

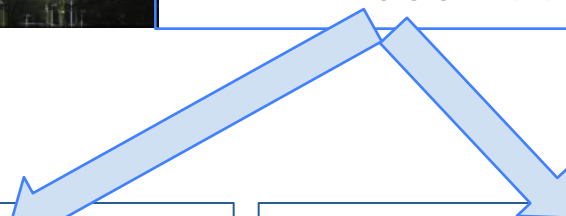
# Professor Jean-François OBADIA

## Hôpital Louis Pradel

- LYON - France



- **1 400 open heart Surgery**
- 300 beating heart coronary Revasc
- 600 pediatric
- 500 General Thoracic
- 300 Vascular Surgery

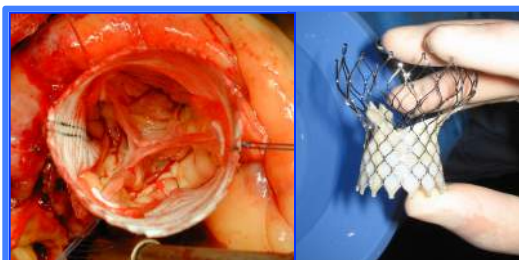


### - Transplantation

- 45 Heart / y
- 30 Lung / y
- x Heart/lung
- 30 Cardiac Assistance
- 100 ECMO

### - Conservative Valvular Surgery

#### Aortic

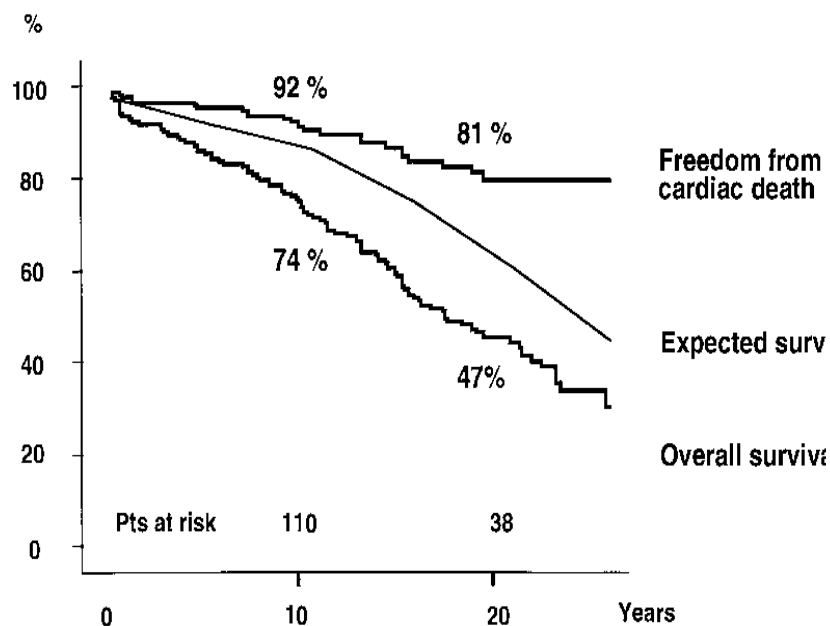


#### Mitral

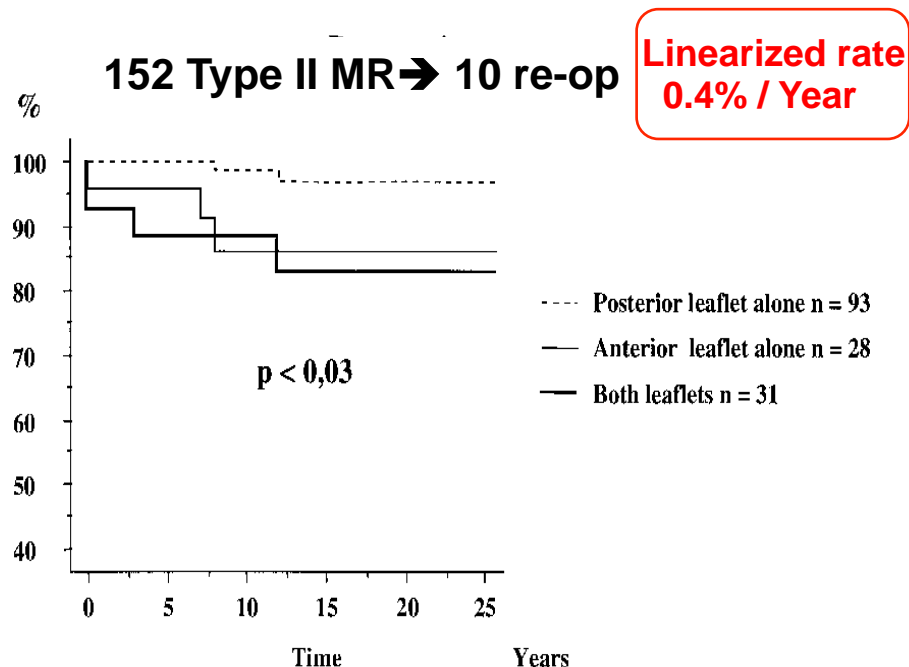


# Very long term results (more than 20 years...)

Broussais-HEGP Paris "Braunberger E,...Carpentier A. Circulation 2001"



**Figure 1.** Rates at 10 and 20 years for freedom from cardiac death, expected survival, and overall survival.



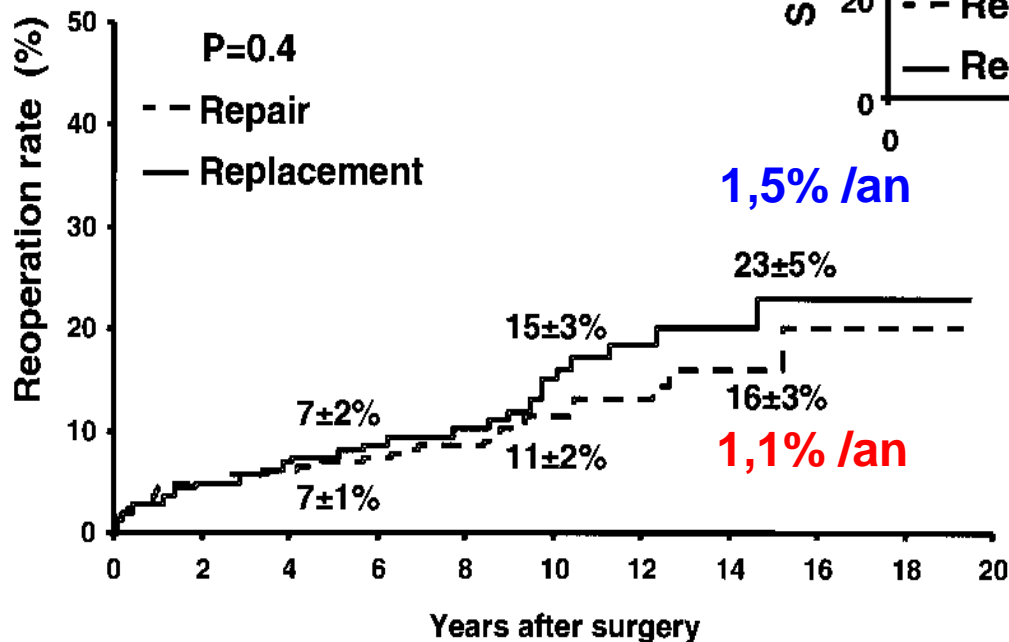
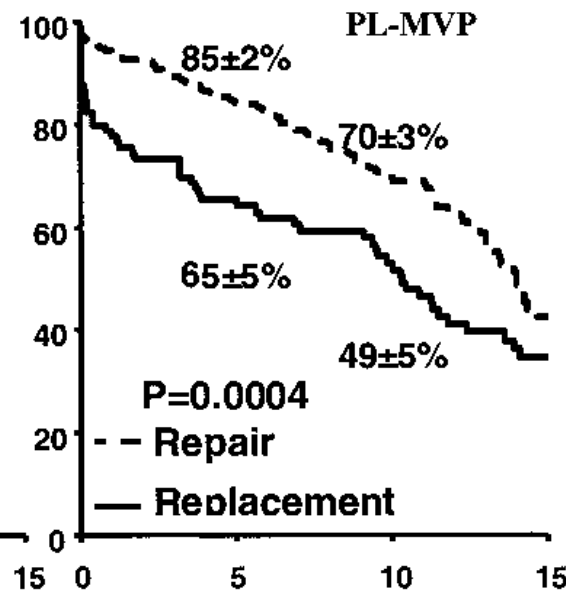
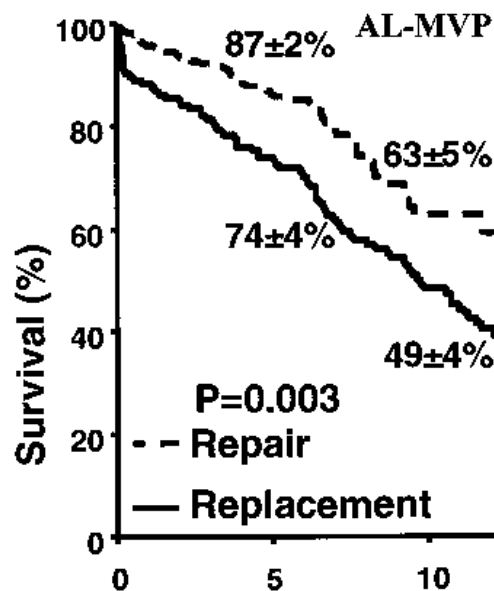
**Figure 3.** Reoperations according to leaflet prolapse. MR indicates mitral regurgitation.

# Very Long-Term Survival and Durability of Mitral Valve Repair for Mitral Valve Prolapse

**Circulation. 2001;104[suppl I]:I-1-I-7**

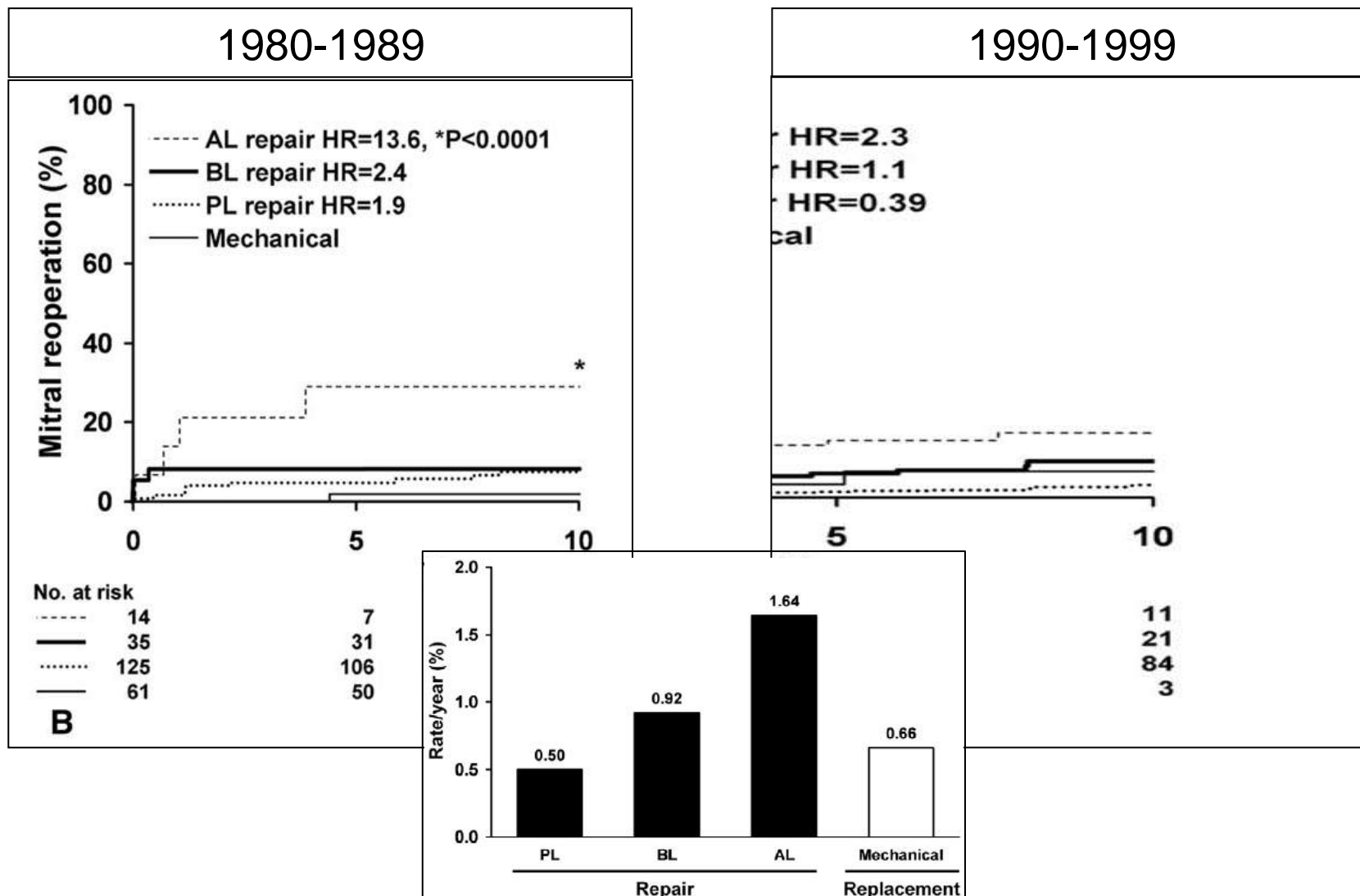
Dania Mohty, MD; Thomas A. Orszulak, MD; Hartzell V. Schaff, MD; Jean-Francois Avierinos, MD;  
Jamil A. Tajik, MD; Maurice Enriquez-Sarano, MD

