

# Anevrysme de l'aorte ascendant

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CLINIQUES ST LUC UCL  
BRUXELLES

# Anevrysme de l'aorte descendant

***En fonction:***

***-du segment aortique?***

***-racine aortique***

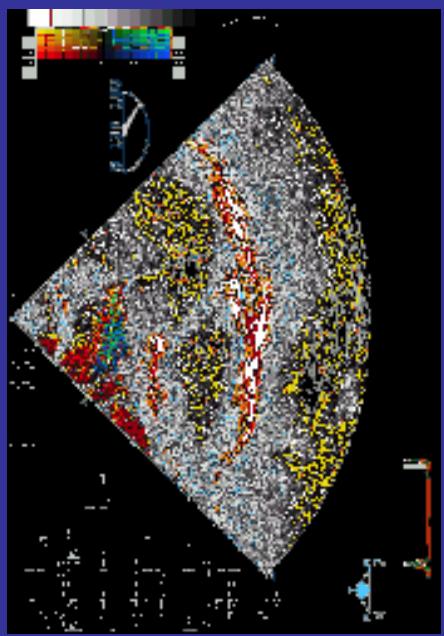
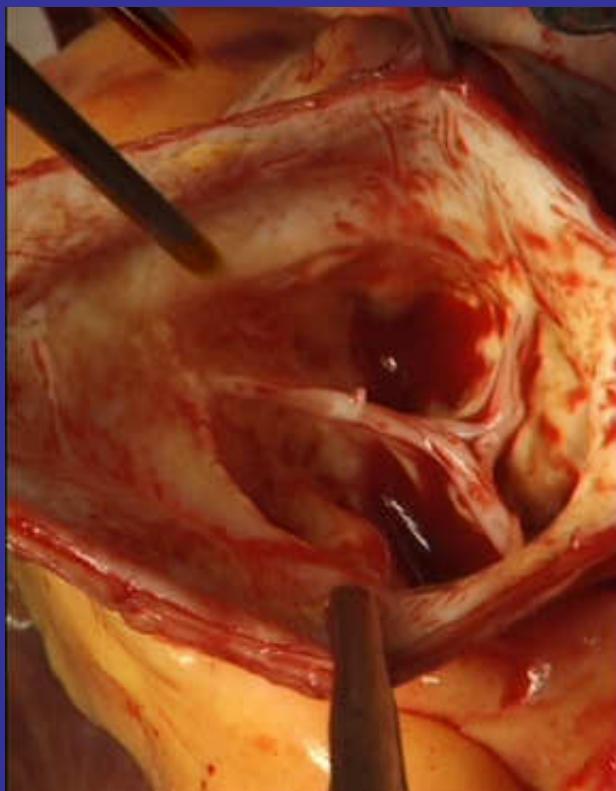
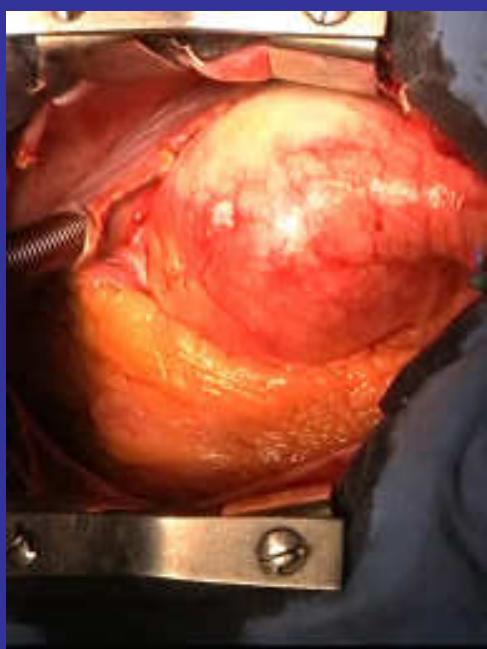
***-aorte tubulaire (supra coronaire)***

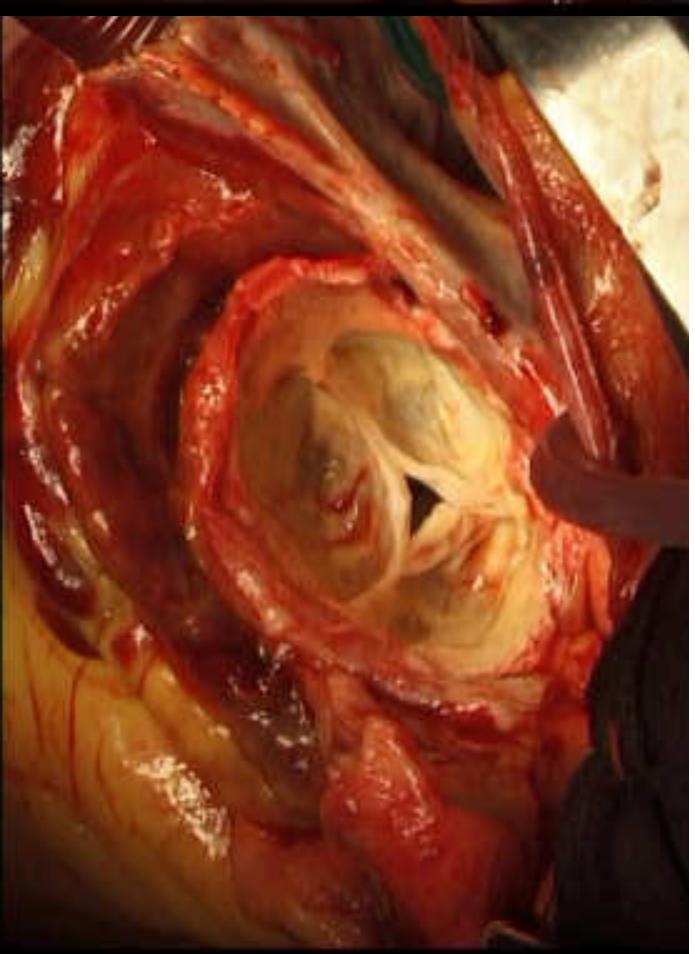
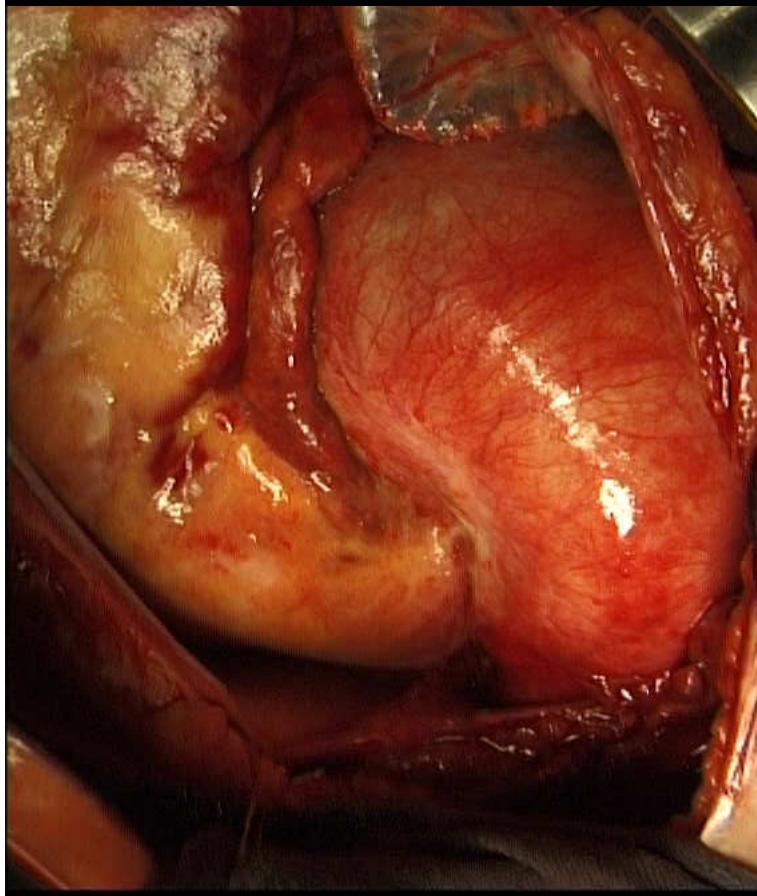
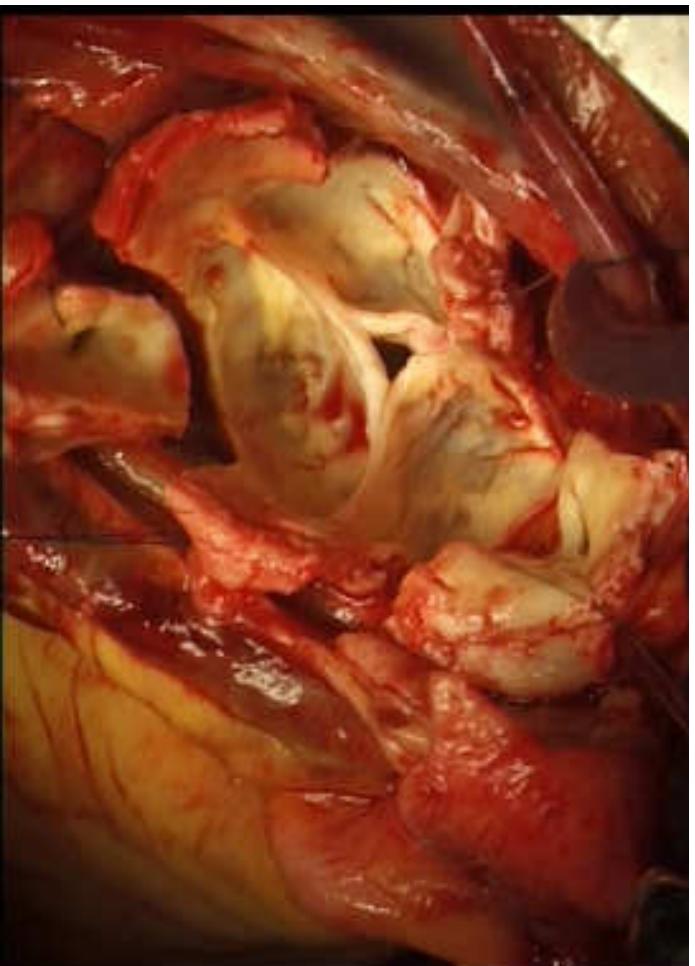
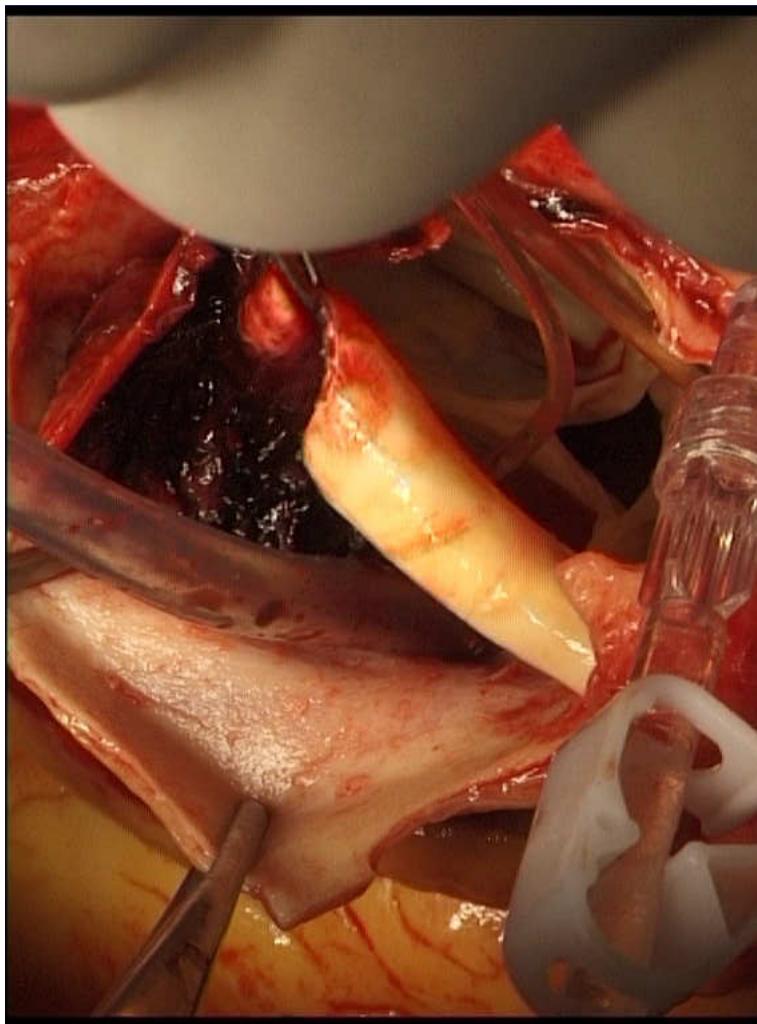
***-de la dysfonction valvulaire?***

***-stenose valvulaire, ou mal valv.***

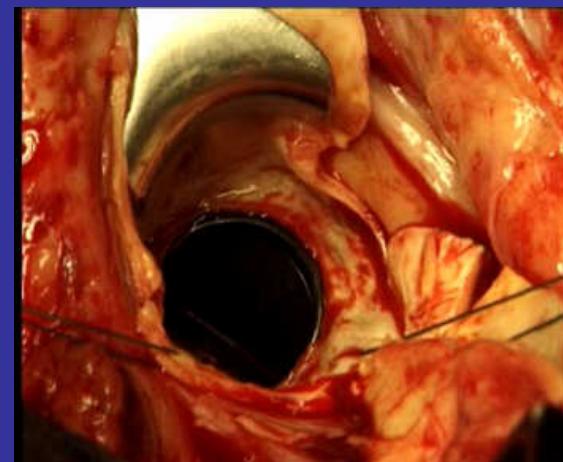
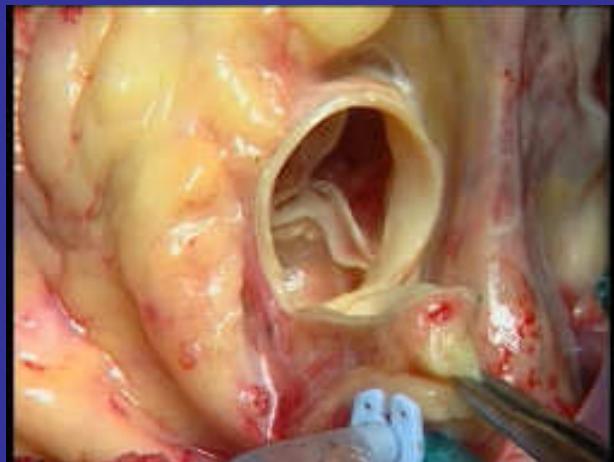
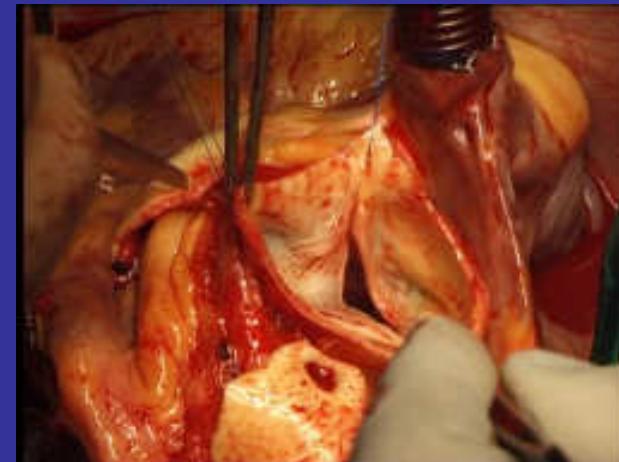
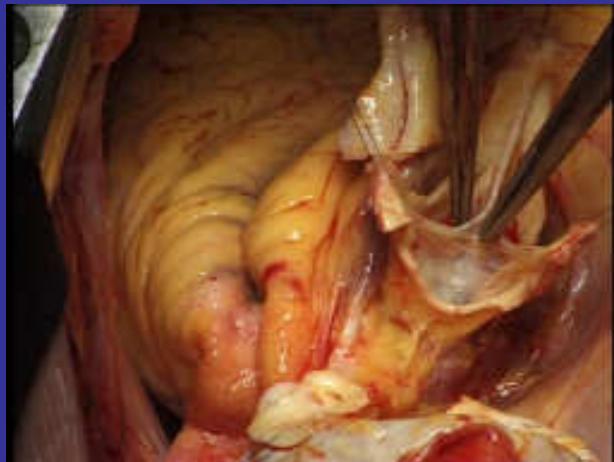
***-pure insuffisance aortique***

***-valve bicuspidé***





# Anevrysme de l'aorte descendant

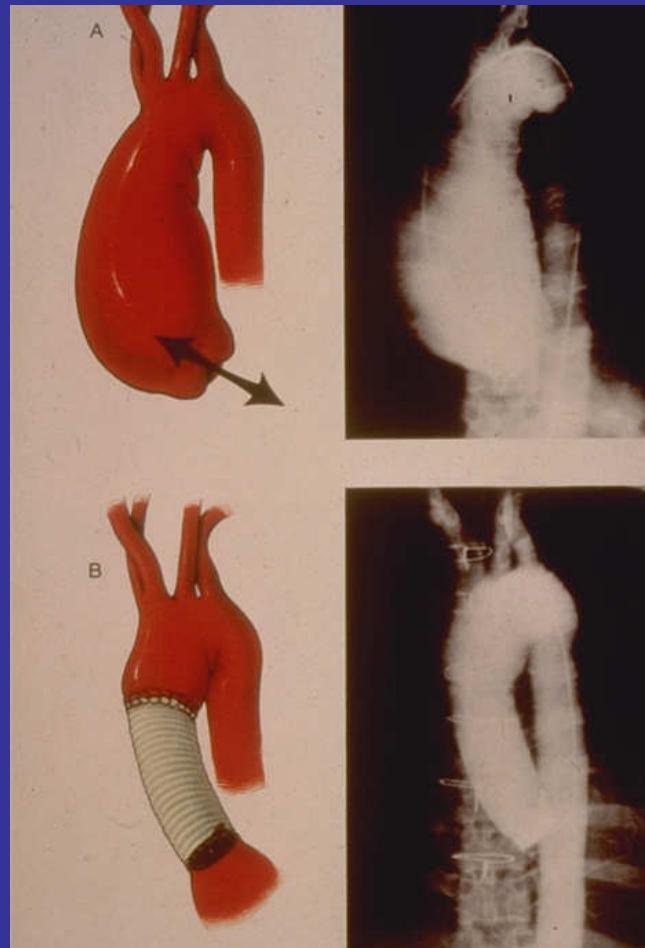


# Anevrysme de l'aorte ascendante

## Anevrysme tubulaire

-stenose , valve à remplacer

-insuffisance, valve à préserver?

