



APPROCCI INTERDISCIPLINARI IN REUMATOLOGIA

2<sup>a</sup> edizione

MANIFESTAZIONI CARDIOVASCOLARI

E METABOLICHE IN REUMATOLOGIA

*4 - 5 aprile 2014*

# **Reumatismo Articolare Acuto: Focus on**

## **Il punto di vista del cardiocirurgo**



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# **Reumatismo Articolare Acuto: Focus on**

## **Il punto di vista del cardiocirurgo**

- **Rheumatic heart disease**
- **Surgical Timing**
- **Mitral valve surgery: Repair or Replacement?**
- **Minimally Invasive MV Surgery**
- **Turin experience**

# **Reumatismo Articolare Acuto: Focus on**

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# Rheumatic Heart Disease



**ACUTE PHASE**

Streptococcal pharyngitis by **group A beta-hemolytic streptococci**.



## **IMMUNE REACTION**

Antibody cross-reaction with heart



**ACUTE RHEUMATIC PANCARDITIS**



**Aschoff's body**



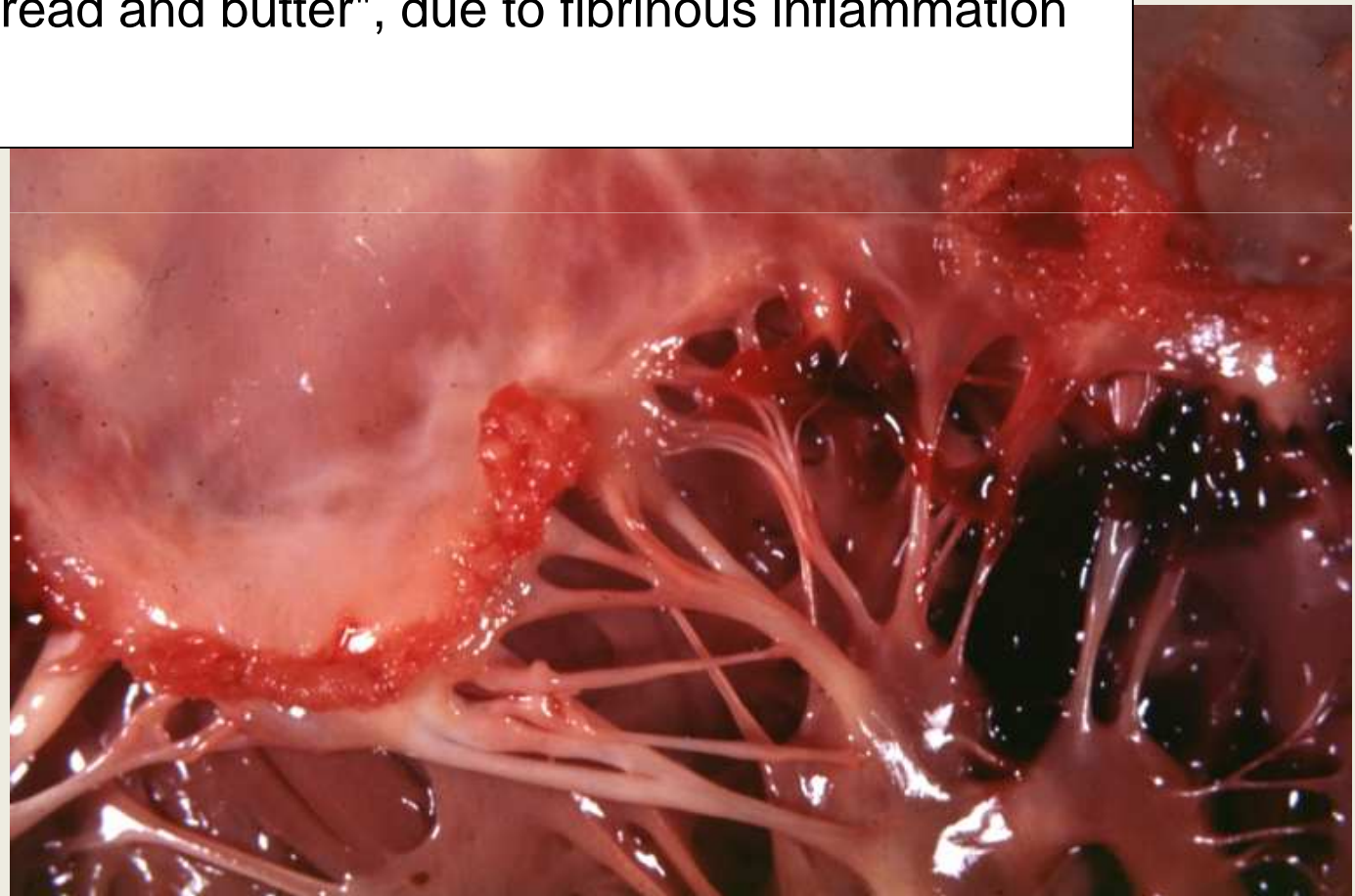
# Rheumatic Heart Disease



## ACUTE RHEUMATIC PANCARDITIS:

- Myocarditis
- Pericarditis: "bread and butter", due to fibrinous inflammation
- Endocarditis.

**ACUTE PHASE**





# Rheumatic Heart Disease



## CHRONIC PHASE

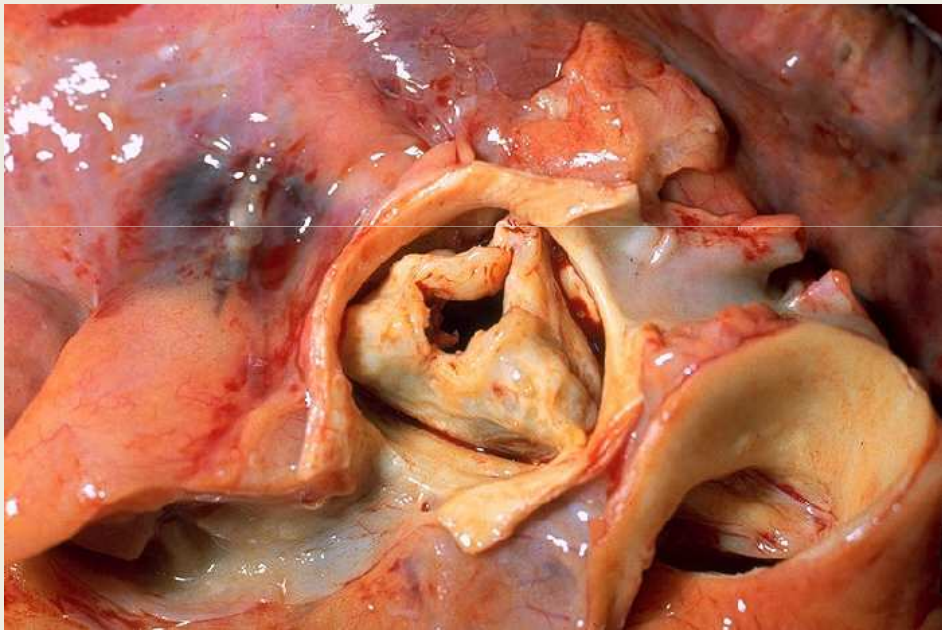
Acute changes may resolve completely or progress to scarring and development of chronic valvular deformities many years after the acute disease.

- Leaflet thickening
- Commissural fusion
- Fibrosis
- Premature calcification
- Shortening of the primary, secondary and tertiary chordae
- **VALVULAR STENOSIS and/or REGURGITATION**

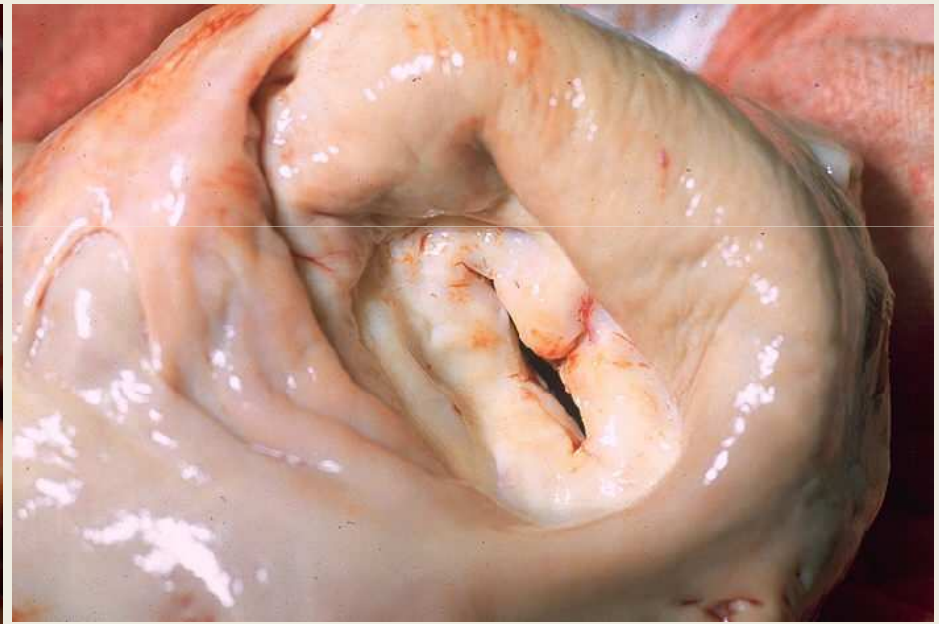


# Rheumatic Heart Disease

CHRONIC PHASE



AORTIC VALVE



MITRAL VALVE

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# Surgical Timing



## **SEVERE VALVE STENOSIS**

	Aortic stenosis	Mitral stenosis	Tricuspid stenosis
Valve area (cm <sup>2</sup> )	<1.0	<1.0	–
Indexed valve area (cm <sup>2</sup> /m <sup>2</sup> BSA)	<0.6	–	–
Mean gradient (mmHg)	>40 <sup>a</sup>	>10 <sup>b</sup>	≥5
Maximum jet velocity (m/s)	>4.0 <sup>a</sup>	–	–
Velocity ratio	<0.25	–	–

**ESC/EACTS GUIDELINES**



European Heart Journal (2012) **33**, 2451–2496



# Surgical Timing



## **AORTIC VALVE STENOSIS**

- Symptoms
- No symptoms with LVEF<50%
- No symptoms at rest but symptoms or fall in blood pressure during exercise test



**ESC/EACTS GUIDELINES**



European Heart Journal (2012) **33**, 2451–2496



# Surgical Timing



## MITRAL VALVE STENOSIS

Natural History and Prognosis of Severe MS <sup>3</sup>	
Symptoms	10-Year Survival (%)
None (class I)	84
Mild (early class II)	34–42
Moderate-severe (late class II, class III)	40
Class IV	0
At 1 year	42
At 5 years	10
Class indicates New York Heart Association Functional class.	



