Mitral Valve Operations
STS Coding Implications

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MSTCVS Quality Collaborative
Project Director

MSTCVS Quality Collaborative
Cardiac Data Manager Meeting
July 27, 2017
Grand Traverse Resort, Acme, MI

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These slides are to be used for quality improvement by the MSTCVS member surgeon champions and data managers. Each slide includes the MSTCVS confidentiality statement.
Disclosures:

- I have nothing pertinent to disclose
First, The Basics....

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Mitral Valve Overview

- Mitral Valve is part of the Left Ventricle
- Composed of:
  - Leaflets
  - Annulus
  - Chordae
  - Papillary Muscles
  - Ventricular Wall
  - Left Atrium
2 Mitral Valve Leaflets

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Coaptation

Google Images: http://www.mitralvalverepair.org/content/view/53/

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Mitral Valve Structures

Anterior annulus
Anterior leaflet
Anteromedial commissure
Posterior leaflet (three lobes)
Posterolateral commissure
Posterior annulus
Chordae tendineae
Lateral papillary muscle
Medial papillary muscle
Papillary Muscles

Google Images: http://www.mitralvalverepair.org/content/view/56/

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Chordae Tendinae

- Arise from Papillary Muscles
- Classified by Leaflet Insertion Site
  - **Primary Chordae**: Free Margin of Leaflets
  - **Secondary Chordae**: Ventricular surface of Leaflets
  - **Tertiary Chordae**: Posterior Leaflet only & connect to Mitral Annulus

Google Images: http://www.mitravalverepair.org/content/view/56/
Chordae Tendinae

https://en.wikipedia.org/wiki/Chordae_tendineae

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Commissures, Chordae, Papillary Muscles

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Trigone: Fibrous Support Structures

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Mitral Anatomy

- Subaortic curtain
- Aortic leaflets
- AV node position
- Coronary Sinus
- Circumflex Artery

Preservation of “surrounding” anatomic integrity essential for a successful mitral repair

Read It, See It, Code It: Prager, RL, Geltz, A. MSTCVS DM Meeting: May 2006

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Normal Mitral Anatomy
Mitral Valve Disease

Mitral Regurgitation

Mitral Stenosis

Floppy Valve

Blood leaking back into left atrium (regurgitation)

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www.heart-valve-surgery.com
Mitral Regurgitation

![Mitral Valve Diagram](image-url)

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Mitral Stenosis

Normal MV

Mitral Stenosis

Open
Closed
MOVING INTO DATA ABSTRACTION!
Surgeon Worksheets Available: STS Website

Mitral Valve Worksheet
- Includes:
  - Etiology
  - Lesion Type
  - Operative Procedures
  - Checklist
- Surgeon or Mid-Level:
  - Complete in the OR

STS Mitral Valve Surgeon Worksheet V2.9

<table>
<thead>
<tr>
<th>Mitral Stenosis:</th>
<th>Yes</th>
<th>No (if Yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallest Mitral Valve Area:</td>
<td></td>
<td>mm²</td>
</tr>
<tr>
<td>Highest Mean Gradient:</td>
<td></td>
<td>mmHg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mitral Disease Etiology:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dilated chordosis (prolapse)</td>
</tr>
<tr>
<td>Rheumatic</td>
</tr>
<tr>
<td>Ischemic: Acute (MI &lt; 31 days)</td>
</tr>
<tr>
<td>Chronic (MI &gt; 31 days)</td>
</tr>
<tr>
<td>Cardiomyopathy: Non-ischemic</td>
</tr>
<tr>
<td>Hypertrophic obstructive</td>
</tr>
<tr>
<td>Tumor</td>
</tr>
<tr>
<td>Cerebrovascular</td>
</tr>
<tr>
<td>Papillary fibroelastoma</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mitral Lesion:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaflet prolapse: Anterior &amp; Bi-leaflet &amp; Anterior</td>
</tr>
<tr>
<td>Papillary muscle: Elongation &amp; Rupture</td>
</tr>
<tr>
<td>Mixed lesion</td>
</tr>
<tr>
<td>Chordal: Elongation &amp; Rupture &amp; Failure &amp; Tethering &amp; Thickening</td>
</tr>
<tr>
<td>Rupture &amp; Fusion</td>
</tr>
</tbody>
</table>

Procedure Performed
If Repair:
- Repair approach: Surgical (if surgery then all apply) & Transcatheter
- Isolated leaflet resection
  - Anterior leaflet: Location: A1, A2, A3 |
  - Posterior leaflet: Location: P1, P2, P3 |
- Commissural leaflet: Location: M1, L1, B1 |
- Laser leaflet resection
  - Anterior leaflet: Location: A1, A2, A3 |
  - Posterior leaflet: Location: P1, P2, P3 |
- Chordal leaflet transfer:
  - Anterior Chordal/Leaflet transfer: Location: A1, A2, A3 |
  - Posterior Chordal/Leaflet transfer: Location: P1, P2, P3 |
- Commissural Chordal/Leaflet transfer: Location: M1, L1, B1 |