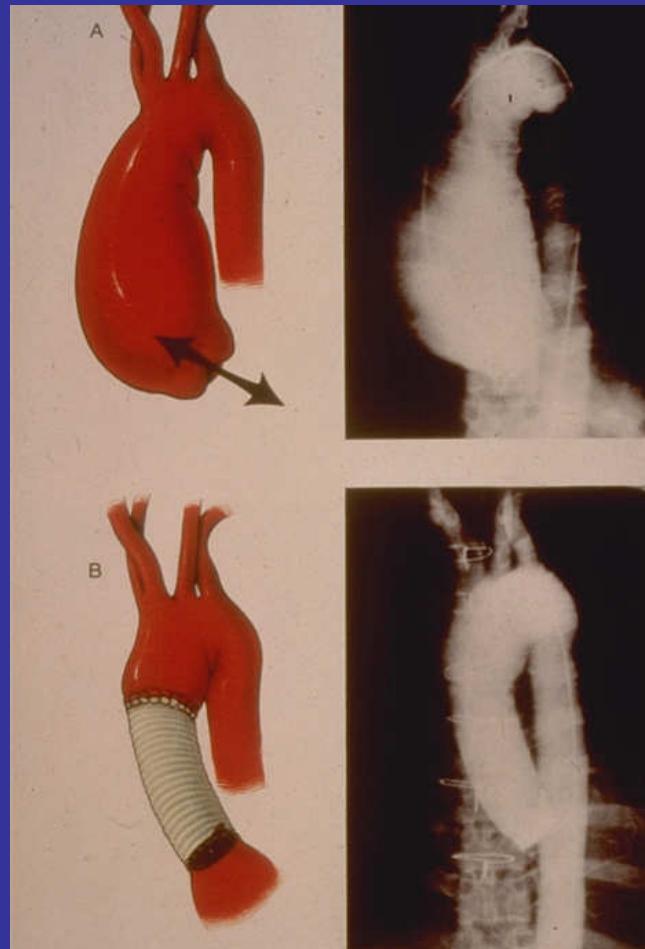


# Anevrysme de l'aorte descendant

## Anevrysme tubulaire

-stenose , valve a  
remplacer

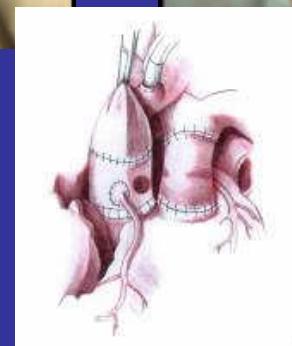
Dilatation retro -  
stenotic

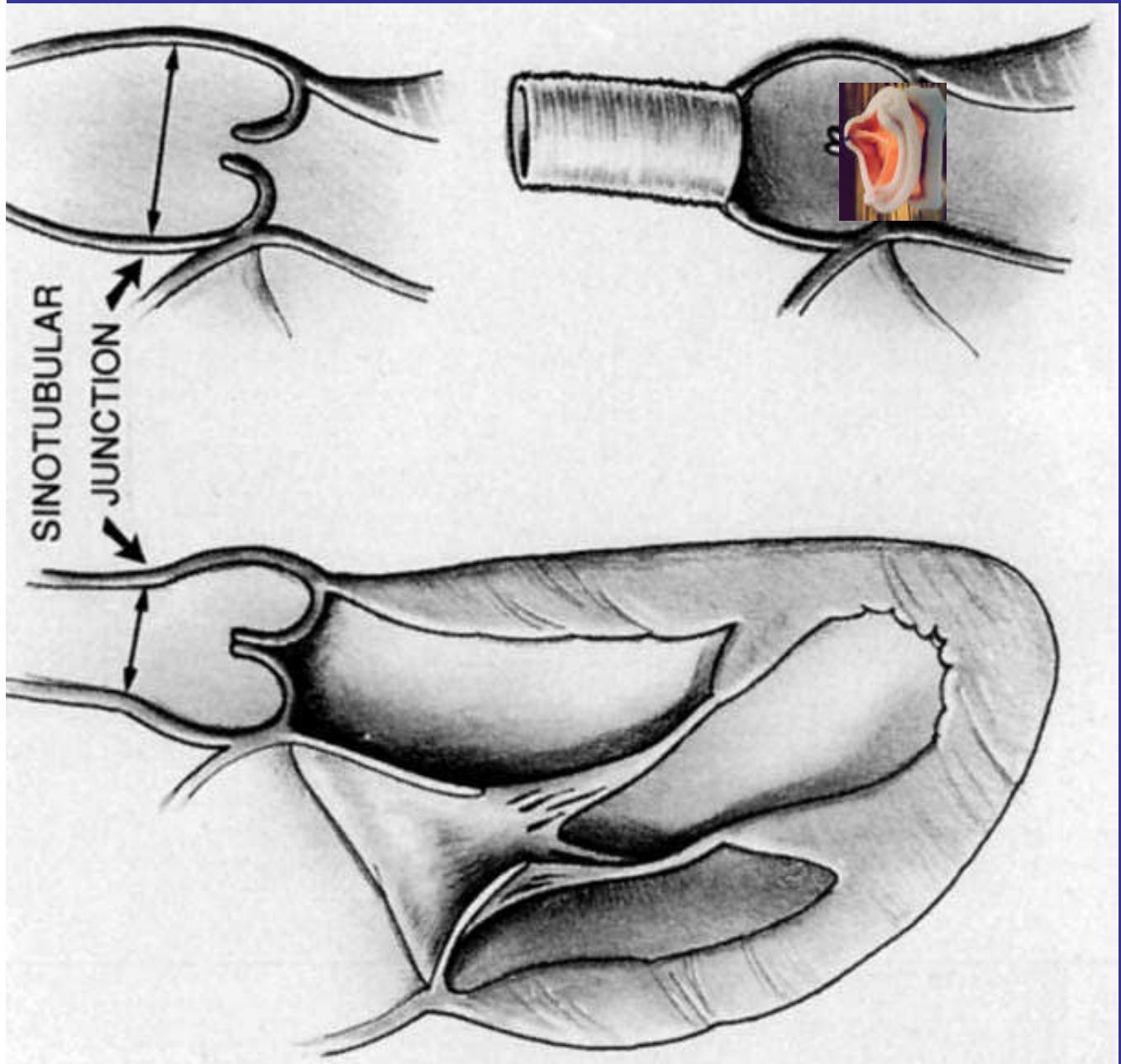


# Anevrysme de l'aorte descendant

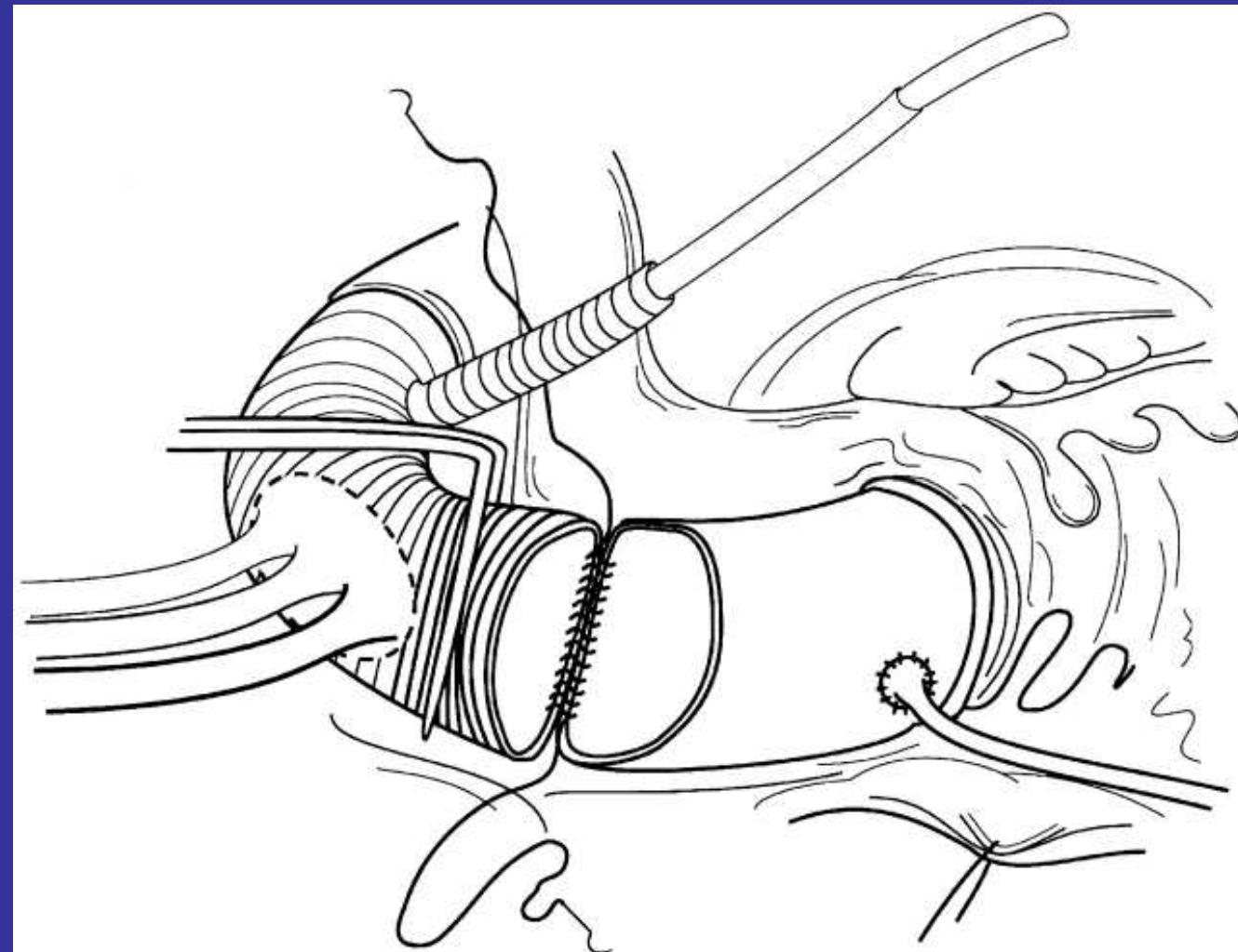
## Age du patient:

- < 50 ans:  
*Ross*  
*mécanique*  
*biologique*
- 50 à 65-70 ans :  
*mécanique*  
*biologique*
- > 70 ans:  
*biologique*





No Caption Found



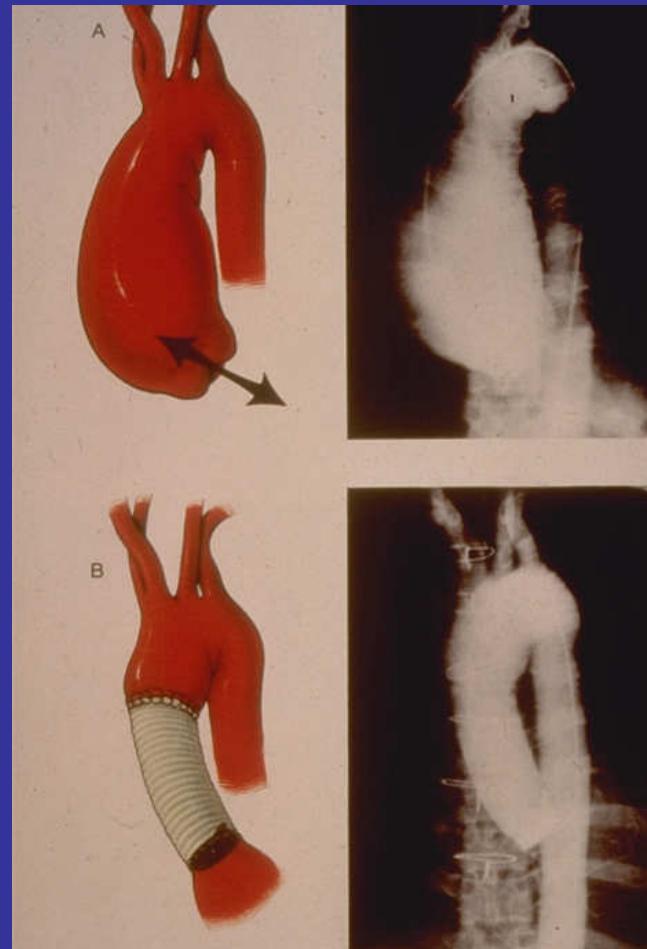
Lewis, M. E. et al.; J Thorac Cardiovasc Surg 2002;123:573-575

# Anevrysme de l'aorte descendant

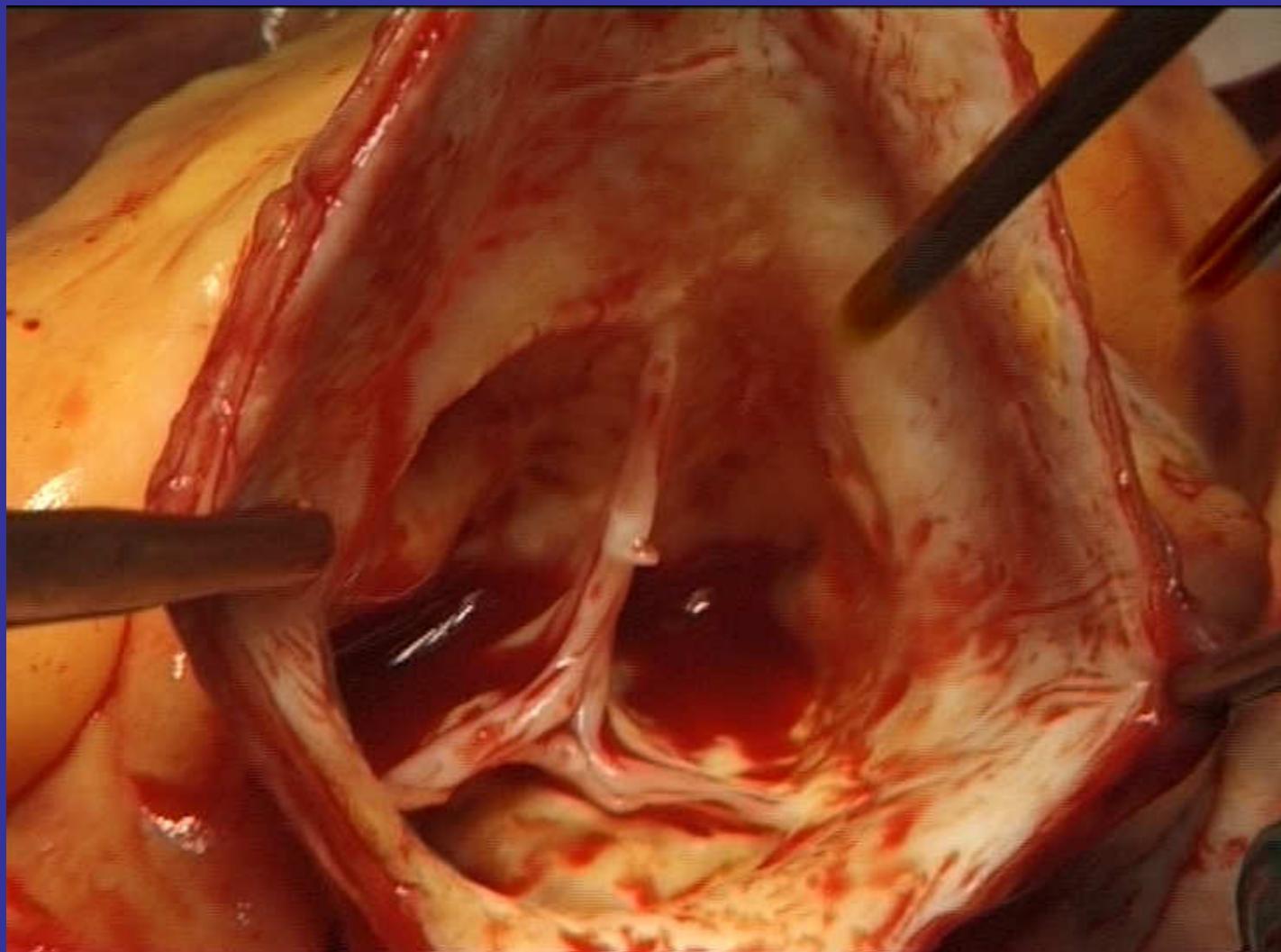
## Anevrysme tubulaire

-stenose , valve a remplacer

-insuffisance, valve a preserver?

