Cases: Why is the Valve Leaking and What Should I do: Surgery, Clip, or Watchful Waiting?

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DISCLOSURE

Relevant Financial Relationship(s)
None

Off Label Usage
None
Case

• 55 year old male with symptomatic mitral regurgitation secondary to a flail MV leaflet
• No Co-morbidities
• Referred for MV Repair
TEE

What’s wrong with the mitral valve?
What’s wrong with the mitral valve?

1. Flail posterior lateral scallop (P1)
2. Flail posterior middle scallop (P2)
3. Flail posterior medial scallop (P3)
4. Flail anterior middle scallop (A2)
5. Mitral valve cleft
What would you recommend?

1. Surgical MV repair
2. Surgical MV replacement
3. MitraClip (if patient prefers this)
View from LA Perspective

View from LV Perspective
Diagnosis: 1. Severe mitral valve regurgitation.
2. Flail middle scallop posterior leaflet.
3. Cleft between lateral and middle scallops of the posterior leaflet.
4. New York Heart Association class II.
5. Moderate right ventricular dysfunction.
6. Pulmonary hypertension.
7. Medial scallop posterior leaflet prolapse.

2. Triangular resection of the middle scallop of the posterior leaflet.
3. Closure of cleft between the lateral and middle scallops of the posterior leaflet.
4. Placement plication stitch between the medial scallops of the anterior and posterior leaflet.
5. Insertion of a 63-mm posterior annuloplasty band.
6. Establishment of temporary extracorporeal circulation to 34 degrees using the Terumo RX15 membrane oxygenator.
7. Cardioplegic arrest (blood).
Successful Result
What’s wrong with the mitral valve?

1. Flail posterior lateral scallop (P1)
2. Flail posterior middle scallop (P2)
3. Flail posterior medial scallop (P3)
4. Flail anterior middle scallop (A2)
5. Mitral valve cleft
Gaping Cleft or Commissure - An Under-Rated Cause of Residual Mitral Insufficiency Following Valve Repair: Case Reports
Stéphane Aubert, Christophe Acar

Department of Cardiac Surgery, Heart Institute Hôpital de la Salpêtrière, Paris, France

Cleft-like indentations in myxomatous mitral valves by three-dimensional echocardiographic imaging
Francesca Mantovani, Marie-Annick Clavel, Ori Vaturry, Rakesh M Suri, Sunil V Mankad, Joseph Malouf, Hector I Michelena, Sonia Jain, Luigi Paolo Badano, Maurice Enriquez-Sarano
89 Year Old Male with Dyspnea

- Worsening over last 1 month

- Improved with diuretics but still NYHA Class III

- PMH
  - CABG 1 year prior
  - Post-op EF 35% (Ischemic CM)
  - Mild MR, Mild PHTN
89 Year Old Male with Dyspnea

Medications:
• Lisinopril 5 mg qd
• Toprol XL 100 mg qd
• Simvastatin 40 mg qd
• ASA 81 mg qd
• Furosemide 20 mg qd

Physical Exam
• BP 130/60 mmHg, pulse 60 BPM, RR 14/min
• JVP mildly elevated
• Heart: diffuse PMI, 2/6 systolic murmur at apex
• Lungs: few bibasilar crackles
• Extremities: minimal pedal edema
EKG
89 Year Old Male with Dyspnea
89 Year Old Male with Dyspnea
89 Year Old Male with Dyspnea

- Moderate RV dysfunction
- Moderate (2+) TR
- RV Sys Pr = 75 mm Hg
What would you recommend?

1. PET or DSE for ischemia/viability
2. Coronary and graft angiography
3. Change medical regimen
4. Biventricular pacing
5. Mitral valve surgery
2 Wks After Intervention
What was the intervention?

