IV CONGRESSO NAZIONALE DI ECOCARDIO CHIRURGIA

MILANO 10-12 MARZO 2010

Gaetano Minzioni

U.O. Cardiochirurgia Univ. Pisa

La tecnica di Bentall. Una tecnica consolidata per la soluzione dei problemi della aorta ascendente

1. Cenni storici
2. Bentall classica
3. Varianti
4. Bentall biologica
5. Problemi tecnici
6. Bicuspidia
7. Endocardite

Thorax (1968), 23, 338.

A technique for complete replacement of the ascending aorta

HUGH BENTALL AND ANTONY DE BONO

From the Royal Postgraduate Medical School, London, and Hammersmith Hospital

A technique for complete replacement of the aortic valve and ascending aorta in cases of aneurysm of the ascending aorta with aortic valve ectasia is described. The proximal aortic root was too attenuated to afford anchorage to the aortic prosthesis, so this was sutured to the ring of a Starr valve and the prostheses were inserted *en bloc*. The ostia of the coronary arteries were anastomosed to the side of the aortic prosthesis.

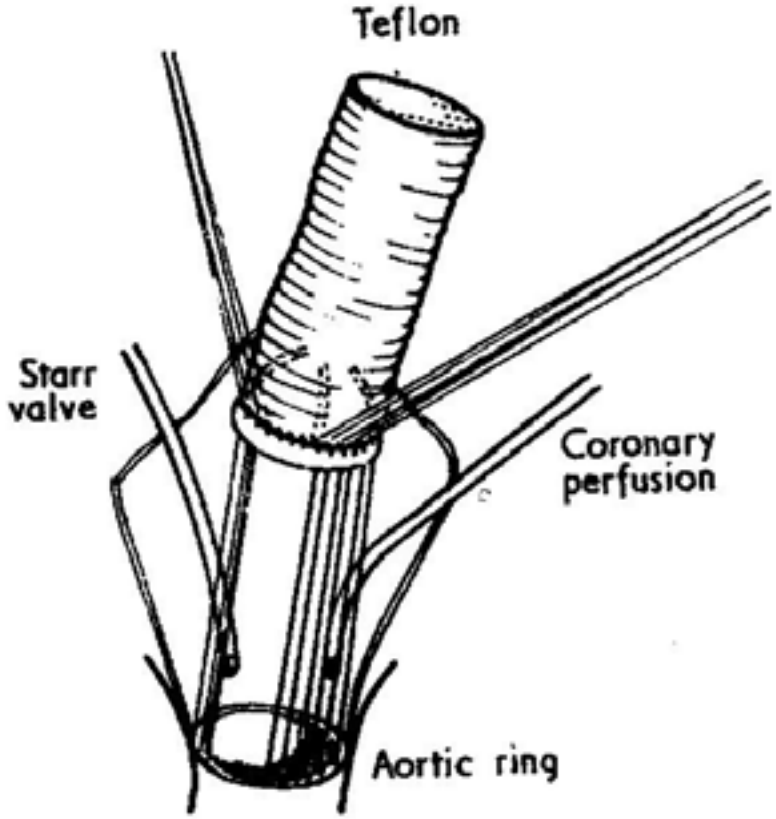


FIG. 2. *Starr valve has been sutured to aortic prosthesis: sutures have been placed in aortic ring before fixing the combined prostheses.*

The technique used is reported as it offers an alternative method of dealing with this type of aortic disease when the whole of the ascending aorta has to be replaced.

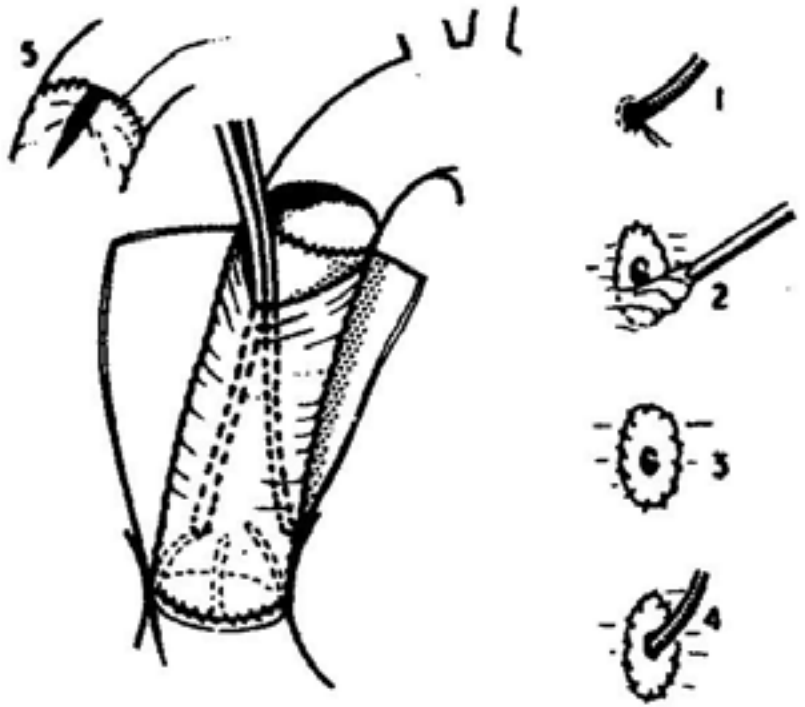
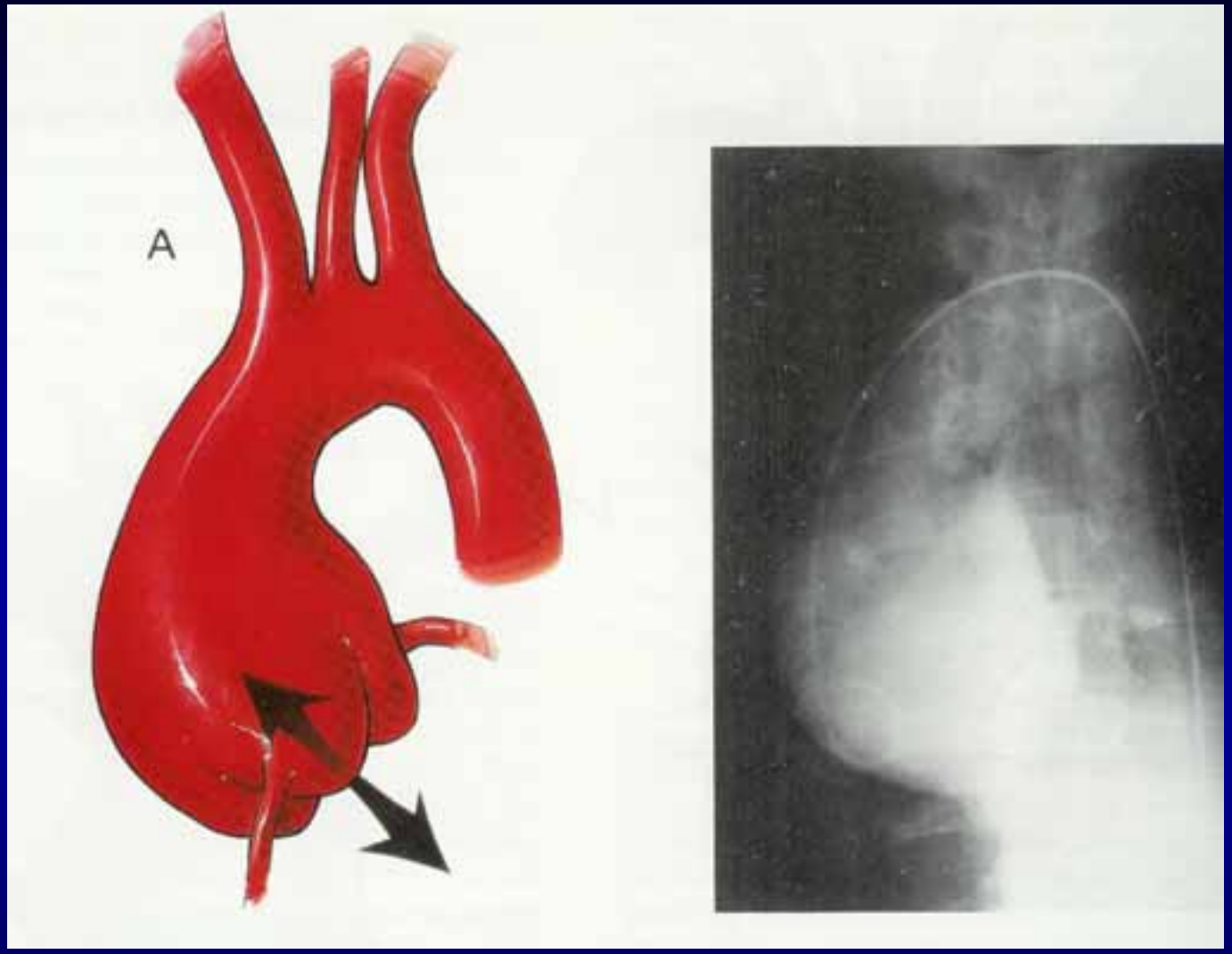


