

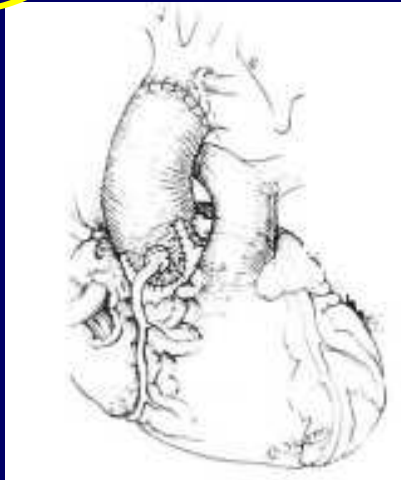
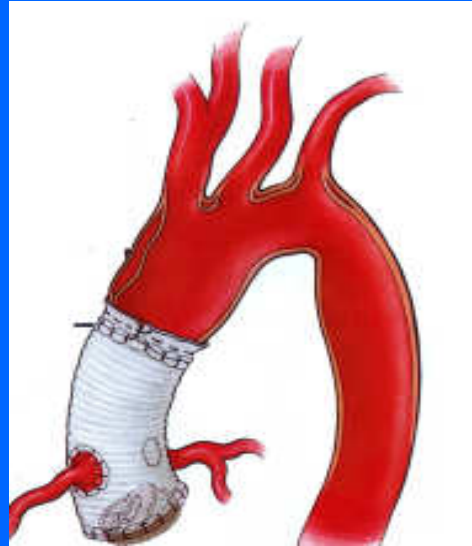
# **The Aortic Valve and The Aortic Root in Type A Aortic Dissections**

**Optimal Surgical  
Technique**

# Type A aortic dissection

## Objectives of surgical repair

- Replace the segment of ascending aorta where the **intimal tear** occurred
- Treat **aortic regurgitation**
- Eliminate any **antegrade flow** in the false lumen
  
- Keep the patient **ALIVE**



# Type A aortic dissection

## Surgical Technique

- Emergency surgery
- « Open » distal anastomosis
  - Avoid aortic Xclamp
  - Inspect the Transverse Ao Arch (30% intimal tear)
- Antegrade flow
- AORTIC ROOT & VALVE ?

..... Canulation of the Axillary Artery

# Type A dissection

## Disease of the aortic valve

- « de novo » aortic regurgitation due to detachment of one or more commissures and prolapse of the valve
- Preexisting disease of the aortic valve and/or root prior to the dissection

# How was the aortic valve **PRIOR TO** dissection ?

- Past cardiac history
- Prior echo studies
- Preoperative echo
- Operative findings

