

Minimally invasive mitral valve surgery – Standard of Care



UniversitätsSpital
Zürich

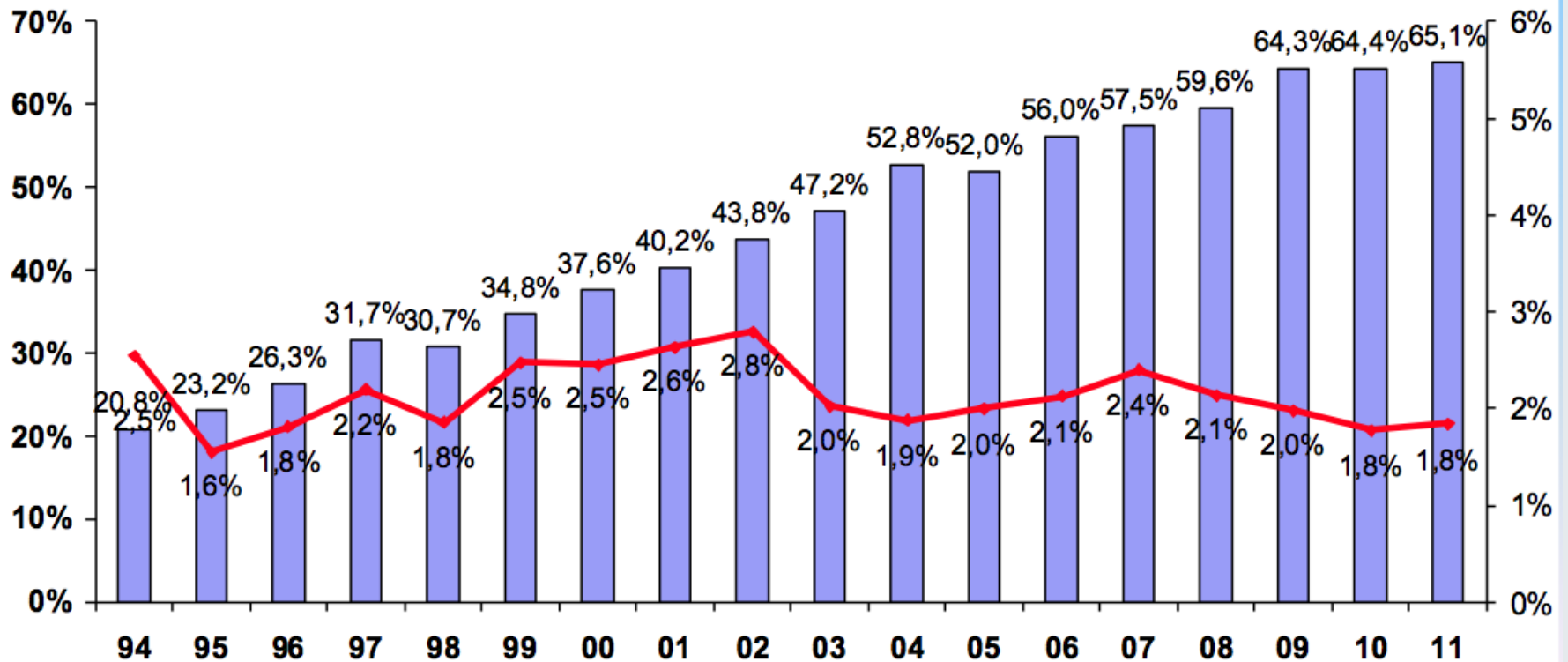
Volkmar Falk, MD

What is the status and rate of implementation?

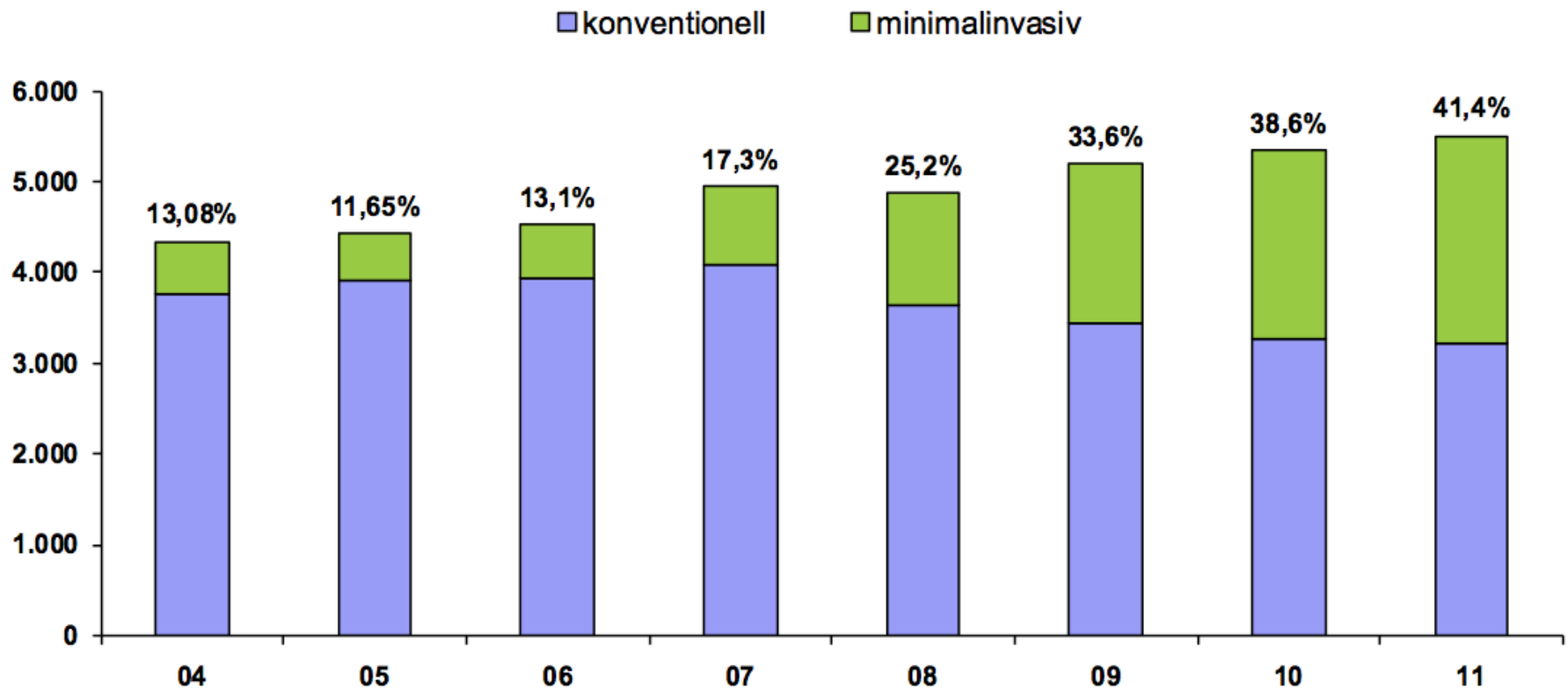


MVR repair rate 2004-2011

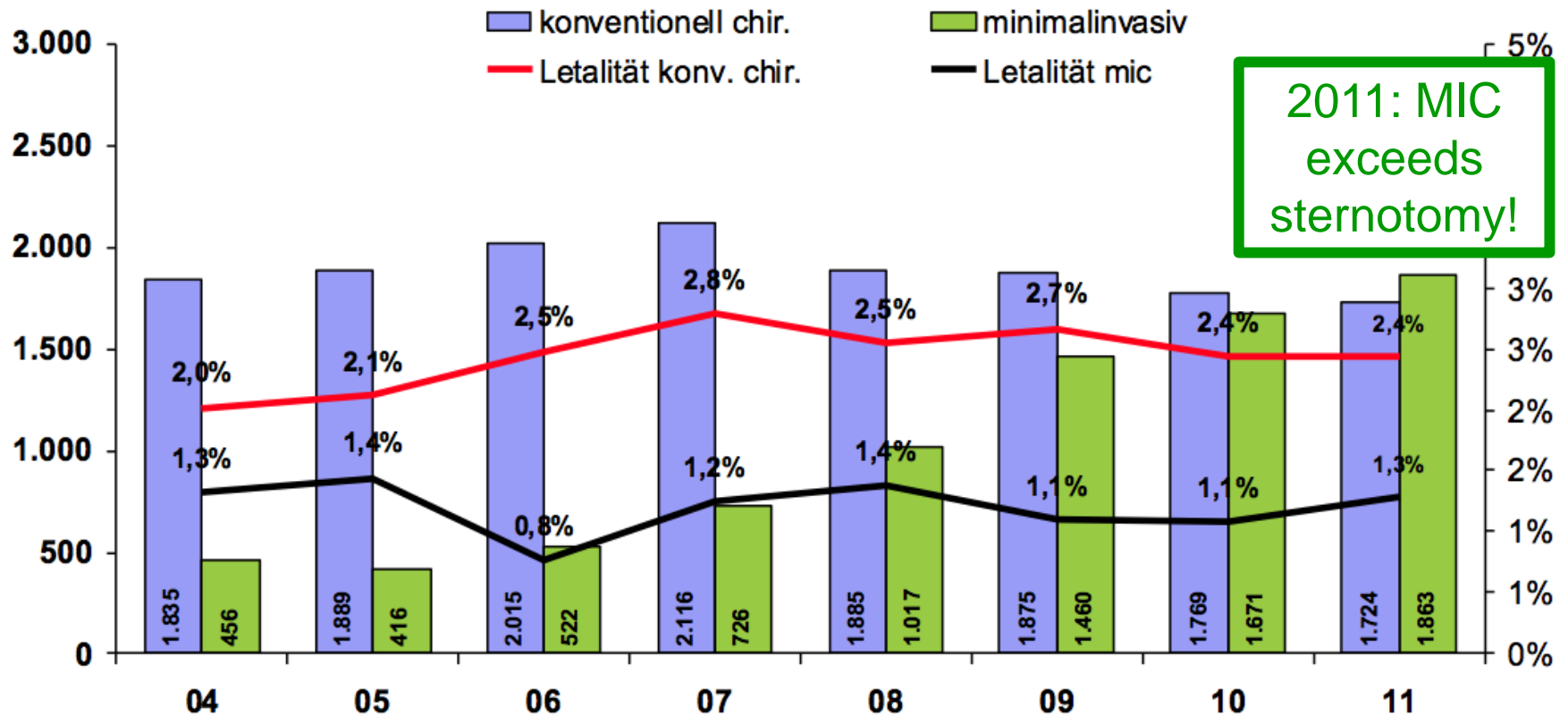
Anteil Rekonstruktion Letalität Mitralklappenrekonstruktion



Isolated MV surgery – MIC vs sternotomy 2004-2011



Isolated MVR for MR – MIC vs sternotomy 2004-2011



Repair rate in MIC exceeds sternotomy

Germany:

MIC repair rate better than national databases
(DGTHG 2011 65.1%)

MIC MVR >90% for PML, AML and bileaflet prolapse

US:

Higher MV-repair rates with minimally invasive technique
(89% vs 67%, STS database 2008)

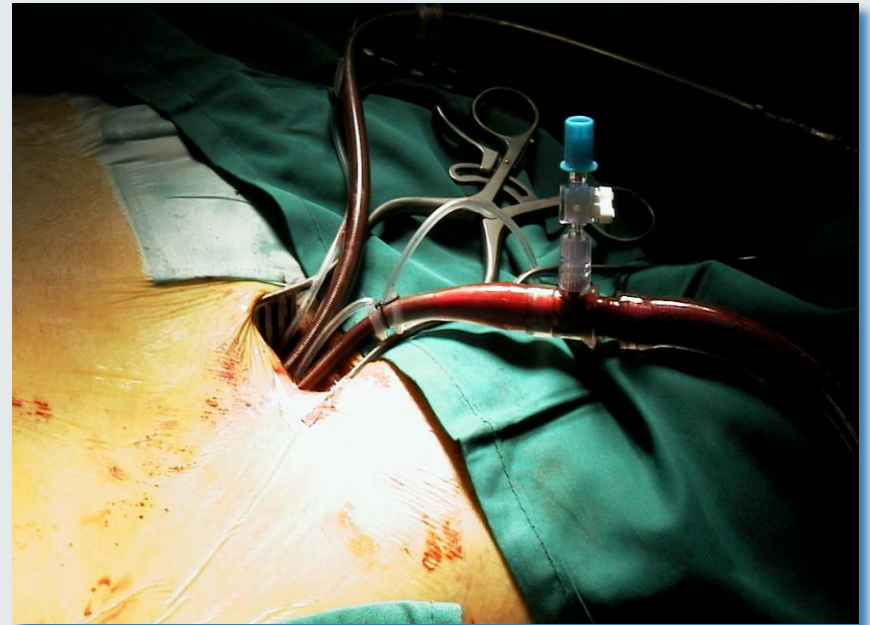
Advantages of MIC MVR

- No Sternotomy
- Excellent visualization
- Fast Recovery

Small thoracotomy approach



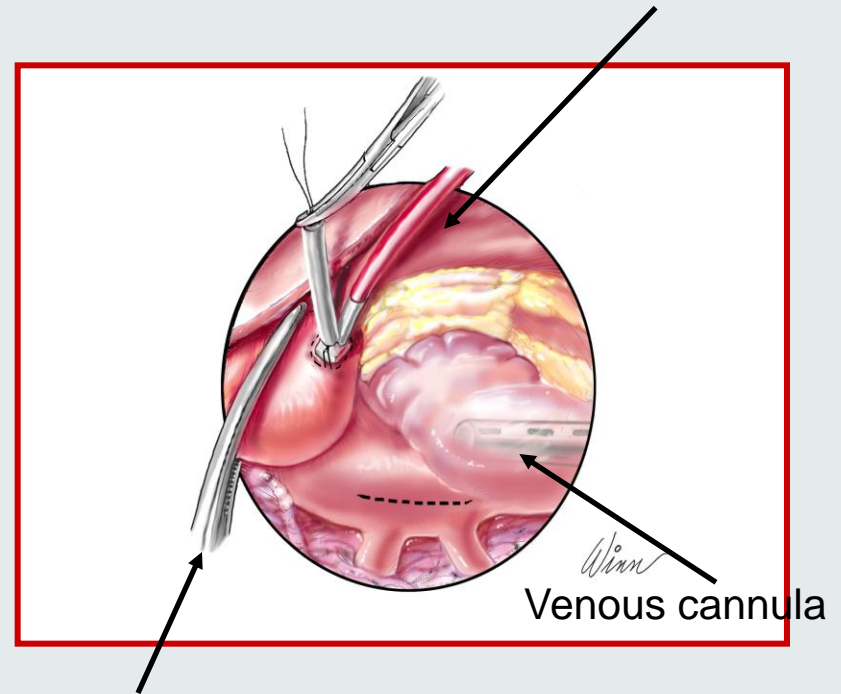
Muscle sparing incision



Femoral cannulation for CPB

Operative Technique

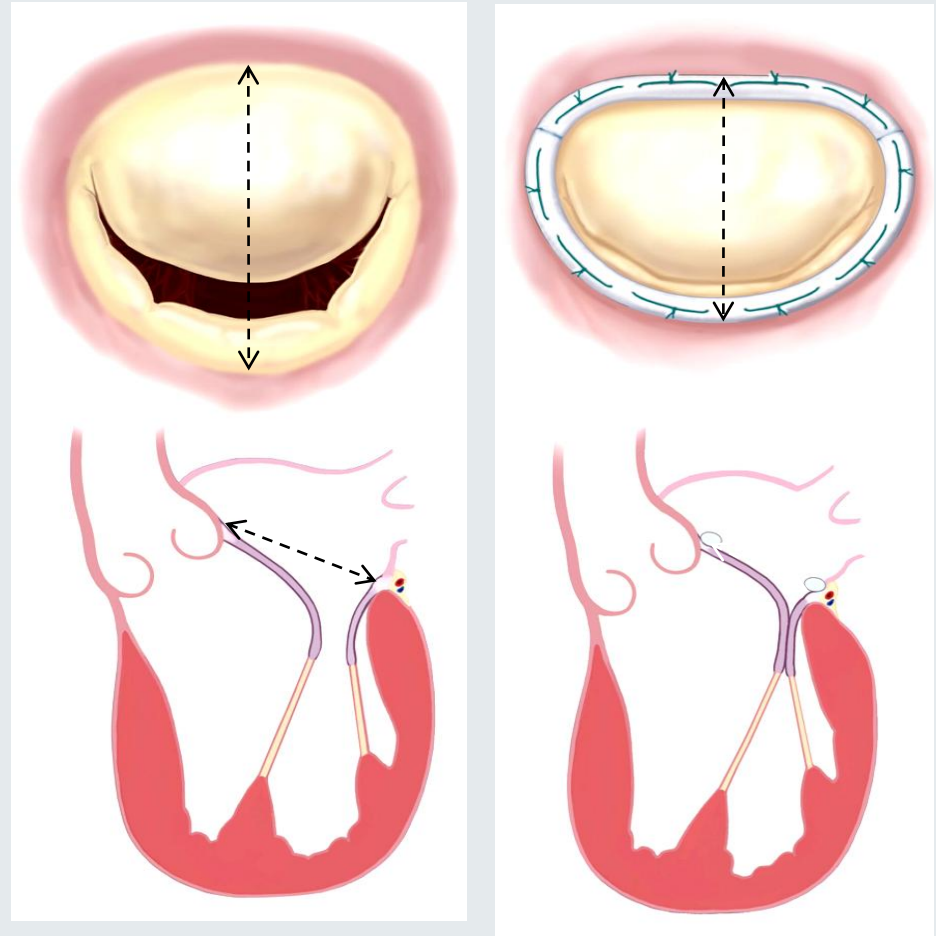
Direct antegrade cardioplegia
(one shot cristalloid)