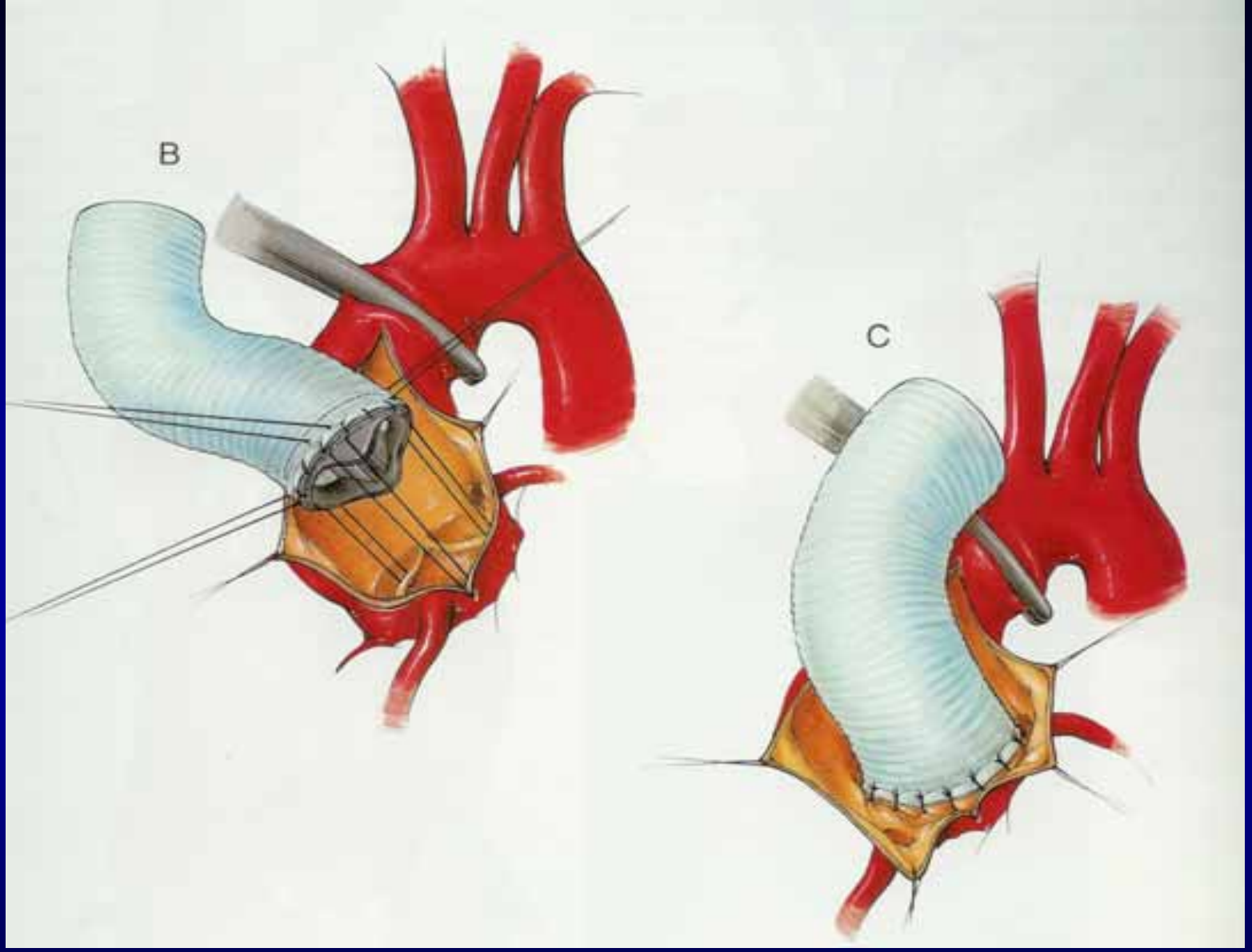
FIG. 3. *Combined prostheses in situ. Insets 1 to 4 show details of holes fashioned in the side wall of the Teflon tube to reincorporate the coronary ostia within the lumen of the new ascending aorta. Inset 5 shows the vertical slit in the prosthesis.*

REFERENCE

Cooley, D. A., Bloodwell, R. D., Beall, A. C., Hallman, G. L., and De Bakey, M. E. (1966). Surgical management of aneurysms of the ascending aorta. *Surg. Clin. N. Amer.*, **46**, 1033.