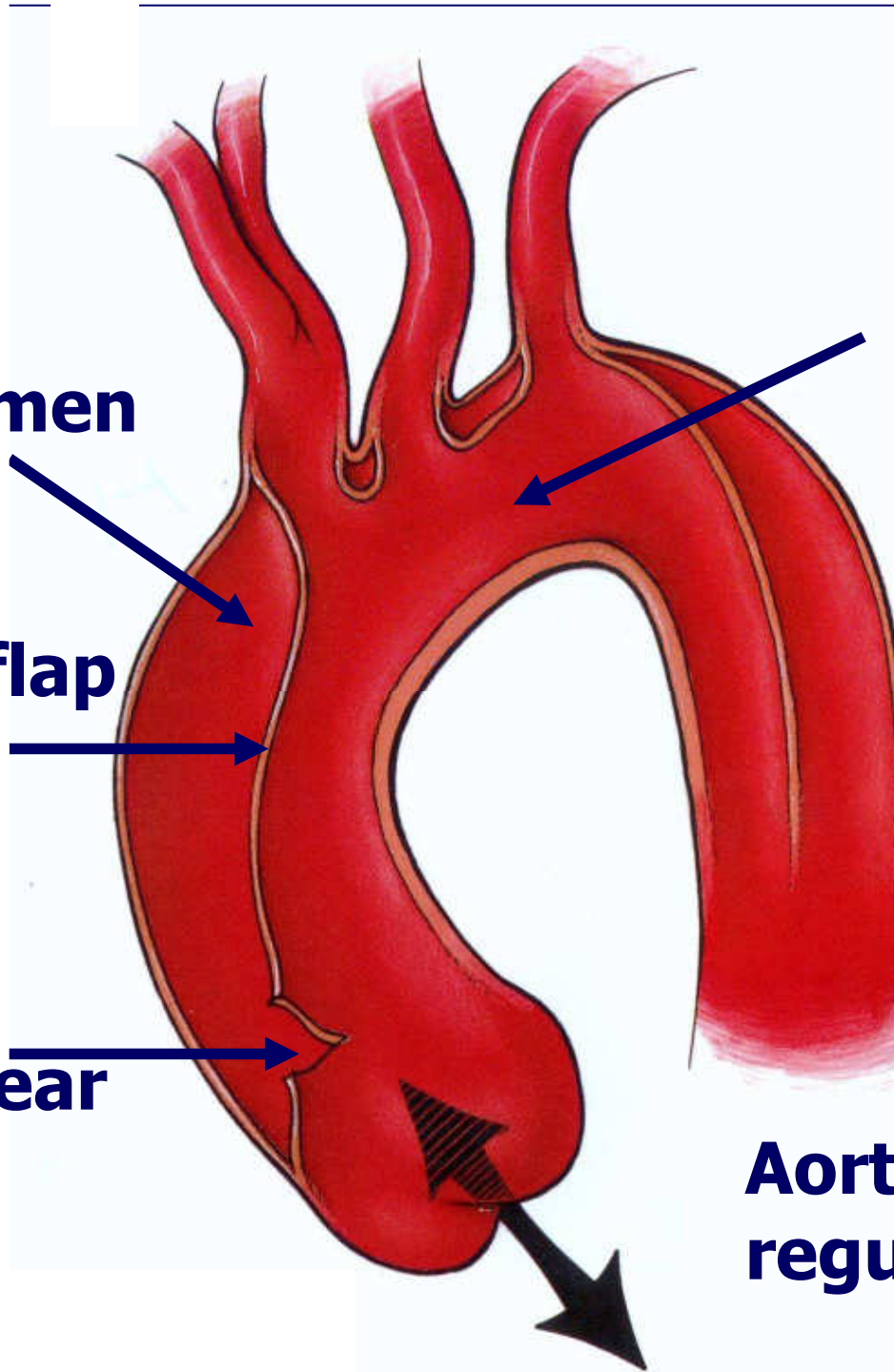
**False lumen**

**True lumen**

**Intimal flap**

**Intimal tear**

**Aortic  
regurgitation**



# Status of Aortic VALVE & ROOT PRIOR to Dissection

## ■ Aortic Valve

- Normal
- Bicuspid
- Calcified
- Aortic Regurgitation

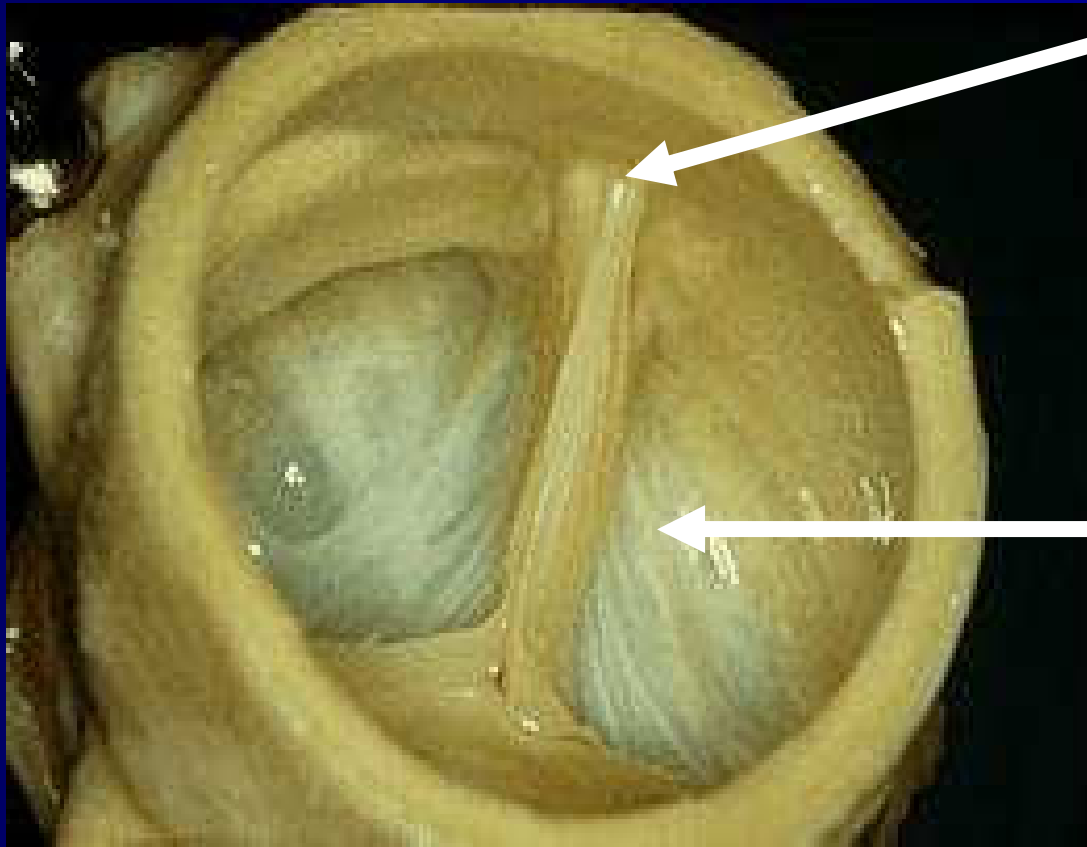
## ■ Aortic Root

- Normal
- Dilated



# Bicuspid aortic Valve

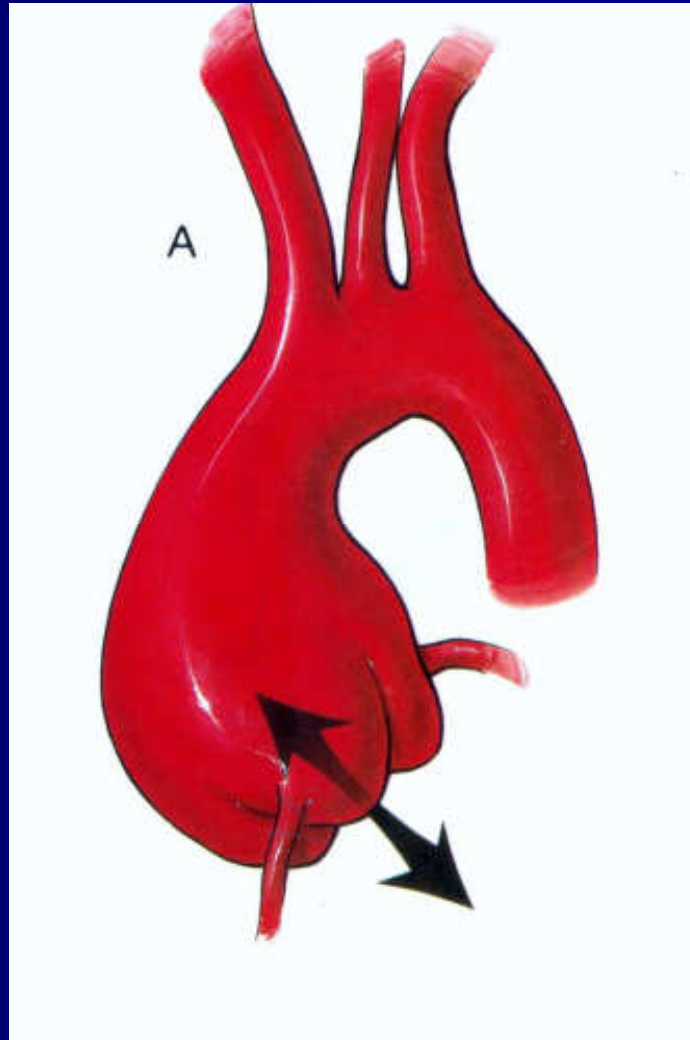
## Normal aortic Root



Commissure

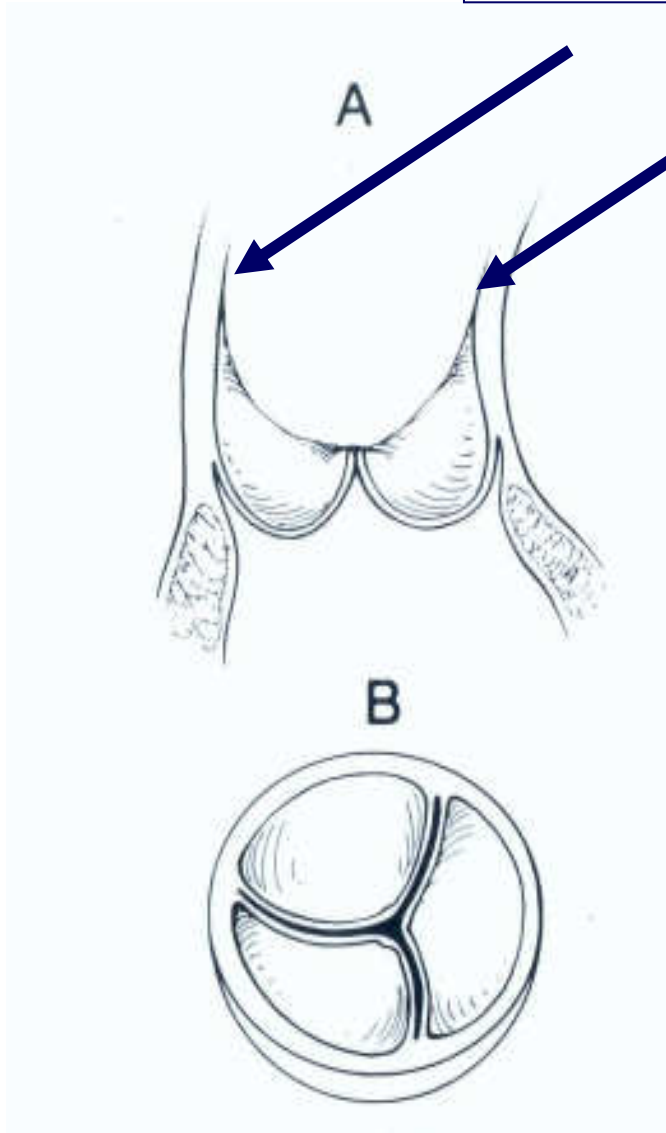
Cusp

# DILATED Aortic Root



**Aortic  
Regurgitation**

commissures

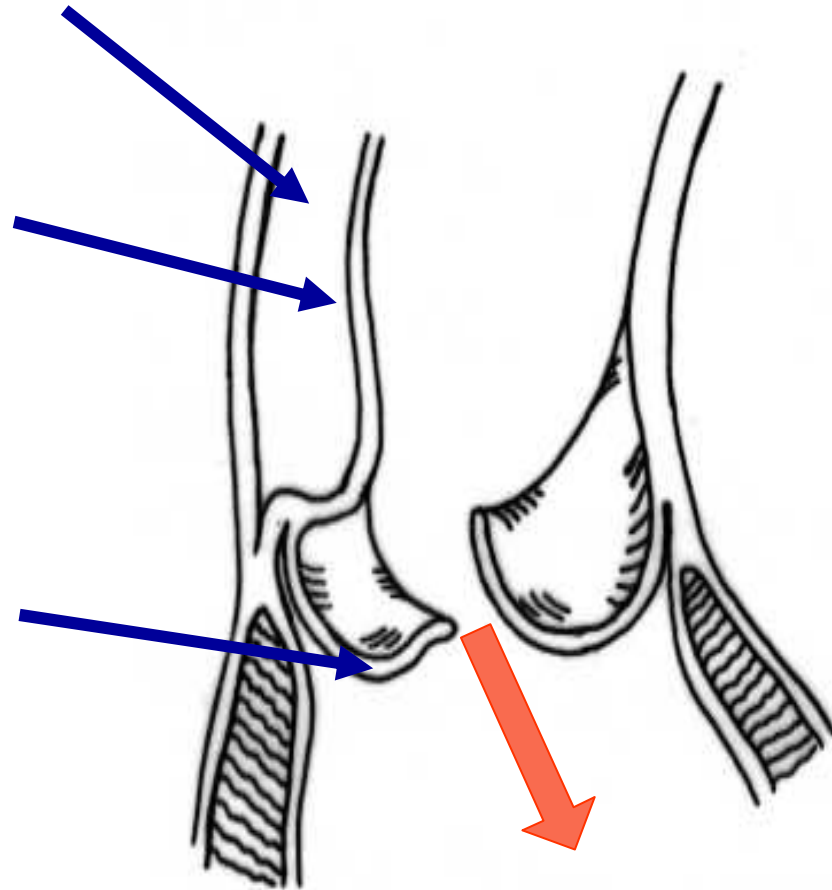


Normal Aortic Valve

False lumen

Intimal flap

The commissure is detached and the cusp prolapse in the LV



**Aortic Regurgitation  
In Aortic Dissection**



# Surgical Techniques

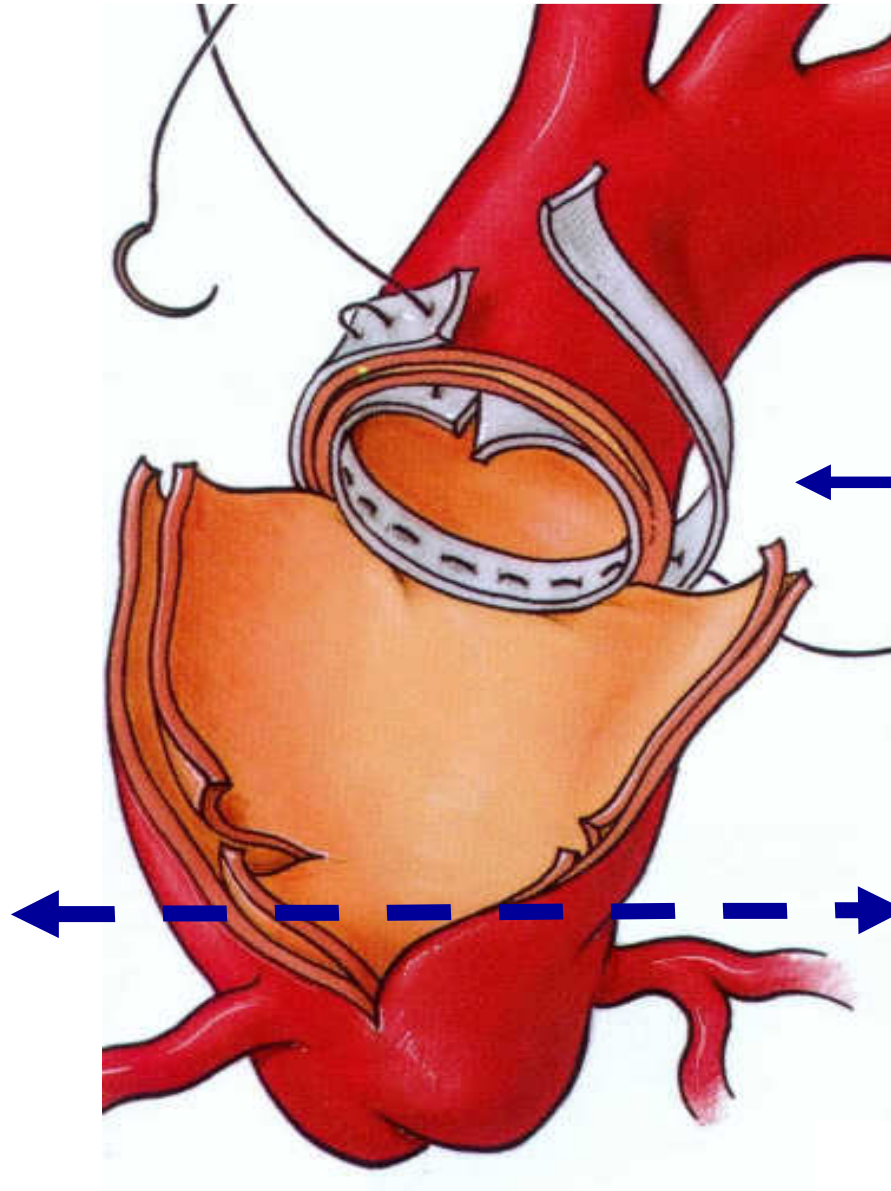
## Aortic Root & Aortic Valve

- Replace the ascending aorta (GRAFT)
- Nothing on the valve and root
- Resuspend the valve
- Replace the valve
- Replace the valve and root (Bental)
- Replace the root (valve sparing)

# Surgical Techniques

## Aortic Root & Aortic Valve

- Replace the ascending aorta
- Nothing on the valve and root
- Resuspend the valve
- Replace the valve
- Replace the valve and root (Bentall)
- Replace the root (valve sparing)



## Reconstruction of the distal aortic segment

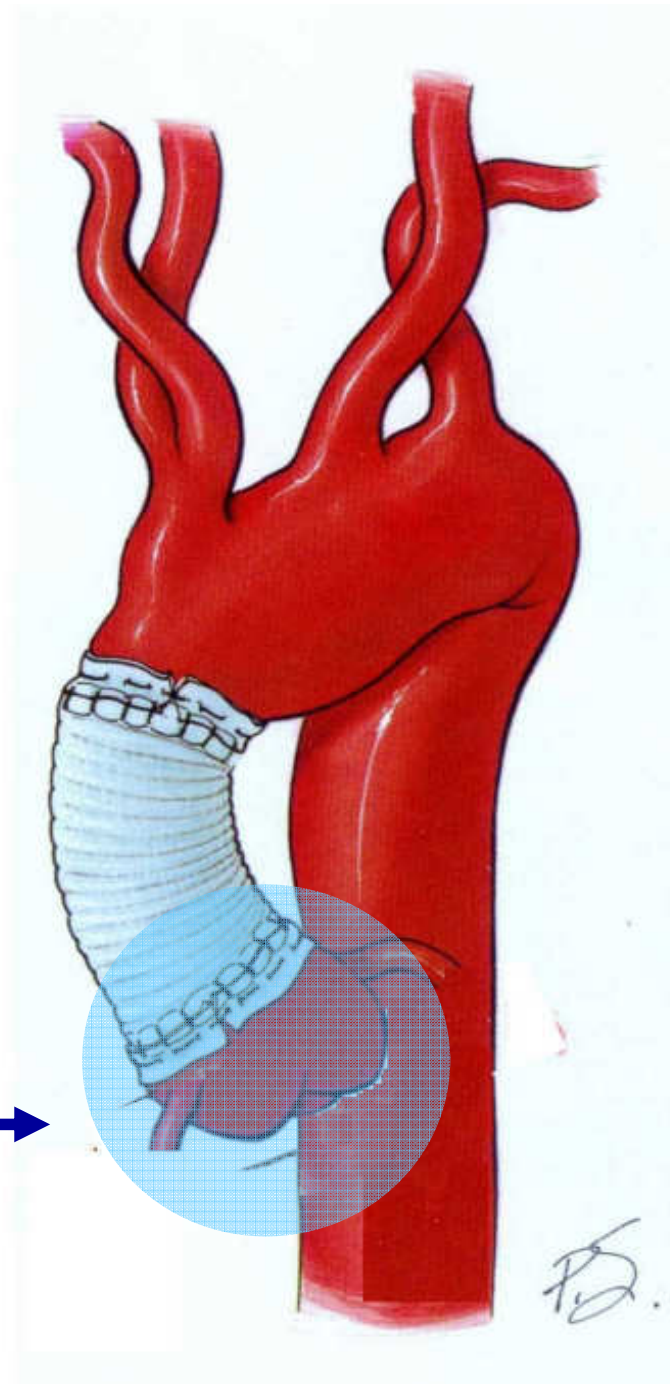
(Obliterate the false lumen)

(Resection of the segment that carries the intimal tear)



# Replacement of the ascending aorta (supra coronary)

Nothing on the valve and the root



# Surgical Techniques

## Aortic Root & Aortic Valve

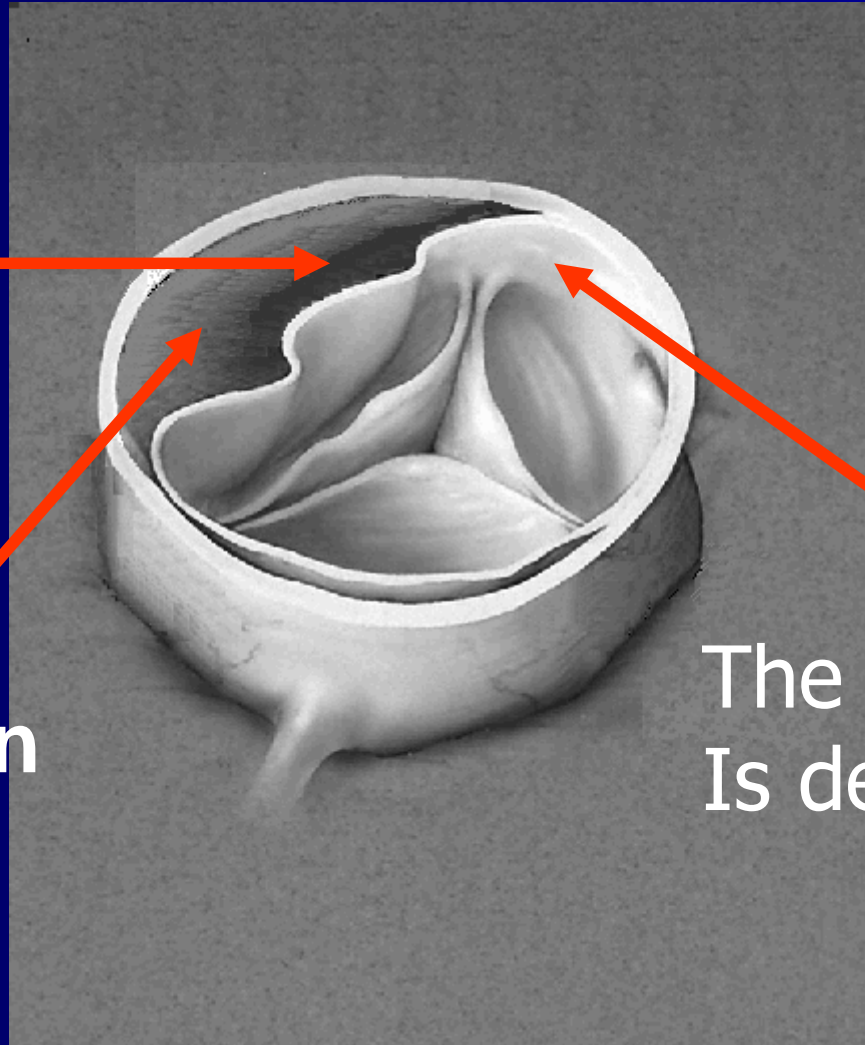
- Replace the ascending aorta
- Nothing on the valve and root
- Resuspend the valve and reconstruct the sinus
- Replace the valve
- Replace the valve and root (Bentall)
- Replace the root (valve sparing)

# Dissection of the Aortic Root

## Non-coronary sinus

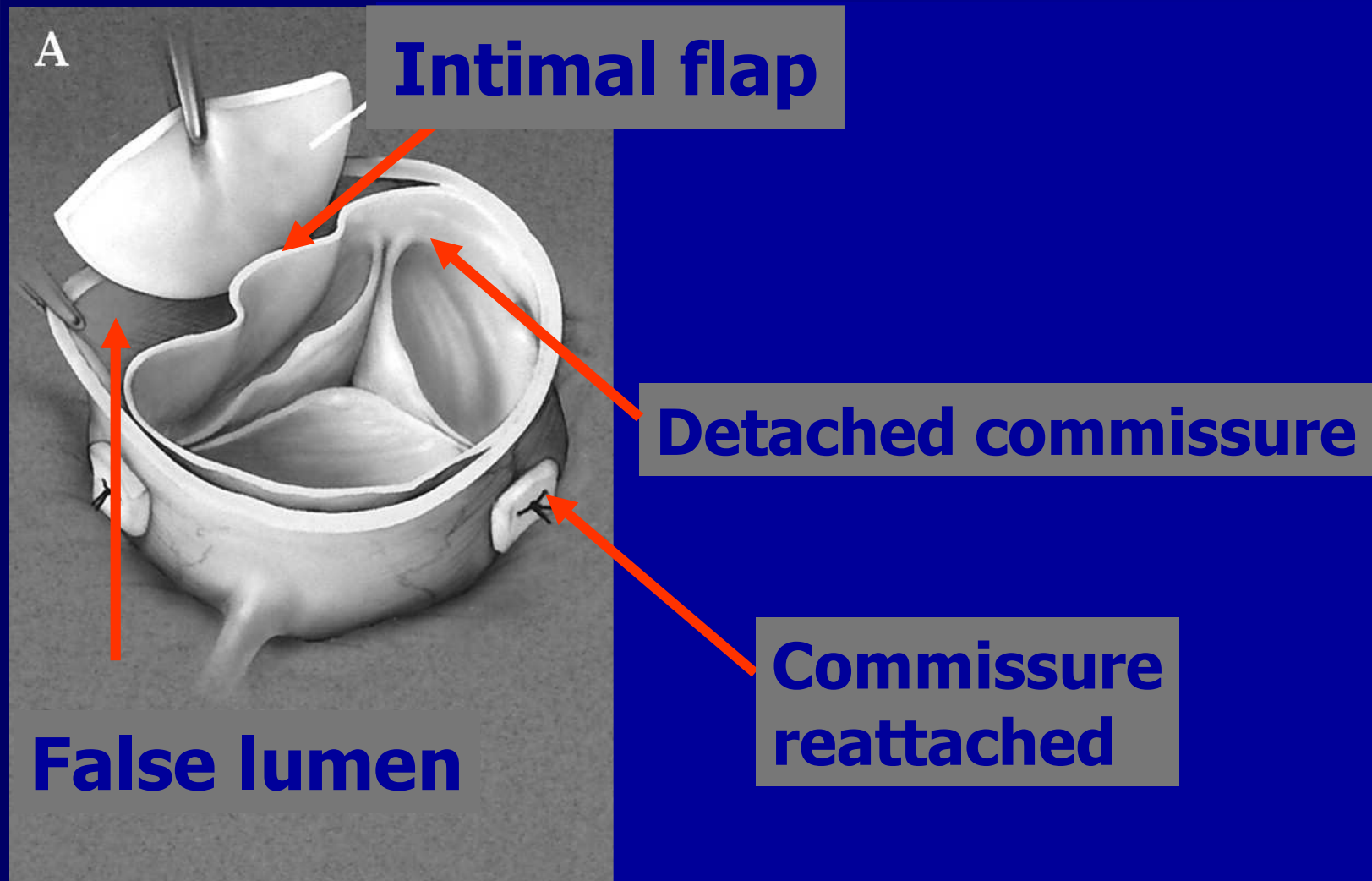
The intimal flap

False lumen



The commissure  
Is detached

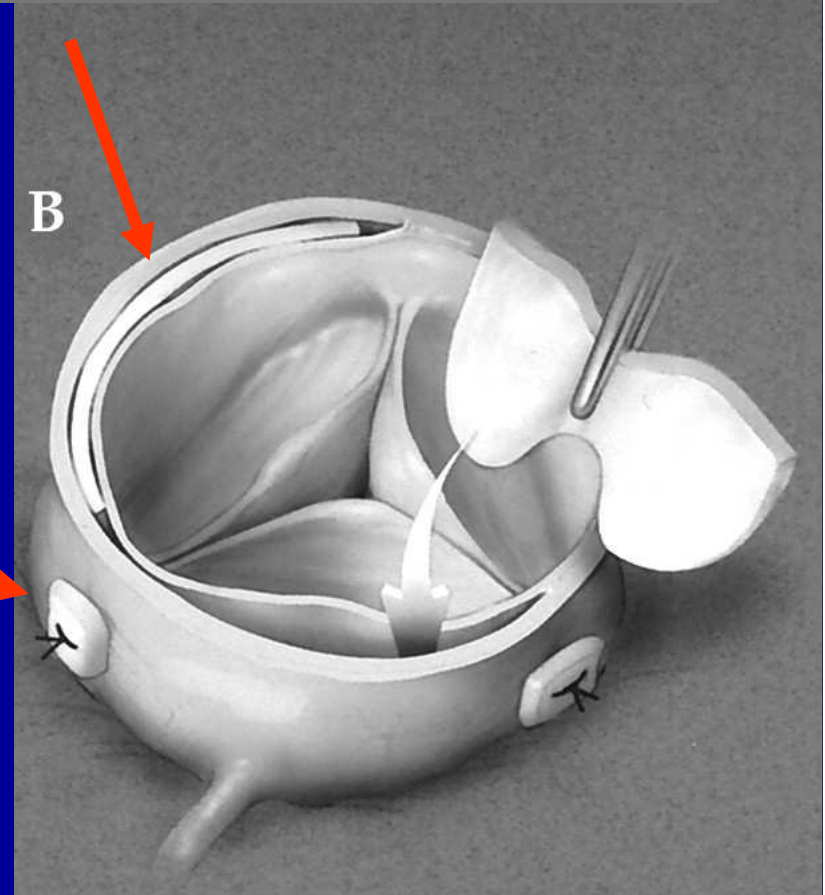
# Dissection of the Aortic Root Non-coronary sinus