Edge to edge repair
- Mitral commissurotomy
- Mitral commissurotomy with leak repair

Replacement (If Replacement):
- Mitral repair attempted prior to replacement
- Mitral cusp preserved: Anterior & Posterior & Both |
- Transcatheter valvuloplasty
- Implant: (If Yes) Implant type: Mechanical valve |
- Biological valve |
- Amnion device |
- Mitral Leaflet clip |

Implant Model:
- Implant Model: |
Section H.
Hemodynamics/Cath/Echo

Mitral Valve Disease Data Elements:

<table>
<thead>
<tr>
<th>Mitral Valve</th>
<th>Mitral Valve Disease</th>
<th>Hemodynamic/Echo data available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitral Insufficiency</td>
<td>□ None □ Trivial/Trace □ Mild □ Moderate □ Severe □ Not Documented</td>
<td>□ Yes □ No □ Not Documented</td>
</tr>
<tr>
<td>VDInsuM (1680)</td>
<td>Eccentric Jet: □ Yes □ No □ Not Documented</td>
<td>VDMV Ecclet (1681)</td>
</tr>
<tr>
<td>VDMit (1685)</td>
<td>Mitral Stenosis: □ Yes □ No (if Yes)</td>
<td>VDStenM (1690)</td>
</tr>
<tr>
<td>Smallest Valve Area: ______ cm²</td>
<td>Highest Mean Gradient:</td>
<td>VDMVA (1700)</td>
</tr>
<tr>
<td>mmHg</td>
<td>VDGradM (1705)</td>
<td></td>
</tr>
</tbody>
</table>
Section H.
Hemodynamics/Cath/Echo

Mitral Valve Disease Data Elements:

Mitral Valve
Mitral Insufficiency: □ None □ Trivial/Trace □ Mild □ Moderate □ Severe □ Not Documented
VDlInsufM (1680)
(If not “None”)
Eccentric Jet: □ Yes □ No □ Not Documented
VDMEccJet (1681)

Mitral Valve Disease: □ Yes □ No
VDMit (1685)

(If Yes ↓)
Mitral Stenosis: □ Yes □ No (If Yes ↓)
VDStenM (1690)

VDlInsufM (1680)
(If not “None”)
Eccentric Jet: □ Yes □ No □ Not Documented
VDMEccJet (1681)

Mitral Valve Disease: □ Yes □ No
VDMit (1685)

(If Yes ↓)
Mitral Stenosis: □ Yes □ No (If Yes ↓)
VDStenM (1690)

Hemodynamic/Echo data available: □ Yes □ No (If Yes ↓)
MiHemoDatAvail (1695)

Smallest Valve Area: ______ cm²
Highest Mean Gradient: 
VDMA (1700) ______ mmHg
VDGradM (1705)
Thomas Binder, MD “Jet Direction & Mechanism of Mitral Regurgitation”
April, 2010

Thomas Binder, MD Cardiologist and Director of Echo Lab at the Medical University of Vienna

http://123sonography.com

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Section H.
Hemodynamics/Cath/Echo

Mitral Valve Disease Data Elements:

What is This?

Smallest Valve Area: _______ cm²
Highest Mean Gradient:
VDMVA (1700)
_______ mmHg
VDGradM (1705)
Coding Valve Area & Gradients

- **Smallest Valve Area (#1700)**
  - Cardiac Cath, TEE, Echo, CT Scan
    - Definition: Document **Smallest in cm\(^2\)** from all Tests:
      - Normal: 4.0 – 5.0 cm\(^2\)
      - Severe: <1.0 cm\(^2\)

- **Highest Mean Gradient mmHg: (#1705)**
  - Cardiac Cath, TEE, Echo CT Scan
    - Definition: Document **Highest mmHg** from all Tests:
      - Normal: “0”
      - Severe: <5mmHg

Use Data within 6 months of Cardiac Operation for both Data Fields

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Etiology and Lesions of:
MITRAL VALVE DISEASE
### Mitral Valve Etiology (Choose **1 Primary Only**!)