Crawford ES and Crawford JL: Diseases of the aorta. Williams & Wilkins editors 1984 Baltimore



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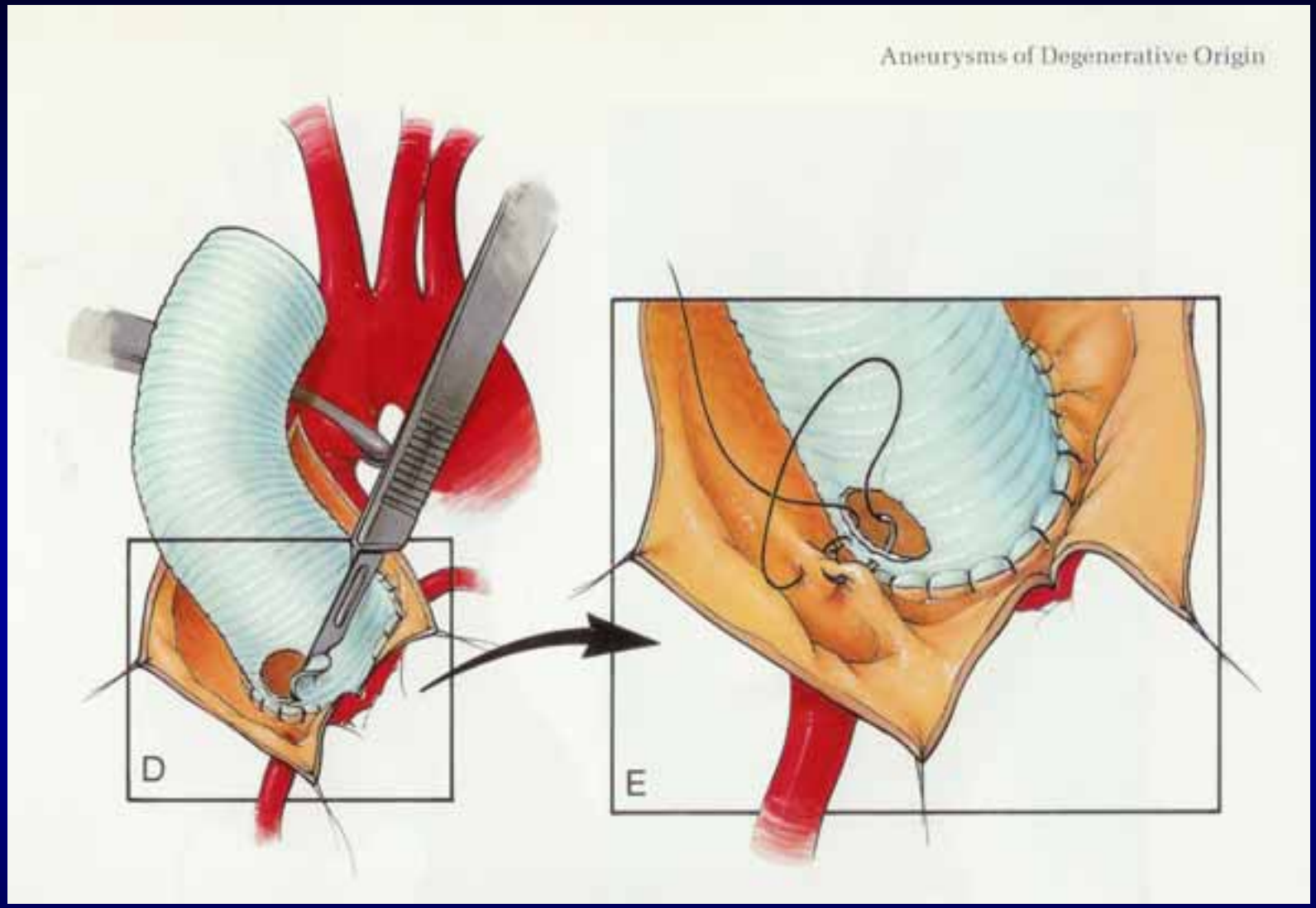
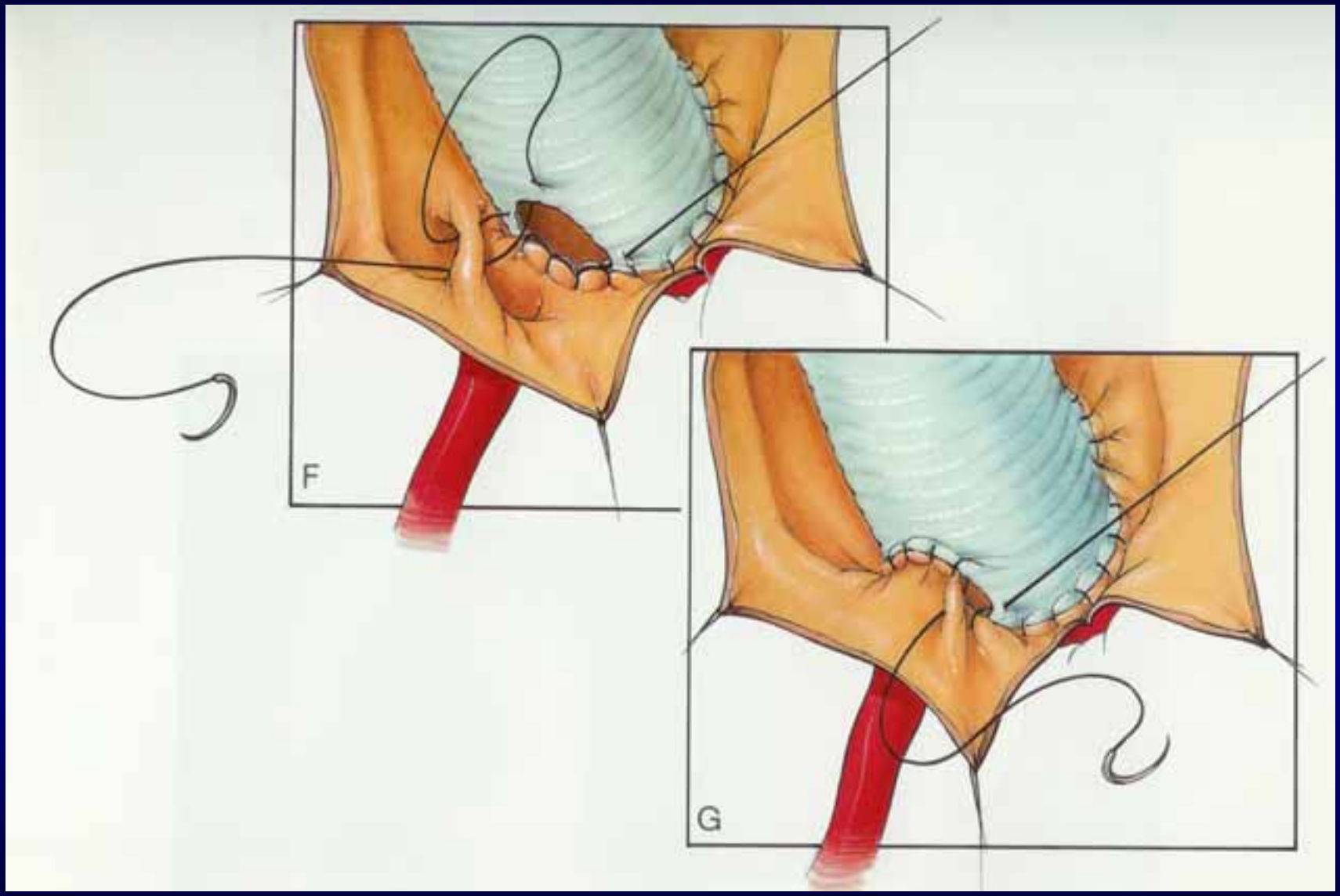


