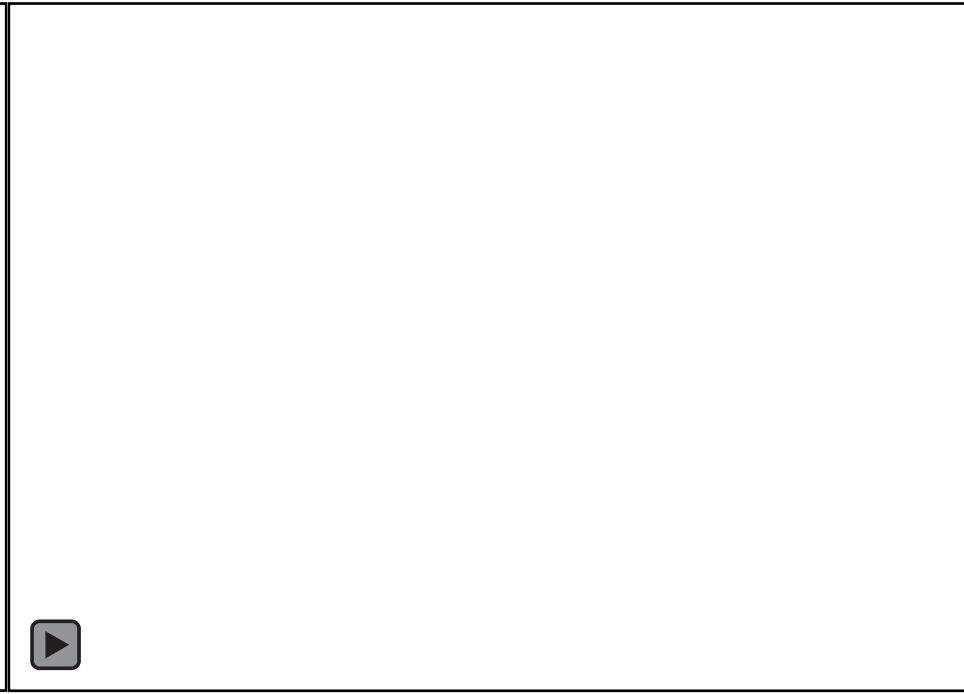
Mode & Views

Anatomy & Orientation

When is 3D Helpful?