Highlighted Etiologies are New for 2.9

<table>
<thead>
<tr>
<th>MV Disease Etiology</th>
<th>Choose PRIMARY Etiology (one):</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Myxomatous degeneration/prolapse</td>
<td>□ Tumor, Papillary fibroelastoma</td>
</tr>
<tr>
<td>□ Rheumatic</td>
<td>□ Tumor, Other</td>
</tr>
<tr>
<td>□ Ischemic-acute, post infarction (MI ≤ 21 days)</td>
<td>□ Carcinoid</td>
</tr>
<tr>
<td>□ Ischemic-chronic (MI &gt; 21 days)</td>
<td>□ Trauma</td>
</tr>
<tr>
<td>□ Non-ischemic Cardiomyopathy</td>
<td>□ Congenital</td>
</tr>
<tr>
<td>□ Endocarditis</td>
<td>□ Pure annular dilatation</td>
</tr>
<tr>
<td>□ Hypertrophic Obstructive Cardiomyopathy (HOCM)</td>
<td>□ Reoperation-Failure of previous MV repair or replacement</td>
</tr>
<tr>
<td>□ Tumor, Carcinoid</td>
<td>□ Mixed Etiology</td>
</tr>
<tr>
<td>□ Tumor, Myxoma</td>
<td>□ Not Documented</td>
</tr>
</tbody>
</table>

Think of these causes as **Why** the valve is diseased

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“Mixed Etiology”

- The cause (MV Pathology) is not Isolated, but a combination of issues.
- **Not** a Default Answer when Surgeon is not helping 😞 !!
- Examples:
  - Rheumatic Heart Disease & Endocarditis
  - Myxoma on a Rheumatically Diseased Mitral Valve
Mitral Valve Lesion (Choose 1 Primary Only!)

Highlighted Lesions are New for 2.9

<table>
<thead>
<tr>
<th>MV Lesion</th>
<th>Choose PRIMARY Lesion (one)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Leaflet prolapse, posterior</td>
</tr>
<tr>
<td>□</td>
<td>Leaflet prolapse, bileaflet</td>
</tr>
<tr>
<td>□</td>
<td>Leaflet prolapse, anterior</td>
</tr>
<tr>
<td>□</td>
<td>Leaflet prolapse, unspecified</td>
</tr>
<tr>
<td>□</td>
<td>Elongated/ruptured chord(s)/Flail</td>
</tr>
<tr>
<td>□</td>
<td>Annular dilatation</td>
</tr>
<tr>
<td>□</td>
<td>Leaflet calcification</td>
</tr>
<tr>
<td>□</td>
<td>Leaflet perforation/hole</td>
</tr>
<tr>
<td>□</td>
<td>Mitral annular calcification</td>
</tr>
<tr>
<td>□</td>
<td>Papillary muscle elongation</td>
</tr>
<tr>
<td>□</td>
<td>Papillary muscle rupture</td>
</tr>
<tr>
<td>□</td>
<td>Leaflet thickening</td>
</tr>
<tr>
<td></td>
<td>Leaflet retraction</td>
</tr>
<tr>
<td>□</td>
<td>Chordal tethering</td>
</tr>
<tr>
<td>□</td>
<td>Chordal thickening/retraction/fusion</td>
</tr>
<tr>
<td>□</td>
<td>Commissural fusion</td>
</tr>
<tr>
<td></td>
<td>Mixed lesion</td>
</tr>
<tr>
<td>□</td>
<td>Not Documented</td>
</tr>
</tbody>
</table>

-Think of causes as **Where** (Anatomic Area) valve is diseased

**Examples:**
- Dilated annulus and Ruptured papillary muscle
- Leaflet Perforation and Calcification

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MITRAL VALVE OPERATIVE PROCEDURES NEXT

University of Michigan Hospital Cardiovascular Center Operating Room
2.9 Mitral Valve Procedures
Data Collection Form

#1 Step: Answer How the MV Procedure was Planned

Mitral Valve Procedure Performed:
VSMV (3495)

Procedure Performed:
VSMVPr (3500)
Mitral Valve Procedure = Yes?

- **Your Choices:**
  - **1. Yes Planned**
    - MV Operation was Planned by Surgeon, Patient & Family.
    - Operative Consent Signed for this Operation
  - **2. Yes, Unplanned due to Unsuspected Disease or Anatomy**
    - Something Unexpected found in the OR requiring additional Operative intervention.
      - Code this additional Procedure(s) on the DCF
      - (data collection form)
Mitral Valve Procedure = Yes?

Your Choices:

3. Yes, Unplanned due to Surgical Complication

BEWARE & Understand What this Means!

- Original Case Is the Procedure Type
- No Added Procedures are Included
- Example: CAB Case with Injury to the Mitral Valve Leaflet..... is an Isolated CAB Case!

If Unsure, contact MSTCVS Coordinating Center To Double Check!!

“You Broke It, You Fix It”!

