

Hong Kong Core Cardiology Certificate Course

Updates in Surgical Treatment of Mitral and Aortic Valves Diseases

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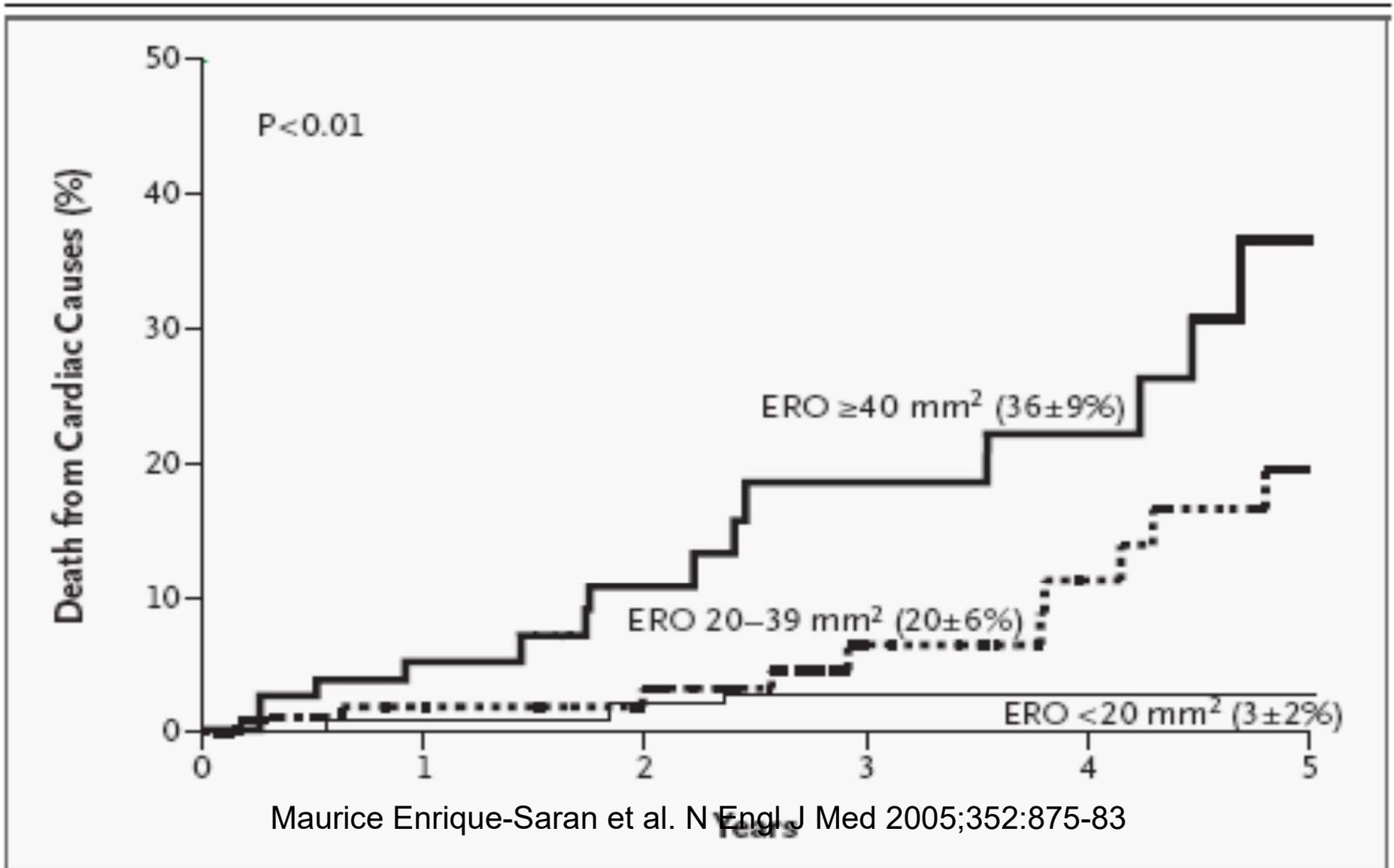
Topic

**Updates in Surgical Treatment of Mitral and Aortic
Valves Diseases**

**NO relevant financial
relationships exist related to our
roles in this session**

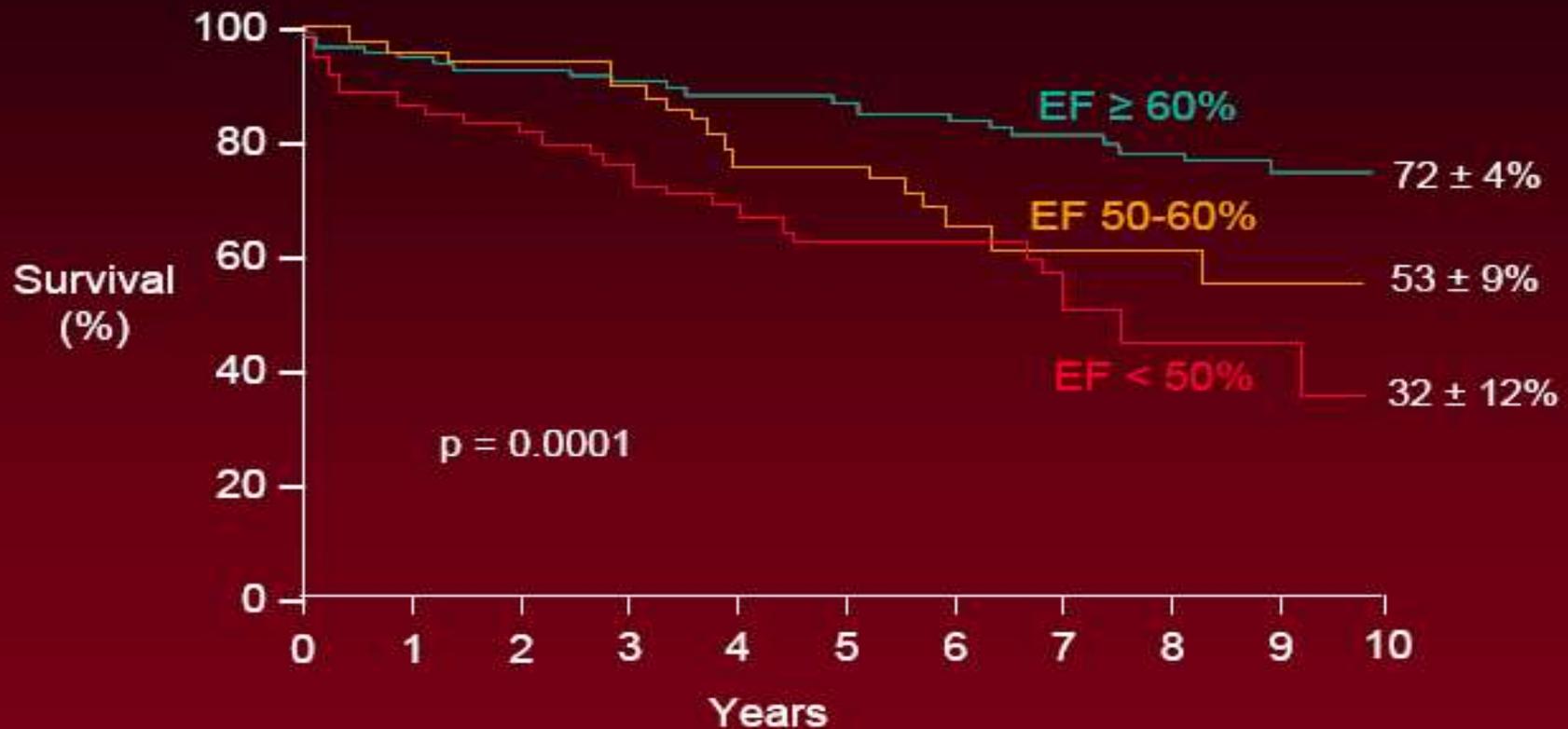


Outcome of Asymptomatic Mitral Regurgitation



LVEF as Predictor of Survival After Surgical Correction of Mitral Regurgitation

Late survival of patients who underwent surgical correction of MR according to preoperative echocardiographic ejection fraction (EF)



Enrique-Saran et al. Circulation. 1994;90:830-37

Facts about MR

- Asymptomatic MR – 5 - 10 years
- Severe MR – annual mortality 5 %
- Sudden death in severe MR
 - Poor NYHA class
 - Low LV ejection
 - Atrial fibrillation
- Severe MR (irrespective of etiology) → **Surgery**



Grigioni F. JACC 1999 34;7:2078-85

Otto C. N Engl J Med 2001, 345;10:740-6



Indications for Mitral Intervention

Class I, symptomatic

Severe MR

Class I, asymptomatic

Severe MR and LVEF \leq 60% or LVEDD \geq 40 mm

Class IIa, asymptomatic, no triggers^b

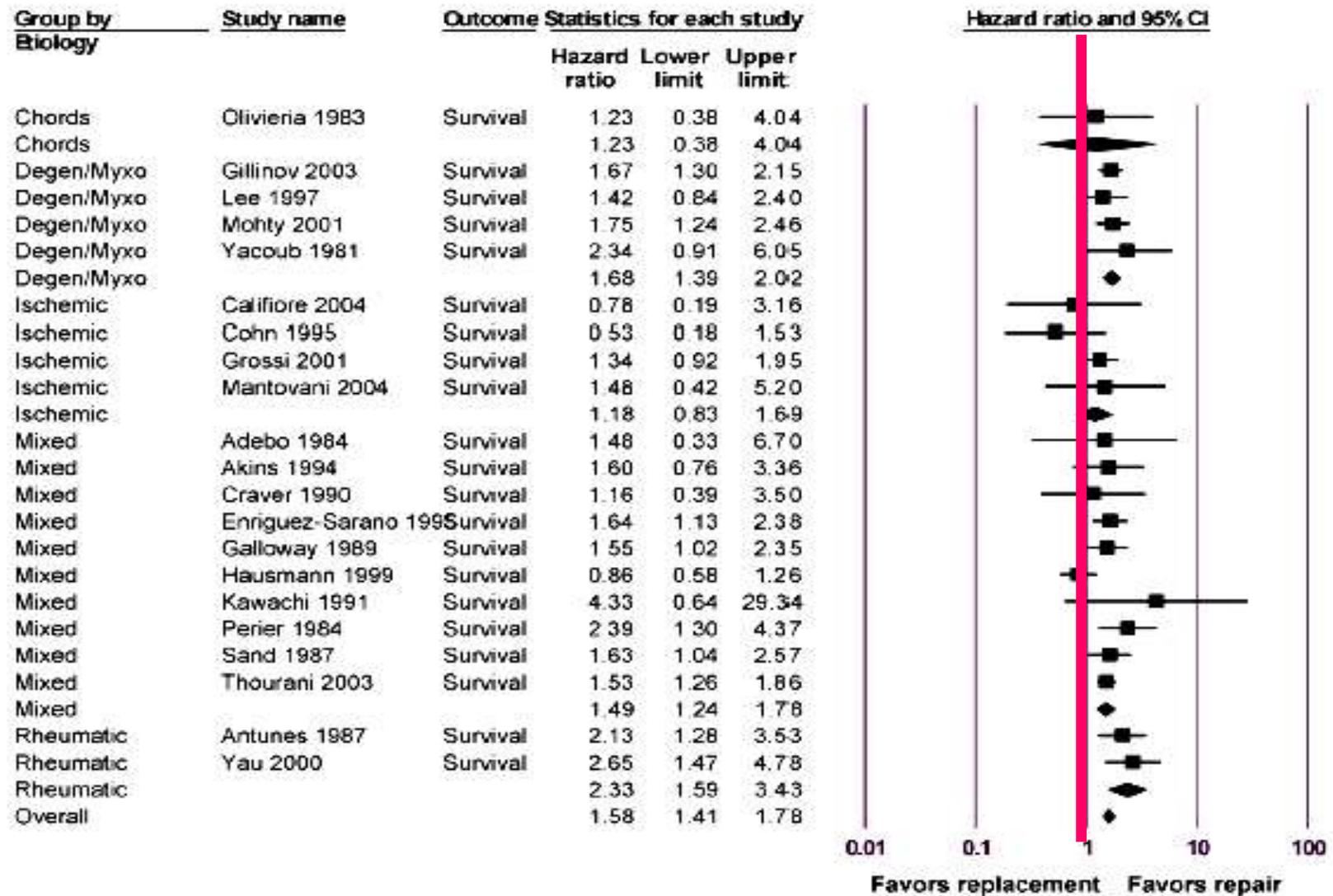
Severe MR and LVEF $>$ 60% and LVEDD $<$ 40 mm

