What is Repairable Degenerative Valve Disease in 2017?

Anelechi Anyanwu, MD

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Disclosures:

None
What is Repairable Degenerative Valve Disease in 2017?
What is *not* Repairable Degenerative Valve Disease in 2017?

- Anatomical Factors
- Surgeon and/or Institutional Factors
- Patient Factors
Anatomical Factors: Which degenerative valves are technically not repairable?

- Extensive leaflet calcification
- Extensive leaflet destruction

- (All other valves are technically repairable)
Four primary lesions are responsible for > 95% degenerative MR. All are treatable

<table>
<thead>
<tr>
<th>Chordal Rupture</th>
<th>Chordal Elongation</th>
<th>Excess Tissue</th>
<th>Annular Dilatation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial Chord</td>
<td>Artificial Chord</td>
<td>Simple Resection</td>
<td>Annuloplasty</td>
</tr>
<tr>
<td>Chordal Transfer</td>
<td>Chordal Transfer</td>
<td>Complex Resection</td>
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<tr>
<td>Resection</td>
<td>Resection</td>
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<td></td>
<td>Papillary Muscle Slide</td>
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A near 100% repair rate for mitral valve prolapse is achievable in a reference center: Implications for future guidelines

Javier G. Castillo, MD, Anelechi C. Anyanwu, MD, Valentin Fuster, MD, PhD, and David H. Adams, MD

**Background:** Although mitral valve repair is the recommended treatment for severe mitral regurgitation of degenerative etiology, valve replacement remains common, particularly for complex lesions or anterior leaflet involvement. We sought to characterize the feasibility and outcomes of an “all comers” repair strategy applied systematically in all cases of degenerative mitral valve disease, regardless of age, complexity, or leaflet involvement.

**Methods:** From January 2002 to December 2010, 744 consecutive patients (mean age, 58 ± 13 years) were included in the analysis. Left atrial and median ring diameters were measured for each patient.

744 consecutive “all comers” (no patient exclusions for any reason)
99.9% repair rate
0.8% mortality, 0.4% debilitating stroke

**Conclusions:** A systematic strategy of mitral valve repair that uses a variety of techniques allows repair of all degenerative valves in a reference center, with good short-term outcomes and mid-term durability. Further study is required to document the long-term efficacy of an “all comers” mitral valve repair strategy in degenerative subgroups with very complex valve morphology. (J Thorac Cardiovasc Surg 2012;144:308-12)

**Figure 1.** Perioperative transthoracic echocardiographic (TTE) assessment. 0, No mitral regurgitation (MR); 1+, mild MR; 2+, moderate MR; 3+, moderate to severe MR; 4+, severe MR.
10:40 AM Plenary Scientific Session
Hall E, BCC

8 minute presentation, 12 minute discussion

**Moderators:** *Thoralf M. Sundt, III and *Marc R. Moon

47. Mitral Valve Surgery in the US Veterans Administration Health System: 10-Year Outcomes and Trends


¹Baylor College of Medicine and Texas Heart Institute, Houston, TX; ²Northport VA Medical Center and Stony Brook School of Medicine, Stony Brook, NY; ³The West Roxbury VAMC and Harvard Medical School, Boston, MA; ⁴University of Pittsburgh, Pittsburgh, PA; ⁵Emory University, Atlanta, GA; ⁶University of Maryland, Baltimore, MD; ⁷Cleveland Clinic Foundation, Cleveland, OH; ⁸University of Alabama at Birmingham, Birmingham, AL; ⁹Stanford University, Stanford, CA; ¹⁰Medical College of Wisconsin and VA Medical Center, Milwaukee, WI; ¹¹University of Colorado Denver, Aurora, CO; ¹²West Virginia University, Morgantown, WV

A. Secular Trends in MV Repair And Replacement

B. Observed MV Repair Rates by Volume

$R^2=0.001$

p=0.081
What is *not* Repairable Degenerative Valve Disease in 2017

- Anatomical Factors
- Surgeon and/or Institutional Factors
Mitral valve repair rates correlate with surgeon and institutional experience

Damien J. LaPar, MD, MSc, Gorav Ailawadi, MD, James M. Isbell, MD, MSCI, Ivan K. Crosby, MD, John A. Kern, MD, Jeffrey B. Rich, MD, Alan M. Speir, MD, and Irving L. Kron, MD. Investigators for the Virginia Cardiac Surgery Quality Initiative

**Objectives:** Mitral valve (MV) repair rates have lagged despite reported superior outcomes in patients with mitral regurgitation. The purpose of the present study was to evaluate the relationship between procedure

![Figure 3. Variation in surgeon mitral valve repair rates.](image-url)
Repair rate decreases with lower surgeon volume

Predictors of Mitral Valve Repair: Clinical and Surgeon Factors

<table>
<thead>
<tr>
<th>Surgeon-Specific Annual Mitral Volume</th>
<th>Predicted Probability of Repair, %</th>
</tr>
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<tbody>
<tr>
<td>100</td>
<td>82.6</td>
</tr>
<tr>
<td>90</td>
<td>82.5</td>
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<tr>
<td>80</td>
<td>82.4</td>
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<tr>
<td>70</td>
<td>82.3</td>
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<tr>
<td>60</td>
<td>82.2</td>
</tr>
<tr>
<td>50</td>
<td>82.1</td>
</tr>
<tr>
<td>40</td>
<td>82.0</td>
</tr>
<tr>
<td>30</td>
<td>81.8</td>
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<tr>
<td>20</td>
<td>81.6</td>
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<tr>
<td>15</td>
<td>81.4</td>
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The lottery of mitral valve repair surgery

