TERMS
TOTAL ENDOSCOPIC ROBOTIC MITRAL SURGERY
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ROBOTIC MITRAL VALVE HISTORY
• 1st Robotic MV Repair performed- 1998
  • Carpenter using early prototype of da Vinci surgical system
• Minimally invasive Mitral Valve surgery began by using a Right anterolateral thoracotomy approach
  • Showed comparable results to sternotomy
• Videoscope assistance – 1996
  • Chitwood clamp
• Currently using endoscopic camera and endoscopic instruments

Da Vinci Xi
- Approved by FDA for MV Repair Surgery-2002
- 3D HD vision system for clear and magnified view

Da Vinci Xi
- Da Vinci EndoWrist- instruments bend and rotate far greater than human wrist
- Surgeons movements are translated into smaller more precise movements of the instruments

COMING TO TERMS: PREPARATION
- 10 Mock Cases Performed in preparation for actual cases
- Operating Room Set-Up was standardized
- Required Checklists were performed at the different stages of the case.
  - ex. Equipment and Supplies checklist, Patient Position checklist,
  - Pre-arrest checklist
- Online training modules were accessible through Intuitive website.
- All required personnel completed and passed the da Vinci Xi Robot training module
PREPARATION

- Mock cases were used to
  - Determine flaws in setup and organization
  - Help build surgical skills with the use of realistic valve models
  - Run emergency drills for surgical equipment failures
  - Simulate CPB initiation, cardioplegia delivery and CPB termination
- Observed Robotic Cases at 2 high volume institutions
- Doing Mocks helped decrease flow disruption
  - Frequently caused by: Coordination,

DEDICATED ROBOTIC TEAM

High Performance Interdisciplinary Teamwork in Robotic Cardiac Surgery is Absolutely Essential to Safe & Successful Robotic Surgery

1-2 Anesthesiologists
1 Surgeon
1 Bedside Assistant
1 Scrub tech or RN

The complex teamwork required for these procedures will generally improve cardiac surgery teamwork overall

1-2 Circulator
1-2 Perfusionist

Steps for Mitral Valve Repair using the L.E.A.R. Technique
Incisions

Hemodynamic Monitor Setup

- Right Radial/Brachial-White
- Left Radial/Brachial-Lavender
- Aortic Root-Red
- PAP- Yellow
- CVP- Blue
- Coronary Sinus-Orange
CARDIOPULMONARY BYPASS

• 3/8-3/8 Loop
• Del Nido Cardioplegia
  • 1000ml Antegrade
  • 500 ml Retrograde
  • Subsequent doses 750 ml delivered retrograde
• VAVD every case
• Hemoconcentration
• Pump Suckers- Aortic Root Vent, LV Vent, Field Suction, PA Vent
• Standardly cooling to 32 degrees Celcius

Cannulas and Catheters

ProPlege

ProPlege Peripheral Retrograde Cardioplegia Device

• Delivers Retrograde Cardioplegia
• Balloon to occlude Coronary Sinus
**EndoVent Pulmonary Catheter**

- Removes Blood from PA
- Assists in decompression of the heart
- Designed to maintain a dry operative field

**Venous Cannulation**

- Femoral Quick Draw Cannula
- Sizes: 22 Fr & 25 Fr
- SVC Cannula: Optisite 16 Fr
- ProPlege balloon should be inflated before venous cannula placement to prevent dislodgement

**Arterial Cannulation**

- EndoReturn Cannula Sizes: 21 Fr & 23 Fr
- Cannula Selection based on patient anatomy
- InterClude Device passed through side port
- Distal perfusion catheter placed to perfuse leg
**IntraClude Intra-Aortic**

- Occludes Ascending Aorta
- Used to deliver Antegrade Cardioplegia
- Vents Aortic Root
- Monitors Aortic Root Pressure
- Monitors Balloon Occlusion Pressure

**TEE Assistance**

**POTENTIAL BENEFITS OF TERMS**

- Less Blood Loss
- Less Pain
- Less time required on ventilator
- Quicker healing time
- Small scars/less adhesions for re-operations
- Shorter hospital stays
- Competition for Transcatheter Repair or Replacement of MV
- More attractive to patients
- Better visualization of the valve
**Date of Discharge**

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<th>Procedure</th>
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<th>Date of Discharge</th>
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* Patient 2 had complications following procedure, could not find discharge date.