Class IIa, asymptomatic, with triggers^{bc}

Severe MR and LVEF $>$ 60% and LVEDD $<$ 40 mm (and AF and/or sPAP $>$ 50 mm Hg)



Meta-analysis Mitral Repair vs Replacement: Survival



Advantages of Preserving the Valves

- Better Hemodynamic
- Less thrombotic complications
- No need for life long Warfarin
- Lower post-op mortality and morbidity
- But more skill demanding



Mitral Repair is Superior to Replacement

- Better preservation of LV function
- Avoidance of Prosthetic related complications
- Reduced Hospital Mortality
- Reduced Morbidity and LOS
- Improved Long Term Survival

Thourani. Circulation 2003;108:298-304

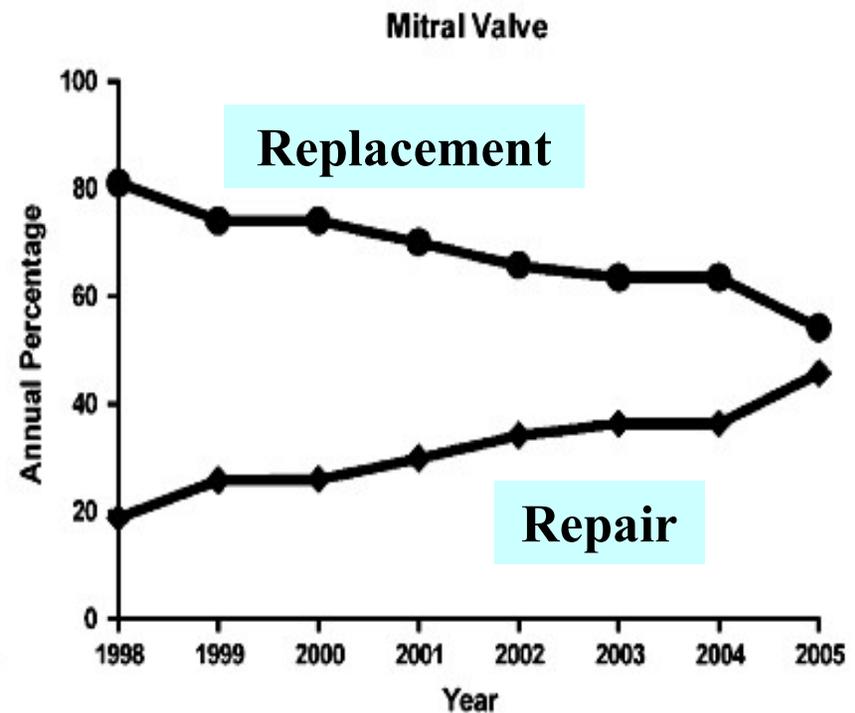
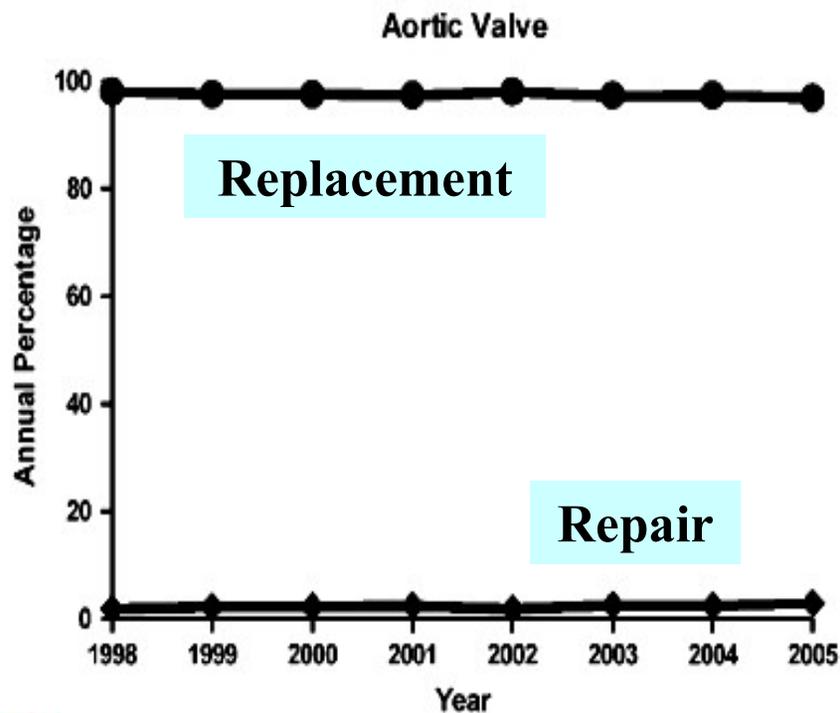
Shuhaiber. EJCTS 2007;31:267-75



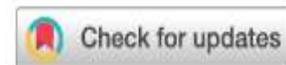
ACQUIRED CARDIOVASCULAR DISEASE

Surgery for aortic and mitral valve disease in the United States:
A trend of change in surgical practice between 1998 and 2005

Scott D. Barnett, PhD and Niv Ad, MD



Isolated Mitral Valve Surgery: The Society of Thoracic Surgeons Adult Cardiac Surgery Database Analysis



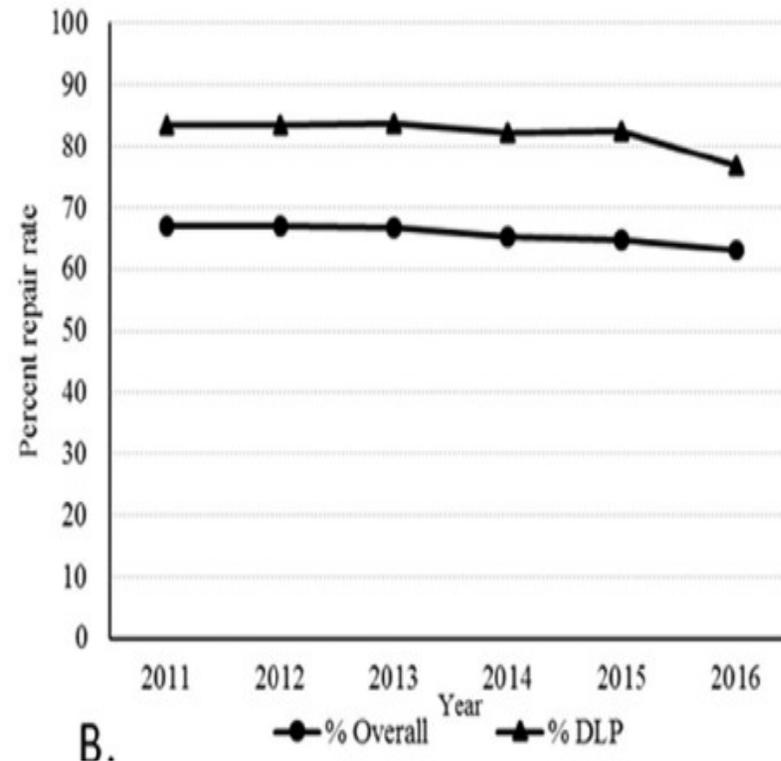
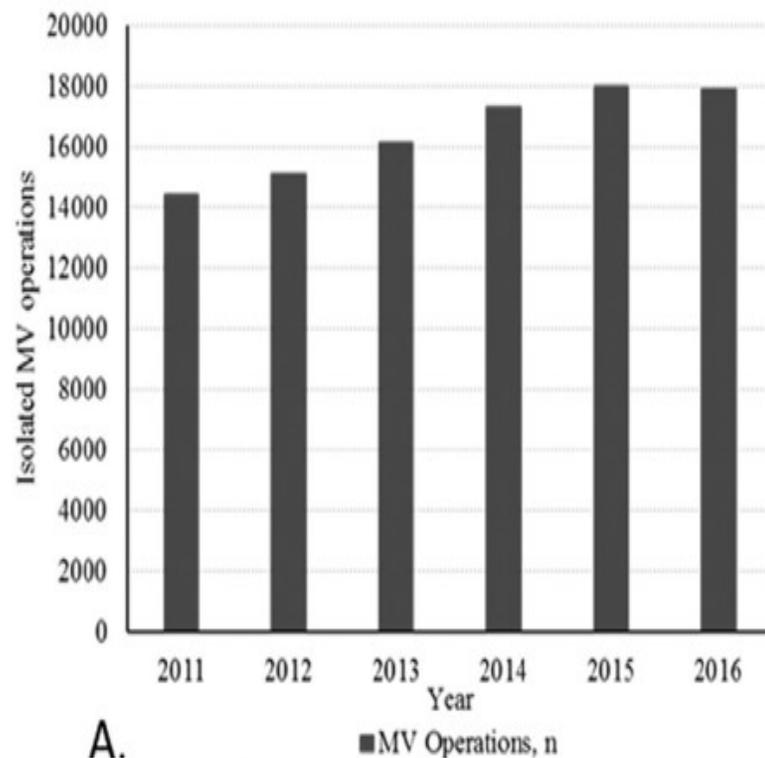
James S. Gammie, MD, Joanna Chikwe, MD, Vinay Badhwar, MD, Dylan P. Thibault, MS, Sreekanth Vemulapalli, MD, Vinod H. Thourani, MD, Marc Gillinov, MD, David H. Adams, MD, J. Scott Rankin, MD, Mehrdad Ghoreishi, MD, Alice Wang, MD, Gorav Ailawadi, MD, Jeffrey P. Jacobs, MD, Rakesh M. Suri, MD, Steven F. Bolling, MD, Nathaniel W. Foster, BS, and Rachael W. Quinn, PhD

Division of Cardiac Surgery, University of Maryland School of Medicine, Baltimore, Maryland; Department of Cardiothoracic Surgery, Mount Sinai Medical Center, New York, New York; Department of Cardiovascular and Thoracic Surgery, West Virginia University, Morgantown, West Virginia; Duke Clinical Research Institute, Durham, North Carolina; Division of Cardiothoracic Surgery, Emory University, Atlanta, Georgia; Department of Thoracic and Cardiovascular Surgery, Cleveland Clinic, Cleveland, Ohio; University of Virginia, Charlottesville, Virginia; Division of Cardiovascular Surgery, Johns Hopkins All Children's Heart Institute, St. Petersburg, Florida; and Department of Cardiac Surgery, University of Michigan, Ann Arbor, Michigan



(Ann Thorac Surg 2018;106:716-27)





Repair techniques included prosthetic annuloplasty (94.3%), leaflet resection (46.5%), and artificial cord implantation (22.7%). Bi

Outcomes

Overall operative mortality was 2.0% and it was 1.2% for degenerative MR group.

