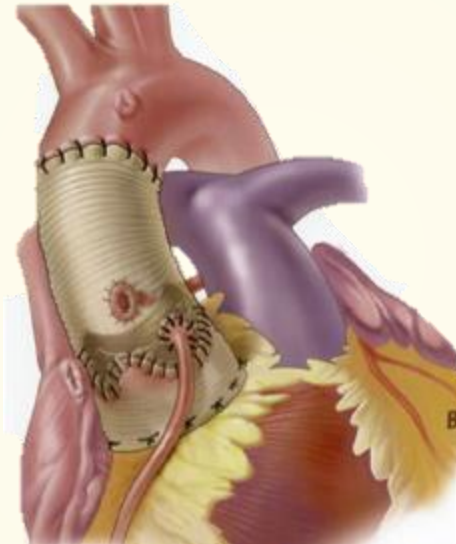


Long-Term Results of Valve Sparing Aortic Root Replacement: Reimplantation Technique



M. Grabenwöger
Dept. of Cardiovascular Surgery
Hospital Hietzing, Vienna

Disclosure Statement

- Nothing to disclose

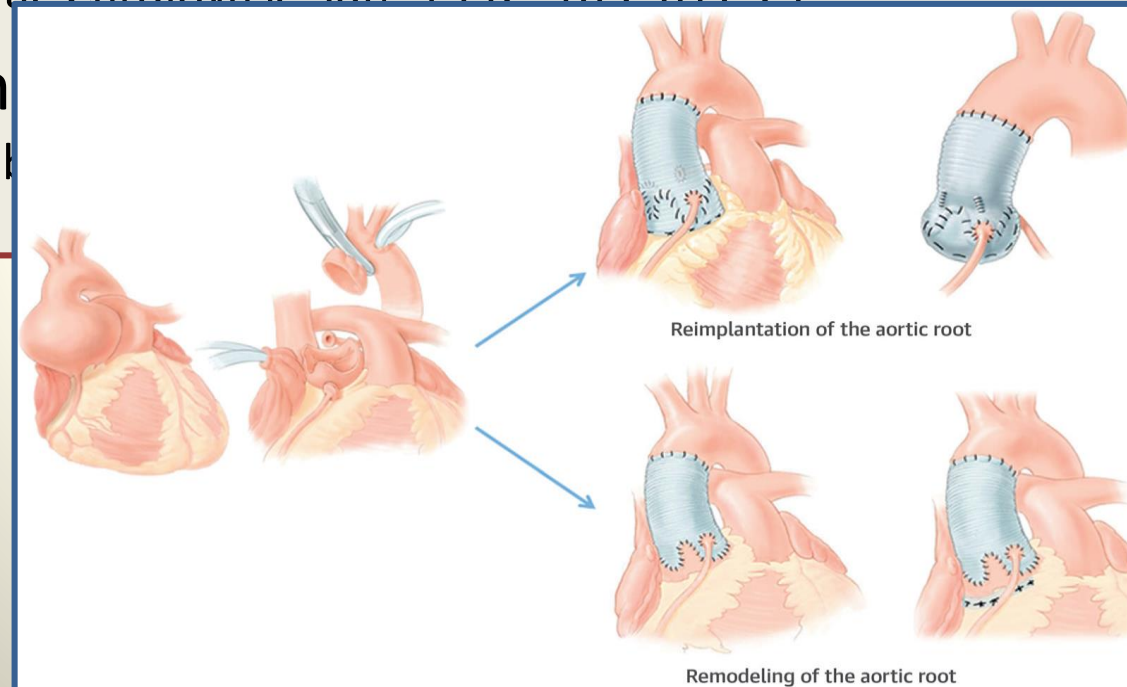
Indication for Valve Sparing Procedures

- Aneurysms of the aortic root/ascending aorta and aortic insufficiency
- Two Methods
 - Reimplantation Technique - **Tirone David Procedure**

J Thorac Cardiovasc Surg 1992; 103: 617-21

- Remodeling Technique - **Yacoub**

30-1084



Aortic Valve Reimplantation

J Thorac Cardiovasc Surg. 1992 Apr;103(4):617-21; discussion 622.

An aortic valve-sparing operation for patients with aortic incompetence and aneurysm of the ascending aorta.

David TE¹, Feindel CM.

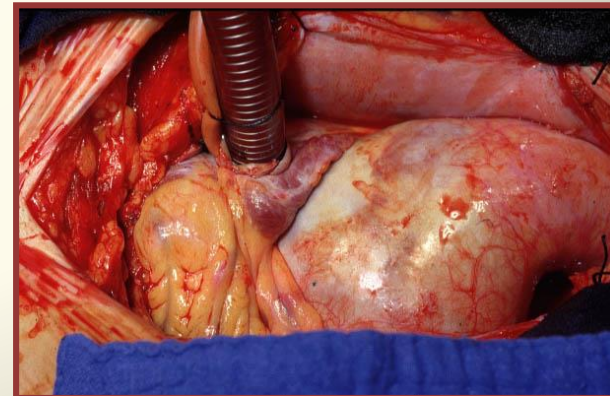
- 10 patients with annuloaortic ectasia were published
- „the aortic valve is re-implanted in a collagen impregnated tubular graft“

Repair of the aortic valve in patients with aortic insufficiency and aortic root aneurysm

Tirone E. David, MD, Christopher M. Feindel, MD (by invitation), and Joanne Bos, RN (by invitation), *Toronto, Ontario, Canada*

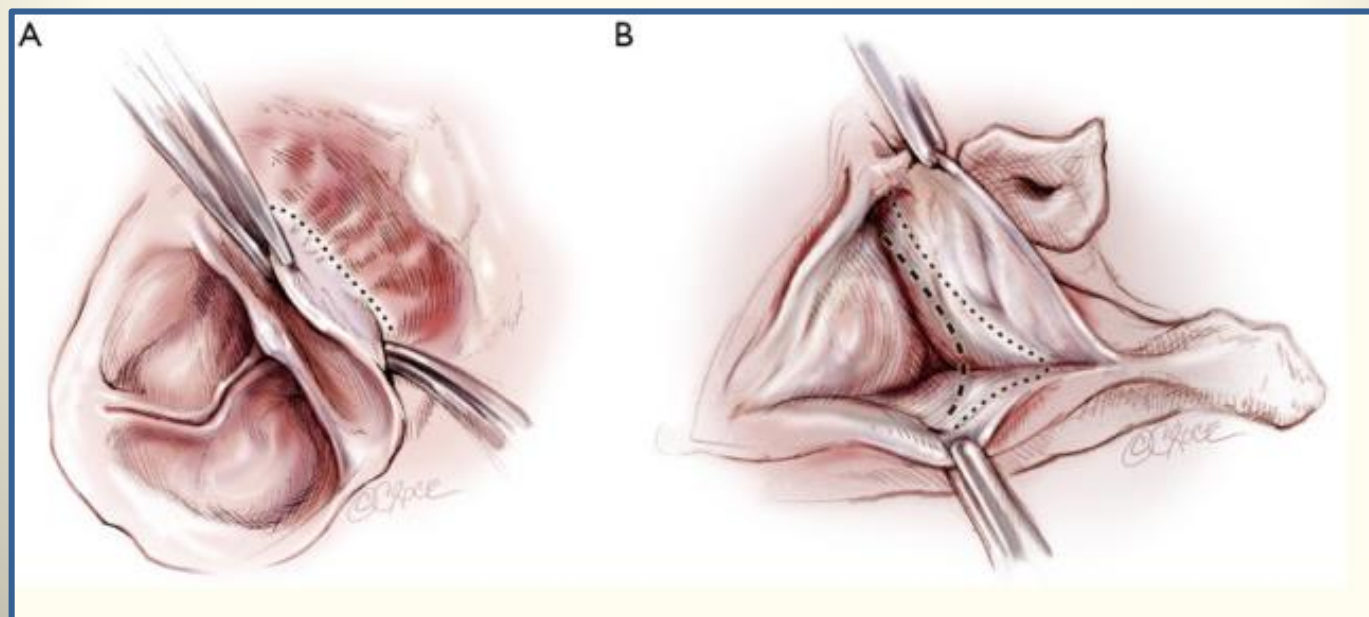
The Journal of Thoracic and
Cardiovascular Surgery
February 1995

- 19 pat. Reimplantation; 26 remodeling of the aortic root;
- Repair remains stable up to 58 month
- These type of repair provided excellent clinical results