**679 Repairs / 238 Replac.**

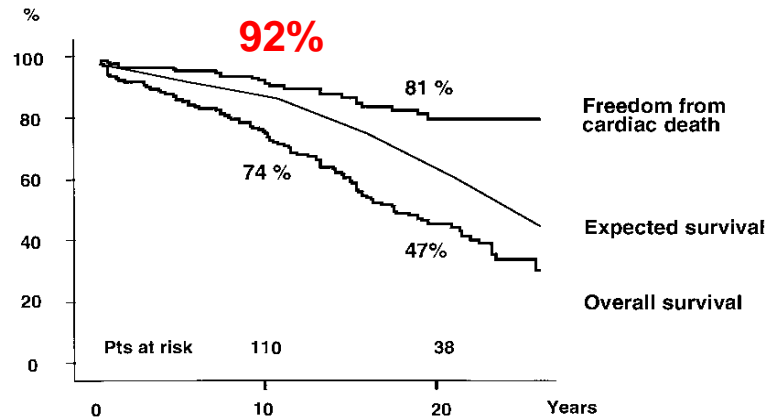


# Dystrophic MR : *Survival advantage and improved durability ...*

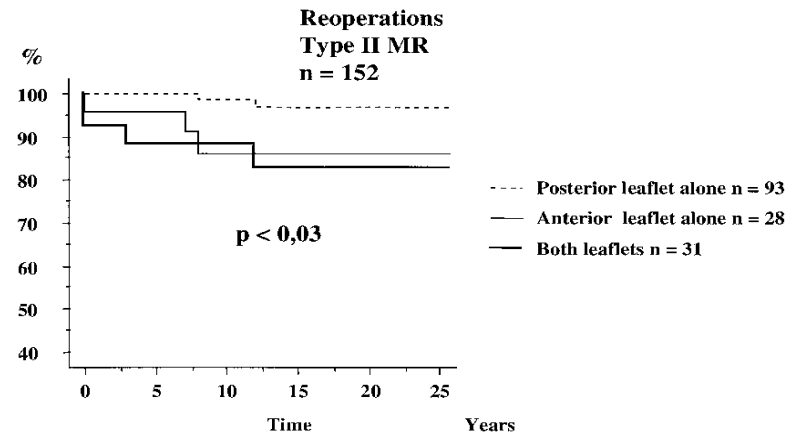
« *Suri MR et al. Ann Thorac Surg 2006;82:819–27* »



# Risk of the learning Curve ! ! !



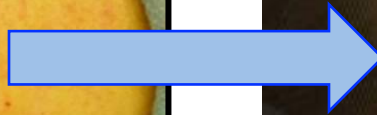
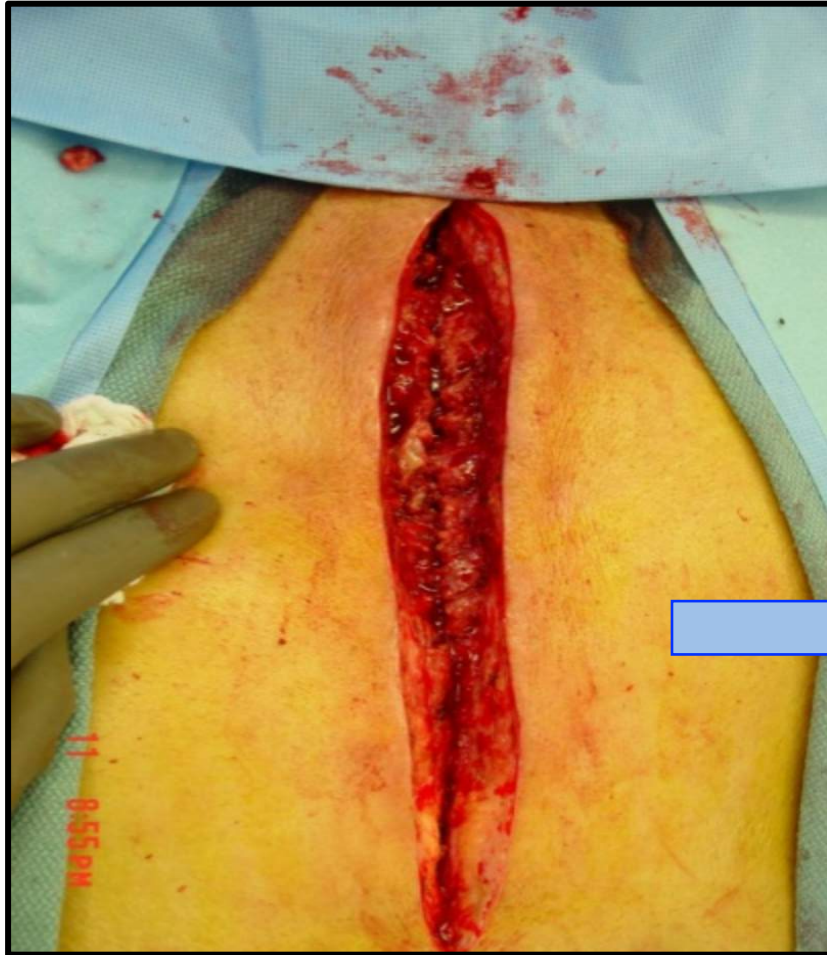
**Figure 1.** Rates at 10 and 20 years for freedom from cardiac death, expected survival, and overall survival.



**Figure 3.** Reoperations according to leaflet prolapse. MR indicates mitral regurgitation.

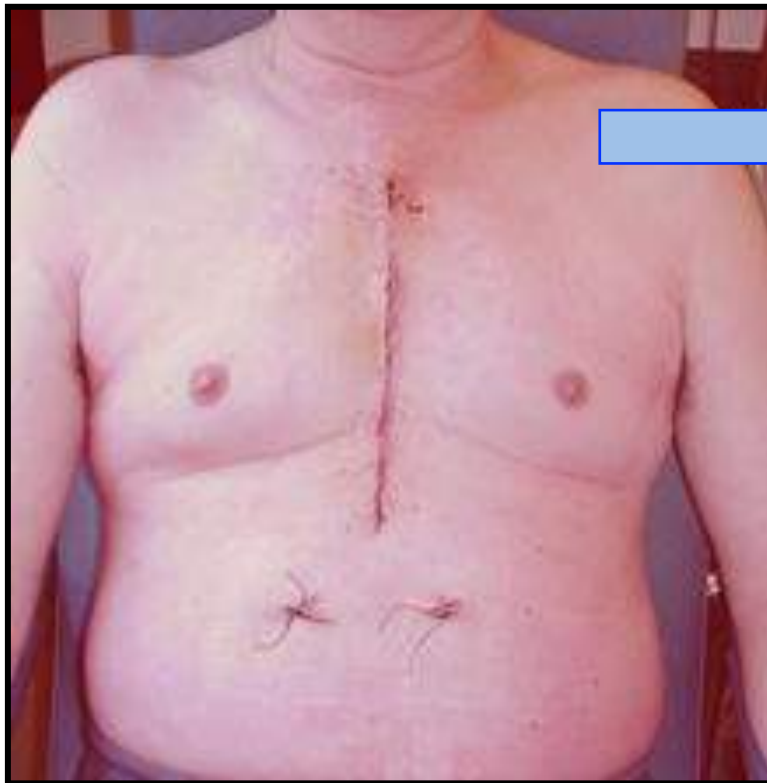
<b>F Mohr Leipzig</b>	<b>1996-1997</b>	<b>51</b>	<b>9,8 %</b>	<b>4000 Euros</b>
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# Video Assisted Mitral Valve Surgery





# Video Assisted Mitral Valve Surgery



<b><u>F Mohr</u></b> <b><i>Leipzig</i></b>	<b>1996-1997</b>	<b>51</b>	<b>9,8 %</b>	<b>4000</b> <b>Euros</b>
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# Video Assisted Mitral Valve Surgery

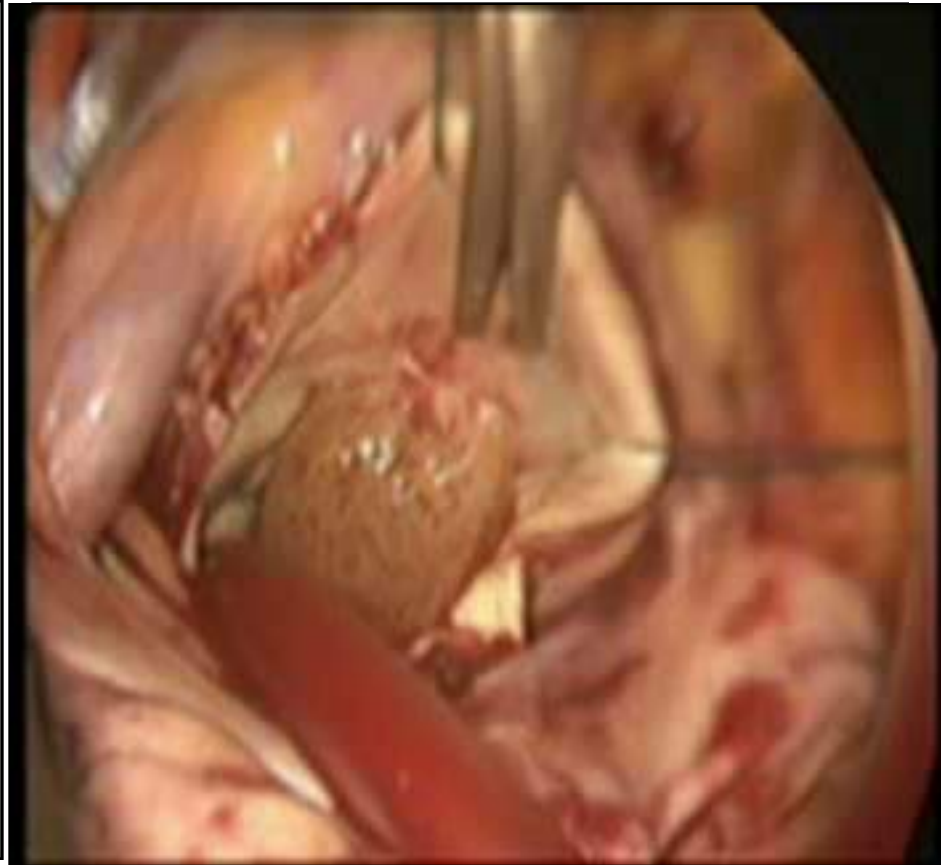
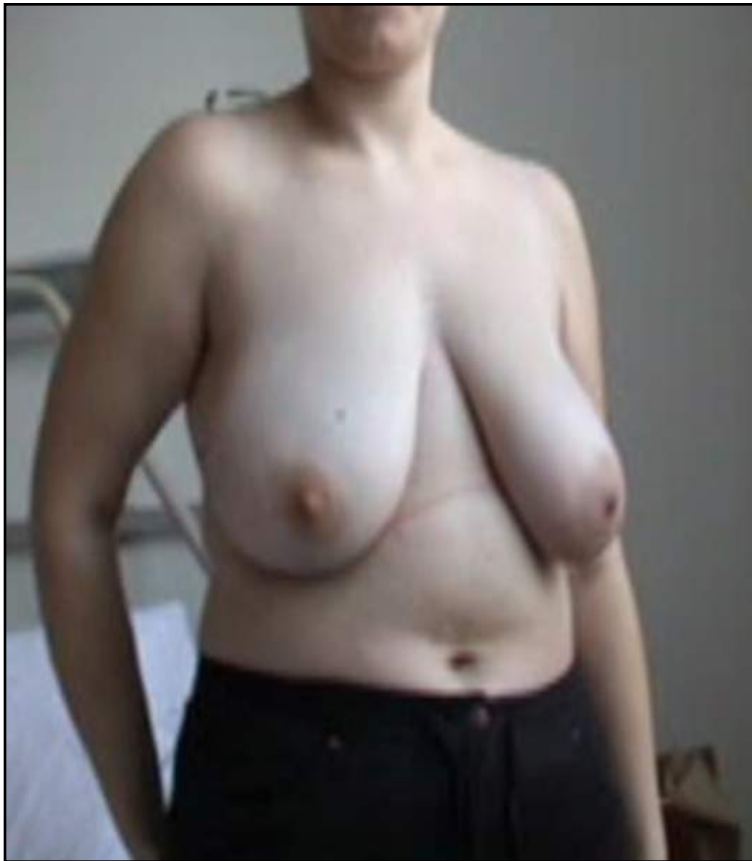
**1000 Patients → 14 to 92 y**