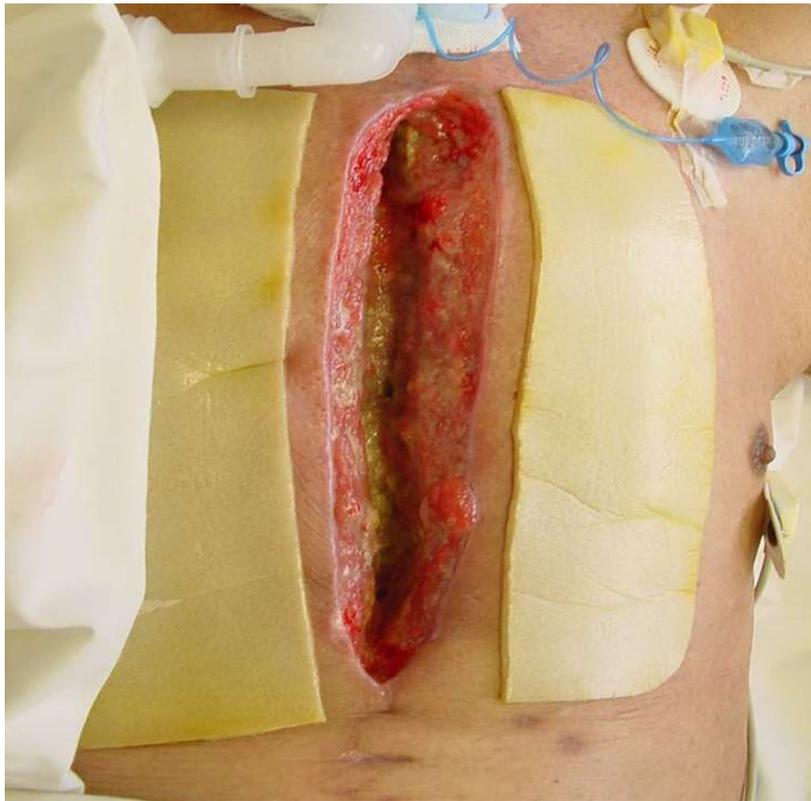
Mitral Valve Replacement was consistently associated with higher unadjusted operative mortality



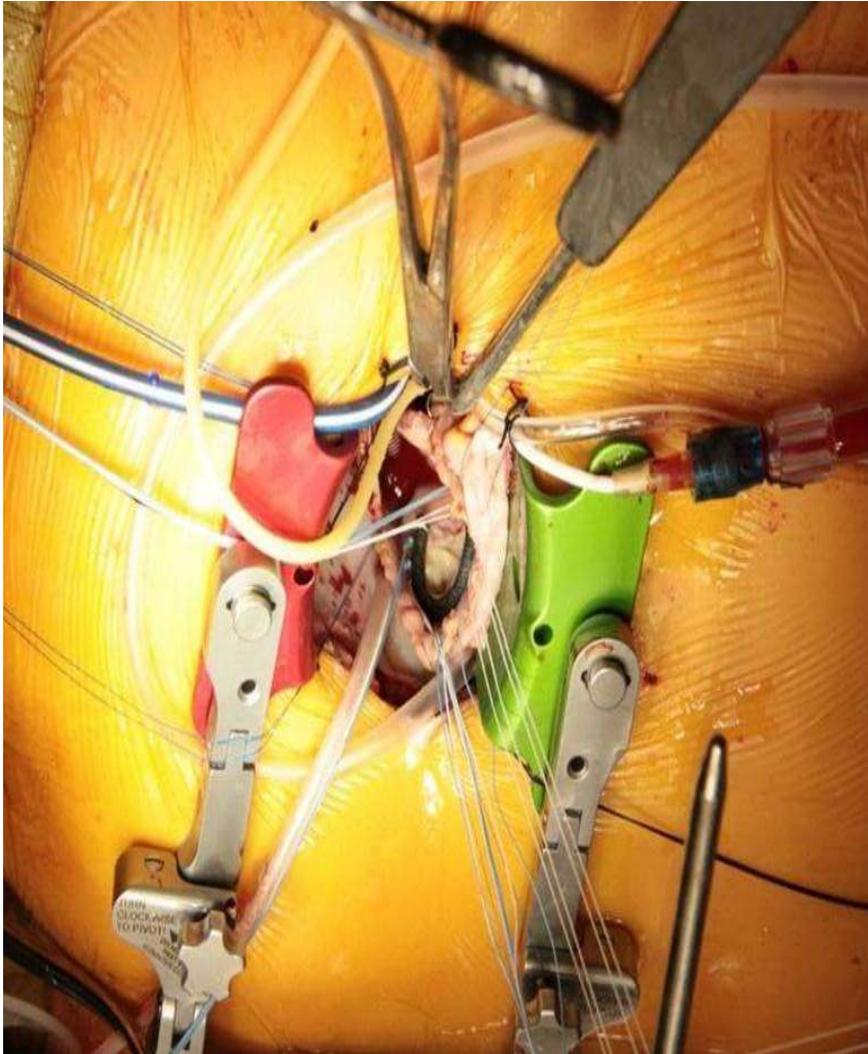
(Ann Thorac Surg 2018;106:716–27)



QMH Minimal Invasive Valve Program

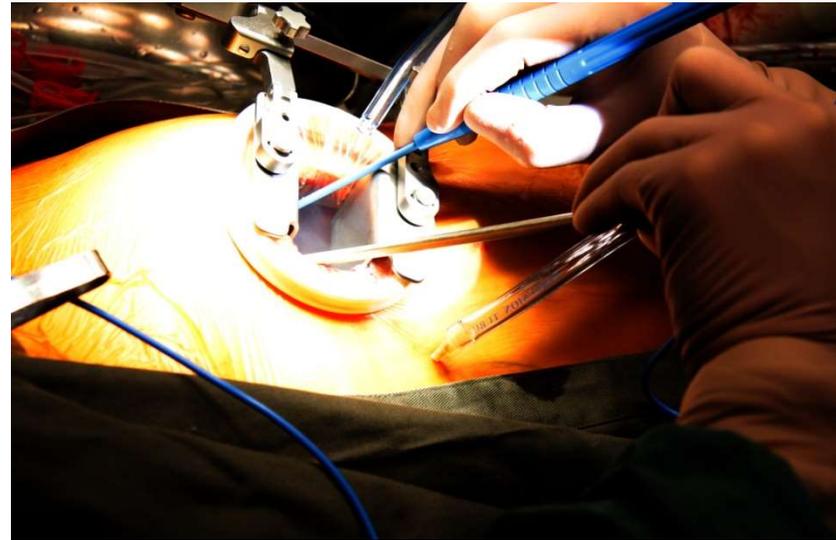
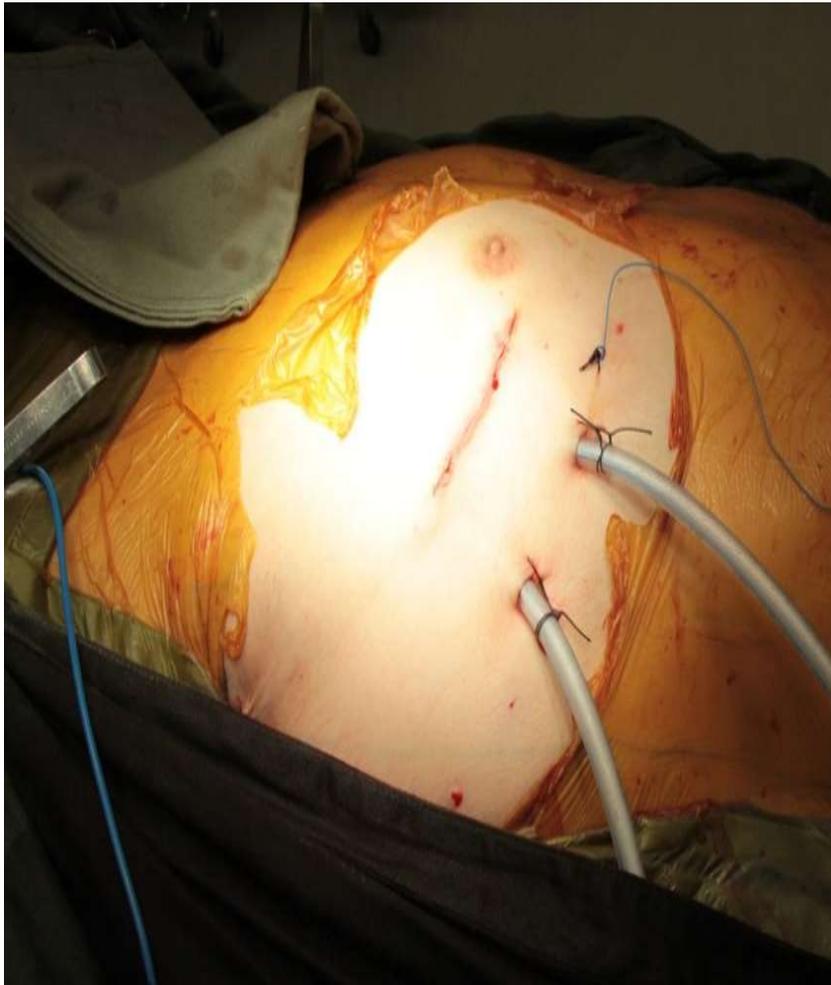


Right Paramedian Mini-Thoracotomy



Right Lateral Mini-Thoracotomy

5 - 6 cm thoracotomy



Mini-Thoracotomy MV Repair

ID:

Name:

Sex: Age:

D.O.B.:

01/11/2012

11:24:21

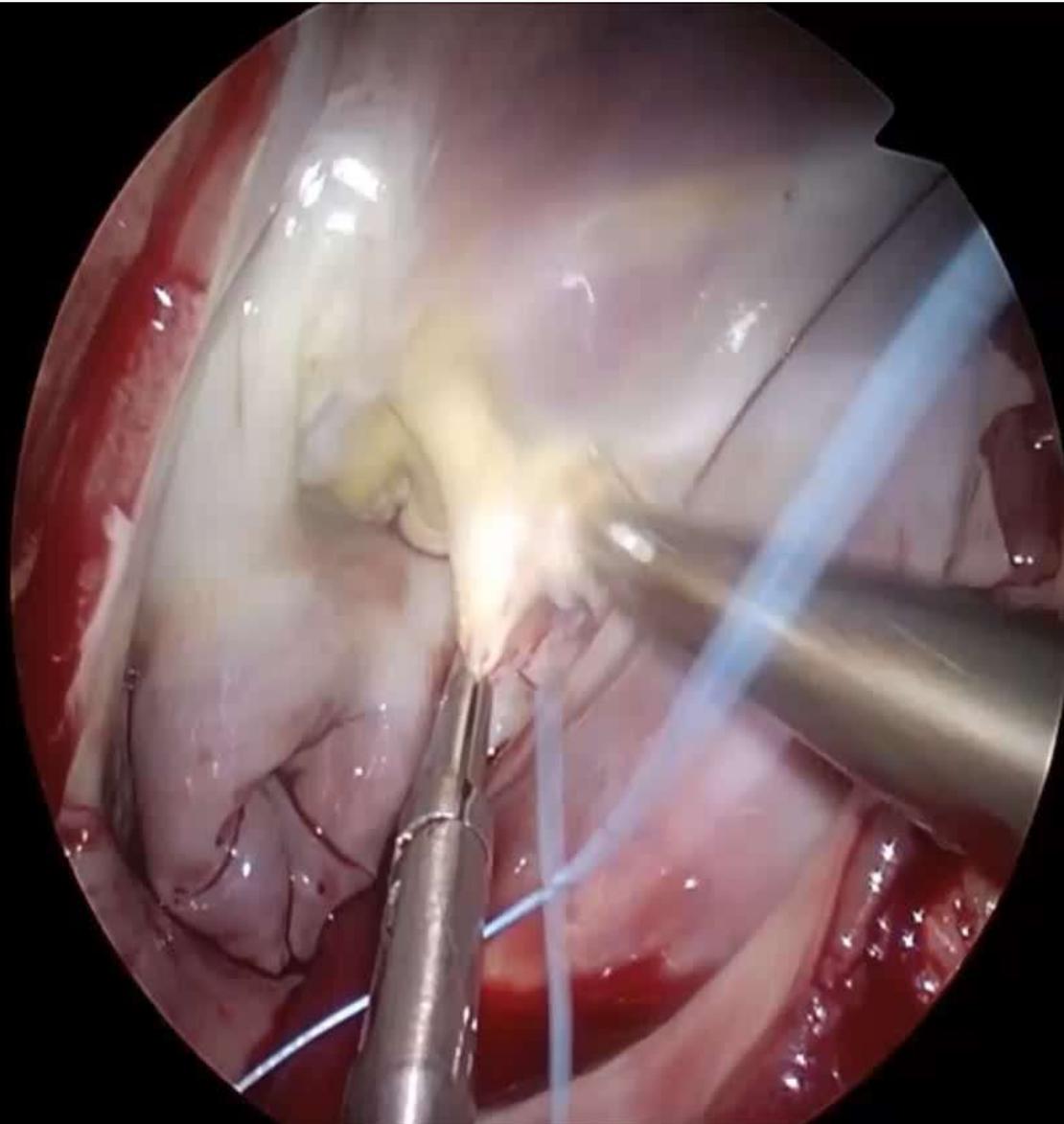
CVP:1

D.F:2

■■■/---(0/2)