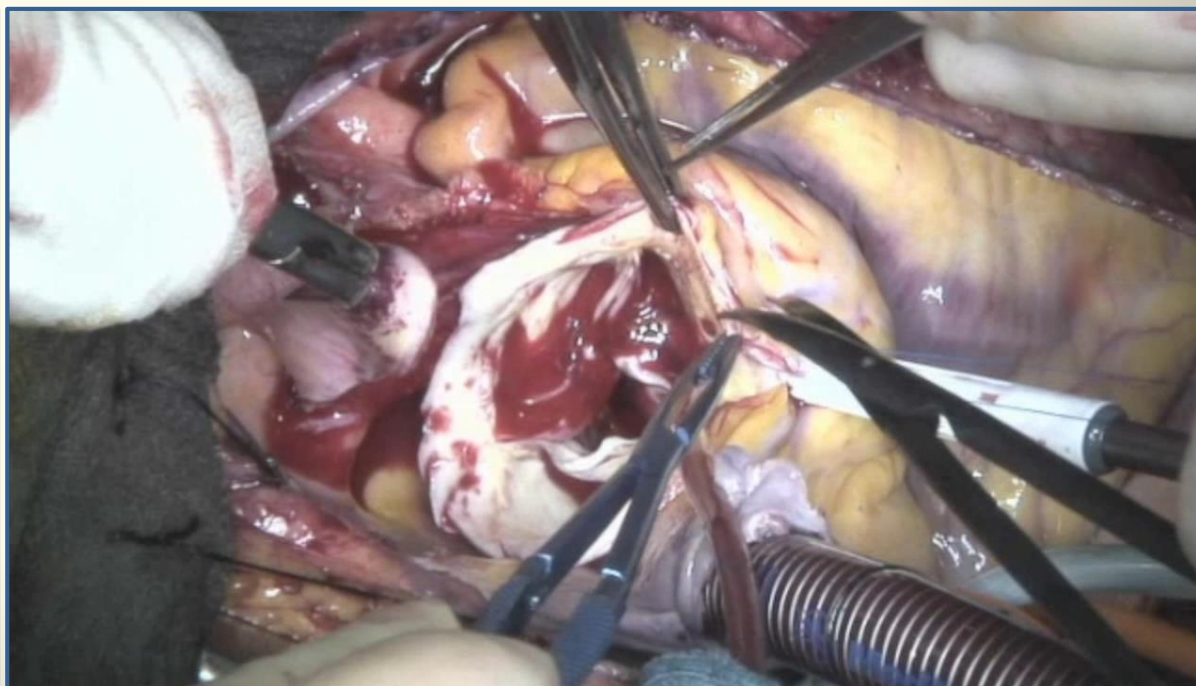
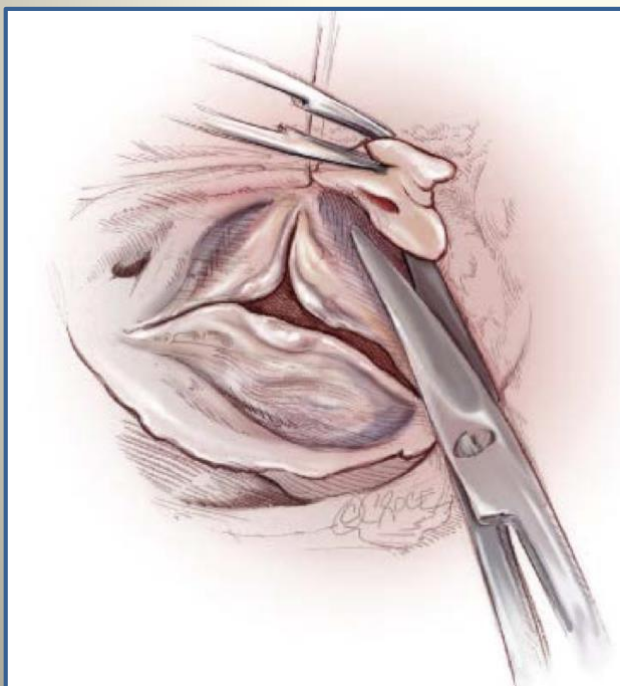
Operative Technique

- Dissection of the aortic root
- As low as possible
- Anatomic limit: plane passing through the nadir of leaflet insertion



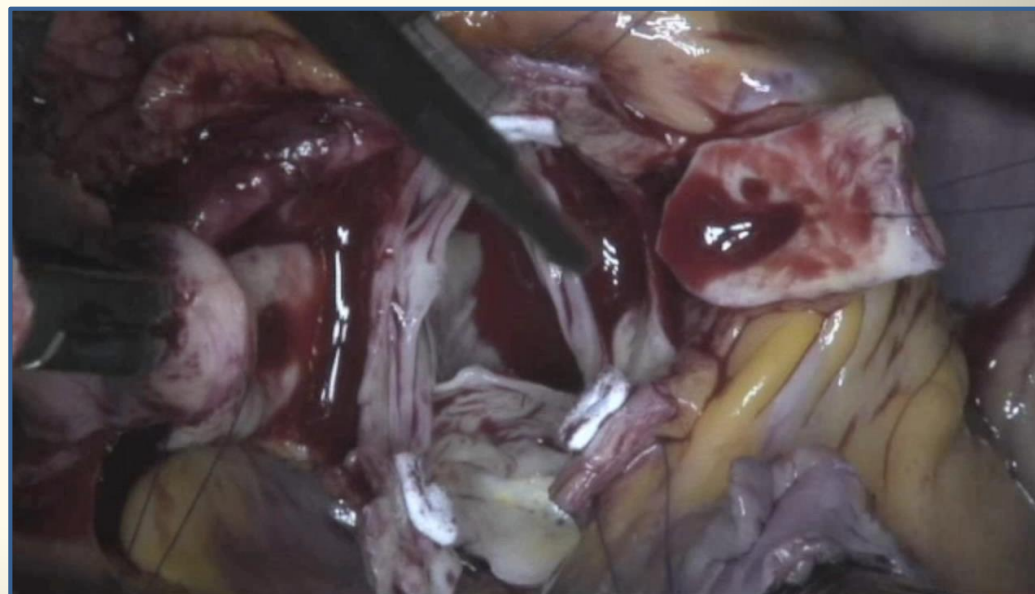
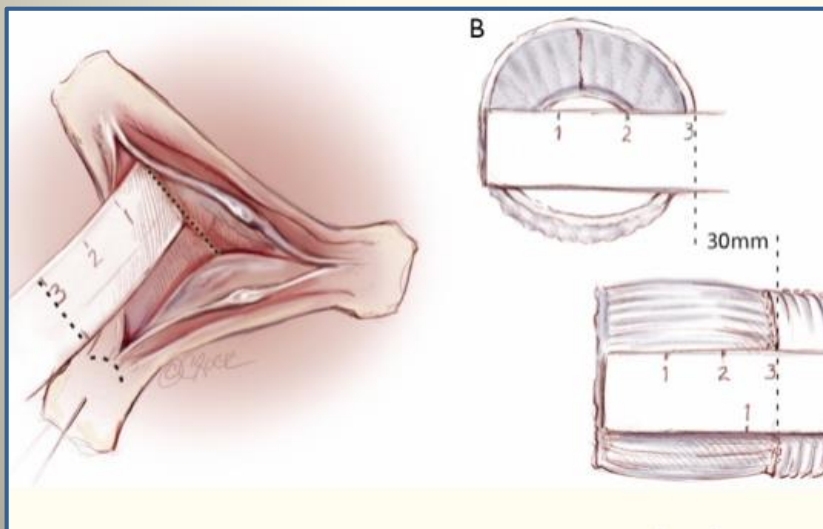
Isolation of Coronary Arteries

- Harvest right coronary artery
- Isolate RCA before external dissection of right sinus



Sizing of the Graft

- **Feindel-David formula:**
 $[(\text{height} \times 2) \times 2/3] + (2 \times \text{thickness of aortic wall})$
- **El Khoury technique:**
Height of interleaflet triangle: L/N coronary sinus
- **De Paulis approach:**
Annulus diameter + 5 mm
- **Vienna approach:**
length of the free margin of the cusp minus 20%