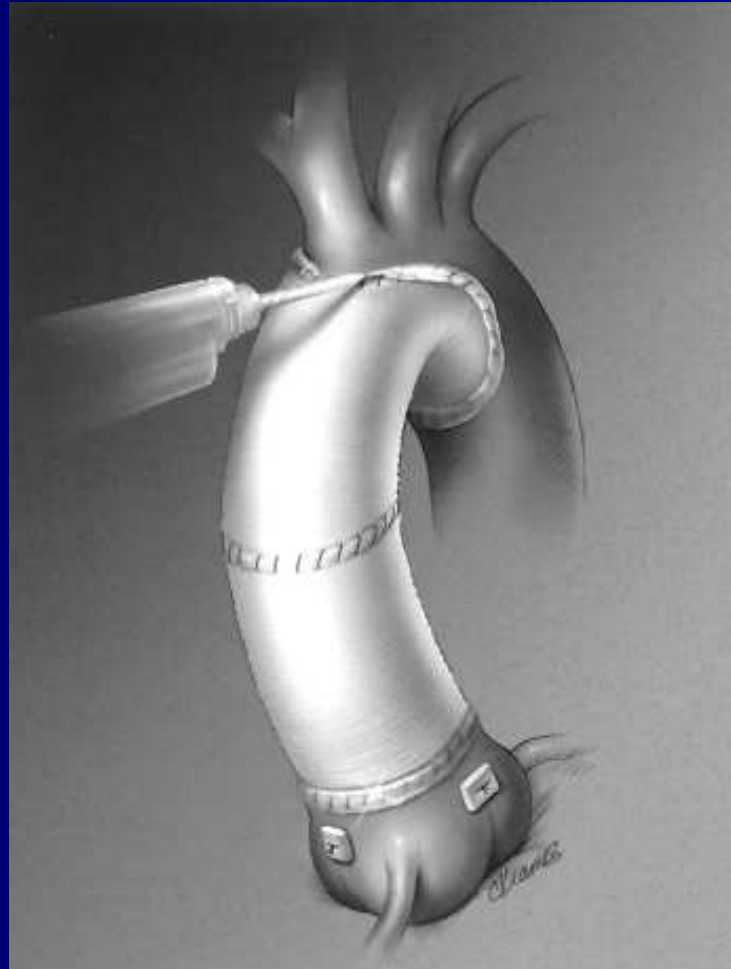
# Reconstruction of the aortic root

Occlusion of the false lumen

Resuspension of the commissures



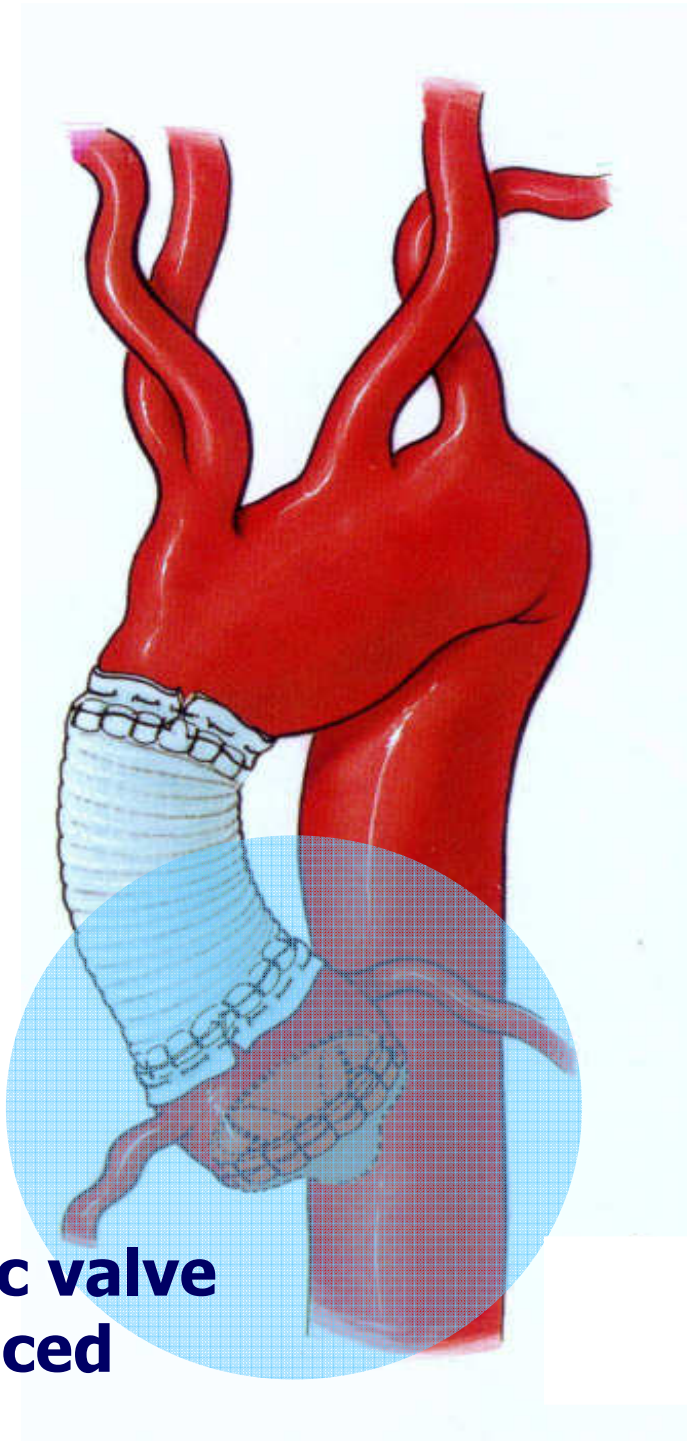
# Reconstruction of the aortic root



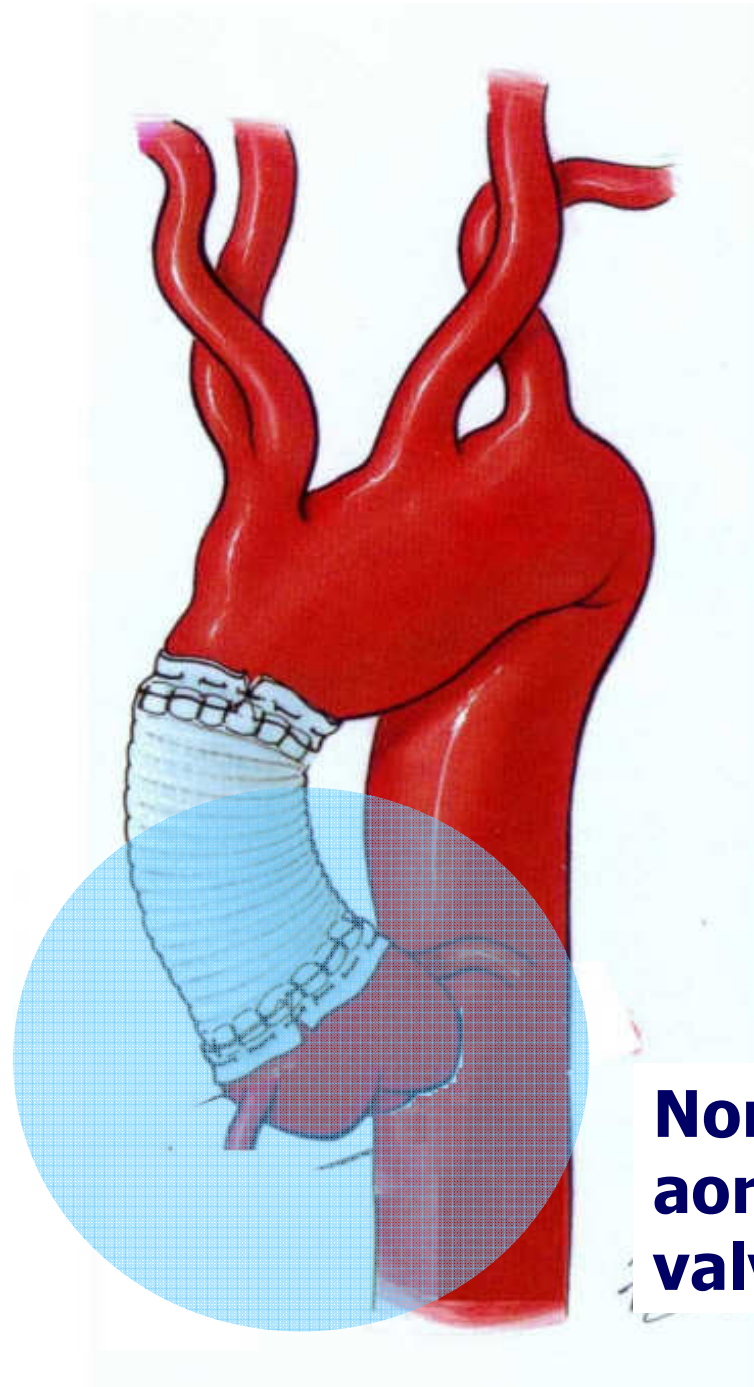
# Surgical Techniques

## Aortic Root & Aortic Valve

- Replace the ascending aorta
- Nothing on the valve and root
- Resuspend the valve
- Replace the valve
- Replace the valve and root (Bental)
- Replace the root (valve sparing)



**Aortic valve  
replaced**



**Normal  
aortic  
valve**

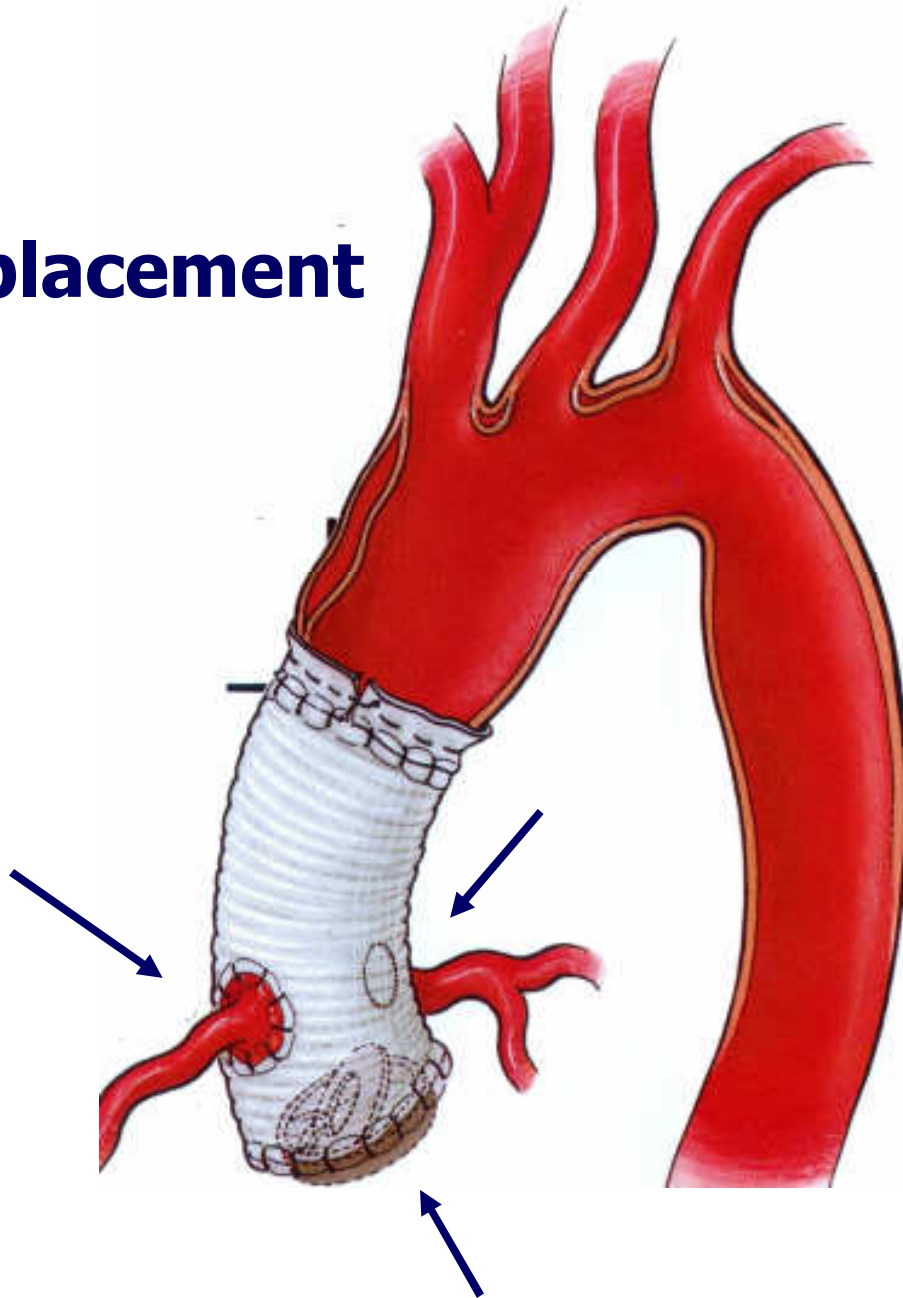


# Surgical Techniques

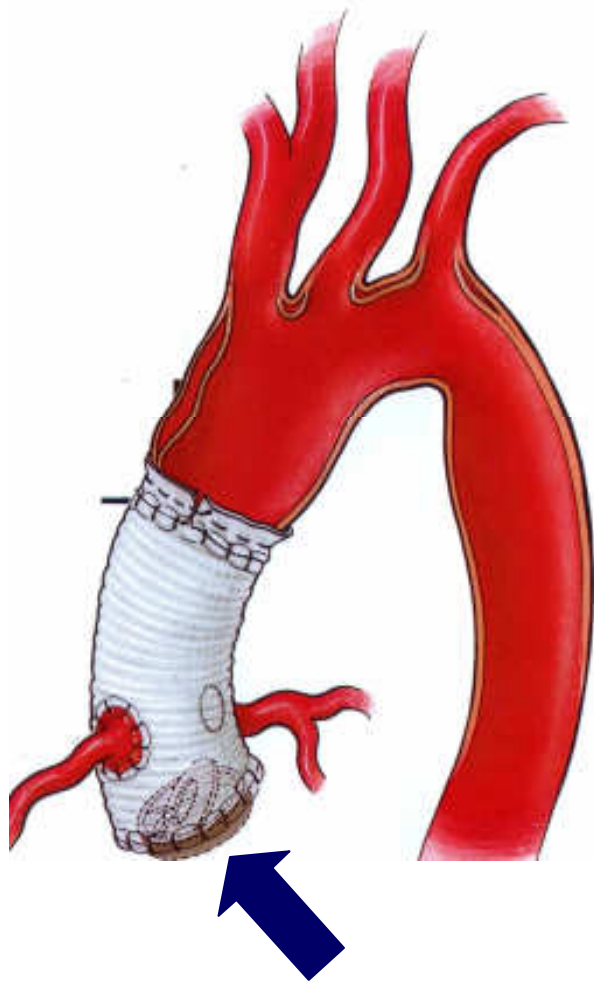
## Aortic Root & Aortic Valve

- Replace the ascending aorta
- Nothing on the valve and root
- Resuspend the valve
- Replace the valve
- Replace the valve and root (Bental)
- Replace the root (valve sparing)