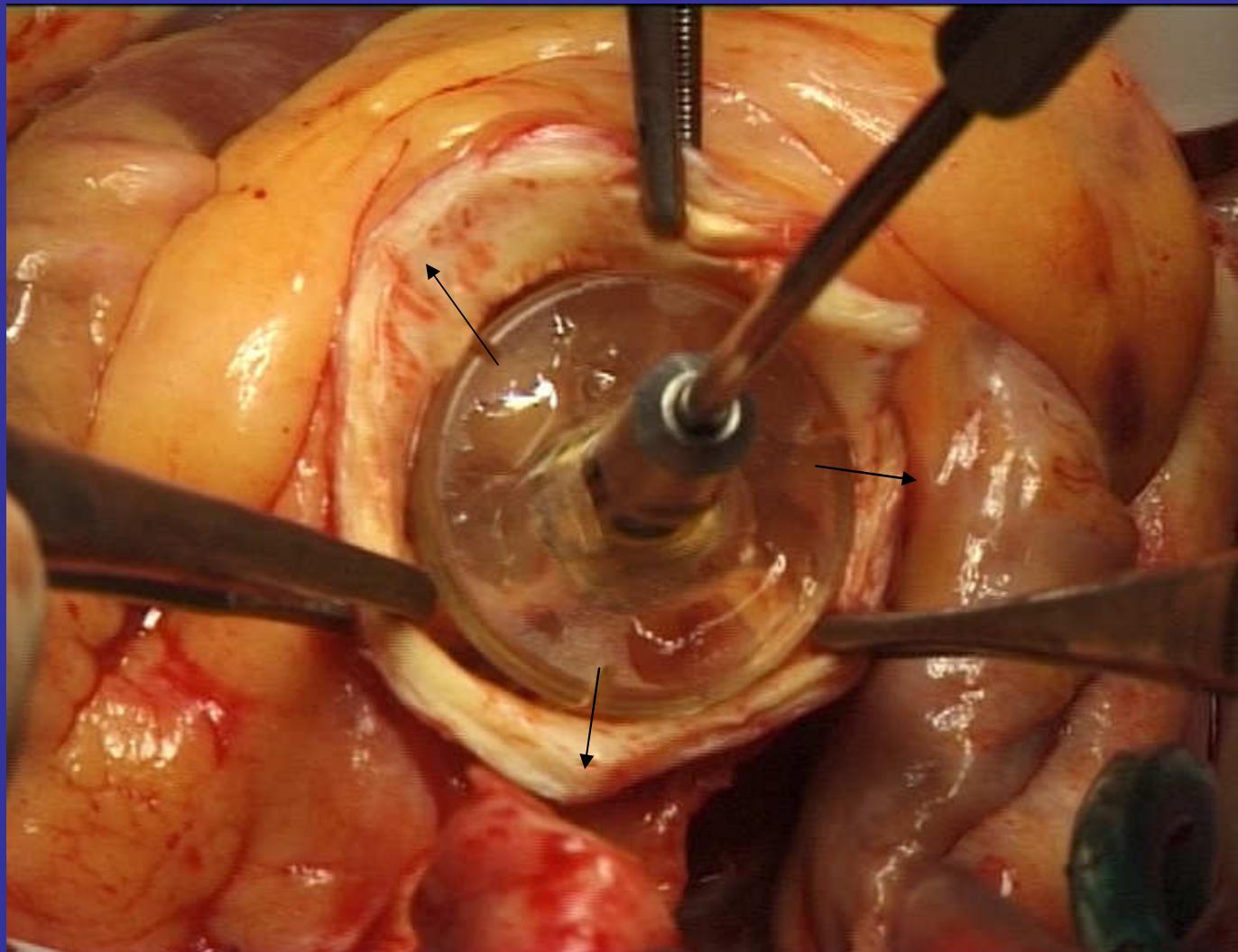


# Aortic Sino-Tubular Ectasy: Ia – No AR



*Aortic and Mitral Reconstructive Surgery Symposium - Brussels- 2004*

# Aortic Sino-Tubular Ectasy



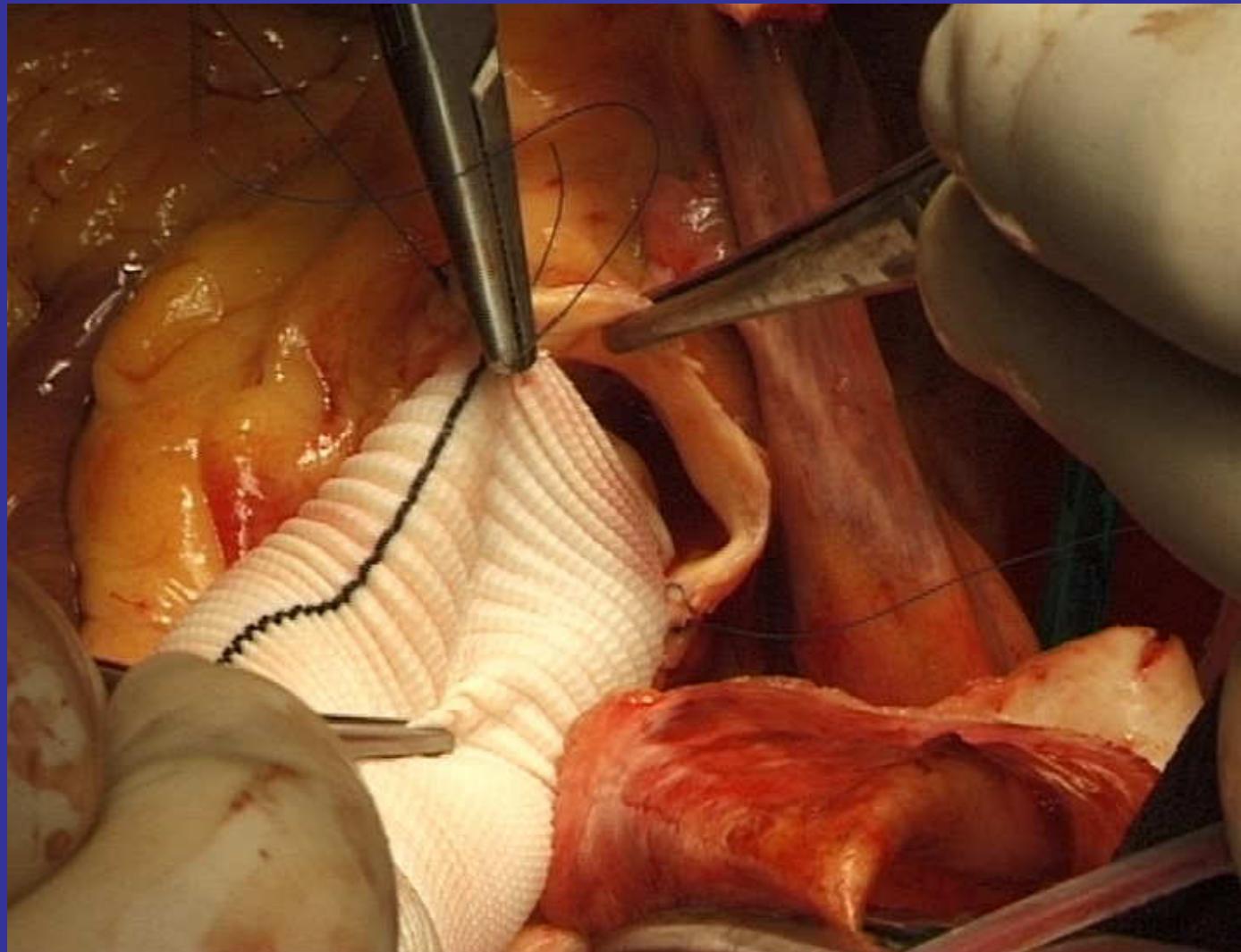
*Aortic and Mitral Reconstructive Surgery Symposium - Brussels- 2004*

# Aortic Sino-Tubular Ectasy



*Aortic and Mitral Reconstructive Surgery Symposium - Brussels- 2004*

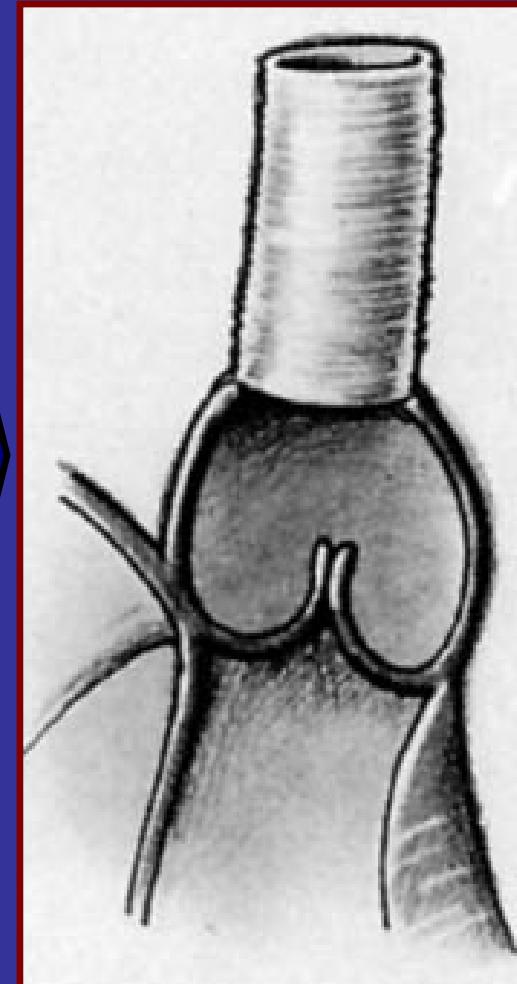
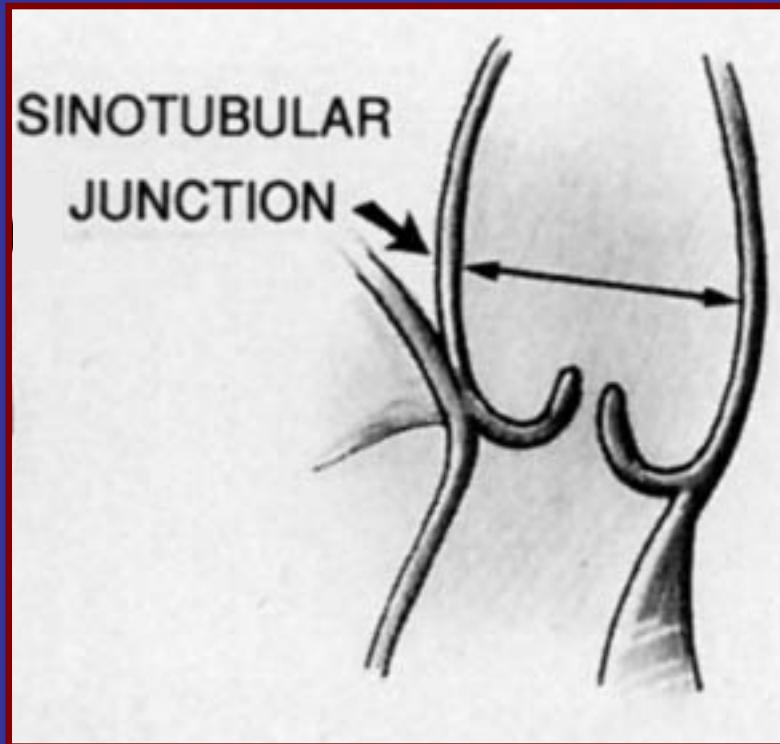
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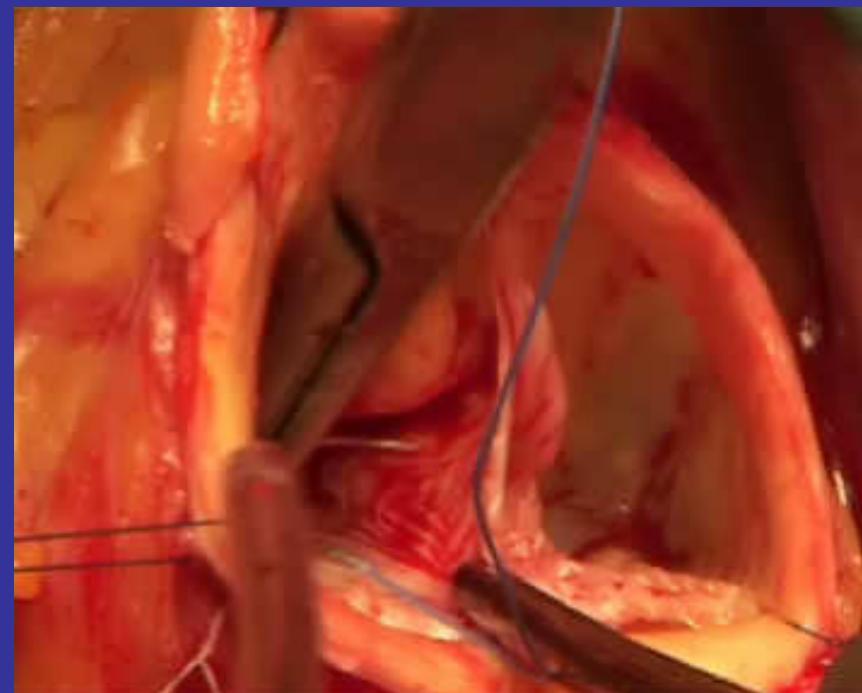
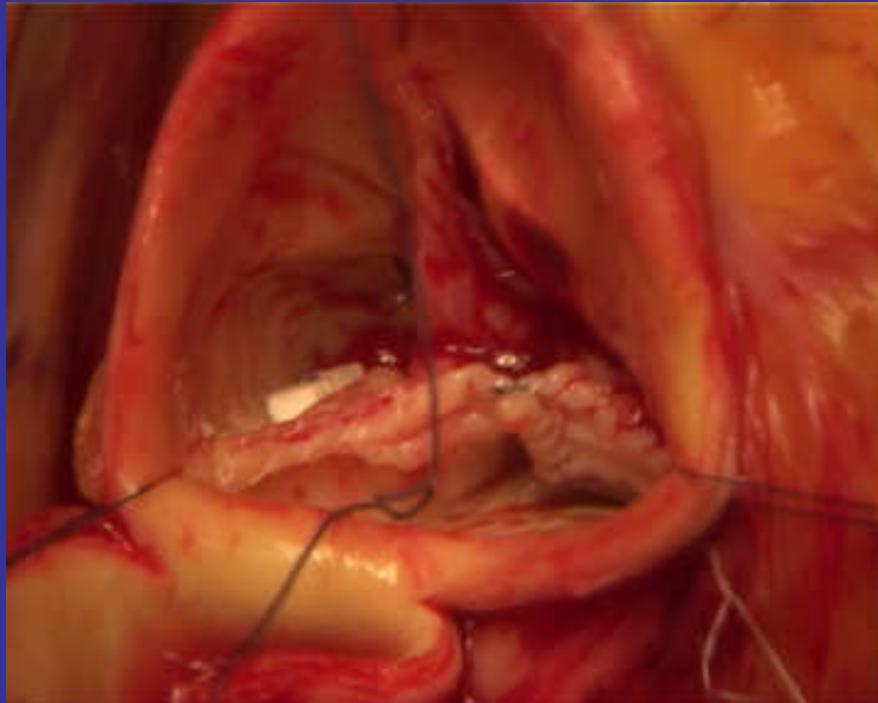
DAVID

**DAVID IV**



# Functionnal Aortic Annuloplasty

## 1/ Ventriculo-Aortic stabilization



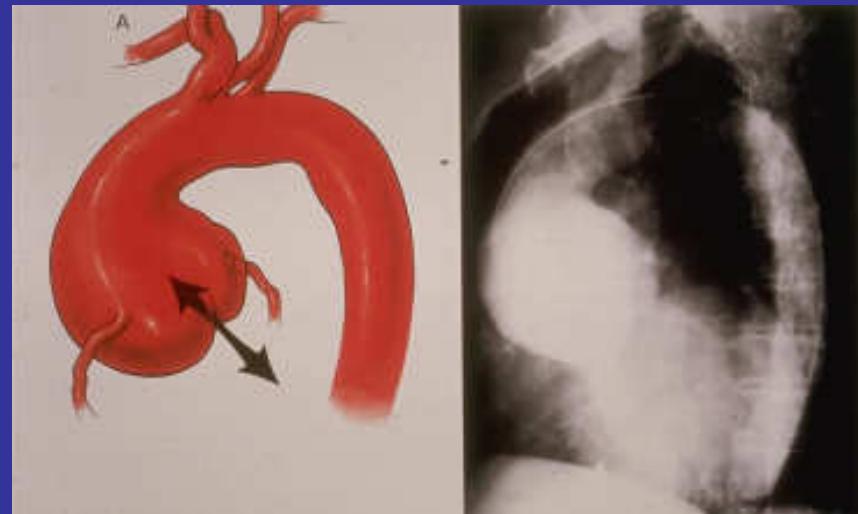
**Subcommissural annuloplasty with reinforced (teflon or autologous pericardium) 2/0 sutures.**

- AN. TUBULAIRE
- +JET ECCENTRIC:
- PROLAPSE



# Anevrysme de l'aorte descendant

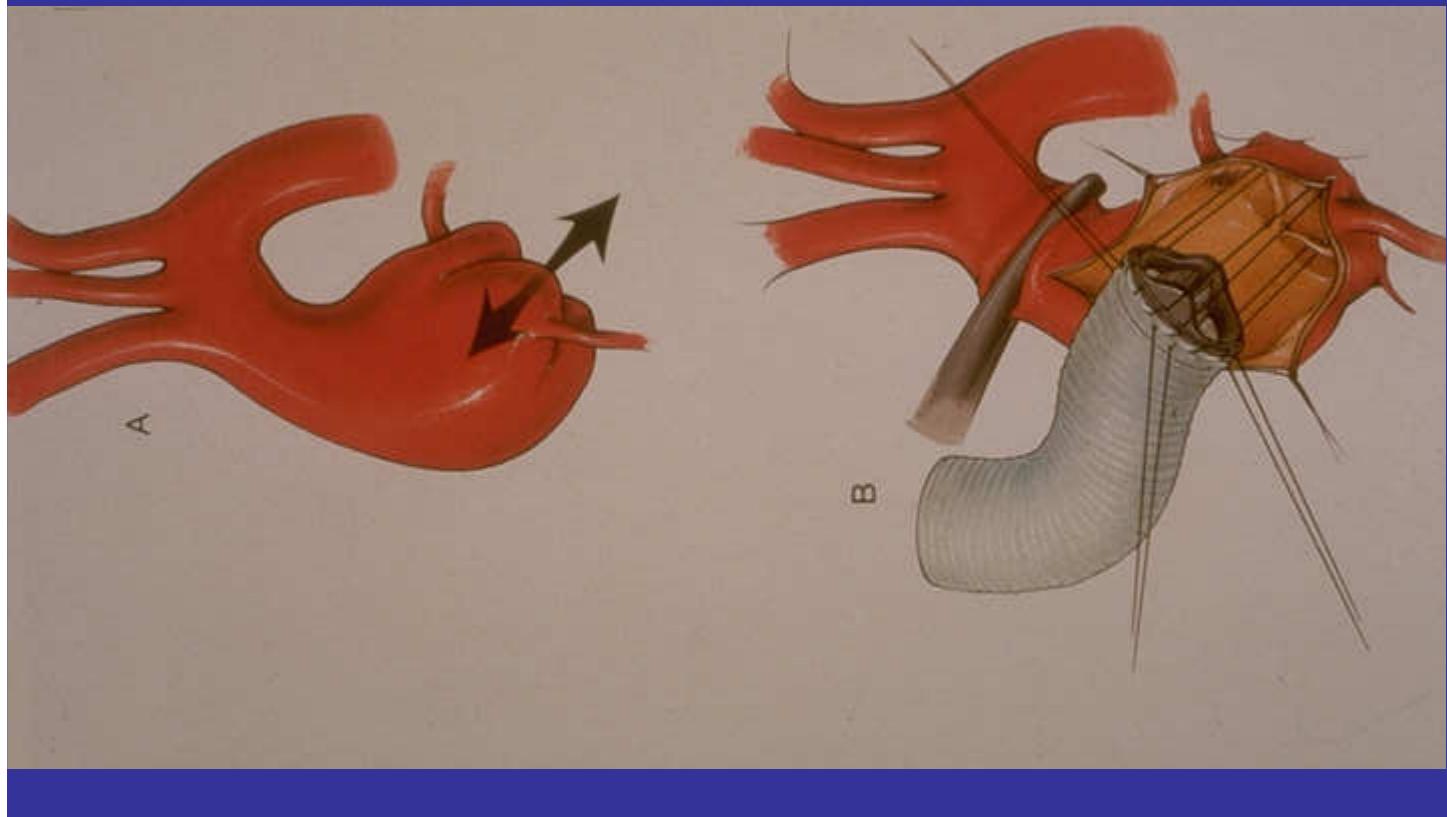
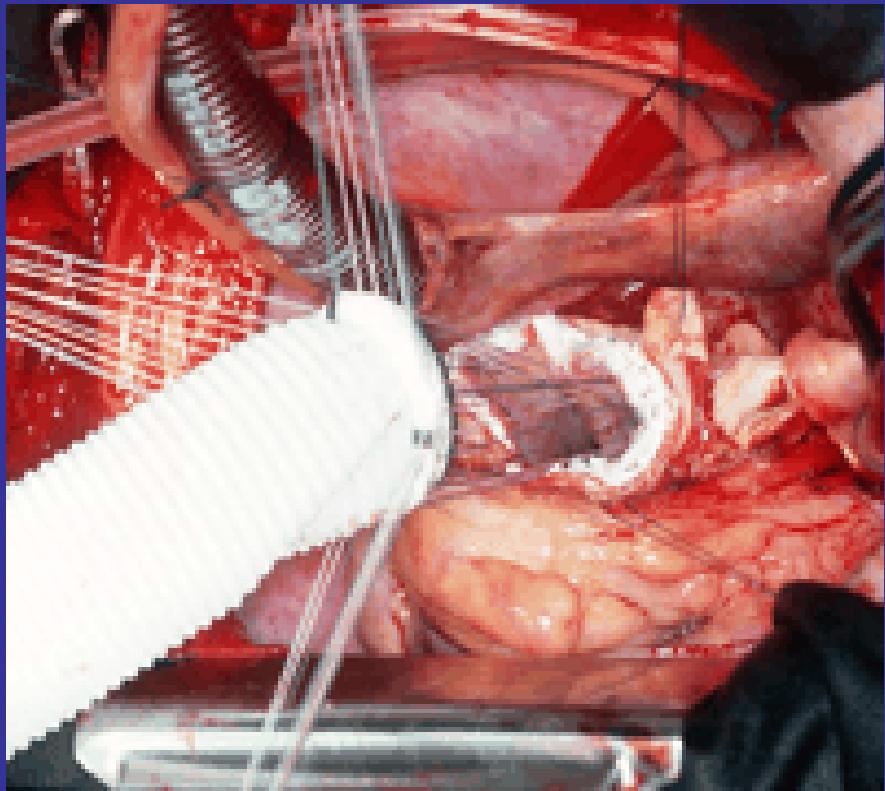
- An.racine aortique
- Stenose valvulaire
- Pure ins.aortique