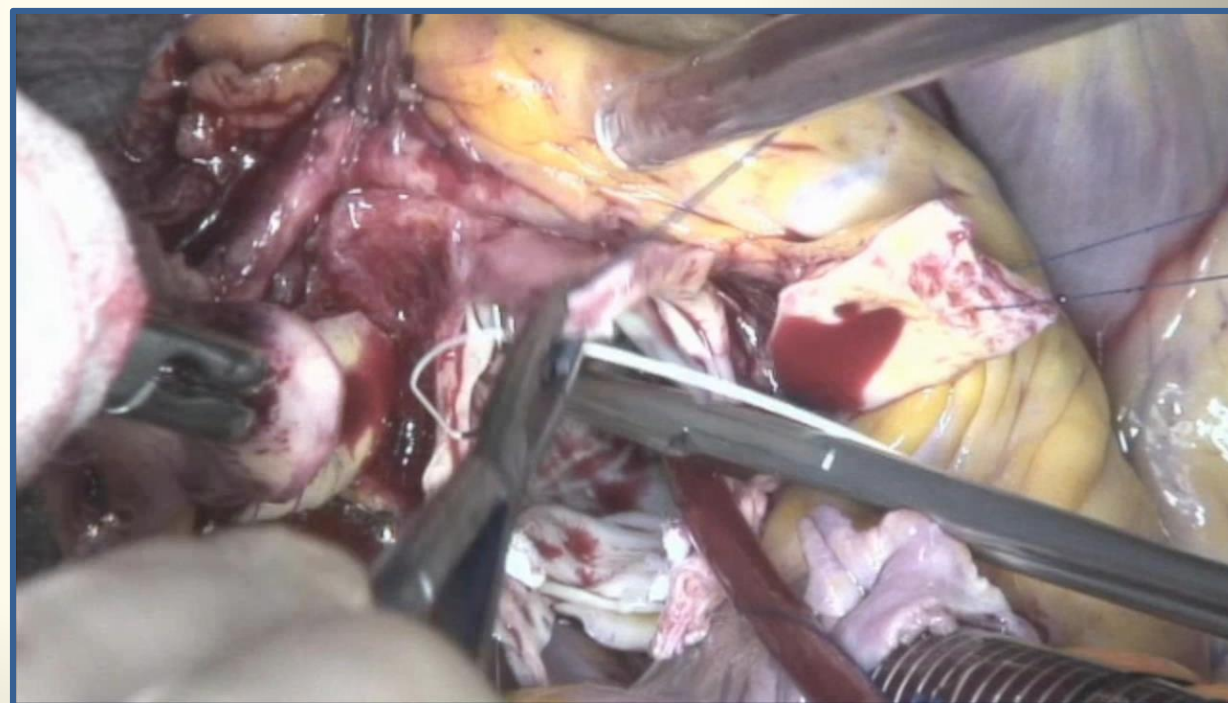
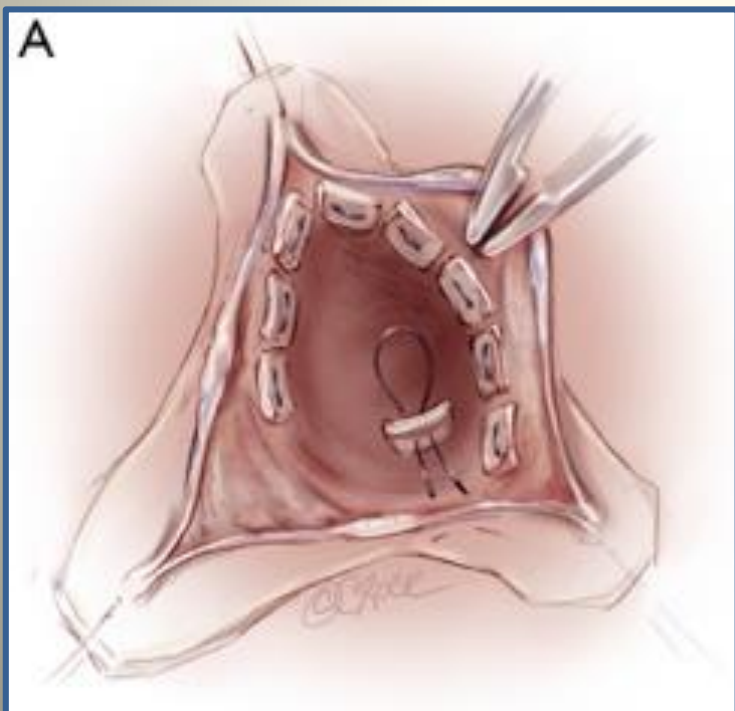


Sizing of the graft is crucial (I always take 28mm !?)

- Diameter of the Dacron prosthesis depends on the length of the free margin of the cusps / size of the annulus
- The longer the free margin of the cusps - the bigger the diameter of the prosthesis!
- Mismatch in sizing will result in:
 - Prolaps of the cusps: long cusps – small prosthesis
 - Central insufficiency: small cusps – big prosthesis

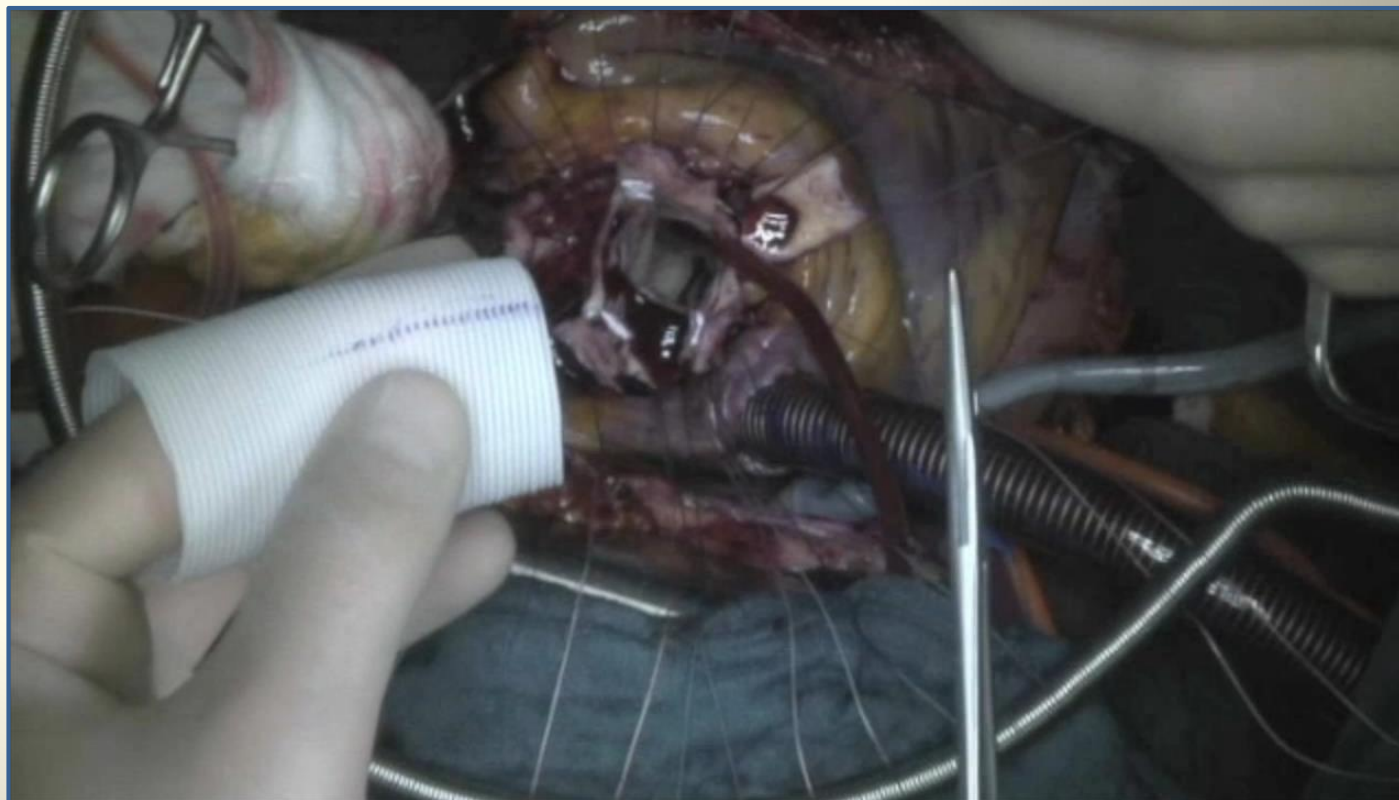
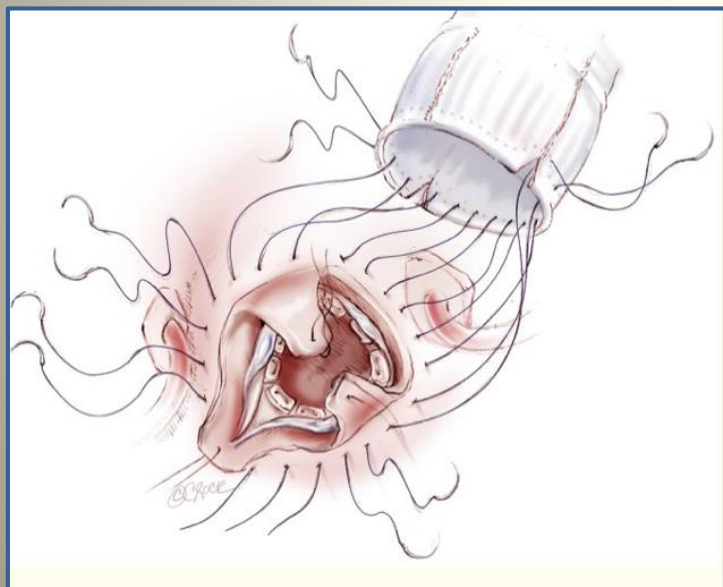
Subvalvular Proximal Suture Line