Eh:A2 Cm:1

Comment:■

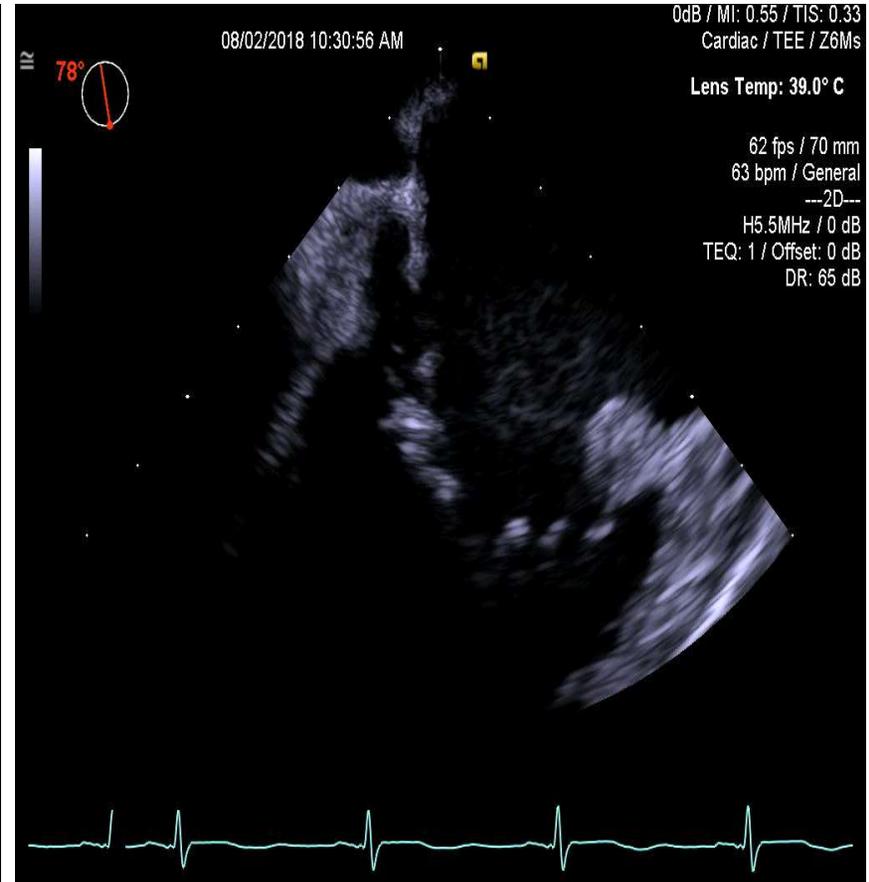
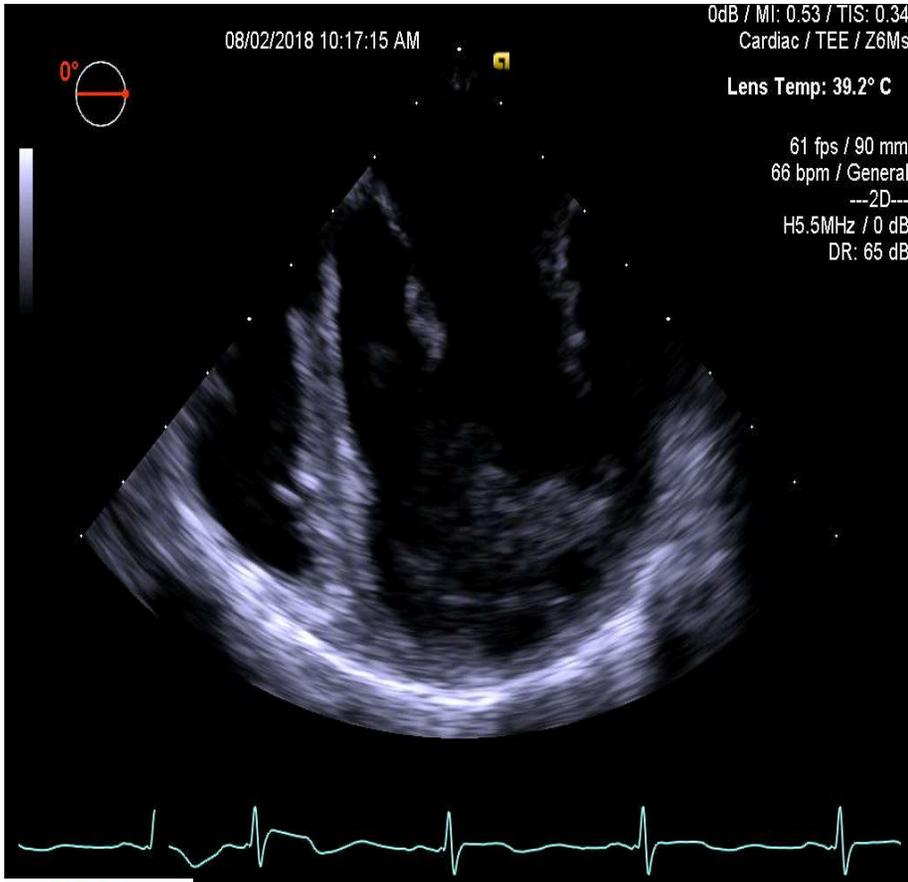


Case 1

- 36 year female
- Mother of 1
- LVDD 5.5 cm
- LVEF 63%
- Fashion Merchandiser
- Functional Class I to II
- ECG Sinus Rhythm

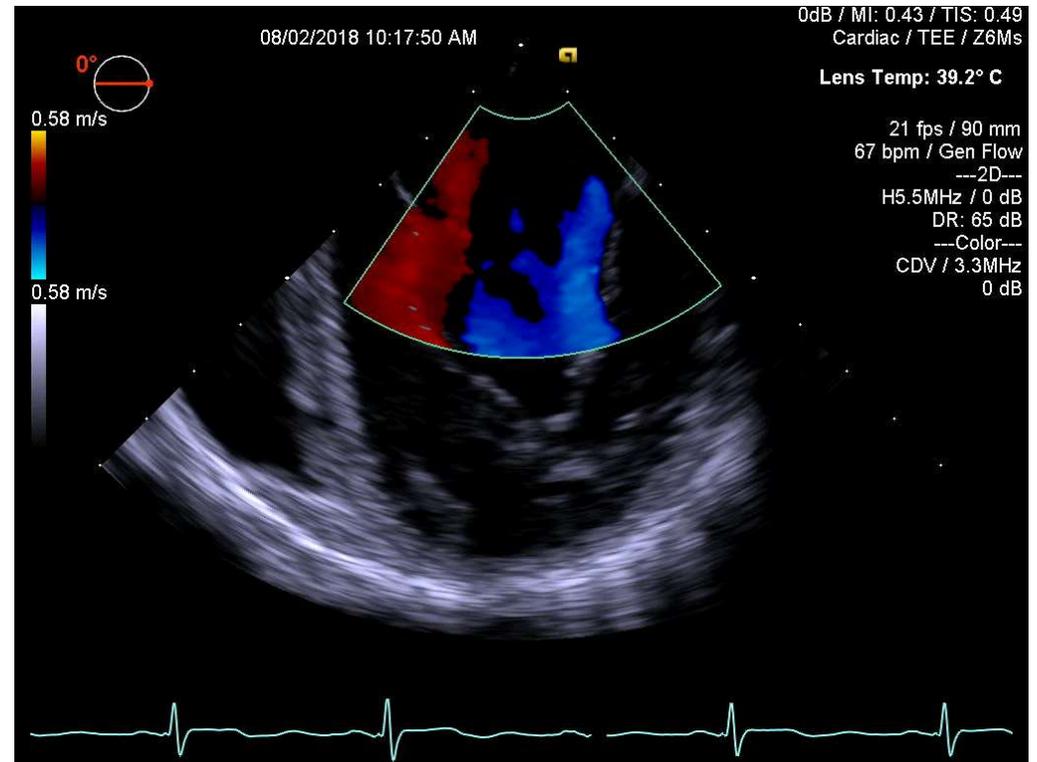


Case 1



Case 1

- Barlow's disease
- Annulus 4.5 cm
- A1 / P1 Prolapse
- MR 4+
- LA around 4.4 cm