# Surgical Timing



## ***MITRAL VALVE STENOSIS***

- Symptoms
- No symptoms with PAPs  $> 50$  mmHg at rest
- No symptoms with PAPs  $> 60$  mmHg during exercise test
- No symptoms with wedge  $> 25$  mmHg
- New onset of atrial fibrillation



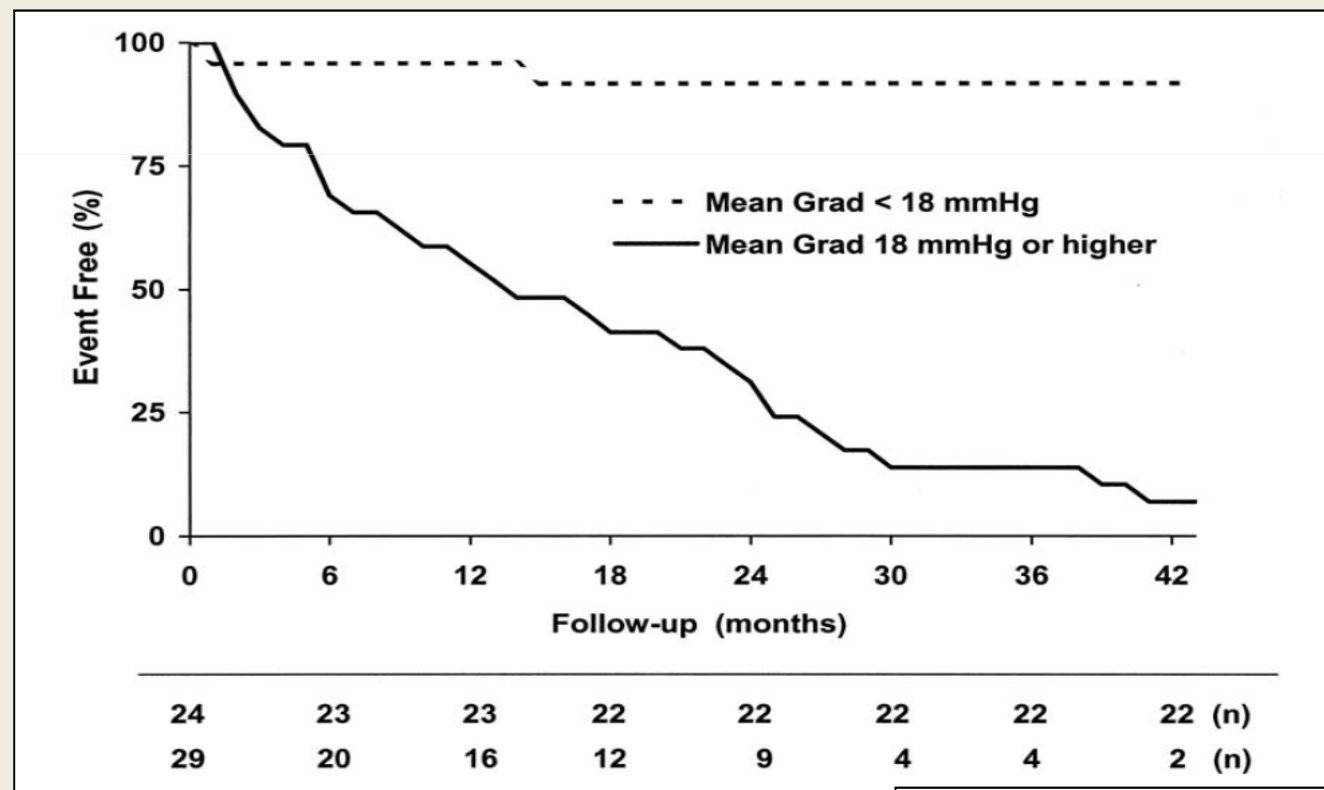


# Surgical Timing



## ***MODERATE MITRAL VALVE STENOSIS***

**DSE-MG 18 mm Hg** identifies a subgroup of **high-risk patients** in whom a more aggressive approach may be warranted.



Reis et al, JACC 2004; 43: 393-401



# Surgical Timing



## ***MITRAL VALVE REGURGITATION***

- Symptoms
- No symptoms with LVEF < 60% or LVESD > 45mm
- No symptoms with PAPs > 50 mmHg at rest
- New onset of atrial fibrillation

***REPAIR WHENEVER POSSIBLE***

**ESC/EACTS GUIDELINES**



European Heart Journal (2012) **33**, 2451–2496

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- **Mitral valve surgery: Repair or Replacement?**
- Minimally Invasive MV Surgery
- Turin experience

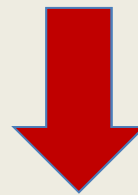


# Mitral valve surgery: Repair or Replacement?



***STATE of ART***

**Degenerative and ischemic disease**



**MITRAL VALVE REPAIR**

- Low operative mortality
- Better haemodynamic characteristics, better preservation of LV function
- Low morbidity and lower likelihood of valve-related complications (thrombo-embolic complications)
- Improved late survival



# Mitral valve surgery: Repair or Replacement?



***STATE of ART***

**Rheumatic disease**



**MITRAL VALVE REPLACEMENT**

Valve replacement continues to be the standard of care particularly in the context of severe calcification



# Mitral valve surgery: Repair or Replacement?



***STATE of ART***

## Rheumatic disease



The evolutive nature of the rheumatic process continues to distort the valve apparatus even beyond a successful repair.



Recurrences of mitral regurgitation or stenosis



## REDO surgery



# Mitral valve surgery: Repair or Replacement?



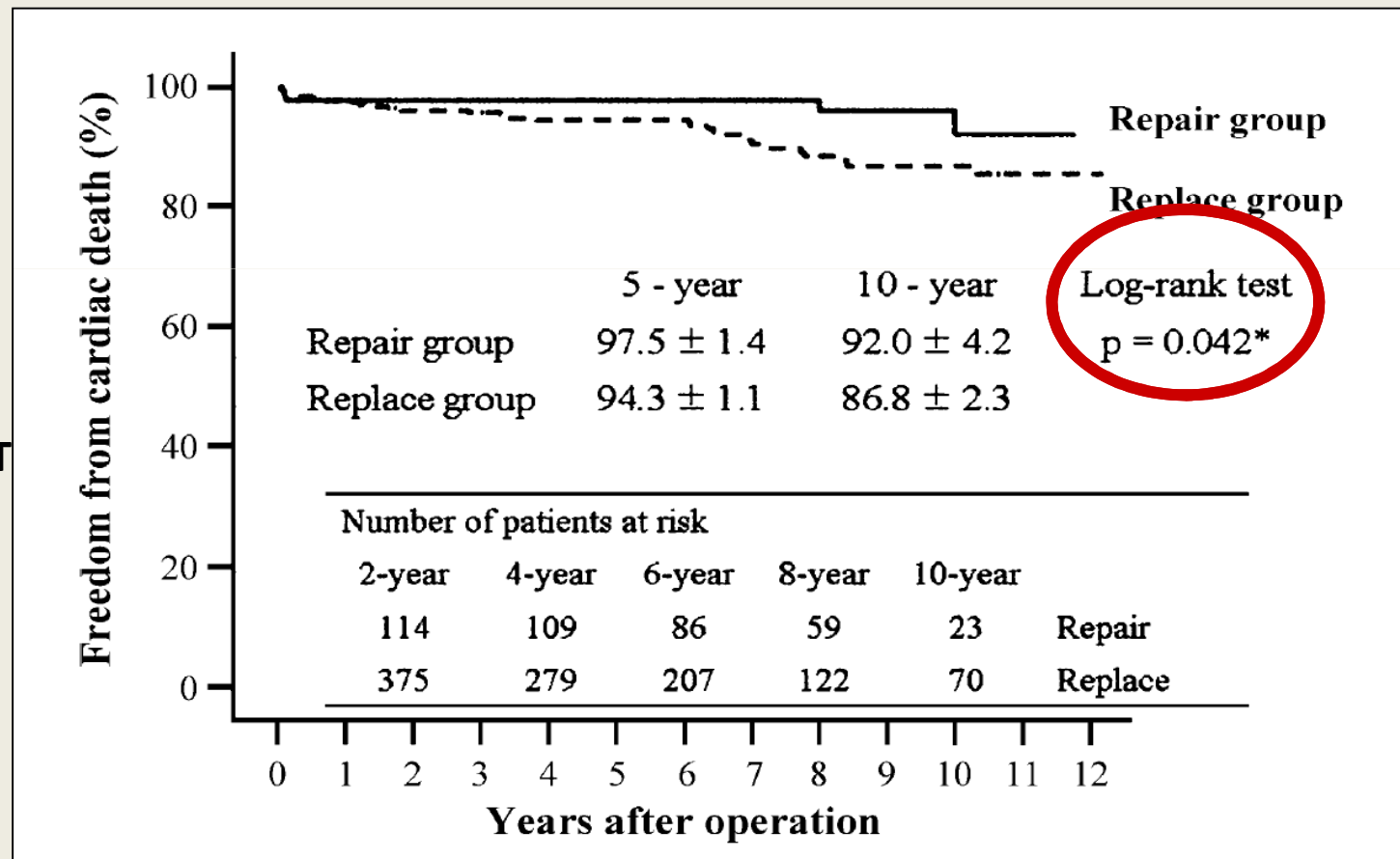
Long-term outcomes after surgery for rheumatic mitral valve disease:  
valve repair versus mechanical valve replacement<sup>☆</sup>

122

MV REPAIR

418

MV REPLACEMENT



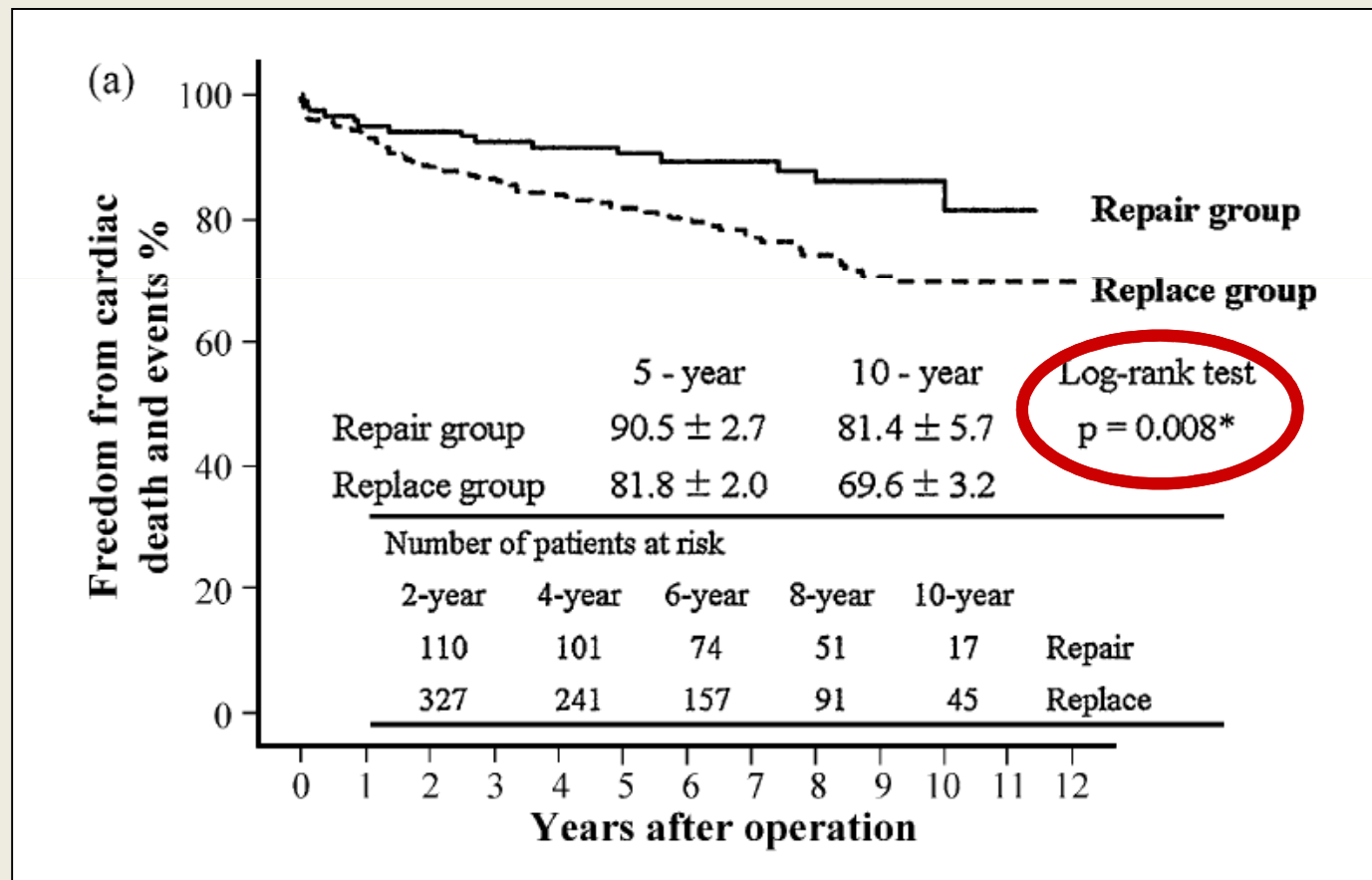
Kim et al, Eur J Cardio-thorac Surg 2010;37:1039-46



# Mitral valve surgery: Repair or Replacement?



Long-term outcomes after surgery for rheumatic mitral valve disease:  
valve repair versus mechanical valve replacement☆





# Mitral valve surgery: Repair or Replacement?



Details of mitral valve repair techniques.