Transthoracic Aortic clamp

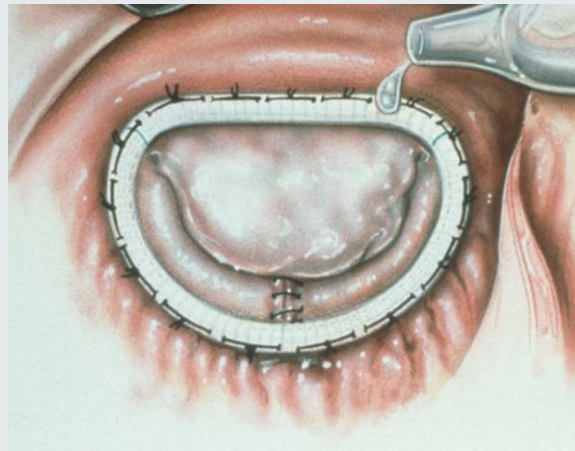
Repair-Techniques

- Enables every known repair technique
- Allows for complete ring implantation
- Enables replacement

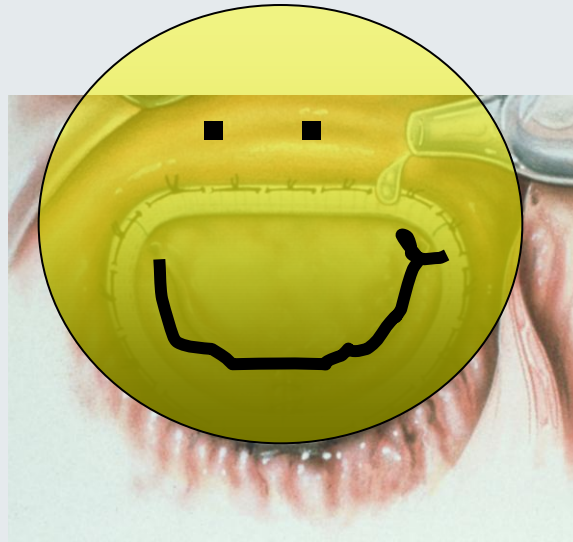


Principles of repair II

After a good repair...

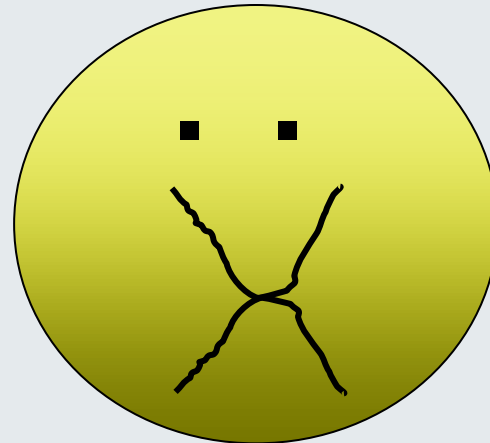
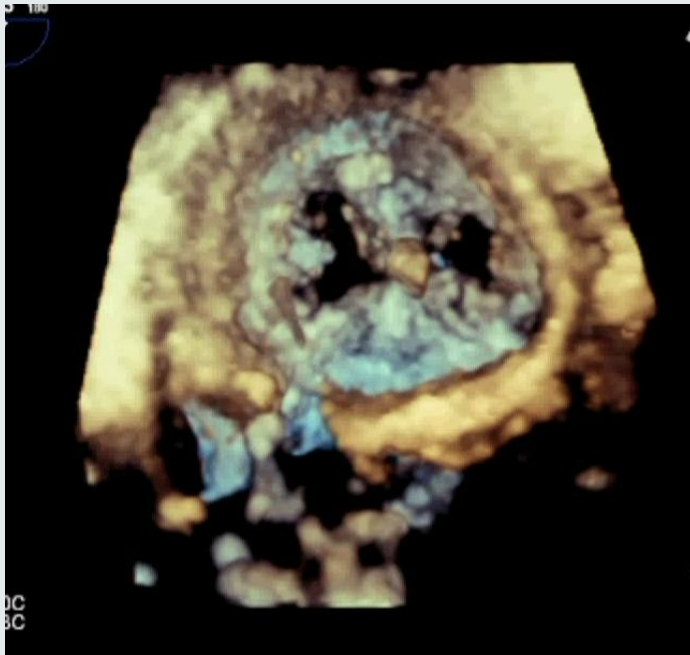


After a good repair...

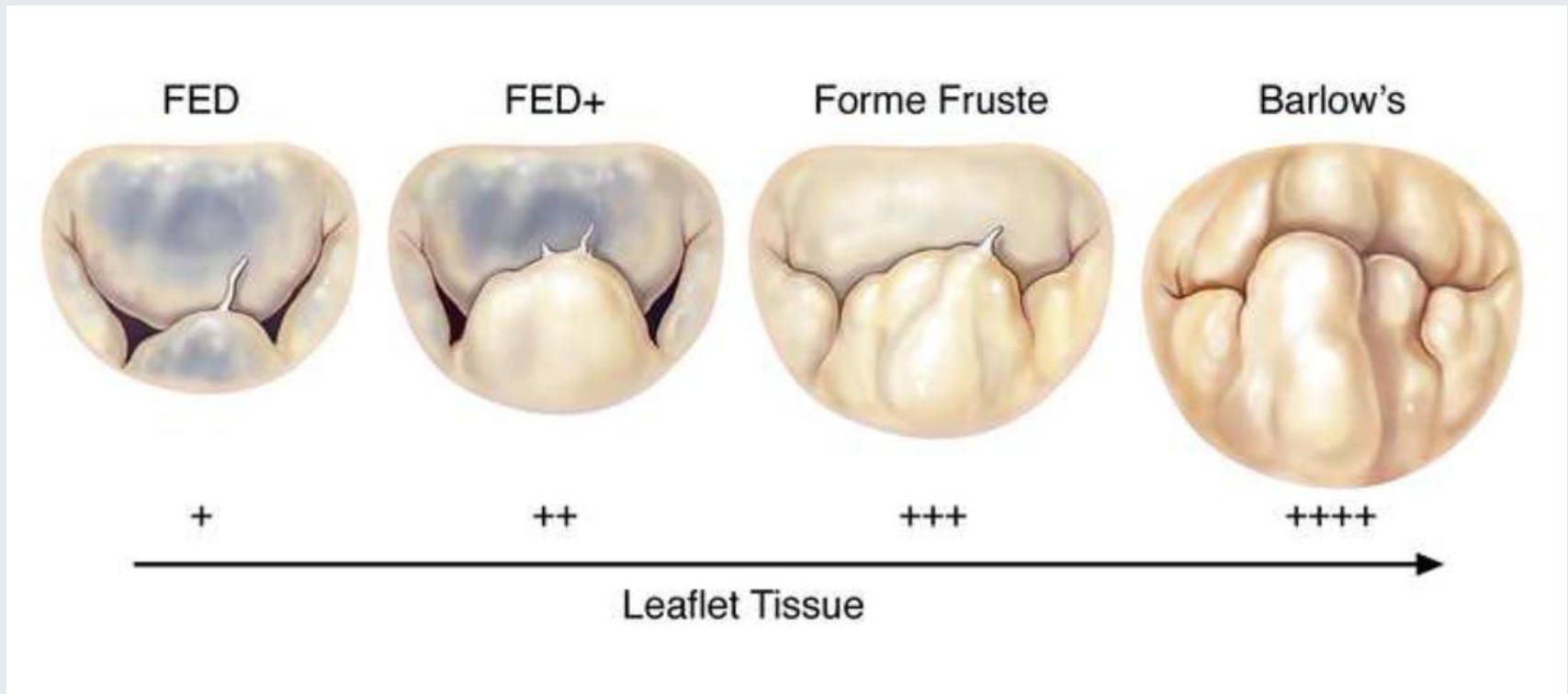


...the valve should smile at you!

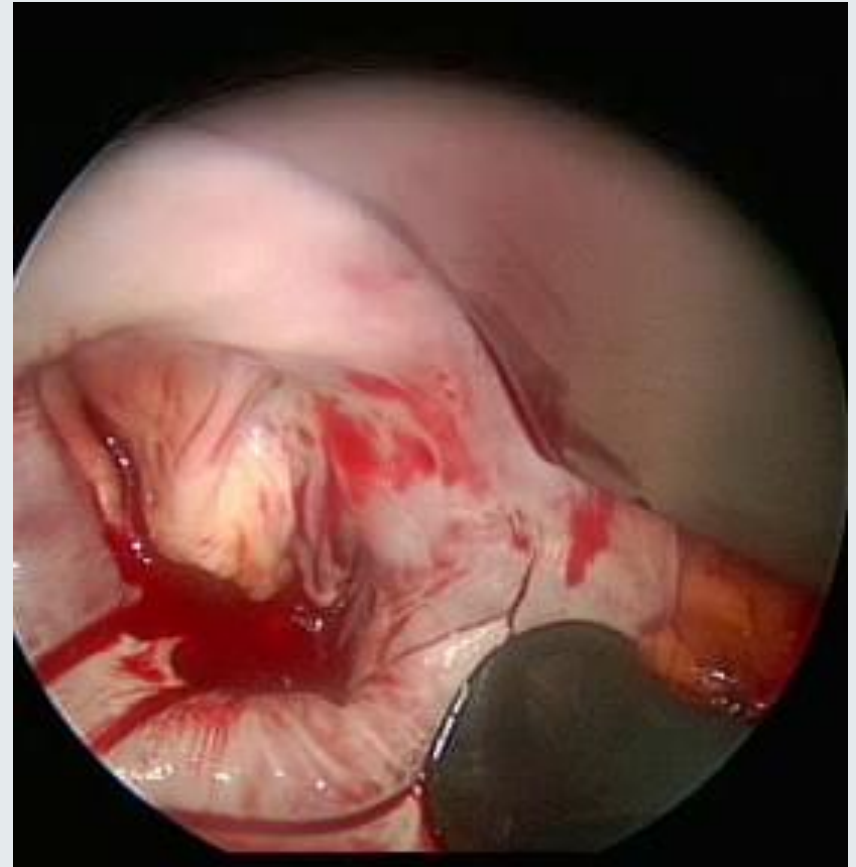
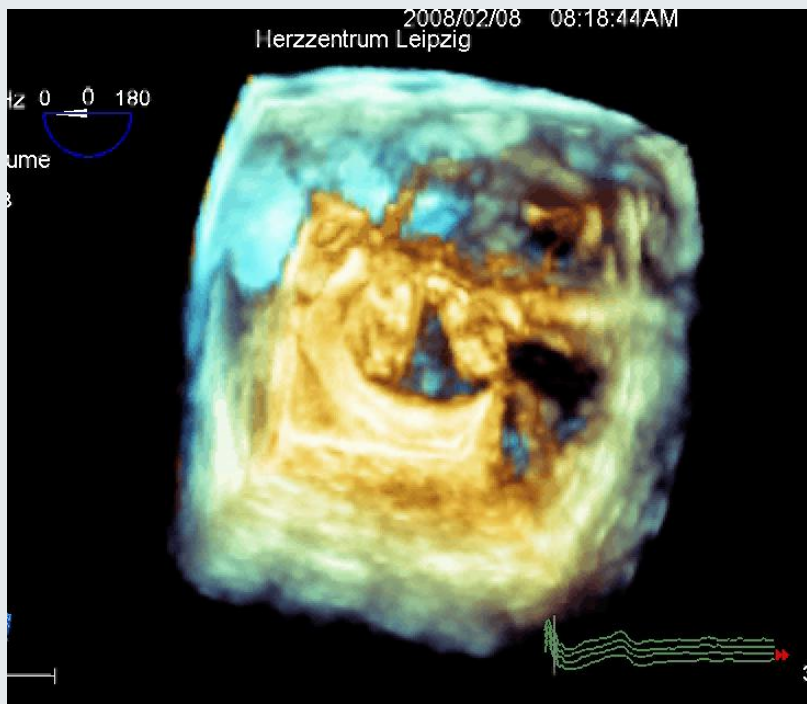
Mitral Clips don't smile!