Aorto-Mitral annular angle : Wide
Posterior P2 leaflet height : 2.5 cm



Case 1

Mitral Valve REPAIR

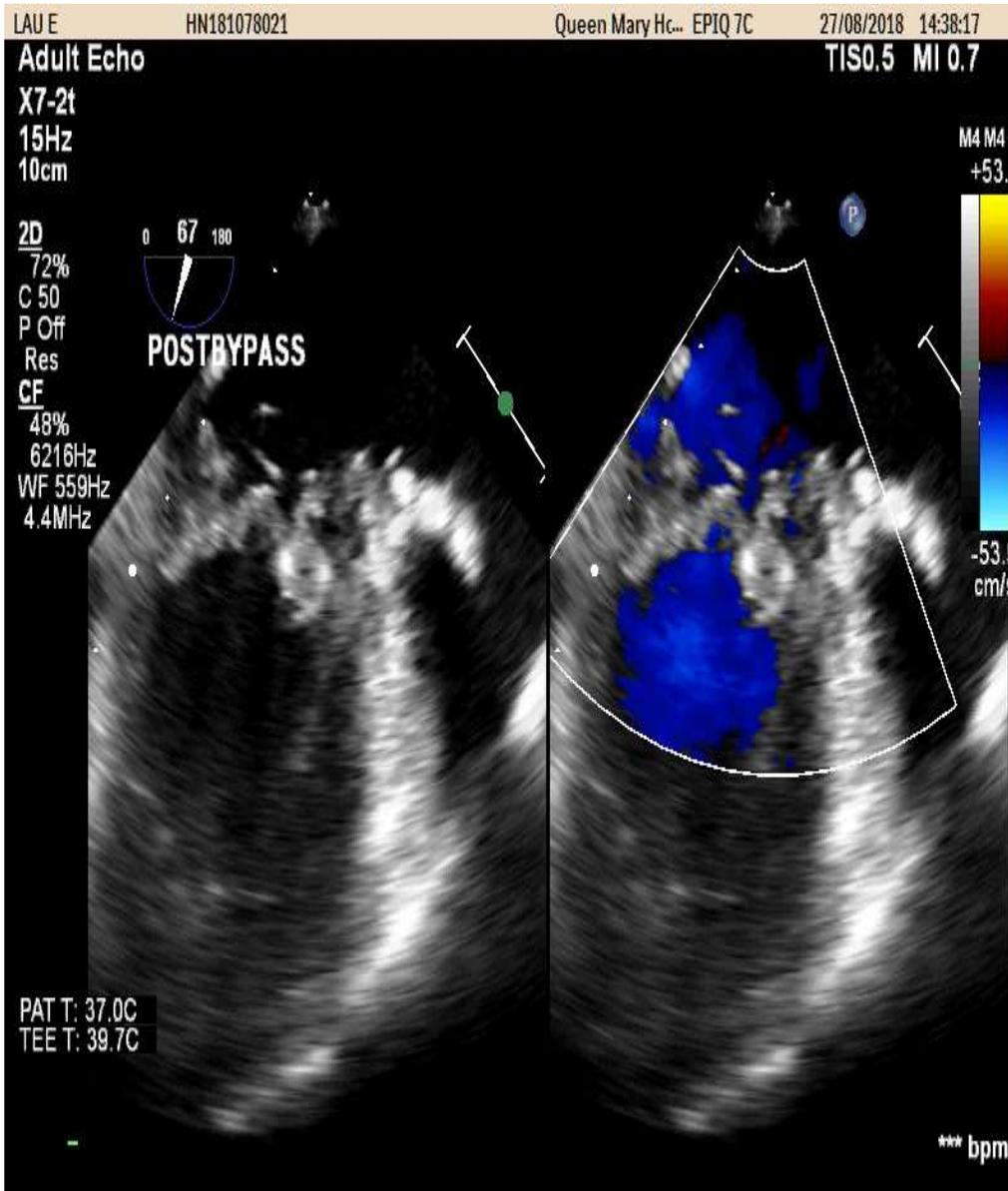
P1 / A1 Commissuroplasty

P2 Triangular Reduction

Annuloplasty Physio II Ring 32

Right Mini-Thoracotomy 6 cm Incision

Post MV Repair



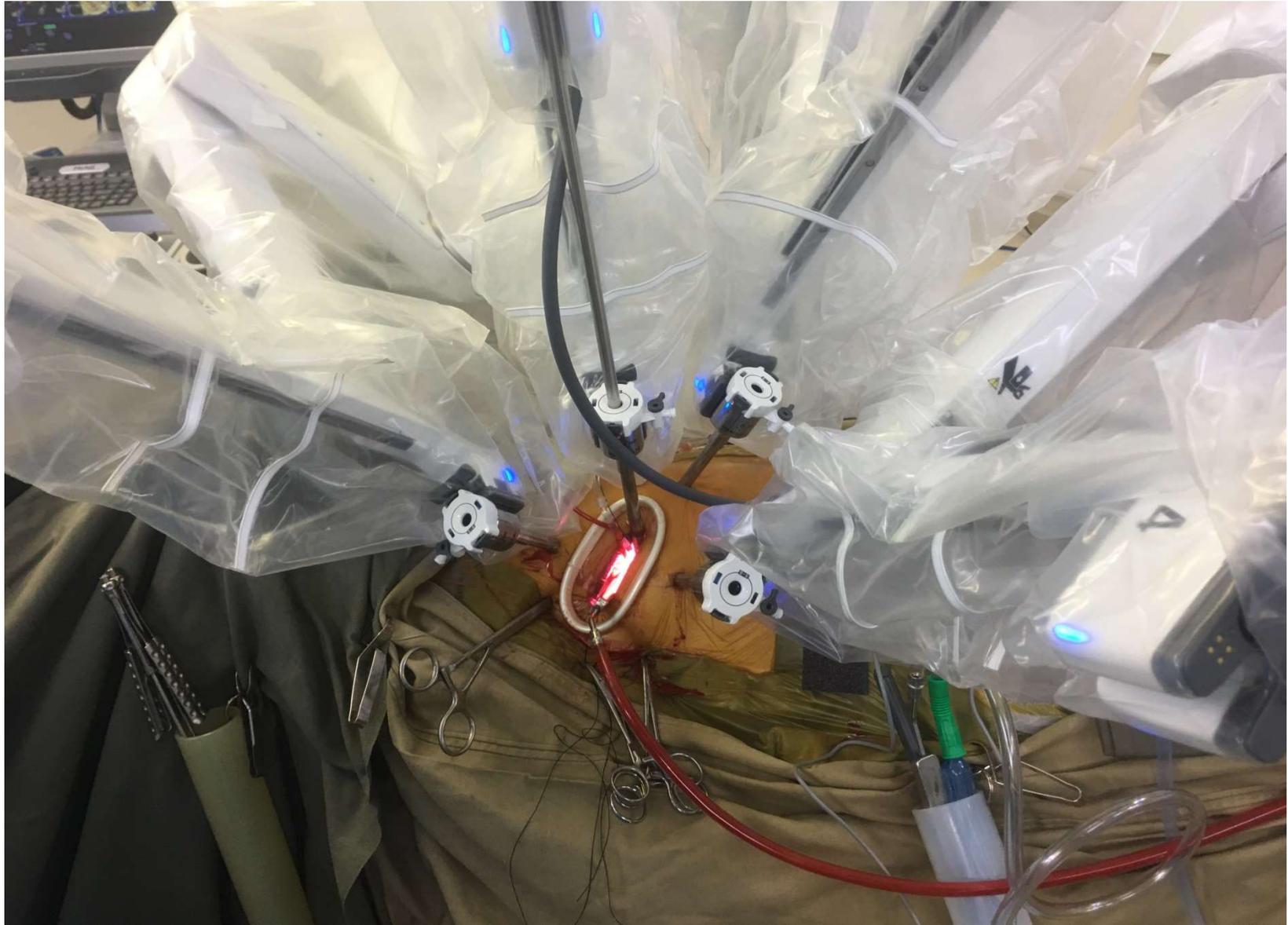
- Trivial MR
- No major gradient
- Coaptation length 13 mm
- No LVOT obstruction or SAM



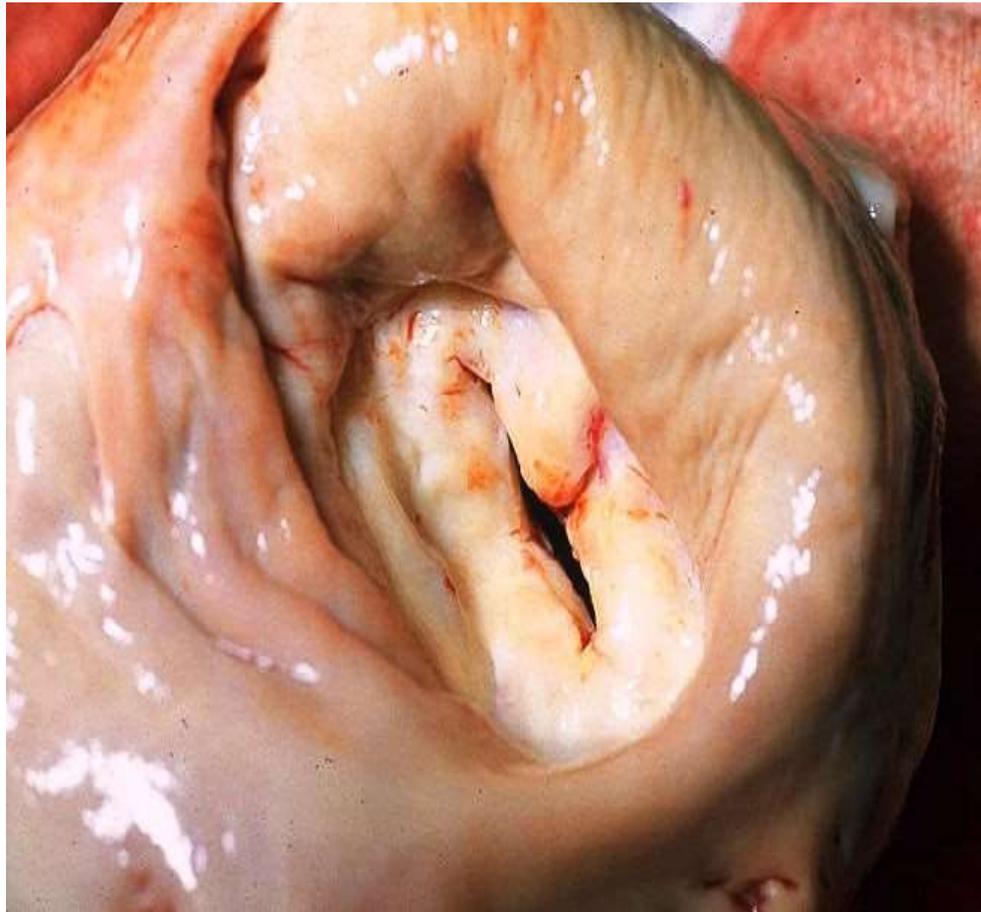
Robotic Mitral Valve Surgery



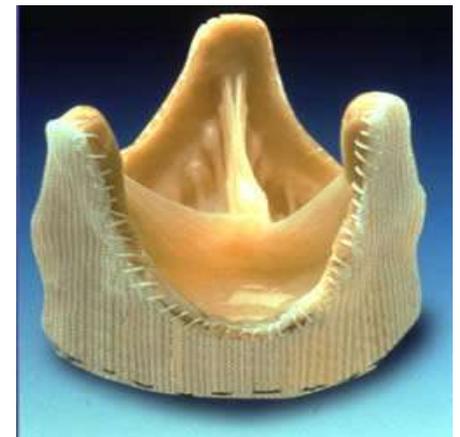
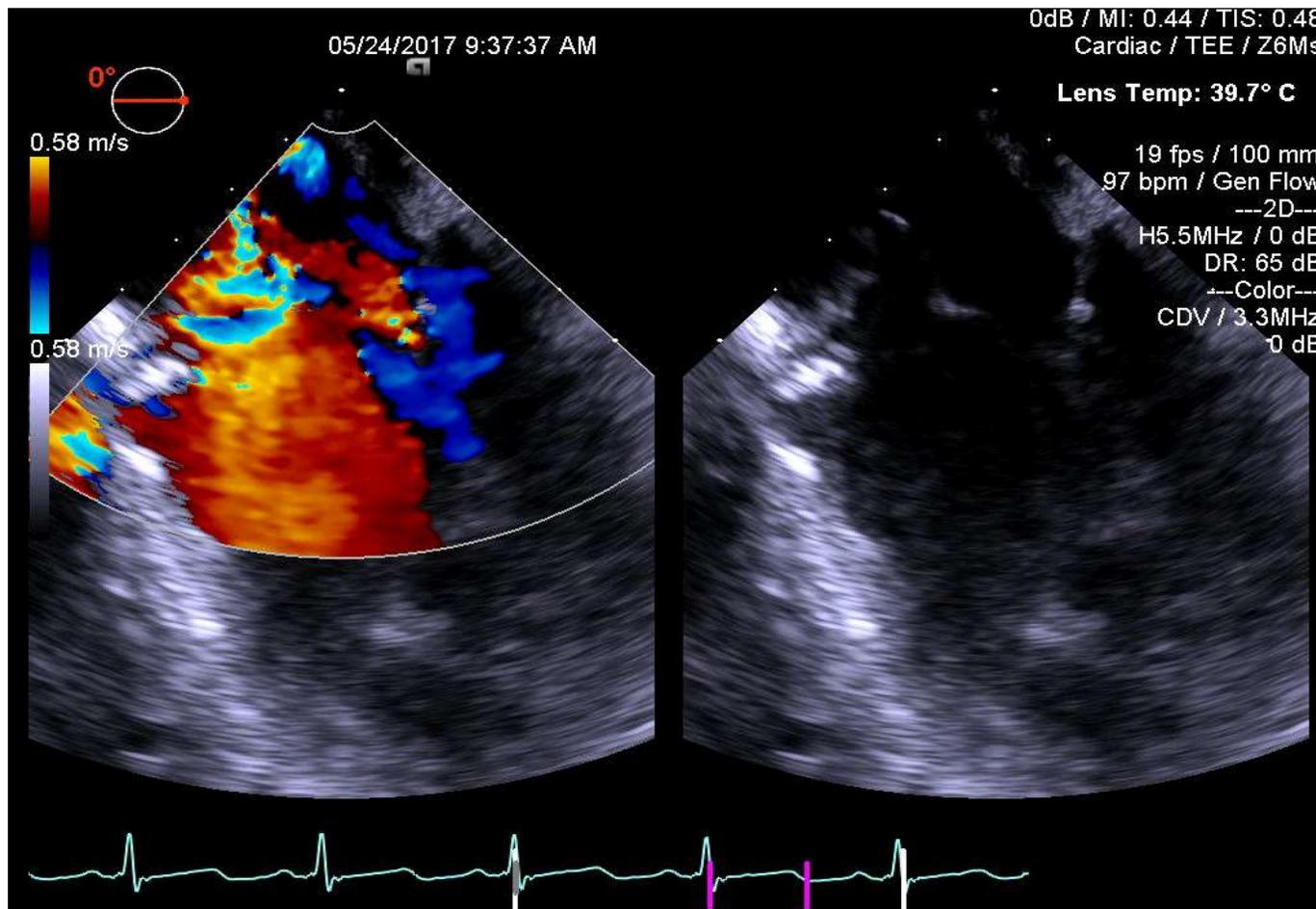
QMH Robotic Mitral / ASD Surgery



What about Rheumatic Mitral Disease



Gold standard for infected or badly damaged valve - Replacement



Rheumatic Mitral Repair

Queen Mary Hospital Experience



Patients Data 1

- 2004 - 2017
- Female 58 : Male 18 (Total 76)
- Age 20 – 81 Mean 58.2 ± 12.1
- Mitral Pathology – rheumatic
 - MR 57 pts
 - Mixed 18 pts
 - Stenosis 1 pt