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**STERNOTOMY VS. TERMS SO FAR.....**

- **Mitral Valve Repair with Sternotomy**
  - Routine length of stay is 7 days with a range of 4-14 days

- **Mitral Valve Repair with TERMS**
  - So far... LOS is 3 days with a range of 2-6 days
  - Average x-clamp= 81 min
  - Average CPB = 116 min

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**Murphy Robotic Mitral Series-Saint Joseph’s Hospital/Emory**

The Expanding Role of Endoscopic Robotic in Mitral Valve Surgery: 1287 Consecutive Procedures

- 1,257 Patients
- Robotic Endoscopic Mitral
- Largest series to date
- 93% Repair
- 7% Replacement
- 18% MAZE
- 0.9% Mortality
**OBJECTIVE:**

To compare outcomes of robotic mitral valve repair with those of conventional approaches: robotic 

**METHODS:**

From January 2006 to January 2009, 759 patients with degenerative mitral valve disease and posterior leaflet prolapse were included in a propensity-matched cohort matching for all leaflet prolapse using techniques identical to open thoracotomy.

**RESULTS:**

Among 745 consecutive patients undergoing open or robotic mitral valve surgery by complete sternotomy (n = 114), partial sternotomy (n = 174), and anterior-lateral thoracotomy (n = 114), or a robotic approach (n = 344), mitral valve repair was achieved in all patients except 1 patient in the robotic group. In matched groups, median cardiopulmonary bypass time was 42 minutes longer for robotic repair than complete sternotomy (P < .0001). Quality of mitral valve repair was similar among matched groups (P = .6, .2, and .1, respectively). There were no conversions to open repair for degenerative disease, 95 propensity matched pairs.

**CONCLUSIONS:**

Robotic mitral valve repair allows complete anatomic correction of all categories of leaflet prolapse using techniques identical to open thoracotomy.

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**Robotic repair of posterior mitral valve prolapse versus conventional approaches: potential realized**

**Cleveland Clinic Experience**

- **Posterior Leaflet Prolapse**
- **263 robotic approach**
- **Longer OR times but not by much**
- **High and comparable repair rate**
- **Lower afib, effusions in robotic group**
- **Shorter LOS**


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**“Robotic mitral valve repair for all prolapse subsetting techniques identical to open valvuloplasty: establishing the benchmark against which percutaneous interventions should be judged.”**

**Mayo Clinic Experience**

- **All Leaflet Prolapse**
- **95 propensity matched pairs**
- **Adverse events similar**
- **OR times longer but improved with time**
- **100% repair rate, all prolapse patients**
- **Shorter ventilation time, ICU stay, hospital stay**


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**“Quality of life after early mitral valve repair using conventional and robotic approaches.”**

**Mayo Clinic**

- **202 patients**
- **Improved QOL of robotic over sternotomy or "port access-robotic" approaches**
- **Earlier return to work**

Robotic-assisted mitral valve repair is becoming more frequently performed in cardiac surgery. However, little is known about its utilization and safety at a national level.

**METHODS:**
Patients undergoing mitral valve repair in the United States from 2008 to 2012 were identified in the National Inpatient Sample. Inhospital mortality, complications, length of stay, and cost for patients undergoing robotic-assisted mitral valve repair were compared with patients undergoing nonrobotic procedures.

**RESULTS:**
We identified 50,408 isolated mitral valve repair surgeries, of which 3,145 were done with robotic assistance. In a propensity score matched analysis of 631 pairs of patients, we found no difference between patients undergoing robotic-assisted and nonrobotic-assisted mitral valve repair with respect to inhospital mortality, complications, or composite outcomes in unadjusted or multivariable analyses. Robotic-assisted mitral valve repair surgery was associated with a shorter median length of stay (4 versus 6 days, p < 0.001), and there was no difference in median total costs between the two procedures.

**CONCLUSIONS:**
In our analysis of a large national database with its inherent limitations, robotic-assisted mitral valve repair was found to be safe, with an acceptable morbidity and mortality profile.
Thank You!

- Bill DeBois – Director of Perfusion Weill Cornell
- Dr. T. Sloane Guy- Cardiac Robotic Surgeon
- Dr. Leonard Girardi – Chairman of Cardiac Surgery
- Dan Brown- Edwards Lifesciences
- Melissa Perlmutter – Intuitive
- Weill Cornell Robotic Team
- Akilah Richards- Perfusion Partner

https://roboticheartsurgeon.com

Questions?