Tricuspid Valve





Mode & Views

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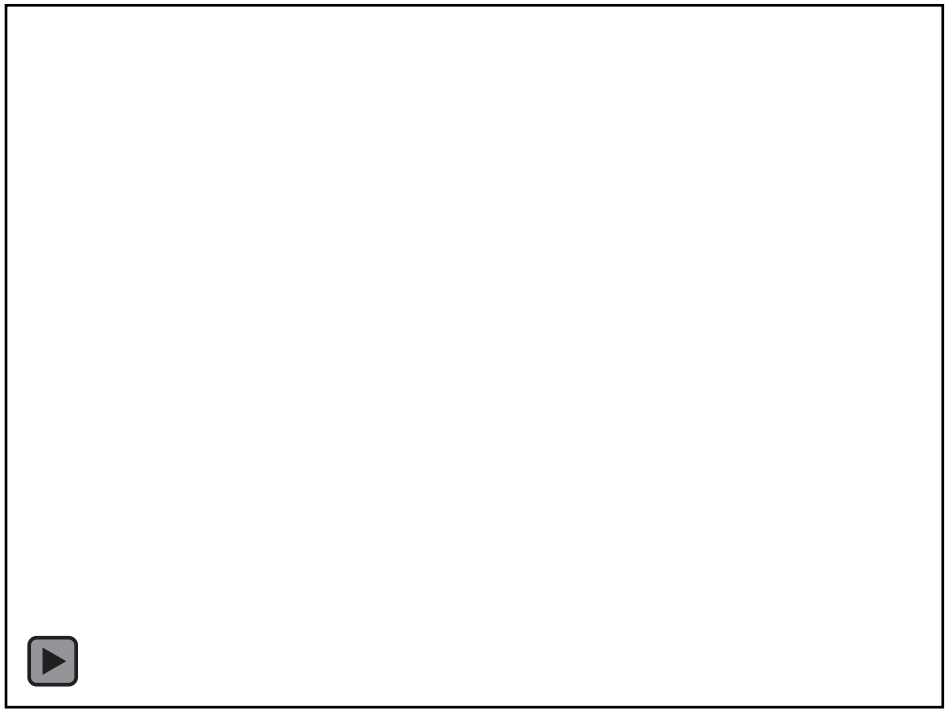
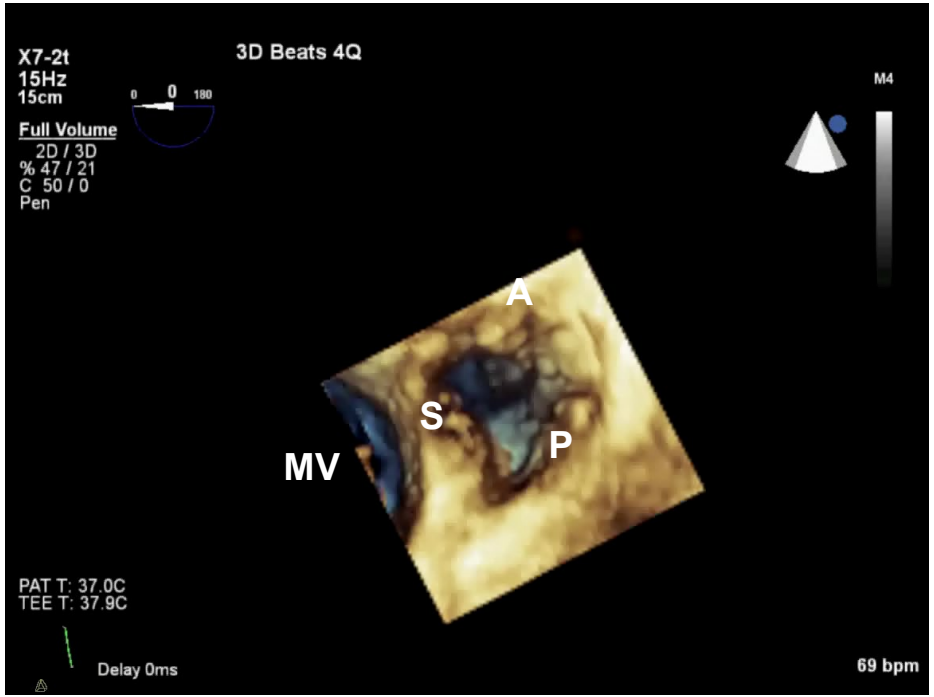
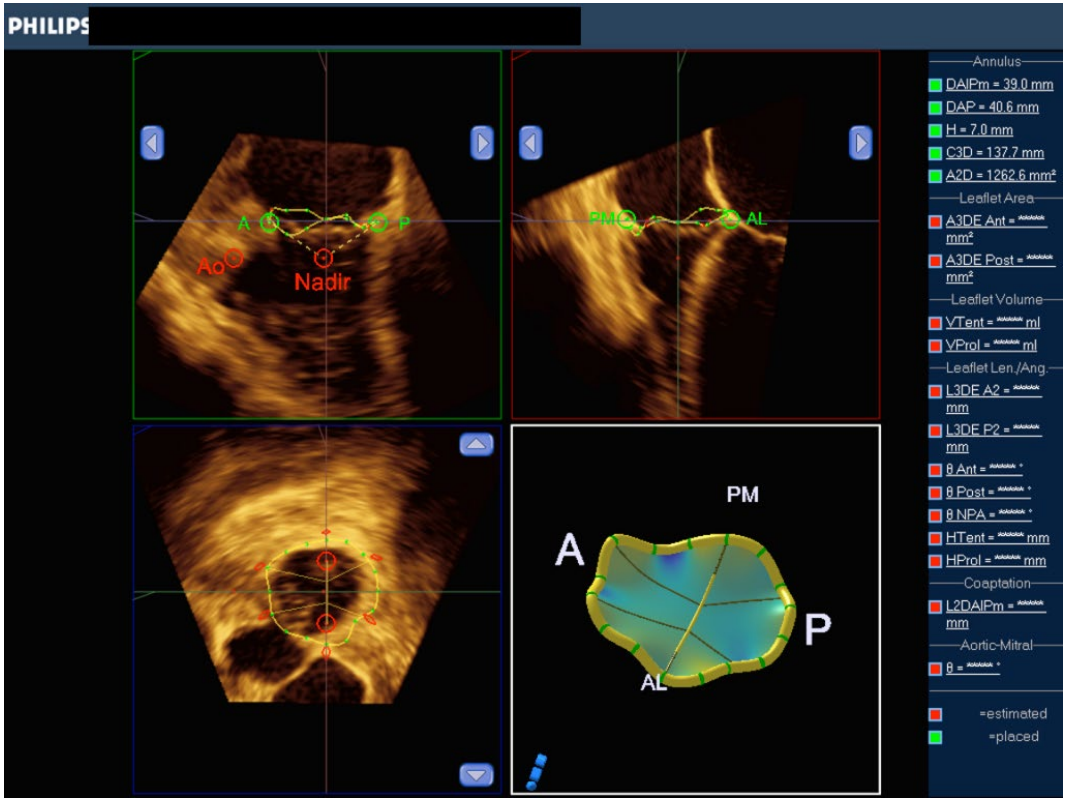
When is 3D Helpful?