Treat the whole spectrum of degenerative MR



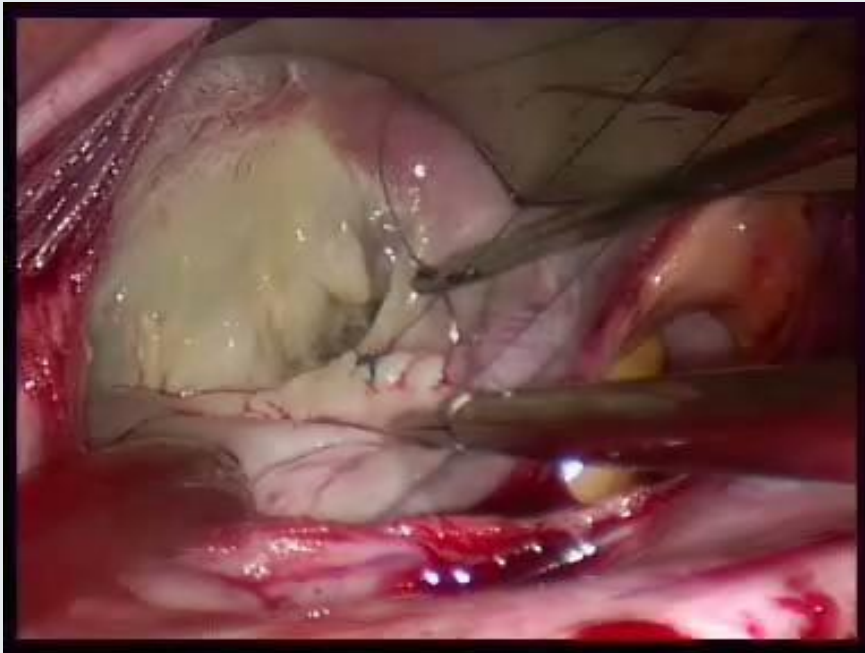
Cleft 3 D



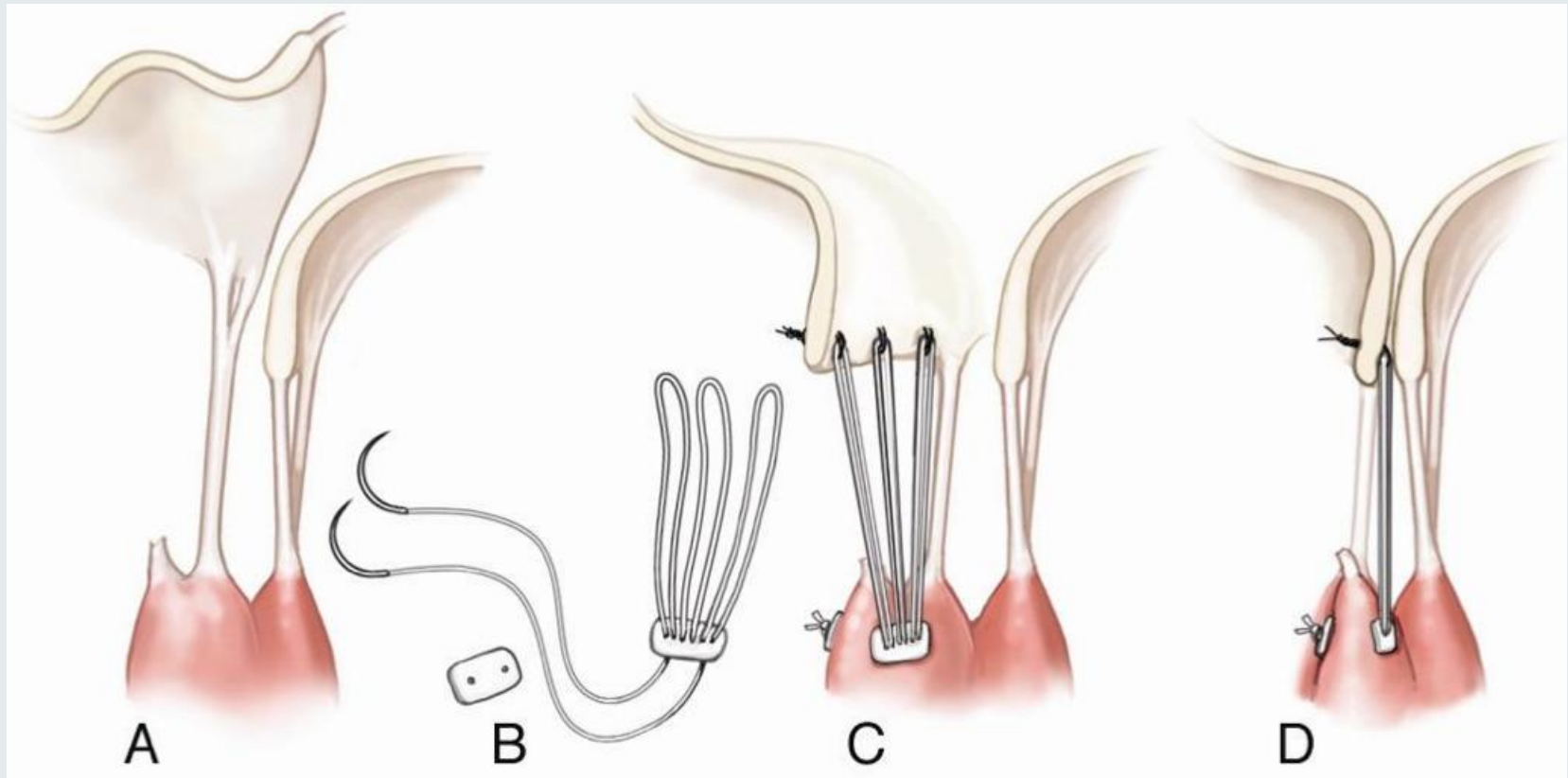
Classic P2 resection



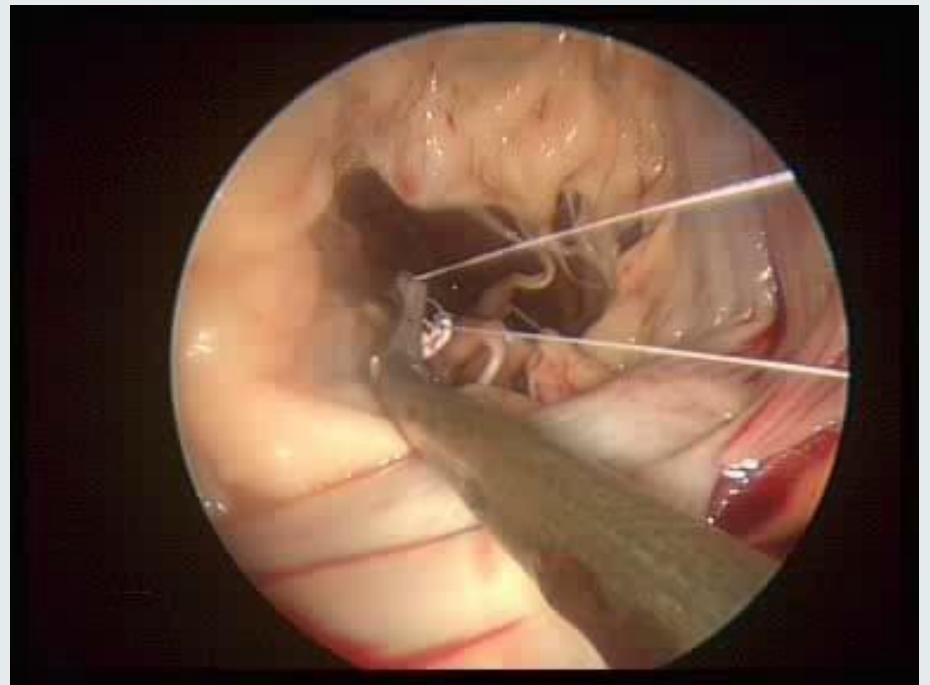
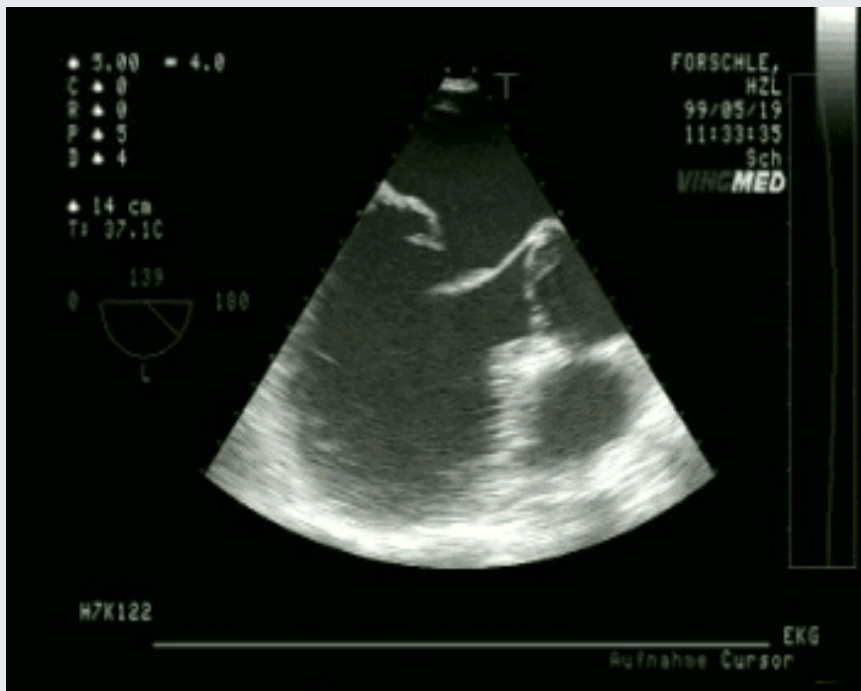
Classic P2 Resection



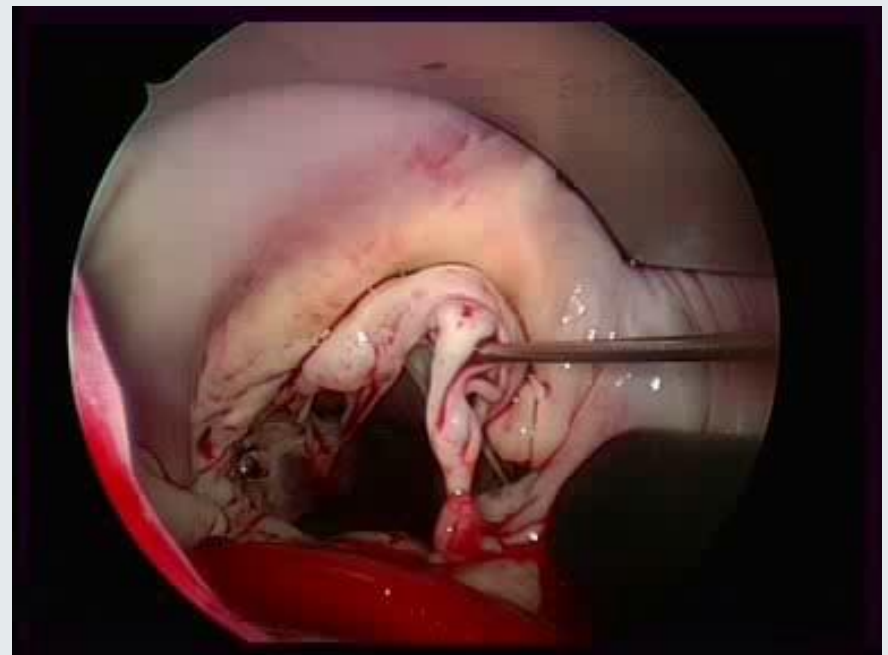
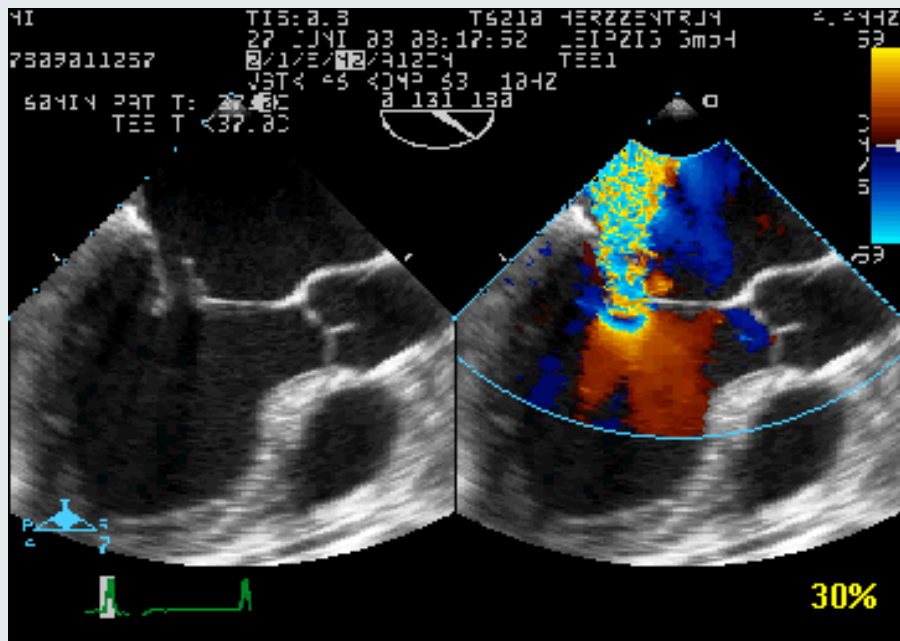
MVR Loop Technique