Mitral repair technique	No. cases (%)
Ring annuloplasty	96 (78.7)
Rigid, complete ring	50 (41.0)
Semi-rigid, complete ring	35 (28.7)
Flexible, complete ring	5 (4.1)
Flexible, partial ring	6 (4.9)
Commissurotomy	70 (57.4)
Leaflet mobilisation	63 (51.6)
Papillary muscle splitting	43 (35.2)
New chordae formation	27 (22.1)
Leaflet extension or augmentation	5 (4.1)
Others <sup>a</sup>	4 (3.3)

<sup>a</sup> Cleft repair, quadrangular resection, sliding annuloplasty and chordae transfer.

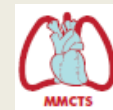
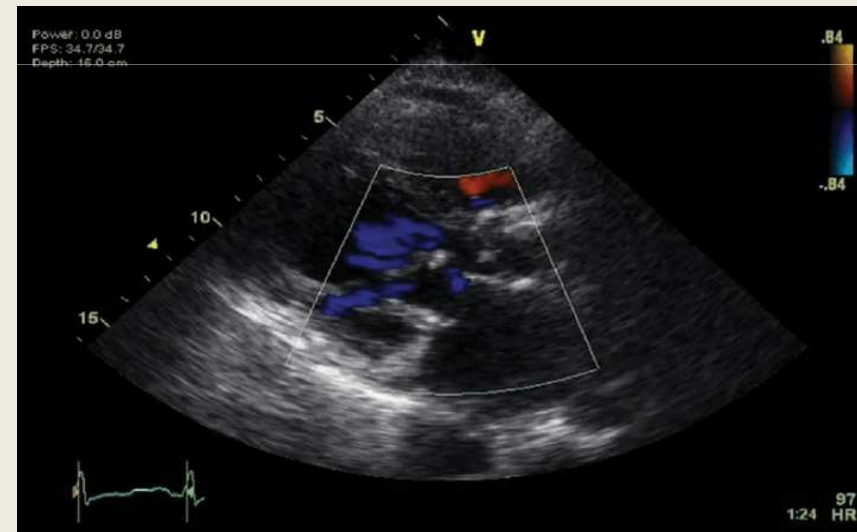


# Mitral valve surgery: Repair or Replacement?



**Repair of rheumatic mitral stenosis with bicommissural release, anterior leaflet augmentation and oversized annuloplasty<sup>†</sup>**

Patrick G. Chan<sup>a</sup>, Awori J. Hayanga<sup>a</sup> and Vinay Badhwar<sup>a,b\*</sup>



MULTIMEDIA MANUAL OF  
**CARDIO-THORACIC**  
SURGERY

published online 6 January 2014



# Mitral valve surgery: Repair or Replacement?



Mitral valve repair and replacement for rheumatic disease.

## Mitral valve repair vs mitral valve replacement:

573 patients

- Better late cardiac survival ( $p = 0.04$ )
- Lower risk of postoperative complications (thromboembolic complications) ( $p < .0001$ ).
- Higher reoperation rate ( $p = 0.005$ ).

**Rheumatic mitral valves should be repaired when technically feasible**



# Mitral valve surgery: Repair or Replacement?



**Mitral valve repair versus replacement in patients  
with rheumatic heart disease.**

Systematic literature review - **7 studies**

## **Mitral valve repair** vs **mitral valve replacement:**

- Better survival rates: 30-day mortality ( $p = 0.009$ )  
Long-term mortality ( $p = 0.003$ )
- Lower risk of postoperative complications (cardiac death, bleeding or thromboembolic complications) ( $p = 0.002$ ).
- Higher reoperation rate ( $p < 0.01$ ).

Wang et al, J Heart Valve Dis. 2013;22(3):333-9

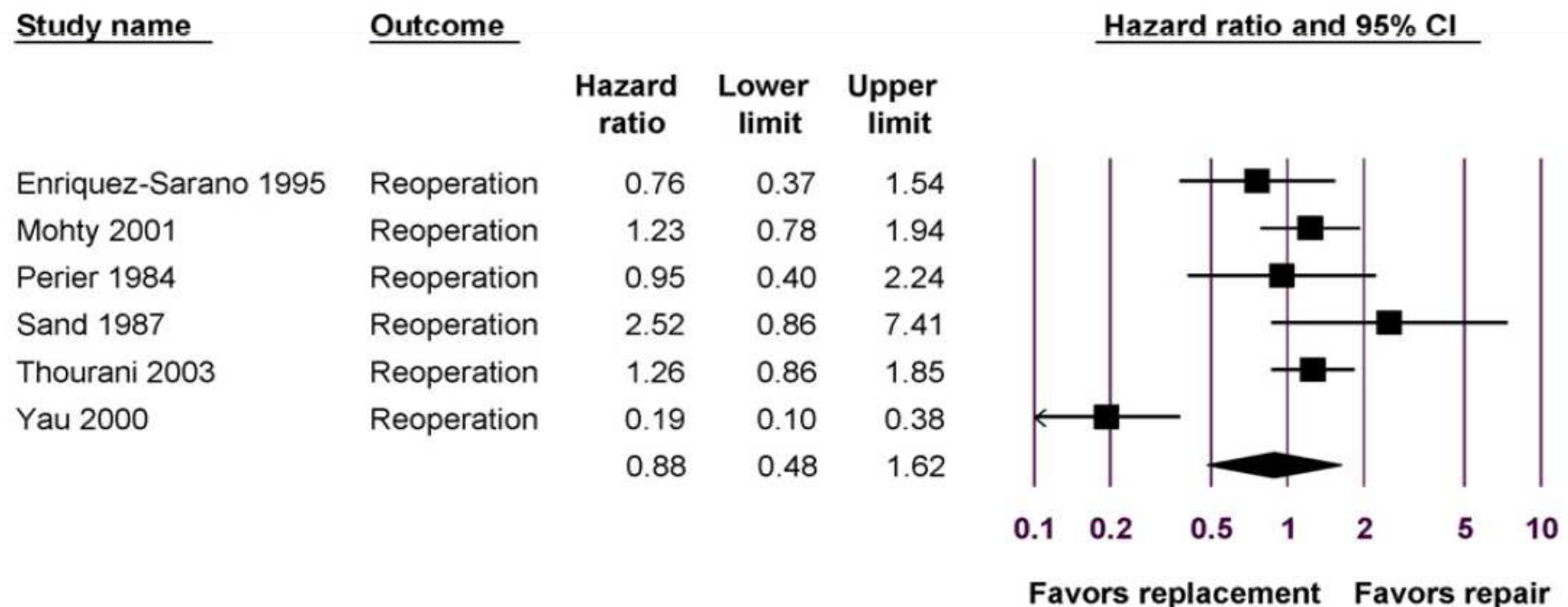


# Mitral valve surgery: Repair or Replacement?

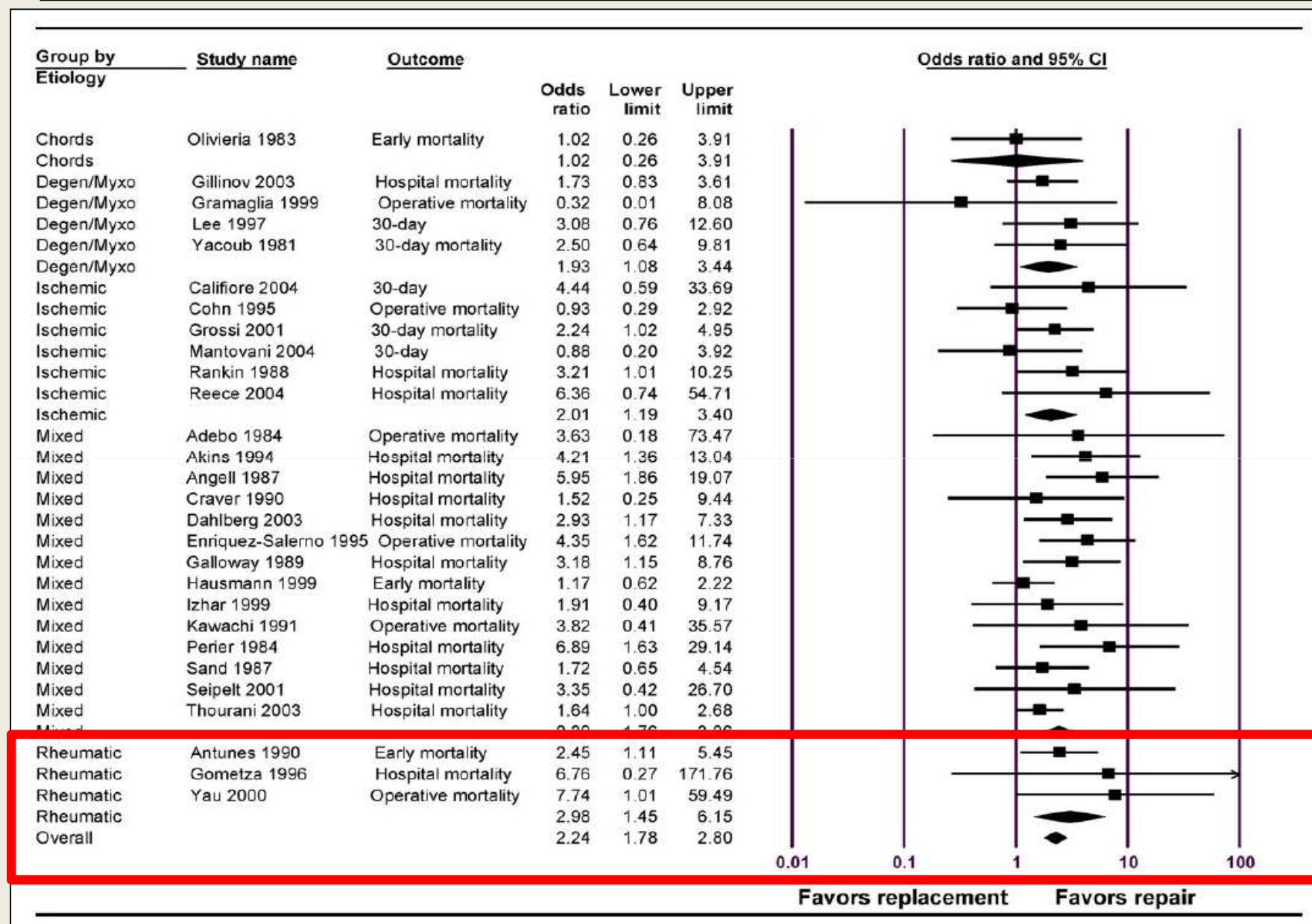


Meta-analysis of clinical outcomes following surgical mitral valve repair or replacement

**Higher re-operative rate** for rheumatic heart disease following repair was observed due to active progression of disease