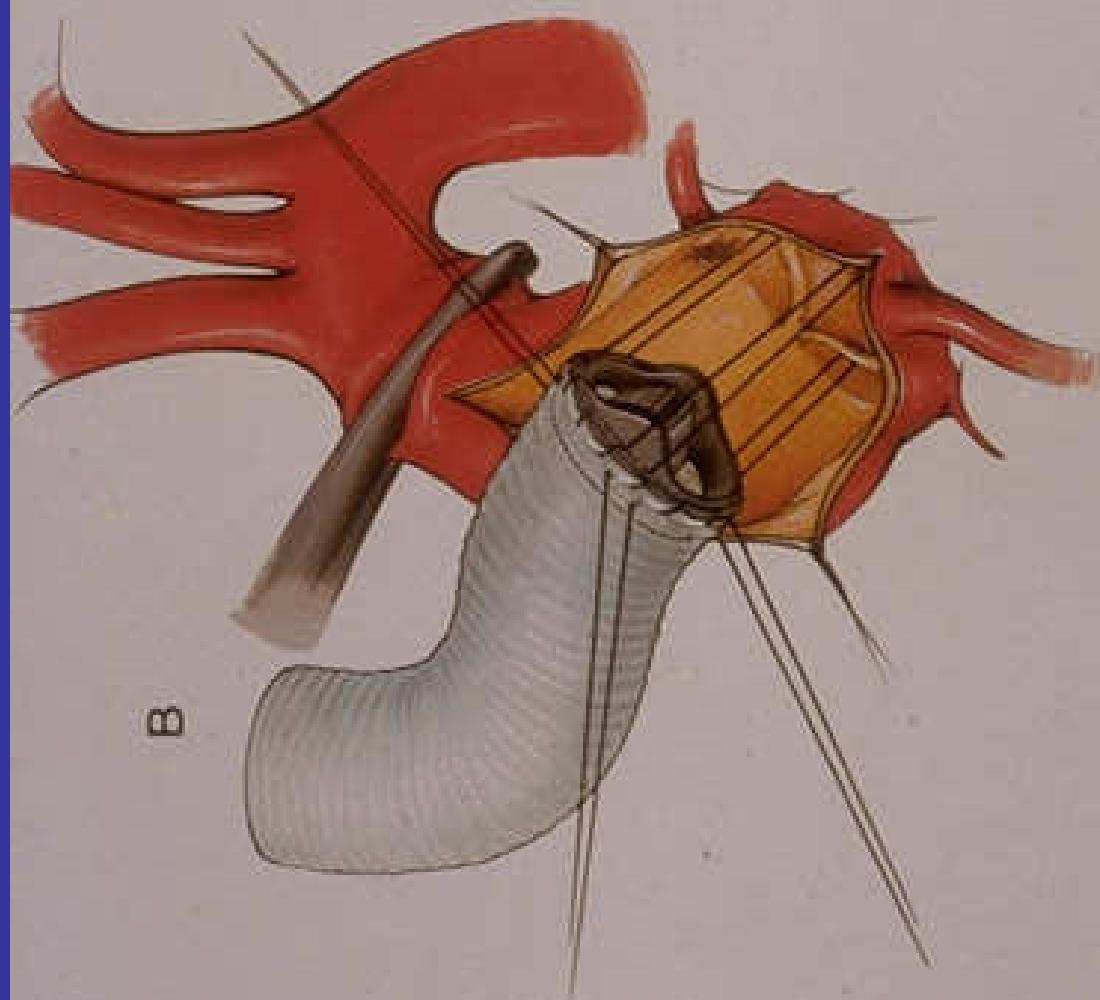
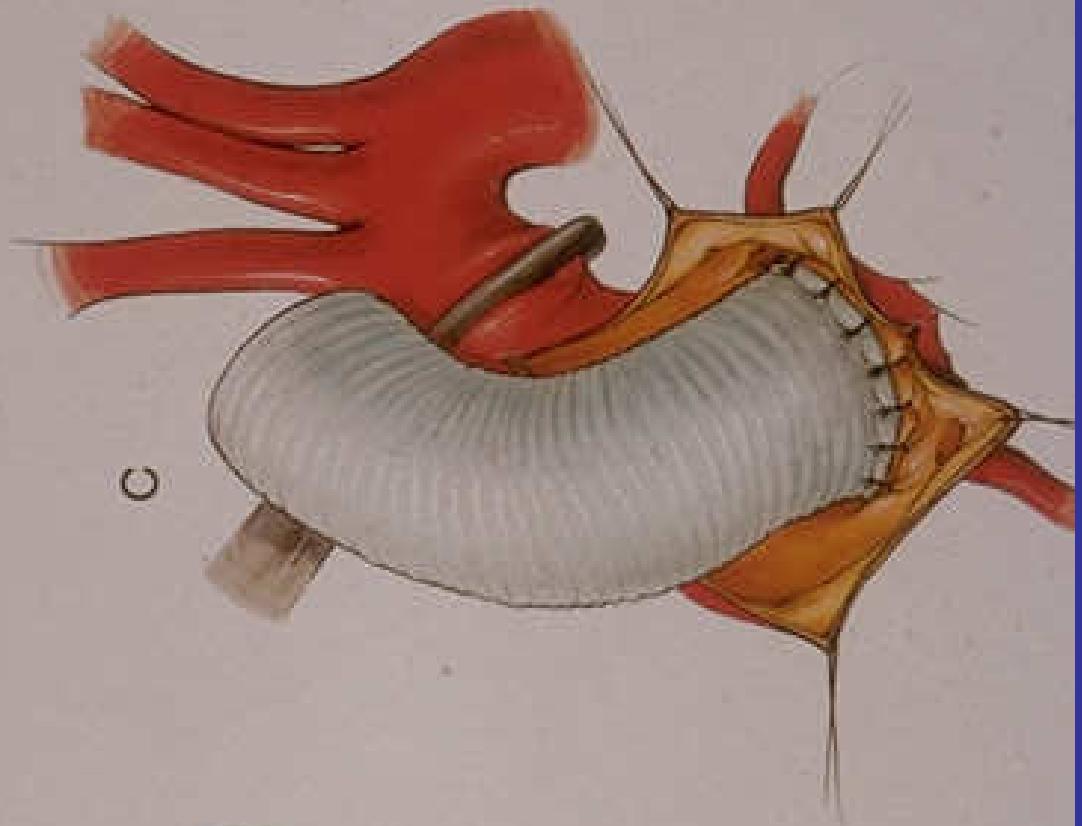


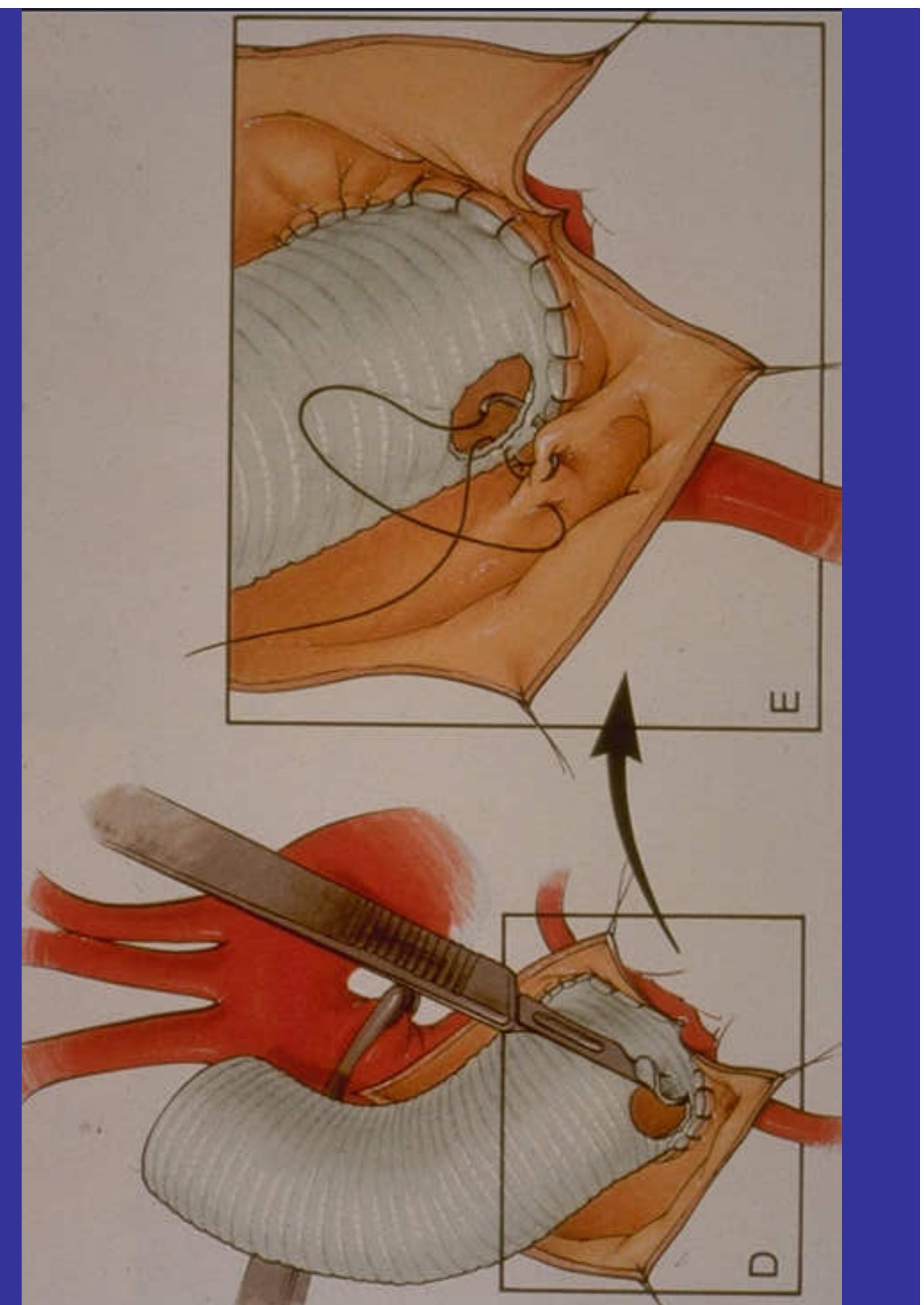
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- An.racine aortique
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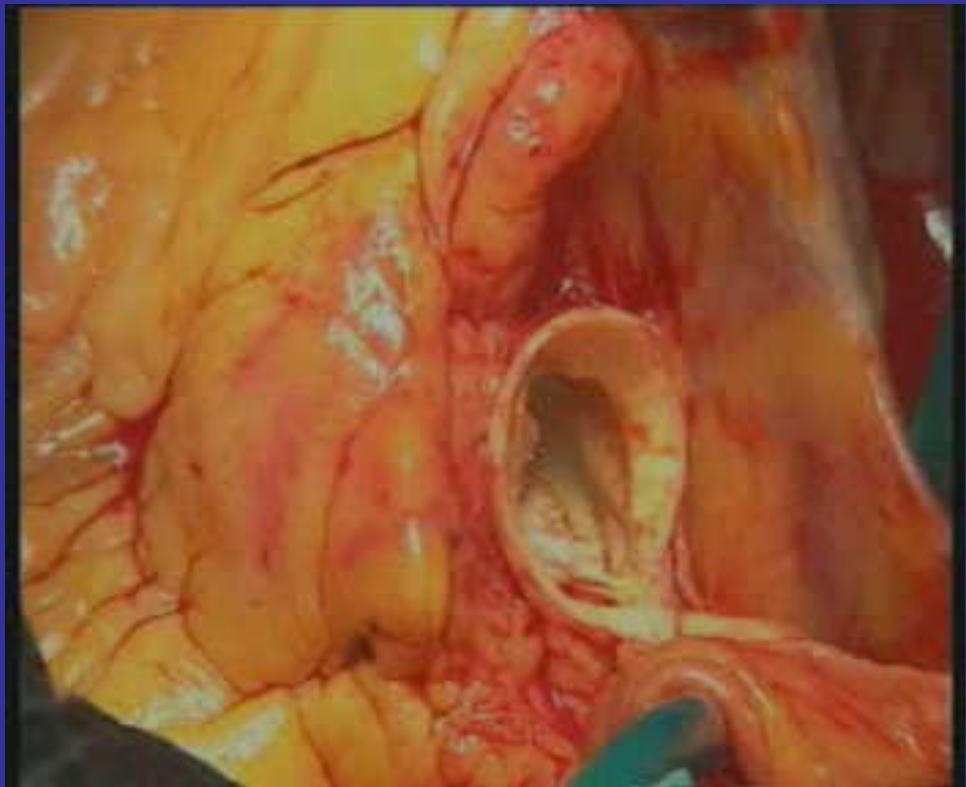




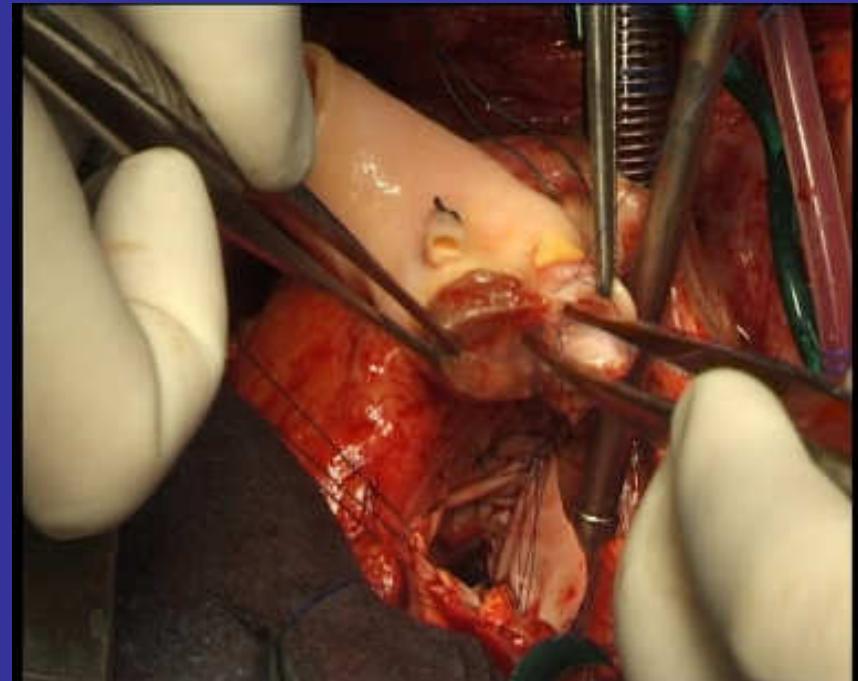
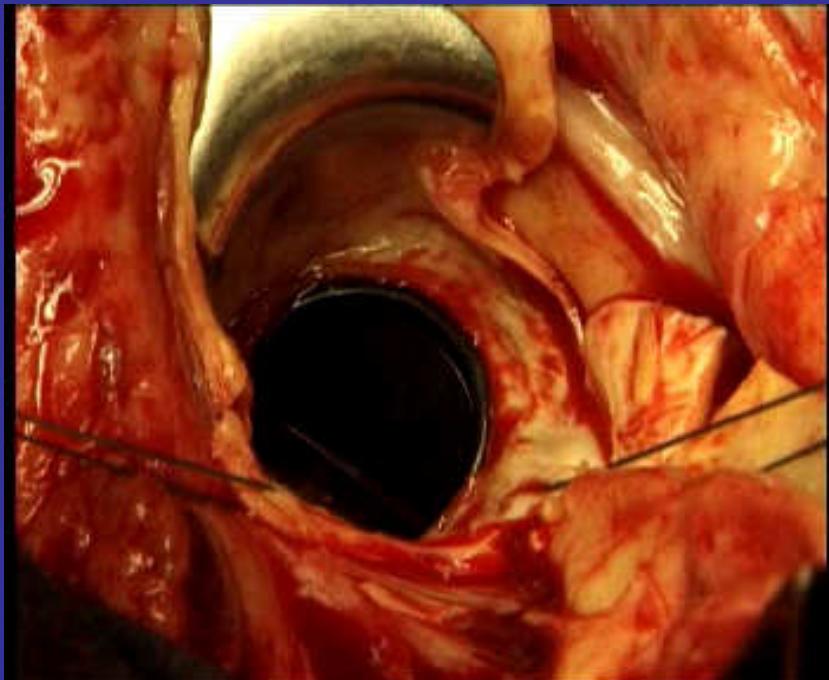