X7-2t
15Hz
15cm
Full Volume
2D / 3D
% 47 / 21
C 50 / 0
Pen
3D Beats 4Q
M4
A
S
P
MV
PAT T: 37.0C
TEE T: 37.9C
Delay 0ms
69 bpm

Normal Tricuspid Valve Anatomy



Courtesy of Alina Nicoara

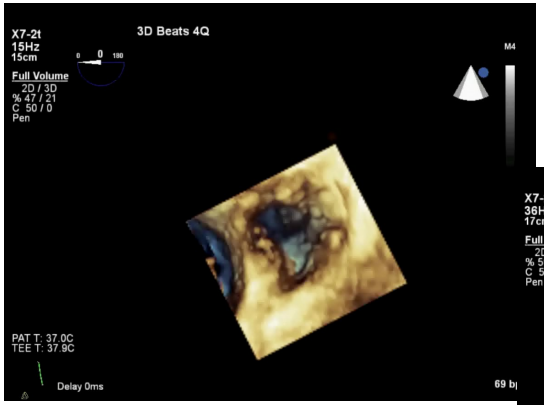
Mode & Views

Anatomy & Orientation

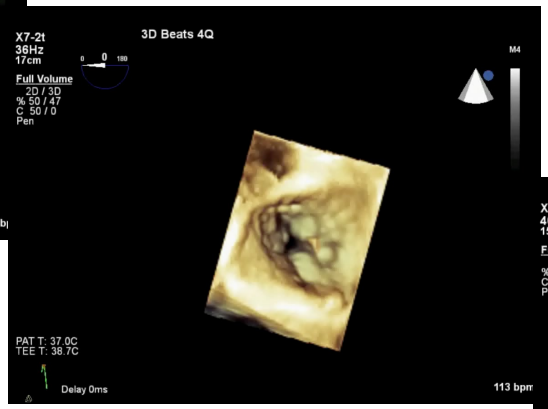
When is 3D Helpful?

Tricuspid Valve: Annulus Geometry and Leaflet Coaptation

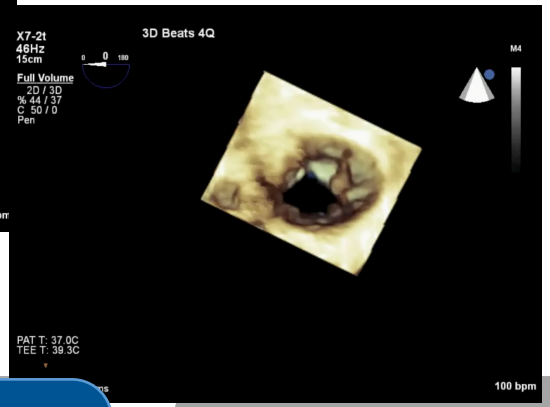
Body-to-Body



Edge-to-Edge



Malcoaptation



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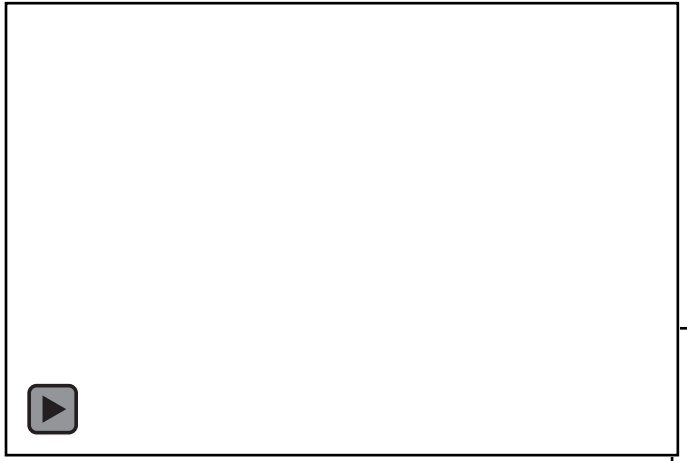