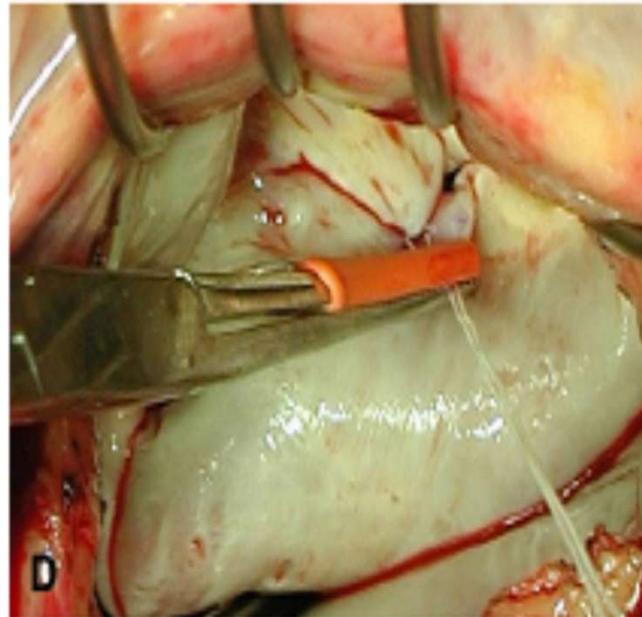
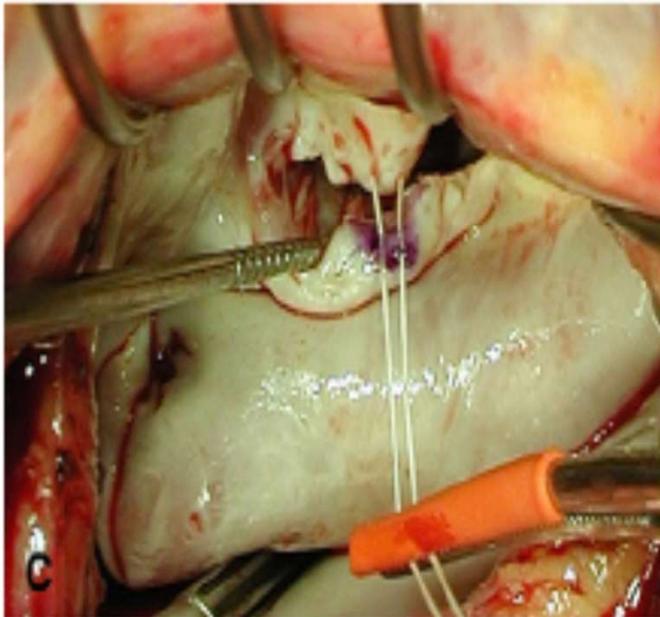
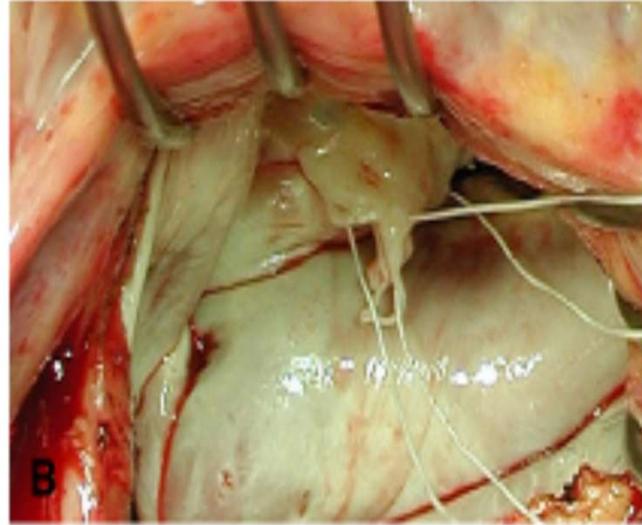
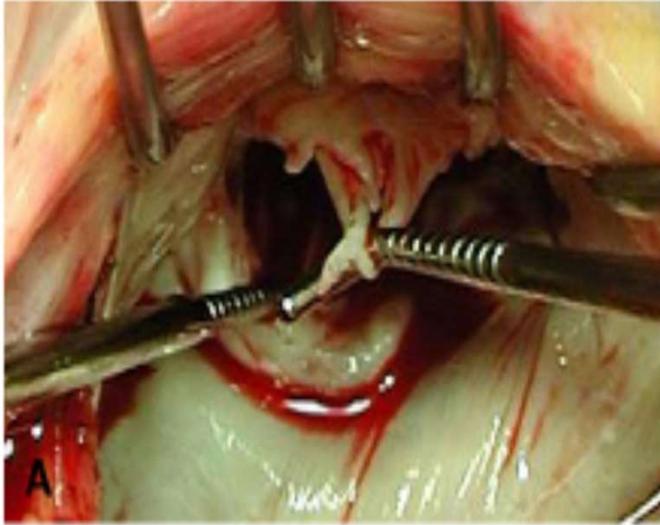
Patients Data 2

- Pre-op Warfarin 33 pts
- Pre-op Atrial Fib 44 pts
 - Ranged 8 – 200 months
- Functional Class III or IV 55 pts
- 3 redo and 3 patients had previous mitral repair [CMV & OMV]
- LVEDD > 5.5 cm 18 pts

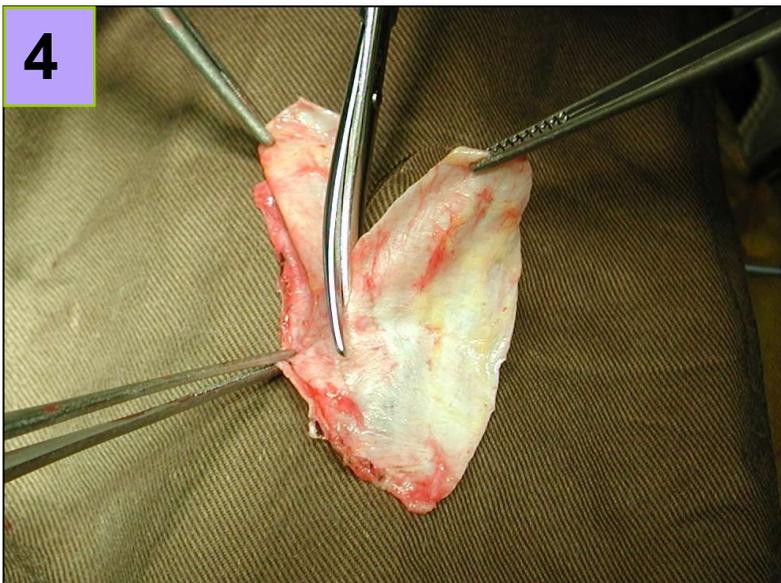
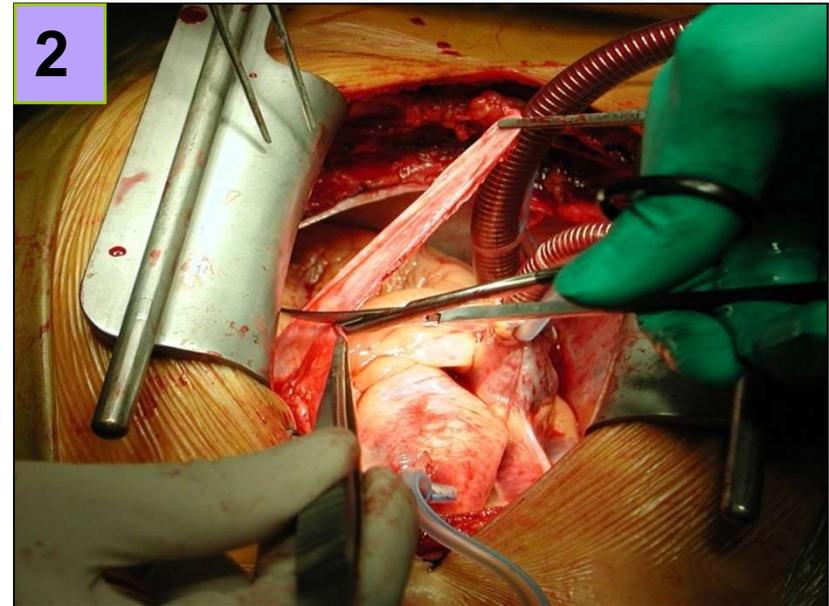
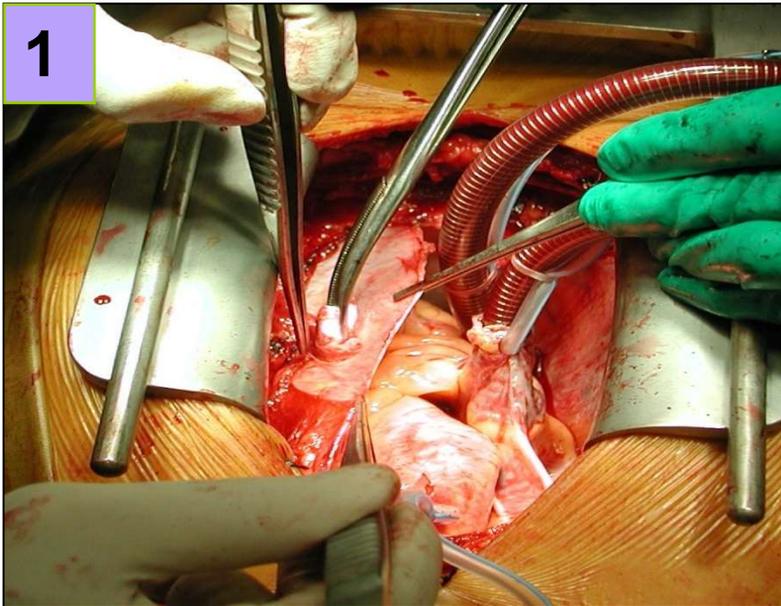
Pathophysiology of Rheumatic Mitral Regurgitation

Type	Leaflet motion	Description	Repair technique
Ia	Normal	Annular dilatation	Annuloplasty
Ib		Leaflet perforation	
IIa	Excessive	Chordal elongation	Goretex or shortening
IIb		Chordal rupture	
IIc		Papillary muscle Infarction / elongation	Goretex or shortening
IIIa	Restricted	Leaflet retraction or Commissural or chordal fusion	Pericardial patch Commissuroplasty Chordal, PM fenestration
IIIb		Leaflet tethering by LV dysf(x) /aneurysm	