# Video Assisted Mitral Valve Surgery

**1000 Patients → 32 to 135 Kg**



- No limit in Size





# Video Assisted Mitral Valve Surgery



# Video Assisted Mitral Valve Surgery





# Video Assisted Mitral Valve Surgery



# Video Assisted Mitral Valve Surgery





# - A step by step “learning curve”

Procedure

Sternotomy

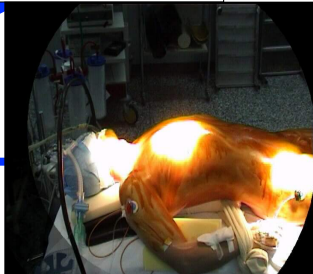
Sternotomy  
Long shafted  
instruments

Right Thoracotomy  
Femoral cannulation  
External clamp

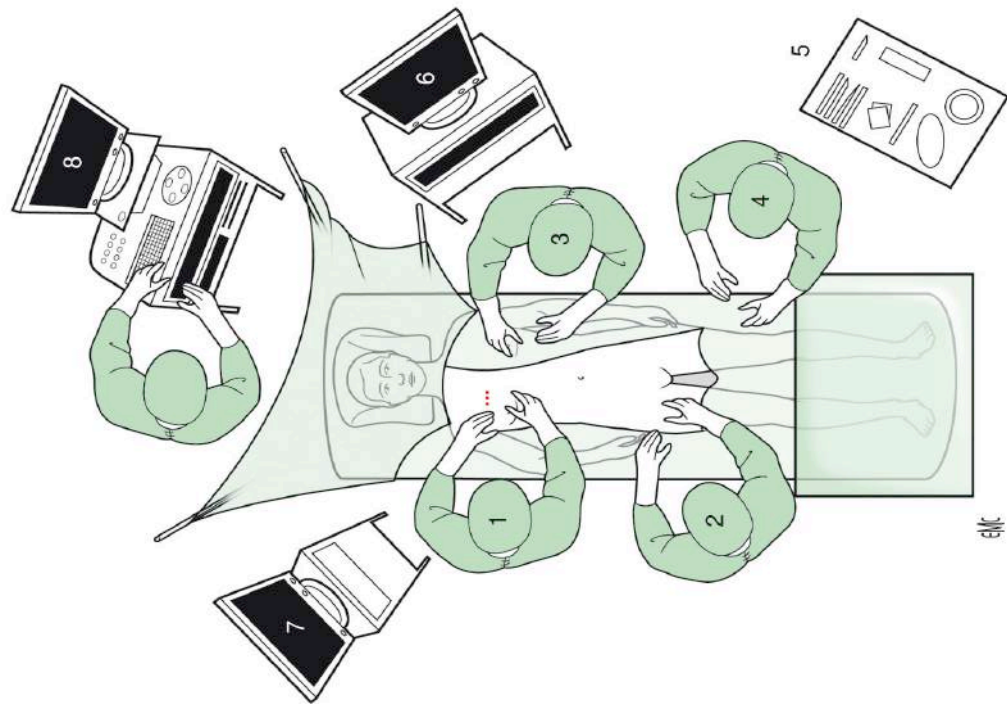
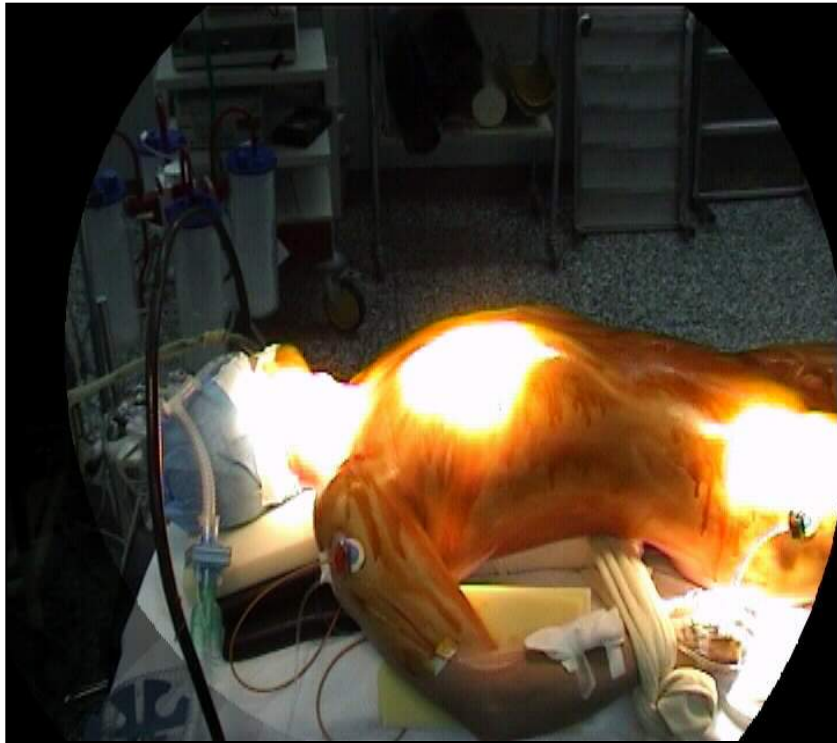
Right mini Thoracotomy  
Video assisted  
Femoral cannulation  
External clamp

Right mini Thoracotomy  
Video assisted  
Femoral cannulation  
Balloon Occlusion

Experience



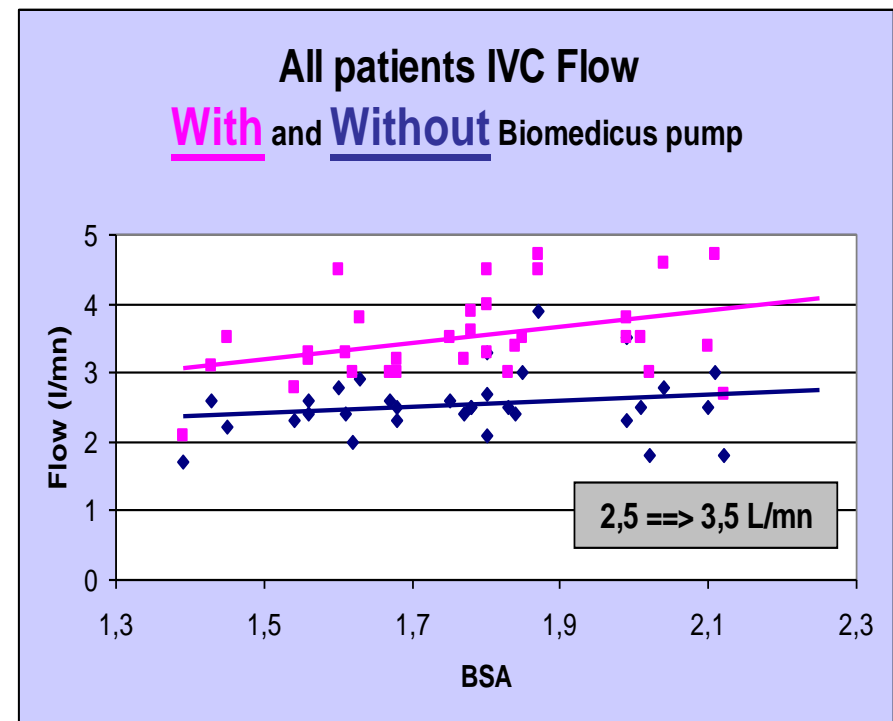
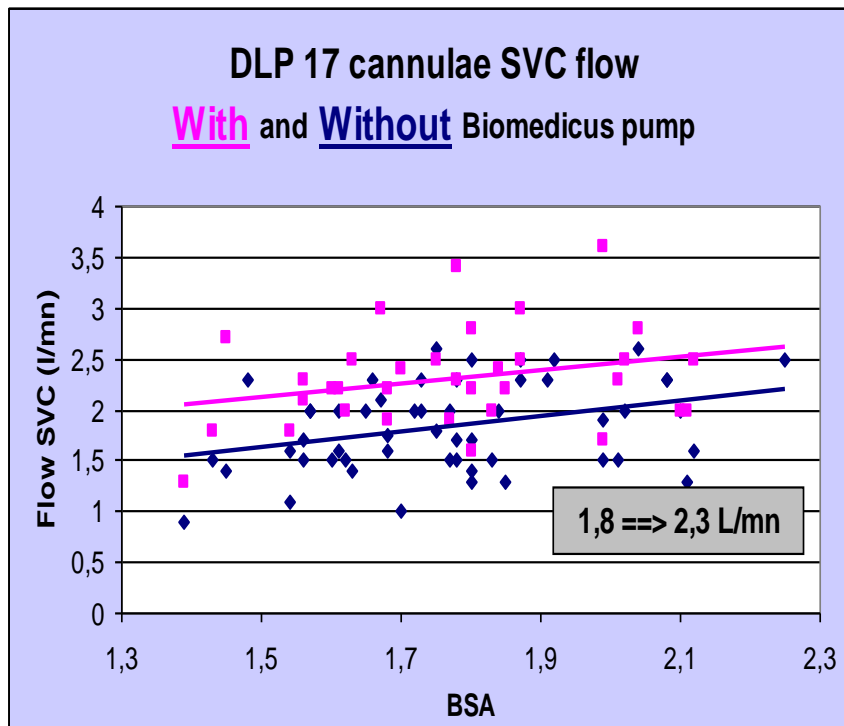
# Video Assisted Mitral Valve Surgery



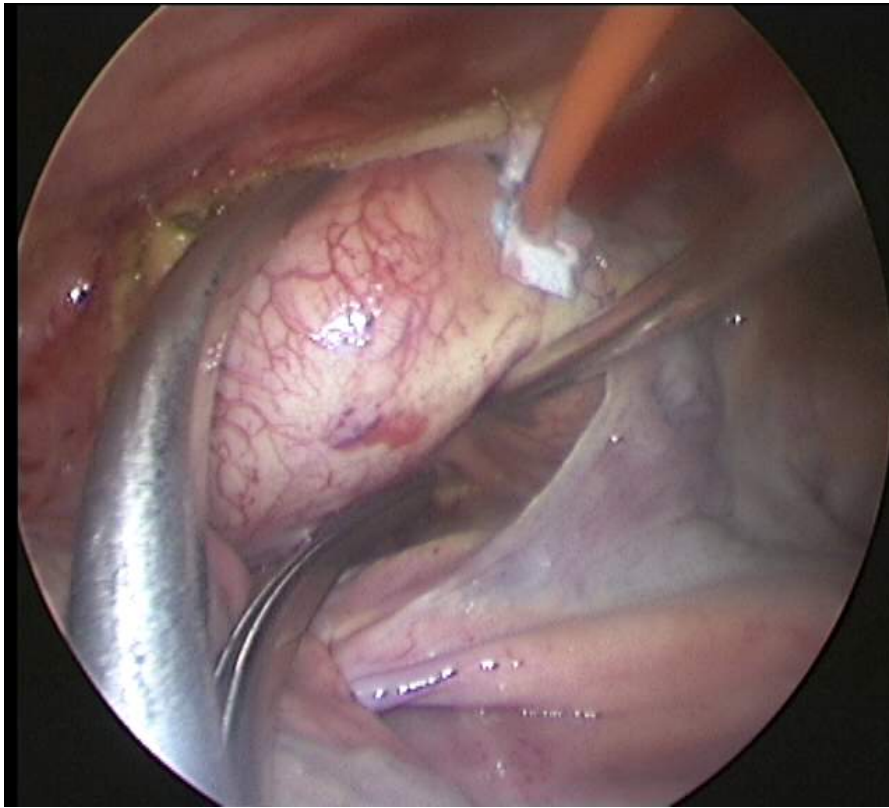
***Cheap, Safe, Simple and Reproducible,***