1. PCI of SVG to circumflex/OM1
2. Medical regimen changed
3. Biventricular pacing
4. Percutaneous mitral annuloplasty
Intervention

- Imdur 30 mg daily added
- 1 week later, dose ↑ed to 60 mg daily
- 2 weeks later, at the time of the echo, his BP was 115/50 mmHg
- RV systolic pressure was ~ 50 mm Hg
Mechanism of Ischemic MR

Normal

Infarct

LV

Closing force

Tethering force

PM

LA

AO

Papillary muscle displacement

Leaflet tethering

Restricted closure

MR

LV Assist Device at “usual” Flow

Annular Area: 19.41 cm^2
Annular Circumference: 157.46 mm
Annular Height: 3.78 mm
Maximum tenting length: 14.94 mm
Mean tenting length: 3.79 mm
Tenting volume: 7.42 cm^3
Diameter:
   AP=50.39 mm
   ML=49.29 mm
Papillary Muscle:
   area=5.20 cm^2
   length PM, AL = 56.72 mm, 46.11 cm
   width PM, AL = 23.33 mm
   Angle 23.44 degree
LV Assist Device with Flow Increased

- Annular Area: 16.40 cm²
- Annular Circumference: 144.28 mm
- Annular Height: 3.54 mm
- Maximum tenting length: 7.91 mm
- Mean tenting length: 2.44 mm
- Tenting volume: 3.61 cm³
- Diameter:
  - AP = 44.68 mm
  - ML = 46.43 mm
- Papillary Muscle:
  - area = 3.63 cm²
  - length PM, AL = 37.98 mm, 39.19 cm
  - width PM, AL = 19.50 mm
  - Angle 29.22 degree
Importance of Loading in Ischemic or Functional MR

Baseline
BP 100/60 mmHg
PA 35/20 mmHg

Phenylephrine
BP 156/80 mmHg
PA 76/41 mmHg
Intraoperative TEE : Pre-op

LV Perspective: “en-face” view

Baseline

Phenylephrine
Mean severity of Functional MR Pre-, Intra and Post-CABG

Conclusions: Intra-op transesophageal echocardiography underestimates MR severity; phenylephrine reduces, yet does not eliminate, intra-op underestimation of MR severity.
Case

- 55 year old female with fever, chills
- *Staph aureus* bacteremia
- Systolic murmur
- Started on antibiotics, but within 24 hours had transient left arm weakness
  - No CVA on CT
  - No residual neurologic symptoms (left arm weakness resolved)
- TEE performed
Transesophageal Echocardiogram

2D TEE

3D TEE
(View from Left Atrium)
What do you recommend?

1. Immediate mitral valve surgery
2. Continue antibiotics and close observation
3. Anticoagulation

Can Echo help decide based on size and mobility?
Vegetation Size and Risk of Embolism

Sanfilippo (Mass Gen) JACC 18:1191(1991)
TEE in Infective Endocarditis

Incidence of Embolism

![Incidence of Embolism Graph](image)

- **Aortic valve**
  - Veg <10mm: 16%
  - Veg >10mm: 35%
  - n = 45

- **Mitral Valve**
  - Veg <10mm: 4%
  - Veg >10mm: 67%
  - n = 31

- **Prosth Valve**
  - Veg <10mm: 38%
  - Veg >10mm: 52%
  - n = 25

*P = ns* for Aortic and Prosth Valve, *p < 0.001* for Mitral Valve

Importance of Vegetation Size and Mobility

Embolic events (%)

n = 178

Vegetation size (mm)

Absent <10 10-15 >15

Absence (n=178)

Vegetation mobility

Absent Low Mod Severe

Considerable Overlap

Mugge et al. J Am Coll Cardiol 1989;14:631

Size of Vegetation (mm)

No Embolism

Embolism

P=0.02

n=72

n=33
Vegetation Size

- 145 patients with endocarditis
- Aortic: 62 (43%) Mitral valve 83 (57%)
- Strokes occurred more often in mitral valve endocarditis: 33% vs. 11% with aortic
- Independent Predictor of stroke:
  - Mitral Valve Vegetation Length > 7 mm