Artificial Chordae – Goretex 5/0



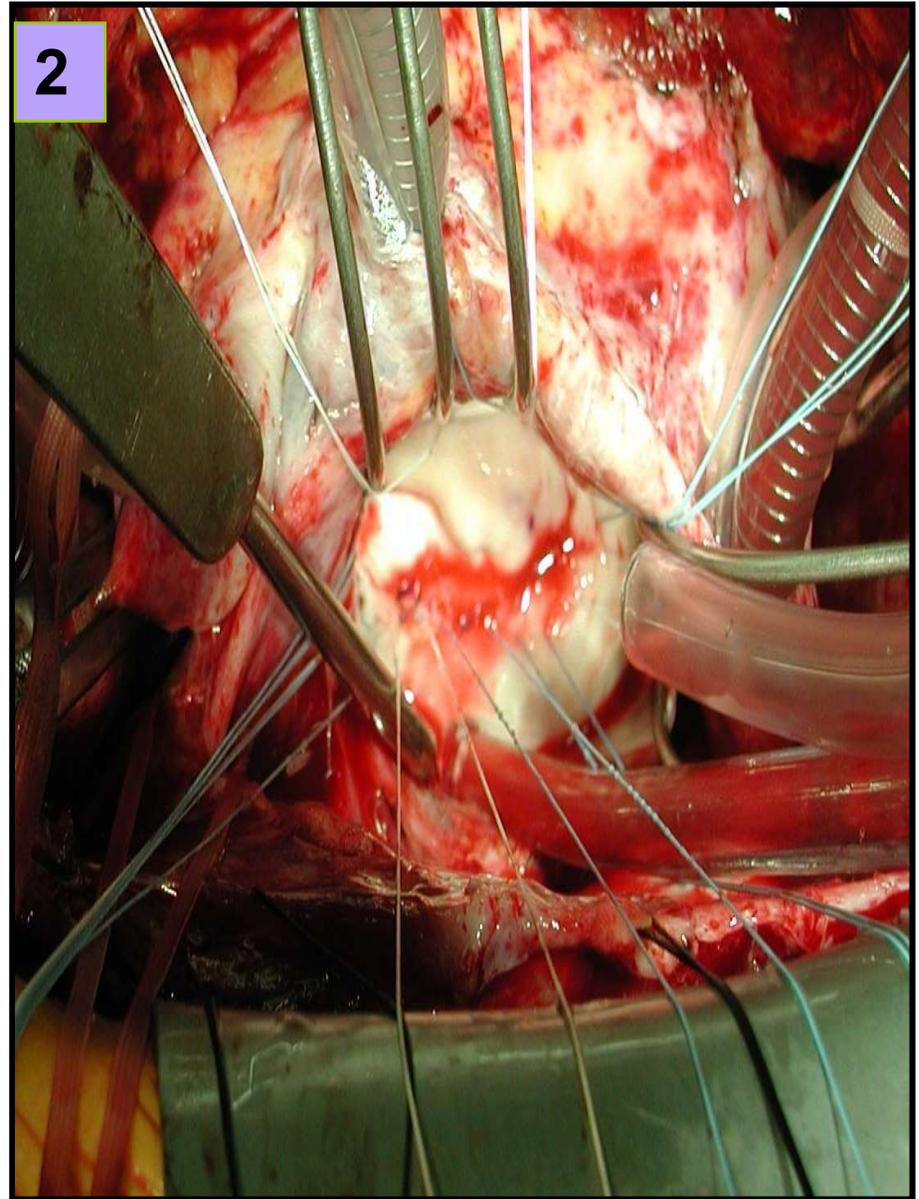
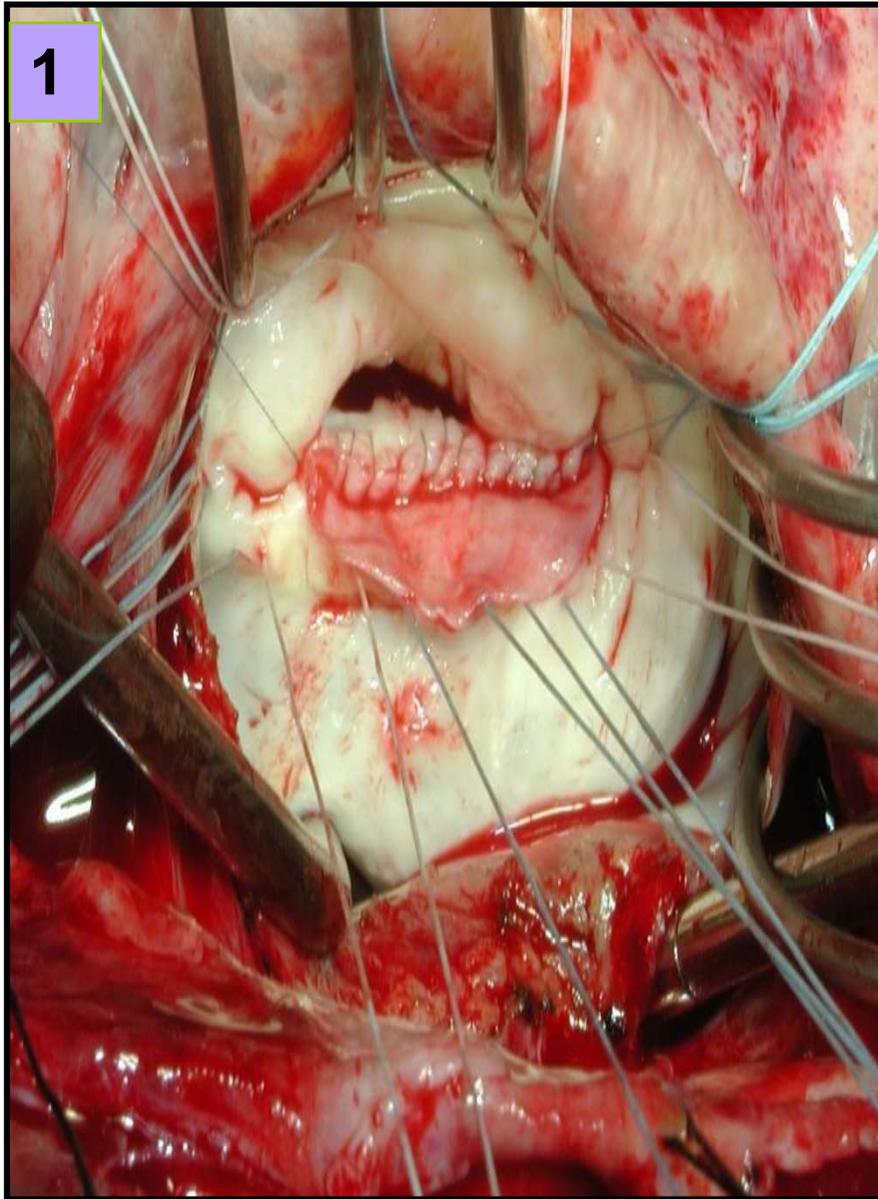
Autologous Pericardial Preparation



3

Glutaldehyde
0.62% solution
3 minutes

Autologous Pericardial Patch Repair



Mitral Repair Data ₁

GoreTEX Chordae 42 pts (55%)

- Anterior Leaflet 40 pts
- Posterior Leaflet 1 pts
- Both Leaflets 1 pts

No. of Chordae	Patient
1	28
2	11
3	1
4	1
5	1

Mitral Repair Data 2

- Commissuroplasty or -otomy 25 pts
- Posterior 2nd Chordae release 45 pts
- Pericardial Patch Augmentation 17 pts
 - Anterior Patch 3 : Posterior Patch 11
- Resection Leaflet / Chordae / PM 14 pts

29 patients had 3 or more repair techniques
[excluding annuloplasty]



Mitral Annuloplasty

- 70 pts had annuloplasty – Physio Ring
- Mitral annulus 3.4 – 5.1 cm --- mean 4.2
- Ring size 26 – 34 mean 30.8 ± 1.8



Follow Up Results

No Operative or In-hospital mortality

- Lost FU [Macau resident] 7 pts
- Mean FU 76 months

FU Mitral Regurgitation	No	Percentage
Grade 0	23	30
Grade 1	34	45
Grade 2	18	24
Grade 3	1	1



Follow Up Results ₂

NYHA Functional Class	No	Percentage
Class I	49	64
Class II	24	32
Class III	3	4
Class IV	0	0



Follow Up Results ₃

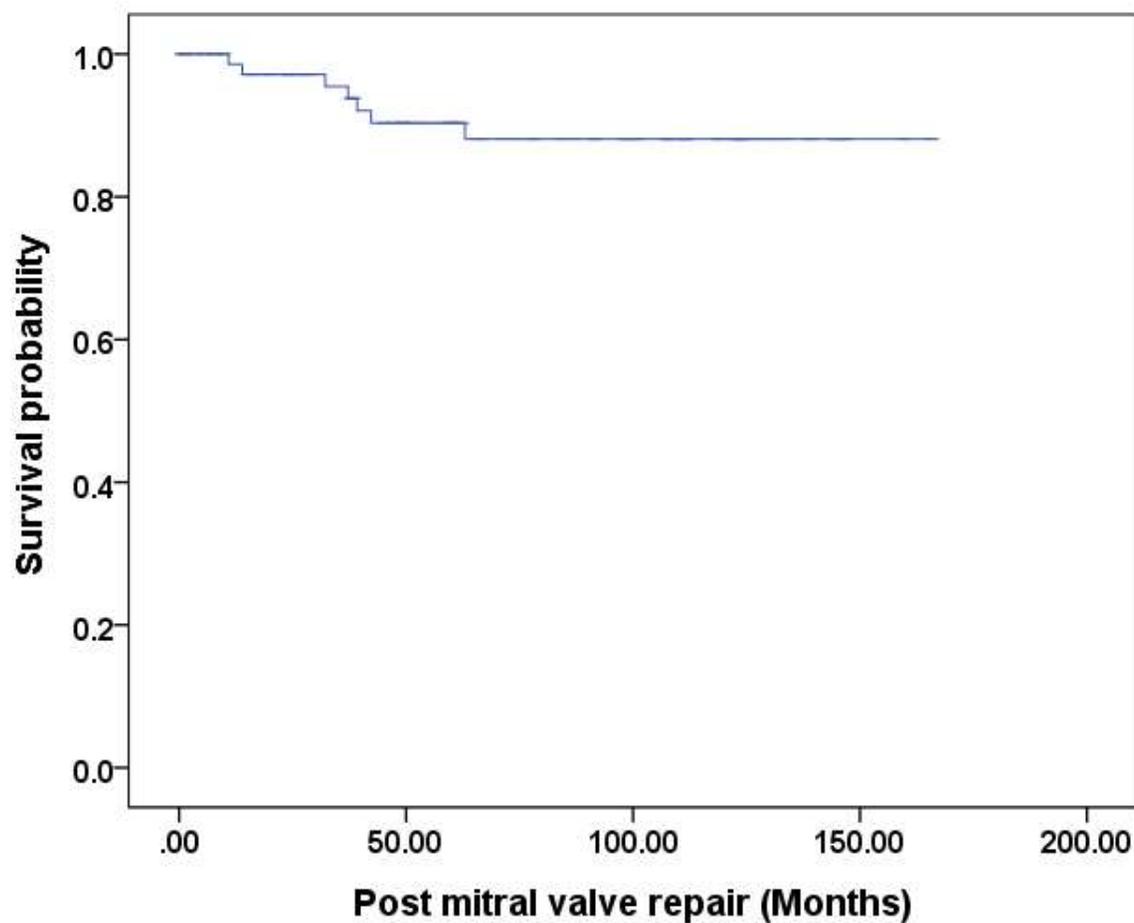
Reoperation: 3 pts

Post mitral repair (Months)	No	
23	1	MR 2+ / MS 3+ / TR 2+ / LVEF 60%
27	1	MR 3+ / AR 4+ / TR 3+ / LVEF 30%
97	1	MR 1+ / MS 3+ / TR 3+ / LVEF 60%

Late Mortality: 7 pts

Mean time to death after MV repair 34 ± 17 months

Kaplan-Meier survival post Rheumatic MV repair



Survival at 2 year 98%

Survival at 5 years 90%

Survival at 10 years 88%



Long-Term (29 Years) Results of Reconstructive Surgery in Rheumatic Mitral Valve Insufficiency

Sylvain Chauvaud, MD; Jean-François Fuzellier, MD; Alain Berrebi, MD; Alain Deloche, MD; Jean-Noël Fabiani, MD; Alain Carpentier, MD, PhD

Methods and Results—From 1970 to 1994, 951 patients with rheumatic MV insufficiency were operated on with the reconstructive techniques elaborated by Alain Carpentier. Mean age was 25.8 years (4 to 75), and sinus rhythm was present in 63%. The functional classification used was type I, normal leaflet motion, 71 patients (7%); type II, prolapsed leaflet, 311 patients (33%); and type III, restricted leaflet motion, 345 patients (36%). The combined lesion of prolapse of the anterior leaflet and restriction of the posterior was present in 224 patients (24%).

Surgical techniques used were implantation of a prosthetic ring in 95%, shortening of the chords and leaflet enlargement with autologous pericardium, and commissurotomy. Hospital mortality rate was 2%. The mean follow-up was 12 years (maximum, 29 years): 8618 patients per year. Actuarial survival was $89 \pm 19\%$ at 10 years and $82 \pm 18\%$ at 20 years. The rate of thromboembolic events was 0.4% patients per year (33 events), with 3 deaths. Freedom from reoperation was $82 \pm 19\%$ at 10 years and $55 \pm 25\%$ at 20 years. The main cause (83%) of reoperation was progressive fibrosis of the MV. The actuarial rate of reoperation was 2% patients per year and was correlated to the degree of preoperative fibrosis.