# Technique of Minimally Invasive Mitral Surgery

## *Double → Single venous Canulation*

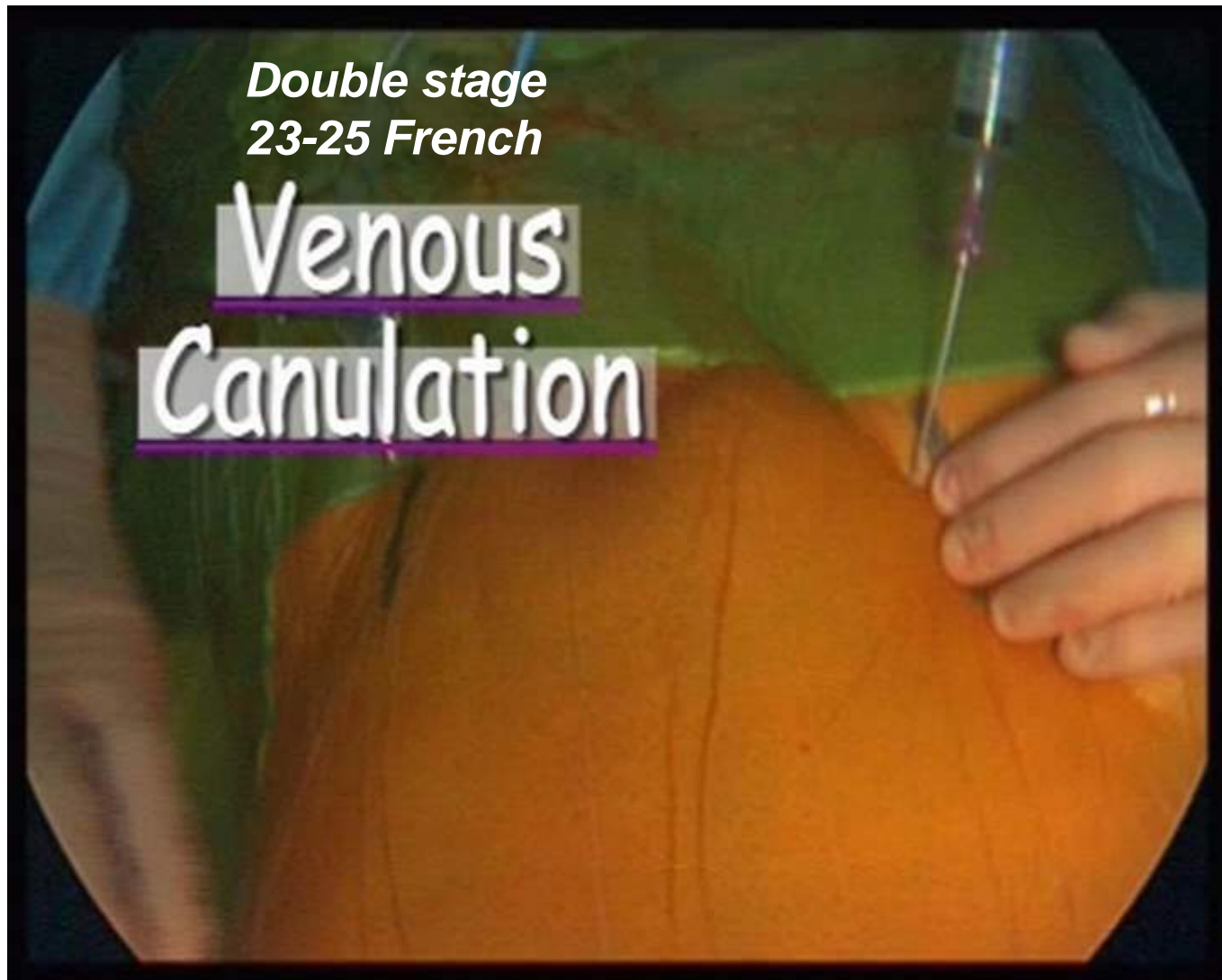


## - Mini-Invasive Approach





# Femoral Approach → Per-cutaneous



# Femoral Approach → Per-cutaneous

## Arterial Canulation

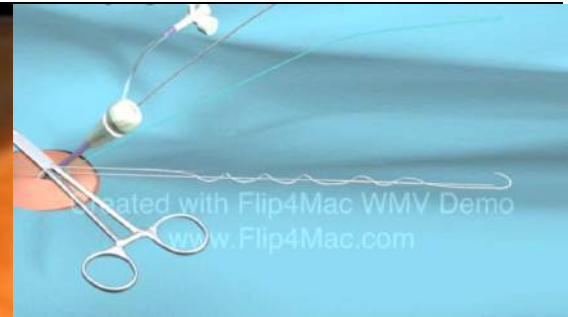
*17 French*

Created with Flip4Mac WMV Demo  
[www.Flip4Mac.com](http://www.Flip4Mac.com)



# Femoral Approach → Per-cutaneous

Arterial  
DeCanulation



# Technique of Minimally Invasive Mitral Surgery

## Percutaneous femoral artery access with Prostar device for innovative mitral and aortic interventions

Mathieu Vergnat<sup>a,b</sup>, Gérard Finet<sup>a,c</sup>, Gilles Rioufol<sup>a,c</sup>, Jean-François Obadia<sup>a,b,\*</sup>

<sup>a</sup>INSERM, U 886 'Cardioprotection', Laboratoire de Physiologie Lyon Nord, UCBL1, Lyon, France

<sup>b</sup>Service de Chirurgie Cardiothoracique et Transplantation, Hôpital Cardiothoracique Louis Pradel, 28 avenue du Doyen Lépine, 69677 Lyon Bron, Cedex, France

<sup>c</sup>Service d' Hemodynamique et de Cardiologie Interventionnelle, Hôpital Cardiothoracique Louis Pradel, 28 avenue du Doyen Lépine, 69677 Lyon Bron, Cedex, France

European Journal of Cardio-thoracic Surgery 39 (2011) 600–602

Table 1. Complication of arterial percutaneous access. Comparison between aortic and minimally invasive cardiac surgery, and between initial and late experience. Thrombosis/ischemia, seroma or infection rate were 0% and thus non-mentioned. Severe complications are shaded.

	TAVI	MICS	Initial experience	Late experience
<i>n</i>	40	116	50	106
Superficial bleeding	5	3	4	4
Cannulation failure	0	2	1	1
Retroperitoneal bleeding	1	2	3	0
Arteriovenous fistula	0	1	1	0
Hospital mortality	7.5% (2/3 vascular event)	0%	4% (TAVI vascular)	0.9% (TAVI non-vascular)

# COST

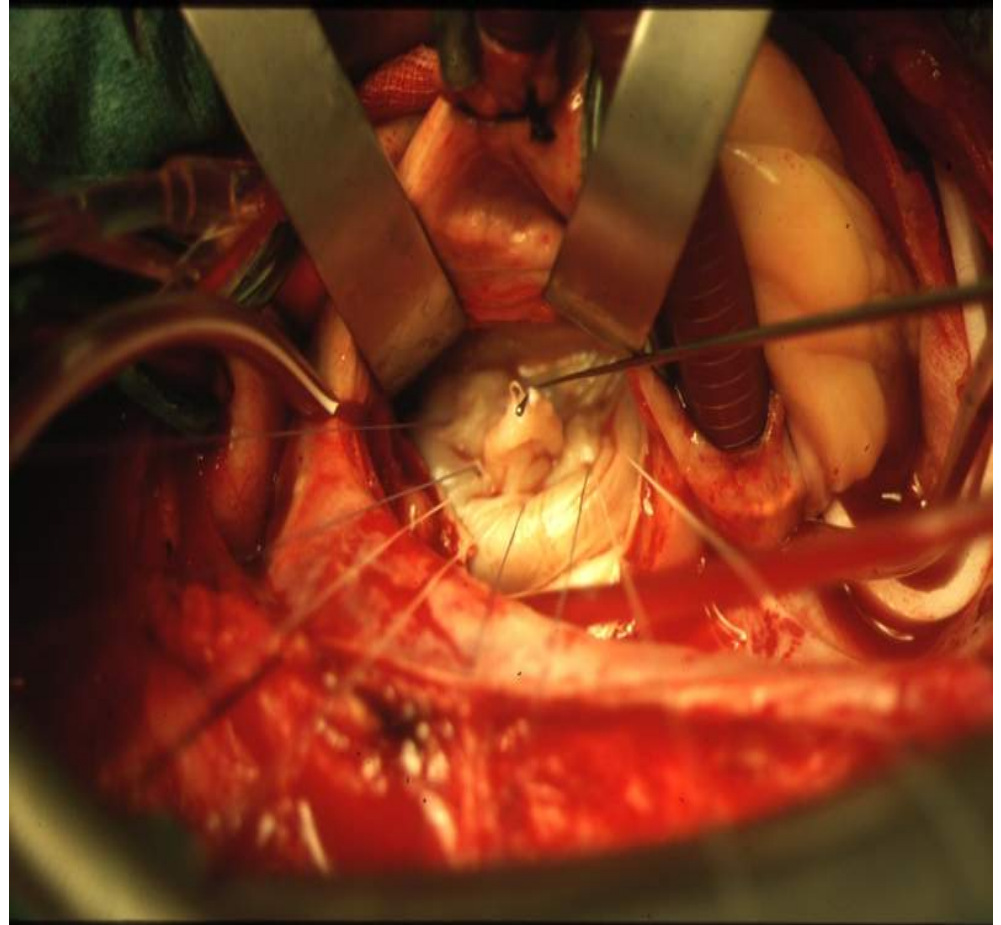
STERNOTOMIE	reference	Price
CANULES VEINEUSES N° 32	66132	75 €
1 CANULE ARTERIELLE 20	77520	43,00 €
1 PIC DE PLEGIE DBLE COURANT	21014	17,00 €
	<b>Total =</b>	<b>135 €</b>



VIDEO EndoClamp	Society	reference	Price
1 PROSTAR	Abbot	12322	350
1 PAIRE DE CISEAU VIDEO	Ethicon	5DCS	78
1 POUSSE NŒUD	Edwards	KP1	127
1 ENDOCLOSE	Autosuture	173022	28
Ballon pour Clampage Endo-Aortique	Edwards	EC 1001	1974
Canule Artérielle avec Y	Edwards	ER 21 ou 23Fr	258
Canule Veineuse	Edwards	QD 22 ou 25Fr	413
		<b>Total =</b>	<b>3 228 €</b>