By your Surgeons!
### #2 Step: Answer Repair Approach

- Transcatheter or Surgical and Continue
2.9 Mitral Valve Procedures
Data Collection Form

Mitral Annuloplasty: Operation to Annulus Only
- Procedure on Annulus = Area Around the Valve
- Does not include Leaflets, Chordae or Papillary Muscle Structures

Step #3: Did this Case have an Annuloplasty Done?
2.9 Mitral Valve Procedures
Data Collection Form:

Step #4: Starts with Repair Types
2.9 MV Repair Types

- Annuloplasty

- Leaflet Resection
  - **Types:** Triangular, Quadrangular, Other
  - **Leaflet Location:** Anterior, Posterior, Both
    - Anterior Resection & Location: A1, A2, A3
    - Posterior Resection & Location: P1, P2, P3
    - Commissure Resection & Location: Medial, Lateral or Both

- Neochords (PTFE) & **Location**
  - Anterior Neochords Location (A1, A2, A3)
  - Posterior Neochords Location (P1, P2, P3)
  - Commissure Neochords Location
    - Neochord Location: Medial (C2), Lateral (C1) Both
2.9 MV Repair Types Con’t.

- Chordal/Leaflet Transfer Y/N
  - Posterior? Y/N
  - Posterior Chordal Leaflet Transfer
  - Commissure Chordal/Leaflet transfer
    - Medial, Lateral both

- Folding Plasty
- Sliding Plasty
- Annular Decalcification/Debridement
- Leaflet Extension/Replacement Patch
  - Patch Location: Anterior, Posterior, Both
- Edge to Edge Repair
- Mitral Commissurotomy
- Mitral Commissuroplasty
2.9 MV Repair Types Con’t.

- Mitral Cleft Repair (Scallop closure)
- Mitral Paraprosthetic leak repair? Y/N
  - Then complete info below:
    - Model #________
    - Implant Size________
    - Unique Device Identifier (UDI) _______
2.9 Mitral Valve Replacement

- **Replacement** Y/N
  - If Replacement:
    - Mitral Repair Attempted prior to Replacement? Y/N

- **Mitral Chords Preserved?**
  - Anterior, Posterior, Both, None

- **Transcatheter Replacement?**

- **Implant? Y/N**
  - **Type:** Mechanical, Bioprosthetic, Annuloplasty Device, Mitral Leaflet Clip, Transcatheter Device, Surgically implanted transcatheter device, Other

- **Model #_________** Implant Size_________
Why Are Mitral Chords Preserved in a Mitral Valve Replacement?

Complete chordal preservation advantages.

- It preserves LV geometry and function,
- reduces the operative mortality,
- improves early and long-term survival
- reduces the risk of ventricular rupture.

With appropriate surgical technique even large size prosthetic valves can be implanted and the risk of prosthetic valve dysfunction and LV outflow tract obstruction can be eliminated.

There is emerging evidence which suggests that RV function may improve significantly after LV chordal preservation.

Mitral Valve Surgery Chordal Preservation: Dr. Jyotindra Singh, MS, MBBS, Cleveland Clinic May 9, 2016

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Mechanical Prosthetic Valve Types

AVR & Treatment Options Lecture: A. Pruitt, MD St. Joseph Mercy Hospital, Ann Arbor September, 2009
Bioprosthetic Tissue Valve Types

- Hancock Modified II Porcine Medtronic
- Mosaic Mitral Medtronic
- Carpentier-Edwards Duraflex Porcine Mitral: Edwards Lifesciences
- Carpentier-Edwards Perimount Magna Mitral Ease
  Pericardial-Edwards Lifesciences
- Epic Mitral St. Jude Medical

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### DIFFERENCES BETWEEN MECHANICAL AND BIOPROSTHETIC VALVE

<table>
<thead>
<tr>
<th></th>
<th>MECHANICAL</th>
<th>BIOPROSTHETIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIFESPAN</td>
<td>30 YEARS OR MORE</td>
<td>10-15 YEARS</td>
</tr>
<tr>
<td>THROMBOGENICITY</td>
<td>MORE</td>
<td>LESS</td>
</tr>
<tr>
<td>NOISE</td>
<td>MORE</td>
<td>NEGLIGIBLE</td>
</tr>
<tr>
<td>PATIENT-PROSTHESIS MISMATCH</td>
<td>MORE</td>
<td>LESS</td>
</tr>
<tr>
<td>VALVE DETERIORATION</td>
<td>DURABLE</td>
<td>HIGHLY SUSCEPTIBLE</td>
</tr>
<tr>
<td>HEMODYNAMICS</td>
<td>IMPROVING</td>
<td>CLOSE TO NATURAL</td>
</tr>
<tr>
<td>ANTICOAGULATION</td>
<td>LIFELONG</td>
<td>3 MONTHS</td>
</tr>
<tr>
<td>RISK OF REOPERATION</td>
<td>LESS</td>
<td>MORE</td>
</tr>
</tbody>
</table>

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Code Operative Cases (4)

- Read Operative Notes
- See Operative Videos
- Code It
Audience Response “Clicker Use”

**ONLY** push the numbers corresponding to the Question Answers

1 = A, 2 = B, 3 = C etc.