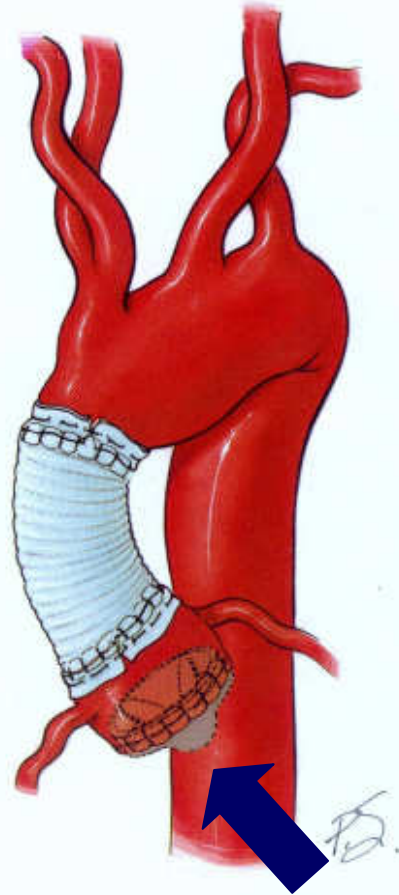
# Root Replacement (Bental)



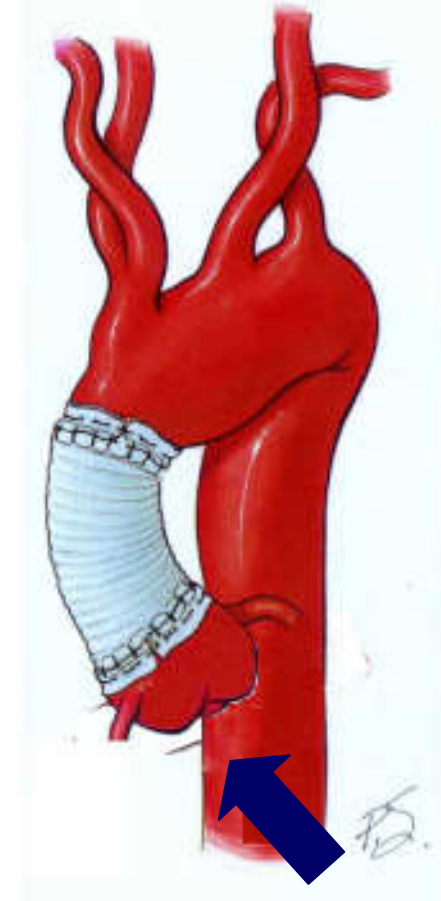
# Root replacement



# Ascending Aorta & Aortic Valve



# Ascending Aorta



# Surgical Techniques

## Aortic Root & Aortic Valve

- Replace the ascending aorta
- Nothing on the valve and root
- Resuspend the valve
- Replace the valve
- Replace the valve and root (Bental)
- Replace the root (valve sparing)

# Valve sparing operation remodelling (Yacoub)

1



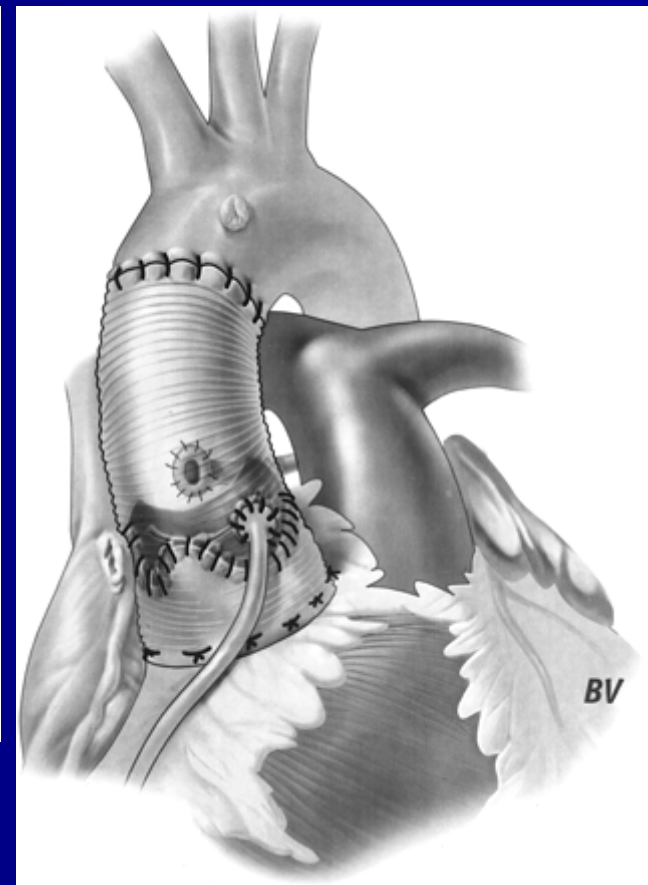
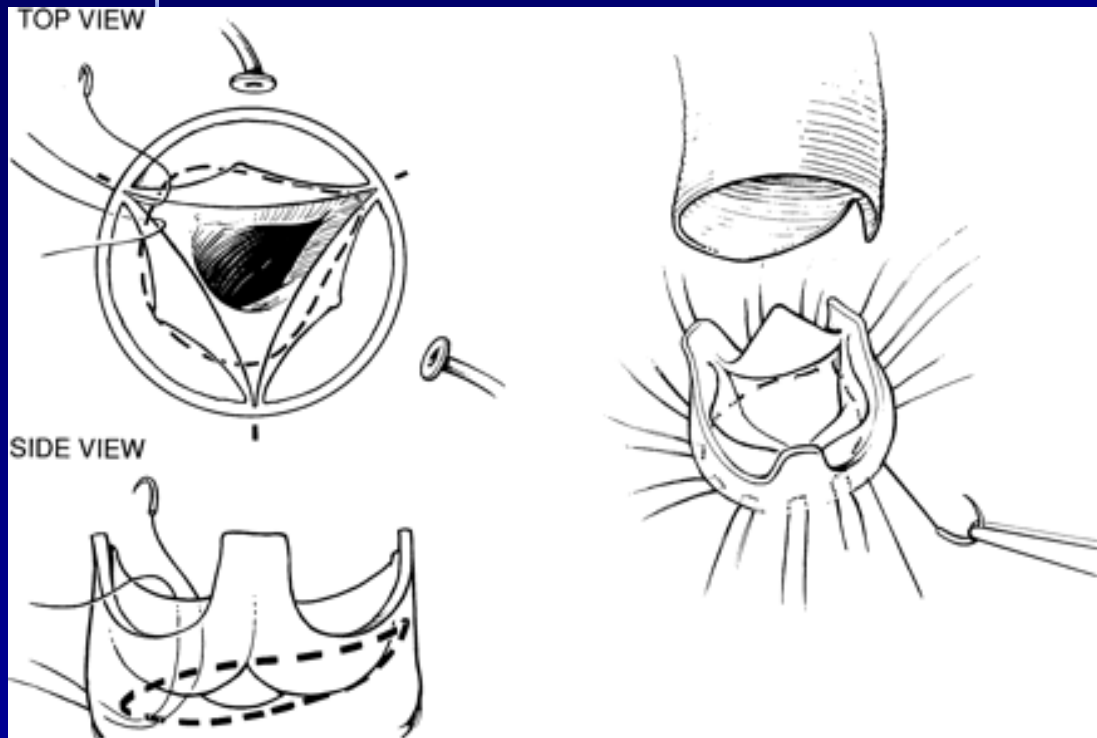
2

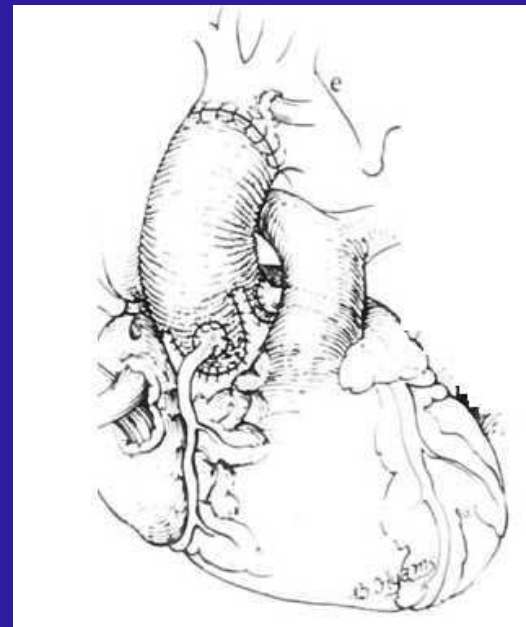


3



# Valve sparing operation reimplantation (David)





# **Surgery for Type A dissections**

**Operative Mortality**

**10 – 26 %**



# Long-term effectiveness

## SURGERY FOR ACQUIRED CARDIOVASCULAR DISEASE

---

### LONG-TERM EFFECTIVENESS OF OPERATIONS FOR ASCENDING AORTIC DISSECTIONS

Joseph F. Sabik, MD  
Bruce W. Lytle, MD  
Eugene H. Blackstone, MD  
Patrick M. McCarthy, MD  
Floyd D. Loop, MD  
Delos M. Cosgrove, MD

**Objective:** To evaluate long-term effectiveness of a strategy for aortic root and distal aorta according to the pathology in ascending aortic dissection.

**Methods:** From 1978 to 1995, 208 patients underwent operations for acute (n = 135) and chronic (n = 73) ascending aortic dissection. Strategies included valve resuspension with supracoronary aortic re-

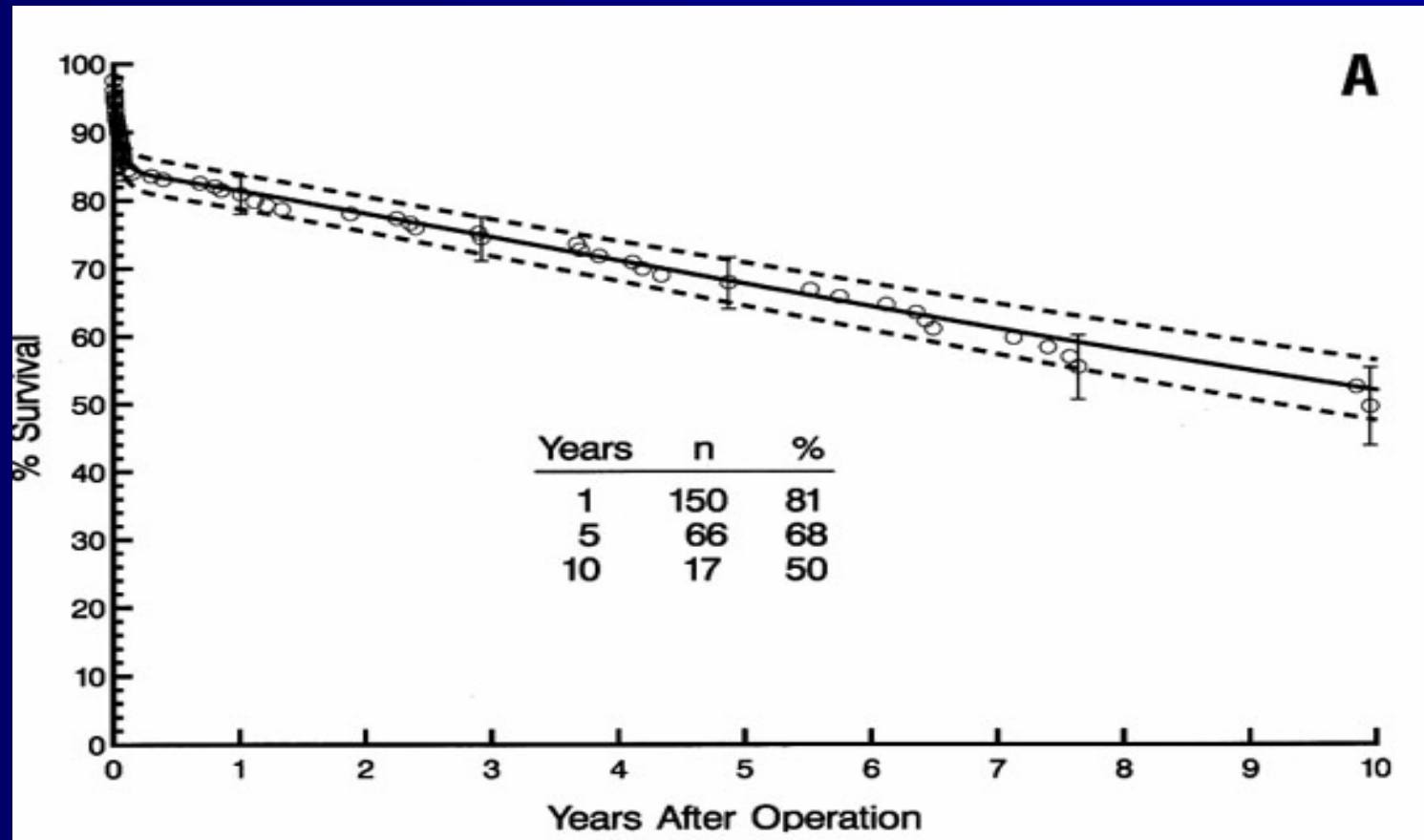
**Sabik et al. J Thorac Cardiovasc Surg 2002**

# Long-term study (Cleveland Clinic)

- n = 208 patients
- 1978-1995
- Operative mortality
- Long-term survival
- Impact of different surgical techniques

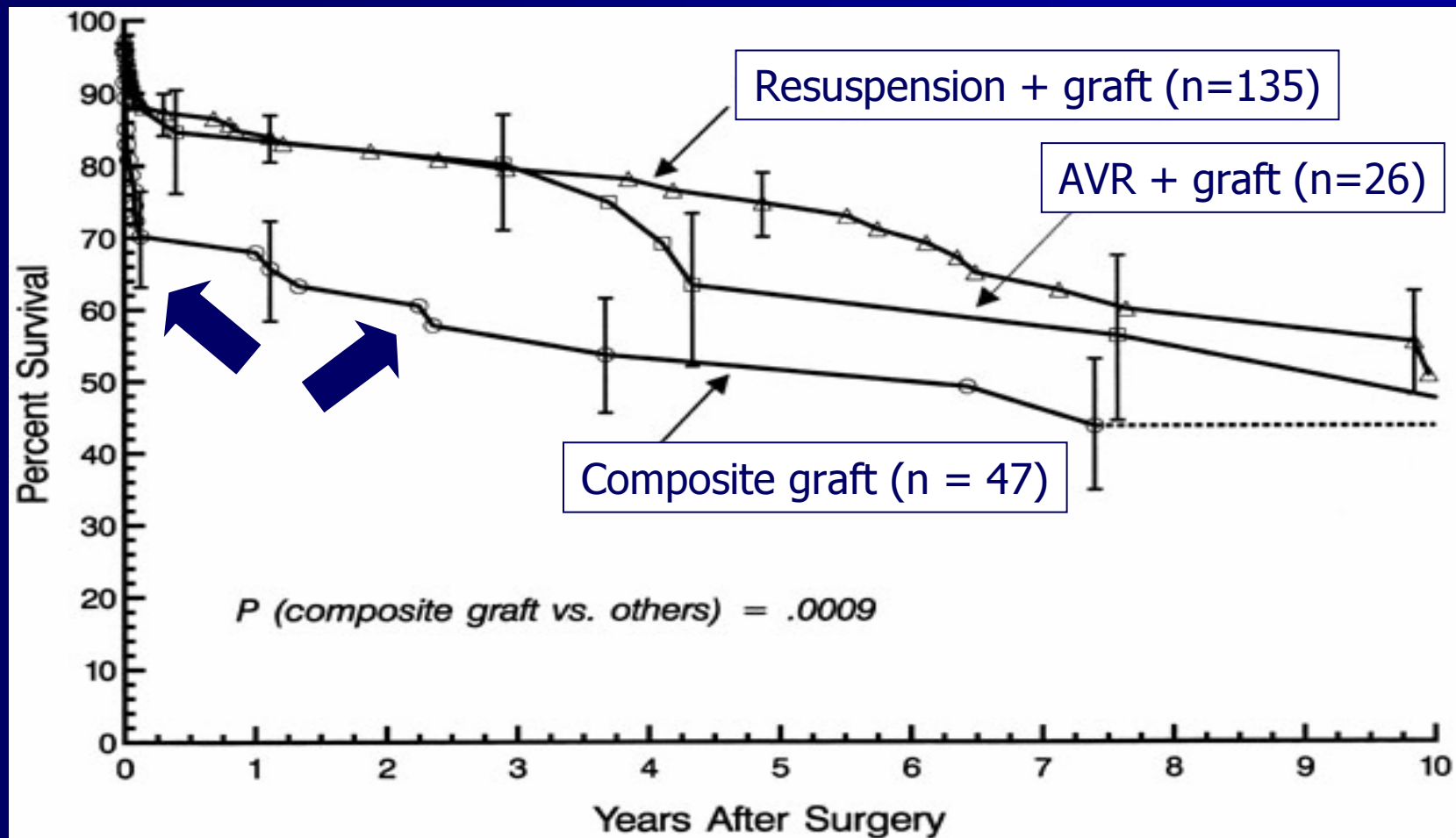
Sabik et al. J Thorac Cardiovasc Surg 2002

