TAVR Cases

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Disclosures

Speakers Bureau (Philips, Medtronic)
Advisory Board (Siemens)
First Let’s Set the Stage...

TAVR | Intraprocedural Echo Evaluation

When...

- Proper preprocedural TAVR valve sizing is done, and
- When newer generation TAVR valves are used,
- By a experienced TAVR team

... TAVR procedure is typically uneventful
... Complications are relatively rare
What to Look For During TAVR on Echo?

- TAVR Valve Function
- Paravalvular Leak
- Complications

Question | Echo Type

Should I use transesophageal echo (TEE) or transthoracic echo (TTE) during TAVR procedures?
## NYU TAVR Program | TEE vs. TTE

Sep 1, 2011 – Jan 21, 2018

### NYU Sedation / TTE Experience

<table>
<thead>
<tr>
<th></th>
<th>NYU Pre-Sedation Protocol (2011-2013)</th>
<th>STS/TVR Registry 2014</th>
<th>NYU Sedation Monsth 1-3</th>
<th>NYU Sedation Monsth 4-6</th>
<th>NYU Sedation Monsth 7-9</th>
<th>NYU Sedation Monsth 10-12</th>
<th>NYU Sedation Entire Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Cases</td>
<td>55</td>
<td>12558</td>
<td>55</td>
<td>42</td>
<td>58</td>
<td>59</td>
<td>214</td>
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<tr>
<td># of Sedation Cases</td>
<td>0</td>
<td>629</td>
<td>42</td>
<td>35</td>
<td>58</td>
<td>59</td>
<td>194</td>
</tr>
<tr>
<td>% Sedation Cases</td>
<td>0%</td>
<td>5%</td>
<td>76%</td>
<td>83%</td>
<td>100%</td>
<td>100%</td>
<td>91%</td>
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<tr>
<td>Average LOS (days)</td>
<td>5.4</td>
<td>6.1</td>
<td>3.1</td>
<td>2.5</td>
<td>2.6</td>
<td>2.1</td>
<td>2.6</td>
</tr>
<tr>
<td>Median LOS (days)</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Average Procedure Time (hh:mm)</td>
<td>2:37</td>
<td>1:19</td>
<td>1:30</td>
<td>1:33</td>
<td>1:23</td>
<td>1:20</td>
<td>1:21</td>
</tr>
<tr>
<td>In-hospital Mortality</td>
<td>5.5%</td>
<td>4.0%</td>
<td>3.6%</td>
<td>2.3%</td>
<td>0.0%</td>
<td>1.7%</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

### NYU Sedation / TTE Program

Decrease in length of stay and in-hospital mortality
TAVR Valve Function

TAVR: Markers of Good Implantation

Seal-Velocity-Shape (SVS) Triad

Valve Seal / Regurgitation
- No significant paravalvular or transvalvular aortic regurgitation

Valve Velocity / Gradient
- Vmax typically < 2.0 m/sec

Valve Shape & Location
- Short axis: Circular rather than ovoid
- Long axis: Proximal end just a few millimeters in the LVOT

If one or more suboptimal, consider:
- Repositioning TAVR valve (for self-expanding valves)
- Post-dilatation of TAVR valve with a balloon
- Implantation of another TAVR valve (valve-in-valve procedure)
TAVR Valve Velocity / Gradients

Good TAVR Result

Before TAVR
Severe native valve stenosis

Vmax = 4.3 m/sec
Peak/Mean Gradient 74/43 mm Hg
Time to peak gradient 140 msec (late peaking)

After TAVR
Minimal aortic valve gradients

Vmax = 1.4 m/sec
Peak/Mean Gradient 9/3 mm Hg
Time to peak gradient 95 msec (early peaking)
TAVR Valve Shape & Location

TAVR Valve Shape

Optimal Shape
Circular
TAVR Valve Shape

**SUBOPTIMAL SHAPE**
Ovoid

TAVR Valve Location

**OPTIMAL LOCATION**
No excessive protrusion into LVOT
TAVR Valve Location

**SUBOPTIMAL LOCATION**
Too deep into LVOT

TAVR Valves

Seal Location

**Self-expanding**
CoreValve Evolut Pro

**Balloon Expandable**
Sapien S3
TAVR: Procedural Steps with Self-Expanding Valve

Step #1
Native Valve Visualization

Step #2
Partial Deployment

Step #3
Full Deployment

Echo Parameters of Good TAVR:
- SEAL: No PVL
- VELOCITY: Systolic Vmax < 2.0 m/s
- SHAPE: Circular in cross-section

TAVR: Procedural Steps with Balloon Expandable Valve

Step #1
Native Valve Predilation

Step #2
TAVR Valve Position Check

Step #3
Full Deployment

Echo Parameters of Good TAVR:
- SEAL: No PVL
- VELOCITY: Systolic Vmax < 2.0 m/s
- SHAPE: Circular in cross-section
Case Presentation

86-year-old woman

- Severe symptomatic high-gradient native aortic stenosis with preserved LVEF (ACC/AHA class D1)
- Undergoing transfemoral TAVR using a self-expanding bioprosthesis
- TTE is being used for intraprocedural assessment

NYU TAVR Cases by Age & Gender

- Men have a higher prevalence of trileaflet valve AS than women (1.3 fold relative increase) 
  *J Am Coll Cardiol*. 2017;69:1523-1532

- Men have a higher incidence of bicuspid aortic valve than women (male: female 3:1 ratio) 
  *Am J Cardiol* 1984;53:849-855
Types of Aortic Stenosis

- Classic High-Gradient AS 65-85%
- Low-Gradient AS with Preserved EF 10-25%
- Low-Gradient AS with Diminished EF 5-10%

Procedural Stage

Self-expanding valve is partly deployed

Ready for Seal-Velocity-Shape (SVS) Triad assessment
A5C View: TAVR Valve Seal Assessment

TAVR Valve Velocity Check: Spectral Doppler
TAVR Valve Velocity Check: Spectral Doppler

TAVR Valve Velocity Check: Spectral Doppler
Question

How did the spectral tracings get inverted?

Ultrasound System Keyboard
Ultrasound System Keyboard

Spectral Doppler in A5C View: Right Side Up
TAVR Valve Shape Check: Noncircular Shape

Solution: TAVR Valve Postdilation
Baseline
Severe Native Aortic Stenosis

Goof
Inverted Spectral Doppler

After Postdilation
Normal TAVR Function

Thank You!

New York University Langone Medical Center