- There is **No On/Off Button**.
- Channel is Already Set.
- Nothing to Figure Out 😊!!

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1. Mr. A.B.

- 70 yr. old obese male
- Increasing SOB and LE edema
- Hx of ETOH abuse
- No CAD
- Echo
  - 4+ MR
  - EF 35%
- Preop DX-CHF, MR, Cardiomyopathy
- Procedure Performed-
  Mitral valve repair
  with a 30mm C-E Physio annuloplasty ring
Op Note Text

- Inspection of the MV revealed there was no organic disease in either leaflet. The annulus was dilated causing Mitral Insufficiency. Sutures were placed around the MV annulus and the CE ring was seated. The valve was injected and shown to have good competency.
All Video Clips: Steven Bolling, MD University of Michigan, 2005

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Mitral Valve Repair

You would code this case as:
1. MV Repair with Leaflet Resection
2. MV Repair with Annuloplasty
3. MV Repair with Edge to Edge Repair
Inspection of the MV revealed there was no organic disease in either leaflet. The annulus was dilated causing Mitral Insufficiency. Sutures were placed around the MV annulus and the CE ring was seated. The valve was injected and shown to have good competency.

A. MV Repair with leaflet Resection.

B. MV Repair with Annuloplasty.

C. MV Repair with Edge to Edge Repair.

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Inspection of the MV revealed there was no organic disease in either leaflet. The annulus was dilated causing Mitral Insufficiency. Sutures were placed around the MV annulus and the CE ring was seated. The valve was injected and shown to have good competency.

A. MV Repair with leaflet Resection.

B. MV Repair with Annuloplasty.

C. MV Repair with Edge to Edge Repair.
# Code Operative Mitral Repair Procedure 2.9 (#1)

<table>
<thead>
<tr>
<th>Mitral Valve Procedure Performed:</th>
<th>☐ Yes, planned</th>
<th>☐ Yes, unplanned due to surgical complication</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSMV (3495)</td>
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<tr>
<td>Procedure Performed:</td>
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<tr>
<td>VSMV (3500)</td>
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<td></td>
</tr>
<tr>
<td>Repair (if Repair)</td>
<td></td>
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<tr>
<td>Repair Approach:</td>
<td>☐ Transcatheter</td>
<td>☐ Surgical</td>
</tr>
<tr>
<td>VSMVRepApp (3501)</td>
<td></td>
<td></td>
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<tr>
<td>If Surgical (Select all that apply):</td>
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<td></td>
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<tr>
<td>Annuloplasty:</td>
<td>☐ Yes</td>
<td>☐ No</td>
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<tr>
<td>VSAnnulLeafAnnulo (3510)</td>
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<tr>
<td>Leaflet resection:</td>
<td>☐ Yes</td>
<td>☐ No</td>
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<tr>
<td>VSLeafRes (3510)</td>
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<tr>
<td>Resection Type:</td>
<td>☐ Triangular</td>
<td>☐ Quadrangular</td>
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<tr>
<td>VSLeafResTyp (3515)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior resection:</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>VSAntRes (3517)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(If Yes)</td>
<td>Location documented: ☐ Yes</td>
<td>☐ No</td>
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<tr>
<td>VSAntResLocD (3518)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior leaflet resection location:</td>
<td>☐ A1 Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Posterior Resection:</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>VSPostRes (3522)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(If Yes)</td>
<td>Location documented: ☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>VSPostResLocD (3523)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posterior leaflet resection location:</td>
<td>☐ P1 Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>VSPostResP1 (3524)</td>
<td>VSPostResP2 (3525)</td>
<td>VSPostResP3 (3526)</td>
</tr>
</tbody>
</table>

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2. Mrs. C.D.

- 41 yr. old female with history of MV prolapse
- 4+ MR
- EF 60%
- No CAD
- Progressive SOB over the last year

- Pre-op Dx- MR, MVP
- Procedure Performed Complex mitral valve repair
• Inspection of the mitral valve revealed severe posterior leaflet prolapse and two ruptured chords of P2 with degenerative changes. The valve was repaired by excising redundant P2 tissue & performing leaflet resection. P1 and P3 were re-attached to the annulus. A 30 mm C-E annuloplasty ring was sutured and tied into place.
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Annuloplasty & Leaflet Resection

“Quad” Piece Removed

Choose the correct coding for this operative procedure (next slide).
The valve was repaired by excising redundant P2 tissue & performing leaflet resection. Code this Case:

A. MV Repair with Annuloplasty.
B. MV Repair with Edge to Edge Repair
C. MV Repair with Annuloplasty & Quadrangular Resection, Posterior P2 Resection.