# Anevrysme de l'aorte descendant

- Freestyle implantation
- Racine aortique
- bentall

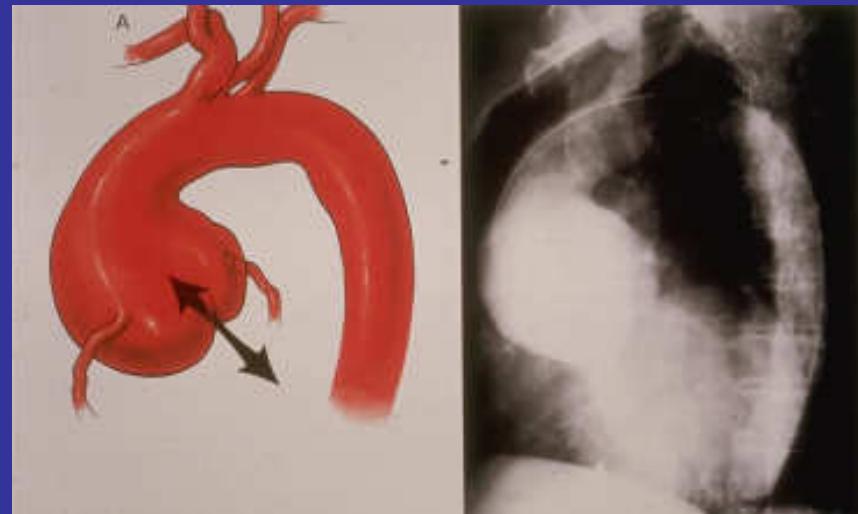


# Anevrisme de l'aorte descendant

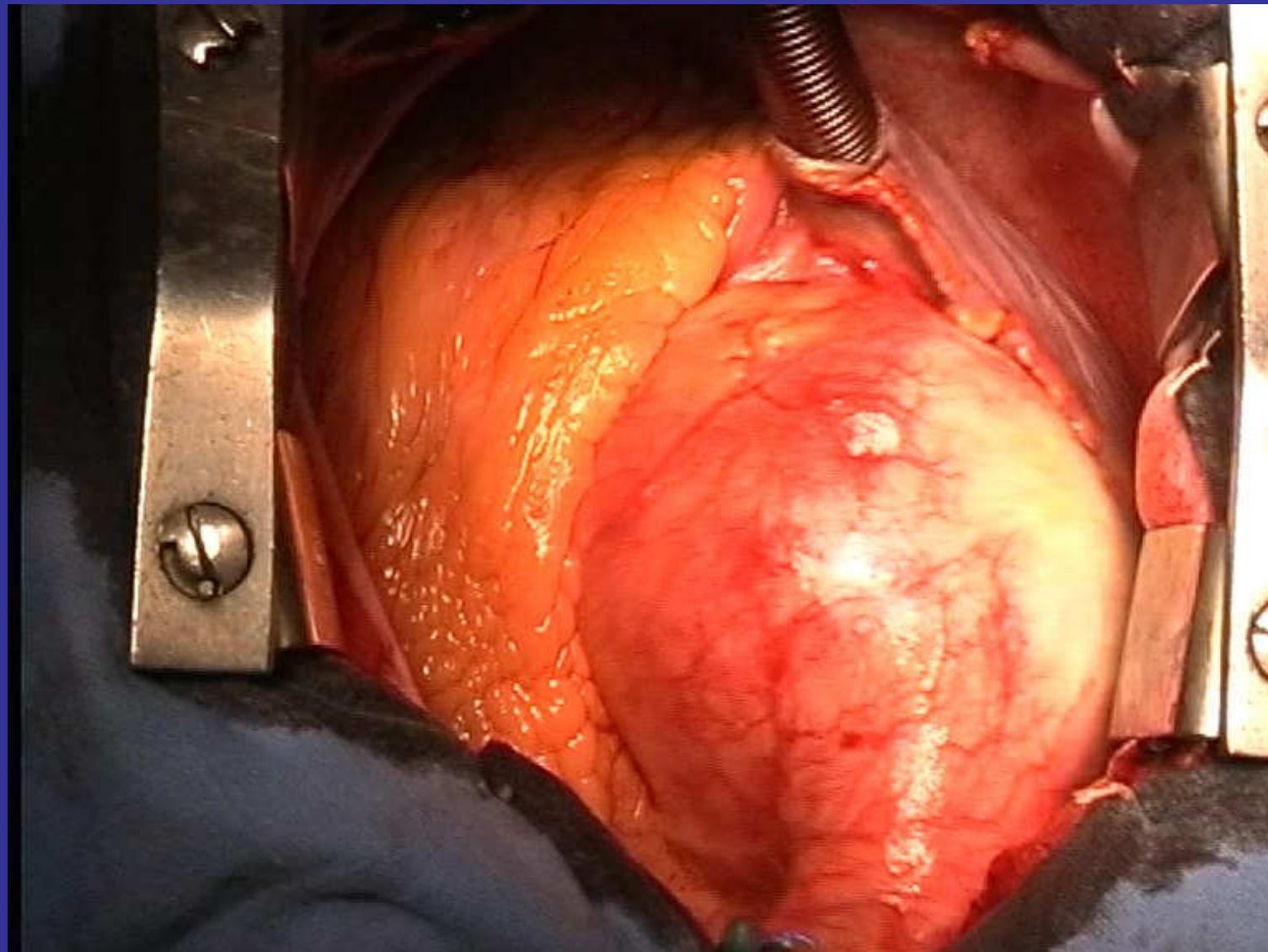


# Anevrysme de l'aorte descendant

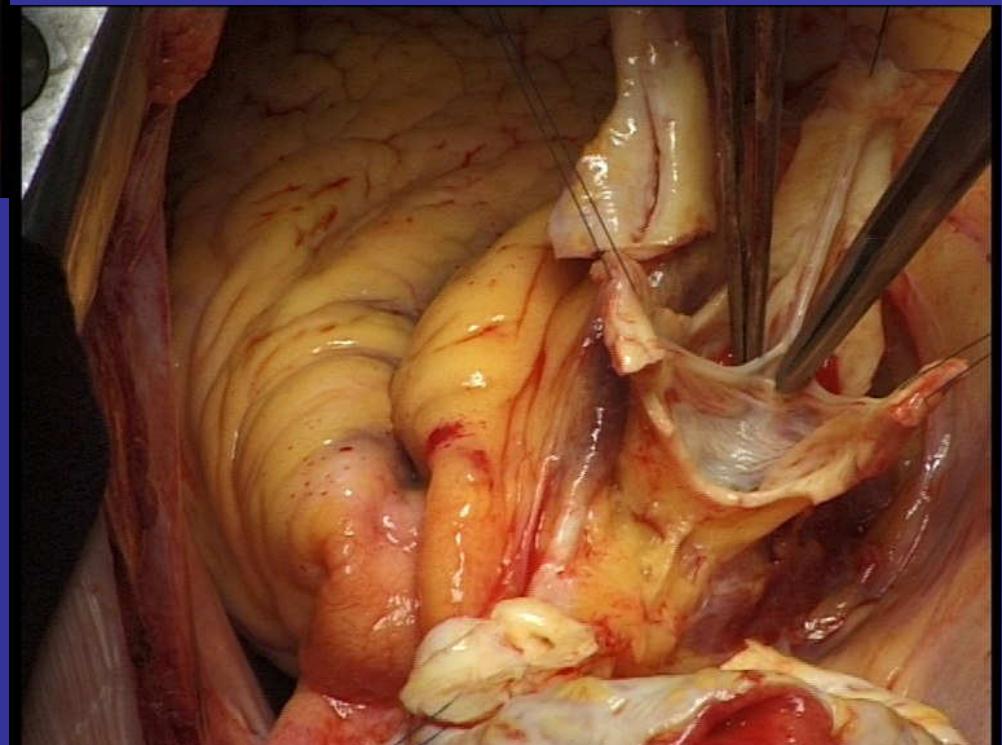
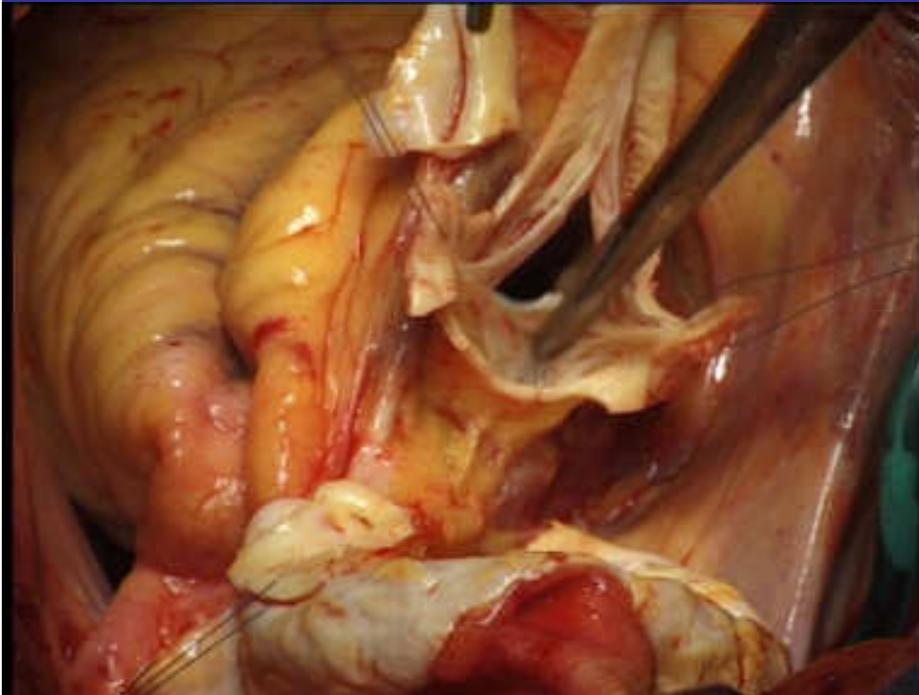
- An.racine aortique
- Stenose valvulaire
- Pure ins.aortique



**Patients with aneurysm of the ascending aorta  
may have or not aortic regurgitation**



# Aortic regurgitation in spite of the presence of normal or nearly normal aortic valve leaflets



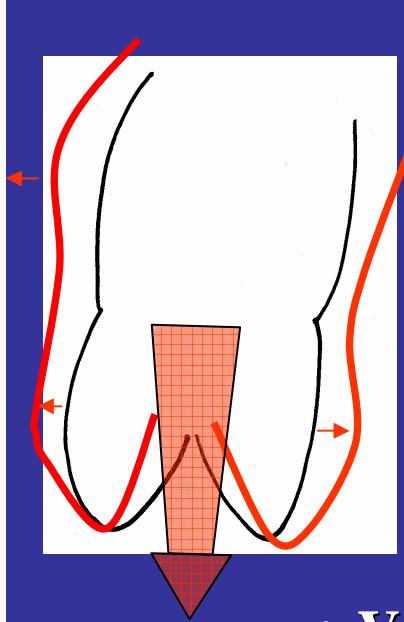
**Conventional treatment = Composite replacement  
(Bentall)**

**Despite the success:**

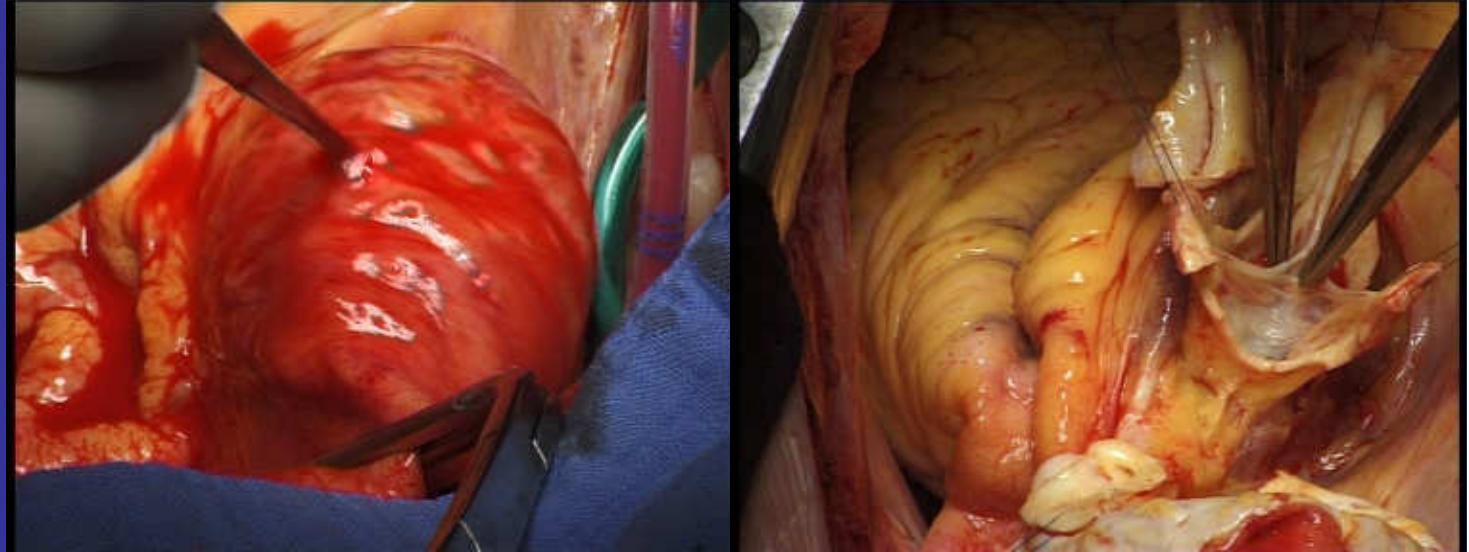
**Complications =**

- T. Embolism
- Endocarditis
- Long-Term anticoagulation

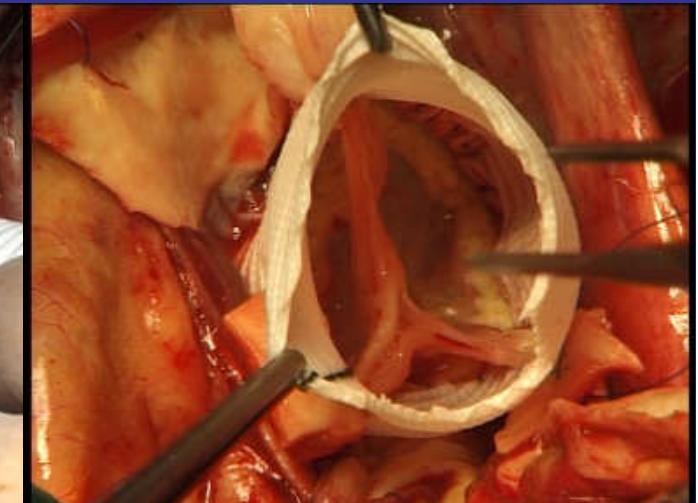
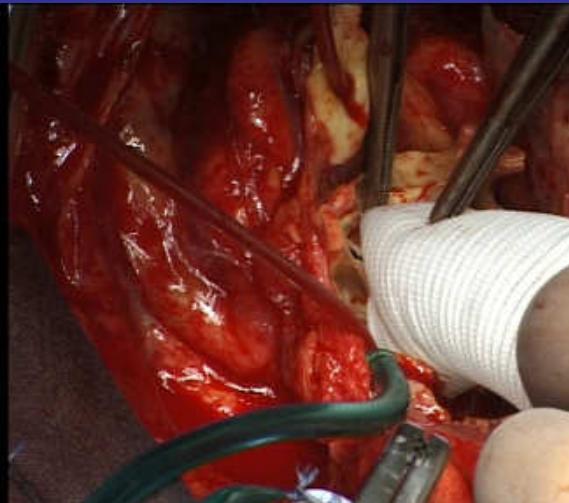
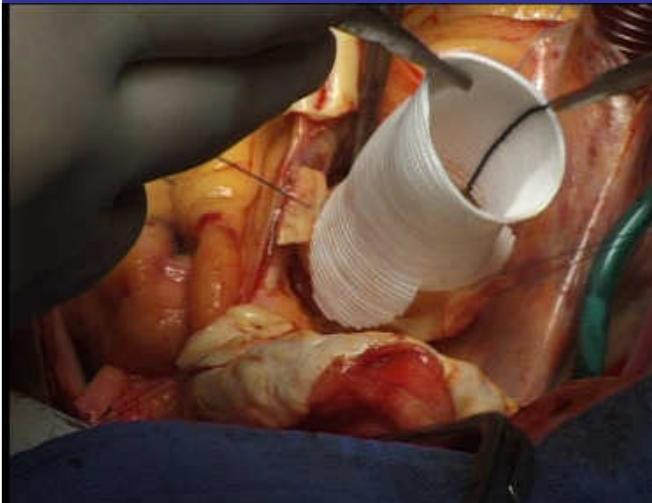
↓ Impetus for the development of new surgical techniques  
preserving the native aortic valve.

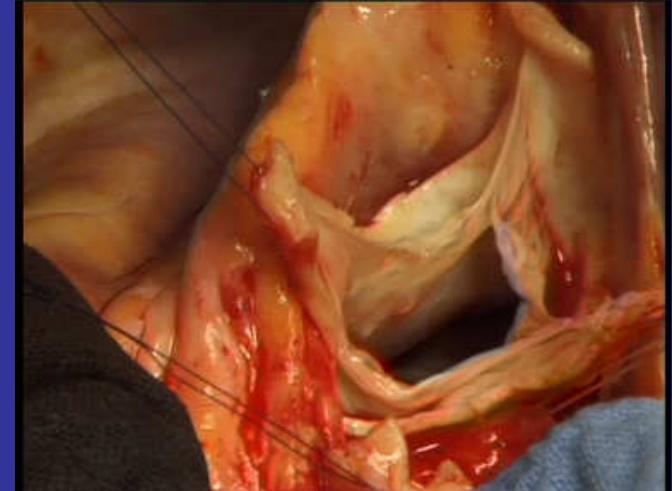
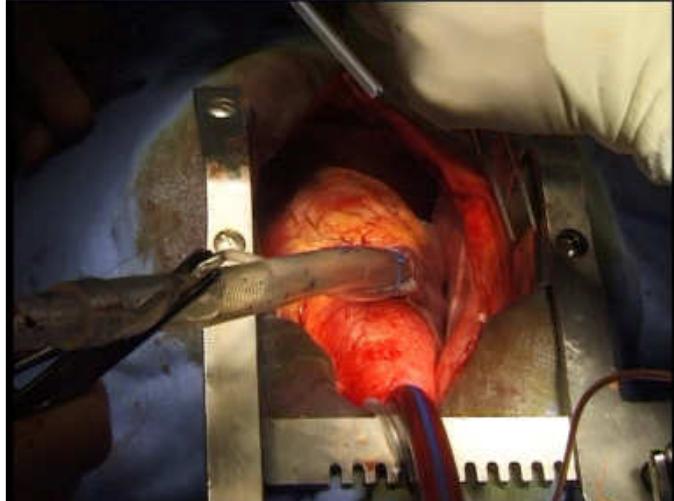


+ Valsalva aneurysm



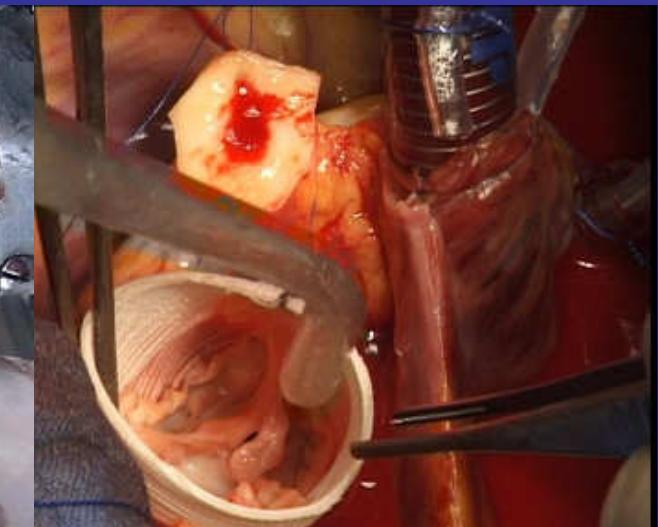
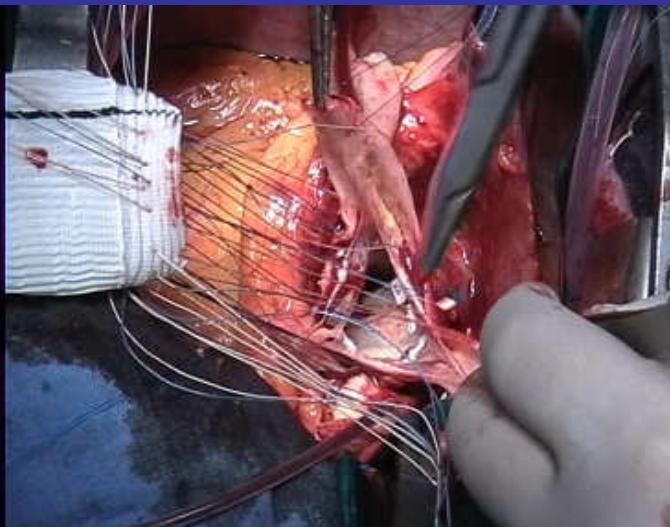
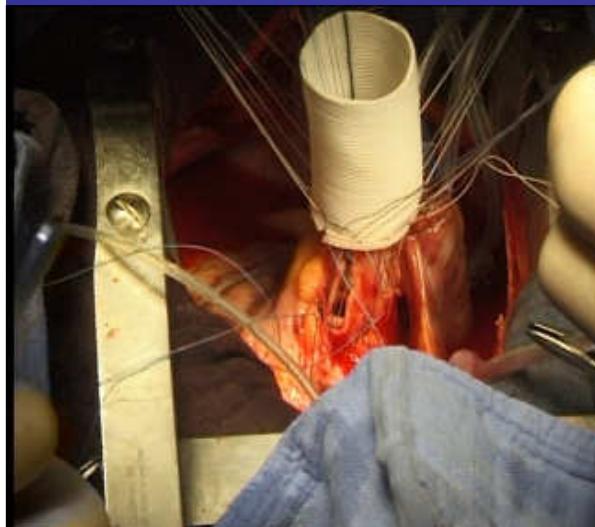
Aortic root remodeling