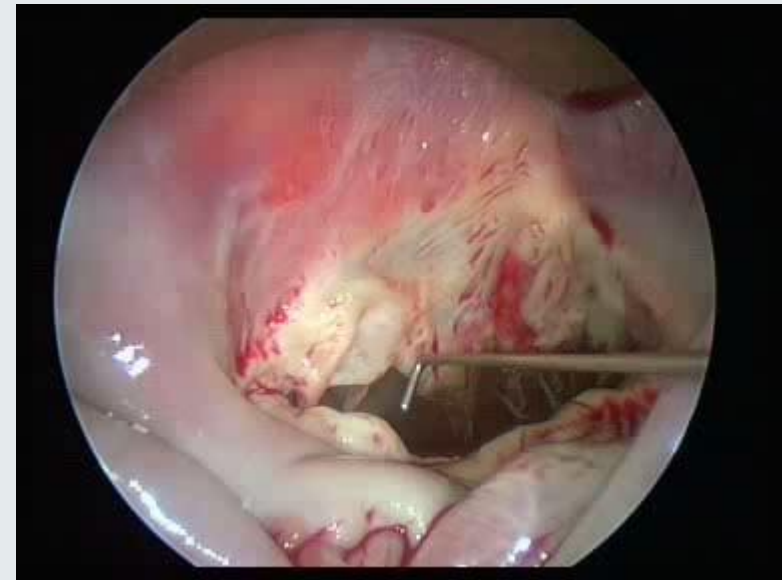
Chordal replacement PML



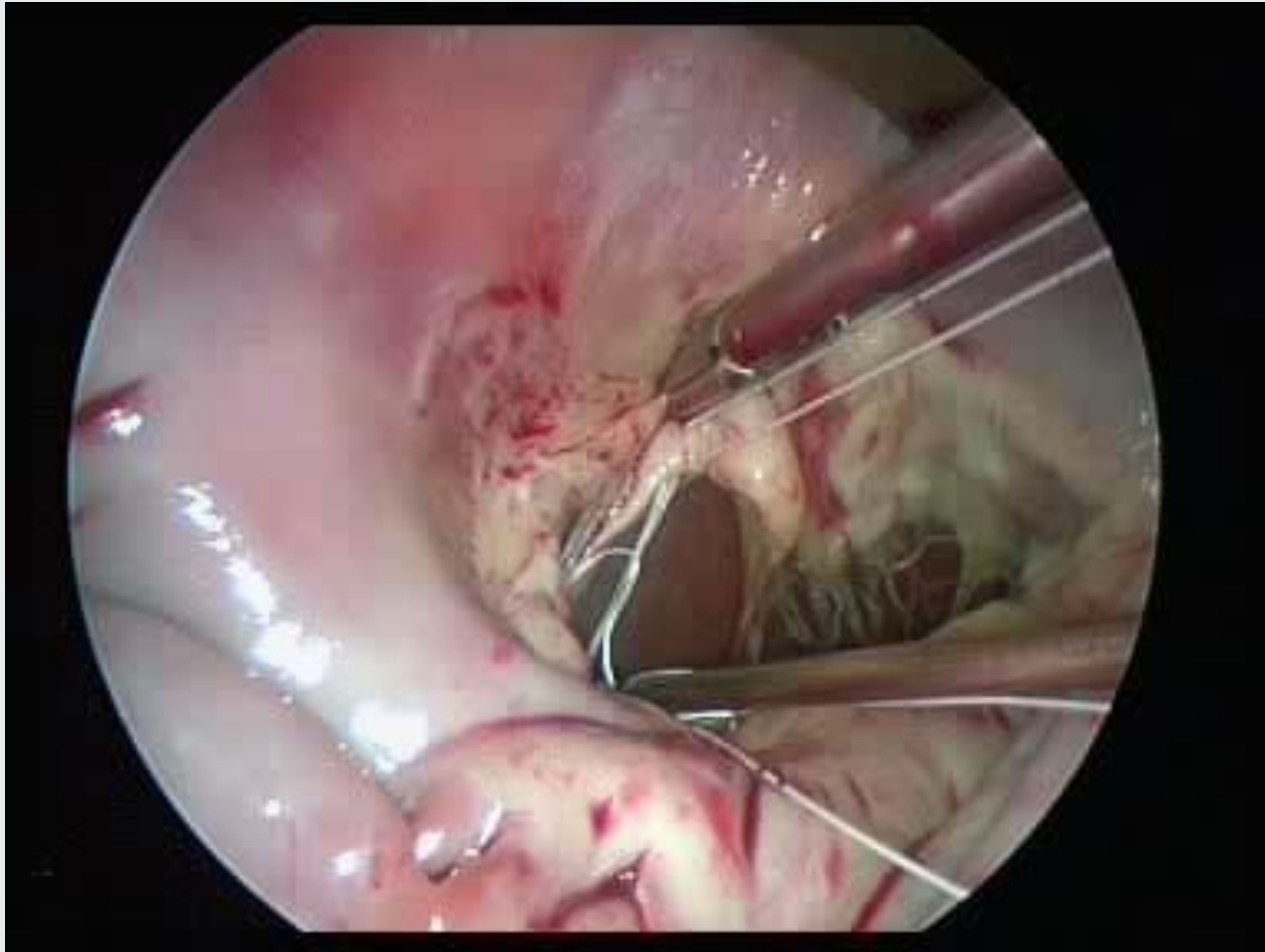
Chordal replacement AML



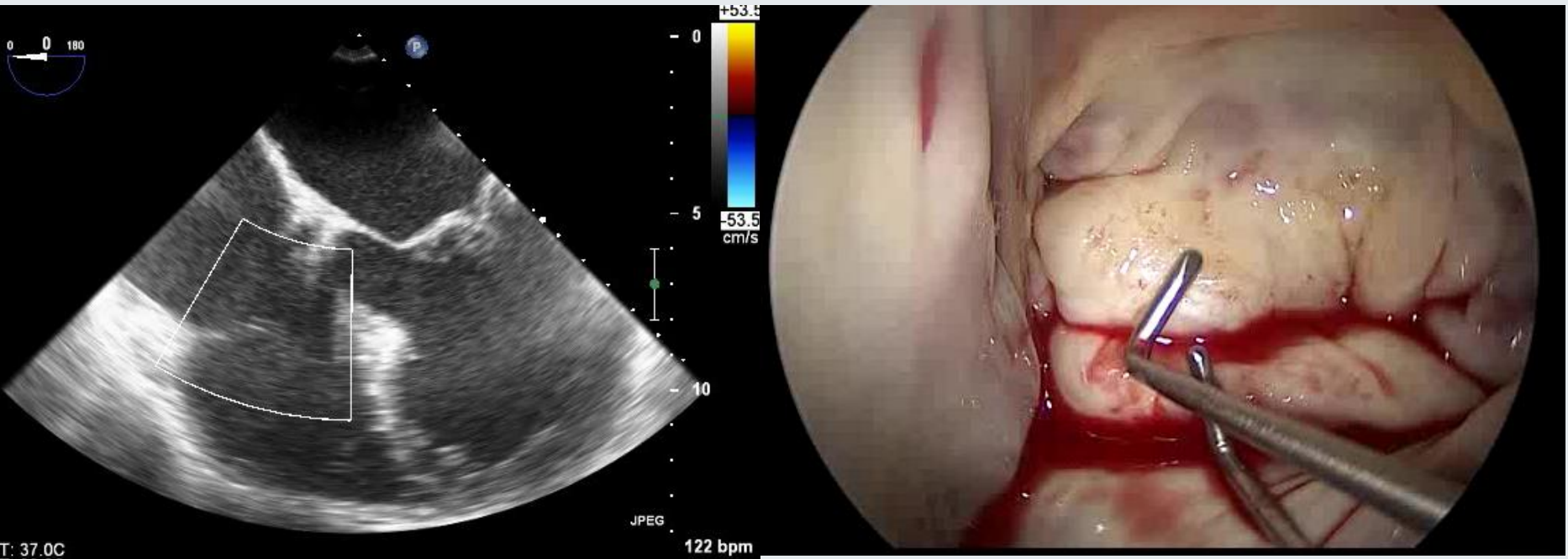
Commisural prolapse A1/P1



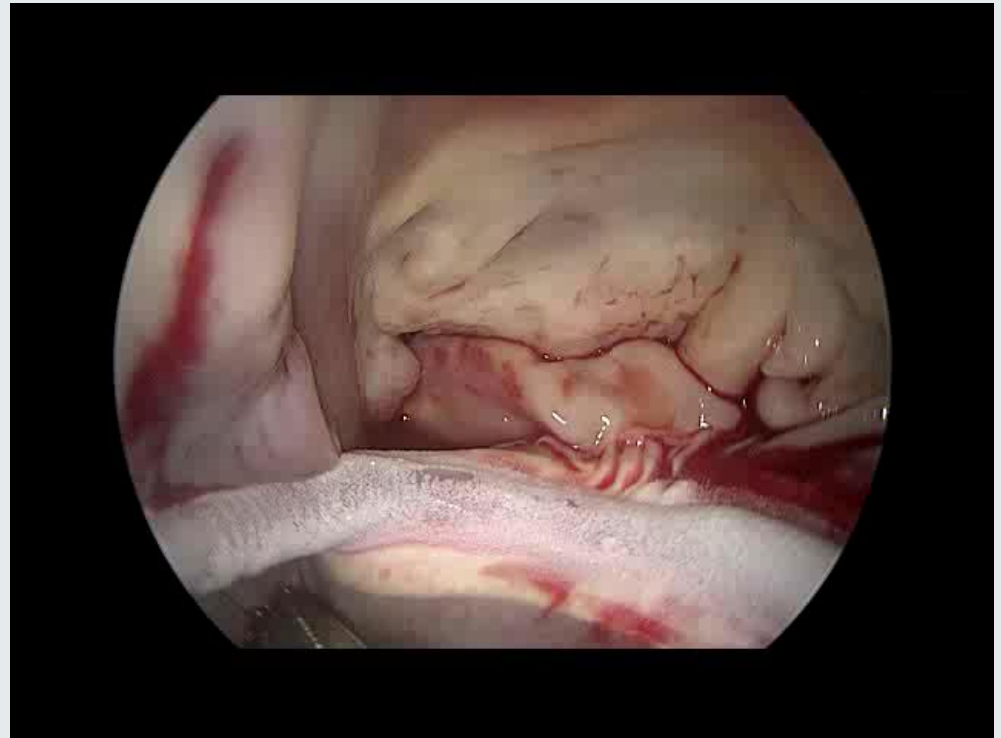
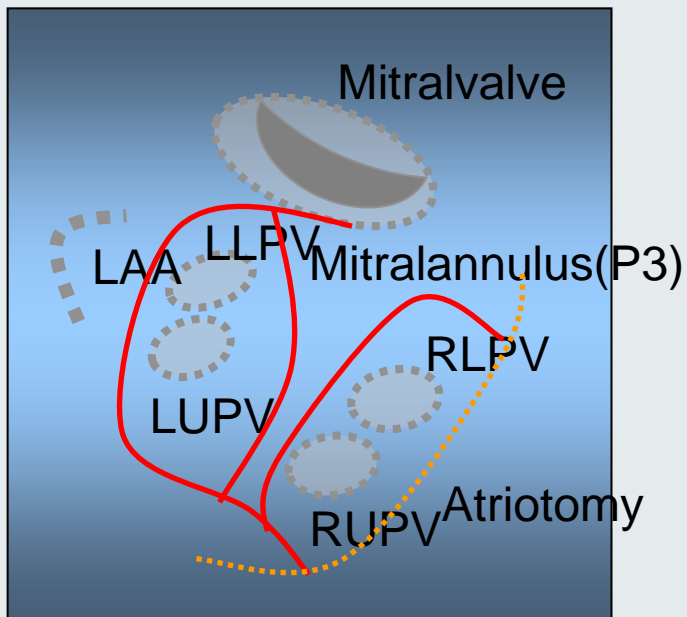
Commisural prolapse A1/P1



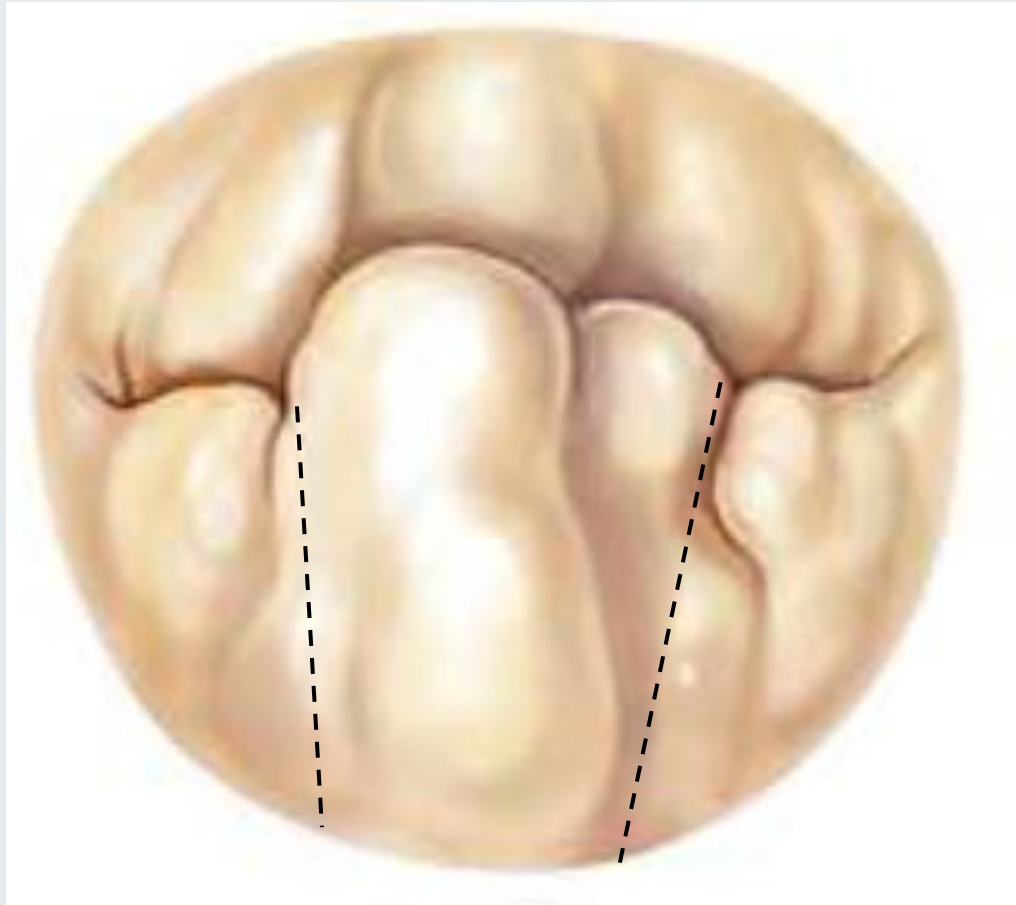
M. Barlow (excessive bileaflet prolapse) (II)