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The valve was repaired by excising redundant P2 tissue & performing leaflet resection. Code this Case:

A. MV Repair with Annuloplasty.
B. MV Repair with Edge to Edge Repair
C. MV Repair with Annuloplasty & Quadrangular Resection, Posterior P2 Resection.

33% 33% 33%
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3. Mrs. E.F.

- 72 yr. old female with history of Afib
- No CAD
- 4+ MR
- Bileaflet prolapse
- Preop DX- Afib, MR
- Procedure Performed Complex mitral valve repair with 30 mm CE annuloplasty ring and MAZE.
• The left atrium was opened and the valve inspected. Both leaflets prolapsed significantly, and the posterior leaflet was rolled upon itself with significant foreshortening of the subvalvular apparatus. The A2 area of the anterior leaflet had 2 ruptured cords.
Op Note Text

- The most protuberant portion of P2 was resected, and a limited slide of both P1 and P3 were carried out. Using 4-0 Prolene sutures, P1 and P3 were re-attached to the annulus and 4-0 interrupted Ethibonds were used to approximate P1 to P3. The A2/A3 area was prolapsing and Gortex neo-chordae were attached to the area and brought in line with the free edge of P2/P3. Following this, twelve 2-0 Ethibond sutures were placed posteriorly from trigone to trigone and sizing the anterior leaflet and 30-millimeter Edwards annuloplasty band was sutured and tied in place.
The most protuberant portion of P2 was resected, and a limited slide of both P1 and P3 were carried out. Using 4-0 Prolene sutures, P1 and P3 were re-attached to the annulus and 4-0 interrupted Ethibonds were used to approximate P1 to P3. The A2/A3 area was prolapsing and Gore-Tex neo-chordae were attached to the area and brought in line with the free edge of P2/P3. Following this, twelve 2-0 Ethibond sutures were placed posteriorly from trigone to trigone and sizing the anterior leaflet and 30-millimeter Edwards annuloplasty band was sutured and tied in place.
P2 was resected, and a limited slide of both P1 and P3 to P3 done. The A2/A3 area was prolapsing and neo-chordae were attached to the area. 30-millimeter Edwards annuloplasty band was sutured and tied in place. Code this Case:

A. MV Repair with Annuloplasty
B. MV Repair with Annuloplasty, Posterior Leaflet Resection P2, sliding plasty & Neochords Anterior A1 & A2 location
C. MV repair with Annuloplasty, leaflet resection, & Chordal Transfer.

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P2 was resected, and a limited slide of both P1 and P3 to P3 done. The A2/A3 area was prolapsing and neo-chordae were attached to the area. 30-millimeter Edwards annuloplasty band was sutured and tied in place.

A. MV Repair with Annuloplasty

B. MV Repair with Annuloplasty, Posterior Leaflet Resection P2, sliding plasty & Neochords Anterior A1 & A2 location

C. MV repair with Annuloplasty, leaflet resection, & Chordal Transfer.
Sliding Plasty Example

Techniques

Sliding Plasty
Code Operative Mitral Repair Procedure 2.9 (#3)

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<tr>
<th>Mitral Valve Procedure Performed:</th>
<th>Yes, planned</th>
<th>Yes, unplanned due to surgical complication</th>
<th>Yes, unplanned due to unsuspected disease or anatomy</th>
<th>No (If Yes: )</th>
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<td>VSMVRepApp (3501)</td>
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<td>Repair (If Repair)</td>
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<td>Surgical</td>
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<tr>
<td>Resection Type:</td>
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<td>VSLeafResTyp (3515)</td>
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<tr>
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<tr>
<td>Anterior leaflet resection location: A1</td>
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<td>No</td>
<td>A2</td>
<td>Yes</td>
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<td>Posterior resection: Yes</td>
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<td>Posterior leaflet resection location: P1</td>
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<tr>
<td>Neochords (PTFE): Yes</td>
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<td>Anterior Neochords: Yes</td>
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<td>A2</td>
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<td>P2</td>
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Code Operative Mitral Repair Procedure 2.9
Continued....(#3)