NeoChord Artificial Chordae Delivery System

Hospital Name
Date



NeoChord Artificial Chordae Delivery System Model DS1000

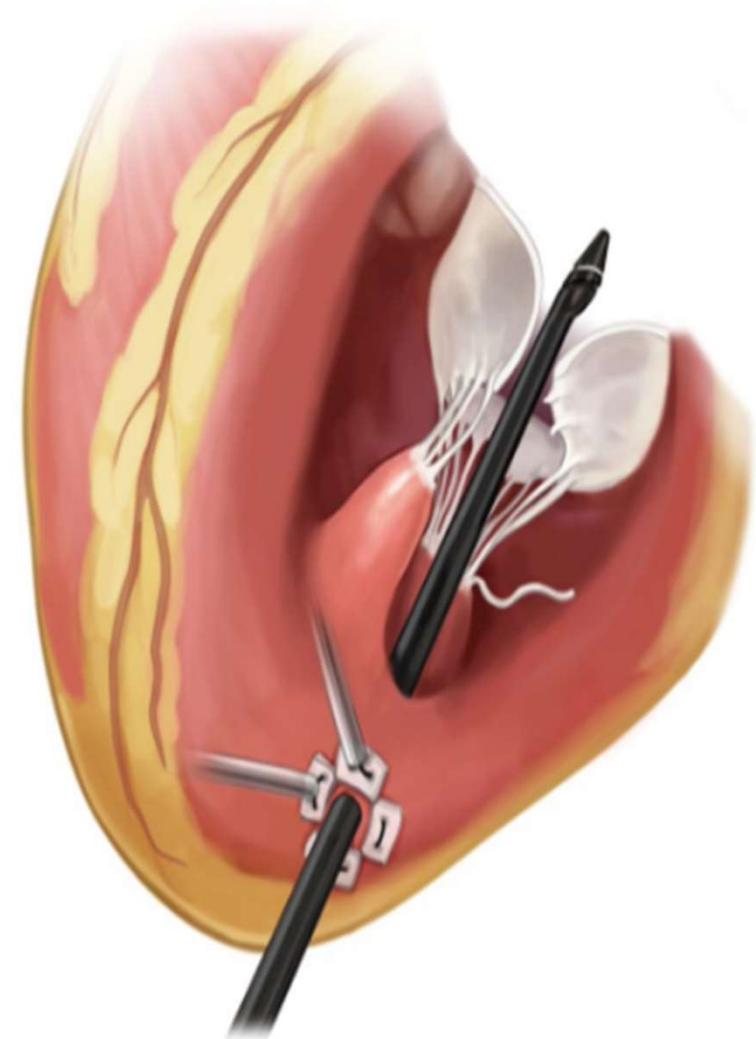
Reloadable Suture
Cartridges

Multi-Use Needles

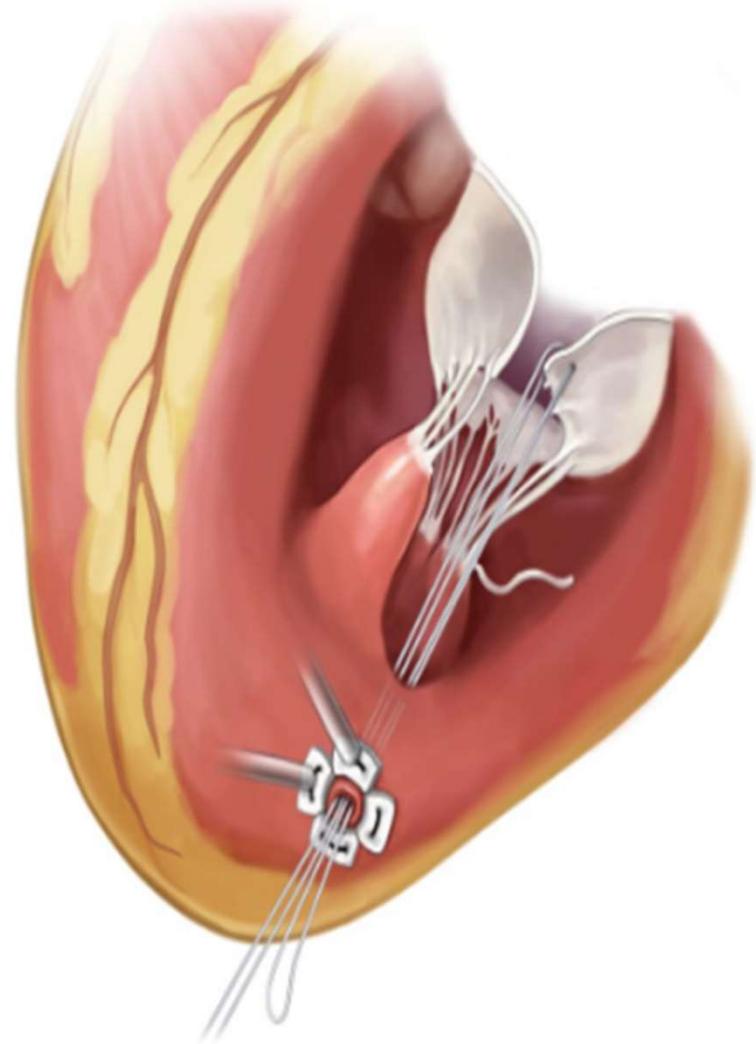


Real-Time
Leaflet-Capture
Verification

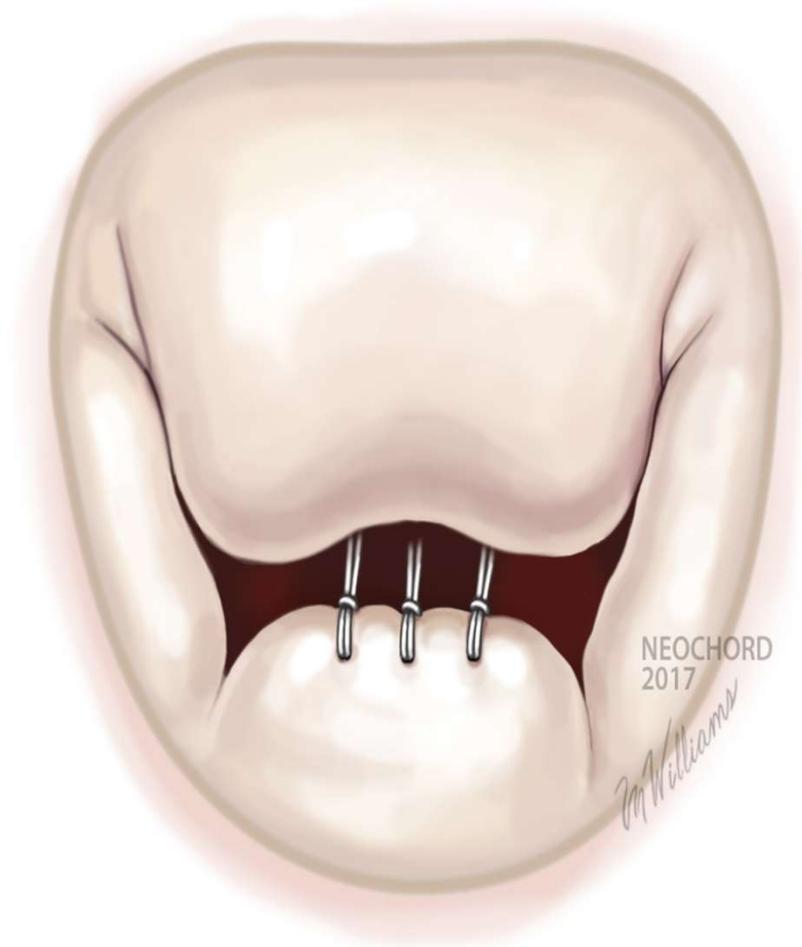
Multi-Chord
Placement



Placement of NeoChords



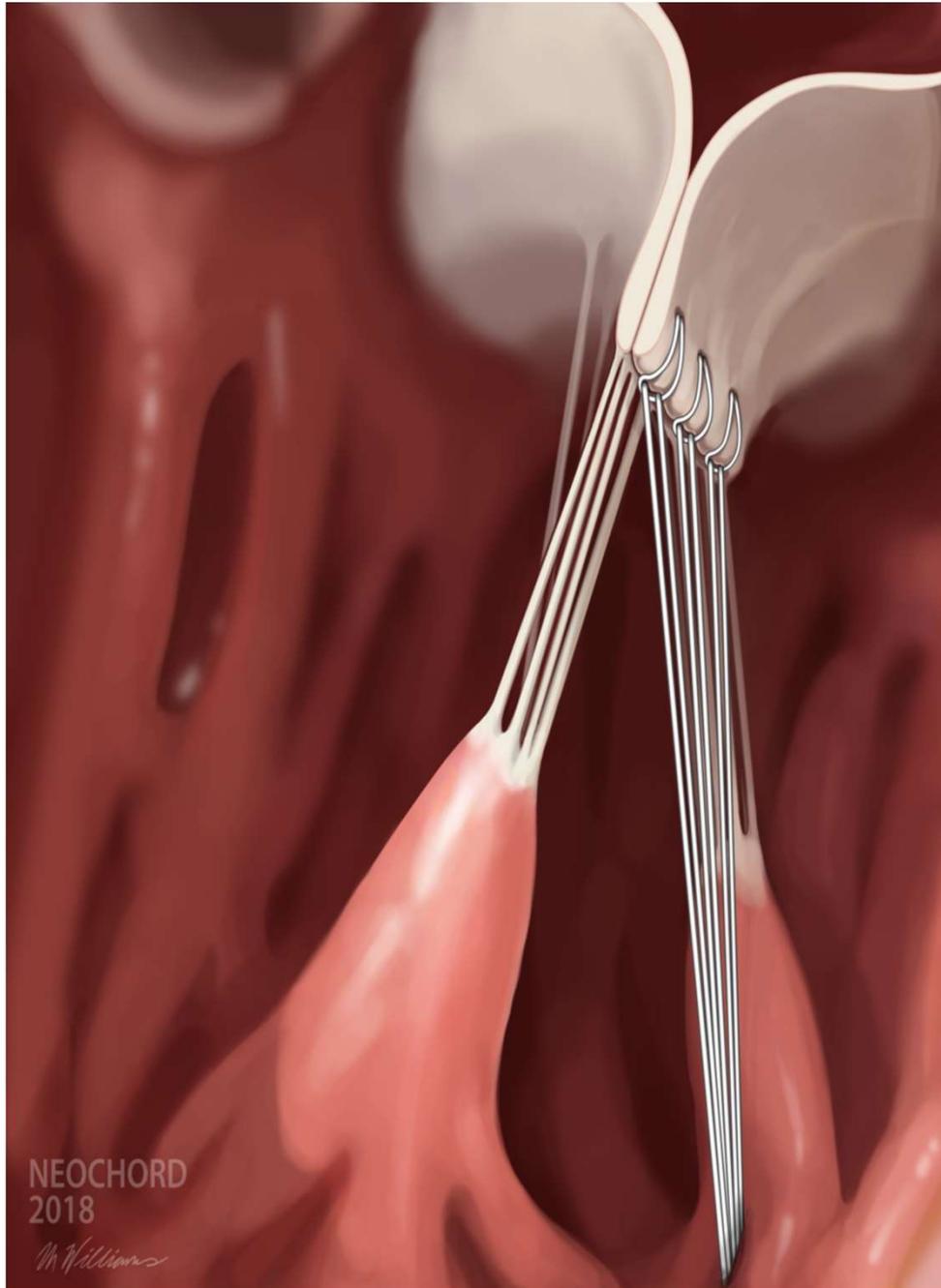
Preserves Future Treatment Options



Surgical mitral valve repair

Interventional annular treatment

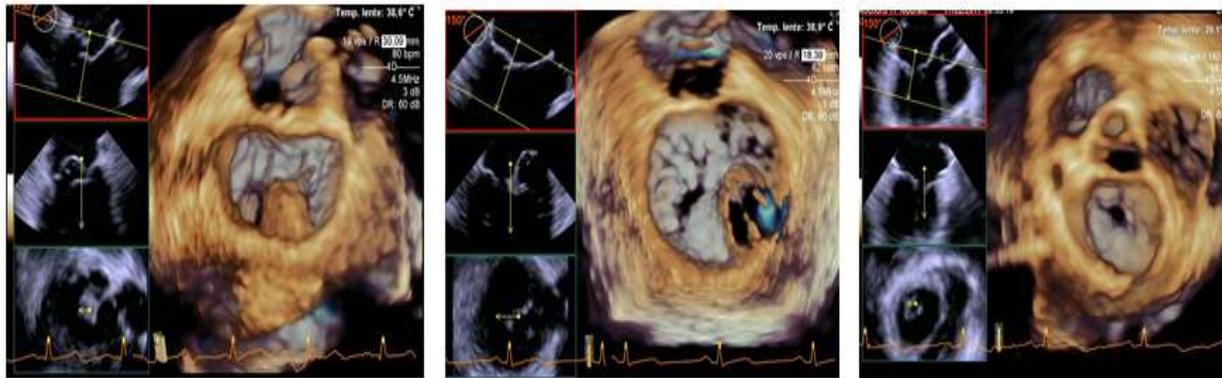
Interventional leaflet repair



**Designed to
Mimic the Native
Chordal Anatomy**

Patient Selection by Mitral Valve Morphology

- **TYPE A:** Isolated central posterior leaflet prolapse/flail (P2)
- **TYPE B:** Posterior multisegment prolapse/flail
- **TYPE C:** anterior, bileaflet disease, presence of annular/leaflet calcifications and/or paracommissural



NeoChord Case Presentation 54 Year Old Male Patient with P2 Prolapse and Severe MR

Courtesy of Diana Zakarkaite, M.D.
Vilnius University Hospital Santaros Klinikos

CAUTION: Investigational Device Limited by Federal (United States) Law to Investigational Use. The NeoChord DS1000 has CE-market clearance.

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