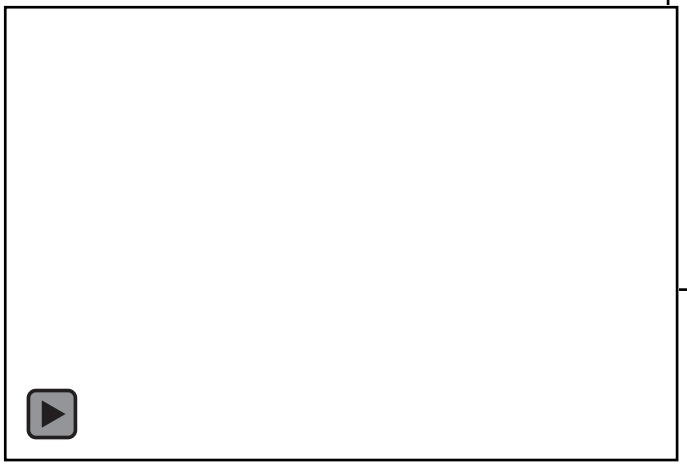

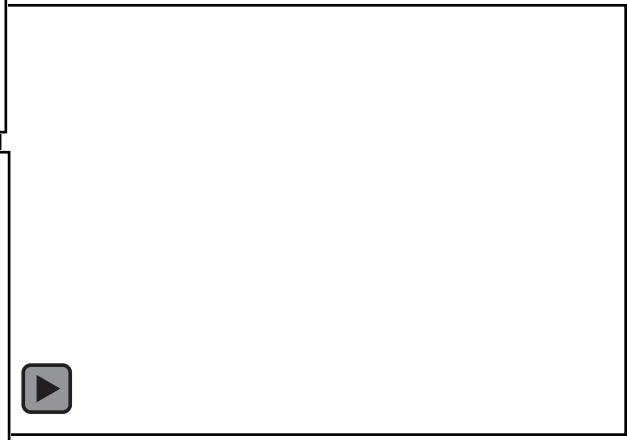

ASE American Society of Echocardiography
Sound Saves Lives

Case 1

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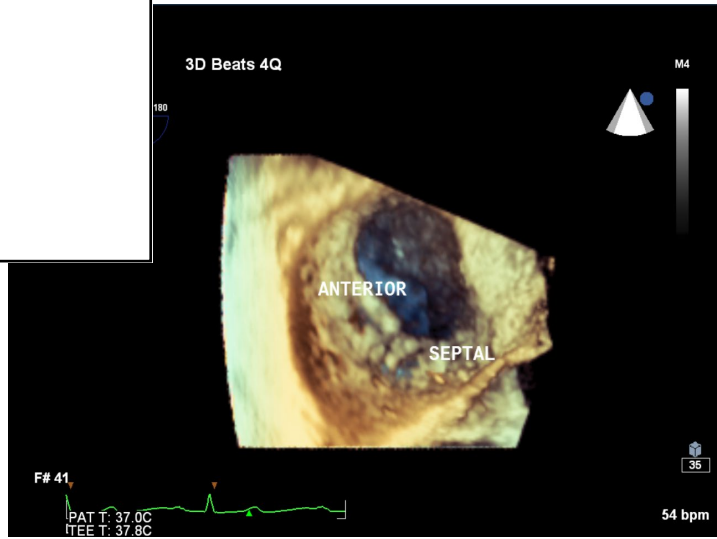

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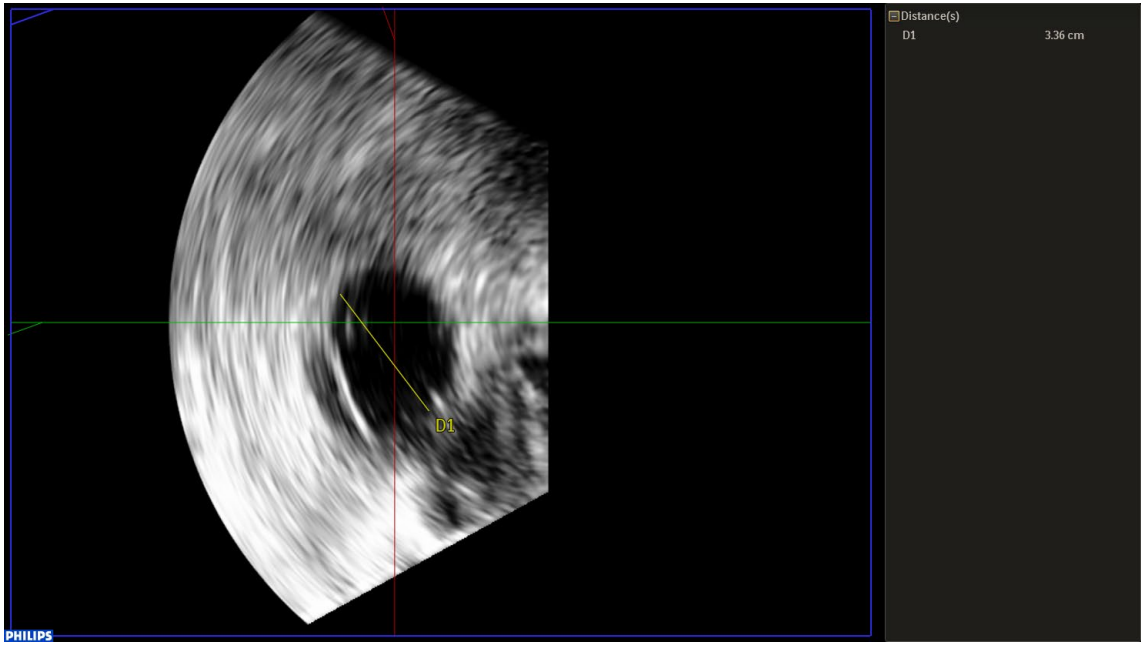