Valsalva aneurysm

Aortic root reimplantation  
+ dilated aortic annulus



## **Valve sparing operation :**

### **Advantages**

- : - Preserve the native valve**
- No need for anticoagulation**
- No thromboembolism**
- Resistance to infection**

### **Disadvantages : behind**

- Abnormal valve tissue left**



**Recurrence ? Durability ?**

# AORTIC VALVE SPARING SURGERY

The main issue:

*the durability of the preserved valve*

--*recurrence of AR:*

-yacoub:22% *moderate AR(FU:3 Y)*

-david:25% *severe AR(FU:10 Y)*

--*reoperation:*

-yacoub:17% *at 10 years(pts at risk 10)*

-david: 0% *at 8 years(pts at risk 9)*

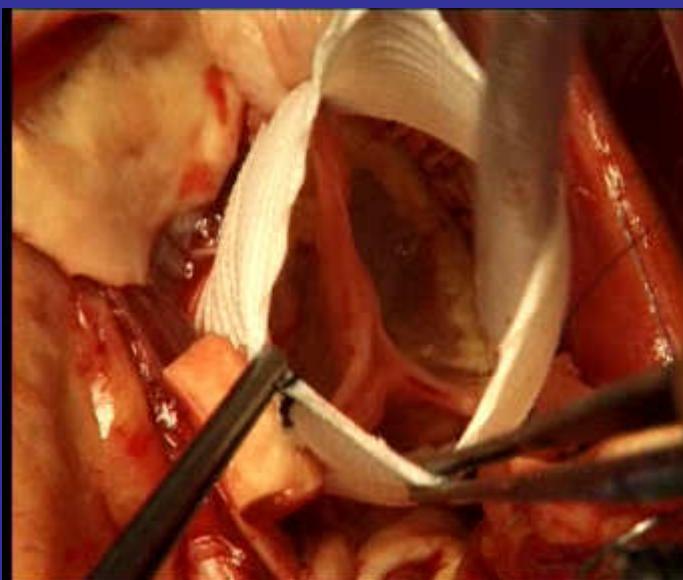
# AORTIC VALVE SPARING SURGERY

- **Recurrence or occurrence of AR**
- patients selection,severity of AR,diseased cusps,overstretched,fenestrations?
- Preoperative missed or untreated cusp(s) prolaps
- Surgery related prolaps,post procedure
- Not optimal coaptation,post procedure:level and area of coaptation,
- « zero tolerance »of residual AR,mainly if eccentric jet

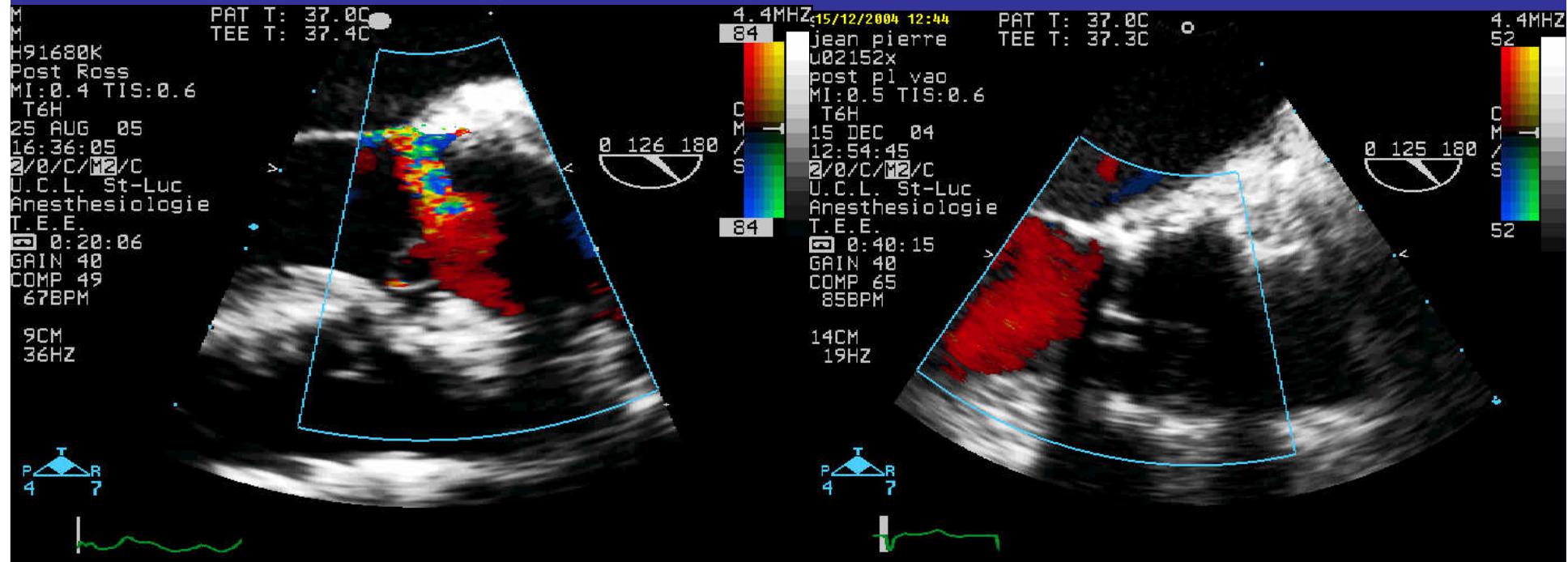
# AORTIC VALVE SPARING SURGERY

- Later on:
- -aortic annulus dilatation?
- 
- -cusp traumatism?(david operation)
- -endocarditis?
- -pseudoaneurysms

# Anevrysme de l'aorte ascendant

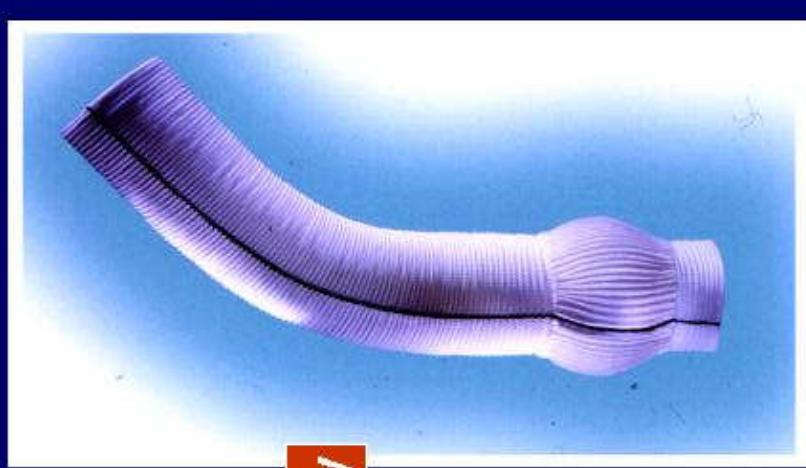
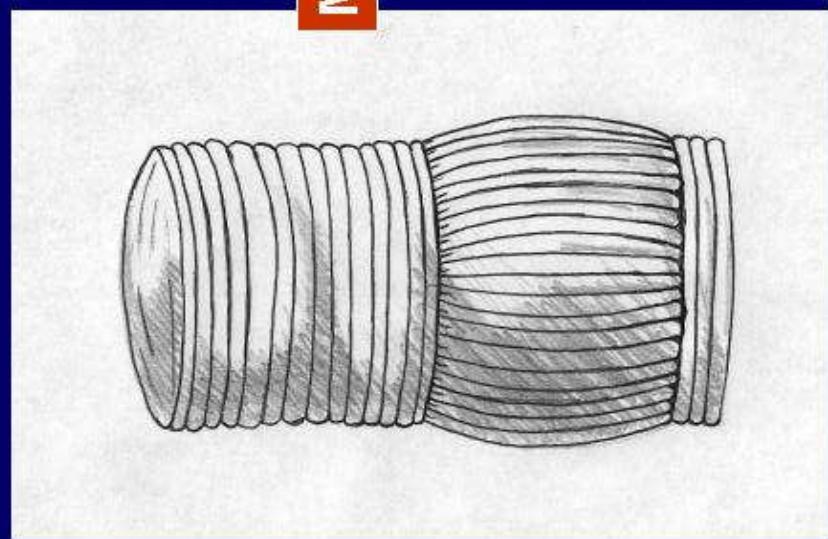


# Anevrisme de l'aorte ascendante



**Original design**

**Gelweave Valsalva™**

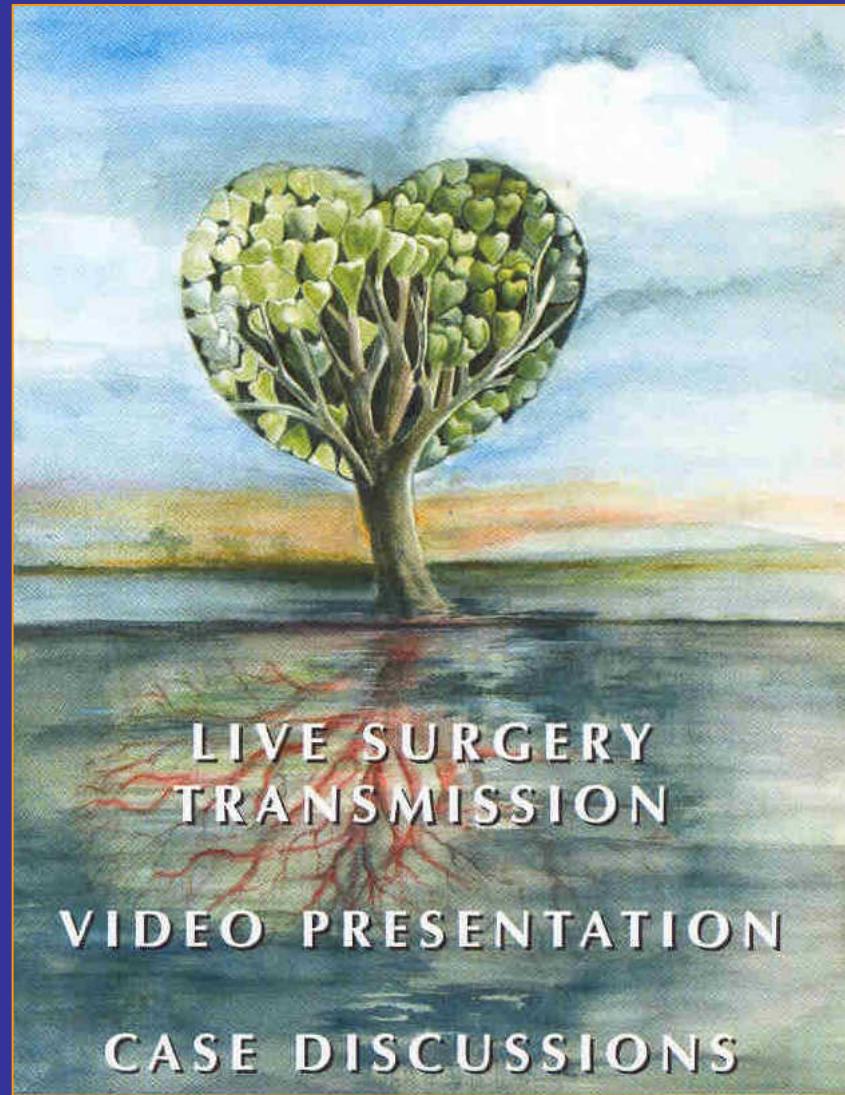


**Main body**

**Skirt**

**Collar**

# **5th Symposium on Aortic and Mitral Reconstructive Surgery**



# Early Experience with Valsalva Prosthesis

## PATIENTS

- 45 pts 04/2001 ⇒ 04/2005
- Mean age 54 y ± 15
- 80 % males
- All elective surgery

# **Early Experience with Valsalva Prosthesis**

## **INDICATION FOR SURGERY**

- AR > II and/or Aorta Dilatation      98%

Mean Annulus:  $25 \pm 4$  mm

Mean Sinus:  $45 \pm 6$  mm

Mean STJ:  $42 \pm 7$  mm

Mean Ascending Aorta:  $51 \pm 12$  mm

- Other cardiac procedure      2 %

# Early Experience with Valsalva Prosthesis

## PREOPERATIVE DATA

- AR >II 63%
- Bicuspid valve 44%
- Marfan Syndrome 5%
- Previous cardiac surgery (2ROSS) 5%
- Mitral Valve Disease 9%
- NYHA > II 24 %
- CAD 2%
- LEF >40% 94%

# **Early Experience with Valsalva Prosthesis**

## **SURGICAL TECHNIQUES (1)**

### **Results:**

- **Free margin reinforcement:** 21 pts (47%)
- **Median raphe resection:** 11 pts (24%)
- **Radial plication:** 10 pts (22%)
- **Patch incorporation:** 4 pts (9%)
  - Tricuspid patch 2 pts (4%)
  - Pericardial patch 2 pts (4%)
- **Triangular resection:** 1 pt (2%)

# **Early Experience with Valsalva Prosthesis**

## **SURGICAL TECHNIQUES (2)**

**Associated Procedures:**

- |                    |            |
|--------------------|------------|
| • MV repair        | 4 pts (9%) |
| • Arch replacement | 3 pts (7%) |
| • PFO closure      | 2 pts (4%) |
| • CABG             | 1 pt (2%)  |
| • Ross procedure   | 1 pt (2%)  |

# **Early Experience with Valsalva Prosthesis**

## **Results**

- Mean CCT                                    113 m (36-155)
- Mean CPB                                    135 m (66-194)
- Circulatory arrest                            5 pts

# **Early Experience with Valsalva Prosthesis**

## **HOSPITAL EVENT (1)**

- No mortality
- Morbidity
  - 4 early reop : - 3 bleeding
  - 1 sternal

# **Early Experience with Valsalva Prosthesis**

## **HOSPITAL EVENT (2)**

**Mean hospital stay**      **11 d ± 4**

**Discharge echography:**

**No AR**      **32 pts (71%)**

**AR grade I (central)  
(29%)**      **13 pts**

# **Early Experience with Valsalva Prosthesis**

## **LATE RESULTS**

**Mean Follow-up :**  $20 \pm 13m$

**No Late Mortality**

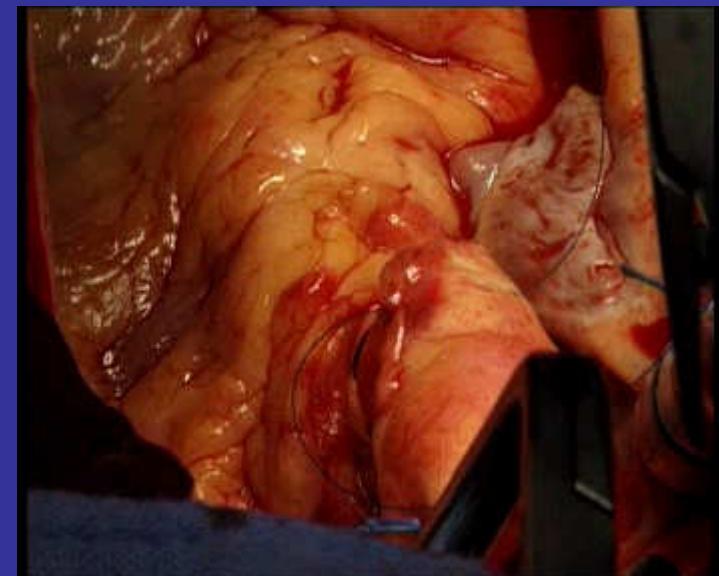
**Reoperation** 1 pt (CABG)

**All survival in NYHA grade I-II**

**Echographic FU:** No AR progression 40 pts  
5 patients with AR grade II

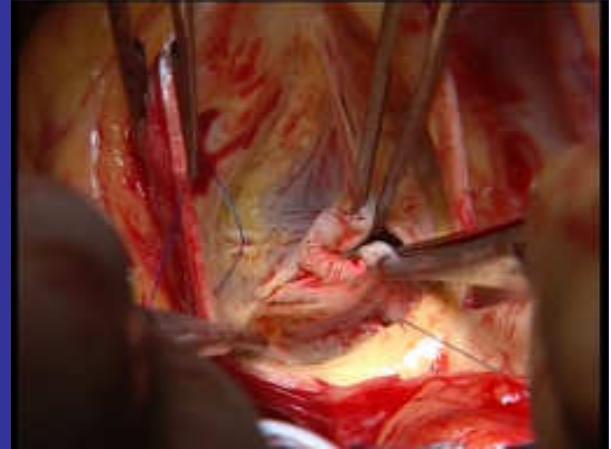
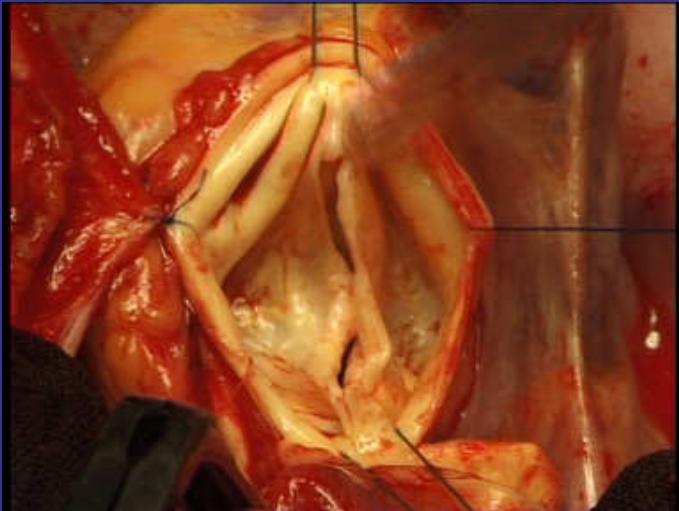
# Anevrysme de l'aorte descendant

- Bicuspid aortic valve
- Stenose
- Insuffisance
- Racine aortique
- Dilatée ou
- non

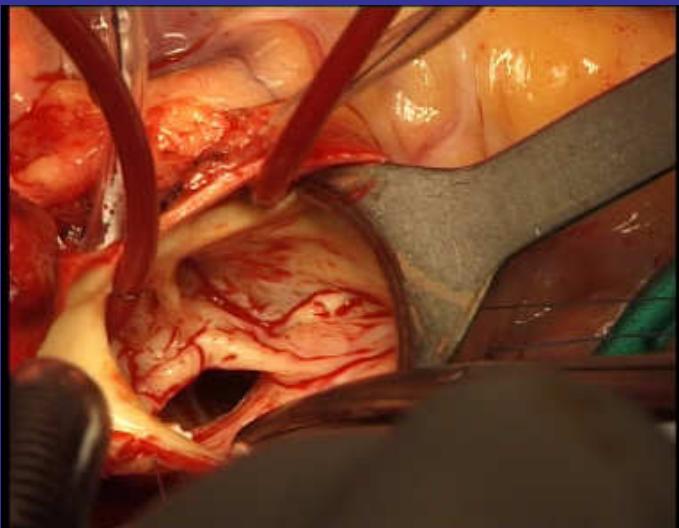


## Age du patient:

- < 50 ans:
  - Ross
  - mécanique
  - biologique
- 50 à 65-70 ans:
  - mécanique
  - biologique
- > 70 ans:
  - biologique



- Some bicuspid entities



# Bicuspid Aortic Valve Repair and Root Management Mid Term Results

G El Khoury MD, Vanoverschelde J-L MD Phd , D Glineur MD, A Poncelet MD, R Verhelst MD, P Astarci MD, JC Funken MD, J Rubay MD Phd, P Noirhomme MD.