- Placement of subannular sutures with pledges
- R/N coronary commissure: stitches higher up to avoid heart block
- Tailoring of the tubular prosthesis recommended



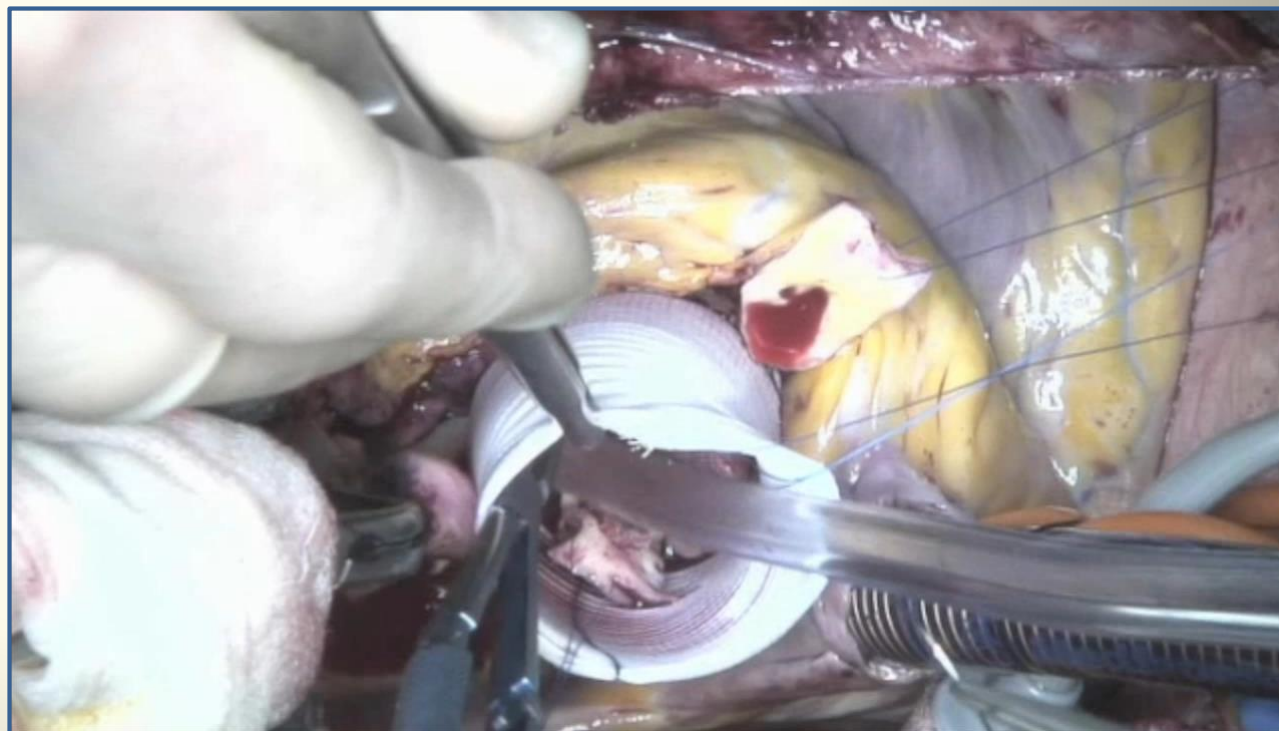
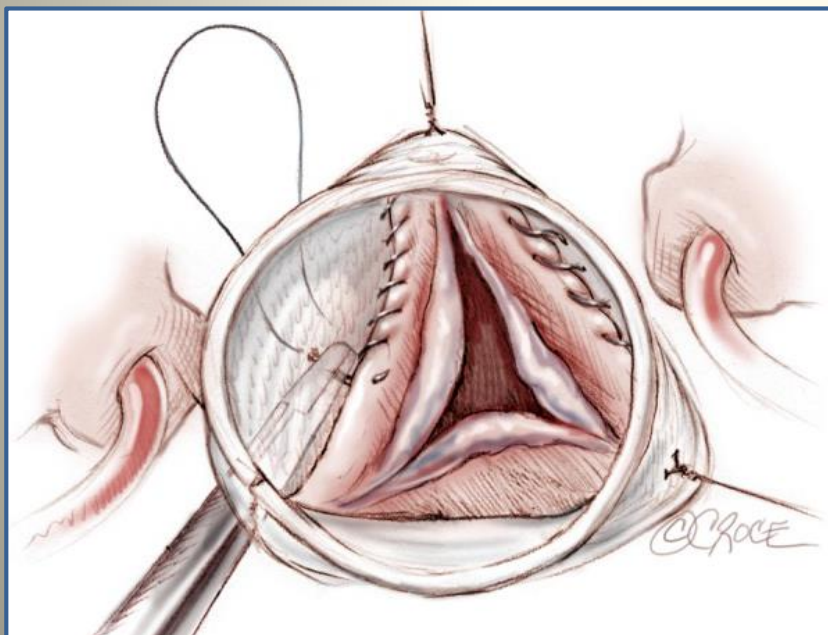
Dacron Graft Implantation

- Placement of the prearranged sutures through the free margin of the Dacron prosthesis