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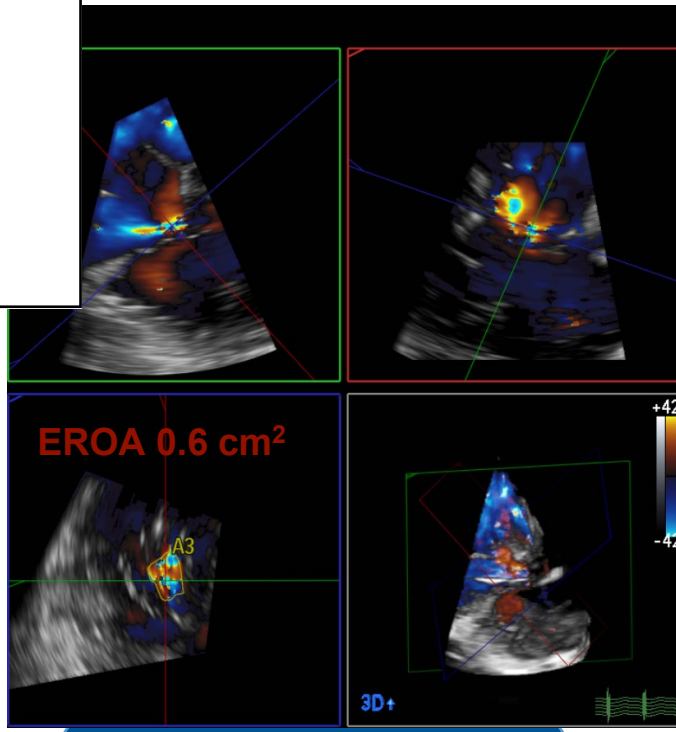

Aortic Valve

Mode & Views

Anatomy & Orientation

When is 3D Helpful?

Aortic Valve

Mode

- **Narrow Volume**
- **Zoom**
- **Wide-Angle/Full Volume**
- **Color 3D**

Views

TEE

- **Mid-esophageal LAX**
- Mid-esophageal SAX
- Transgastric LAX
- Deep Transgastric

TTE

- **Parasternal 3Ch**
- **Apical 5C**
- Parasternal RV I/O

Aortic Valve

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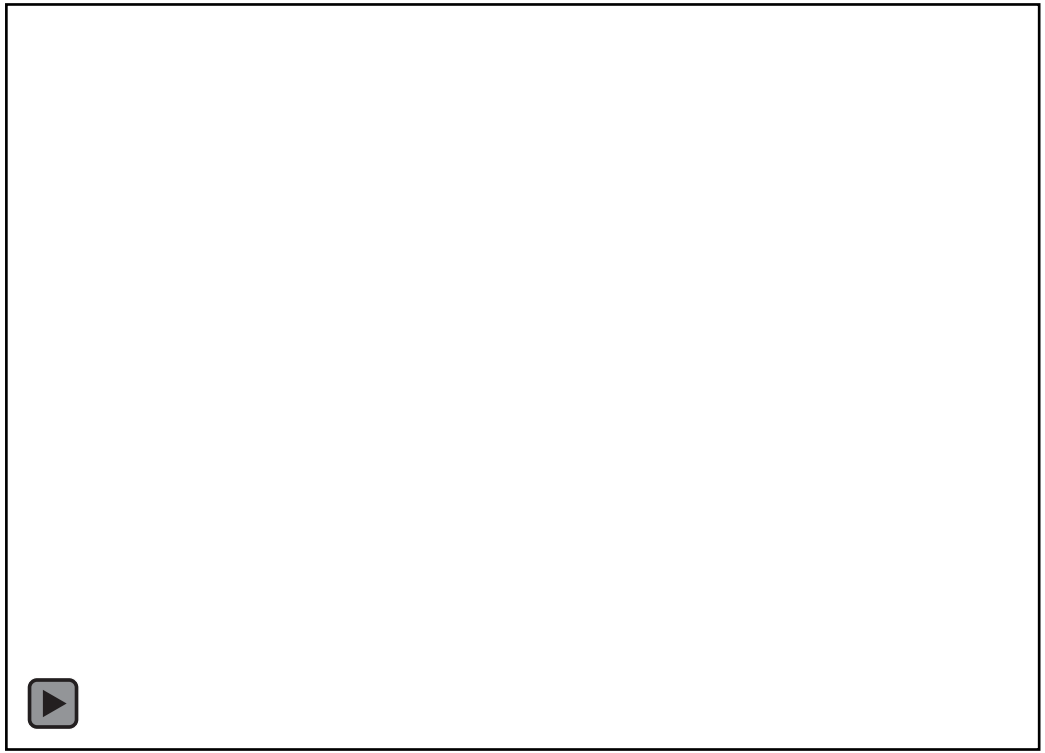
Aortic Valve