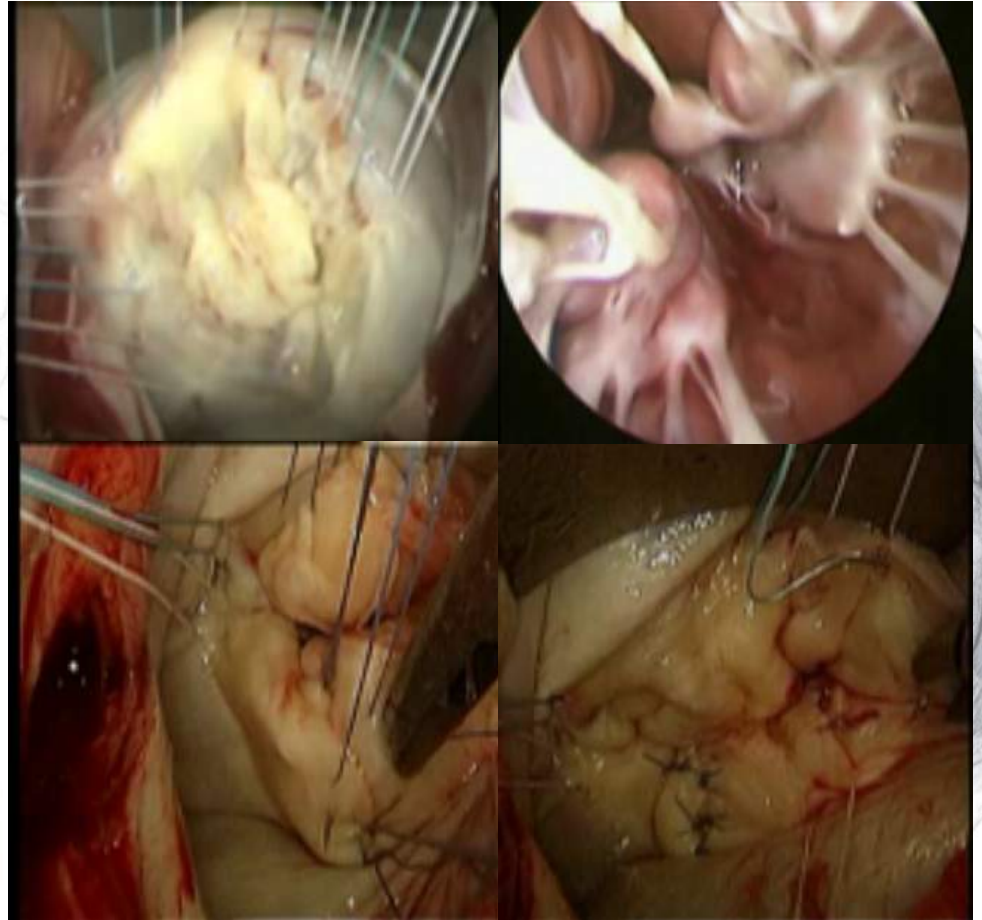
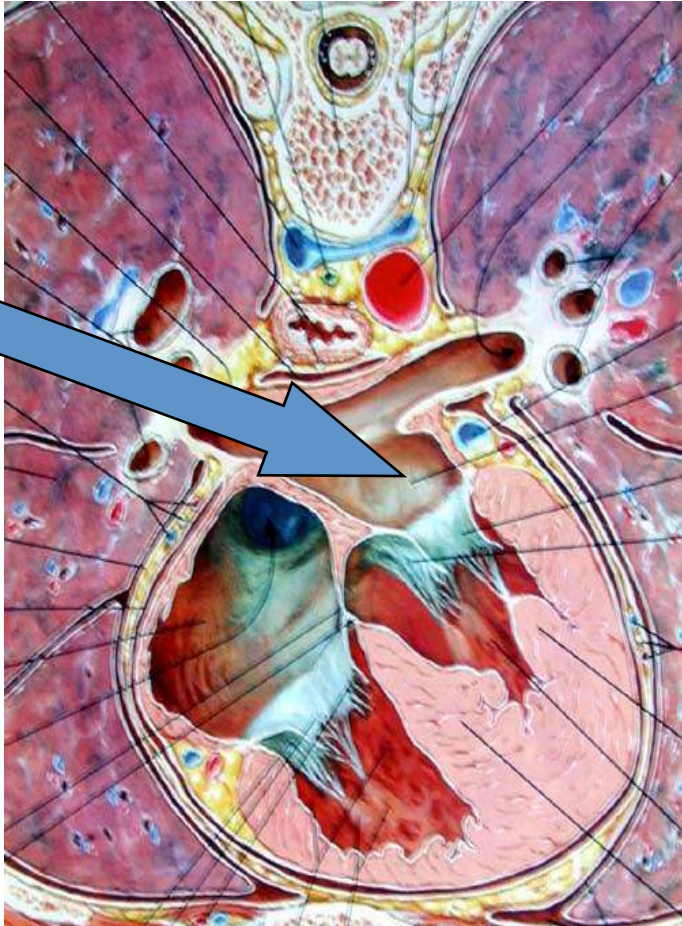
VIDEO Clamp TransThor	Society	reference	Price
1 CANULE VEINEUSE 23/25 ESTECH	Estech	200-150	410
1 KIT DE CANULATION ESTECH	ESTECH	200-120	32
1 CANULE ARTERIELLE 18 VIDEO	Medtronic	77718	43
Prostar	Abbott		350
		<b>Total =</b>	<b>835 €</b>