Anelechi C Anyanwu,¹ Benjamin Bridgewater,² David H Adams¹

![Graph showing treatment approach at contributing hospitals (n=5,163)]

**Figure 1** Variations in rates of mitral valve repair for degenerative disease among 46 heart centres in the UK (adapted from Bridgewater, et al¹).
Relation of Mitral Valve Surgery Volume to Repair Rate, Durability, and Survival

Joanna Chikwe, MD,1,2,3 Nana Toyoda, MD,1,4 Anelechi C. Anyanwu, MD,1 Shinobu Itagaki, MD,2,3 Natalia N. Egorova, PnD,2,3 Percy Boateng, MD,4 Ahmed El-Eshmawi, MD,4 David H. Adams, MD1

**Figure 1** Institutional Repair Rates for Degenerative Mitral Valve Operations Between 2002 and 2013 at All Institutions in New York State

Wide variation in degenerative mitral repair rates is observed among all 41 institutions reporting mitral valve operations in New York State.

**Central Illustration** Current Status of Degenerative Mitral Valve Repair in New York State

Key findings: 1) the median annual surgeon mitral volume is 10 operations; 2) wide variability of repair rates is observed among surgeons; 3) higher volume is associated with higher repair rates and better outcomes; 4) reoperation after repair is less common for patients operated on by surgeons with >25 mitral valve operations a year; and 5) low-volume surgeons (<25 operations/year) in institutions where high-volume, high-repair-rate surgeons (>50 operations/year and >70% repair rate) are present have improved repair rates.

Spectrum of Degenerative Mitral Disease

FED  FED+  Forme Fruste  Barlow’s

Increasing Repair Difficulty

European Association of Echocardiography recommendations for the assessment of valvular regurgitation. Part 2: mitral and tricuspid regurgitation (native valve disease)

### Table 1  Probability of successful mitral valve repair in organic mitral regurgitation based on echo findings

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<td>No/Localized</td>
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A complexity scoring system for degenerative mitral valve repair

Anelechi C. Anyanwu, MD, Shinobu Itagaki, MD, Joanna Chikwe, MD, Ahmed El-Eshmawi, MD, and David H. Adams, MD

**FIGURE 1.** Distribution of complexity scores.

Spectrum of Degenerative Mitral Disease

FED  FED+  Forme Fruste  Barlow’s

Increasing Repair Difficulty

Simple Valve – FED P2

**Repairable with > 95% Likelihood**

- Experienced Valve Surgeon
- Surgeon with Focused Interest in the Mitral Valve
- Reference Mitral Valve Surgeon
Simple Valve – Isolated Prolapse, localized excess tissue

Repairable with > 95% Likelihood

- Experienced Valve Surgeon
- Surgeon with Focused Interest in the Mitral Valve
- Reference Mitral Valve Surgeon
Intermediate Valve – Multisegment Prolapse, excess tissue, small valve

Repairable with > 95% Likelihood

- Experienced Valve Surgeon
- Surgeon with Focused Interest in the Mitral Valve
- Reference Mitral Valve Surgeon
Complex Valve – Bileaflet prolapse, generalized excess tissue

Repairable with > 90% Likelihood

- Experienced Valve Surgeon
- Surgeon with Focused Interest in the Mitral Valve
- Reference Mitral Valve Surgeon
Complex Valve – Bileaflet prolapse, excess tissue with coexisting diminutive or restricted segments

Repairable with > 90% Likelihood

- Experienced Valve Surgeon
- Surgeon with Focused Interest in the Mitral Valve
- Reference Mitral Valve Surgeon
Complex Valve – Bileaflet prolapse, dystrophic valve

**Repairable with > 90% Likelihood**

- Experienced Valve Surgeon
- Surgeon with Focused Interest in the Mitral Valve
- Reference Mitral Valve Surgeon
Complex Valve – Calcification

Repairable with > 90% Likelihood

- Experienced Valve Surgeon
- Surgeon with Focused Interest in the Mitral Valve
- Reference Mitral Valve Surgeon
What is *not* Repairable Degenerative Valve Disease in 2017

- Anatomical Factors (technically irreparable)
- Surgeon and/or Institutional Factors
- Patient Factors
Patient Factors that may lead to replacement of repairable valves

**Preoperative**
- Advanced age or comorbidity
- Severe LV dysfunction
- Unstable patient
- Patient choice

**Operative**
- Where shorter surgical time is critical
- Where a predictably competent valve is necessary for immediate survival
- Intraoperative catastrophe
- Multiple concurrent procedures
- Unfavorable Operative conditions
- Suboptimal myocardial protection

Caveat – Apply more to Complex repair – a simple repair may be as quick and predictable as a valve replacement
What is Repairable Degenerative Valve Disease in 2017?

- All non-calcified valves are repairable if
  - Surgeon skill is appropriately matched to valve complexity
  - Favorable operative conditions
  - Patient can tolerate additional surgical time (if applicable)

- Otherwise depends on what combination of valve anatomy, surgical skill, and operative factors are present in a given operation