## Comparison of 30-day survival experience in the mitral valve repair and replacement groups

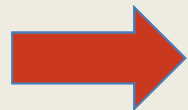




# Mitral valve surgery: Repair or Replacement?



**What has changed in recent years?**



## **TECHNICAL ADVANCES IN COMPLEX MITRAL VALVE SURGERY**

- Use of artificial chordae made of polytetrafluoroethylene
- Leaflet extension to increase leaflet area and coaptation surface

# **Reumatismo Articolare Acuto: Focus on**

## **Il punto di vista del cardiocirurgo**

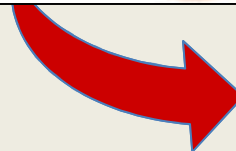
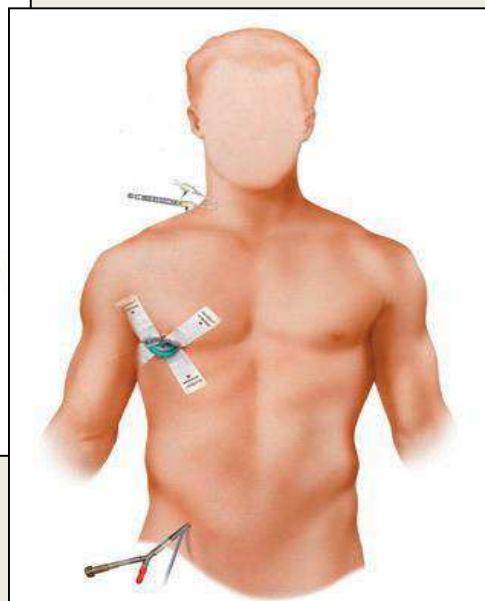
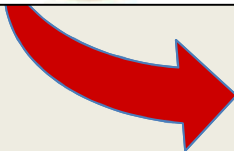
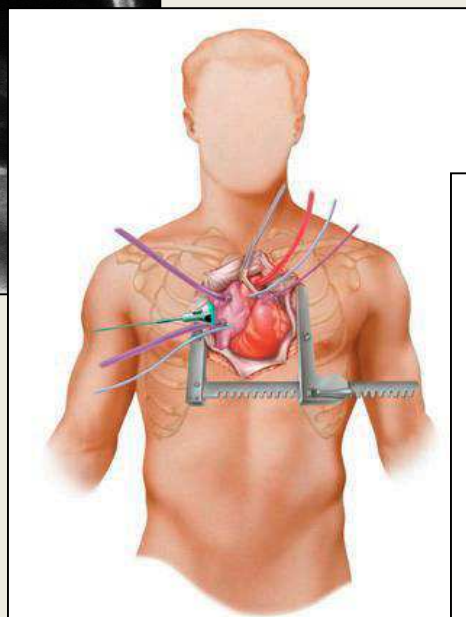
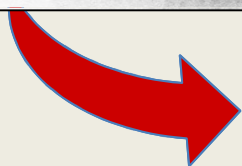
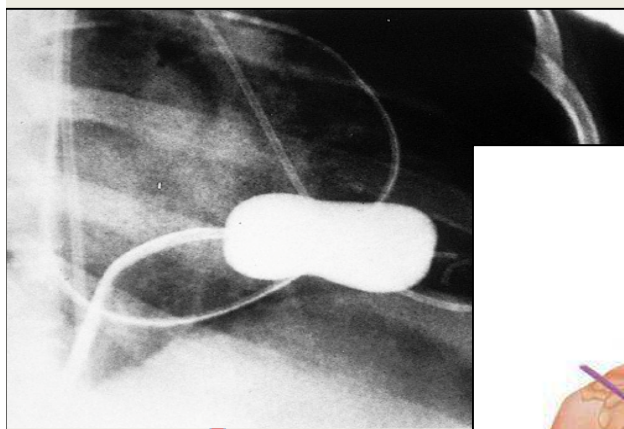
- Rheumatic heart disease
- Surgical Timing
- Mitral valve surgery: Repair or Replacement?
- **Minimally Invasive MV Surgery**
- Turin experience



# Minimally invasive MV surgery



## APPROACH EVOLUTION





# Minimally invasive MV surgery



## Minimally Invasive Versus Conventional Open Mitral Valve Surgery

*A Meta-Analysis and Systematic Review*

***MINI vs ST similar mortality rates***

**30 days 1.2% vs 1.5% - 1 year 0.9% vs 1.3% - 3 years 0.5% vs 0.5% - 9 years 0.2% vs 0.7%**

### Advantages

- Decreased bleeding
- Reduced transfusions
- Shorter ICU and hospital stay
- Shorter ventilation time
- Reduced time to return to normal activity
- Reduced surgical pain
- Better cosmesis

### Disadvantages

- **Increased risk of stroke 1.2vs1.9%**
- **Increased risk of aortic dissection**
- Increased ECC and aortic clamp time
- Groin infections/complications

***Cheng et al, Innov 2011;6:66-76 – Falk et al, Innov 2011;6:84-103***



# Minimally invasive MV surgery



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

Lars G. Svensson, MD, PhD,<sup>a</sup> Fernando A. Atik, MD,<sup>a</sup> Delos M. Cosgrove, MD,<sup>a</sup>  
Eugene H. Blackstone, MD,<sup>a,b</sup> Jeevanantham Rajeswaran, MSc,<sup>b</sup> Gita Krishnaswamy, MS,<sup>b</sup> Ung Jin, MD,<sup>a</sup>  
A. Marc Gillinov, MD,<sup>a</sup> Brian Griffin, MD,<sup>c</sup> José L. Navia, MD,<sup>a</sup> Tomislav Mihaljevic, MD,<sup>a</sup> and  
Bruce W. Lytle, MD<sup>a</sup>

- Min Invasive = 2124
- Sternotomy = 1047
- Propensity matched showed no difference in mortality
- MI: less blood, < pain

**Relatively longer CPB and  
aortic clamping time**



# Minimally invasive MV surgery



	Propensity-Matched				
	Minimally invasive (n = 590)		Conventional (n = 590)		<i>P</i> value
	No.	%	No.	%	
Death	1	0.17	5	0.85	.2
Stroke	7	1.2	6	1.0	.8
Renal failure	4	0.68	5	0.85	>.9
Myocardial infarction	4	0.68	2	0.34	.7
Deep sternal wound infection	6	1.02	4	0.68	.8
Sepsis/septicemia	8	1.4	12	2.0	.4
Return to OR for bleeding	20	3.4	26	4.4	.4
RBC transfusion	155/517*	30	184/500*	37	.01
Respiratory failure	20	3.4	19	3.2	.9



# Minimally invasive MV surgery



**Minimally invasive approach provides at least equivalent results for surgical correction of mitral regurgitation: A propensity-matched comparison**

Outcome	Any cause		P value
	Median sternotomy (n = 201)	Minimally invasive (n = 201)	
Death	1 (0.5%)	0 (0%)	.5
MI	0 (0%)	1 (0.5%)	.5
Deep infection	0 (0%)	0 (0%)	—
Sepsis	2 (1.0%)	0 (0%)	.2
Stroke	1 (0.5%)	0 (0%)	.5
Renal failure	3 (1.5%)	2 (1.0%)	.7
Gastrointestinal event	3 (1.5%)	0 (0%)	.1
Exploration for hemorrhage	1 (0.5%)	5 (2.5%)	.2
Transfusion	44 (22.9%)	28 (14.0%)	.03
Atrial fibrillation	50 (25.0%)	42 (20.8%)	.3
Time to extubation (h)	8.0 (6.0-13.0)	8.0 (6.0-12.0)	.3
Time to discharge (d)	6.0 (5.0-8.0)	6.0 (5.0-7.0)	.4
Discharge home	187 (93.5%)	193 (95.5%)	.4
Readmission within 30 d	15 (12.6%)	7 (4.4%)	.01

- Min Invasive = 556
- Sternotomy = 455
- Propensity matched showed no difference in mortality
- MI: less blood
- 9 yr f/u No Difference



# Minimally invasive MV surgery



A minimally invasive approach is more **cost-effective** than a traditional sternotomy approach for mitral valve surgery

Alexander Iribarne, MD, MS,<sup>a</sup> Rachel Easterwood, BA,<sup>a</sup> Mark J. Russo, MD, MS,<sup>b</sup> Y. Claire Wang, MD, ScD,<sup>c</sup> Jonathan Yang, MD,<sup>a</sup> Kimberly N. Hong, MHSA,<sup>a</sup> Craig R. Smith, MD,<sup>a</sup> and Michael Argenziano, MD<sup>a</sup>

- 217 MI vs 217 ST pts (2003 – 2008)
- Propensity matched showed no difference in morbidity and long term survival

**Higher rate of home discharge with no nursing service in the MI group p=0.01**



# Minimally invasive MV surgery



## Hospital Costs

Median ST

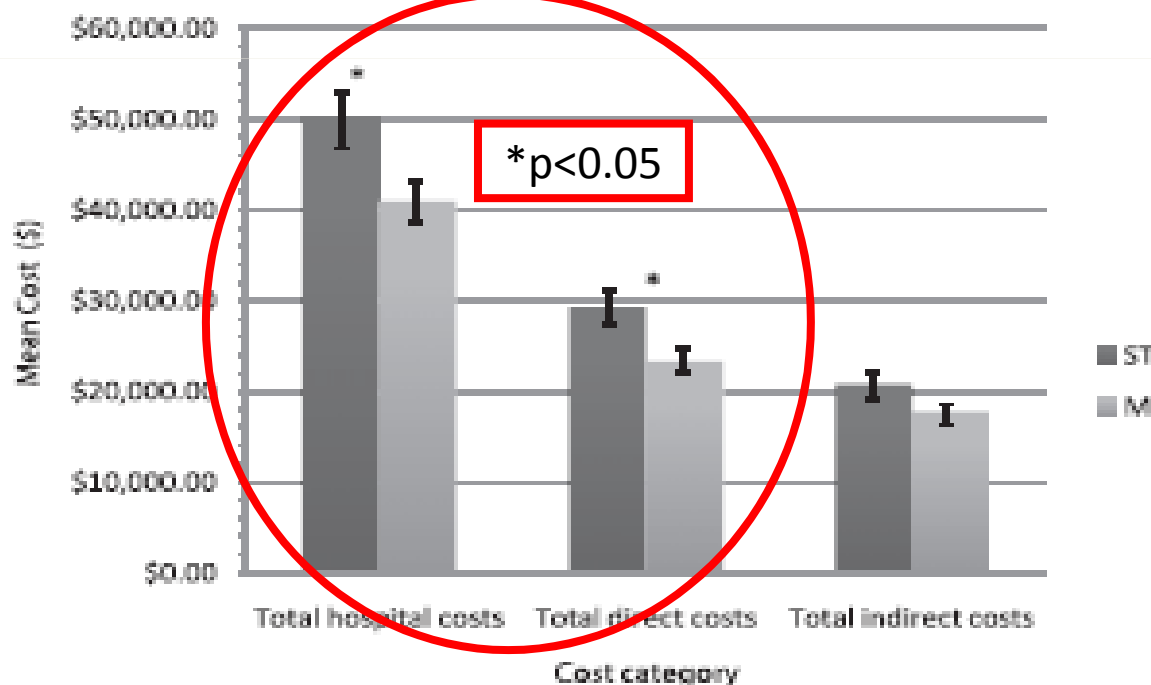
50060 ± 2659 \$

**MINI**

**41006 ± 1887 \$**

**Difference**

**9054 ± 3302 \$**



Reduction in:

Cardiac imaging p=0.004

Laboratory tests p=0.005

Nursing p=0.001

Radiology p=0.002



# Minimally invasive MV surgery

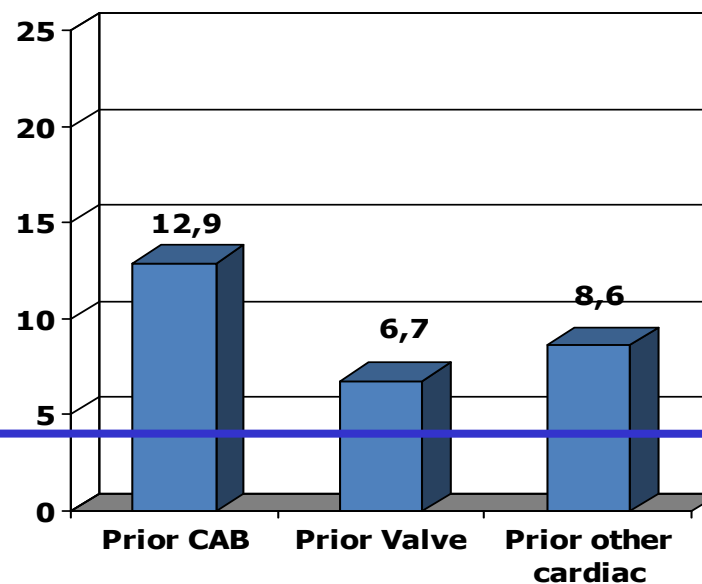
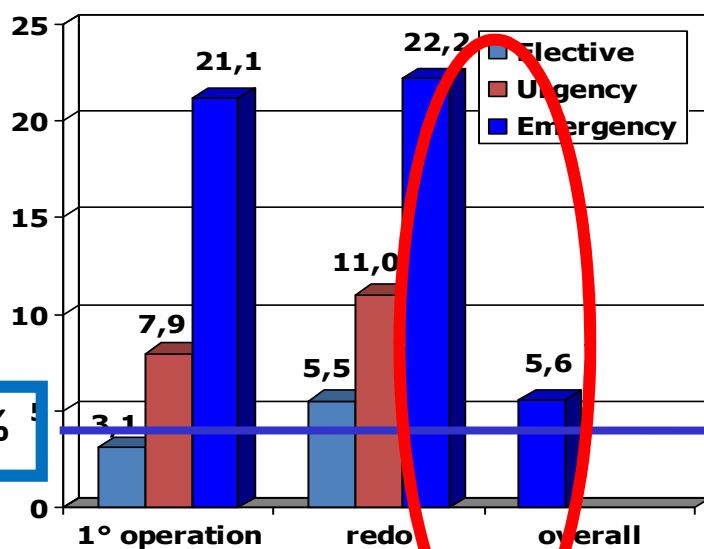


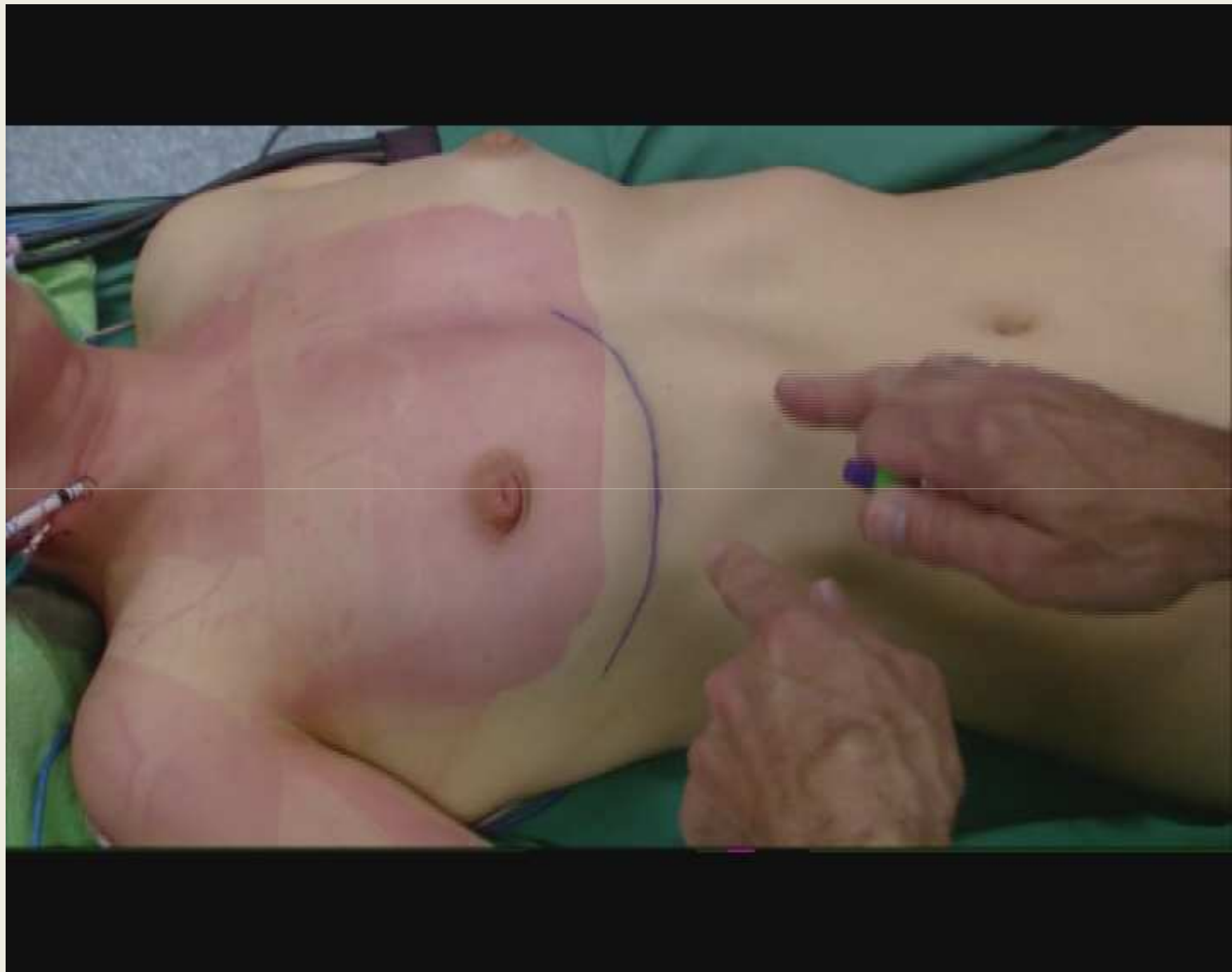
## Port-access surgery as elective approach for mitral valve operation in re-do procedures

Davide Ricci<sup>b,\*</sup>, Carlo Pellegrini<sup>a</sup>, Marco Aiello<sup>a</sup>, Alessia Alloni<sup>a</sup>, Barbara Cattadori<sup>a</sup>, Andrea M. D'Armini<sup>a</sup>, Mauro Rinaldi<sup>b</sup>, Mario Viganò<sup>a</sup>

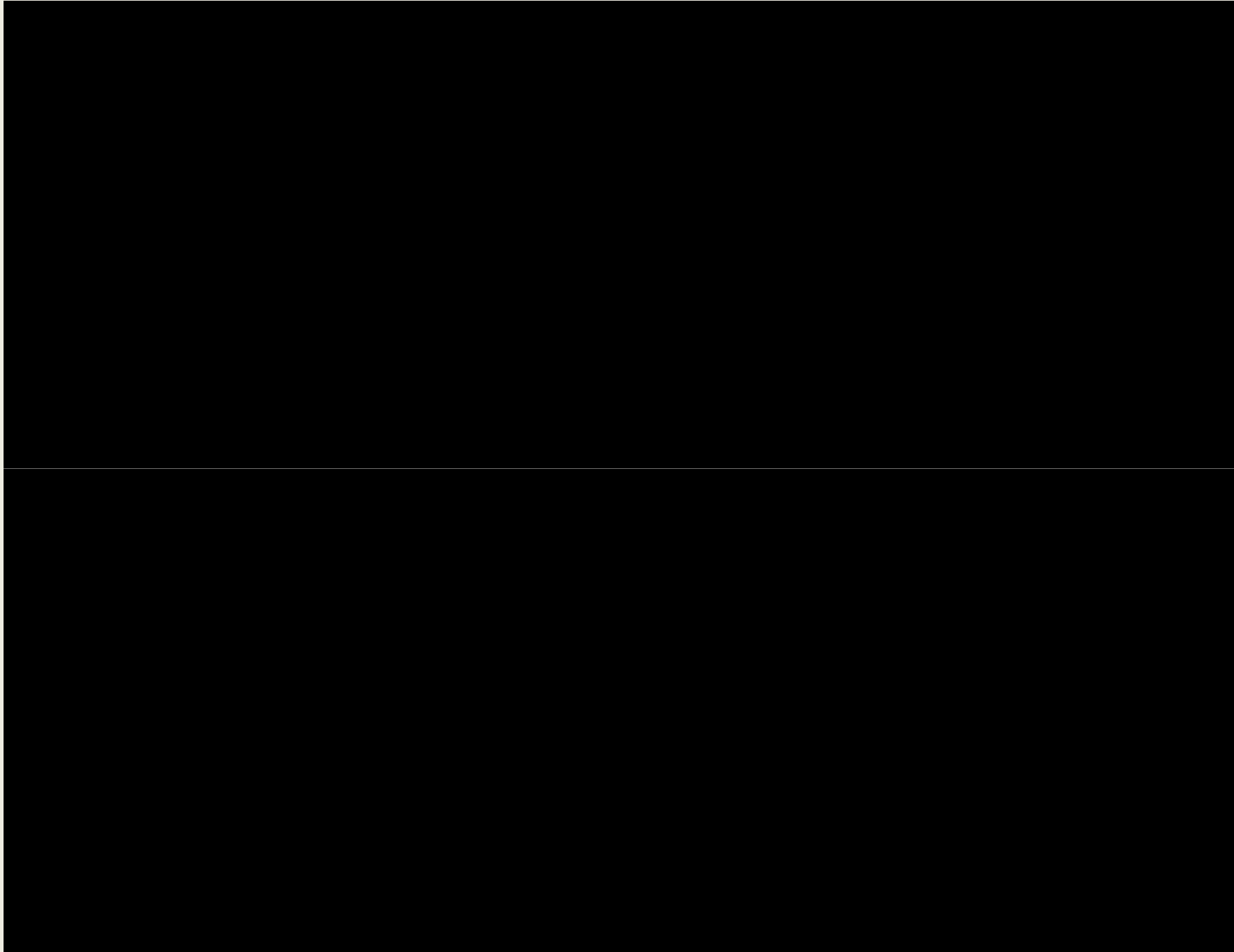
<sup>a</sup> Division of Cardiac Surgery, Foundation I.R.C.C.S. Policlinico San Matteo, University of Pavia, 27100 Pavia, Italy