Crawford ES and Crawford JL: Diseases of the aorta. Williams & Wilkins editors 1984 Baltimore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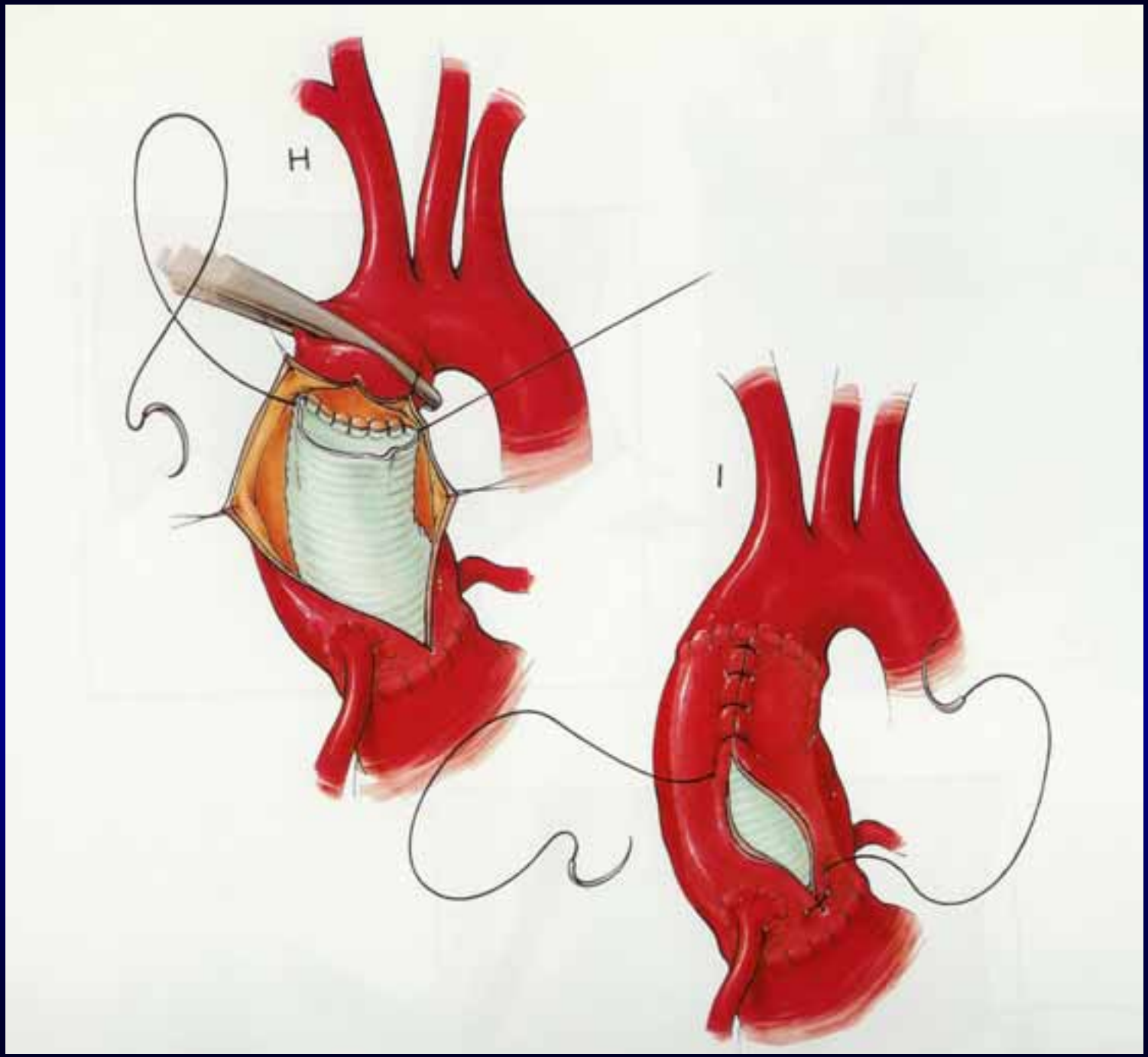
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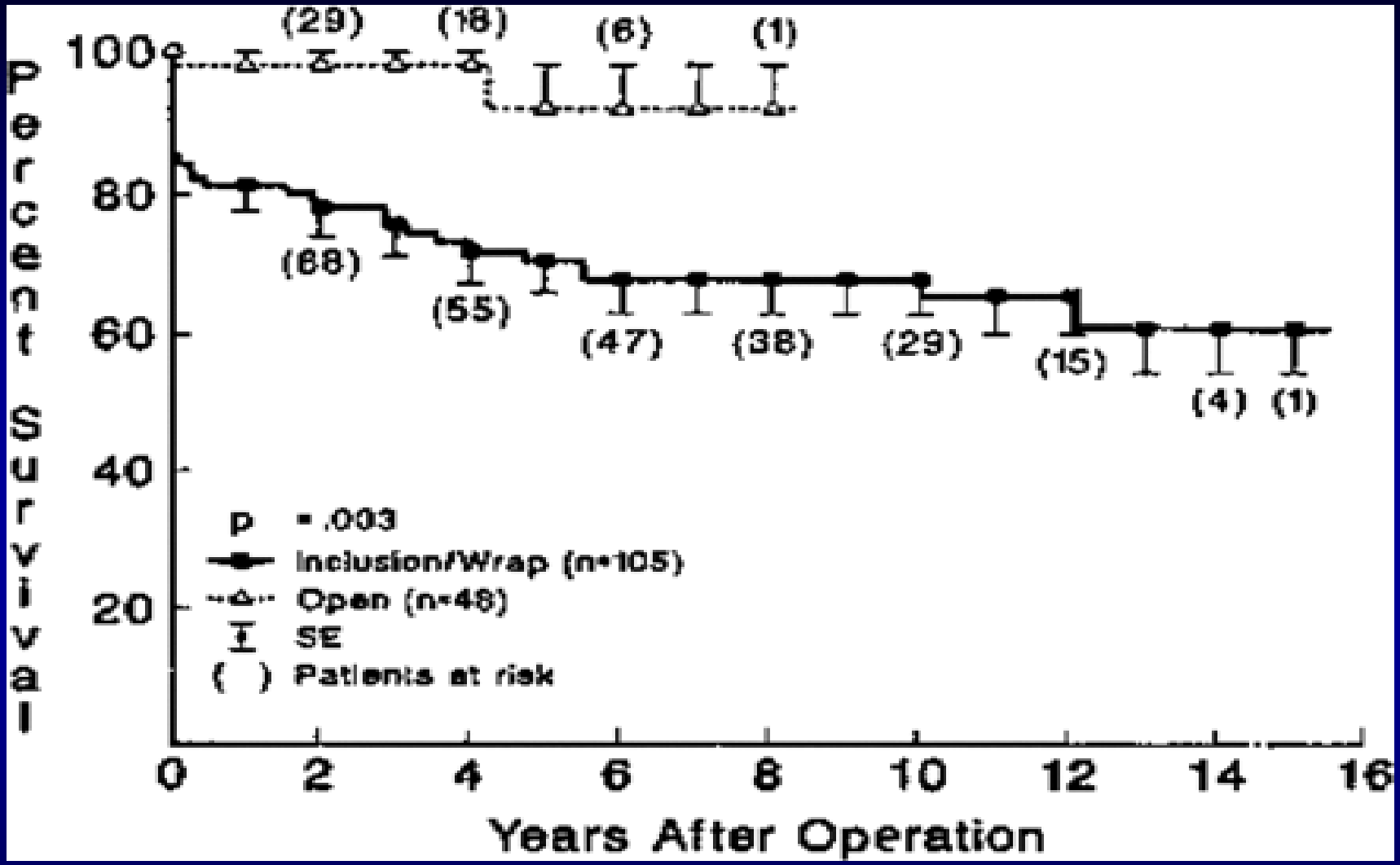
Varianti della Bentall