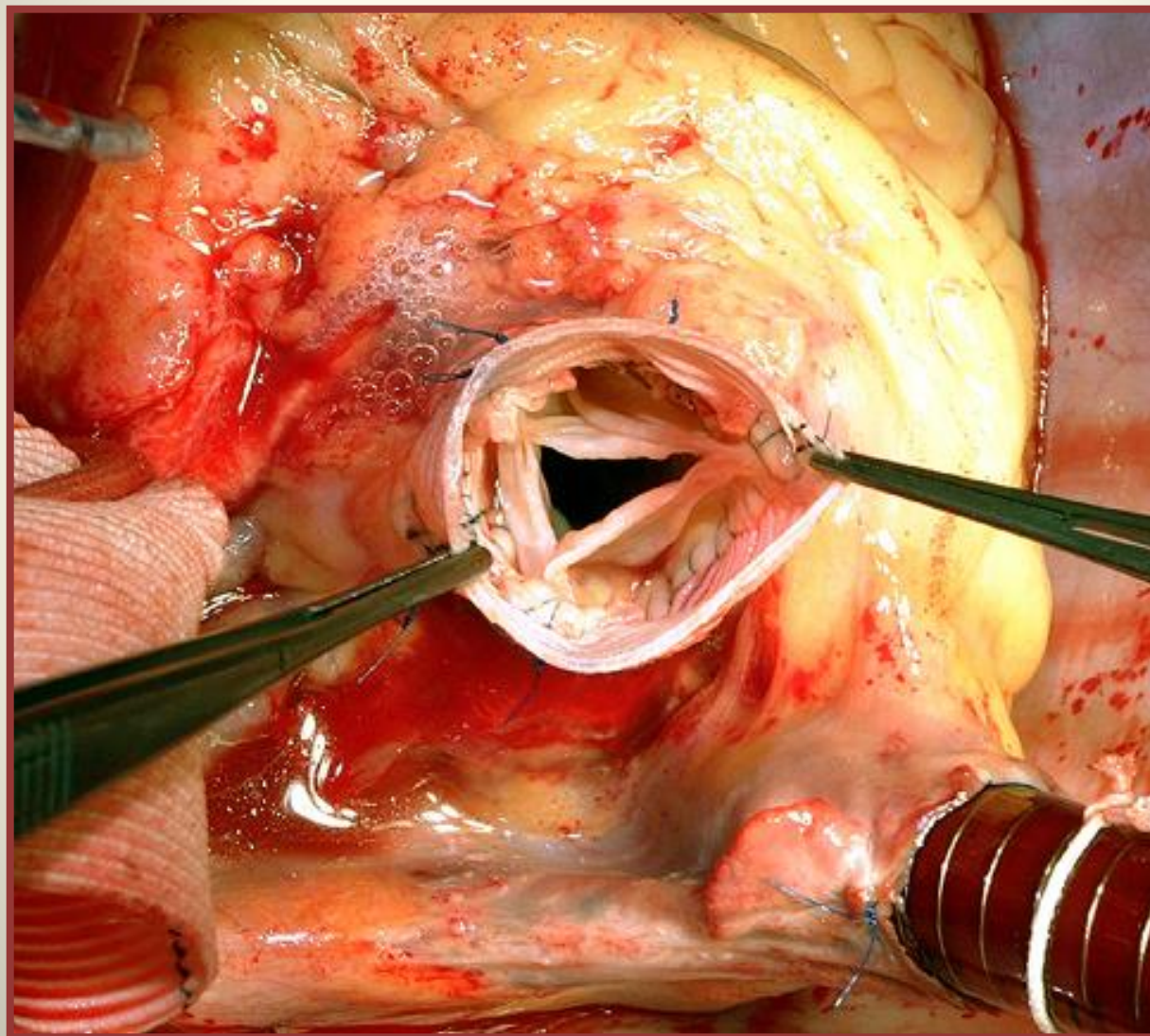


Re-Implantation of the Valve

- Firmly pull the 3 commissures
- Attach high on the tube graft
- 4-0 polypropylen running suture around valve apparatus

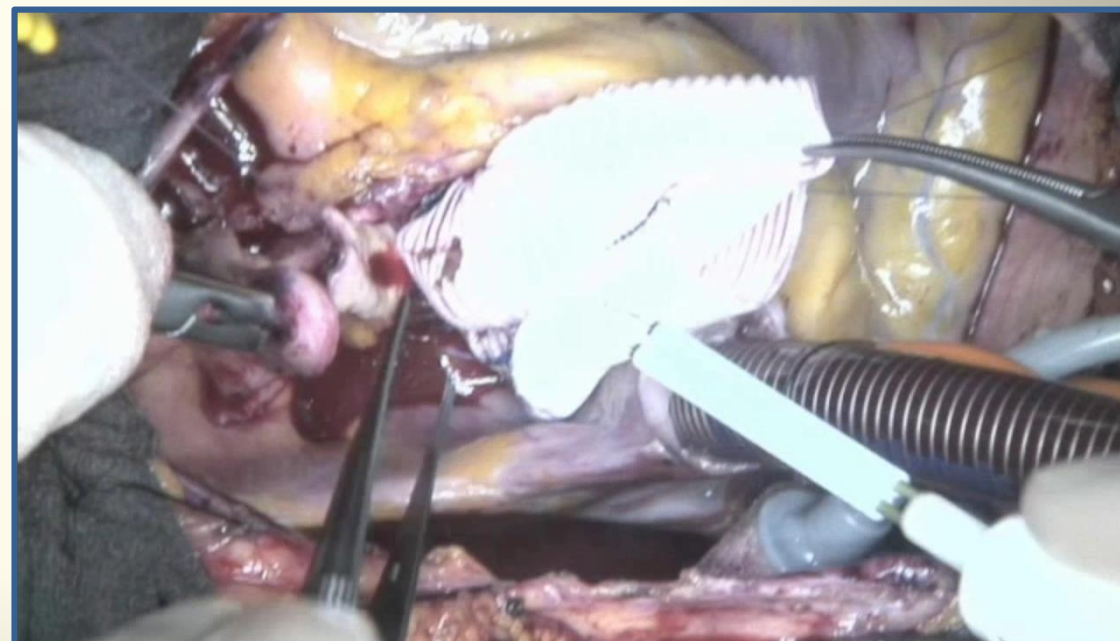
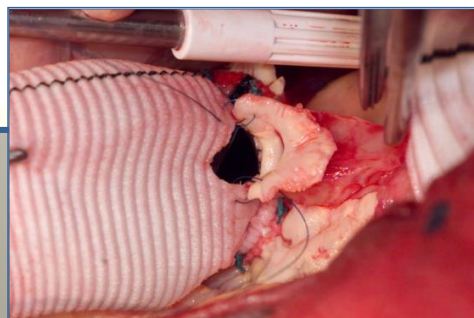
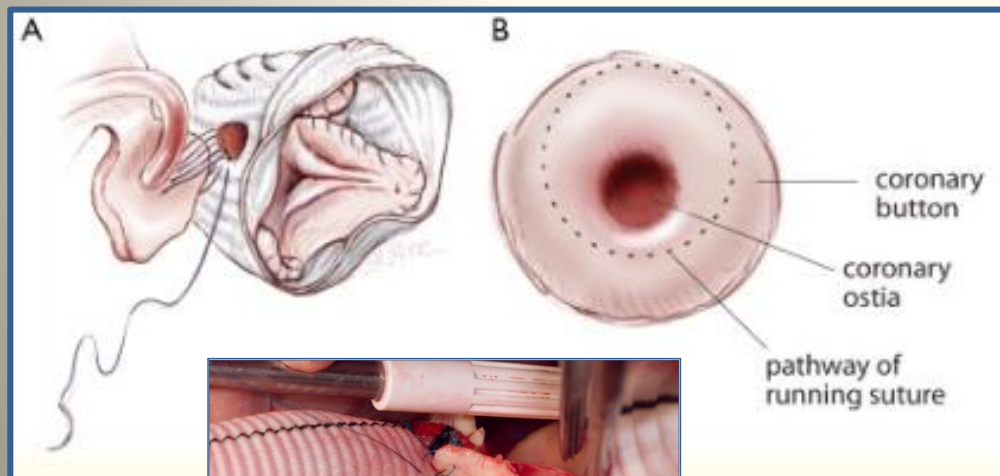