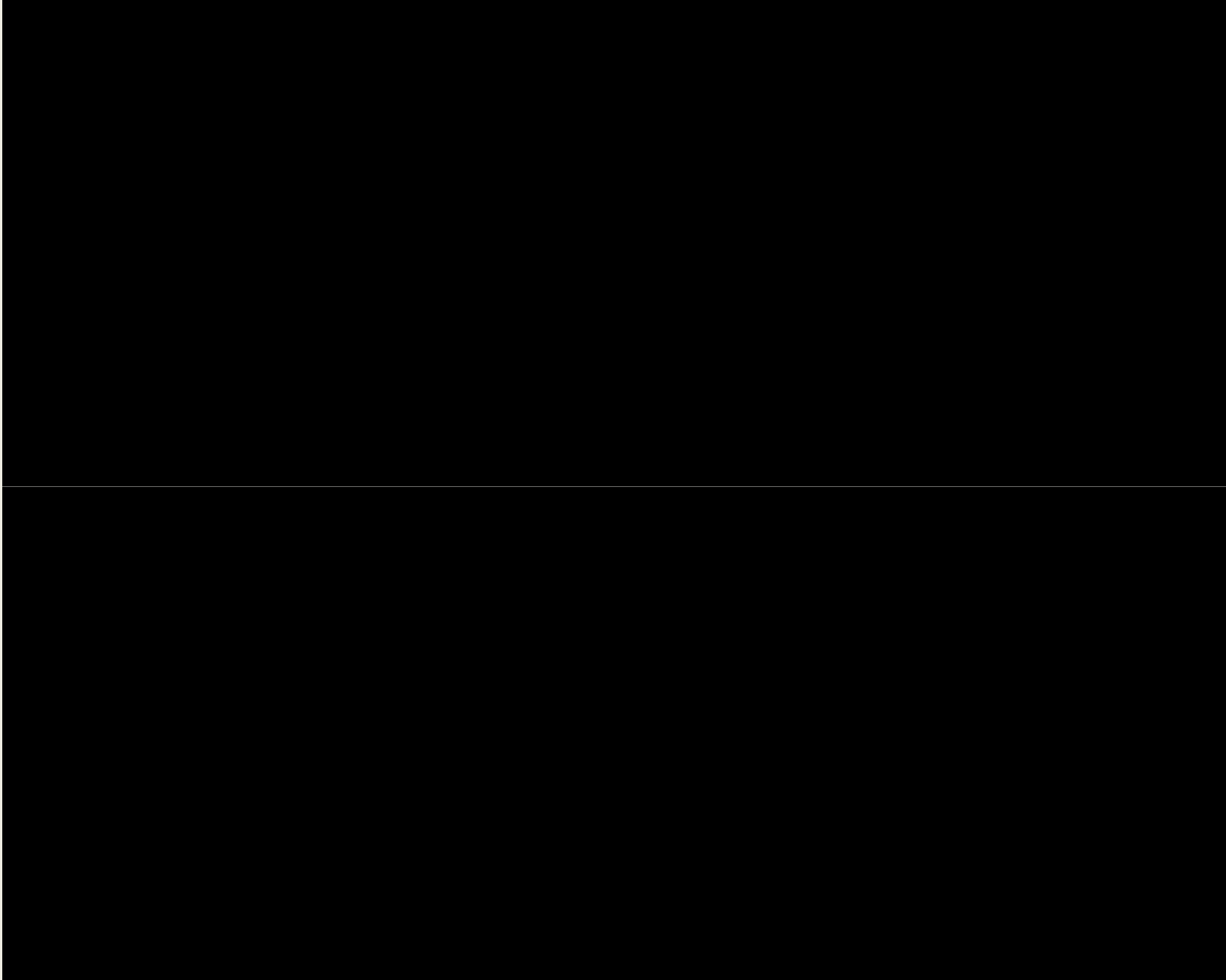
<sup>b</sup> Division of Cardiac Surgery, San Giovanni Battista Hospital "Molinette", University of Torino, 10126 Turin, Italy

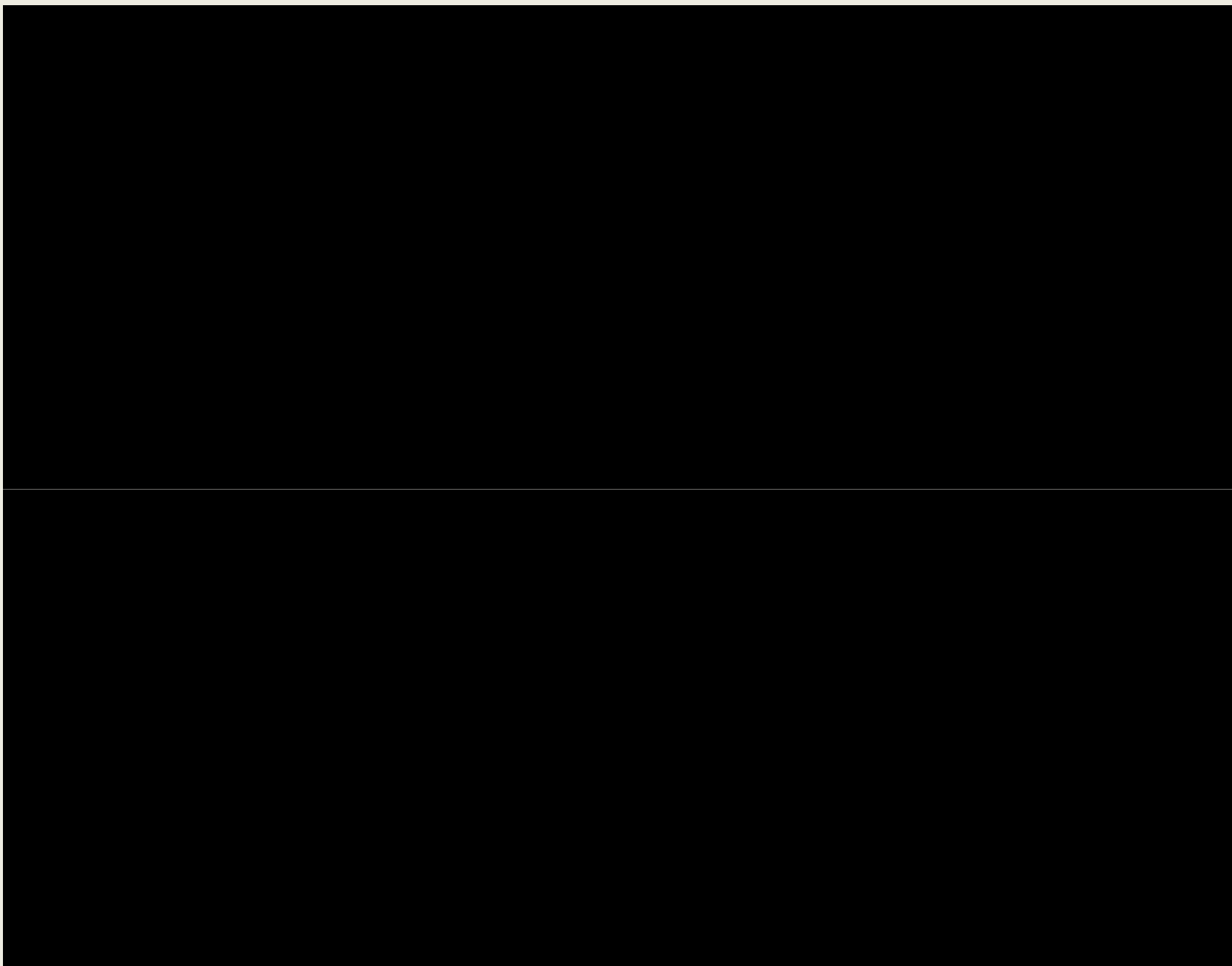


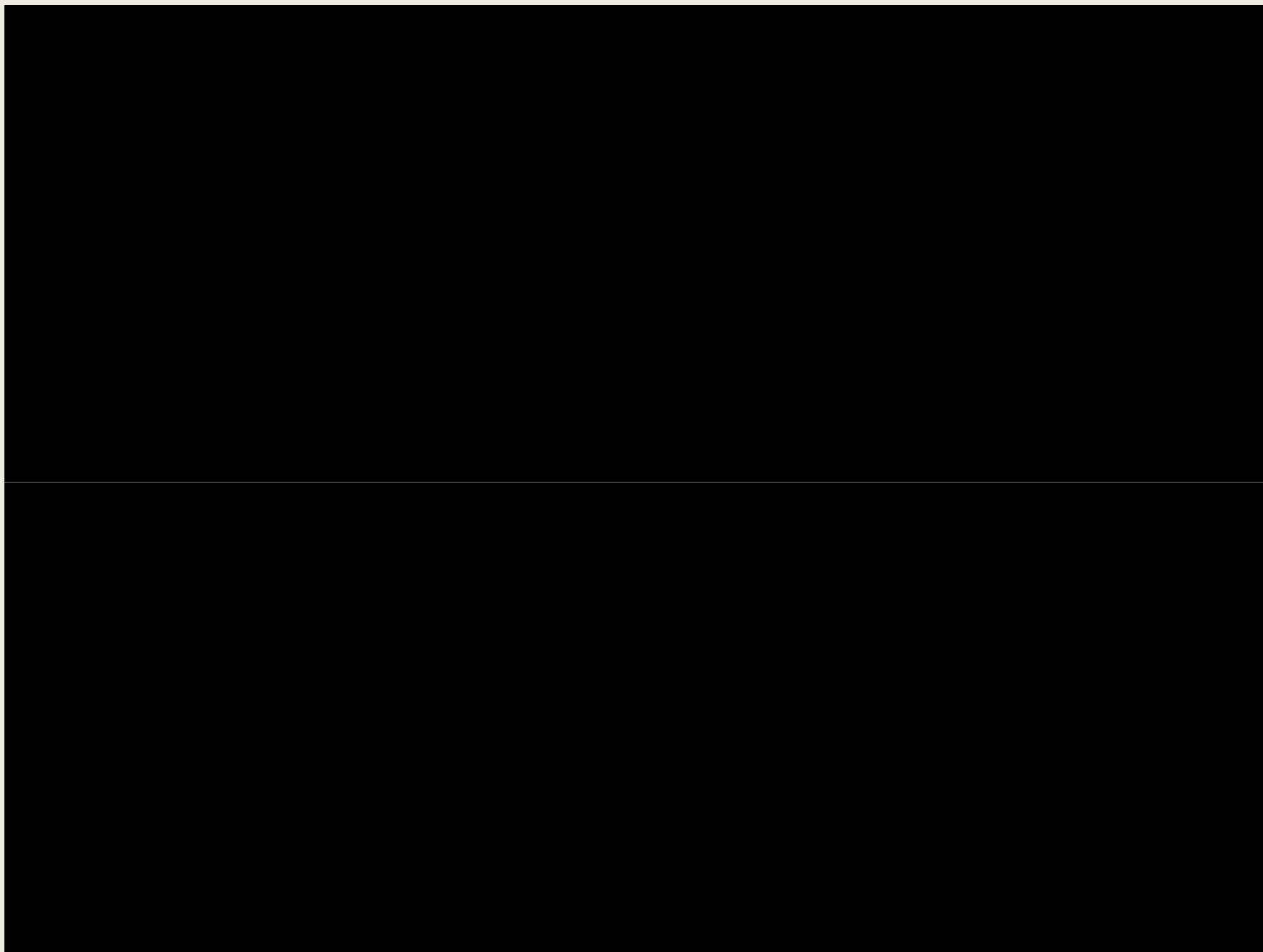












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- Mitral valve surgery: Repair or Replacement?
- Minimally Invasive MV Surgery
- **Turin experience**