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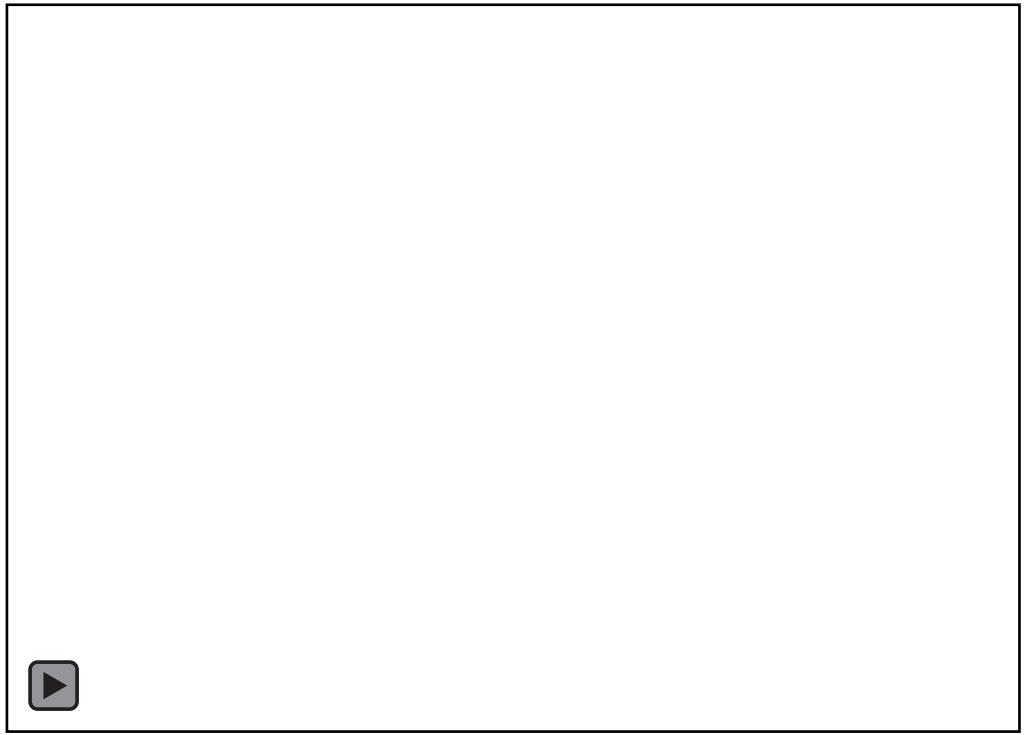

Pulmonic Valve

Mode & Views

Anatomy & Orientation

When is 3D Helpful?

Pulmonic Valve

Mode

- **Narrow Volume**
- **Zoom**
- **Wide-Angle/Full Volume**
- **Color 3D**

Views

TEE

- **Mid-esophageal RV I/O**
- Upper esophageal ascending aorta short axis
- **Upper esophageal aortic arch long axis**
- Transgastric RV I/O

TTE

- **Parasternal RV I/O**
- **Parasternal RV Outflow**
- Subcostal RV I/O

Pulmonic Valve

Mode

- **Narrow Volume**
- **Zoom**
- **Wide-Angle/Full Volume**
- **Color 3D**

Views

TEE

- **Mid-esophageal RV I/O**
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Pulmonic Valve

Views

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- **Parasternal RV Outflow**
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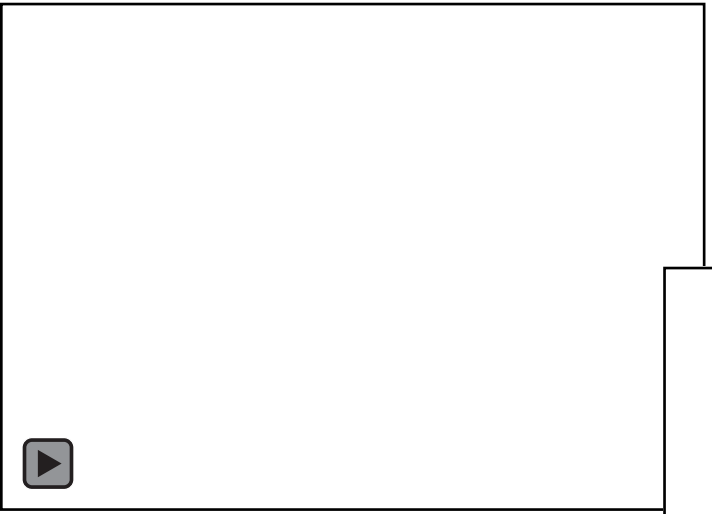
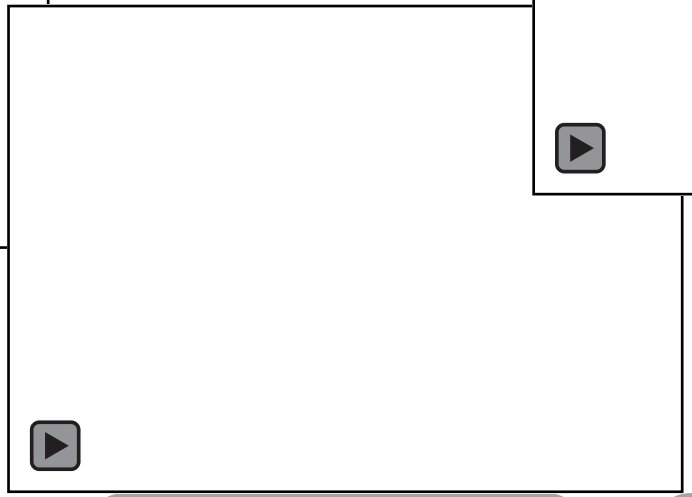
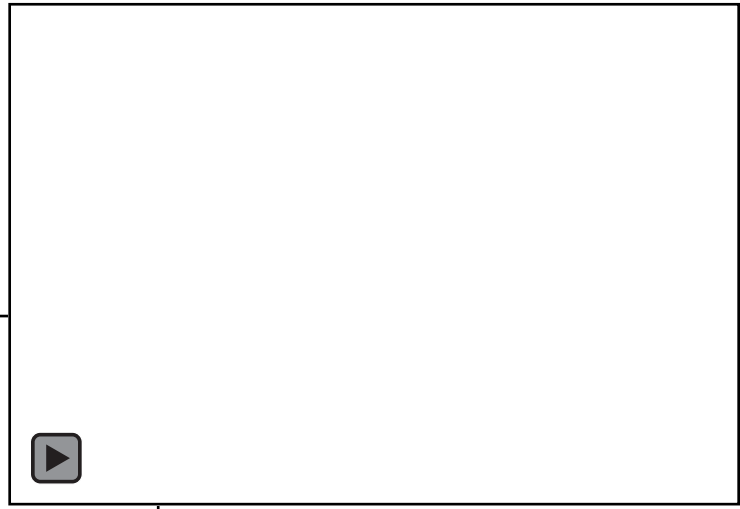
Pulmonic Valve