# Sternotomy → Mitral Valve Approach

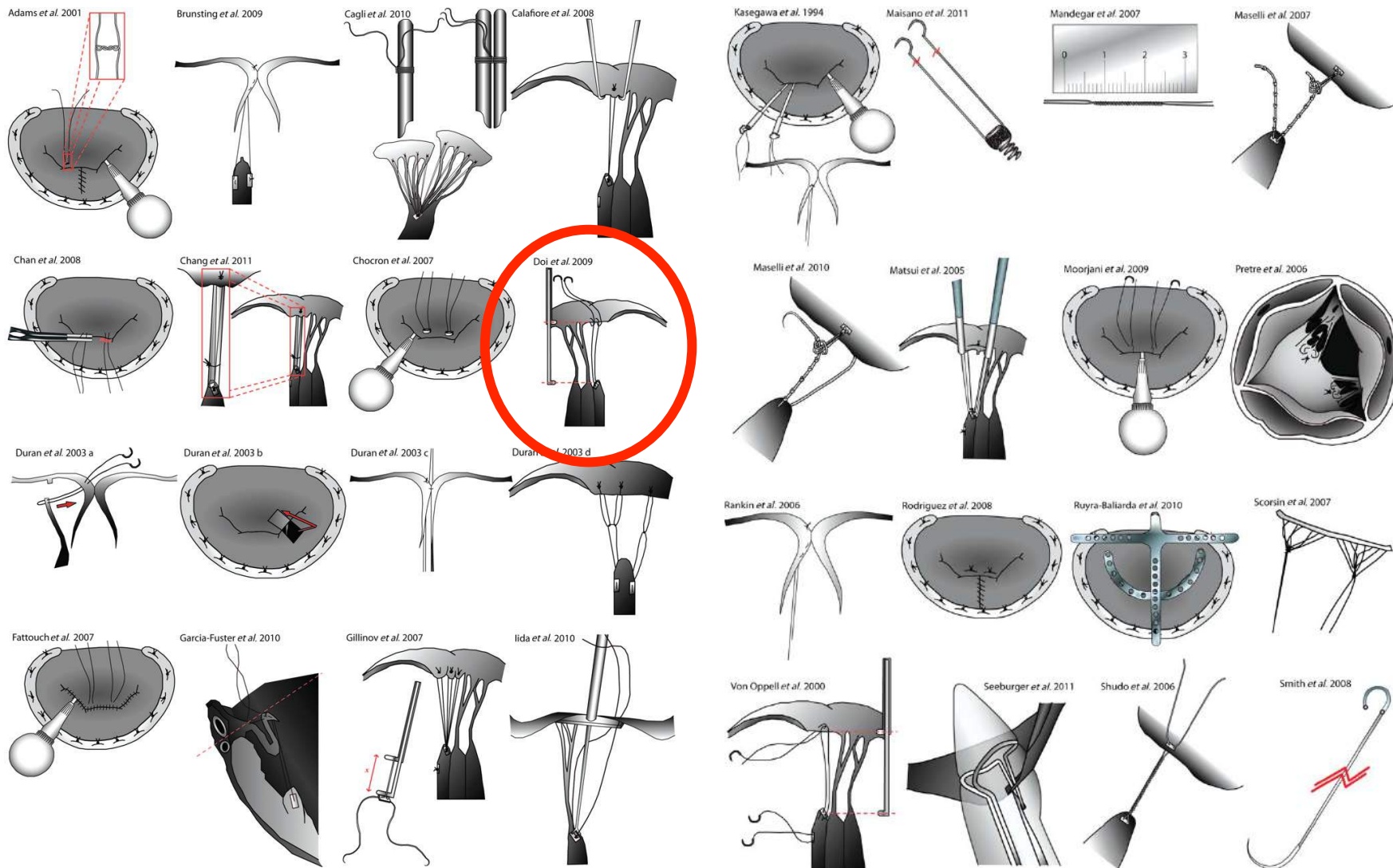




# Direct Approach → Right Thoracotomy

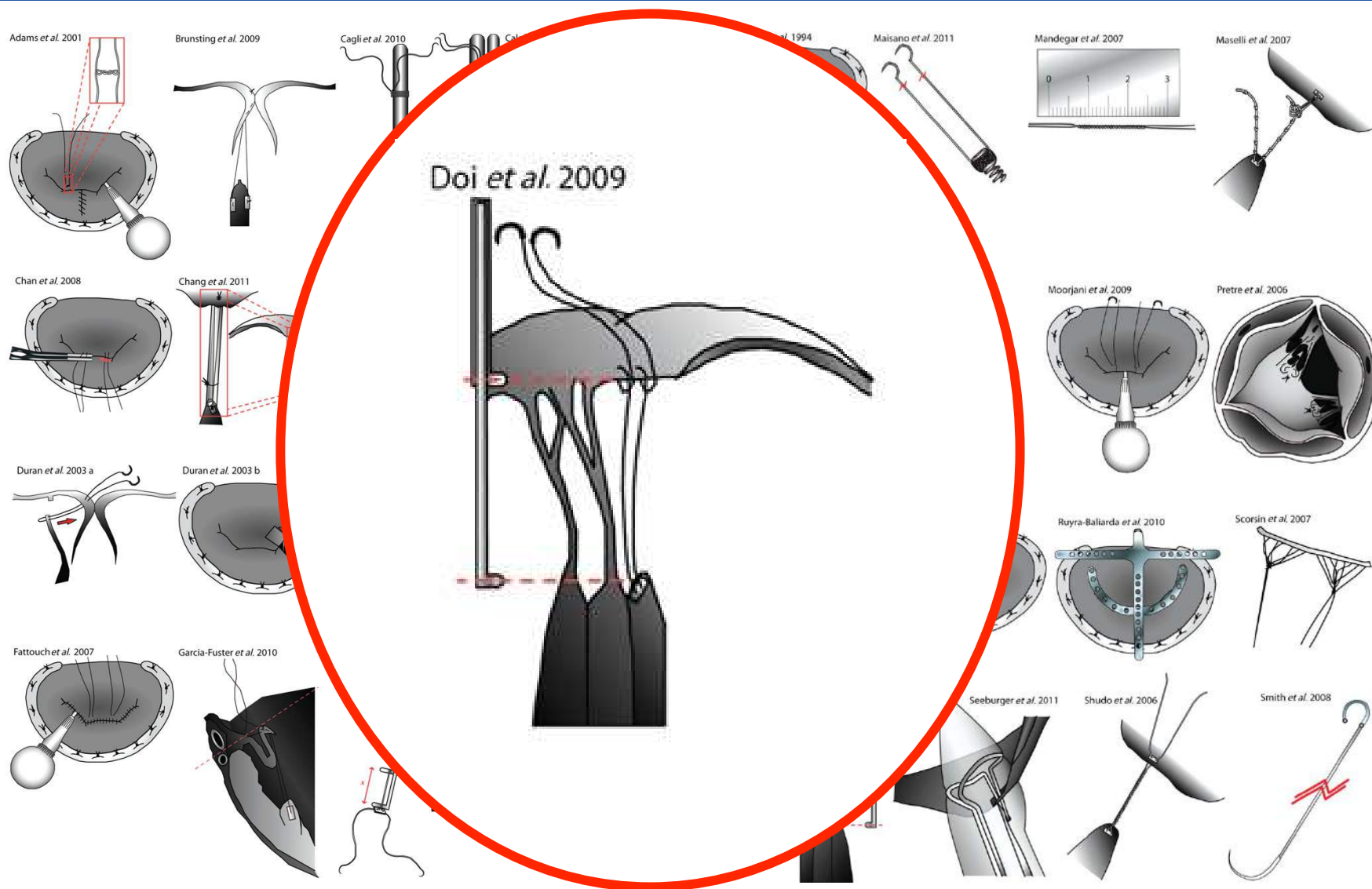


# « Artificial chordae for degenerative mitral valve disease I Michael et al. *Interactive CVTS* . 15 (2012) 1019–1032 »

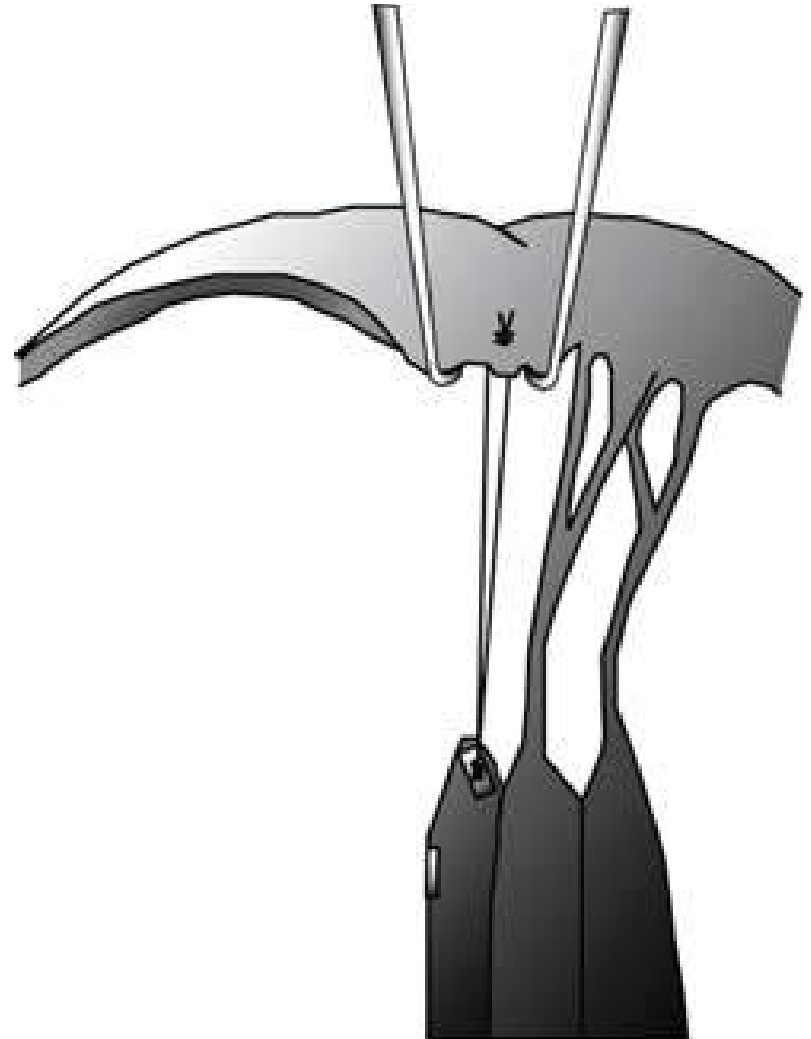
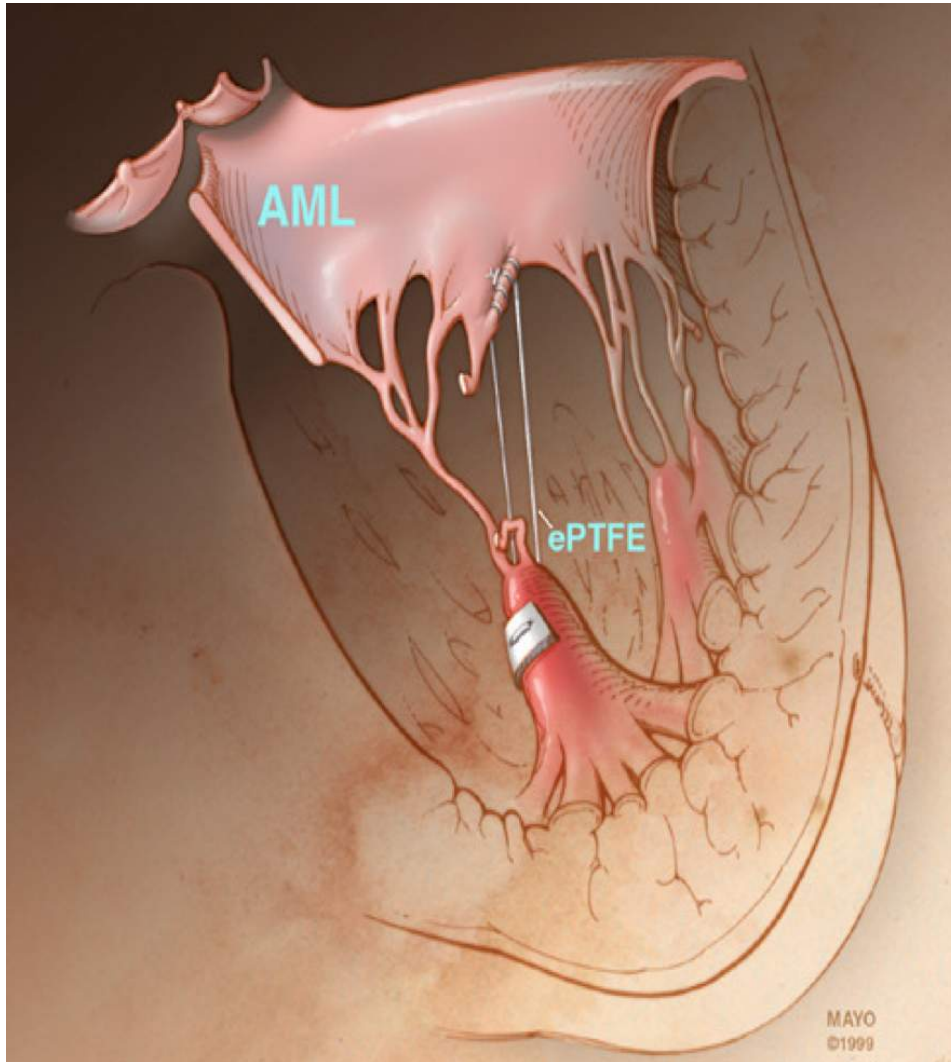




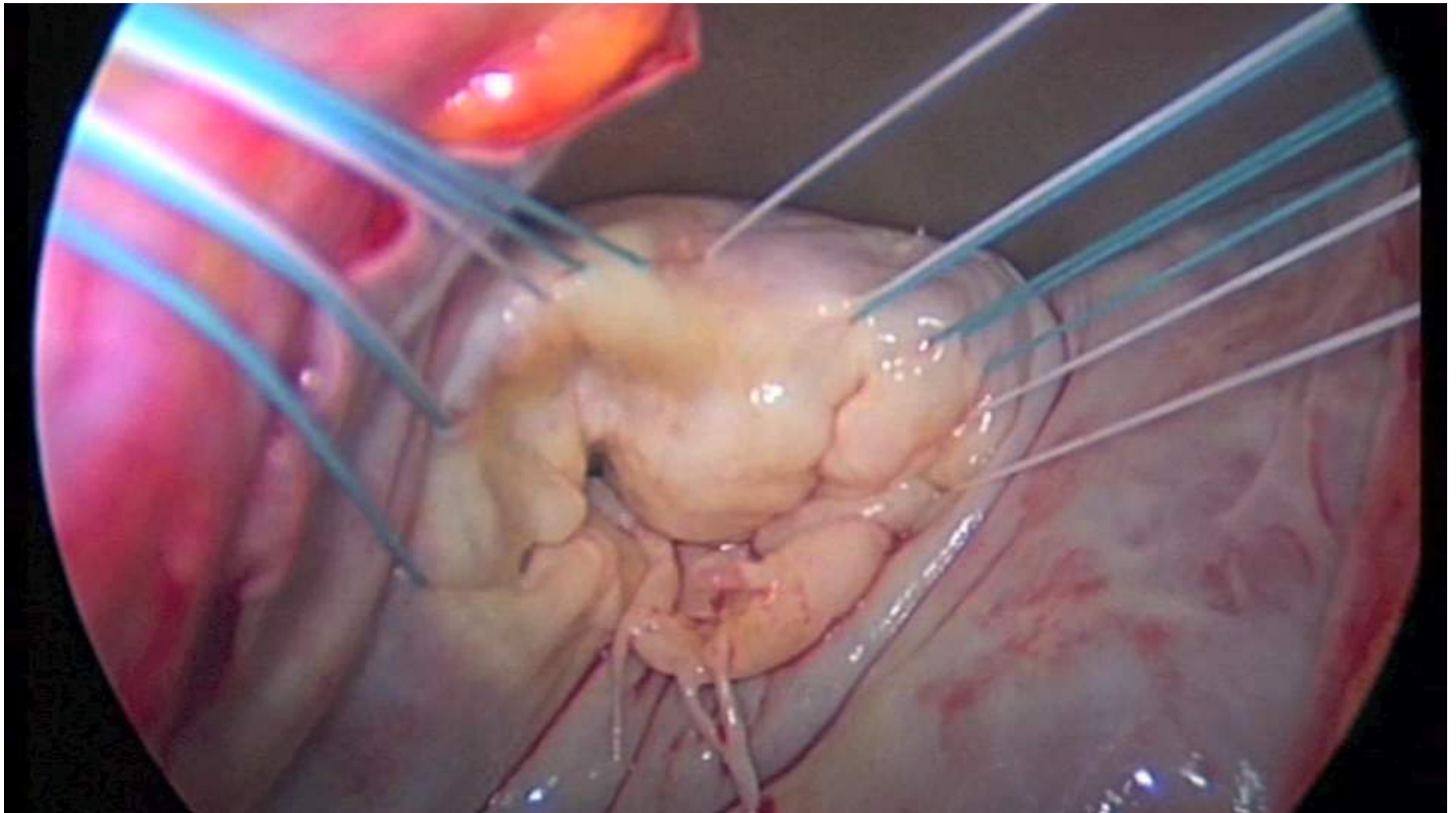
# « Artificial chordae for degenerative mitral valve disease I Michael et al. Interactive CVTS . 15 (2012) 1019–1032 »



# Goretex Technique



After > 1 000 Pts → *Cheap, safe and reproducible*



# Meta analysis → 21 studies / 13 000 pts

## 2 Randomized Control Trials

Dogan 2005

El-Fiky 2000

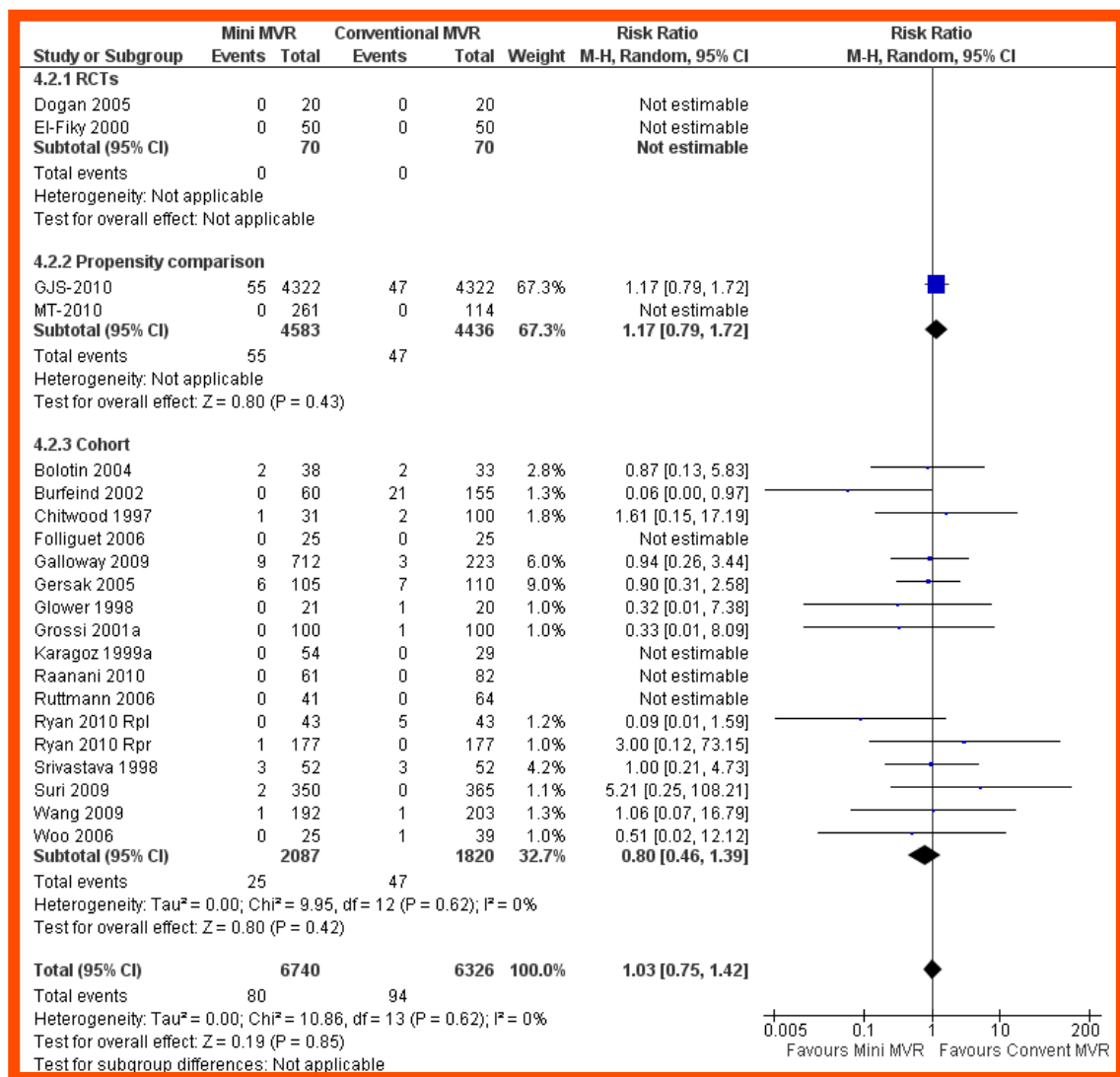
### 19 Non-Random Cohort Studies

Aklog 1998  
Bolotin 2004  
Burfeind 2002  
Chaney 2000  
Cohn 1997  
Chitwood 1997  
Cosgrove 1998  
de Vaumas 2003  
Felger 2001  
Folliguet 2006  
Galloway 2009

Gersak 2005  
GJS 2010 (unpub)  
Glower 1998  
Grossi 2001a  
Grossi 2001b  
Karagoz 1999  
McCreath 2003  
Mohr 1998  
MT 2010 (unpub)  
Nikolic 2000  
Onnasch 2002

Raanani 2010  
Reichenspurner 00  
Ruttmann 2006  
Ryan 2010  
Schneider 2000  
Shinfeld 2003  
Srivastava 1998  
Suri 2009  
Walther 1999  
Wang 2009  
Woo 2006