- Bentall classica (meccanica, wrapping)
- Bentall “modificata” (button technique)
- Cabrol
- Bentall biologica (stented)
- Bentall biologica (stentless)
- condotto valvolare xenopericardico



Kouchoukos NT, Wareing TH, Murphy SF, Perrillo JB: Sixteen-year experience with aortic root replacement: Results of 172 operations. *Ann Surg* 1991; 214:308.

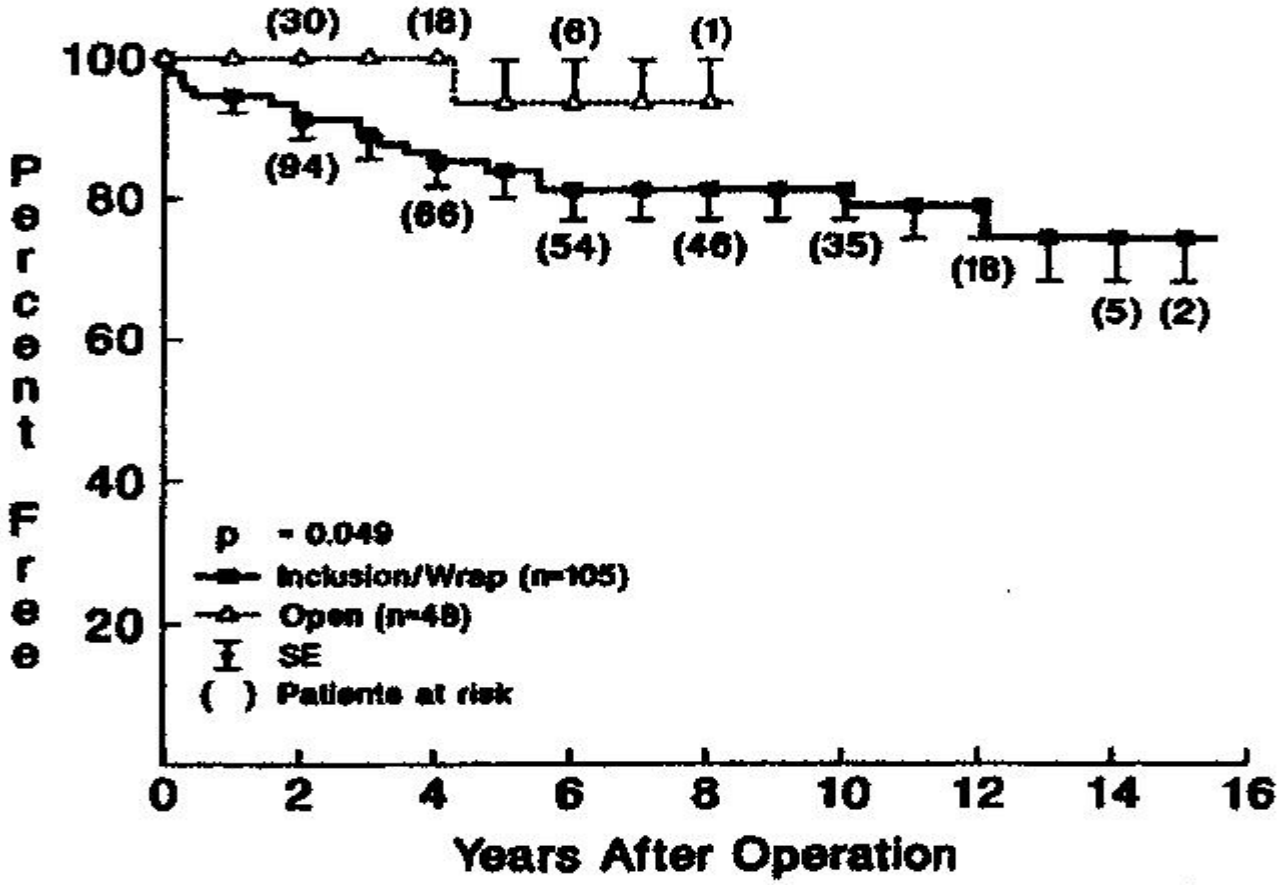
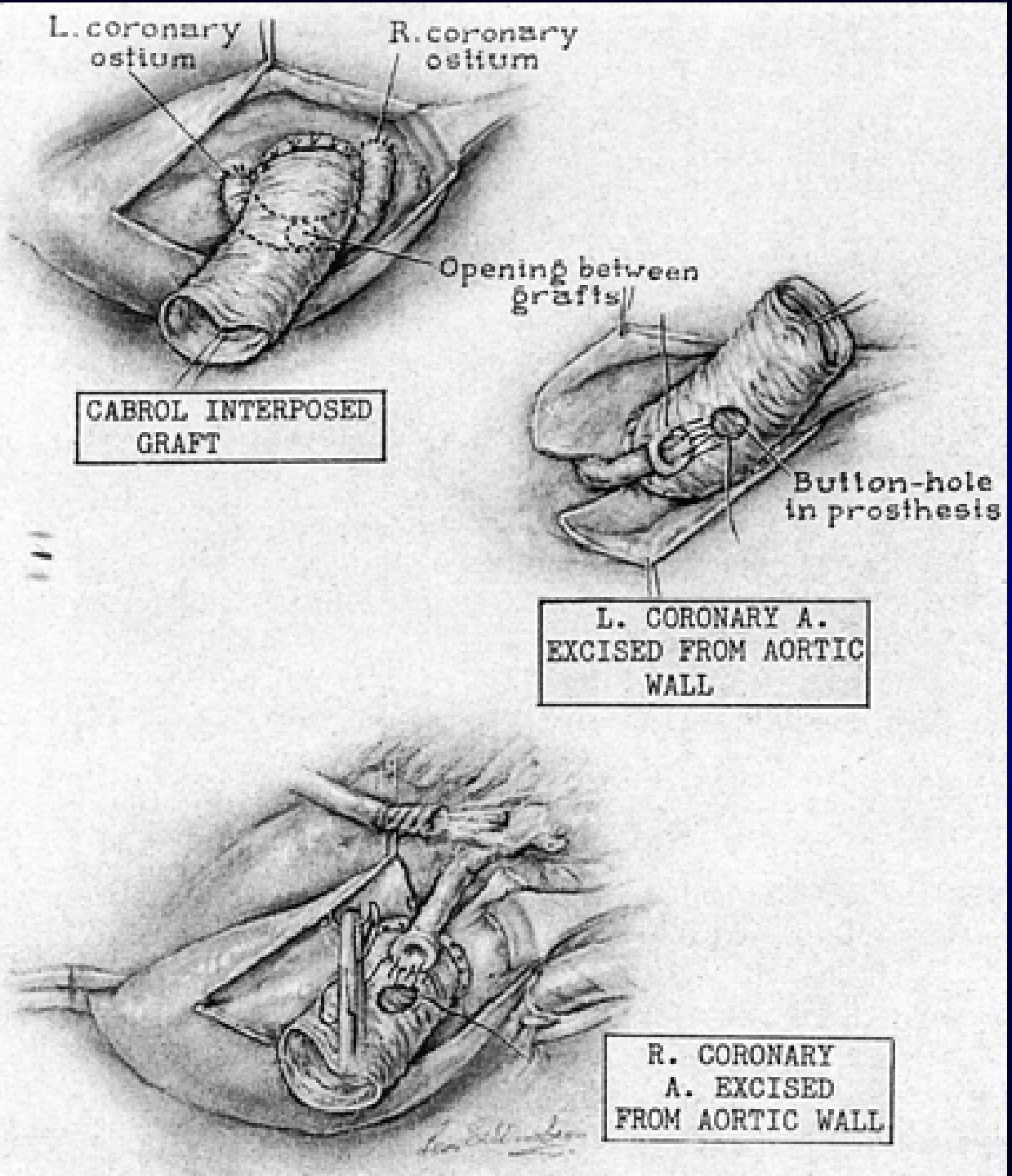
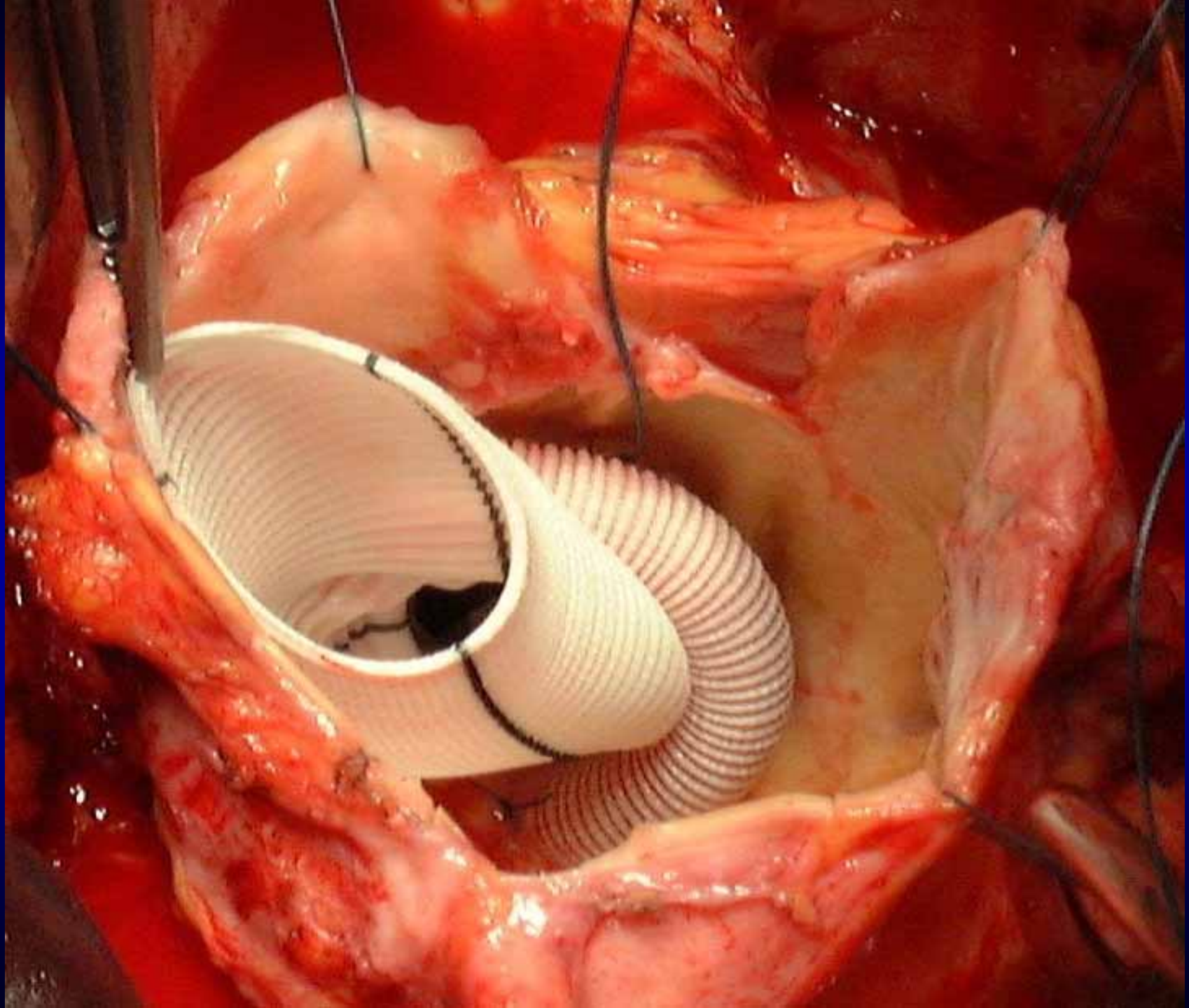
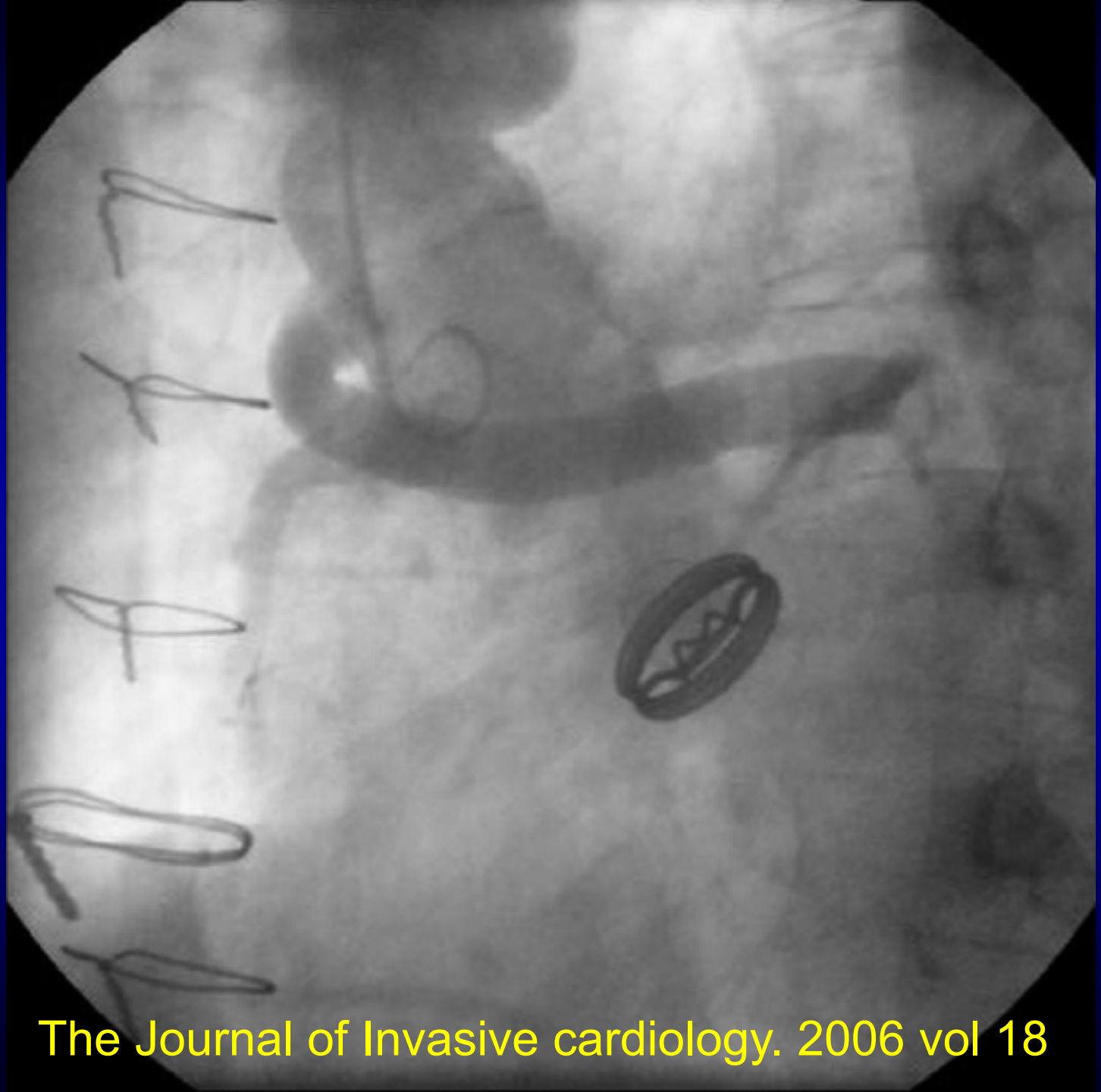


