Annular Stabilization Techniques in the Context of Aortic Valve Repair

Prashanth Vallabhajosyula, MD MS
University of Pennsylvania, Philadelphia, Pennsylvania

2nd North American Aortic Valve Repair Symposium
September 9, 2016
Annular Stabilization

• Critical and integral component of aortic valve repair
• Once the decision is made to preserve and repair aortic valve, many aortic surgeons will perform the stabilization procedure first, and then repair the valve
• Especially in patients with enlarged aortic annulus (>27-28 mm), robust annular stabilization is critical to prevent recurrent aortic insufficiency
• Primary goal is to reduce the functional aortic annulus
Annular Stabilization

• Three main annular stabilization techniques utilized at our institution
  – Subcommissural annuloplasty
  – Subannular external aortic band
  – Valve sparing root reimplantation

• Each approach has its pros and cons, and the decision regarding the ideal technique is made in the context of patient related factors, valvular pathology, and the aortic root complex
  – Age, LVEF and myocardial contractile reserve, comorbid burden
  – Severity and eccentricity of AI, leaflet: coaptation, fenestration, tethering, billowing
  – Annular diameter, coronary anatomy, root dimensions
Subcommissural Annuloplasty

Basic technique: Pledged interrupted mattress stitch going from one side of the commissure to the other, through the interleaflet triangle

**Pros**
- Simple
- Minimize bypass and cross clamp time
- No need to dissect the aortic root
- Good short term annular reduction

**Cons**
- Least robust annular stabilization
- Asymmetric annular reduction
- Not ideal for dilated aortic annulus
- Level of reduction achieved limited to commissural interleaflet triangle
Subcommissural Annuloplasty
Subannular External Aortic Band/ Ring

**Basic technique:** Secure a rigid ring/ band around the annulus with interrupted stitches that are placed subannularly to stabilize and reduce the annulus.

**Pros**
- Relatively simple
- Relatively less bypass and clamp time
- More robust stabilization than SCA
- More symmetric annular reduction
- Location of coronary ostia in relation to valve does not matter

**Cons**
- Does not directly address billowing
- Does not address asymmetric dilatation
- Cannot “elevate” the aortic root complex
- Primarily addresses aortic annular geometry in a two dimensional plane
Subannular External Aortic Ring
Valve Sparing Root Reimplantation

**Basic technique:** Subannular stabilization and implantation of the annulus into a neoroot

**Pros**
- Address annular stabilization in all three planes
- Address billowing
- Most robust and symmetric stabilization technique
- Facilitates “elevation” of the annular complex to desired variable height in the neoroot for each commissure
- For BAV, flexibility with valve geometric orientation

**Cons**
- Longer bypass and cross clamp times
- Technically more complex
- Difficult to justify its use as a stand-alone procedure for annular stabilization, without root dilatation
Valve Sparing Root Reimplantation
Aortic Root Dimension

- Dilated Root (>4.5 cm)
  - Valve Sparing Root Reimplantation (VSRR)
- Non-Dilated Root (<4.5 cm)
  - Evaluation of Annulus
    - Dilated Annulus (>28 mm)
      - Valve Sparing Root Reimplantation (VSRR)
    - Non-Dilated Annulus (≤27 mm)
      - External Annular Band
      - Subcommissural Annuloplasty (SCA)
Annular Stabilization with Valve Preservation
N=258

VSRR
N=175

Subcommissural Annuloplasty
N=53

External Annular Band
N=26

Quadracusp / Unicusps Valve Repair
N=4

TAV
N=122

BAV
N=53
# Operative Outcomes

<table>
<thead>
<tr>
<th></th>
<th>SCA</th>
<th>BAV VSRR</th>
<th>TAV VSRR</th>
<th>External Annular Ring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>53</td>
<td>53</td>
<td>122</td>
<td>26</td>
</tr>
<tr>
<td><strong>Freedom from AI &gt;1+</strong></td>
<td>66</td>
<td>53</td>
<td>122</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
</tr>
<tr>
<td><strong>Peak gradient, mmHg</strong></td>
<td>18 ± 10</td>
<td>12 ± 6</td>
<td>13 ± 6</td>
<td>17 ± 10</td>
</tr>
<tr>
<td><strong>Mean gradient, mmHg</strong></td>
<td>11 ± 6</td>
<td>6 ± 3</td>
<td>7 ± 3</td>
<td>9 ± 6</td>
</tr>
<tr>
<td><strong>Leaflet coaptation</strong></td>
<td>9 ± 3</td>
<td>9 ± 2</td>
<td>8 ± 2</td>
<td>8 ± 4</td>
</tr>
<tr>
<td><strong>Stroke (%)</strong></td>
<td>0</td>
<td>0</td>
<td>1 (&lt;1%)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Reoperation for bleeding (%)</strong></td>
<td>0</td>
<td>0</td>
<td>6 (5%)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Pacemaker placement (%)</strong></td>
<td>0</td>
<td>0</td>
<td>4 (3%)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Mortality (%)</strong></td>
<td>0</td>
<td>1 (1.9%)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Thank you