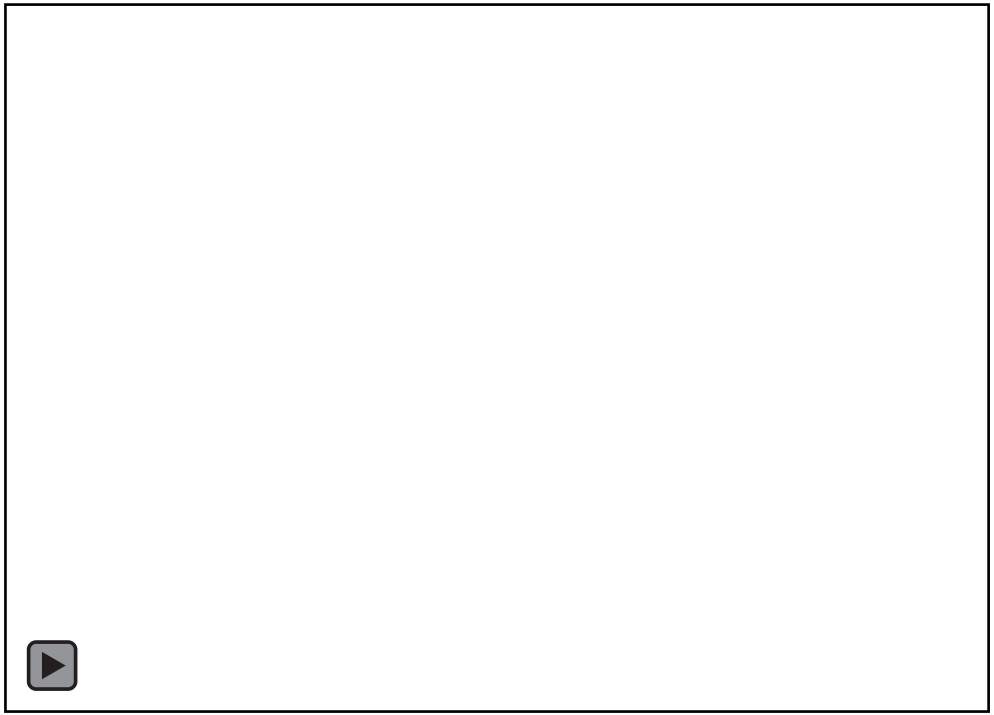


Mode & Views

Anatomy & Orientation

When is 3D Helpful?