# Actuarial Survival

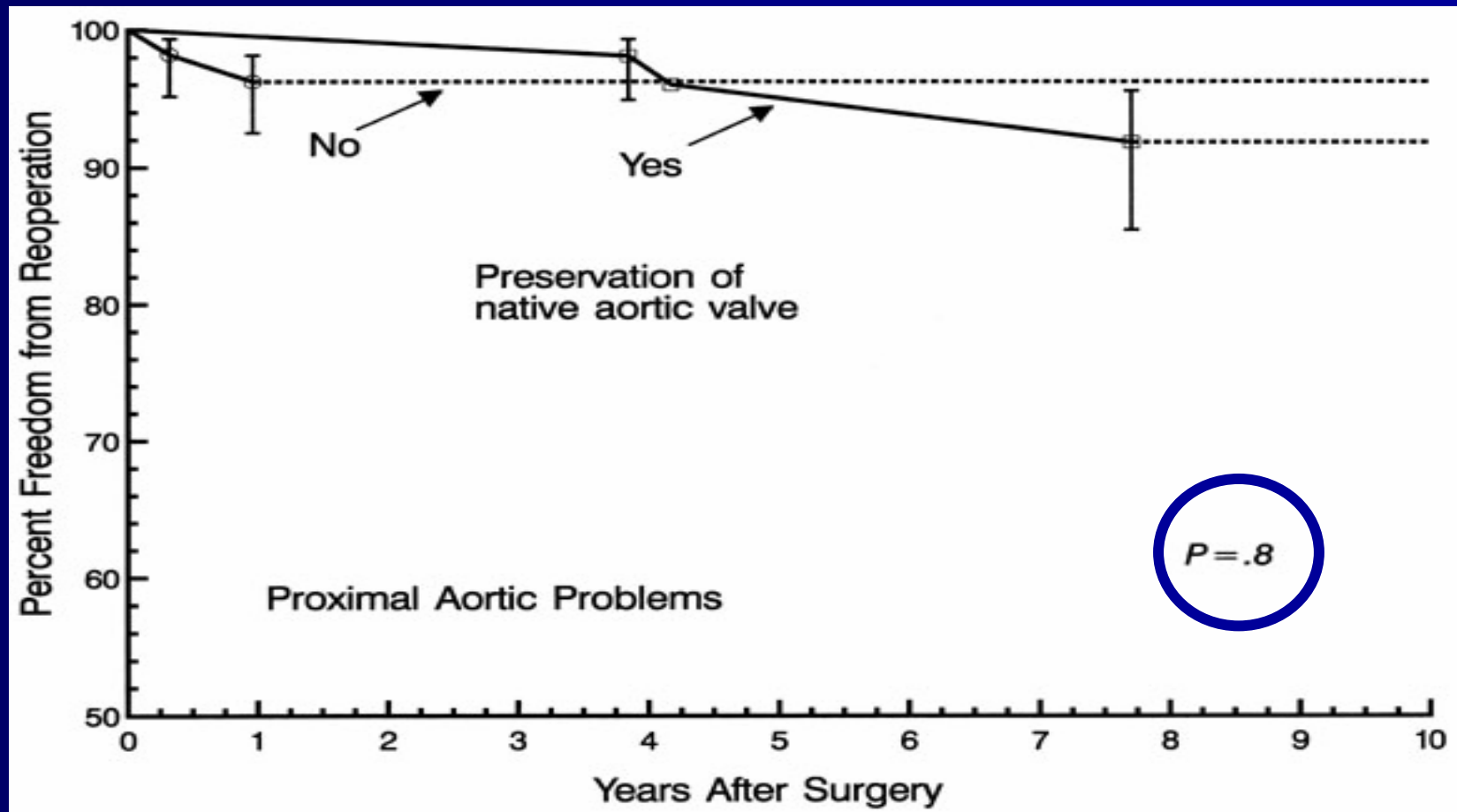


**Sabik et al. J Thorac Cardiovasc Surg 2002**

# Actuarial Survival Bental vs Resuspension vs AVR



# Freedom from Reoperations Composite graft vs Resuspension



*Sabik et al. JTCS 2002*

# Durability of the native aortic valve after resuspension

## Durability of Aortic Valve Preservation and Root Reconstruction in Acute Type A Aortic Dissection

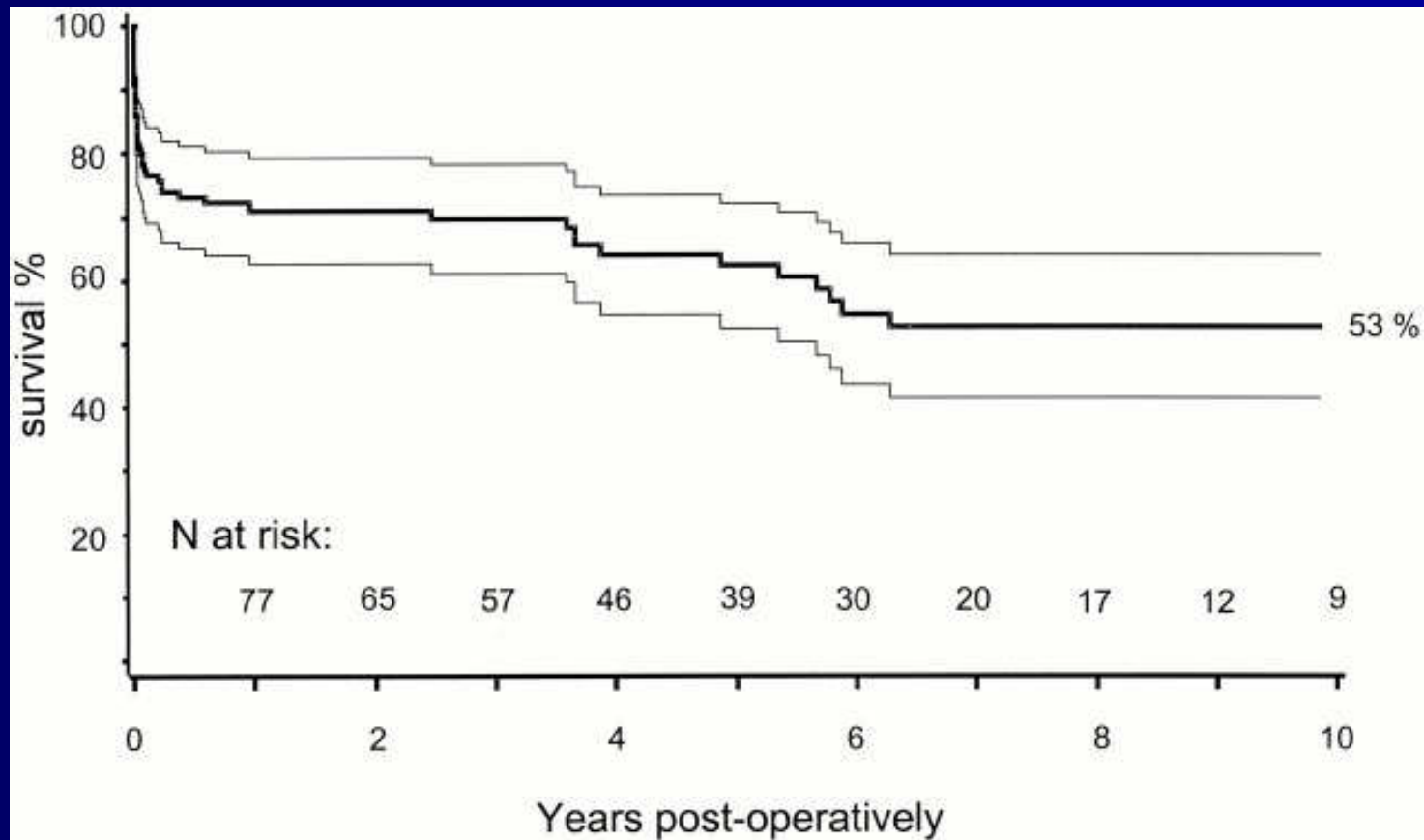
Filip P. Casselman, MD, M. Erwin S. H. Tan, MD, Freddy E. E. Vermeulen, MD, Johannes C. Kelder, MD, Wim J. Morshuis, MD, PhD, and Marc A. A. M. Schepens, MD, PhD

Departments of Cardio-Thoracic Surgery and Cardiological Epidemiology, St. Antoniusziekenhuis, Nieuwegein, The Netherlands

# Durability of the native aortic valve after resuspension

- n = 246 patients (1976-1999)
- Operative mortality
- Long-term survival
- Impact of different surgical techniques
- Fate of the root & valve