Intra-OP Aspect

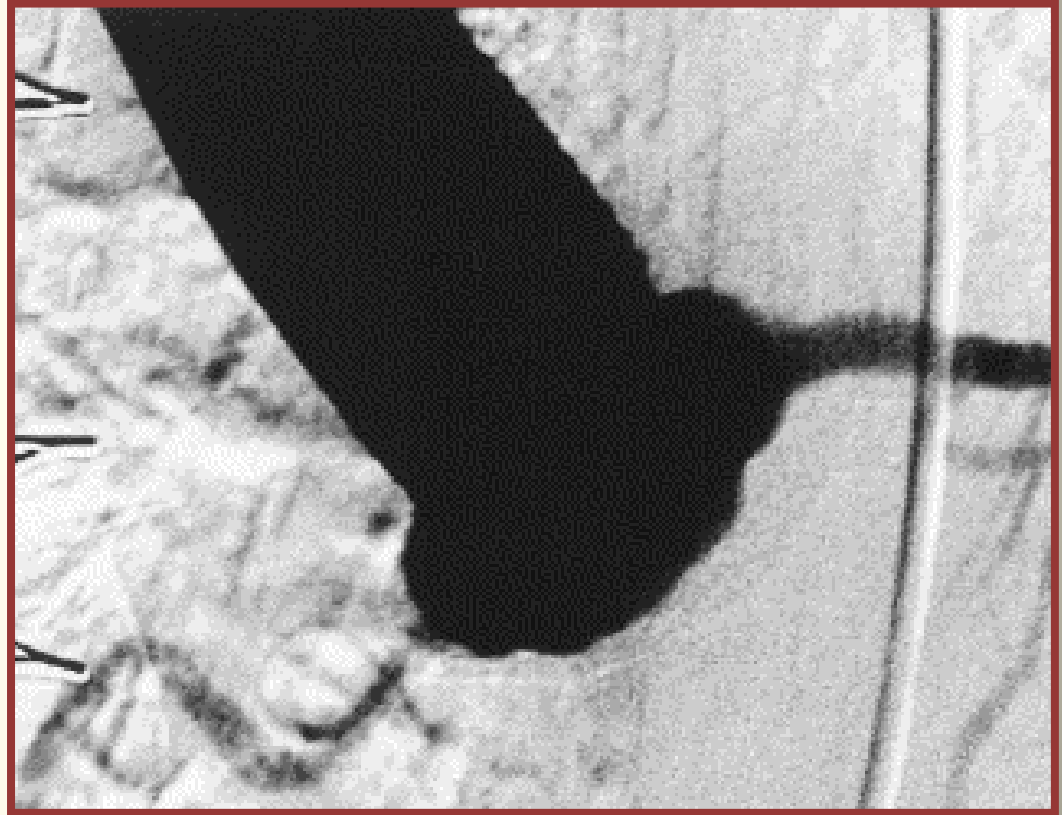
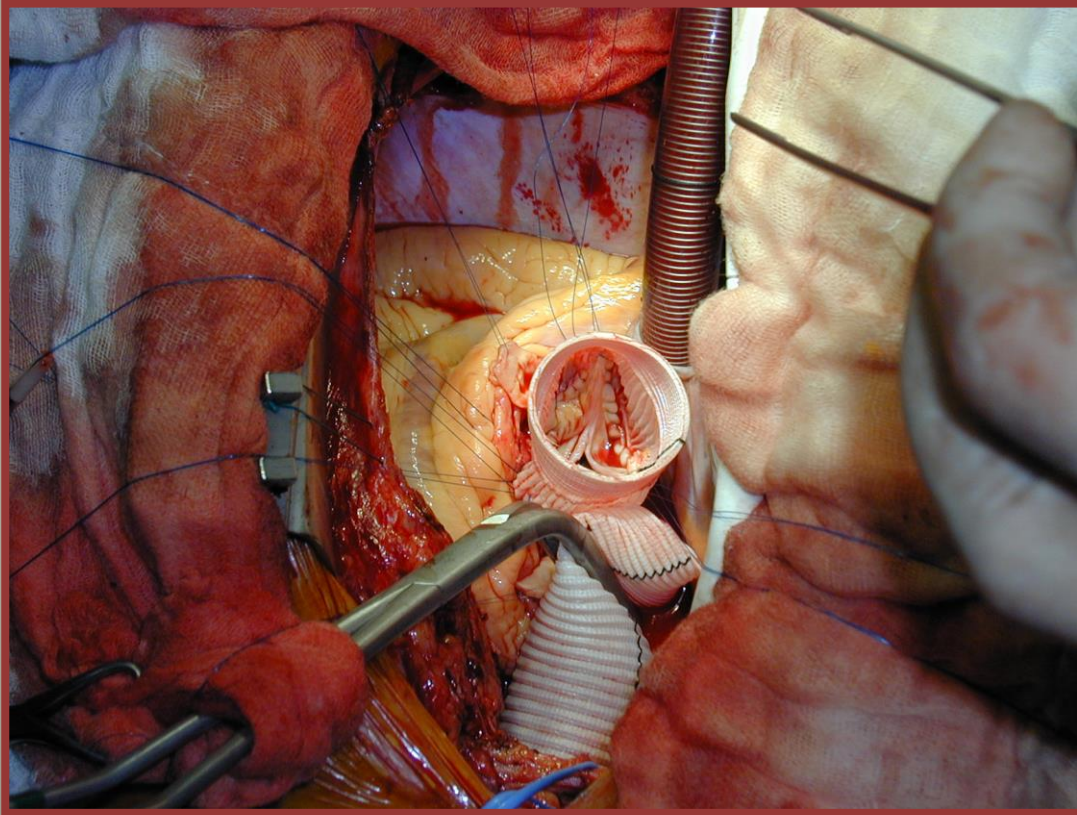


Coronary Button Reimplantation

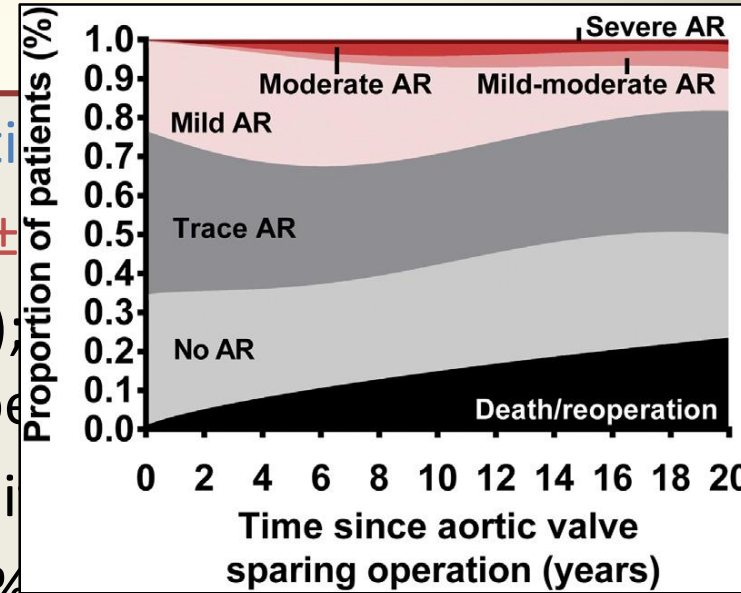
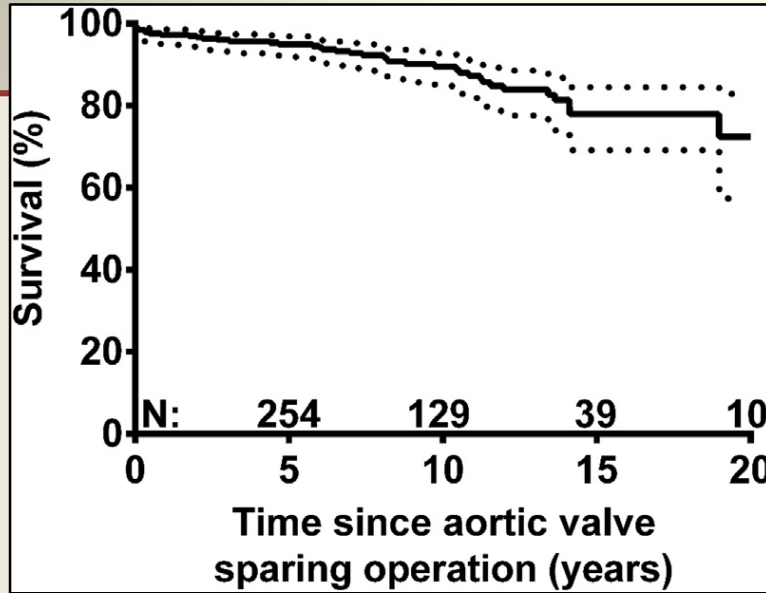
- Cave: atypical location of right coronary artery in patients with root aneurysms
- Reimplantation with 6-0 polypropylen suture
- Reinforcement with strip of autologous pericardium in patients with friable tissue



Operative Result



Tirone E. David, MD, Carolyn M. David, BN, Christopher M. Feindel, MD, and Cedric Manlhiot, PhD



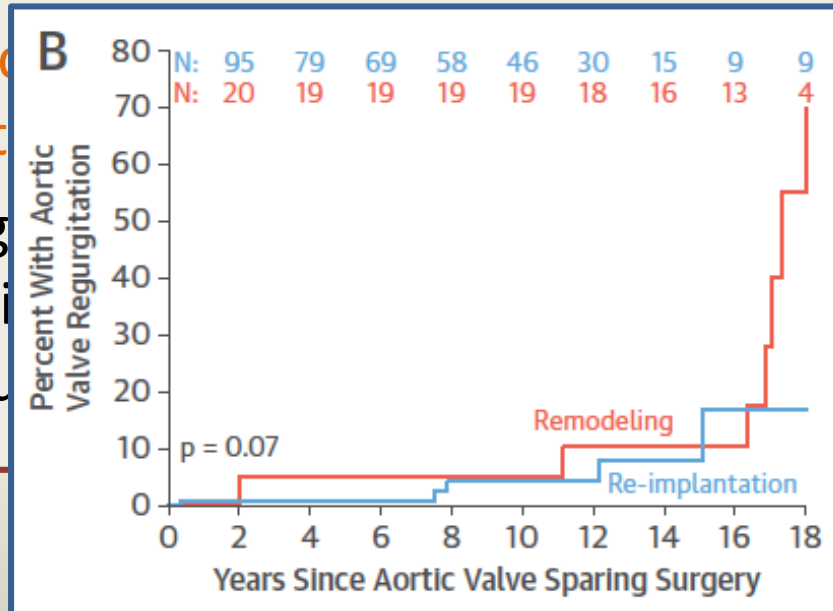
Survival rate after 15 years: 77,9%, 20 years: 72,4%

- Freedom from re-operation at 20 years: 96,9%
- Conclusion: aortic valve re-implantation provides excellent clinical results and stable aortic valve function during the second decade of observation