Cabell et al. Am Heart J. 2001;142:75-80
### Vegetation Size and Embolic Events

<table>
<thead>
<tr>
<th>Authors</th>
<th>No.</th>
<th>Events</th>
<th>Relation to size</th>
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<tbody>
<tr>
<td>Lutas</td>
<td>77</td>
<td>22%</td>
<td>-</td>
</tr>
<tr>
<td>Mugge</td>
<td>105</td>
<td>31%</td>
<td>+</td>
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<tr>
<td>Jaffe</td>
<td>70</td>
<td>43%</td>
<td>-</td>
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<tr>
<td>Sanfilippo</td>
<td>204</td>
<td>33%</td>
<td>+</td>
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<tr>
<td>Steckelberg</td>
<td>207</td>
<td>13%</td>
<td>-</td>
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<tr>
<td>Rohman</td>
<td>118</td>
<td>26%</td>
<td>+</td>
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<tr>
<td>Heinle</td>
<td>41</td>
<td>49%</td>
<td>-</td>
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<tr>
<td>Werner</td>
<td>106</td>
<td>35%</td>
<td>+</td>
</tr>
<tr>
<td>De castro</td>
<td>57</td>
<td>44%</td>
<td>-</td>
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<tr>
<td>Di Salvo</td>
<td>178</td>
<td>37%</td>
<td>+</td>
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</table>
# Embolism in Infective Endocarditis

## Vegetation Size by TEE and Impact of Therapy

<table>
<thead>
<tr>
<th>Study</th>
<th>Vegetation Size (mm)</th>
<th>Embolic Events</th>
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<tbody>
<tr>
<td>Di Salvo et al: JACC, 2001</td>
<td>&gt;10</td>
<td>37%</td>
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<tr>
<td>(178 pt)</td>
<td></td>
<td>9%</td>
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<tr>
<td>Cabell et al: AHJ, 2001</td>
<td>&gt;7</td>
<td>23%</td>
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<tr>
<td>(145 pt)</td>
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<td>11%</td>
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<tr>
<td>Vilacosta et al: JACC, 2002</td>
<td>&gt;10</td>
<td>33%</td>
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<tr>
<td>(211 pt)</td>
<td></td>
<td>13%</td>
</tr>
</tbody>
</table>
One Year Survival According to Vegetation Length

Thuny F et al. Circulation 2005; 112:69-75

n = 384
# Predictors of 1-Year Mortality (Cox Multivariable Analysis)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Adjusted RR</th>
<th>95% CI</th>
<th>P</th>
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<tbody>
<tr>
<td>Age</td>
<td>1.02</td>
<td>1.01–1.04</td>
<td>0.007</td>
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<tr>
<td>Female sex</td>
<td>1.6</td>
<td>1.01–2.58</td>
<td>0.048</td>
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<tr>
<td>Comorbidity index &gt;2</td>
<td>1.6</td>
<td>0.92–2.64</td>
<td>0.1</td>
</tr>
<tr>
<td>Serum creatinine &gt;2 mg/L</td>
<td>1.9</td>
<td>1.16–3.23</td>
<td>0.01</td>
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<tr>
<td>Prosthetic valve</td>
<td>1.6</td>
<td>0.99–2.68</td>
<td>0.053</td>
</tr>
<tr>
<td><em>S aureus</em> IE</td>
<td>2</td>
<td>1.19–3.24</td>
<td>0.001</td>
</tr>
<tr>
<td>Moderate or severe CHF</td>
<td>1.6</td>
<td>1.02–1.54</td>
<td>0.04</td>
</tr>
<tr>
<td>Vegetation length &gt;15 mm</td>
<td>1.8</td>
<td>1.10–2.82</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Thuny F et al. *Circulation* 2005; 112:69-75
Early Surgery versus Conventional Treatment for Infective Endocarditis

Duk-Hyun Kang, M.D., Ph.D., Yong-Jin Kim, M.D., Ph.D., Sung-Han Kim, M.D., Ph.D., Byung Joo Sun, M.D., Dae-Hee Kim M.D., Ph.D., Sung-Cheol Yun, Ph.D., Jong-Min Song, M.D., Ph.D., Suk Jung Choo, M.D., Ph.D., Cheol-Hyun Chung, M.D., Ph.D., Jae-Kwan Song, M.D., Ph.D., Jae-Won Lee, M.D., Ph.D., and Dae-Won Sohn, M.D., Ph.D.
Early Surgery for Infective Endocarditis with Large Vegetations (> 10 mm)

Mortality

Composite End-Point

8 vs 0 embolic events

Risk of Embolism

- *Consider* early surgical treatment for:
  - Larger vegetations
  - Highly mobile vegetations
  - Mitral valve location
  - Controversial
- Risk diminishes significantly over time with antibiotics
Thank You!
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