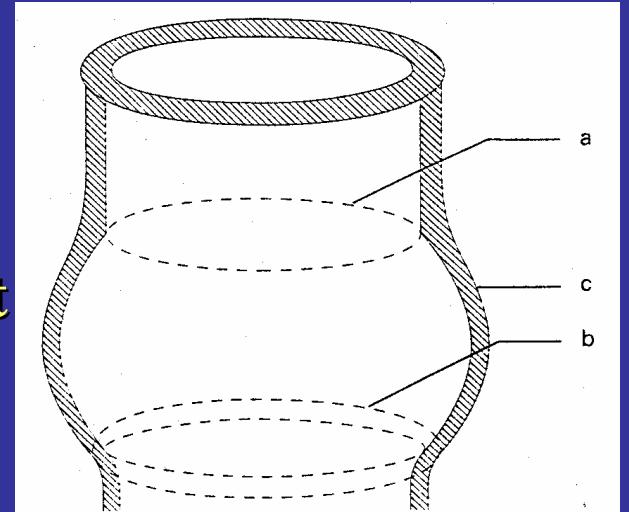
Cliniques Universitaires Saint-Luc Brussels-Belgium

## **DISCLOSURE INFORMATION:**

**No relationships exist related to this presentation**

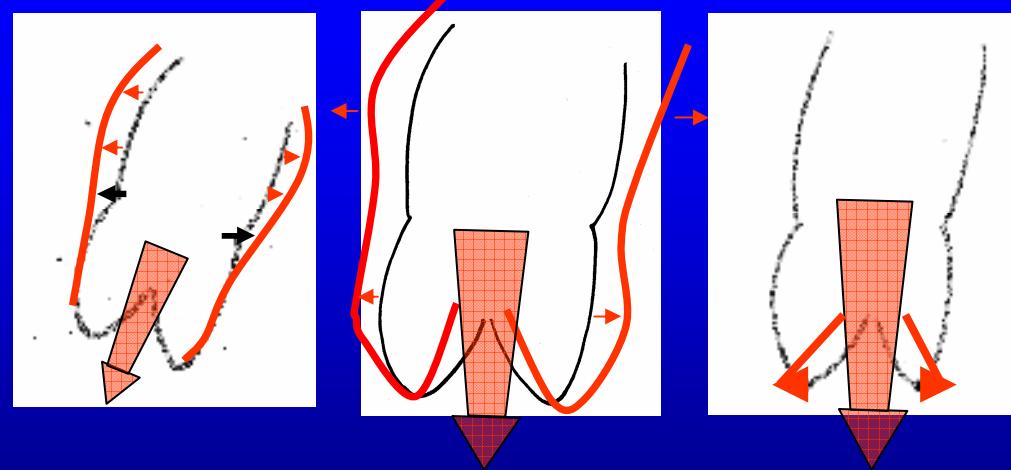
- Aortic cusps
- Aortic annulus
- Valsalva sinuses
- Commissures
- Sinotubular junction

## Aortic Root

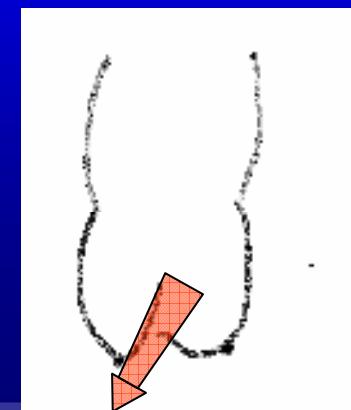


*Figure 1* Diagrammatical representation of the aortic root: (a) sinotubular junction; (b) basal ring (surgical annulus); (c) the sinuses of Valsalva.

### • ROOT PATHOLOGY



### • CUSP PATHOLOGY (PROLAPSE)



# **Functional classification ( *TEE + Visual inspection* )**

## **Functional type**

**Type 1 : normal cusp motion**

**Type 2 : cusp prolapse**

**Type 3 : restricted cusp motion**

## **Lesions**

**1a : sino-tubular junction dilation**  
**1b : ST junction + sinuses dilation**  
**1c : annular dilation**  
**1d : cuspal defect**

**Excess of cuspal tissue**  
**Commissure flailed or distorted**

**Fibrous thickening**  
**Calcifications**

Functianal classification of aortic root/valve abnormalities and their correlation with etiologies and surgical procedures.

G. El Khoury, D Glineur, J Rubay et All Current Opinion in Cardiology 20:115-120. 2005

## **AIM OF THE STUDY:**

To report our experience in conservative surgery of regurgitant aortic bicuspid valve, isolated or associated to a dilatation of the aortic root and ascending aorta.

## PATIENTS:

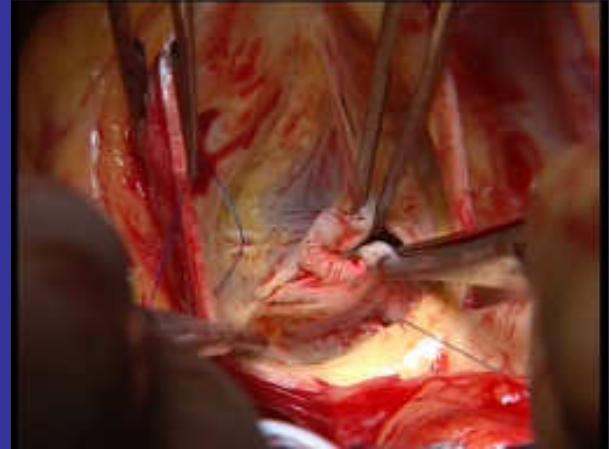
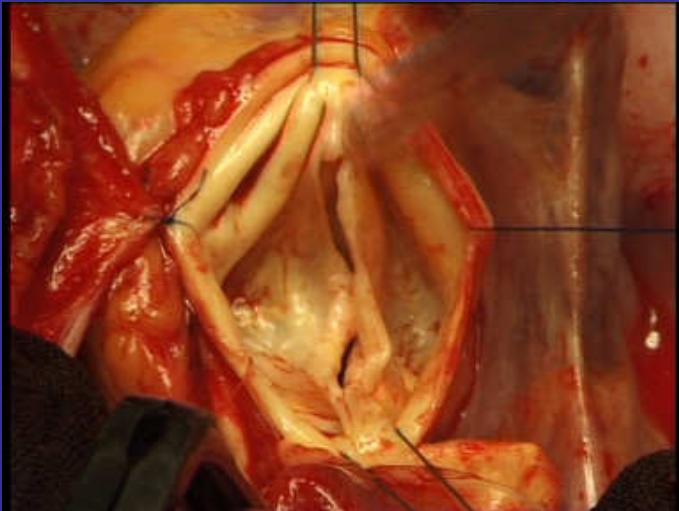
- N : 68 pts 12/1995 ⇒ 11/2004
- Mean age : 43 y (16-76 y)
- ♂ : 65 (96%)
- NYHA > II : 42 pts (62%)
- Mean LVEF : 59 % ± 11

## INDICATION FOR SURGERY

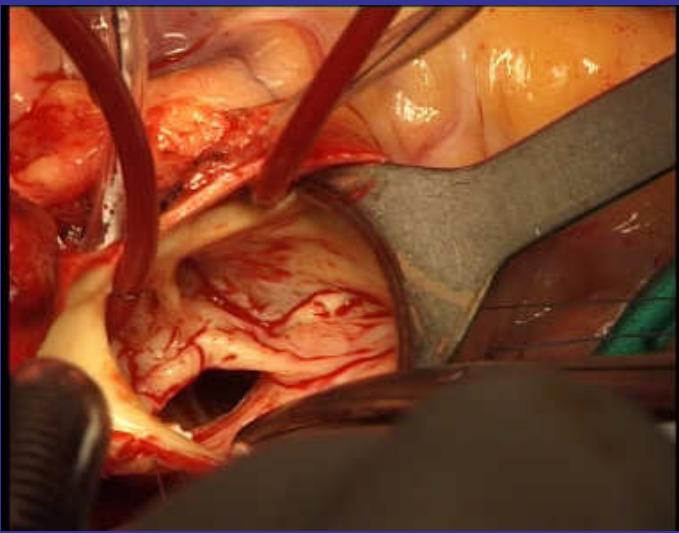
- AR severity ( > 2) : 49%
- Aortic diameter : 53%
- Other cardiac procedure : 7%

## **SURGICAL TECHNIQUES**

- Leaflet pathology
- Root pathology



- Some bicuspid entities



# **Standardized surgical technique**

## **a) Leaflet pathology :**

### **1) Adequation of the free margin length:**

- Plication
- Resection
- Patch incorporation

### **2) Reinforcement of the free margin (PTFE)**

## **b) Root management :**

### **1) without root dilatation :**

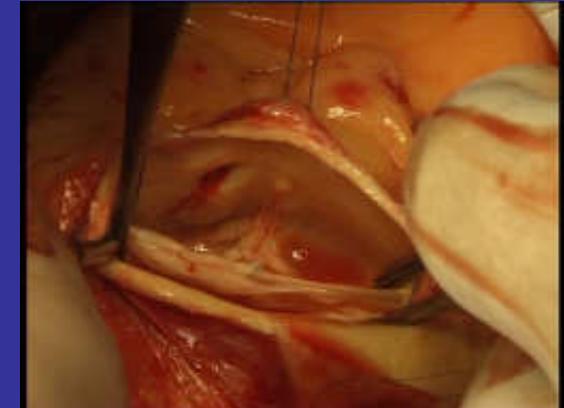
- Subcommissural annuloplasty
- STJ plasty

### **2) with root dilatation :**

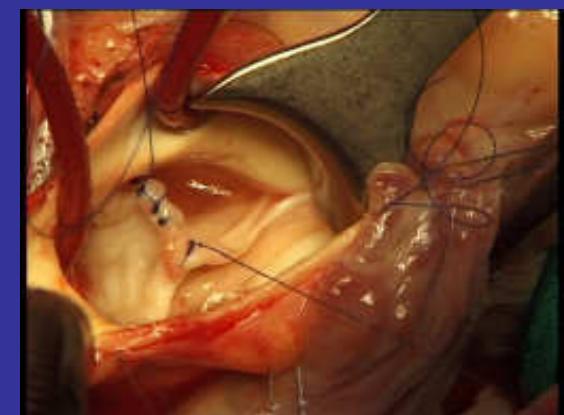
- Remodeling
- Reimplantation



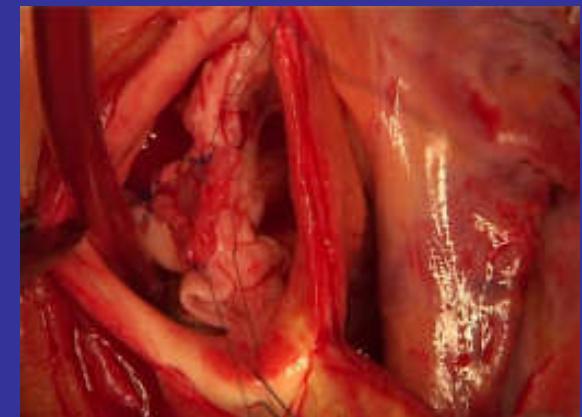
Plicatio  
n



Resection-  
suture



Raphe resection  
Patch  
incorporation



# **Standardized surgical technique**

## a) Leaflet pathology (prolapse) :

1) Adequation of the free margin length:

- Plication
- Resection
- Patch incorporation

2) Reinforcement of the free margin (PTFE)

## b) Root management :

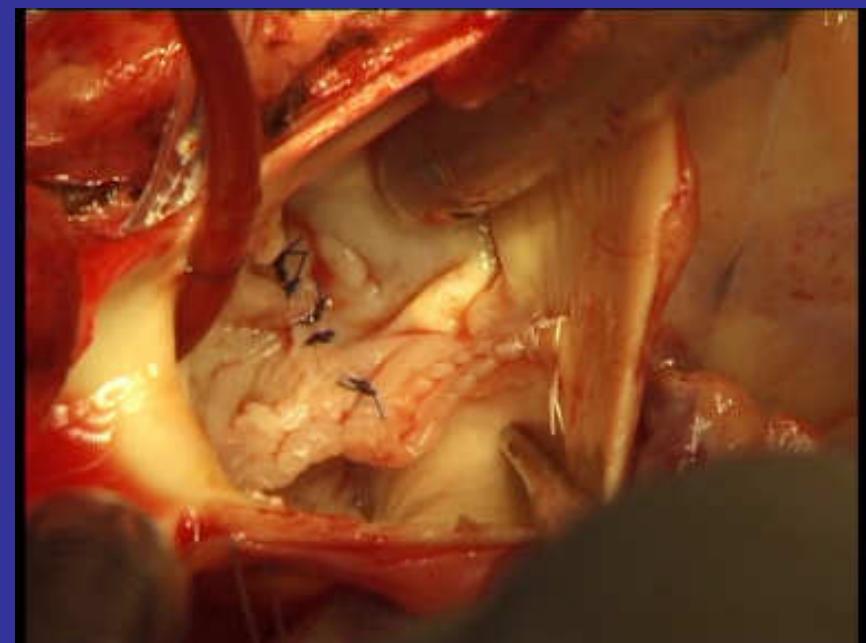
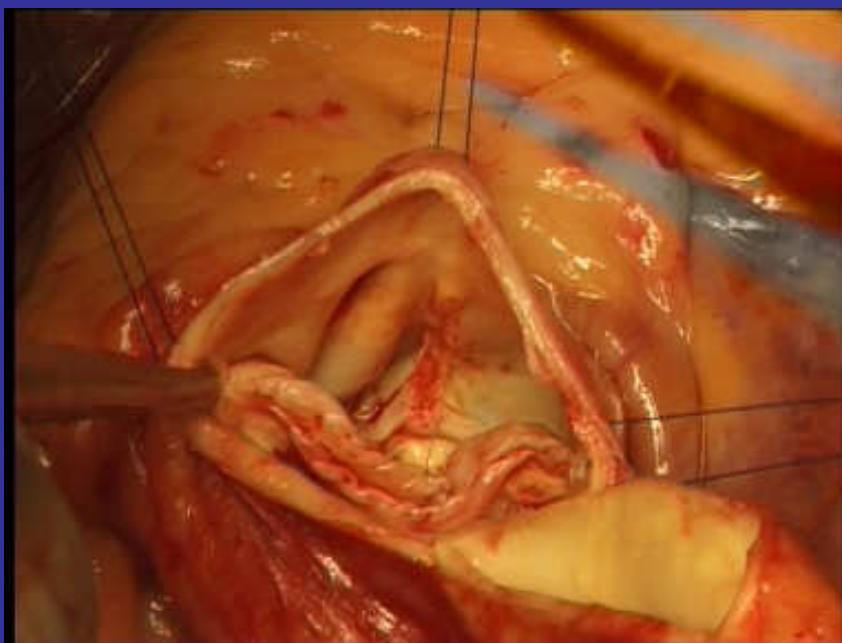
1) without root dilatation :

- Subcommissural annuloplasty
- STJ plasty

2) with root dilatation :

- Remodeling
- Reimplantation

- Free margin reinforcement :
  - stabilisation of the repair
  - consolidation fragilised margin
  - adjust level coaptation



# **Standardized surgical technique**

## **a) Leaflet pathology (prolapse) :**

1) Adequation of the free margin length:

- Plication
- Resection
- Patch incorporation

2) Reinforcement of the free margin (PTFE)

## **b) Root management :**

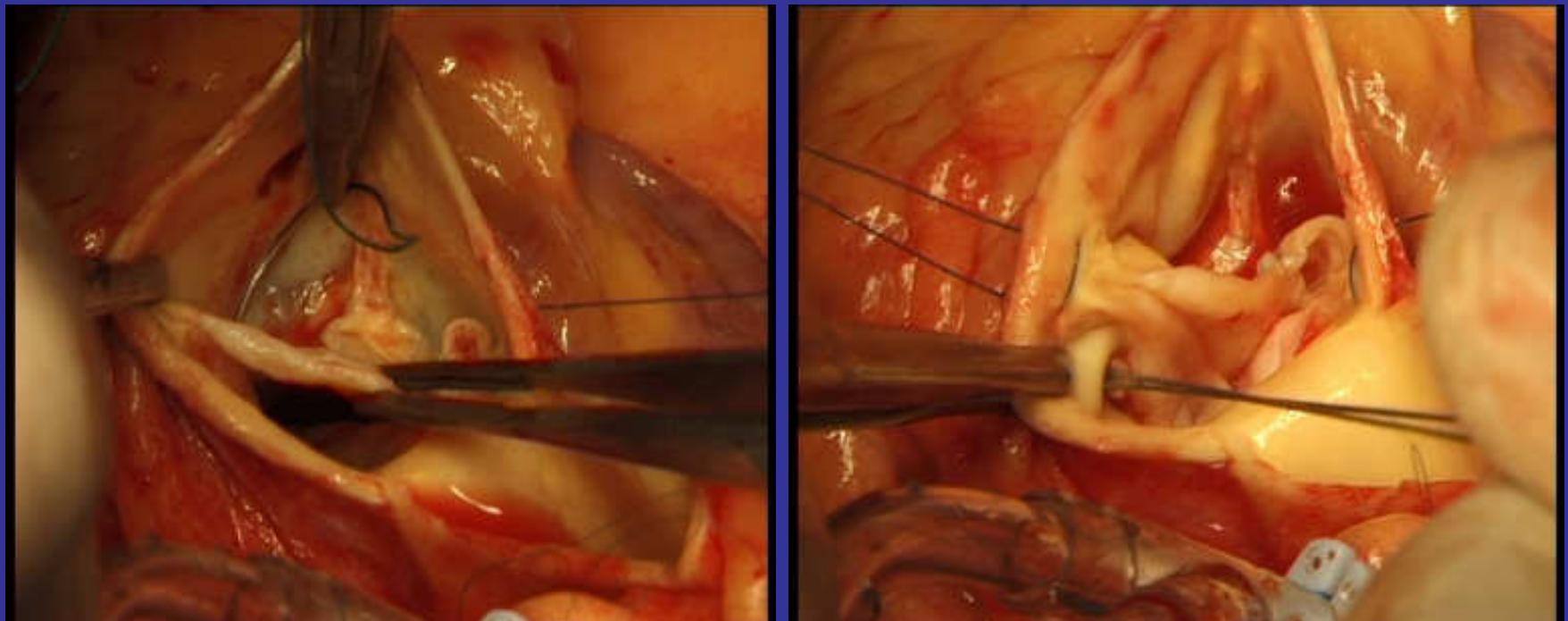
1) without root dilatation :