Outcomes of Aortic Valve-Sparing Operations in Marfan Syndrome

Tirone E. David, MD, Carolyn M. David, BN, Cedric Manlhiot, BSc, Jack Colman, MD, Andrew M. Crean, MD, Timothy Bradley, MB, ChB

- 1988-2012: valve sparing operation in 146 patients; reimplantation technique in 121pat.; remodeling technique in 25 pat.; mean age: 35,7 years
- Mortality at 15 years: 6,8%
- Aortic insufficiency for remodeling than
- Valve sparing associated with complications in long-term follow-up

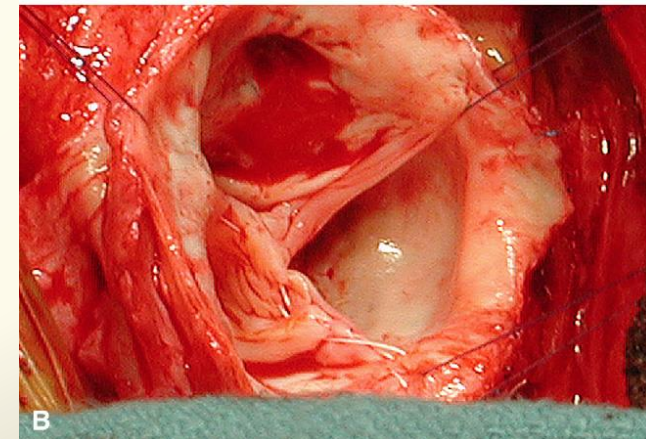
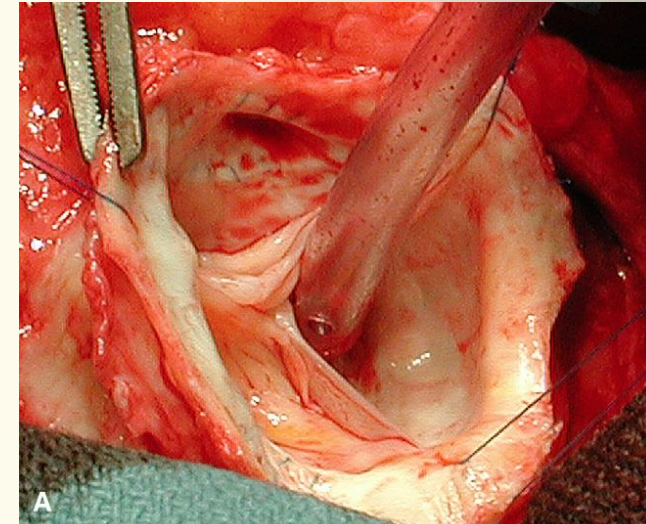


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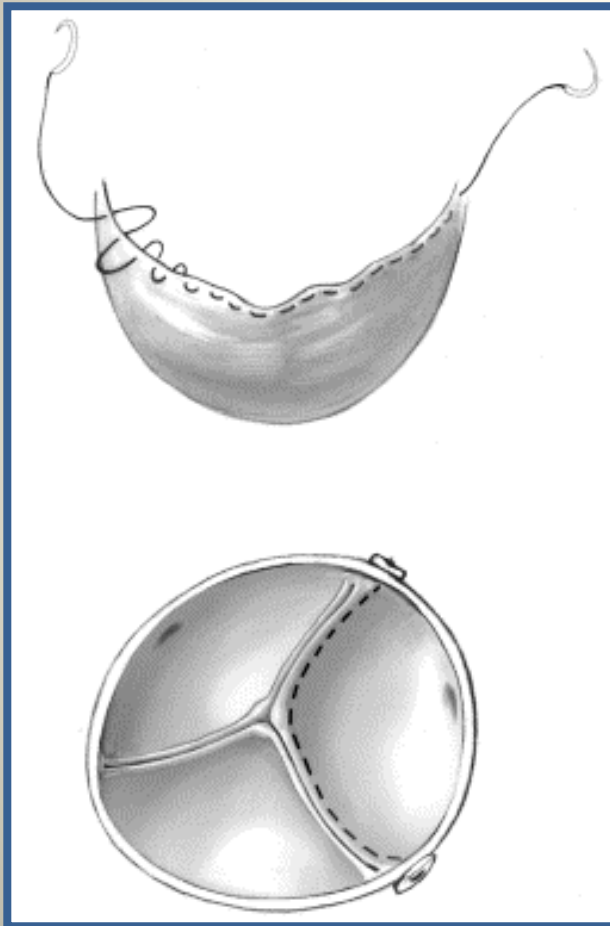
Aortic cusp repair with Gore-Tex sutures during aortic valve-sparing operations

Tirone E. David, MD, and Susan Armstrong, MSc, Toronto, Ontario, Canada

- 1994-2007: out of 267 valve sparing procedures 64 patients had repair of one or more cusps
- Freedom from valve insufficiency > mild
 - 1 year: 100%
 - 5 years: 96,4%
 - 10 years: 86,7%
- Cusp repair by plication or Gore-tex suture had no negative effect on durability



Prolaps of a single leaflet



- Repair of prolapsing aortic leaflet with **6-0 Gore-Tex suture** (mild-to-moderate prolapse)
- **Triangular resection** at the central area of the leaflet
- **Plication of the free margin** of the cusps at the central area

Survival and reoperation pattern after 20 years of experience with aortic valve-sparing root replacement in patients with tricuspid and bicuspid valves

Stefan Klotz, MD, Si
Ulrich Stierle, MD, a

Michael Petersen, MD,

- 315 patient
- Reimplant
- 30 day mo
- No differ
- comparabl
- Reoperatio
- remodelin
- Conclusio

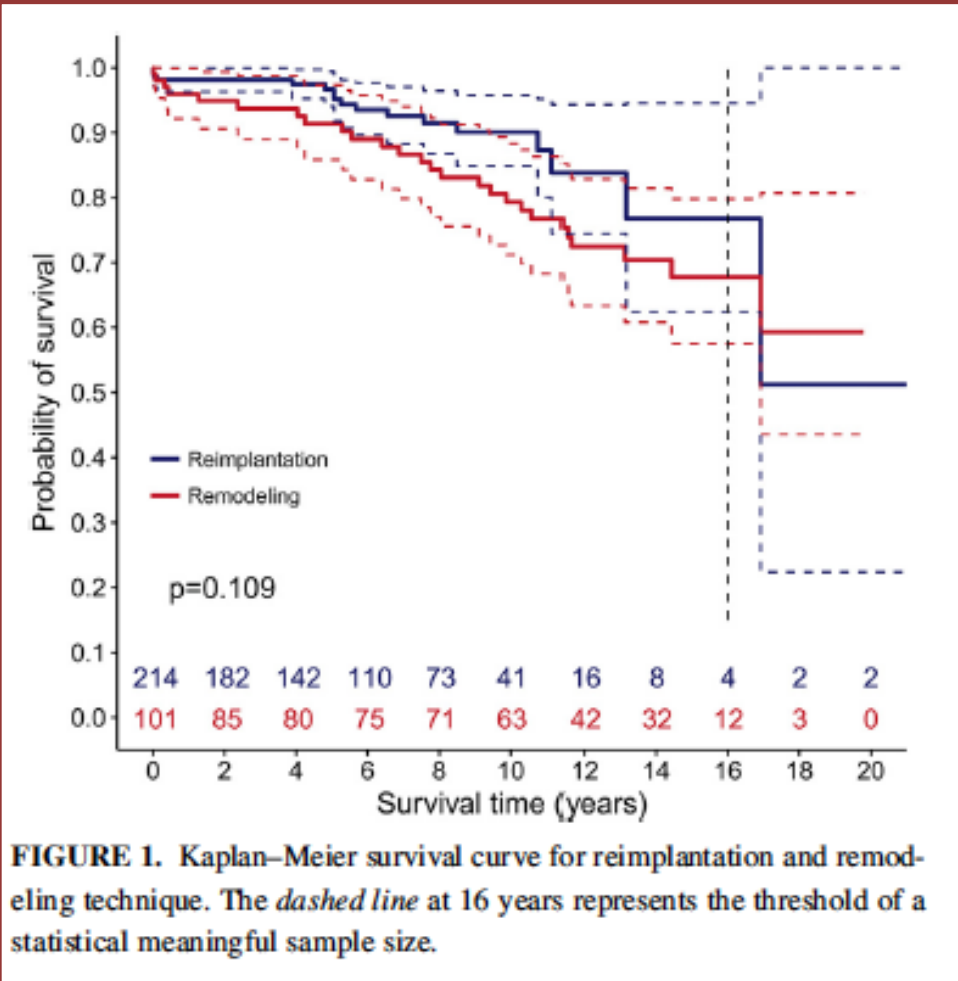


FIGURE 1. Kaplan–Meier survival curve for reimplantation and remodeling technique. The dashed line at 16 years represents the threshold of a statistical meaningful sample size.