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<tr>
<td>Sliding Plasty</td>
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<td>VSMitRSlidP (3566)</td>
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<tr>
<td>Annular decalcification/debridement</td>
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<td>VSMitRADecalc (3567)</td>
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<tr>
<td>Leaflet extension/replacement patch</td>
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<td>VSMitRLeafERP (3568)</td>
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<tr>
<td>(If Yes→) Patch Location</td>
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<td>VSMitRLeafERPLoc (3569)</td>
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<tr>
<td>Edge to edge repair</td>
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<td>VSMitREdge (3570)</td>
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<tr>
<td>Mitral commissurotomy</td>
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<td>VSMitRMitComm (3580)</td>
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<tr>
<td>Mitral commissuroplasty</td>
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<td>VSMitRMitCplasty (3585)</td>
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<tr>
<td>Mitral cleft repair (scallopl closure)</td>
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<td>VSMitRMitCleft (3590)</td>
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<tr>
<td>Mitral paraprosthetic leak repair</td>
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<tr>
<td>VSMitParaprosLeak (3591)</td>
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<td></td>
</tr>
</tbody>
</table>
4. Mrs. G.H.

- 68 yr. old with history of Rheumatic fever
- No CAD
- 2+MR
- Mitral Stenosis mean gradient 13mmHg
- Preop Dx-MR, MS, CHF
- Procedure Performed Complex mitral valve repair

:www.heartpoint.com

www.lifescript.com
The valve was characterized by mitral insufficiency, rheumatic heart disease, mitral stenosis, annular calcification, leaflet calcification, subvalvar fusion, commissural fusion, and chordal shortening. Commissurotomies were performed and the valve debrided of excessive calcium to allow more mobility.
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- Commissurotomies were performed and the valve debrided of excessive calcium to allow more mobility. **You would code this case as:**

A. Mitral Valve Repair with Mitral Valve Commissurotomy

B. Mitral Valve Repair with Annuloplasty

C. 3. Mitral Valve Repair with Annular Decalcification

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Commissurotomies were performed and the valve debrided of excessive calcium to allow more mobility. **You would code this case as:**

A. Mitral Valve Repair with Mitral Valve Commissurotomy

B. Mitral Valve Repair with Annuloplasty

C. 3. Mitral Valve Repair with Annular Decalcification

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5. Mr. H.K.

- 52 yr. old white male
- Hx of Severe Mitral Stenosis
- Percutaneous Mitral Valvuloplasty in 2012
- Progressive DOE & increase mitral insufficiency to moderate
- Chronic AFib
- Cardiomegaly
- TTE: + Pulmonary HTN (65mmHg Systolic) & Severe MR

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Mr. H.K.

- Procedure performed:
- Mitral Valve Replacement with #25 Carbomedics mechanical valve.
- No Intraop complications and weaned from CPB without difficulty.

Video Clip: Cipriano Abad, MD, PhD. University Las Palmas de Gran Spain
January 31, 2014
Video
Coding Mitral Valve Replacement (#5)

Complete Carbomedics Model # and Implant Size (#25)
Future of Mitral Valve Operations

Figure 1. Mitral valve repair using the expanded polytetrafluoroethylene (ePTFE) preformed knot implantation device (TSD-5).

Circulation: 2016;134:189-197
# Glossary of Mitral and Aortic Valve Operation Terms