# Mortality, 30 days: Mini- vs Conv-MVR



No difference

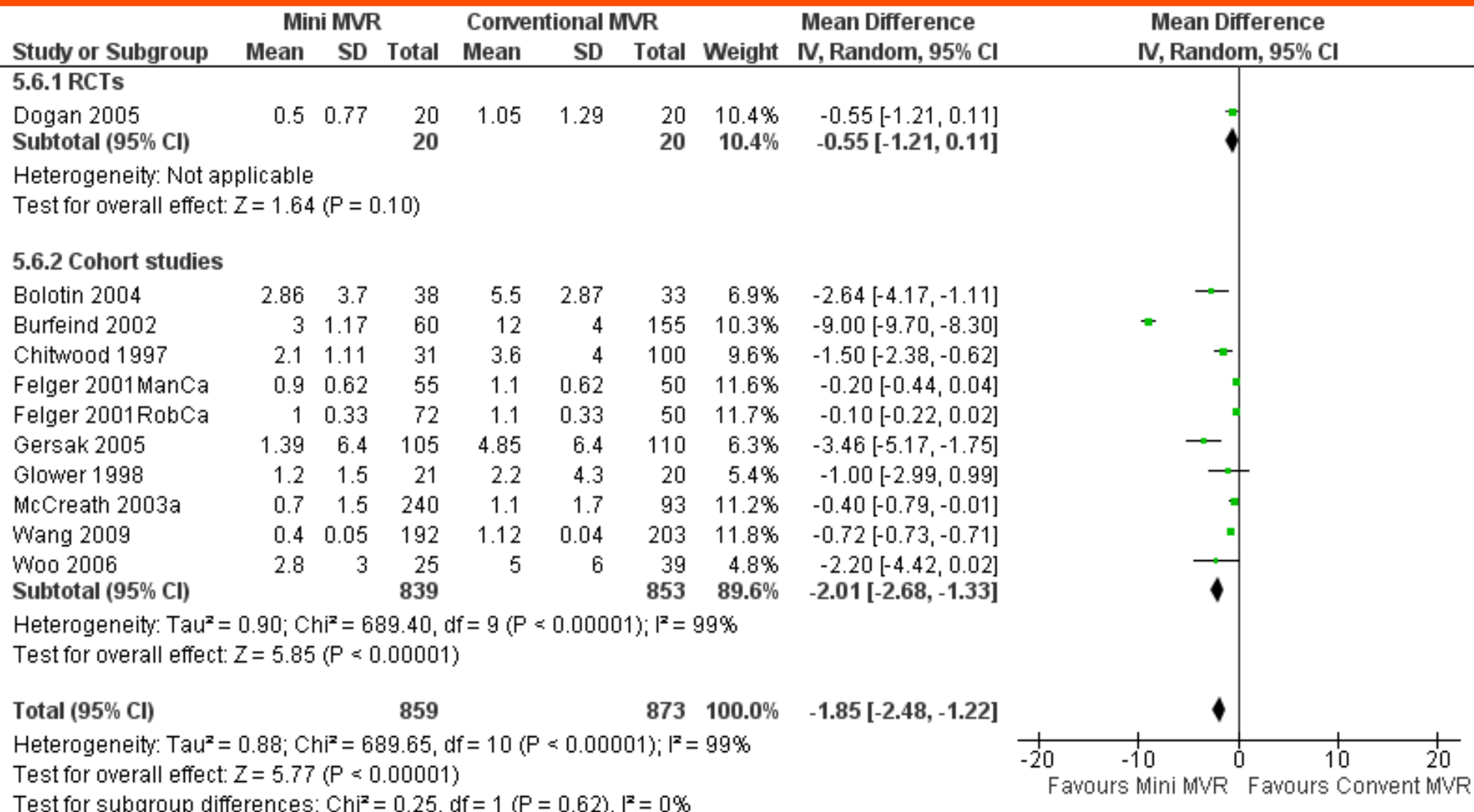
**Mini → 1.2%**

**Sterno → 1.5 %**

**Sub-group :**

- Repair vs Replacement
- First time vs Redo
- EndoClamp vs Tran Tho.

# Blood Transfusion (units): Mini- vs Conv-MVR



Mini I S → Less Blood transfusion



# Technique of Minimally Invasive Mitral Surgery

## ■ Minimally Invasive Versus Sternotomy :

### ■ **Longer**

- **crossclamp time**, WMD [95% CI] = **21** [10 - 33] min (overall of 27 studies). *In sub-analysis, the increased XCL time was found mainly for repair, but not for replacement*
- **cardiopulmonary bypass time**, WMD [95% CI] = **33** [19 - 47] min (overall of 30 studies).
- **procedure time**, WMD [95% CI] = **0.8** [0.4- 1.2] hours (14 studies)

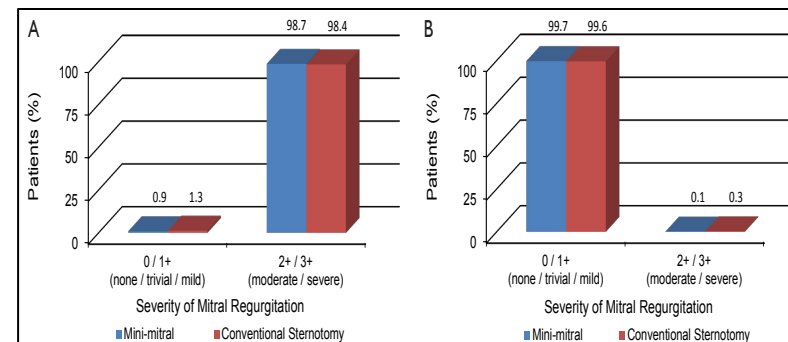
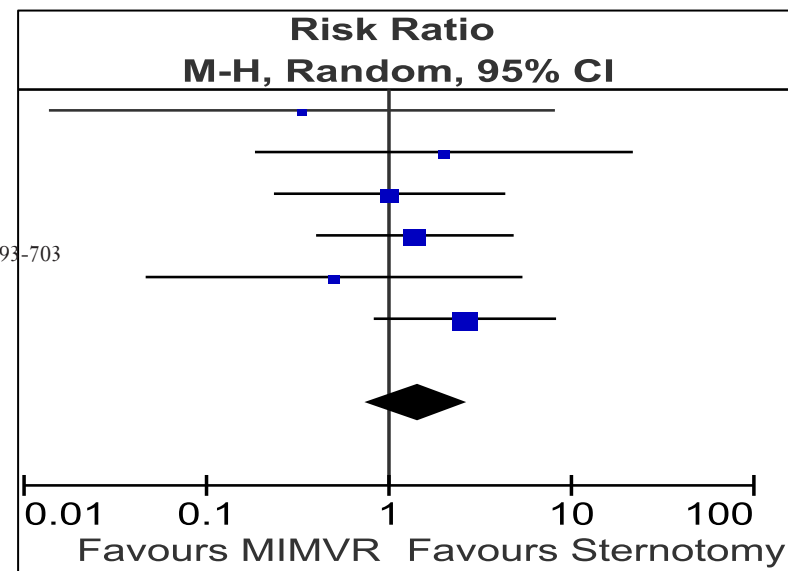
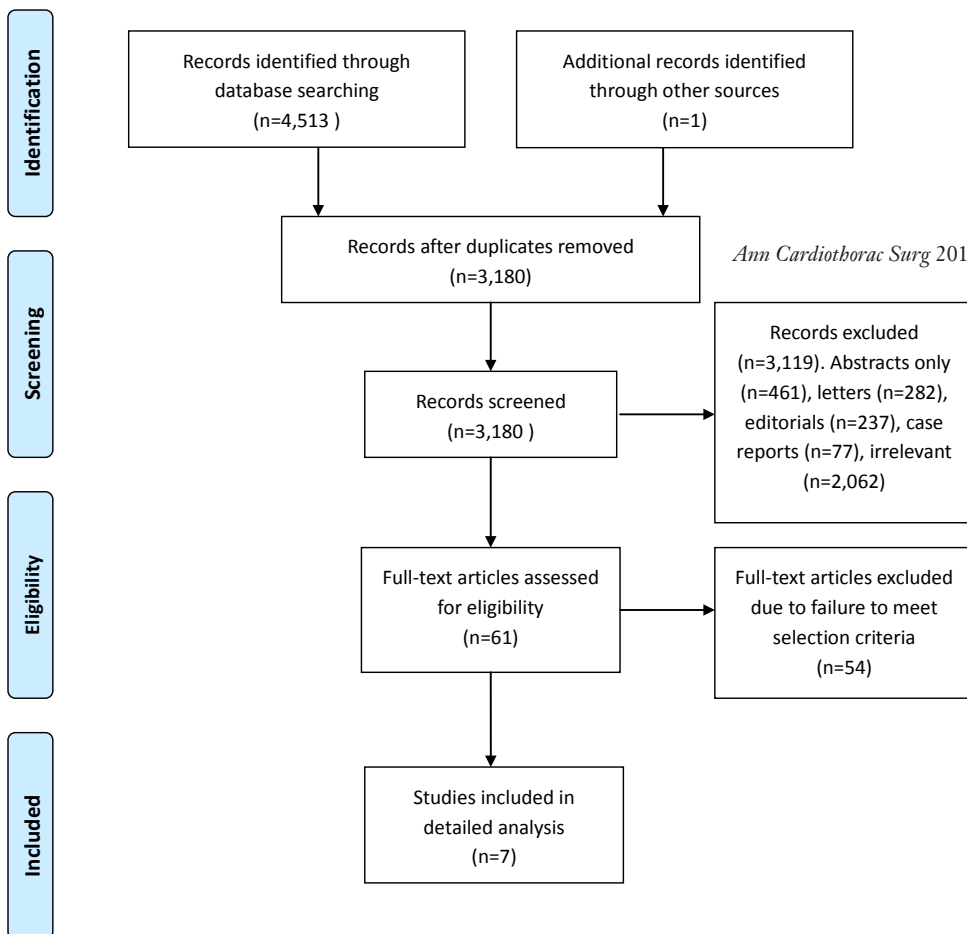
### ■ **Shorter**

- **ventilation time**, WMD [95% CI] = **-2.1** [-3.4, -0.8] hours (20 studies)
- **ICU length of stay**, WMD [95% CI] = **-0.5** [-0.7, -0.3] days (20 studies)
- **Hospital length of stay**, WMD [95% CI] = **-1.6** [-2.1, -1.1] days (28 studies)

# A meta-analysis of minimally invasive versus conventional mitral valve repair for patients with degenerative mitral disease

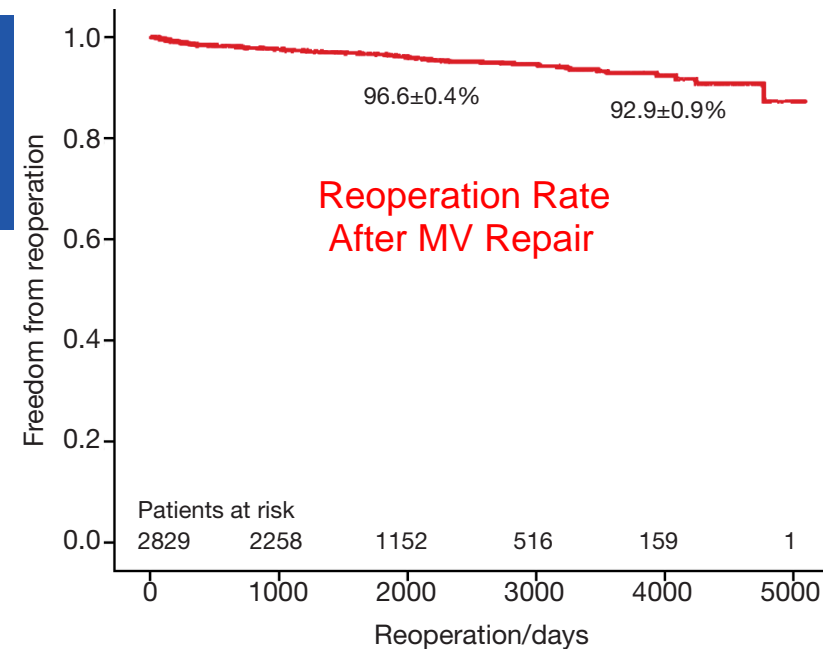
Christopher Cao<sup>1</sup>, Sunil Gupta<sup>1</sup>, David Chandrakumar<sup>1</sup>, Thomas A. Nienaber<sup>1</sup>, Praveen Indraratna<sup>1</sup>, Su C. Ang<sup>1</sup>, Kevin Phan<sup>1,2</sup>, Tristan D. Yan<sup>1,2</sup> *Ann Cardiothorac Surg* 2013;2(6):693-703

<sup>1</sup>The Collaborative Research (CORE) Group, Macquarie University, Sydney, Australia; <sup>2</sup>The Royal Prince Alfred Hospital, Sydney University, Sydney, Australia