- Subcommissural annuloplasty
- STJ plasty (plication)

2) with root dilatation :

- Remodeling
- Reimplantation

- Subcommissural annuloplasty



# **Standardized surgical technique**

## a) Leaflet pathology (prolapse):

1) Adequation of the free margin length:

- Plication
- Resection
- Patch incorporation

2) Reinforcement of the free margin (PTFE)

## b) Root management :

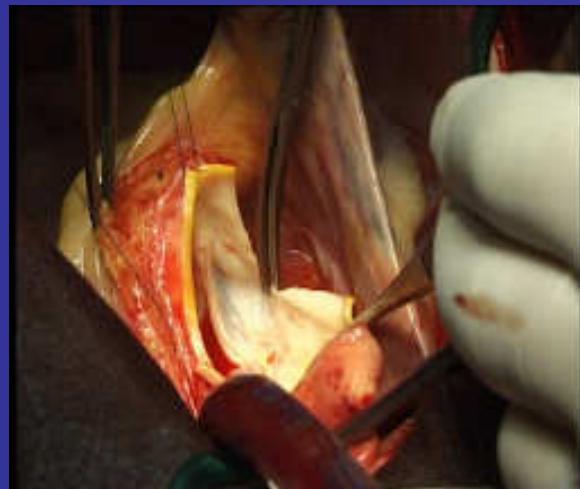
1) without root dilatation :

- Subcommissural annuloplasty
- STJ plasty (plication)

2) with root dilatation :

- Remodeling
- Reimplantation

## Remodeling



## Reimplantation



## SURGICAL TECHNIQUES (1)

- Radial plication: 13 % (9 pts)
- Triangular/raphe resection: 77 % (52 pts)
- Patch incorporation : 13 % (9 pts)
- Cusp extension 3 % (2 pts)
  
- Free margin reinforcement: 75 % (51 pts)
- Subcommissural annuloplasty: 69% (47 pts)
- STJ plasty 32 % (22 pts)
- Root remodeling: 19 % (13 pts)
- Root reimplantation: 29 % (20 pts)
- Associated procedure: 28% (19 pts)

## **SURGICAL TECHNIQUES (2)**

- 2d run for AR > I or eccentric jet 5 pts
- Mean AoCCT 71 mn (36-155)
- Mean CPB 91 mn (66-194)

## HOSPITAL EVENTS (1)

- No mortality
- Morbidity :
  - 3 AR > II (4%) at days 7, 8 and 11 => REDO
  - 5 Bleeding
  - 1 BAV conduction 2/1 => Pace maker
  - 1 AMI => conservative treatment

### **3 Early redo for AR > II**

j7 : Median raphe suture disruption  $\Rightarrow$  re- repaired

J11 : Tricuspid autograft suture disruption  $\Rightarrow$  re-repaired

j8 : Commissural disruption  $\Rightarrow$  Ross procedure

## HOSPITAL EVENTS (2)

- Mean hospital stay 9 d (5-21)
- Discharge echography:
  - No AR 48 pts (70%)
  - AR grade I (central) 19 pts (30%)

## LATE RESULTS (1)

Mean clinical Follow-up: 40 months (8-115)

Mortality: 3 pts (not cardiac related)

Redo: 2 pts (3%): 1 AR and 1AS

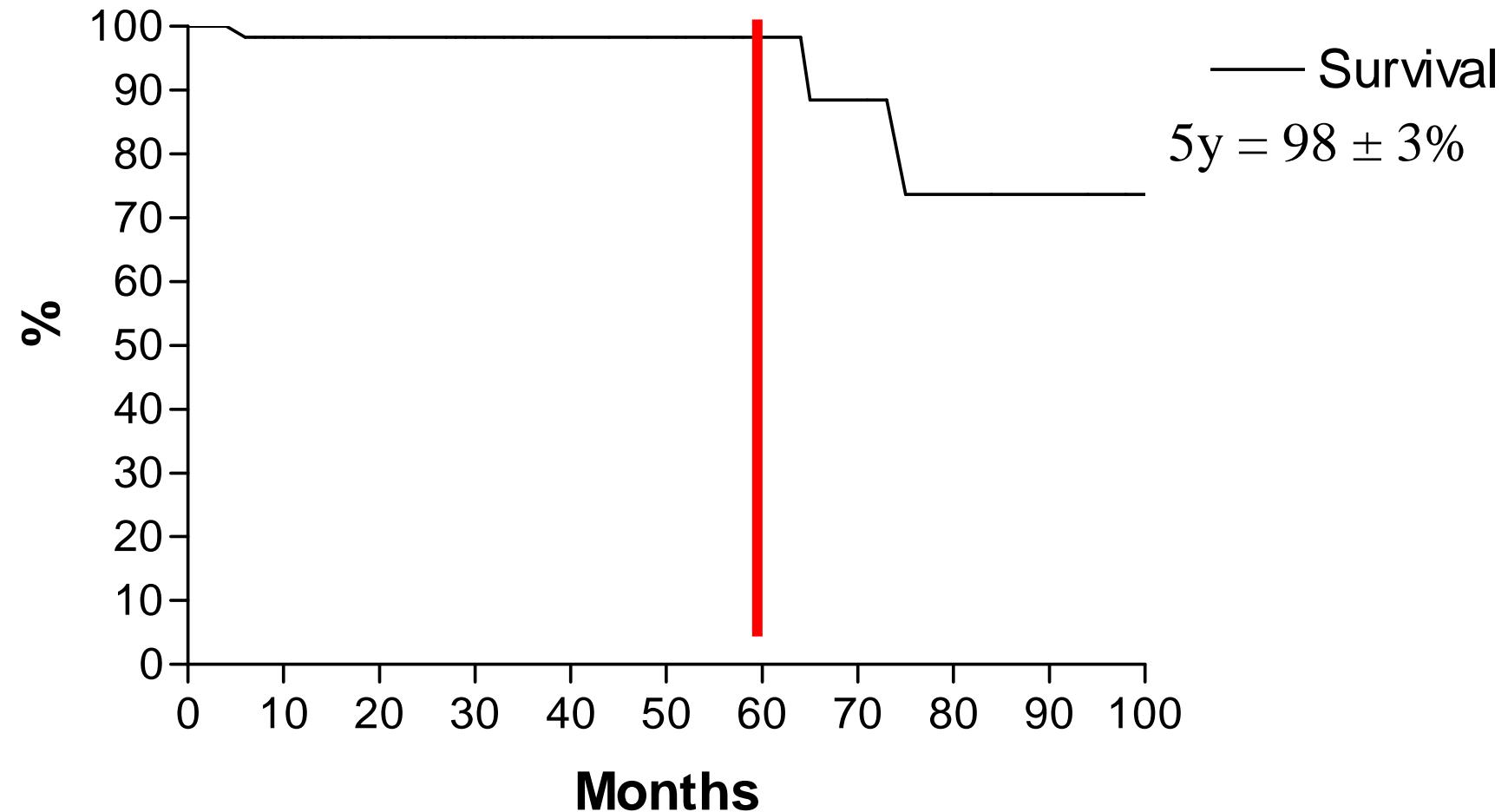
One reoperation at month 23 : AR 3/4 ,  
tric. patch perforation => ROSS procedure

One reoperation at month 98 : Ao Valve stenosis  
(calcifications) => RVAo

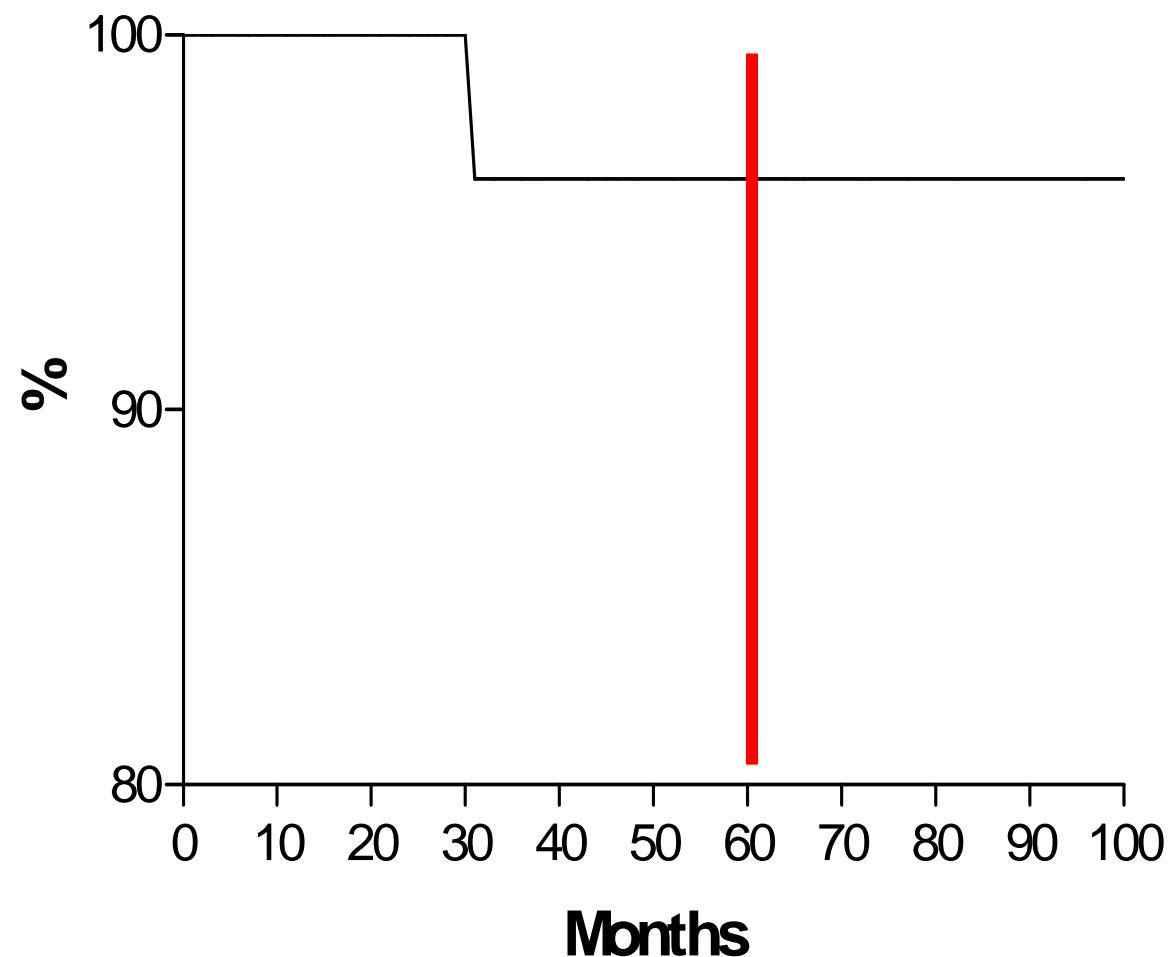
## LATE RESULTS (2)

- Echographic FU (median 26 months): 62 pts
  - No AR progression 58 pts (94%)
  - 4 patients with AR grade I → II (6%)
  - mean peak gradient :  $10 \pm 6$  mmHg

## Survival proportions



## **Freedom from AR > 2**



Subject at risk: 67

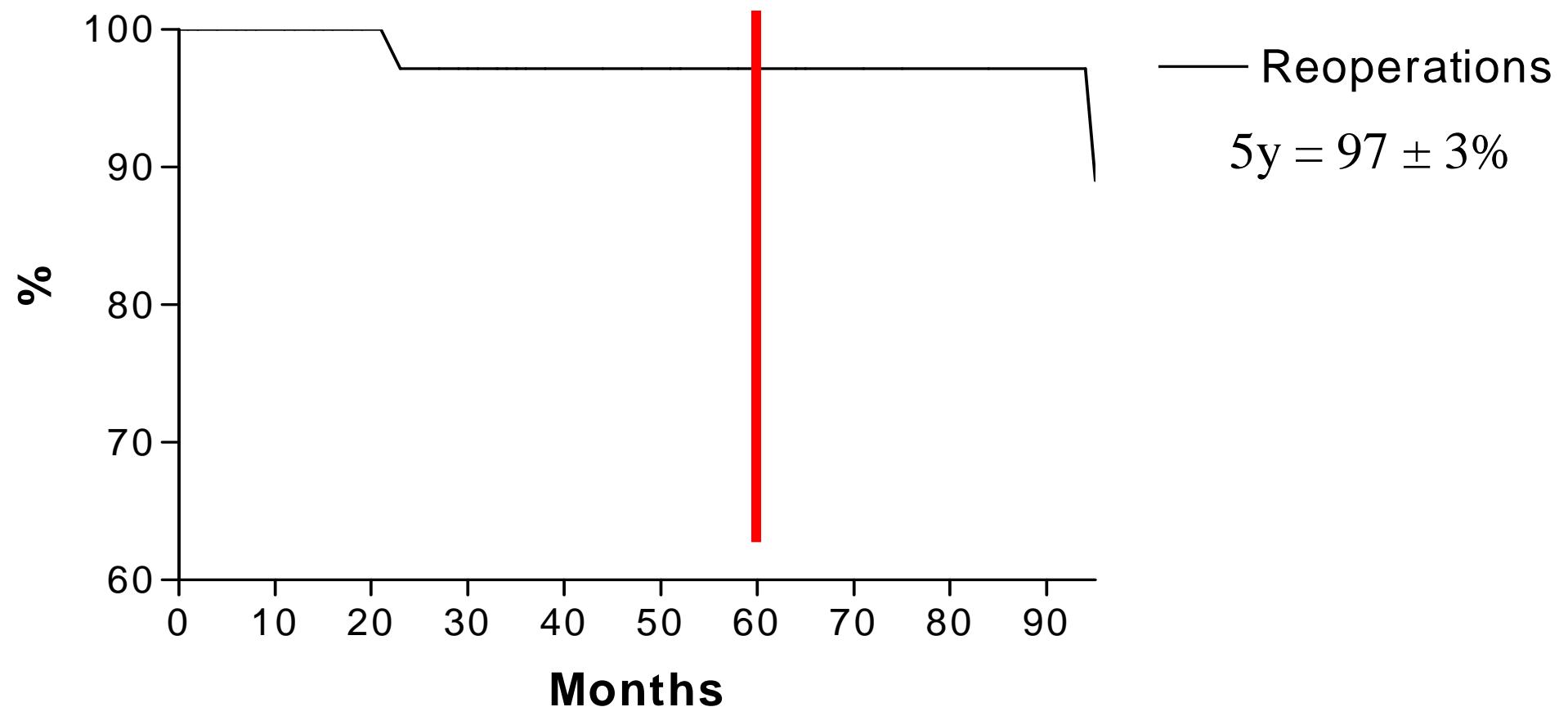
36

15

6

3

## Freedom from Valve reoperation



Subject at risk: 67

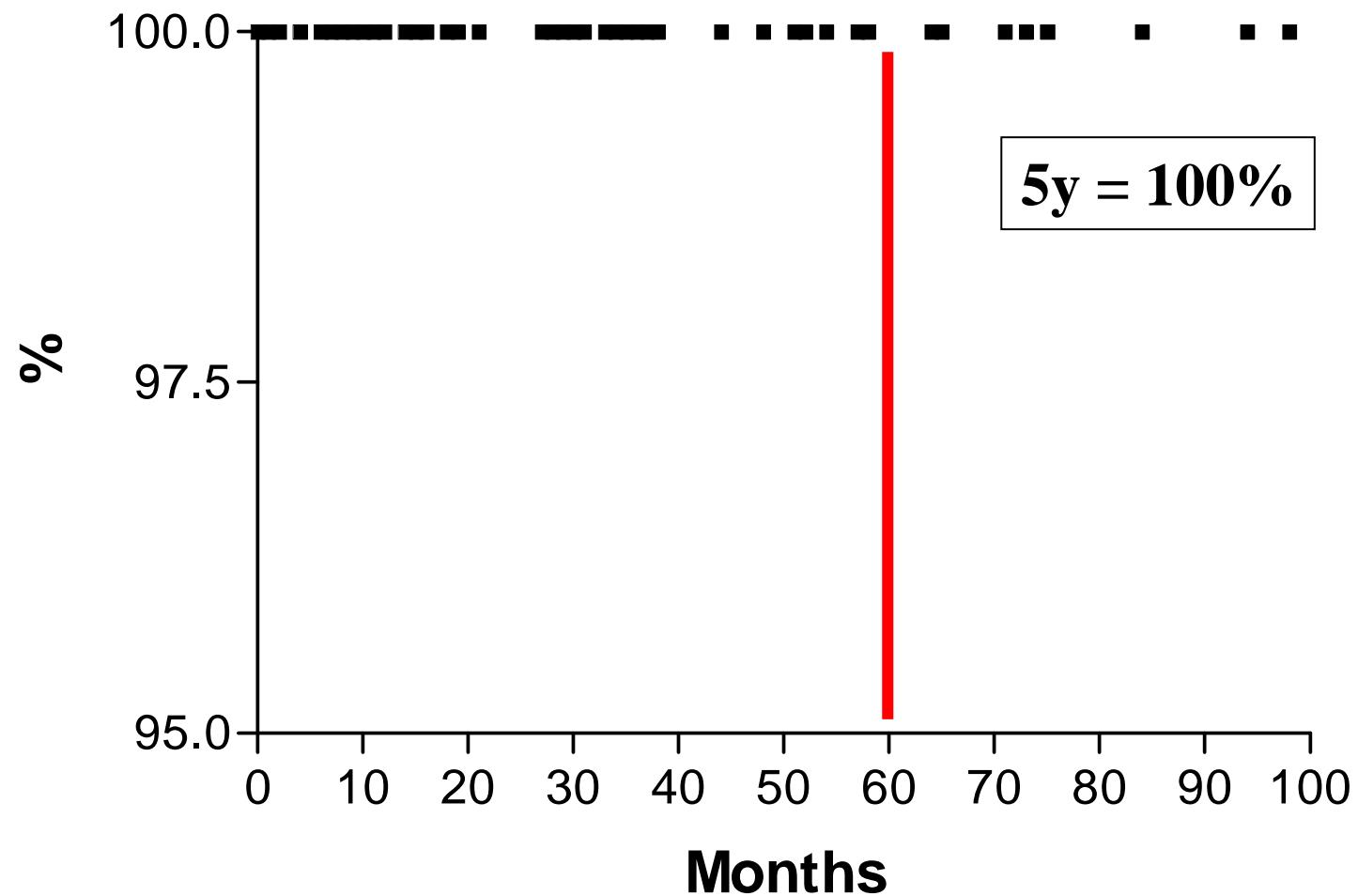
36

15

6

3

# **Freedom from NYHA>2, Endocarditis, Thromboembolism**



Subject at risk: 67

40

20

8

3

## CONCLUSIONS

- The absence of early post discharge reoperation or recurrence of AR shows the stability of the repair achieved by our standardised surgical technique
- The stabilisation and/or the replacement of the aortic root contributes in our opinion to the durability of the repair
- Leaflet management gives excellent mid term results. Longer follow up is necessary for long term durability

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