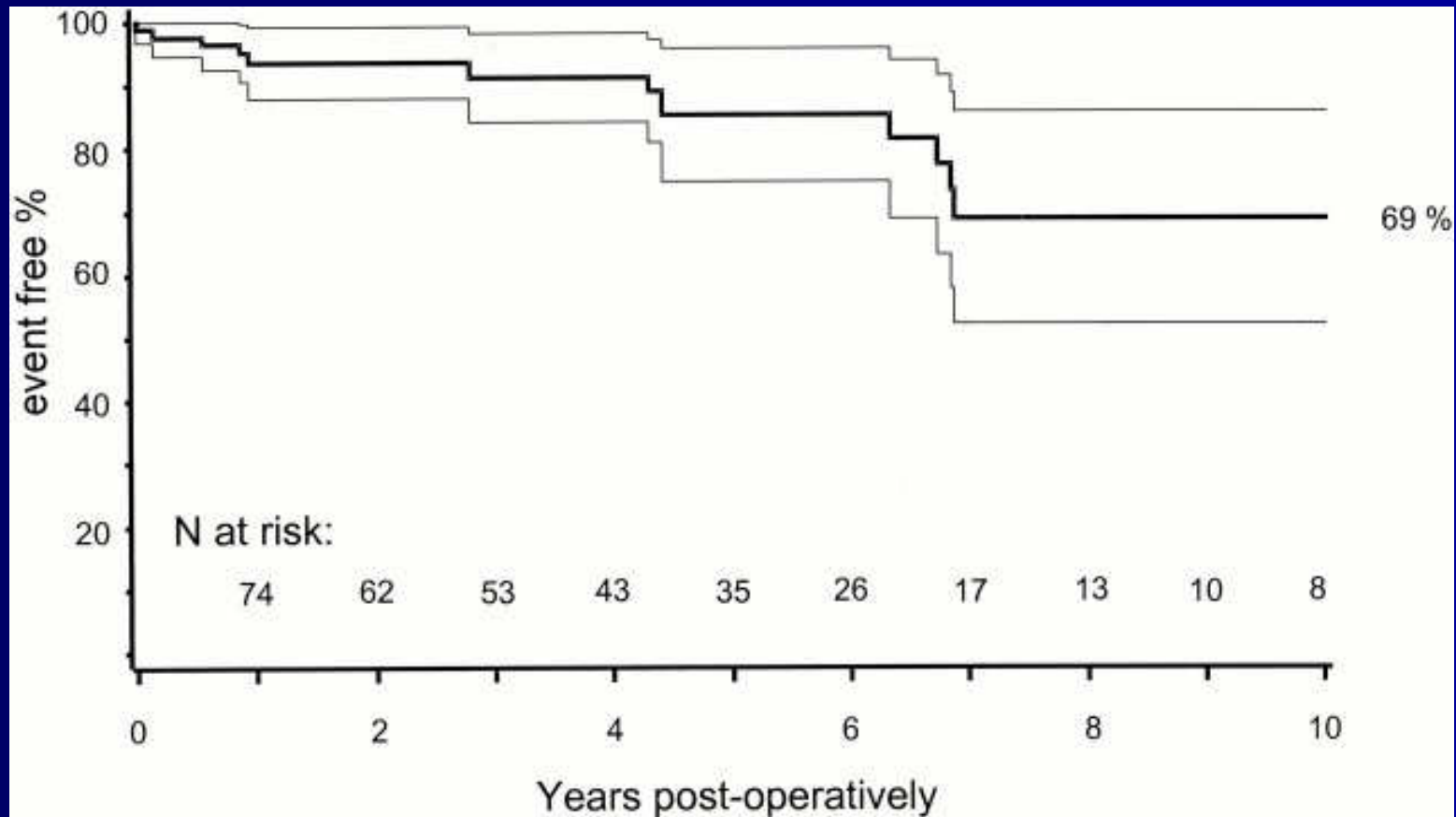
# Actuarial Survival



Casselmann et al Ann Thorac Surg 2000



# Actuarial Freedom from Reoperation



Casselmann et al Ann Thorac Surg 2000

## Echocardiographic **follow-up of the aortic root** after conservative surgery for Type A dissections

Diametre (mm)	N pts
< 35	37
36-40	9
41-45	7
46-50	1
>50	2

Casselmann et al Ann Thorac Surg 2000

# Aortic Valve Preservation

The Journal of  
**Thoracic and Cardiovascular Surgery**

February 1996 • Volume 111 • Number 2

**Aortic valve preservation in acute type a dissection: Is it sound?**

**Ludwig K. von Segesser, MD (by invitation)** [\[MEDLINE LOOKUP\]](#)

**Enrico Lorenzetti, (by invitation)** [\[MEDLINE LOOKUP\]](#)

**Mario Lachat, MD (by invitation)** [\[MEDLINE LOOKUP\]](#)

**Urs Niederhäuser, MD (by invitation)** [\[MEDLINE LOOKUP\]](#)

**Mariette Schönbeck, MD (by invitation)** [\[MEDLINE LOOKUP\]](#)

**Paul R. Vogt, MD (by invitation)** [\[MEDLINE LOOKUP\]](#)

**Marko I. Turina, MD** [\[MEDLINE LOOKUP\]](#)

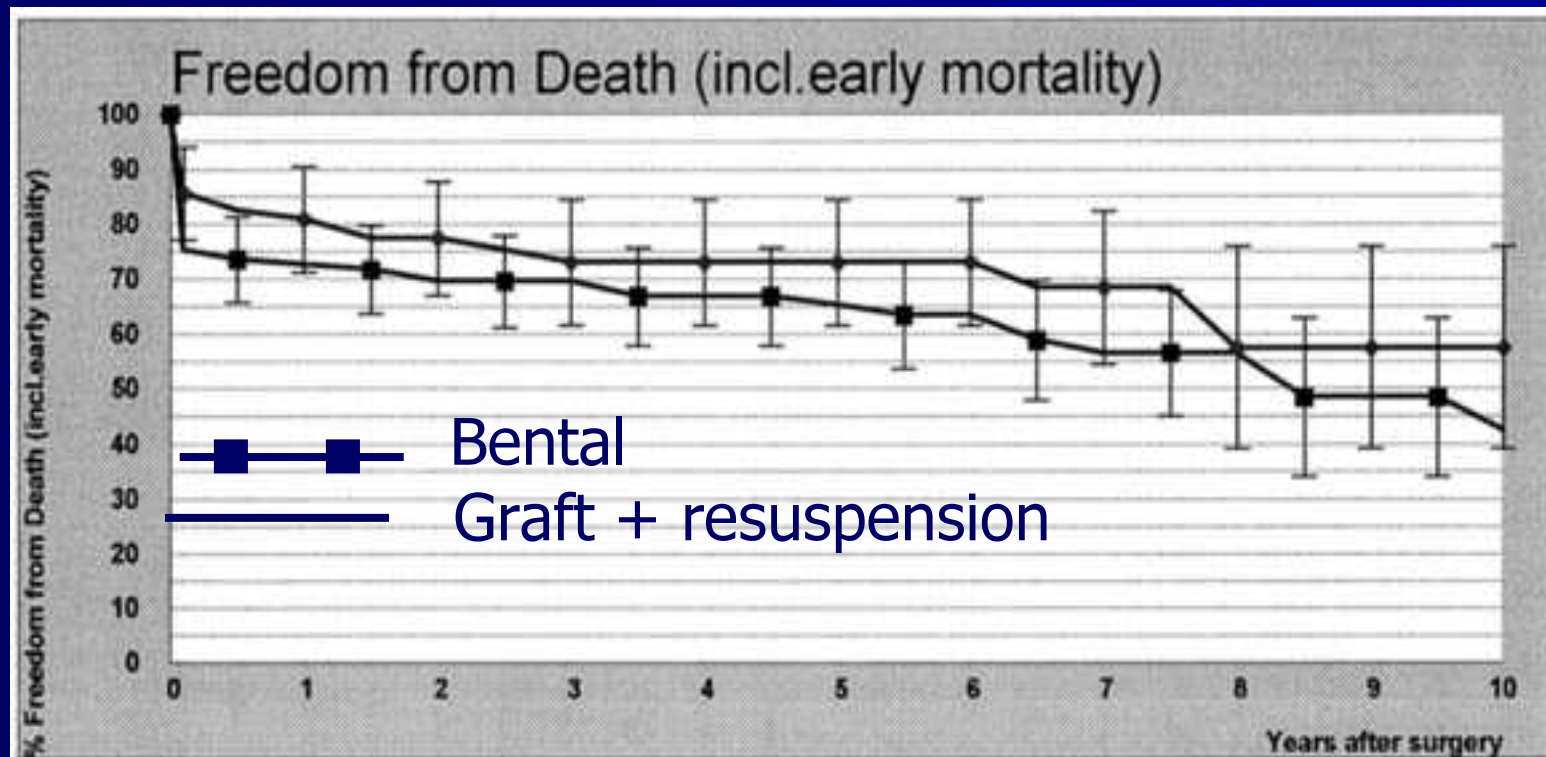
*Zurich, Switzerland*

# Long-term results

- n = 200 patients
- Operative mortality
- Long-term survival
- Impact of different surgical techniques

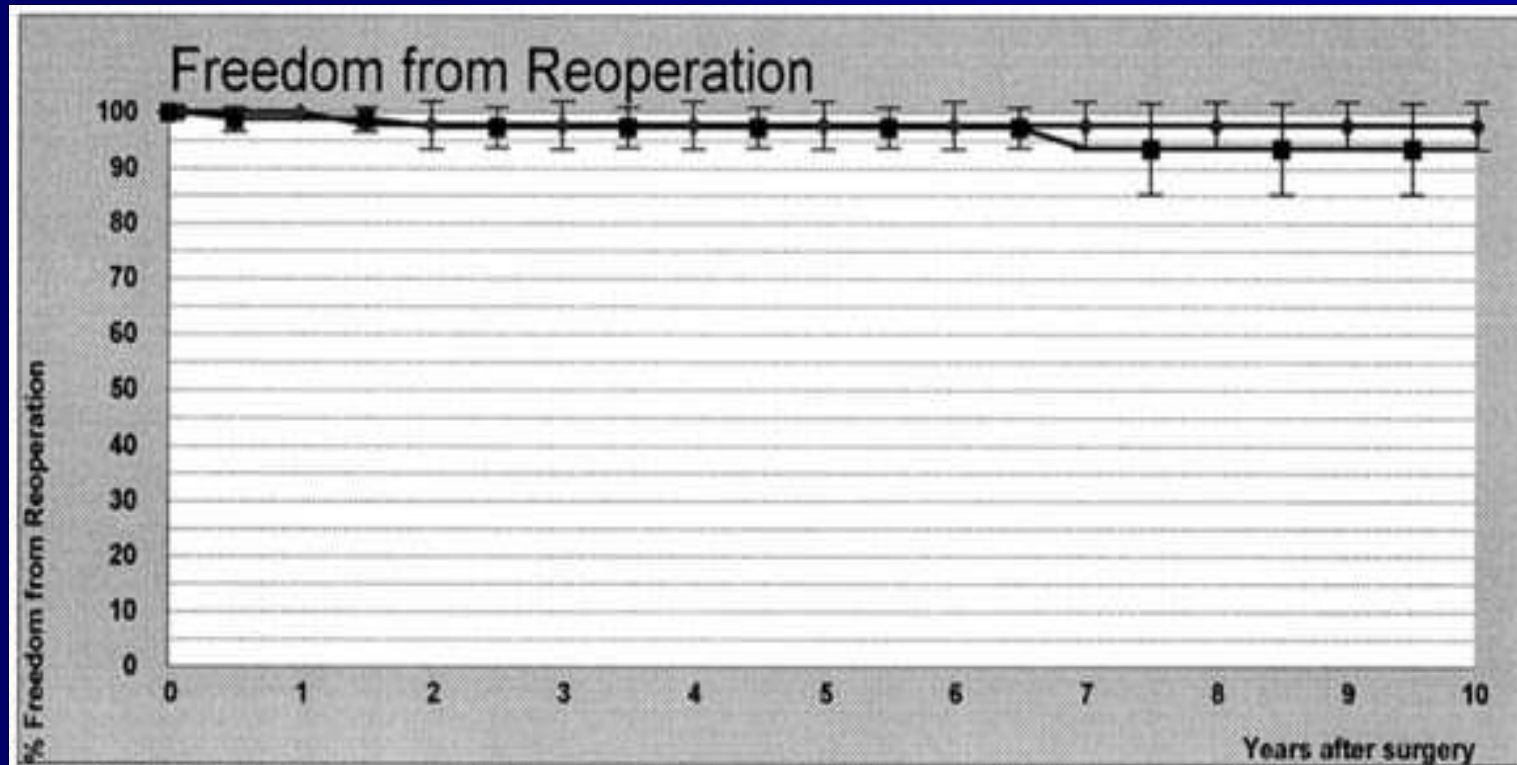
Von Segesser et al. J Thorac Cardiovasc Surg 1996

# Actuarial Survival Bental vs Graft & Resuspension



Von Segesser et al. J Thorac Cardiovasc Surg 1996

# Freedom from Reoperation Bental vs Graft & Resuspension



Von Segesser et al. J Thorac Cardiovasc Surg 1996

# **Advances in the Treatment of Acute Type A Dissection: An Integrated Approach**

**Joseph E. Bavaria, MD, Derek R. Brinster, MD, Robert C. Gorman, MD,  
Y. Joseph Woo, MD, Thomas Gleason, MD, and Alberto Pochettino, MD**

**Division of Cardiothoracic Surgery, University of Pennsylvania Medical Center, Philadelphia, Pennsylvania**

# Analysis of the Results of the « integrated approach »

- n = 163 patients
- 1994-2002
- Operative mortality
- Long-term survival
- Impact of different surgical techniques



# When to replace the Aortic Valve ?

## ➤ Conclusion

- Marfan
- Dilation of the Valsalva sinuses
- Bicuspid or calcified

## Composite aortic root replacement in acute type A dissection: time to rethink the indications? <sup>☆</sup>

James C. Halstead<sup>a,\*</sup>, David Spielvogel<sup>a</sup>, Dieter M. Meier<sup>a</sup>, Sindy Rinke<sup>a</sup>, Carol Bodian<sup>b</sup>,  
Ramin Malekan<sup>a</sup>, M. Arisan Ergin<sup>a</sup>, Randall B. Griepp<sup>a</sup>

<sup>a</sup>*Department of Cardiothoracic Surgery, Mount Sinai School of Medicine, One Gustave L. Levy Place, New York, NY 10029, USA*

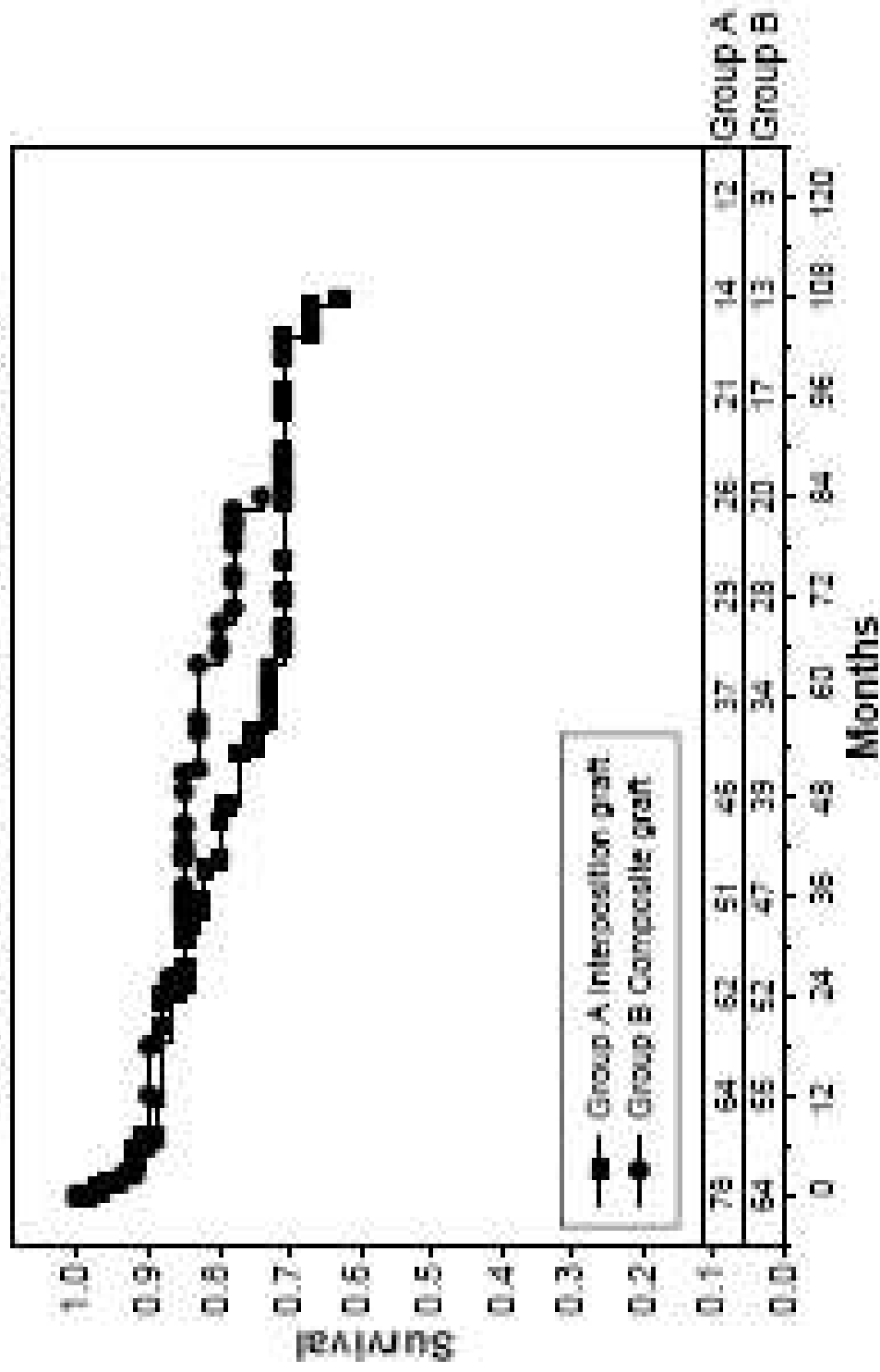
<sup>b</sup>*Department of Biostatistics, Mount Sinai School of Medicine, New York, NY 10029, USA*

Received 21 September 2004; received in revised form 2 December 2004; accepted 20 December 2004

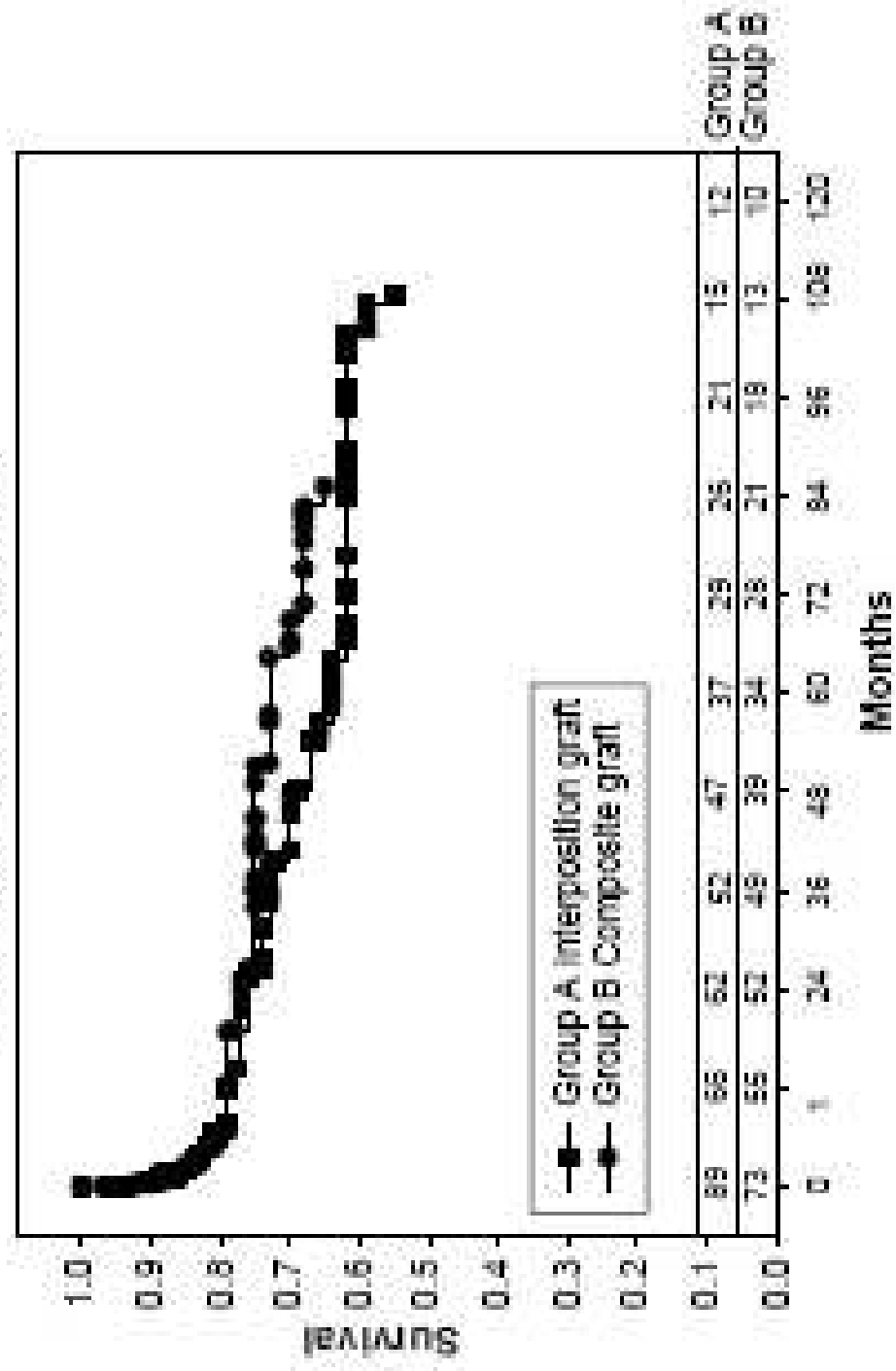
# Patients & Methods

- 1986 - 2003.
- 162 patients
- Group A (n=89, 54.9%) had interposition graft replacement of the ascending aorta with resuspension, repair or separate replacement of the aortic valve
- Group B (n=73, 45.1%) underwent composite graft replacement of the aortic root and ascending aorta.