FIG. 6. Actuarial freedom from reoperation on the ascending aorta or aortic valve (exclusive of early reoperations for hemorrhage) according to operative technique for the patients receiving prosthetic grafts.

Kouchoukos NT, Wareing TH, Murphy SF, Perrillo JB: Sixteen-year experience with aortic root replacement: Results of 172 operations. *Ann Surg* 1991; 214:308.


L. coronary ostium
R. coronary ostium
CABROL INTERPOSED GRAFT
Opening between grafts
Button-hole in prosthesis
L. CORONARY A. EXCISED FROM AORTIC WALL
R. CORONARY A. EXCISED FROM AORTIC WALL





The Journal of Invasive cardiology. 2006 vol 18

Long-Term Results of Aortic Root Replacement: 15 Years' Experience

Ilker Mataraci, MD, Adil Polat, MD, Burak Kıran, MD, Ahmet Çalışkan, MD, Altug Tuncer, MD, Vedat Erentug, MD, Kaan Kirali, MD, Omer Isik, MD, and Cevat Yakut, MD

Kartal Kosuyolu Heart and Research Hospital, Cardiovascular Surgery Clinic, Bagcilar Research and Training Hospital, and JFK Hospital, Istanbul; Military Hospital, Elazig, and Elazig Research and Training Hospital, Elazig, Turkey