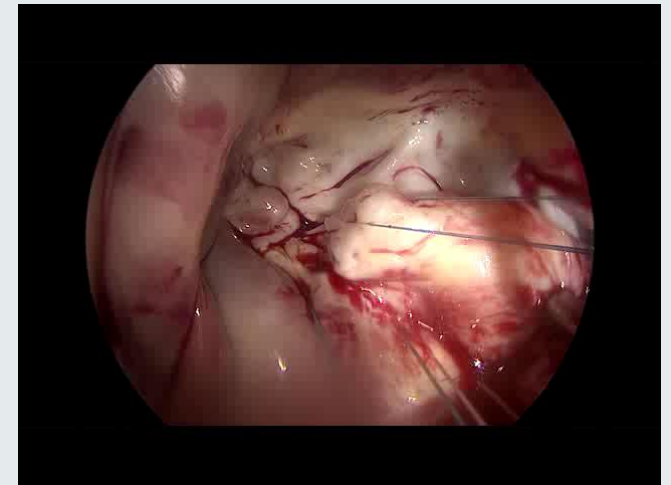
Ablation Concept



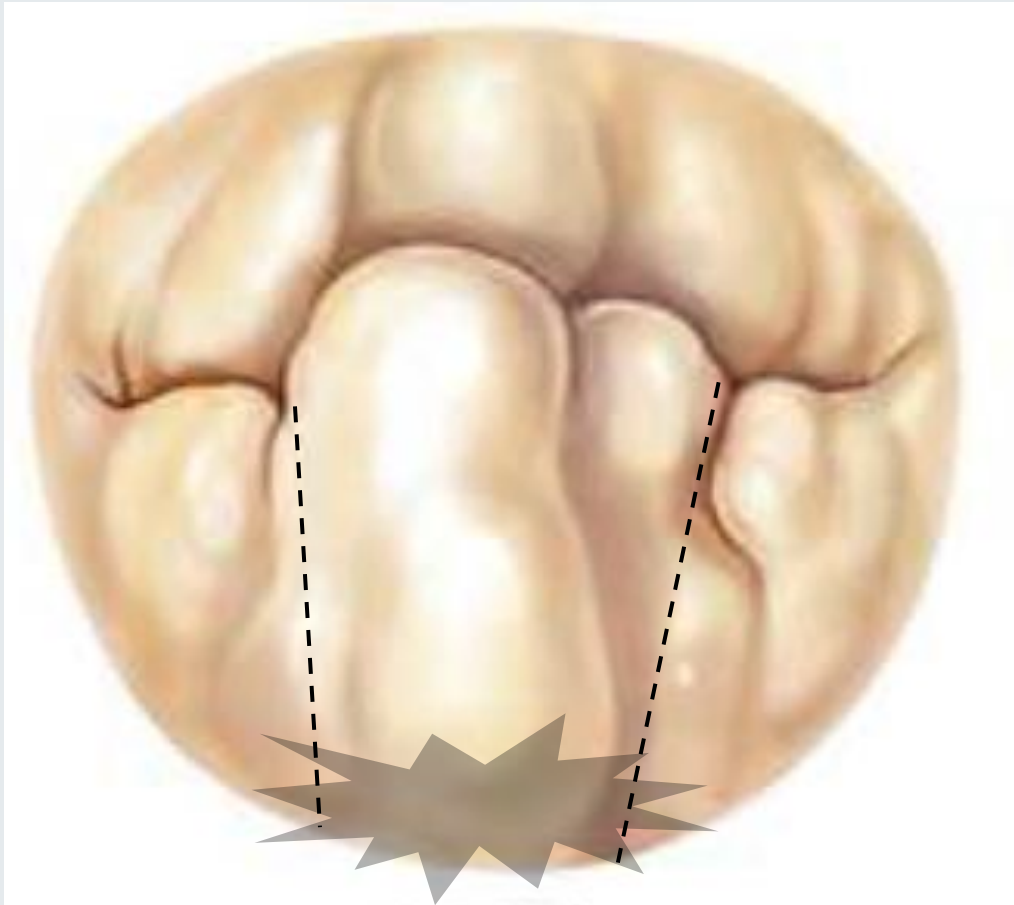
Surgical Plan



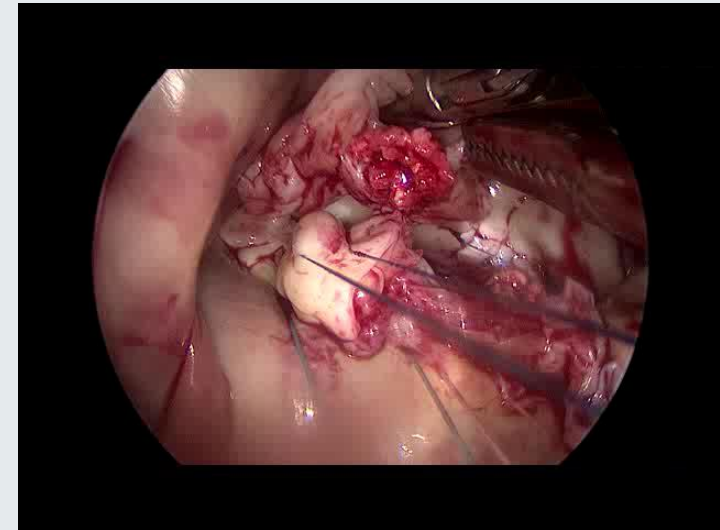
1. Quadrangular resection P2



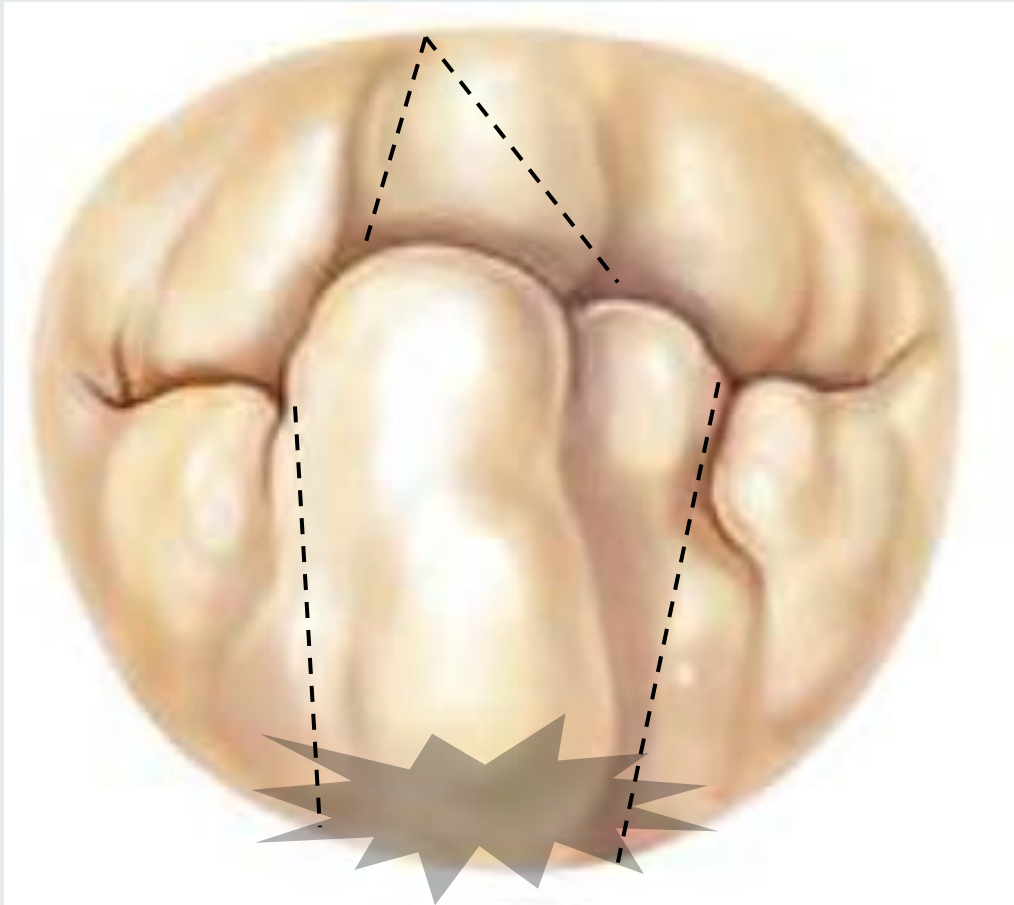
Surgical Plan



1. Quadrangular resection P2
2. Decalcification posterior annulus

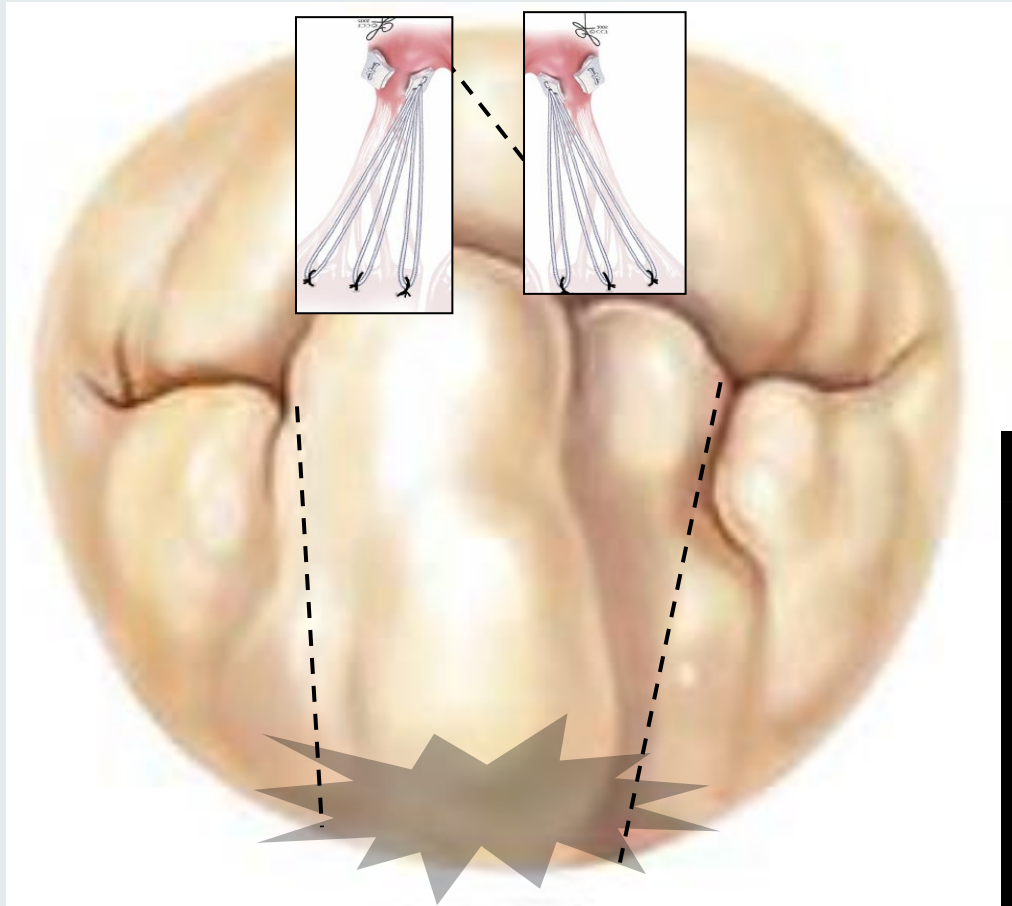


Surgical Plan

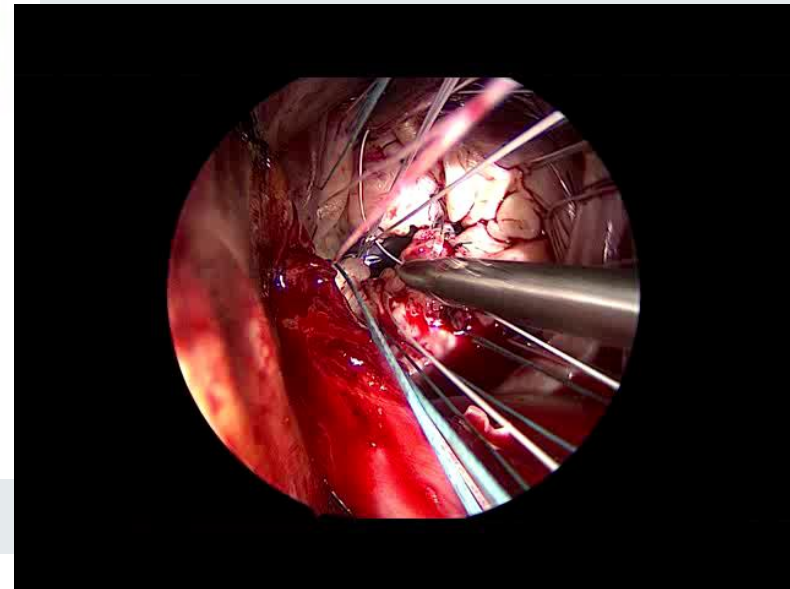


1. Quadrangular resection P2
2. Decalcification posterior annulus
3. Triangular resection A2

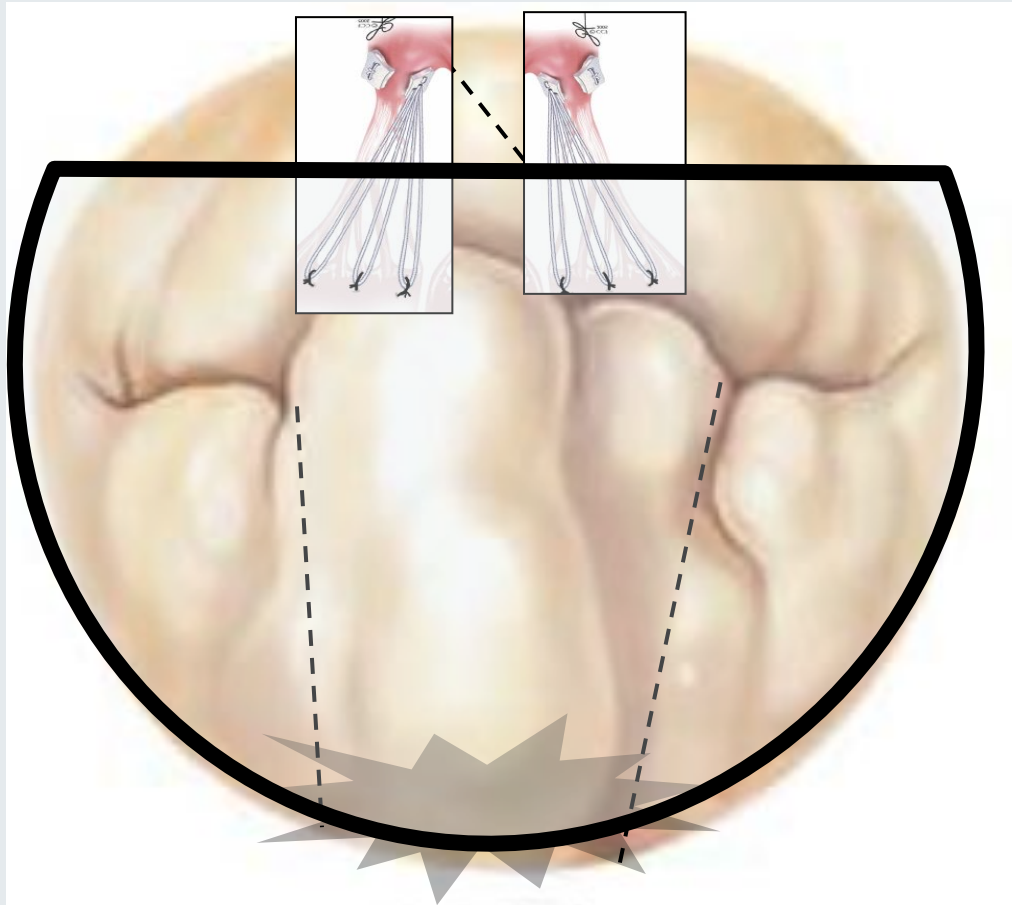
Surgical Plan



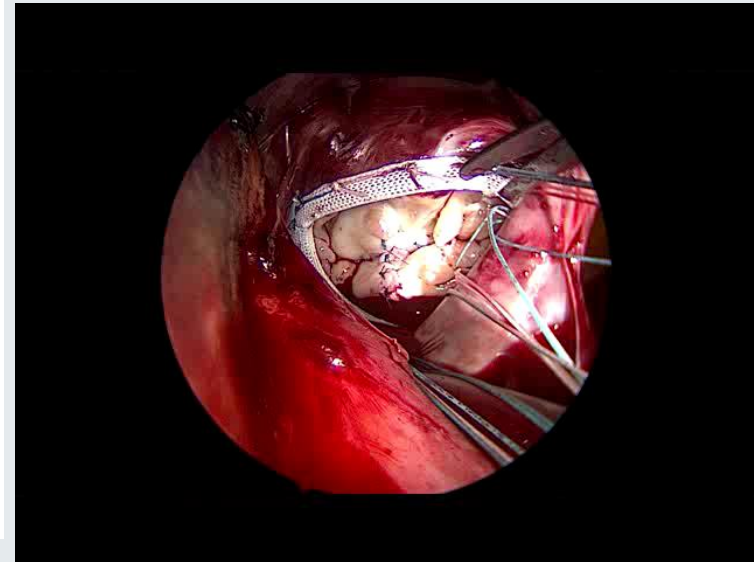
1. Quadrangular resection P2
2. Decalcification posterior annulus
3. Triangular resection A2
4. Chordae replacement A2



Surgical Plan



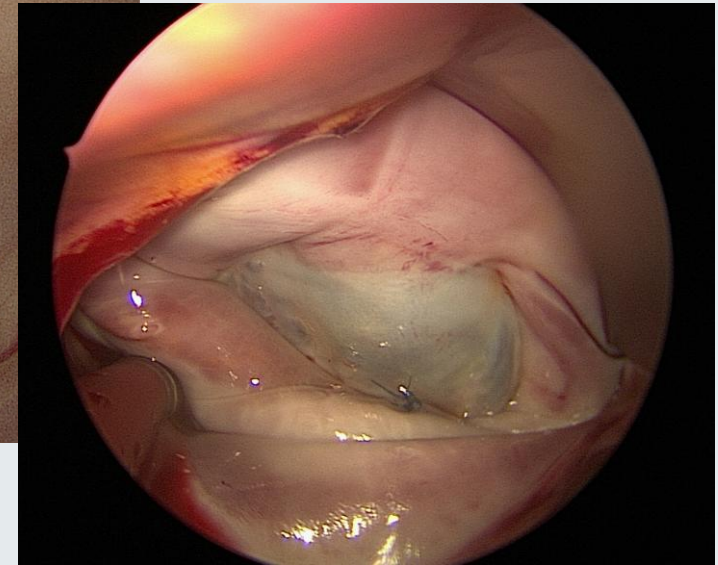
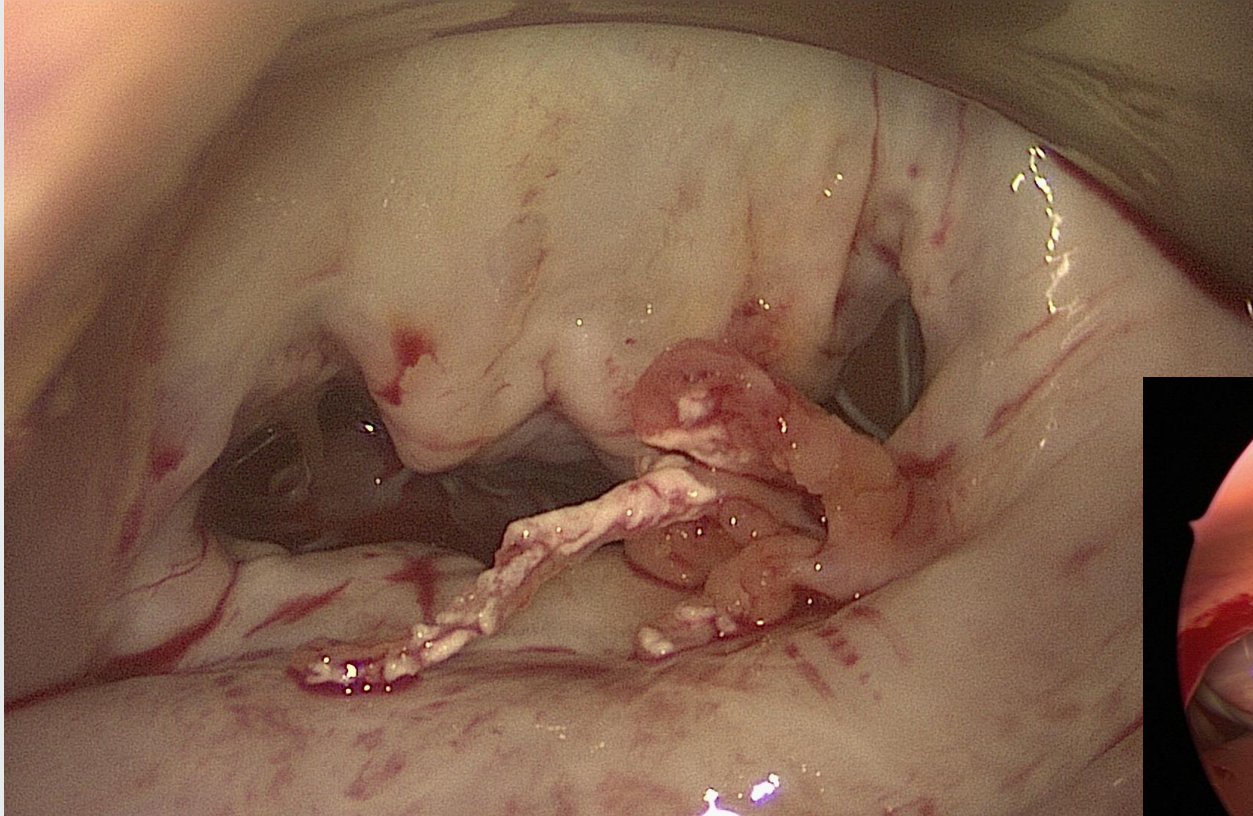
1. Quadrangular resection P2
2. Decalcification posterior annulus
3. Triangular resection A2
4. Chordae replacement A2
5. Ring implantation



Post repair result – excellent coaptation

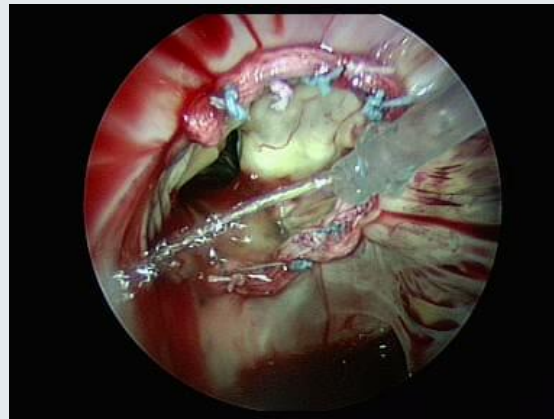


Repair in endocarditis



Added procedures

- Tricuspid repair easy to accomplish (beating heart)
- Atrial ablation and LAA closure
- No restrictions by access

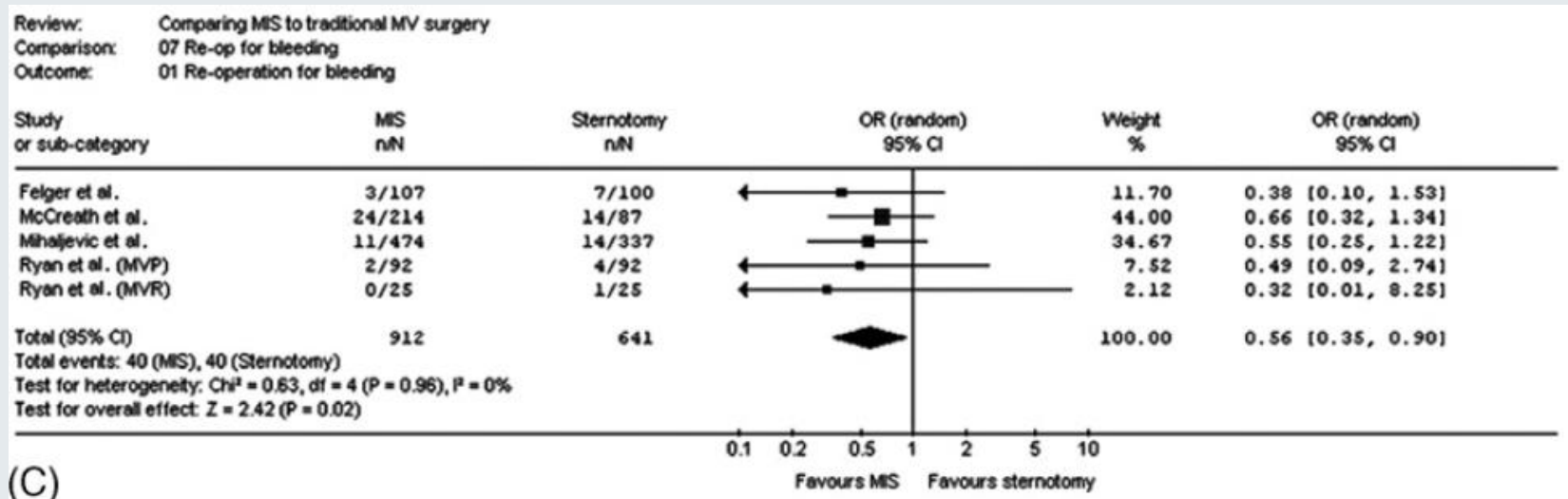


Results match standard sternotomy



Reoperation for Bleeding

- Fewer reexplorations for bleeding
- Similar need for transfusion



Neurological events

- 6 studies (1801 patients)
- No difference

Summary data derived from above cohort studies compared to data from STS Fall 2007 report

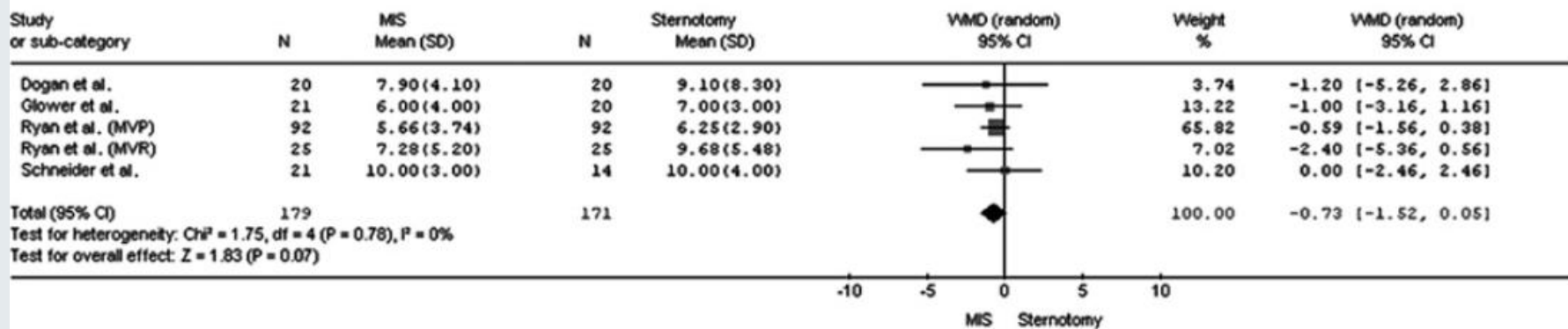
		No. of patients	No. of studies	Summary data (%)	STS data (%)
Mortality	Repair	2176	6	1.1	1.5
	Replacement	979	5	4.9	5.5
	Overall	6253	10	2.0	3.3
Stroke	Repair	1226	4	1.6	1.9
	Replacement	778	3	2.3	3.2
	Overall	6290	10	2.2	2.5