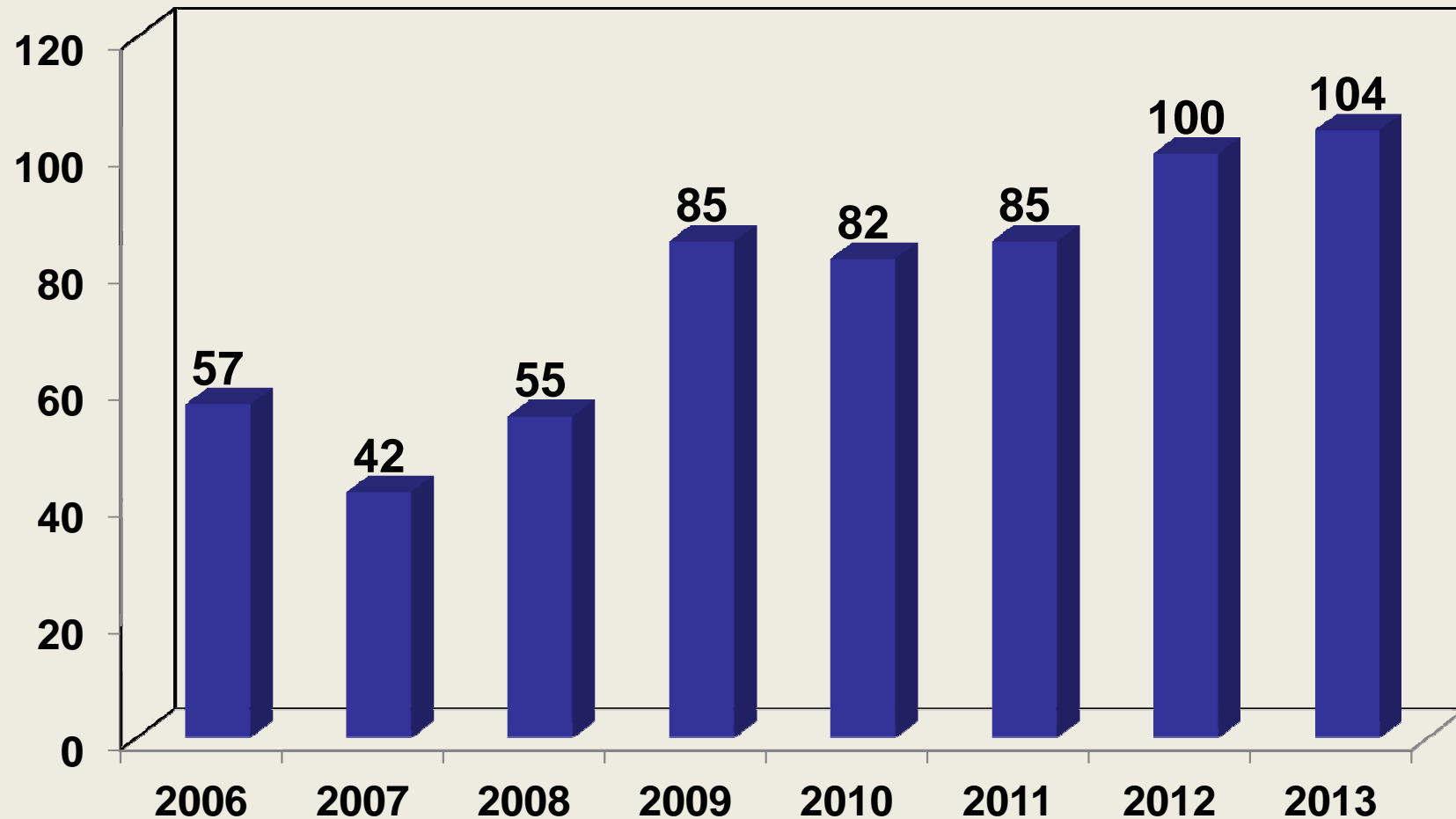
# ***MIS - Turin experience***

**Minimally invasive mitral valve surgery**

**2006-2014**

# ***MIS - Turin experience***

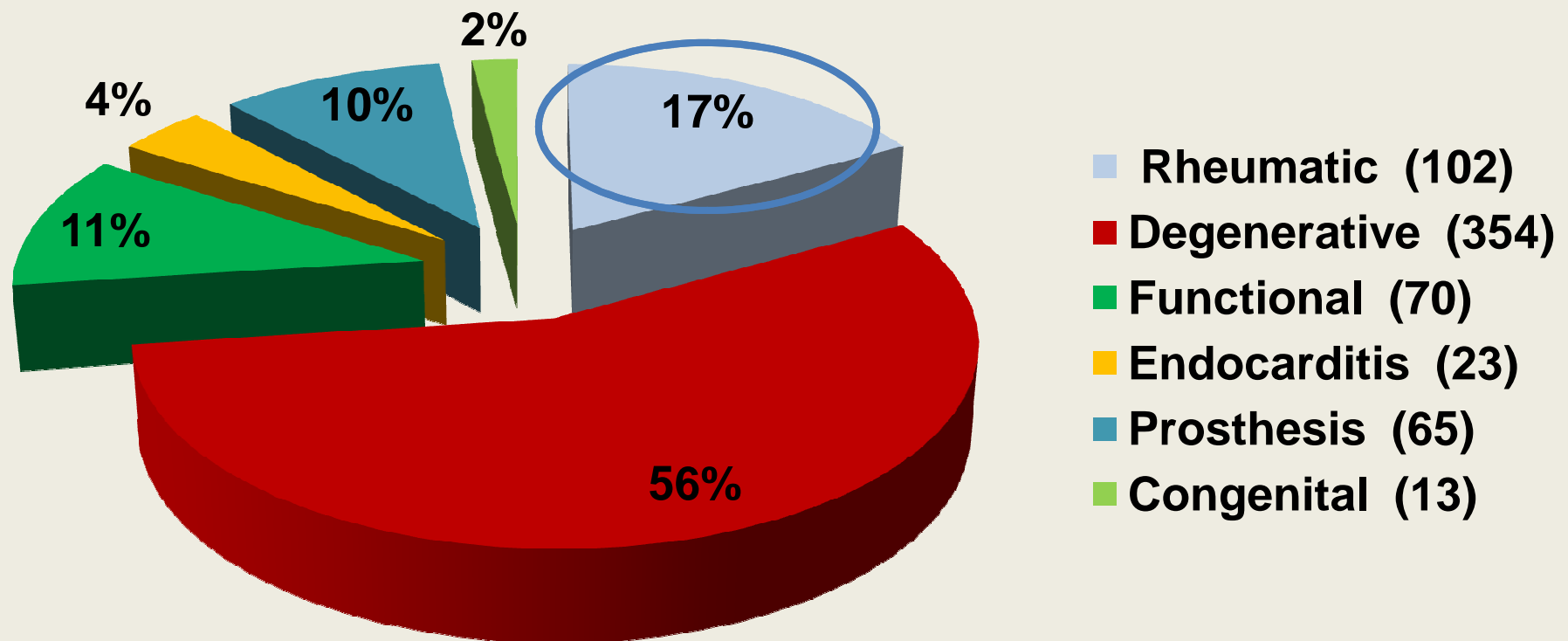
**Jan 2006 – Mar 2014: 627 Mitral valve procedures**



# *MIS - Turin experience*

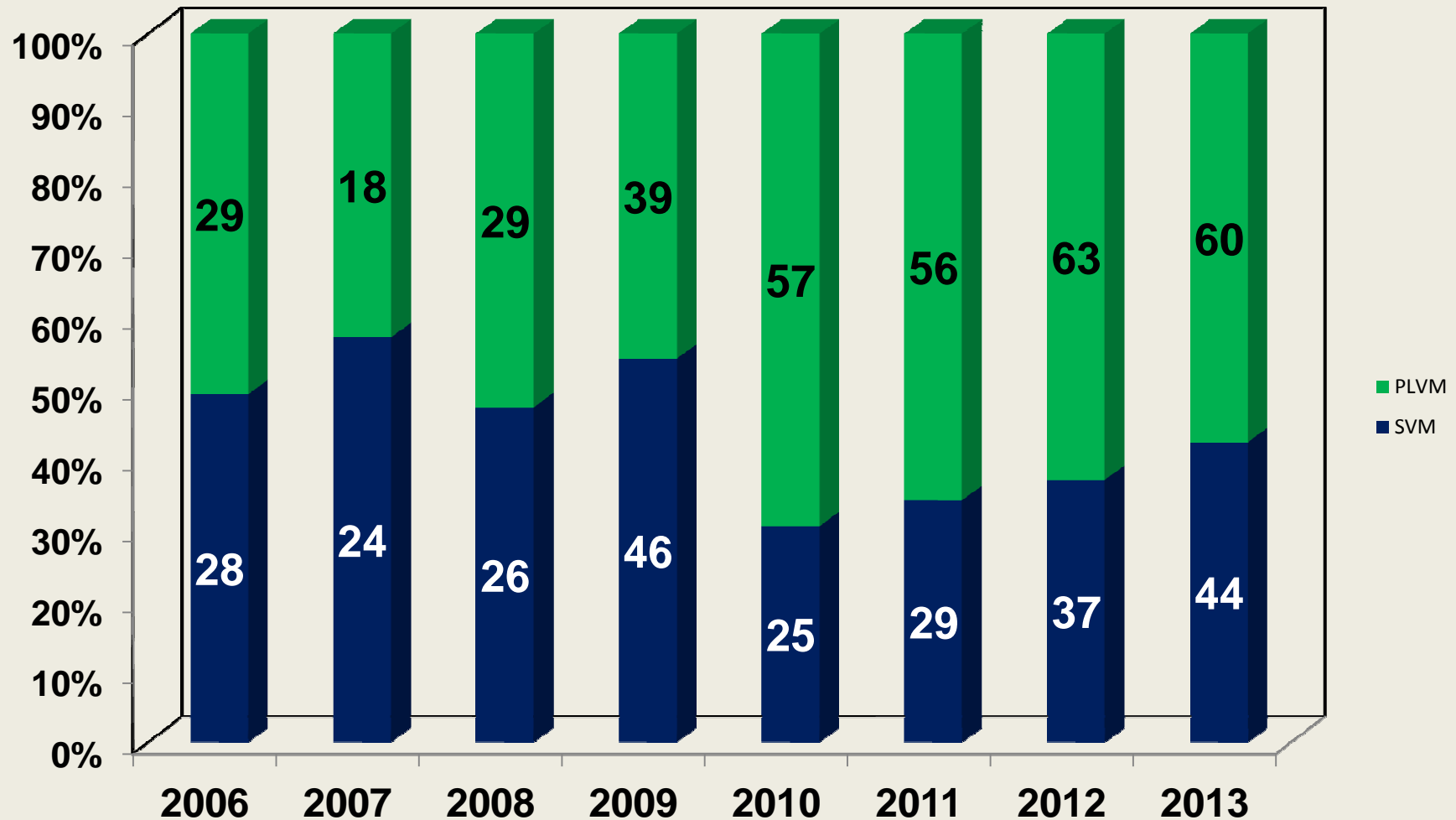
Jan 2006 – Mar 2014: 627 Mitral valve procedures