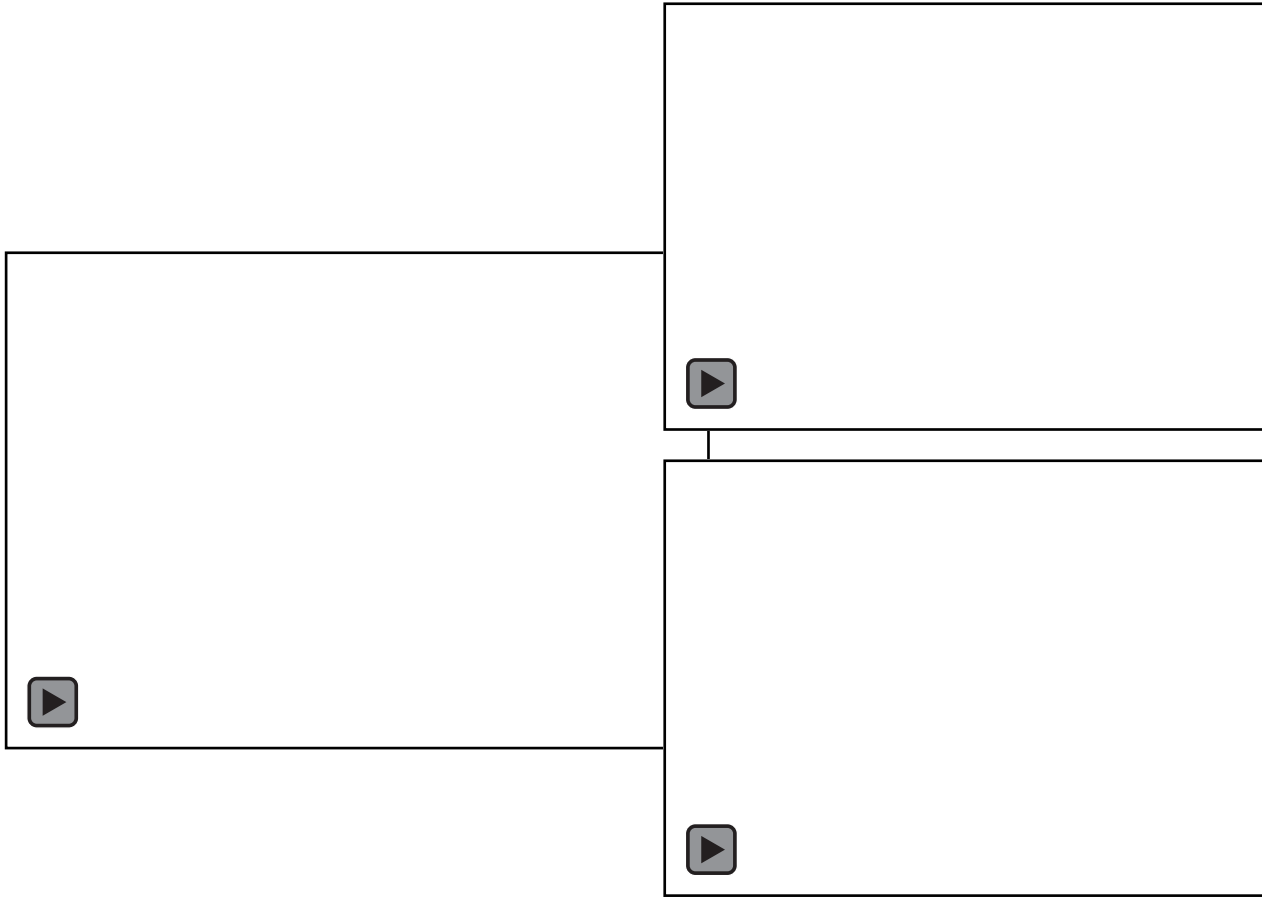
Pulmonic Valve



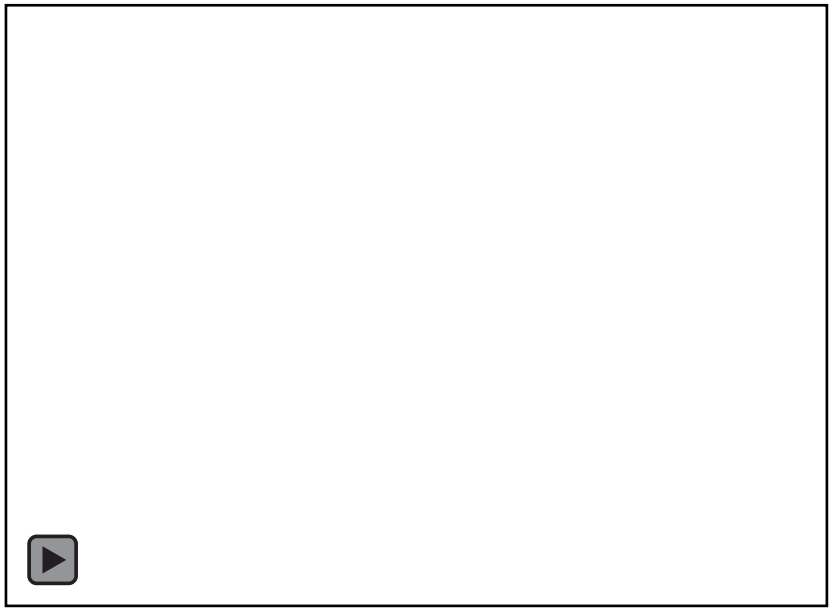
Mode & Views | Anatomy & Orientation | When is 3D Helpful?

When is 3D Helpful?

- **Determining exact pathology**
- Determining origin of multiple regurgitant jets
- Visualizing all valve leaflets/scallops at one time
- Changes in valve geometry and annular pathology
- Quantifying Regurgitant Jets



Thank you!



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