Stroke rate MVR 1.6%

Hospitalization

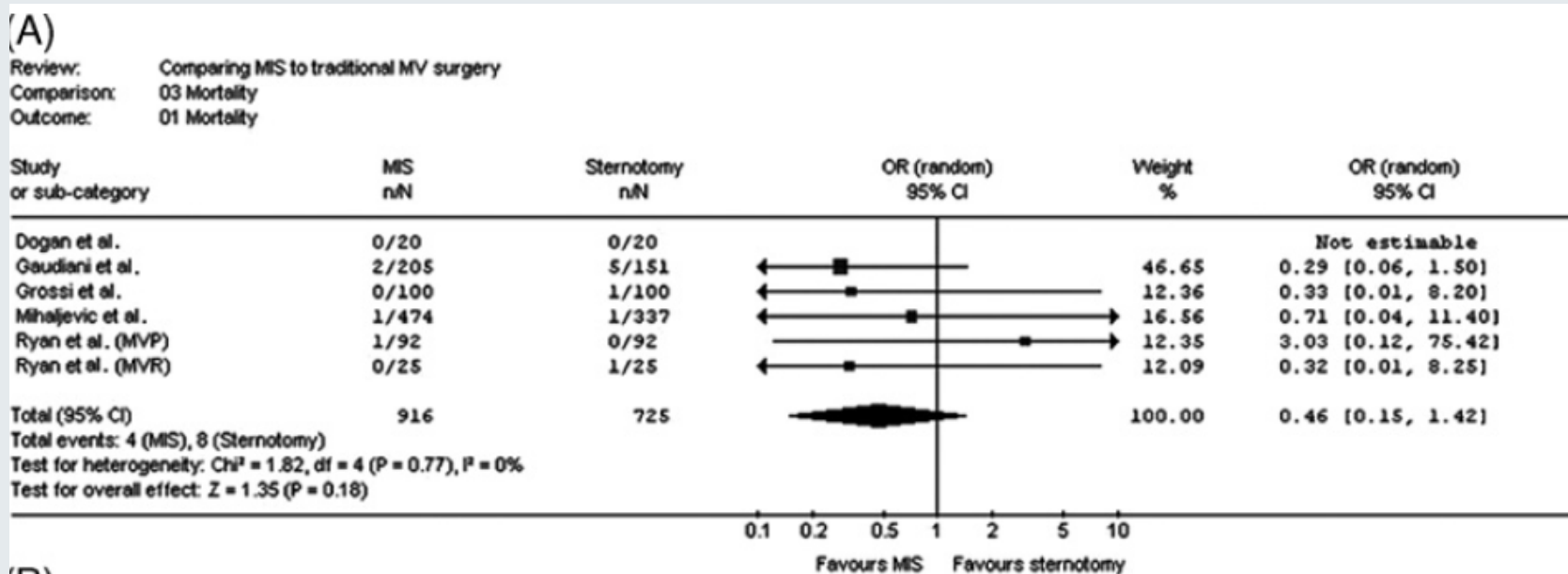
- LOS less with minimally invasive approach (US)

Review: Comparing MIS to traditional MV surgery
 Comparison: 01 Hospital LOS
 Outcome: 01 Length of stay in hospital



Mortality

- 6 studies (1641 patients)

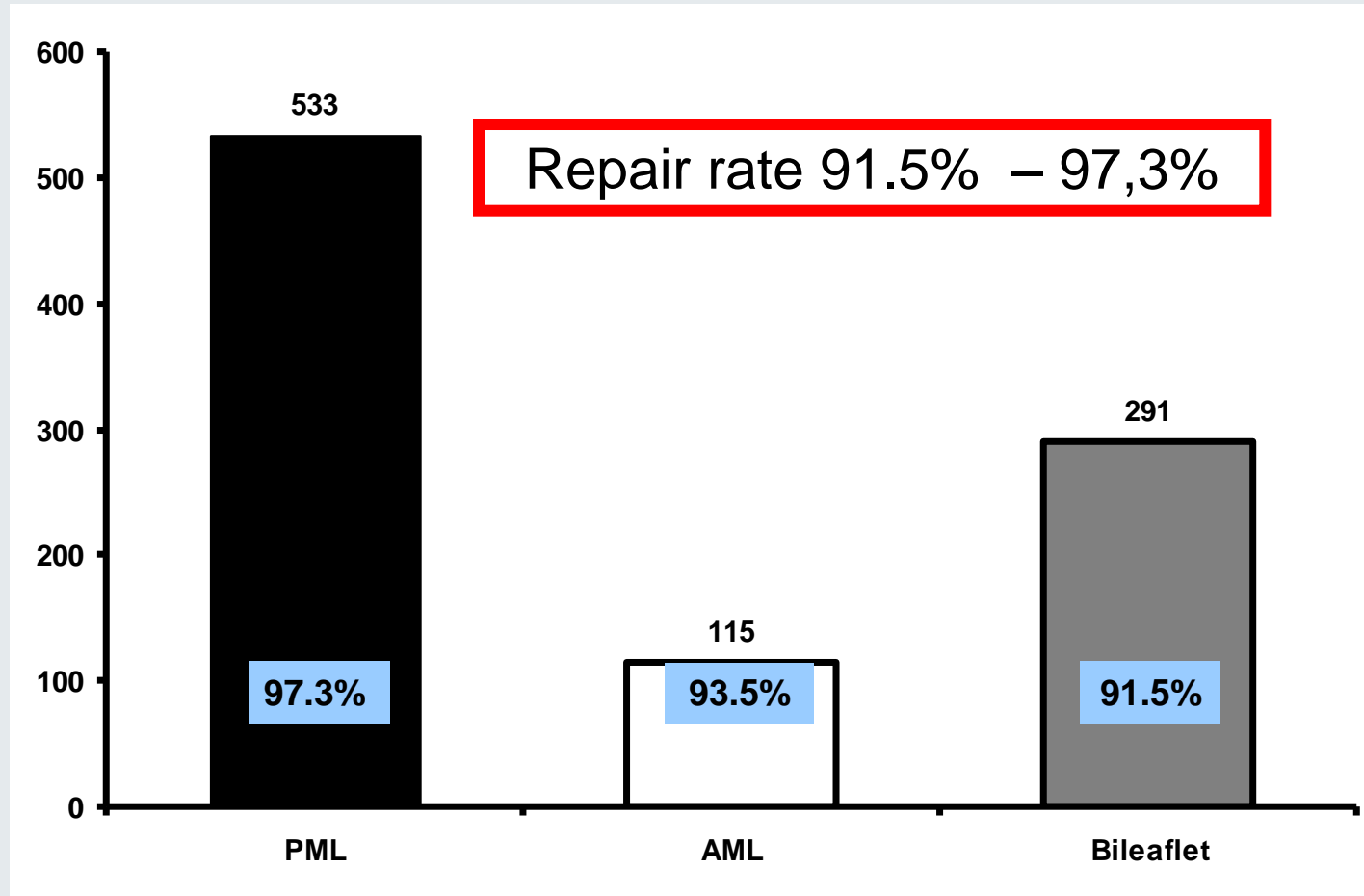


No difference

Pain and Speed of Recovery

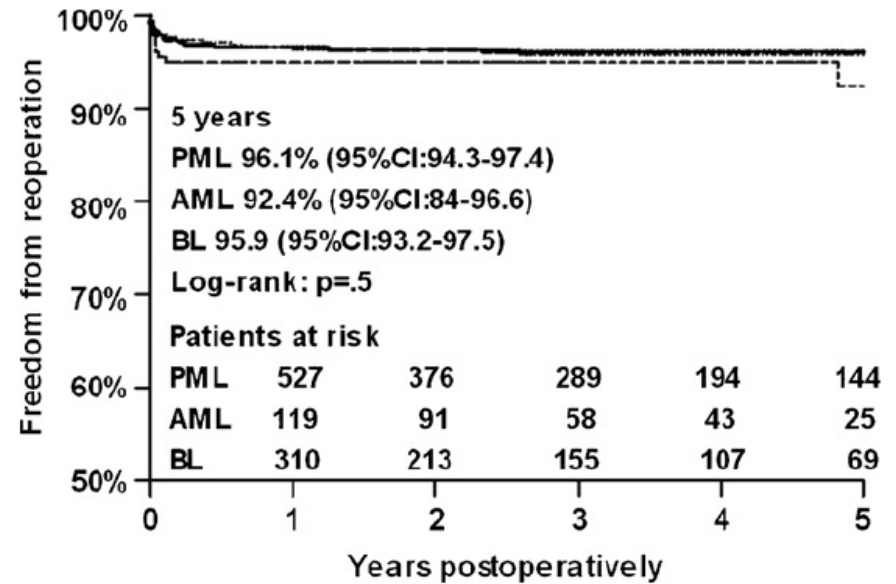
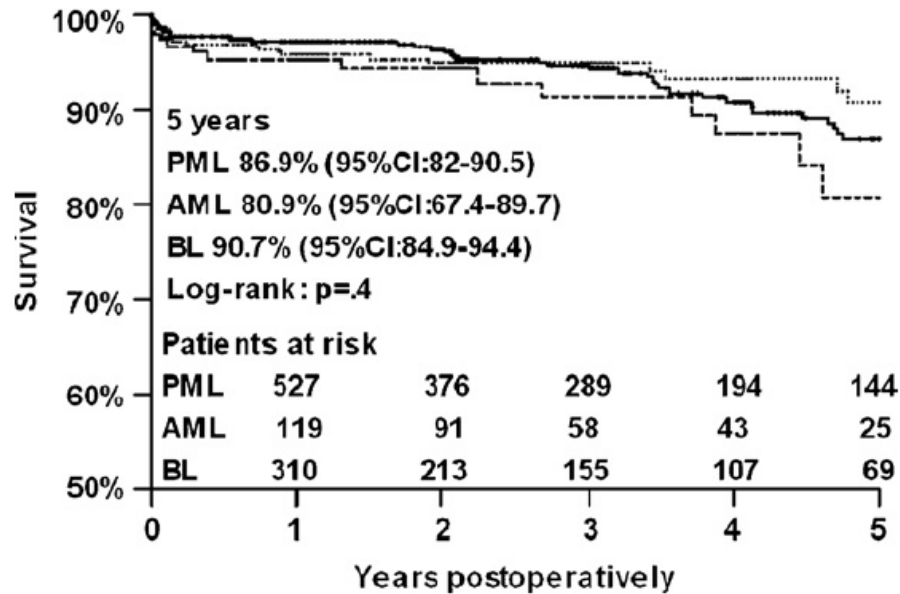
- 4 studies
- Less postoperative pain
- Faster return to normal activity
- Fewer requirements for post-hospital rehabilitation

Isolated PML, AML, und Bileaflet Prolapse HCL (n=989) 2000-2007



Comparison of outcomes of minimally invasive mitral valve surgery for posterior, anterior and bileaflet prolapse[☆]

Joerg Seeburger^{*}, Michael A. Borger, Nicolas Doll, Thomas Walther,
Jurgen Passage, Volkmar Falk, Friedrich W. Mohr



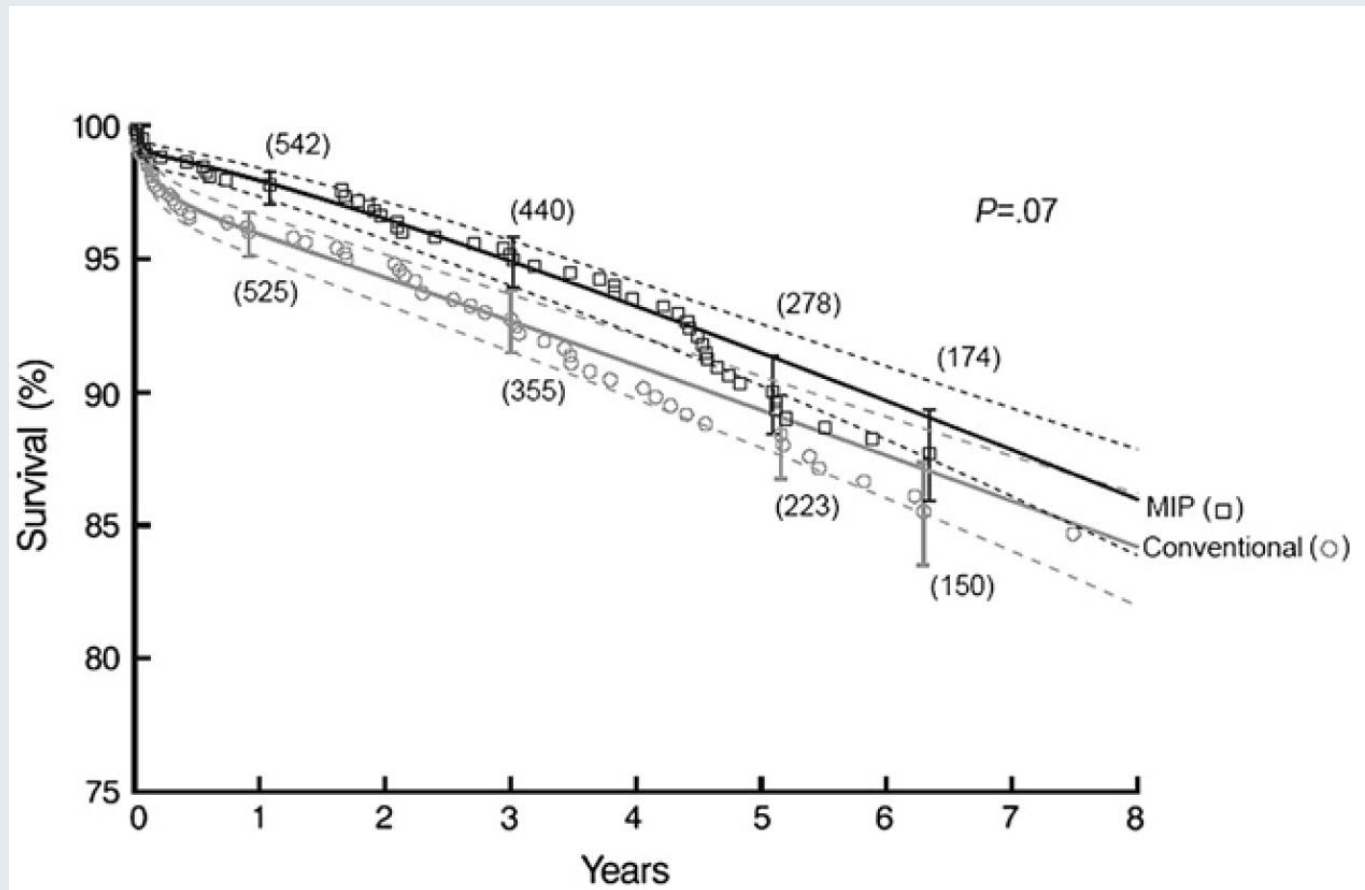
Long-term results MIC

Similar survival and freedom from reoperation

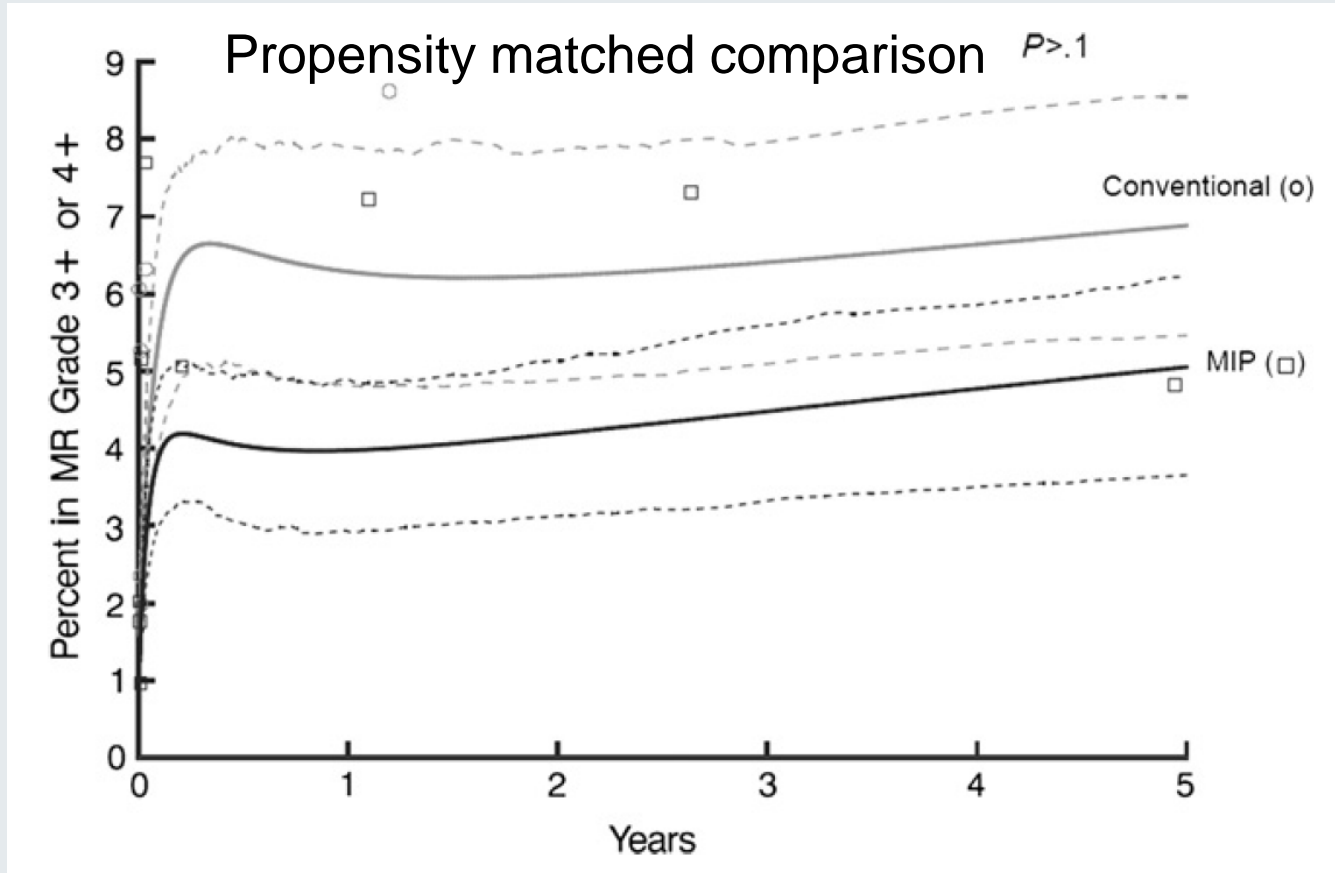
Studies reporting long-term results of minimally invasive mitral valve surgery