**Glossary of Mitral Valve & Mitral Valve Operation Terms**

<table>
<thead>
<tr>
<th>Associated Valve Word/Term</th>
<th>Explanation of Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annulus</td>
<td>&quot;Ring&quot; - The ring-shaped area where valve leaflets attach to the surrounding heart.</td>
</tr>
<tr>
<td>Anuloplasty</td>
<td>&quot;Molding, surgically forming&quot; – The mitral annulus (attachment ring) is formed or molded to more normal geometry maintaining as much leaflet and subvalvular structure as possible.</td>
</tr>
<tr>
<td>Anterior Mitral Leaflet</td>
<td>When MV closed, comprises 1/2 to 2/3 of surface area. The fibrous support is fixed. The anterior leaflet is attached to the annulus and comprises 1/3 of the annulus. The anterior leaflet is close to the aortic valve.</td>
</tr>
<tr>
<td>Chorda (Chorda, plural)</td>
<td>&quot;Cord or Tendon&quot; – Tendinous tissue originating from the Papillary Muscles and attach to the MV Leaflets. Chordae are classified as primary or secondary depending on leaflet insertion site.</td>
</tr>
<tr>
<td>Chordal Transfer</td>
<td>Usually involves taking a Posterior Leaflet chorda and moving it to the Anterior Leaflet to replace a flail (ruptured) chorda.</td>
</tr>
<tr>
<td>Coaptation</td>
<td>The normal movement and function of the valve leaflets when they come together to close the mitral valve during systole.</td>
</tr>
<tr>
<td>Commissure(s)</td>
<td>The points of attachment of the 2 mitral valve leaflets within the mitral annulus. The area between 2 leaflets where they meet is the commissure.</td>
</tr>
<tr>
<td>Commissuroscopy</td>
<td>&quot;Sickening, opening&quot; – Leaflets that are fused together at the commissural area are surgically separated to widen the opening.</td>
</tr>
<tr>
<td>Degenerative Disease</td>
<td>Also known as Myocarditis Disease, Mitral Valve Prolapse, or floppy valve disease. Abnormal leaflet and chordal tissue makeup that allows them to stretch or elongate and prevent the leaflets from coapting.</td>
</tr>
<tr>
<td>Edge-to-Edge Repair</td>
<td>Sealing the Anterior Leaflet and Posterior Leaflet together. This can also be done panniculoplasty with the Mitral Valve Clip. Sometimes referred to as an ‘Allini Stitch’ in open mitral valve repair.</td>
</tr>
<tr>
<td>Functional Mitral Regurgitation</td>
<td>MR results from geometric abnormalities of the ventricle, which results in dysfunction of a morphologically normal mitral valve. The mitral annulus may or may not be dilated. Examples are ischemic cardiomyopathy or dilated cardiomyopathy.</td>
</tr>
<tr>
<td>Gore-Tex PTFE Chords or Neochords</td>
<td>Chordae made from Gore-Tex®PTFE suture that is attached to the papillary muscle and then to unsupported leaflet.</td>
</tr>
<tr>
<td>Hypertrophic Obstructive Cardiomyopathy (HOCM)</td>
<td>Previously referred to as IHEG (idiopathic hypertrophic subaortic stenosis). Genetic disorder characterized by massive myocardial hypertrophy (enlargement) without dilatation. Usually the ventricular septum is thickened and localized to the subaortic region. This causes LVOT obstruction. A Septal myectomy and often MV replacement are done to help correct problem.</td>
</tr>
<tr>
<td>Ischemic Mitral Regurgitation</td>
<td>MR that has resulted from a myocardial infarction. The MR results from LV changes and annular dilatation.</td>
</tr>
<tr>
<td>Leaflets</td>
<td>The mitral valve has 2 leaflets that open and close allowing blood to flow through the valve from the left atrium into the left ventricle. The leaflets are composed of strong thin pieces of tissue.</td>
</tr>
<tr>
<td>Leaflet Cleft</td>
<td>The Posterior Leaflet usually has 3 indentations or scallops separated by clefts.</td>
</tr>
<tr>
<td>Leaflet Resection</td>
<td>Removing redundant leaflet tissue and re-approximating and suturing back together. Can be a Triangular (triangular shape) or Slabheamular Resection.</td>
</tr>
<tr>
<td>Mitral Annular Calcification</td>
<td>Calcium deposits on the mitral annulus seen in absence. Causes MR by interposing with obstruction.</td>
</tr>
<tr>
<td>Mitral Valve Area</td>
<td>The surface area of the mitral valve opening (offace). An area of less than 1.0cm² represents critical mitral stenosis.</td>
</tr>
<tr>
<td>Mitral Valve Gradient</td>
<td>The difference in pressure between the left atrium and left ventricle during diastole, or ventricular relaxation and filling phase. Indicates the measured amount of stenosis across a mitral valve. The valve can be calcified or fibrosed and not allow the leaflets to open adequately creating a higher pressure in front of the valve (in the atrium) than after the valve (in the ventricle).</td>
</tr>
</tbody>
</table>

Created by:
Amy Geltz RN, MS
Jaelene Williams, RN, MS
August 2010 for the MSTCVS QC Data Managers.
Updated: July 2017

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Good Computer Simulated Mitral Valve Anatomy & Operations “ ~ 5 minutes

http://cardiac-surgery.med.nyu.edu/treatments-procedures/mitral-valve-repair

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Credits & Thank You!

- R. Prager, MD Presentation: Michigan Data Mgr. Meeting
  - August 2010: Aortic & Mitral Valve Operations
- Amy Geltz RN, MS – University of Michigan
  - Access to Video Clips: Steven Bolling, MD University of Michigan
- Patty Theurer, RN, BSN
  - Several DM Previous Mitral Valve Talks
- Dr’s Bobby Kong, Andrew Pruitt, Manak Sood
  - Cardiac Surgery: St. Joseph Mercy Hospital Ann Arbor Presentation
- LaWaun Hance, PA-C
  - St. Joseph Mercy Hospital Ann Arbor
    • Power Point Presentations & Graphic Designs
- STS References: STS Website www.sts.org
- R. Prager, MD AQO Presentation: Valve Disease 2.81Oct. 2014