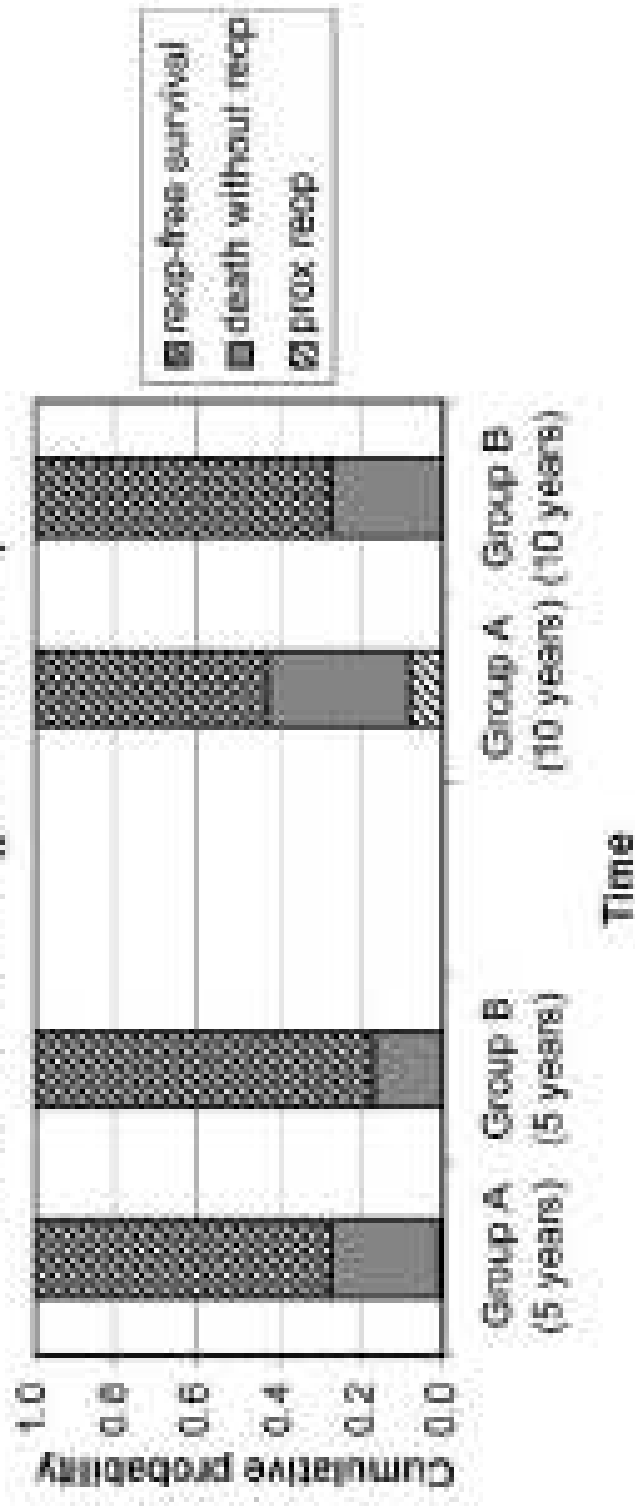
## SURVIVAL AFTER HOSPITAL DISCHARGE



### SURVIVAL FROM ADMISSION



### Patient outcome (proximal aorta)



# **Evolving Strategies for Treatment of Acute Aortic Dissection Type A**

Klaus Kallenbach, MD; Timm Oelze, MS; Rolf Salcher, MS; Christian Hagl, MD;  
Matthias Karck, MD, PhD; Rainer G. Leyh, MD, PhD; Axel Haverich, MD, PhD

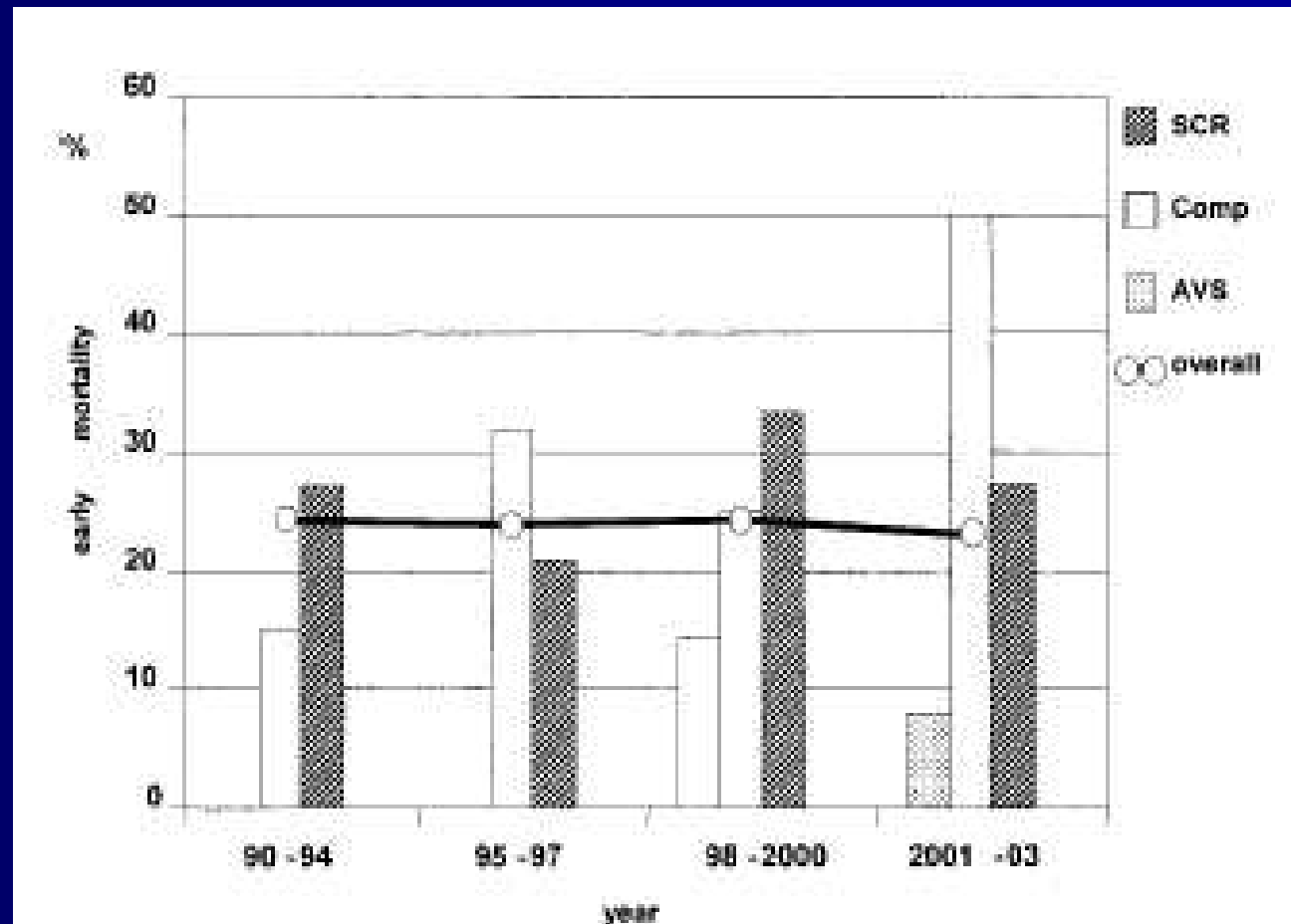
**(*Circulation*. 2004;110[suppl III]:II-243–II-249.)**

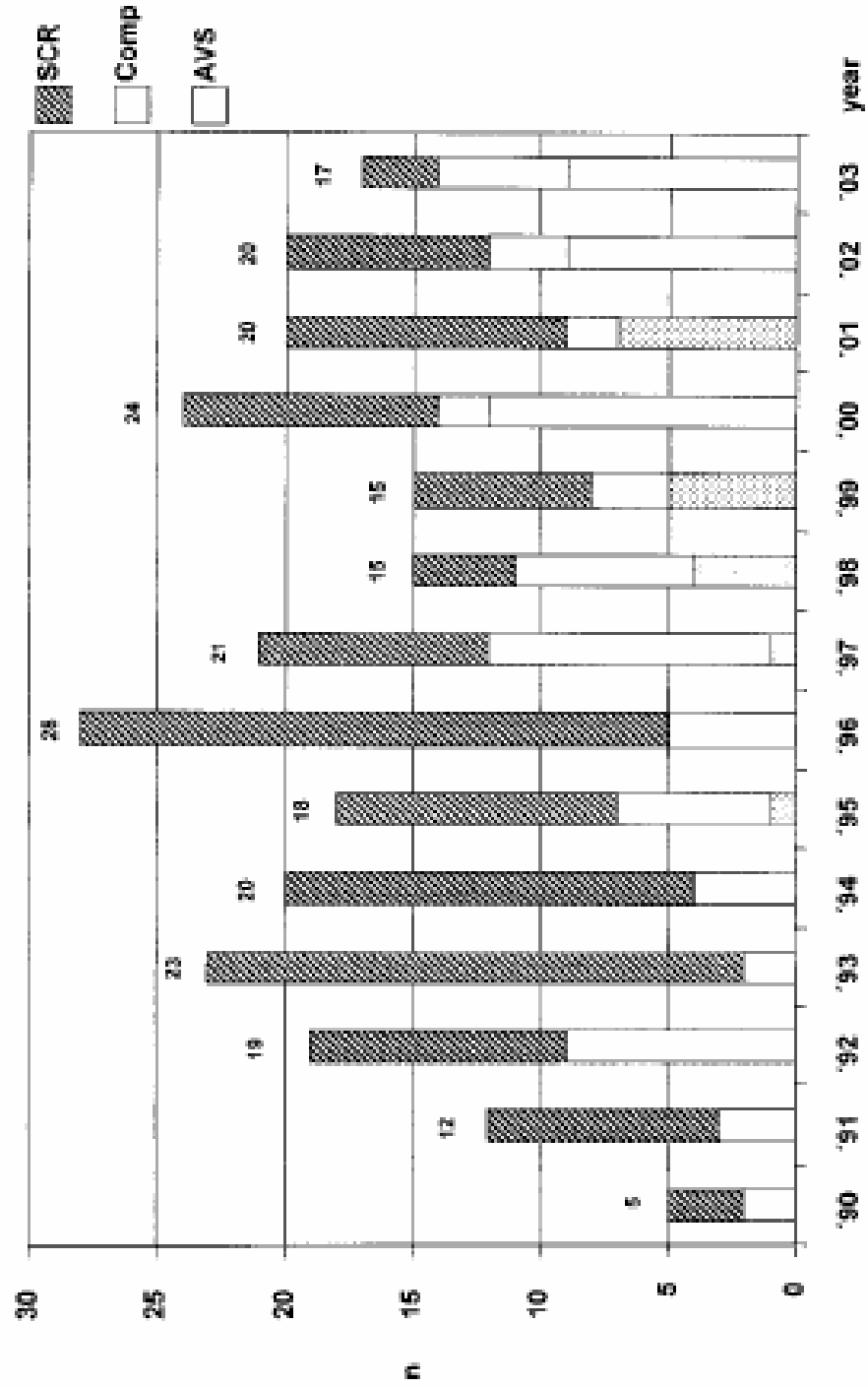
# Patients & Methods

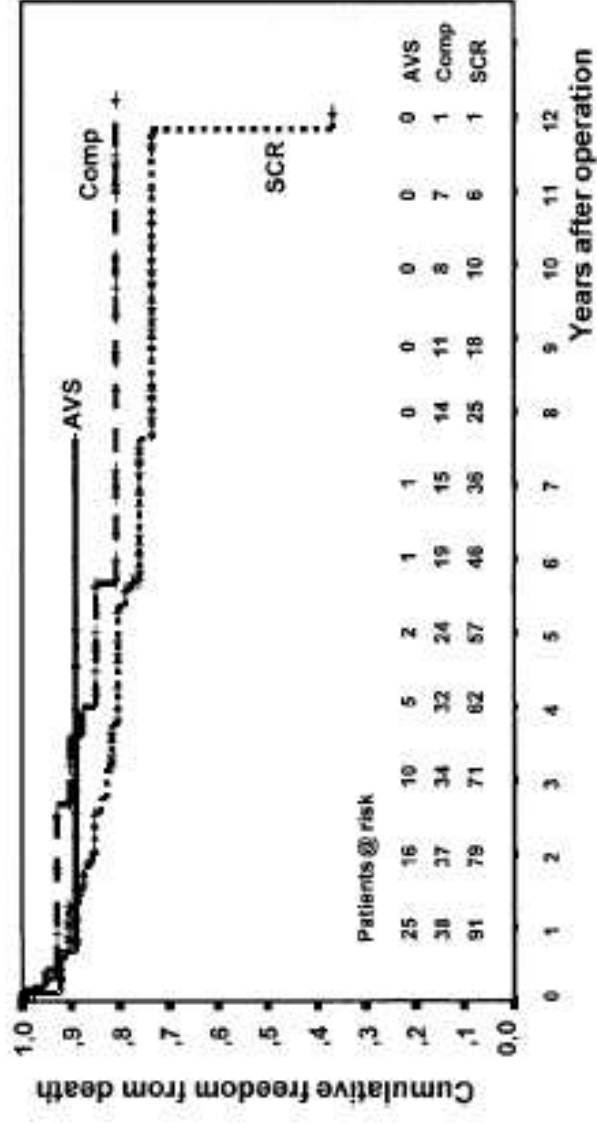
- 1990 - 2003
- 257 pts. were divided into 3 subgroups by surgical treatment:
  - 145 patients operated with SCR of the ascending aorta,
  - 64 patients were treated with a composite graft (comp),
  - 48 patients the native aortic valve was reimplanted into a Dacron tube replacing the ascending aorta (AVS)



# Early mortality







actual survival @	AVS	Comp	SCR
3 years	89 ± 5 %	90 ± 5 %	83 ± 4 %
5 years	89 ± 5 %	85 ± 6 %	80 ± 4 %
10 years	-	81 ± 7 %	73 ± 5 %

log rank = 0.61

# Type A Dissection : Disease of the aortic root

Root Normal  
Valve Normal

Root Normal  
Valve Abnormal

Root Abnormal  
Valve Normal

Root Abnormal  
Valve Abnormal

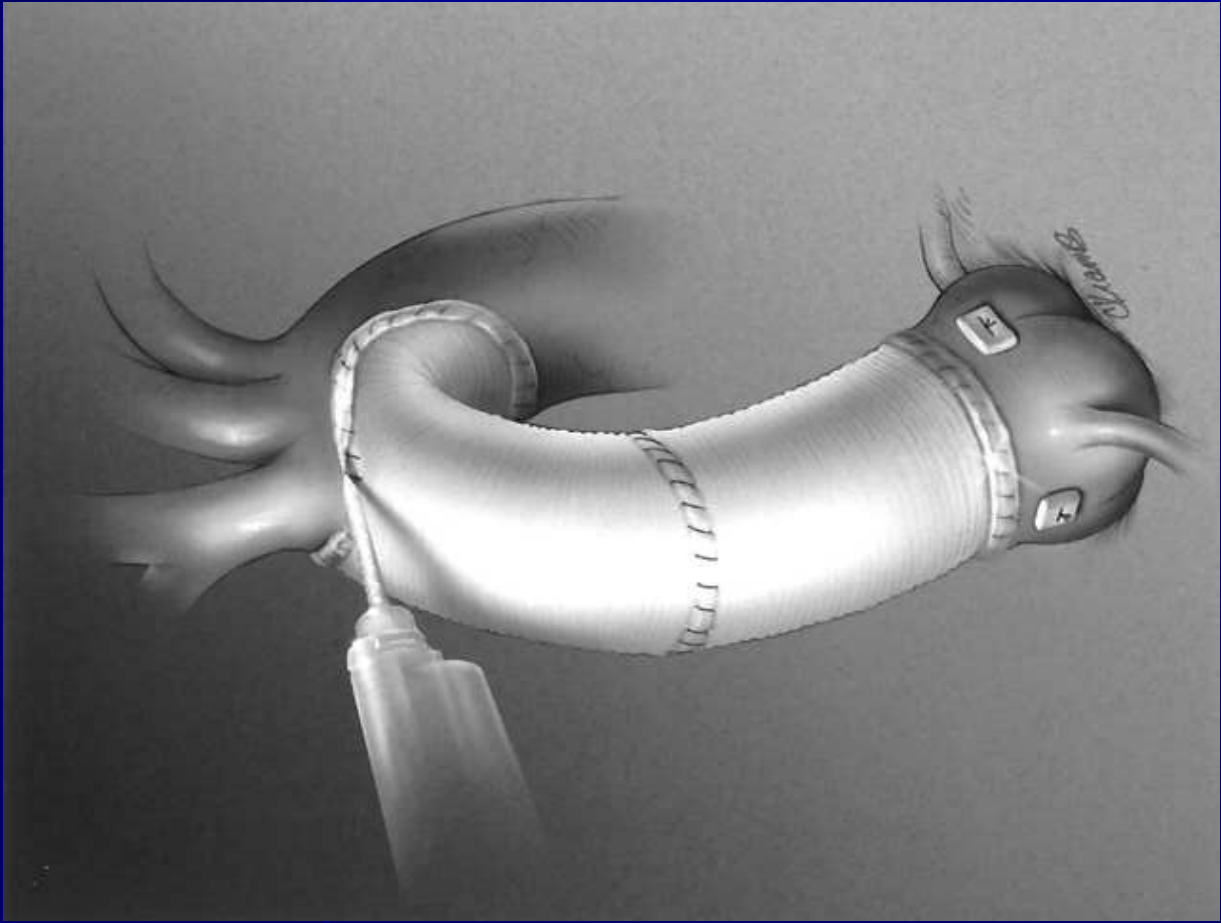
# Type A Dissection : Disease of the aortic root