Study, year, reference	Institution	Survival	Freedom from re-operation
Gulielmos et al. (2000) [43]	Dresden	93.5% at 3.3 years	—
Casselmann et al. (2003) [34]	Aalst	95.4 ± 1.7% at 4 years	91 ± 3.5% at 4 years
Greelish et al. (2003) [44]	Brigham	95% at 5 years	92% at 5 years
Walther et al. (2004) [39]	Leipzig	83% at 6.8 years	—
Mishra et al. (2005) [40]	New Delhi	99% at 3.2 years	99.3% at 3.2 years
Aybek et al. (2006) [41]	Frankfurt	90.7% at 6.3 years	96.2% at 6.3 years
Torracca et al. (2006) [42]	Milan	100% at 2.3 years	95.2% at 4 years

Minimally invasive versus conventional mitral valve surgery: A propensity-matched comparison



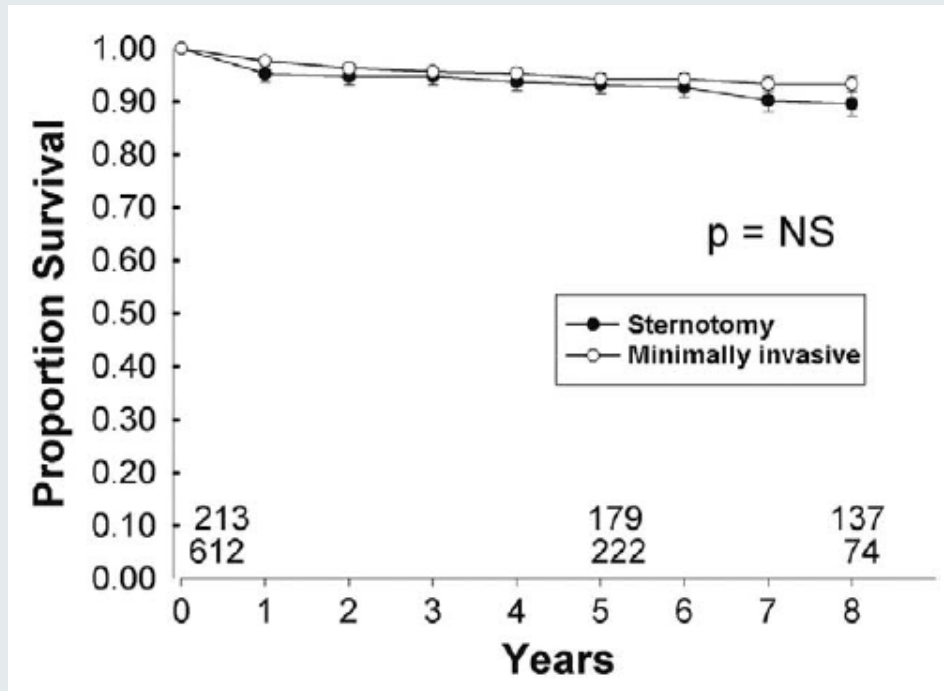
Residual MI



A Decade of Minimally Invasive Mitral Repair: Long-Term Outcomes

Aubrey C. Galloway, MD, Charles F. Schwartz, MD, Greg H. Ribakove, MD, Gregory A. Crooke, MD, George Gogoladze, MD, Patricia Ursomanno, PhD, Margaret Mirabella, MSN, Alfred T. Culliford, MD, and Eugene A. Grossi, MD

Department of Cardiothoracic Surgery, New York University Medical Center, New York, New York



8y freedom from Re-OP

Sternotomy 91%

MIC 95%

8y freedom from all valve related complications

Sternotomy 86%

MIC 90%

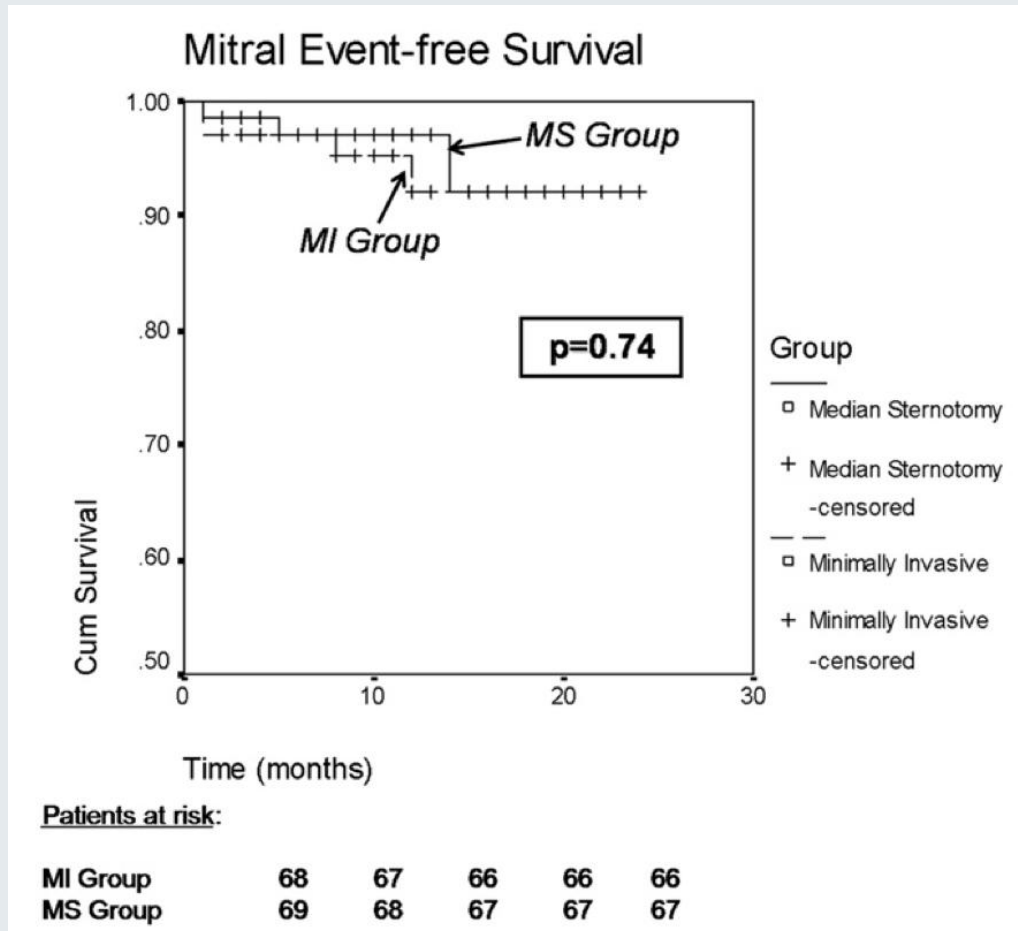
MIC MVR for bileaflet repair ?

Randomized trial (MIC vs Conv. MVR in Barlows disease)

140 patients mean FU 12,4 months

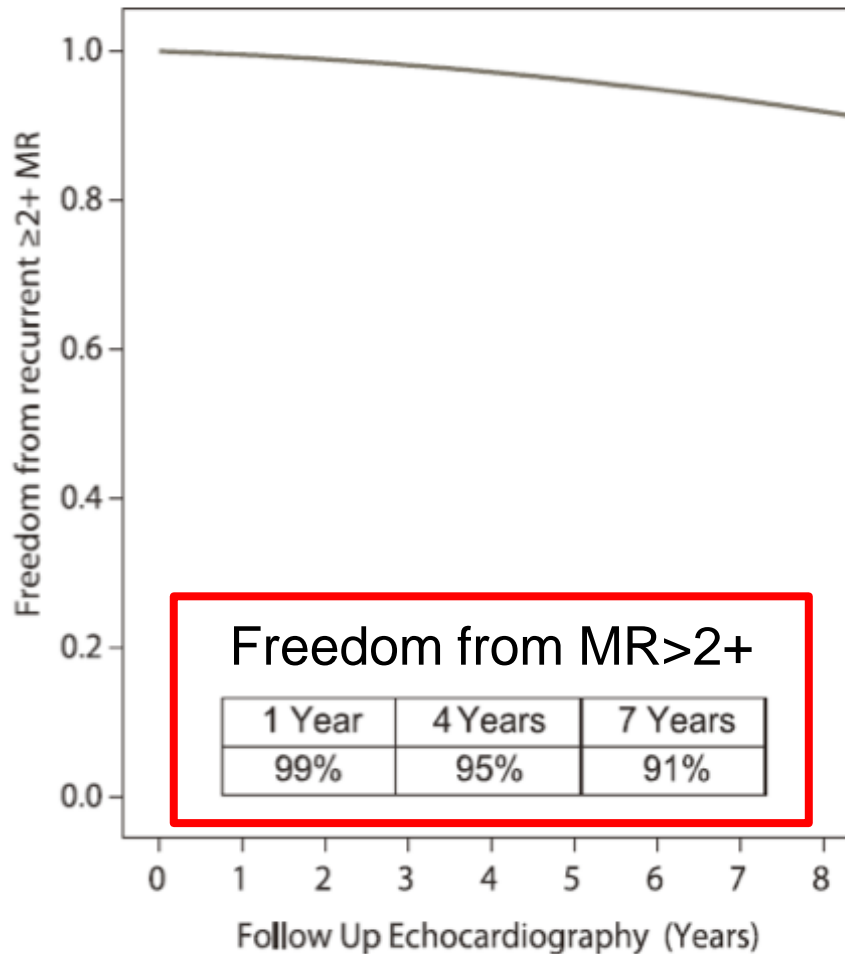
	MIC	Sternotomy	p
Repair rate (%)	98.5	100	ns
Mortality (%)	2.8	1.3	ns
ICU (d)	1.2	2.3	0.02
LOS (d)	8.6	11.8	0.03
FU freedom from MI> 2+ (%)	97	98	ns

MIC MVR for bileaflet repair ?



2012 reference: MVR - Sternotomy

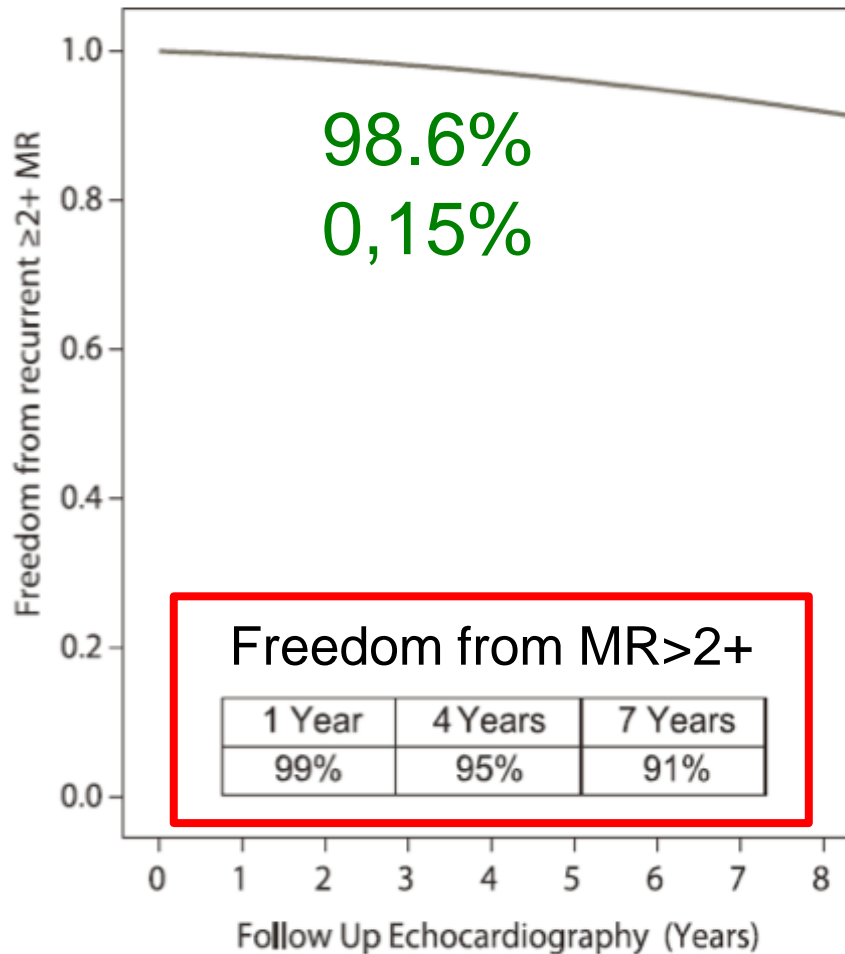
Repair rate 99%
Mortality 0,9%



Castillo JG JTCVS 2012

2012 reference: MVR – Sternotomy MIC MVR

Repair rate 99%
Mortality 0,9%



Castillo JG JTCVS 2012

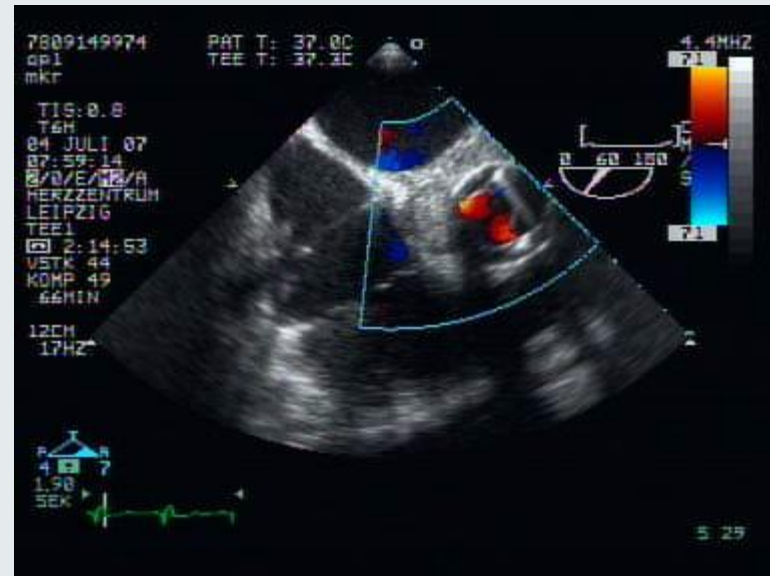
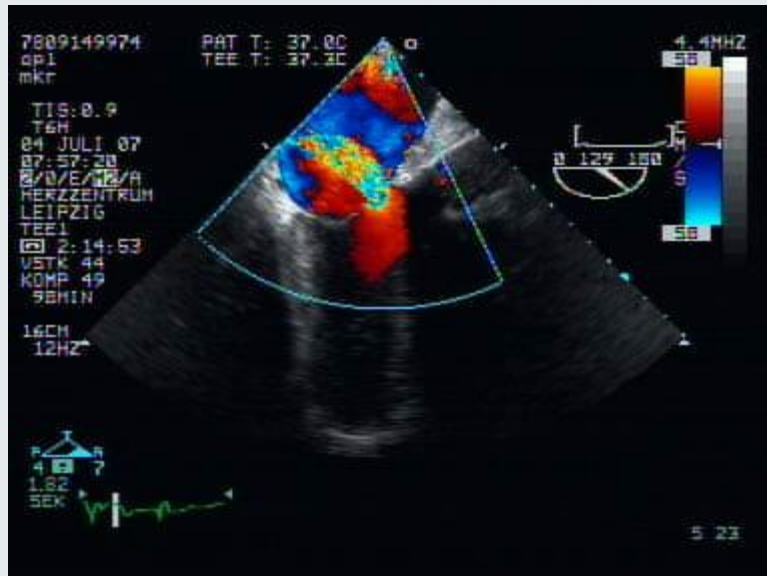
Perrier P PC 2012

MIC MVR for reoperation

- 5 studies
- Less bleeding
- Less reoperation
- Fewer wound infections
- Decreased LOS
- Similar or better mortality (Non randomized)
- Patients with sternotomy experience prefer lateral approach (2 studies)