## *ETIOLOGY*



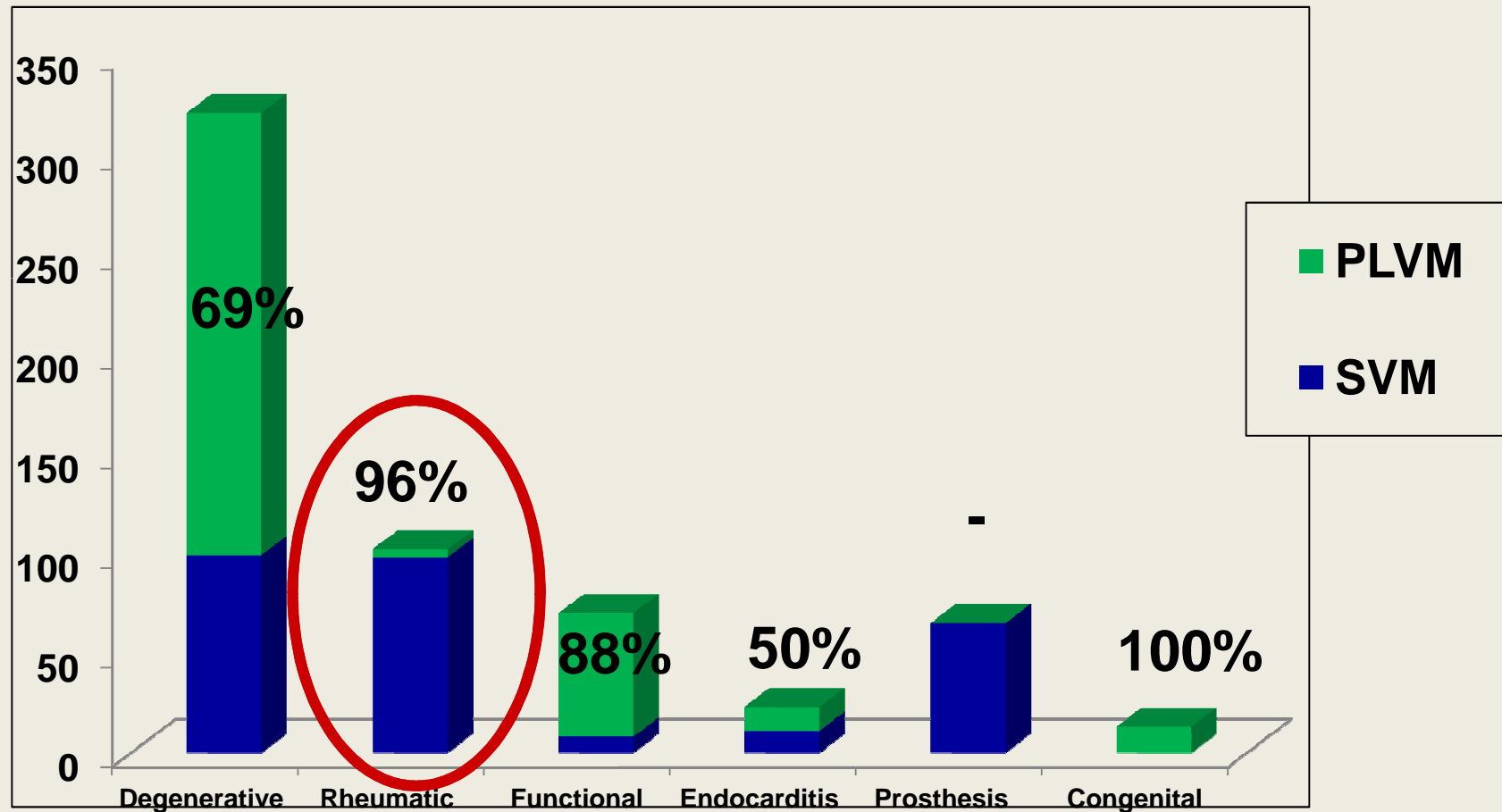
# ***MIS - Turin experience***

**Jan 2006 – Mar 2014: 627 Mitral valve procedures**



# ***MIS - Turin experience***

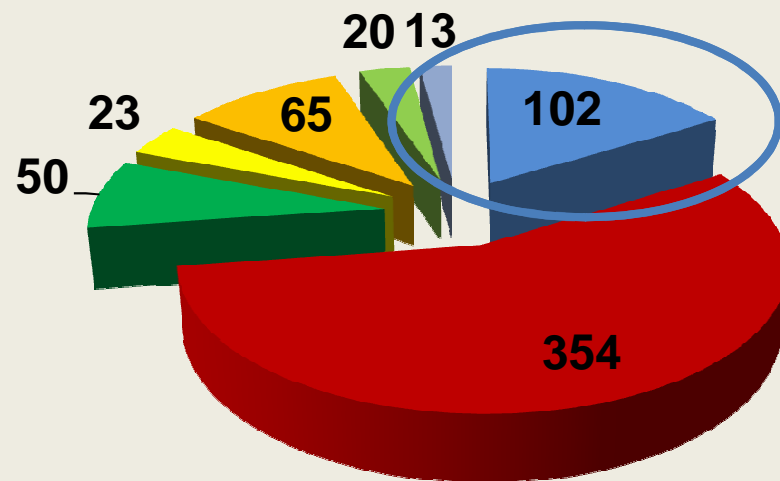
**Jan 2006 – Mar 2014: 627 Mitral valve procedures**



# MIS - Turin experience

## *Rheumatic Mitral Valve Procedures*

102 patients



**96 %** MV Replacement  
(n= 96 patients)

**4 %** MV Repair  
(n= 4 patients)

**2** Ring annuloplasty

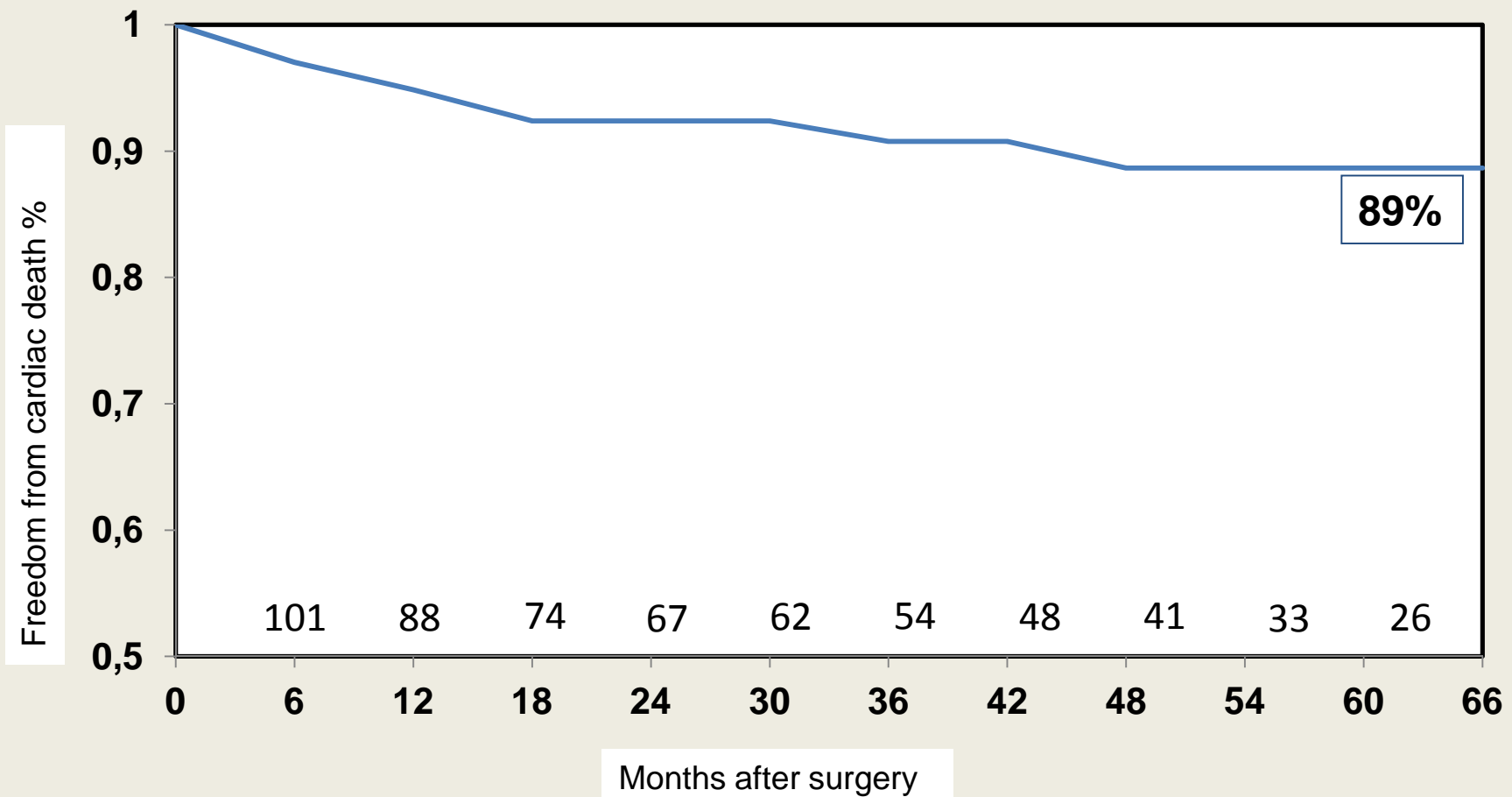
**1** commissurotomy + posterior  
papillary muscle splitting

**1** Mitrofix

**30-day mortality: 2.9%**

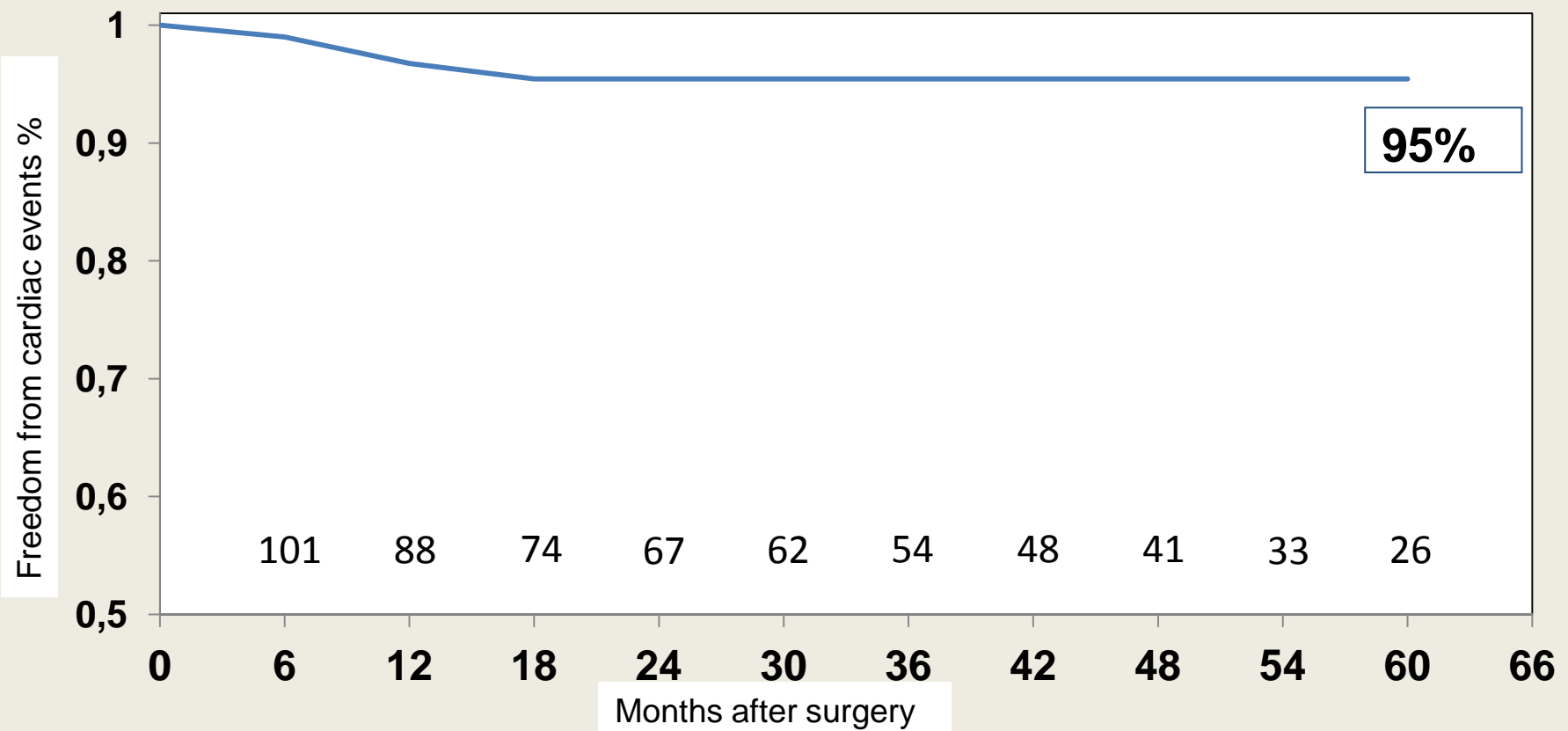
# *MIS - Turin experience*

## Actuarial survival rates



# *MIS - Turin experience*

## Actuarial events free rates



# **Reumatismo Articolare Acuto: Focus on**

## **Il punto di vista del cardiocirurgo**

### **CONCLUSIONS**

- Mitral valve replacement continues to be the standard of care in case of rheumatic disease particularly in the context of severe calcification.
- Rheumatic mitral valves should be repaired when technically feasible
- Minimally invasive mitral valve surgery offers same or even better safety and efficacy respect to standard technique.