Root Normal  
Valve Normal



Valve resuspension

Graft replacement of  
the ascending aorta



# Type A Dissection : Disease of the aortic root

Root Normal  
Valve Normal

Root Normal  
Valve Abnormal

Root Abnormal  
Valve Normal

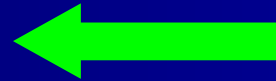
Root Abnormal  
Valve Abnormal

# Type A Dissection : Disease of the aortic root

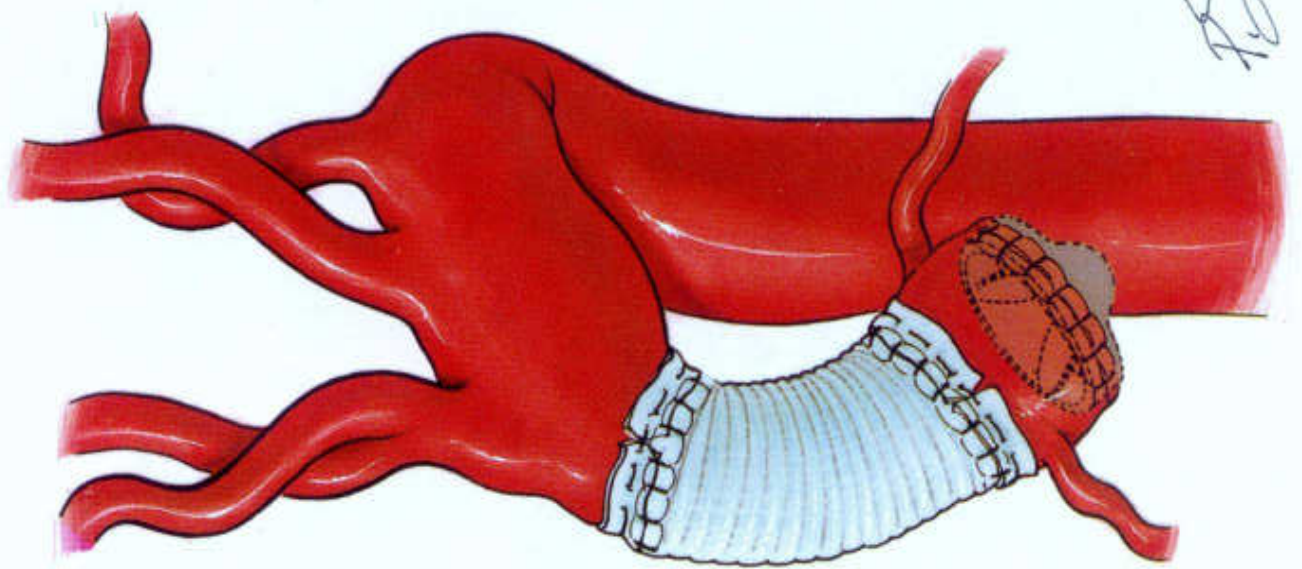
Valve replacement

Graft replacement of  
the ascending aorta

Root Normal  
Valve Abnormal







Handwritten signature or initials.

# Type A Dissection : Disease of the aortic root

Root Normal  
Valve Normal

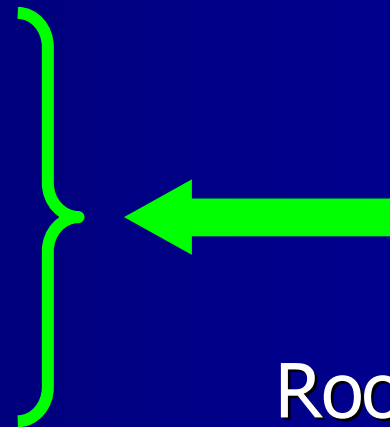
Root Normal  
Valve Abnormal

Root Abnormal  
Valve Normal

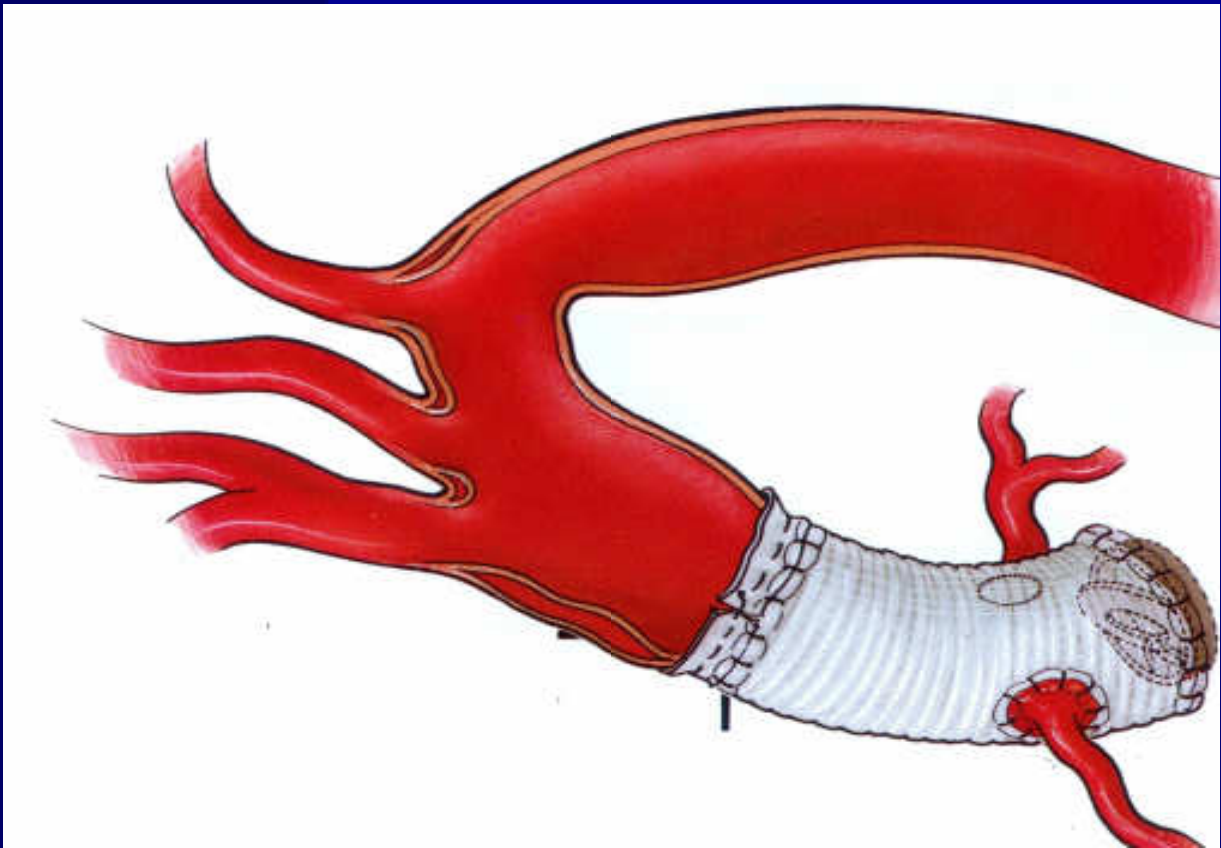
Root Abnormal  
Valve Abnormal

# Type A Dissection : Disease of the aortic root

Root replacement  
Composite Graft  
Bental



Root Abnormal  
Valve Abnormal



# Type A Dissection : Disease of the aortic root

Root Normal  
Valve Normal

Root Normal  
Valve Abnormal

Root Abnormal  
Valve Normal

Root Abnormal  
Valve Abnormal

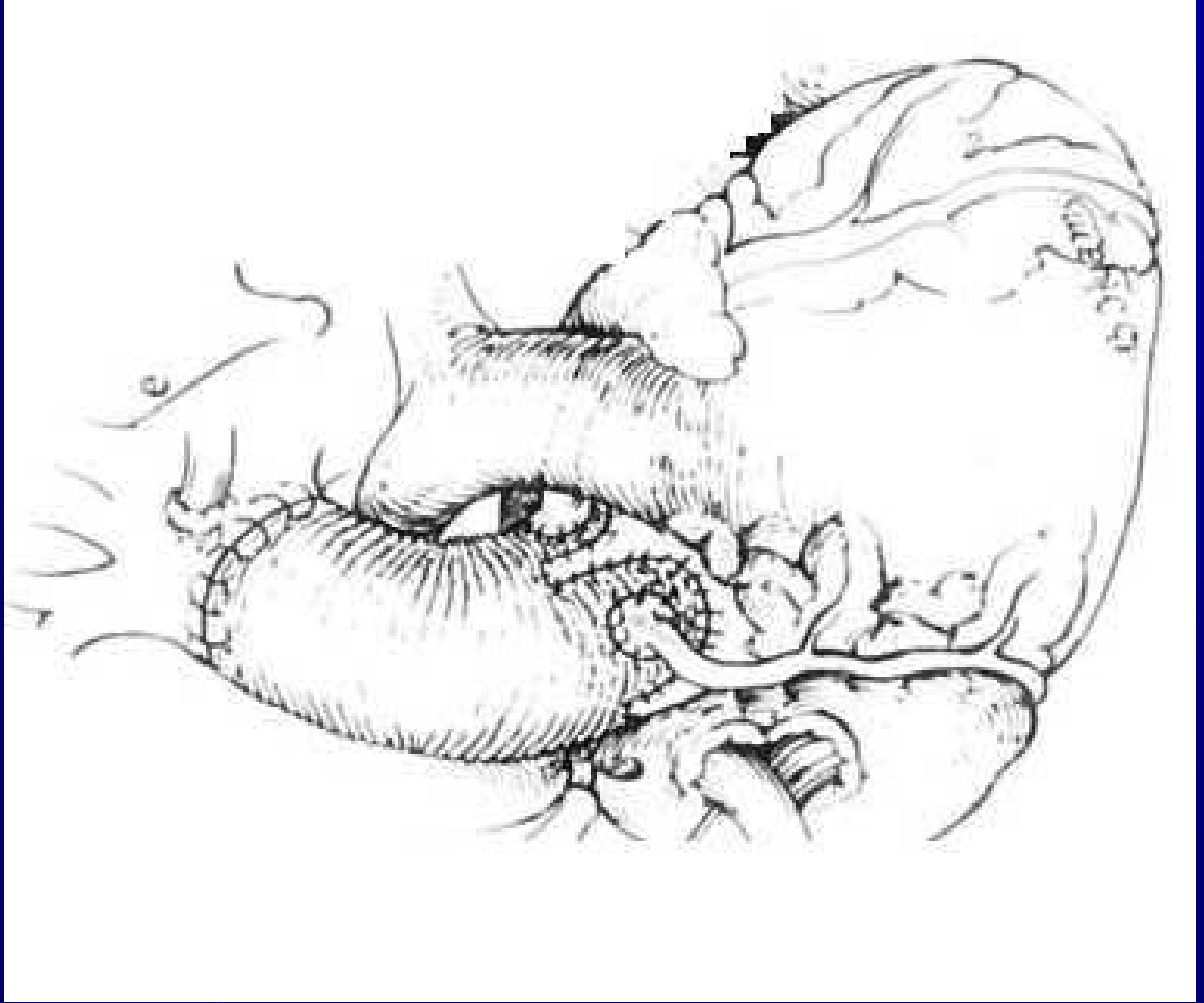
# Type A Dissection : Disease of the aortic root

Root Abnormal  
Valve Normal



Total Replacement  
of the aorta

Valve sparing



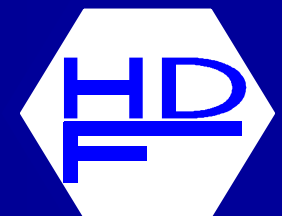
# Conclusion

- The surgical technique should be **adapted** to operative findings
- Graft replacement of the ascending aorta and valve **resuspension** offer excellent results
- More extensive operations are associated to a **higher operative mortality. BUT .....**



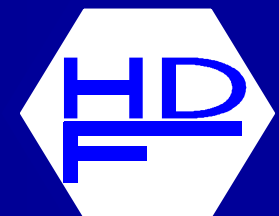
# Type A Dissection

- 1993 – 2005
- N = 44
- M/F 32/12
- Age = 61 (39-84)
- Marfan = 0



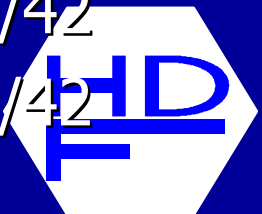
# Surgical Technique

- Arterial cannulation
  - < June 1994 femoral artery 8/44
  - 1994 – 2002 axillary artery 36/44
- Open distal anastomosis 42/44
  - Hemiarch 39/42
  - Total arch 3/42
- Aortic root
  - Ao valve resuspension 41/44
  - Ao valve replacement 2/44
  - Composite graft Bentall 1/44



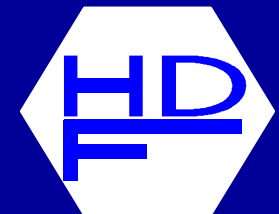
# Cerebral Protection

- DHCA  $t < 16^\circ \text{C}$  41/42
- Retrograde perfusion (1994) 8/42
- Antegrade perfusion 34/42
  
- Circulatory arrest time
  - $< 30$  minutes (19-30) 30/42
  - 30 – 45 minutes 7/42
  - $> 45$  minutes 4/42
  - $> 60$  minutes 1/42



# Results

- 30-day mortality 4/44 (9%)
  - Causes of death
    - Neurological 1/4
    - Respiratory 1/4
    - MOF 2/4
  
- Morbidity
  - Neurological 4 (3 transient)
  - Renal 1 (dialysis 1mo)
  - Respiratory 6



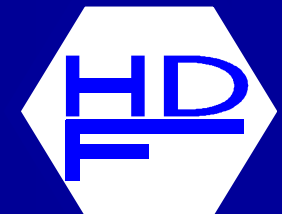
# Echo follow-up (1-5years)

## ■ Aortic valve

- AR = 0 21/29
- AR = 1+ 7/29
- AR = 2+ 1/29

## ■ Diameter of the aortic root

- < 40 mm 27/29
- 43,45 mm 2/29



# Conclusion

- **Open** distal anastomosis
- **Adapted** surgical technique to operative findings at the level of the aortic root
- Graft replacement of the ascending aorta and valve **resuspension** offer excellent results