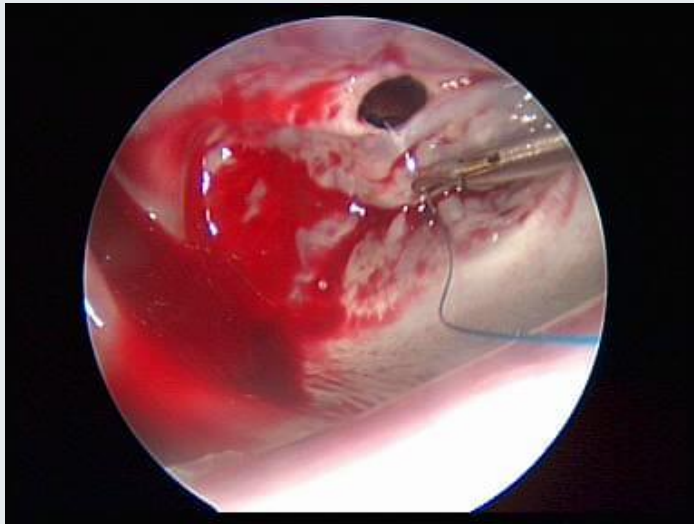
Redo Case

- 55 yo male s/p AVR (Mechanical Conduit)
- Perforation of AML

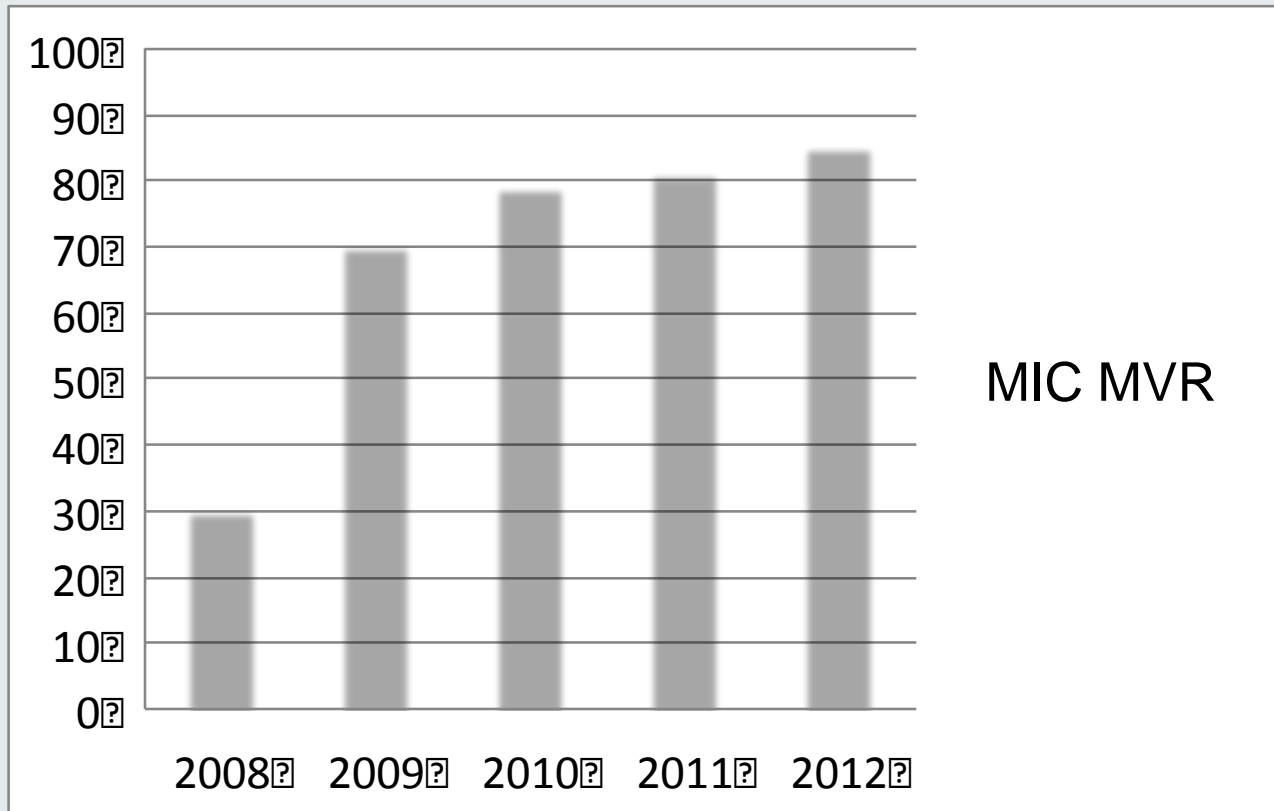


Redo Case

repair of AML perforation



Minimally invasive MVR USZ



Repair rate in MR USZ: 85-90%

Obstacles for implementation

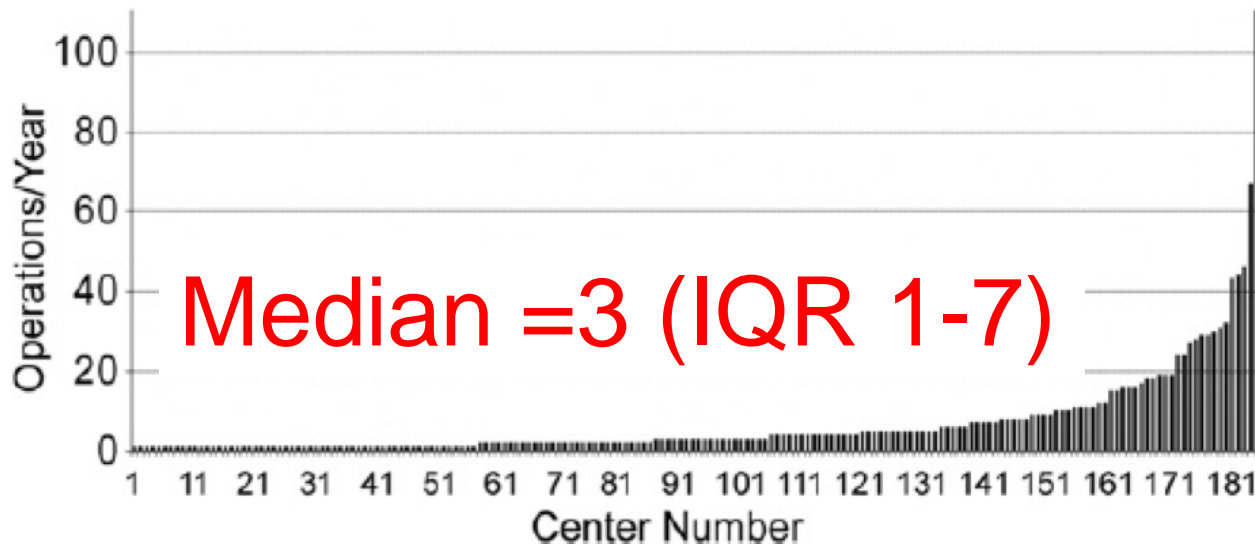


Low average case load

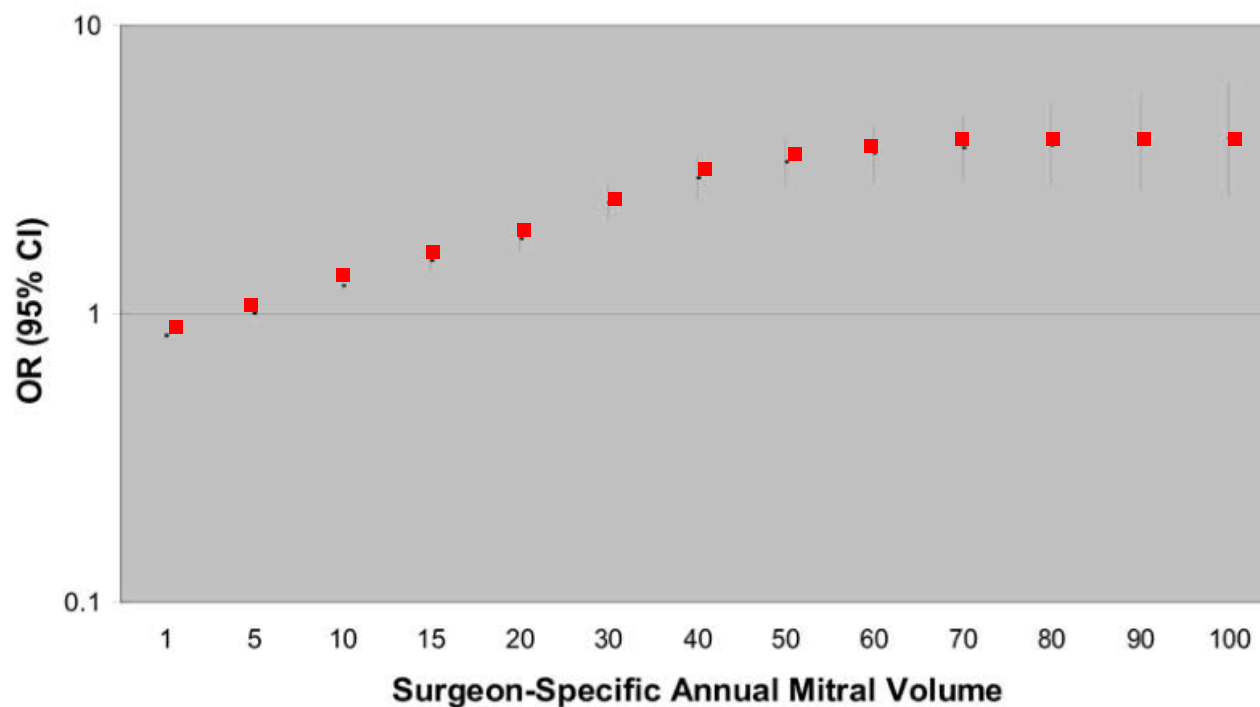
J. MAXWELL CHAMBERLAIN MEMORIAL PAPER FOR ADULT CARDIAC SURGERY

Less-Invasive Mitral Valve Operations: Trends and Outcomes From The Society of Thoracic Surgeons Adult Cardiac Surgery Database

Minimally Invasive Mitral Surgery in US



Likelihood of mitral valve repair and surgeon volume

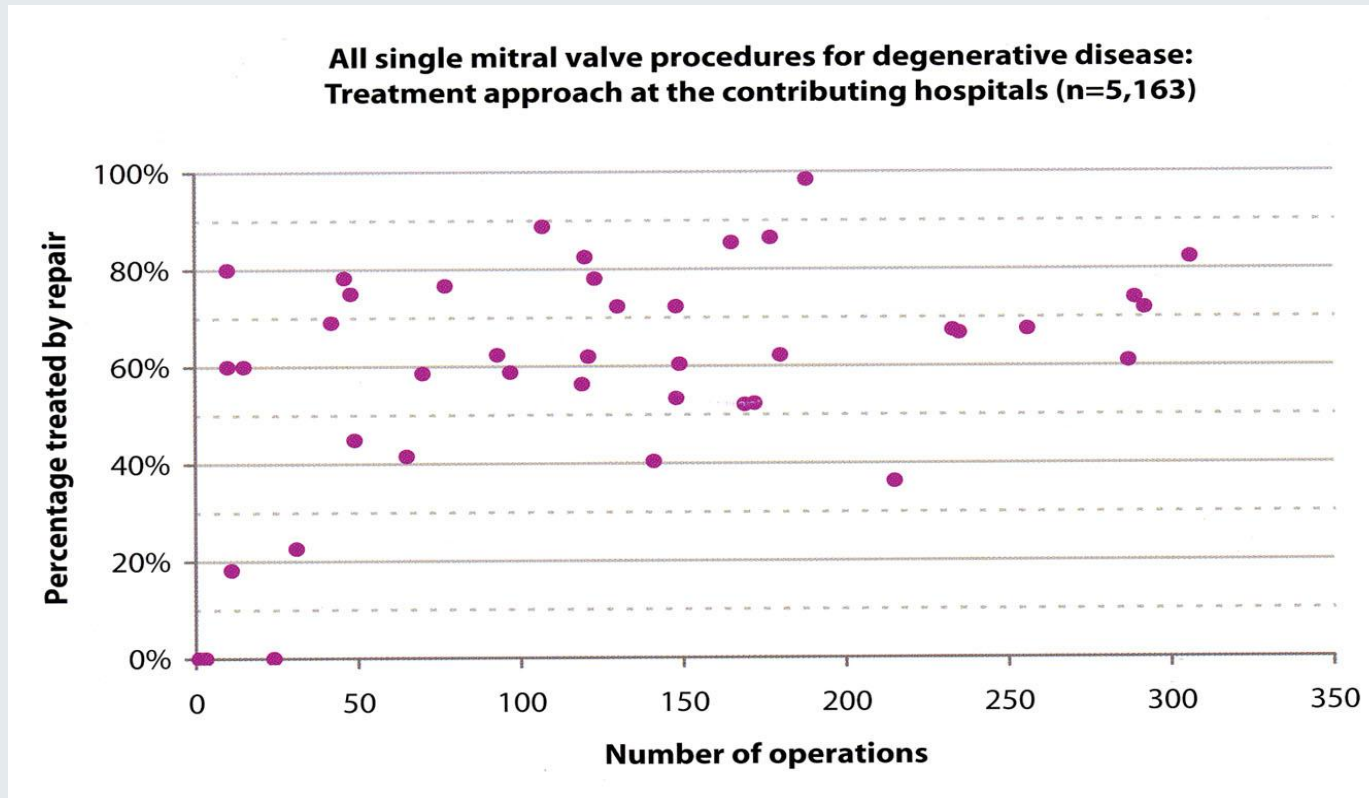


B

Annual Mitral Volume	1	5	10	15	20	30	40	50	60	70	80	90	100
Predicted Probability of Repair, %	49.9	54.6	60.4	65.4	69.6	75.4	78.9	80.8	81.8	82.3	82.4	82.5	82.6

The mitral repair lottery

Repair vs. Replacement in the UK

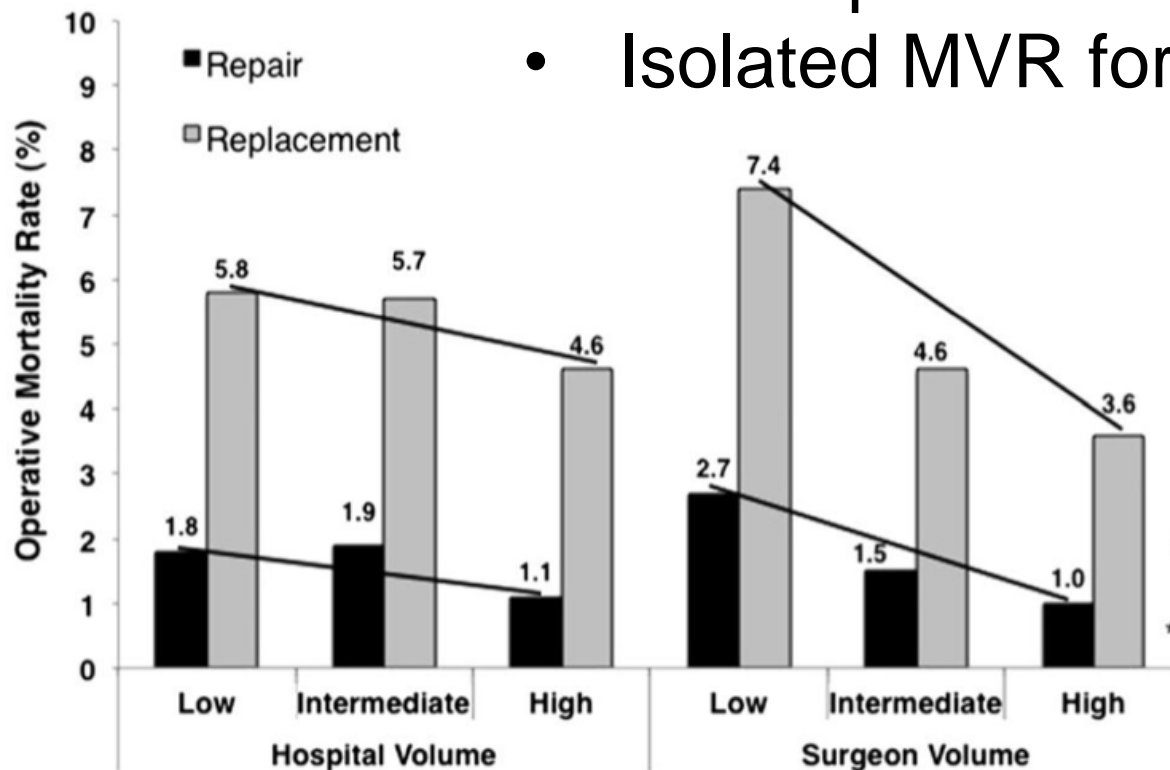


Variability – 20-90% between different hospitals (n = 46)
National repair rate UK 51% (Ger 60%)

Operative outcomes in mitral valve surgery: Combined effect of surgeon and hospital volume in a population-based analysis

Arman Kilic, MD,^a Ashish S. Shah, MD,^a John V. Conte, MD,^a William A. Baumgartner, MD,^a and David D. Yuh, MD^b

- 50152 patients
- Isolated MVR for MR



Thank you!