# Long Term Results of MIS

***“Minimally invasive mitral valve surgery:  
The Leipzig experience  
Piroze M... F Mohr.  
Ann Cardiothorac Surg 2013;2(6):744-750”***



Preoperative variables	3438 Patients
Age in years	60.3±13
Male	1,733 (61.3)
Body-mass index (kg/m <sup>2</sup> )	25.6±3.9
Preoperative cerebrovascular accident	90 (3.2)
Left ventricular ejection fraction (%)	56.8±18.9
Prior cardiac surgery	152 (5.4)
Active endocarditis	36 (1.3)
Timing of surgery	
Elective	2,632 (93)
Urgent/emergent	197 (7)
Log EuroSCORE (%)	4.9±6

Outcomes	n (%)
30-day mortality	23 (0.8)
Low output syndrome	31 (1.1)
Failed mitral valve repair	45 (1.6)
Re-exploration for bleeding	198 (7)
Myocardial infarction	18 (0.6)
Sepsis	24 (0.8)
Stroke	57 (2)
Postoperative new dialysis	87 (3.1)
Postoperative symptomatic neuropsychotic syndrome	71 (2.5)
Hospital stay, days	12.2±9.4



# Rate of repair in minimally invasive mitral valve surgery

Ann Cardiothorac Surg 2013;2(6):751-757

Patrick Perier, Wolfgang Hohenberger, Fitsum Lakew, Gerhard Batz, Anno Diegeler

Herz und Gefäß Klinik, Salzburger Leite 1, 97616 Bad Neustadt/Saale, Germany

**Table 1** Patient characteristics

Demographics	
Age (y, range)	56.15±11.62 (
Female (no, %)	206 (24.5 %)
NYHA functional class	
I	278 (33%)
II	405 (48.1%)
III	143 (17%)
IV	16 (1.9%)
Leaflet involvement	
Isolated posterior	688 (81.7%)
Isolated anterior	82 (9.7%)
Bileaflet	72 (8.6%)
Cardiac comorbidity	
LVEF (%)	64.8%±5.2%

**Table 2** Operative details

Procedures	
Mitral valve repair	835 (99.2%)
Mitral valve replacement	7 (0.8%)
Concomitant procedures	
PFO closure	161 (19.4%)
AF ablation therapy	115(13.6%)
Tricuspid repair	20 (3.7%)
CPB time (mean, range)	162±29.3
Aortic cross clamping time (mean, range)	95±28.5

**Table 3** Major adverse events

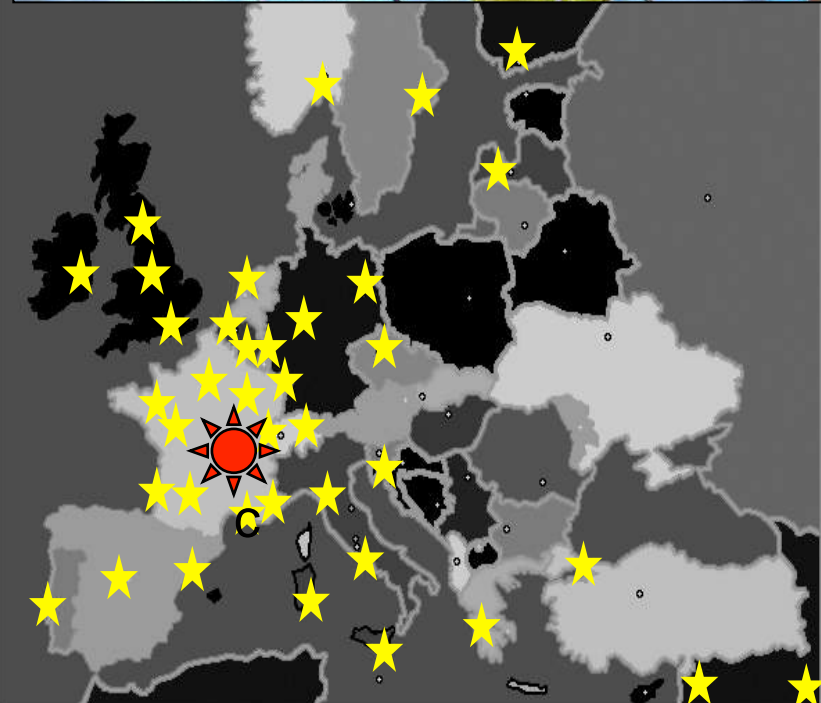
Death	2 (0.24%)
Major stroke	5 (0.6%)
Re-operative mitral valve	2 (0.24%)
Re-operative aortic valve	3 (0.35%)
Urgent/emergent CV surgery	3 (0.35%)
Myocardial infarction	5 (0.6%)

Grade 1 → 90,5 %

Grade 2 → 9%

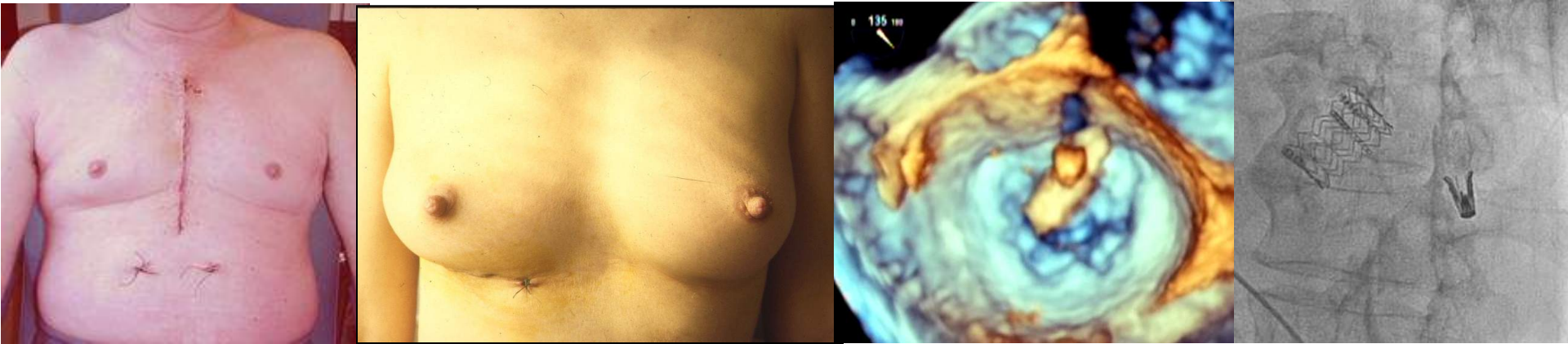
# Work Shop

## Post-Graduate Course – Lyon University



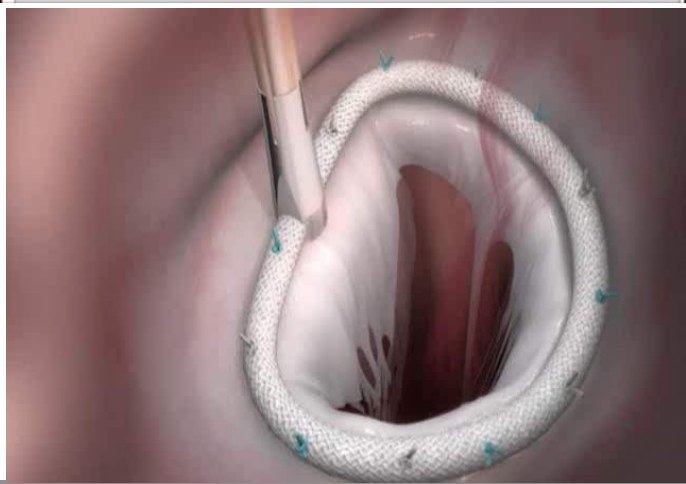
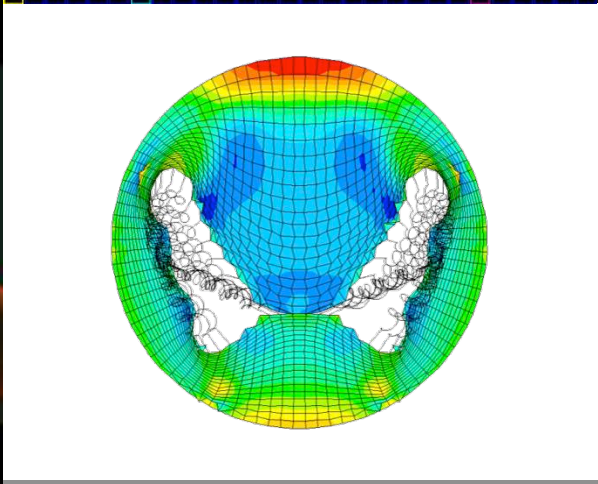
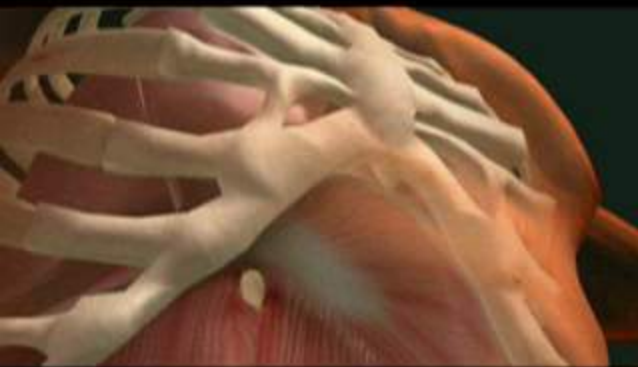
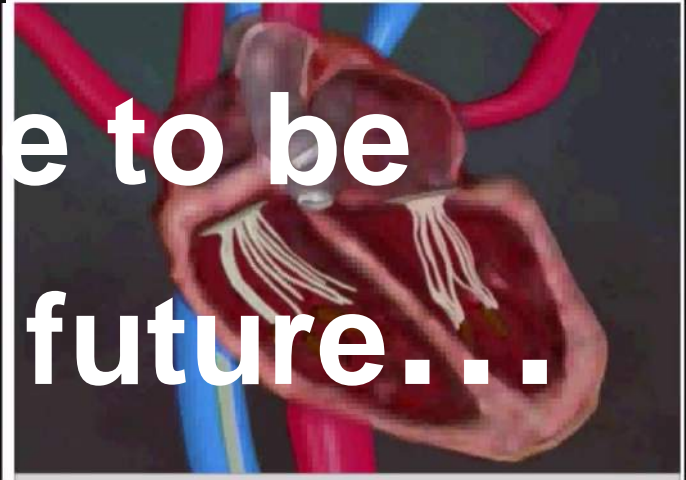
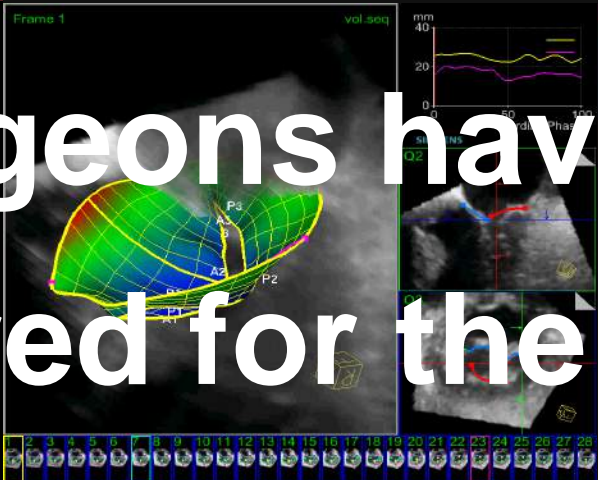
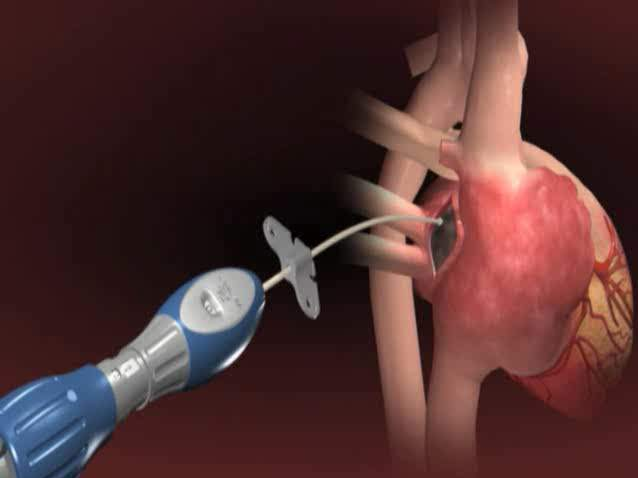
# CONCLUSIONS :

**Less Invasive → More Collaboration**



- *Learning Curve*
- *Heart team*





Surgeons have to be Prepared for the future...