- Both te
- Risk of (after 10 years)

d, 89 bicuspid);
unique: 101
ing: 2%
h groups,
; 11,7% for

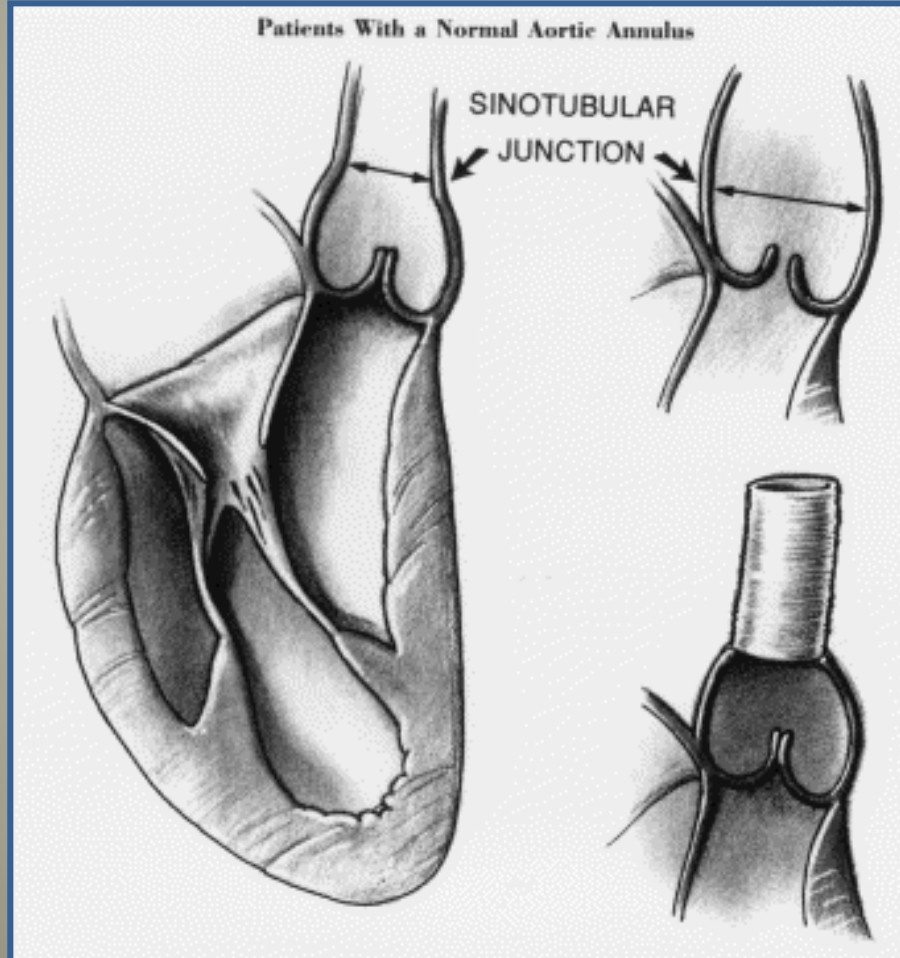
bicuspid group

Rationale of Valsalva Prosthesis



- **Mimics the natural shape** of the aortic sinuses
- **Creates** compliant aortic sinuses
- **Enables** physiologic „pulsation” of sinuses
- **Prevents contact** of the aortic leaflets with the wall of the prosthesis during opening process

Role of Sinuses of Valsalva

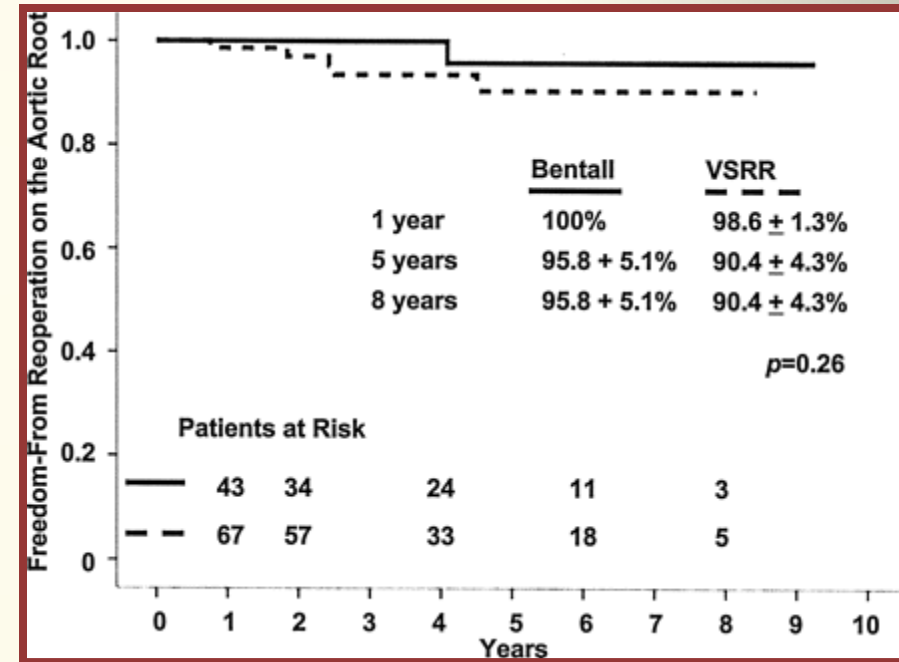
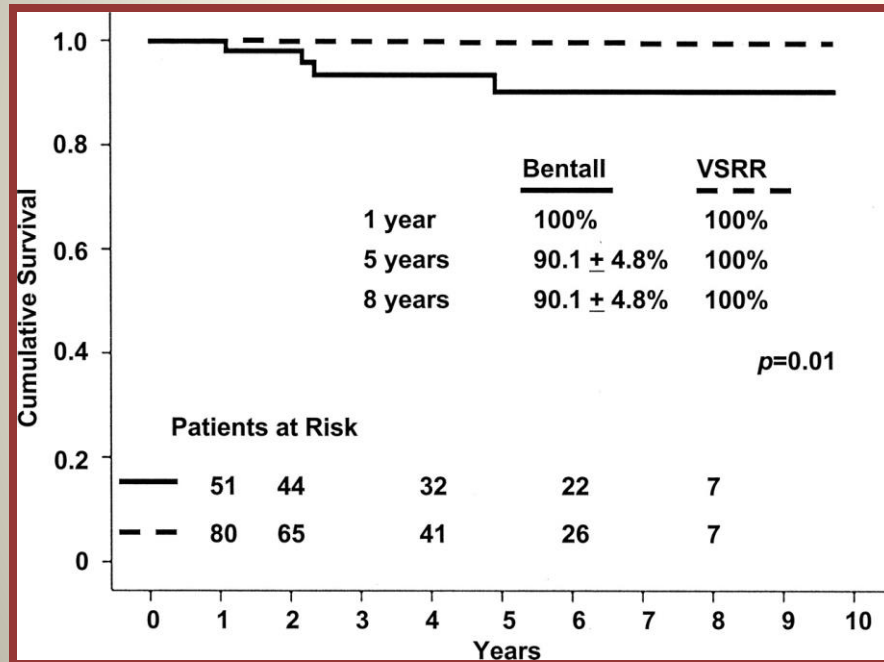


- **Compliant nature** of the Sinuses of Valsalva
- **Allows commissural movement**, which is critical in the mechanism of valve opening
- Important **role in valve closure**
- **Minimizes the stresses** in the leaflet
- **Impact on longevity** of aortic cusps

T. David's comment to Sinus Valsalva Prosthesis

- Further complicates the performance of this operation
- Sinuses are spherical and will deform the aortoventricular junction
- Height of the sinuses may not coincide with the height of the native aortic valve commissures
- relatively high re-operation rate (10% at 10 years) is published using the Gelweave Valsalva graft.

Bentall Operation versus Valve-Sparing Aortic Root Replacement



Conclusion

- **Aortic valve reimplantation** technique demonstrates excellent long-term results
- Can be performed in **Marfan patients**
- **Cusp repair** has no negative effect on durability
- Reimplantation technique in patients with **bicuspid valves** may have higher reoperation rate after 10 years
- **Remodeling technique** may result in higher reoperation rate due to the lack of annular stabilization