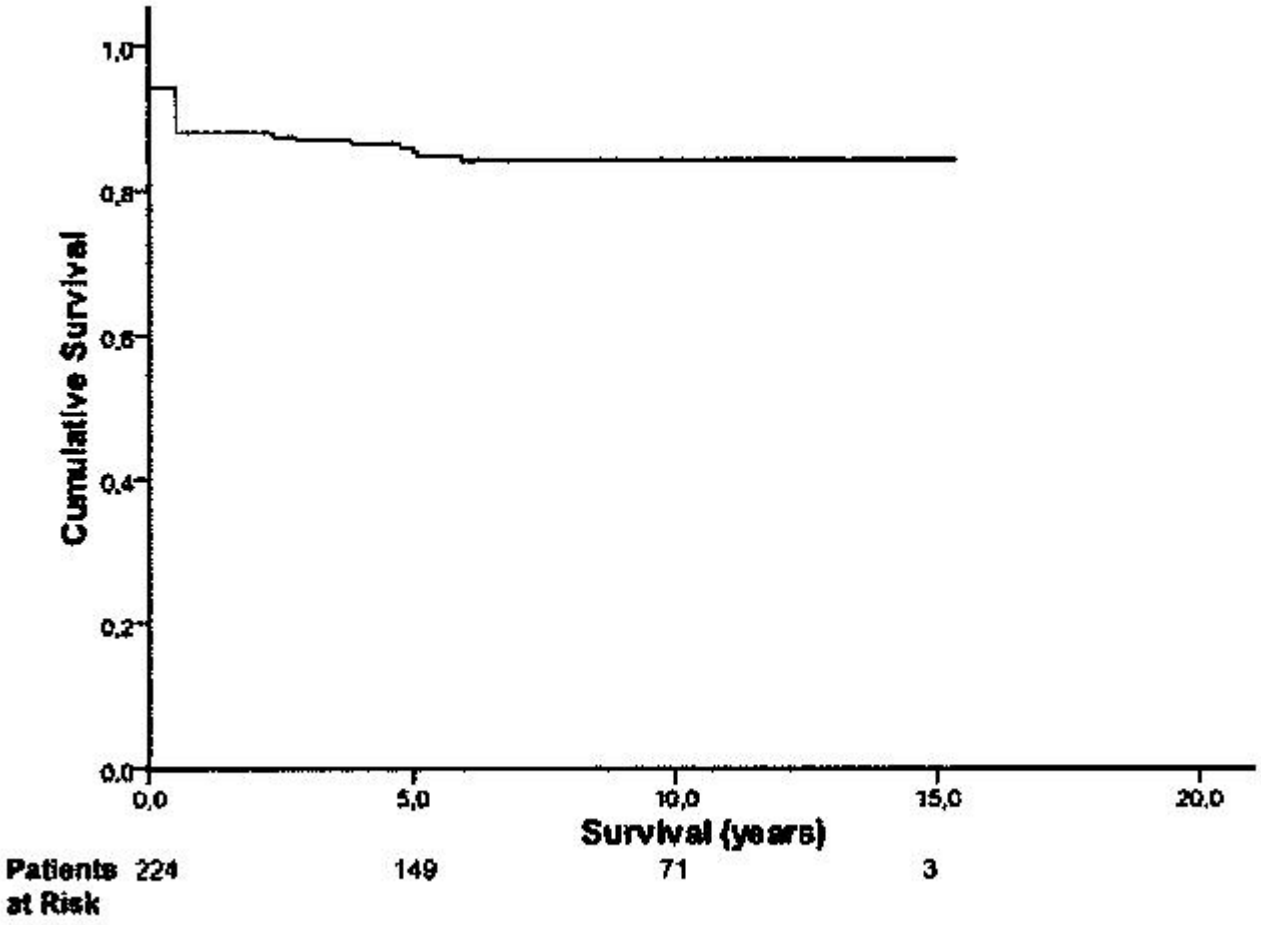


Fig 1. Kaplan-Meier survival curve.

Yakut C et al: Long-term results of aortic root replacement: 15 years' experience. Ann Thorac Surg 2009;87:1783-8

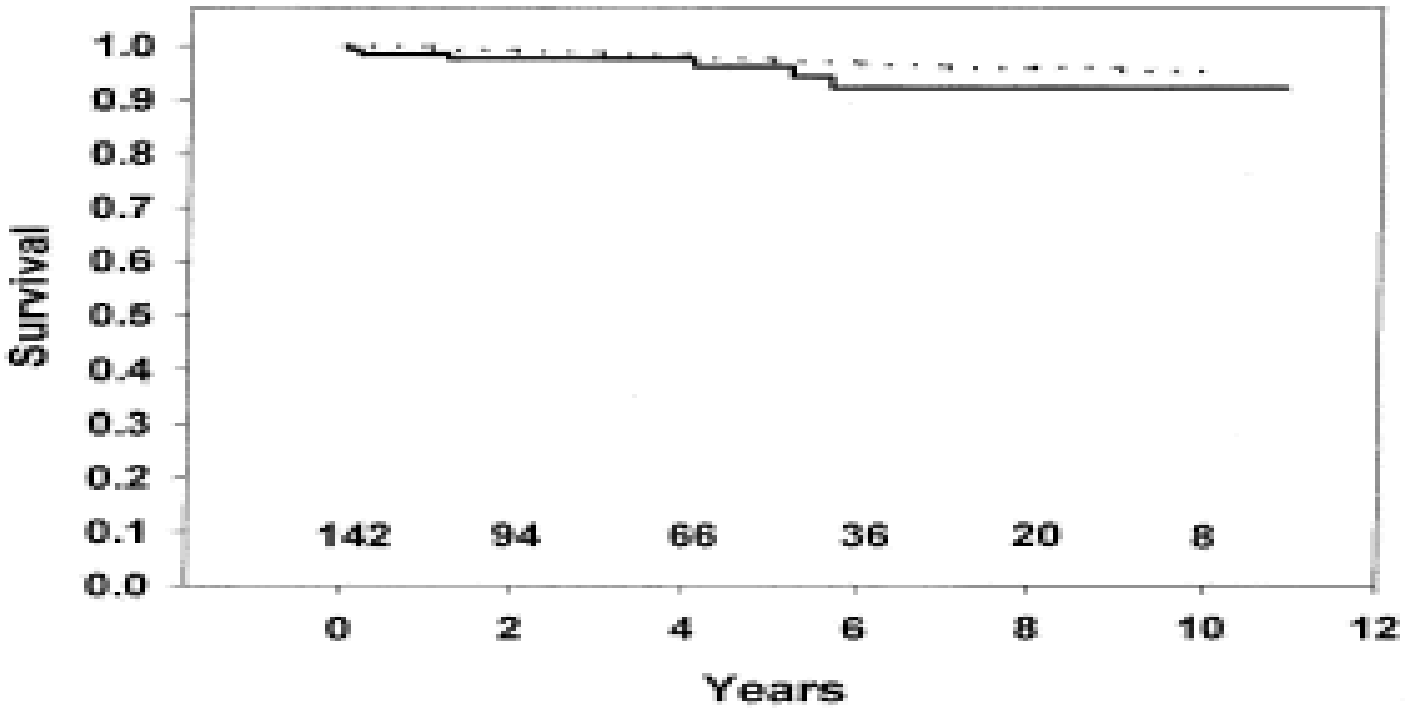


Fig 1. Kaplan-Meier curve of survival of all patients after the Bentall operation (solid line). *Overall survival is 0.95 (95% confidence intervals, 0.9 to 0.99) at 5 years and 0.93 (95% confidence intervals, 0.86 to 0.99) at 8 years. Shown for comparison is an age-matched and sex-matched curve for the US population* (dotted line).

Hagl, Griepp et al: Is the Bentall Procedure for ascending aorta or aortic valve replacement the best approach for long-term event-free survival ? Ann Thorac Surg 2003;76:698-703

Surgical options

valve	annulus	Sin e STJ	Procedure
path (old)	N	N	Aorta + valve, wrap (?)
path (young)	N	N	Bentall, Ross (?)
N	N	path	valve-sparing
N	path	path	Bentall
N (Marfan)	path	path	Bentall
N (Marfan)	N	path	Bentall, valve-sparing (?)
Infected	N	N	Bentall, allograft ?

Ergin MA, Griepp RB: Ann Thorac Surg 1999;67:1834-9.

Bentall “biologica”

Associa i vantaggi di una tecnica ben nota e a basso rischio con il vantaggio di evitare una anticoagulazione a vita.

Espone i paz. al deterioramento della bioiprotesi e al conseguente reintervento

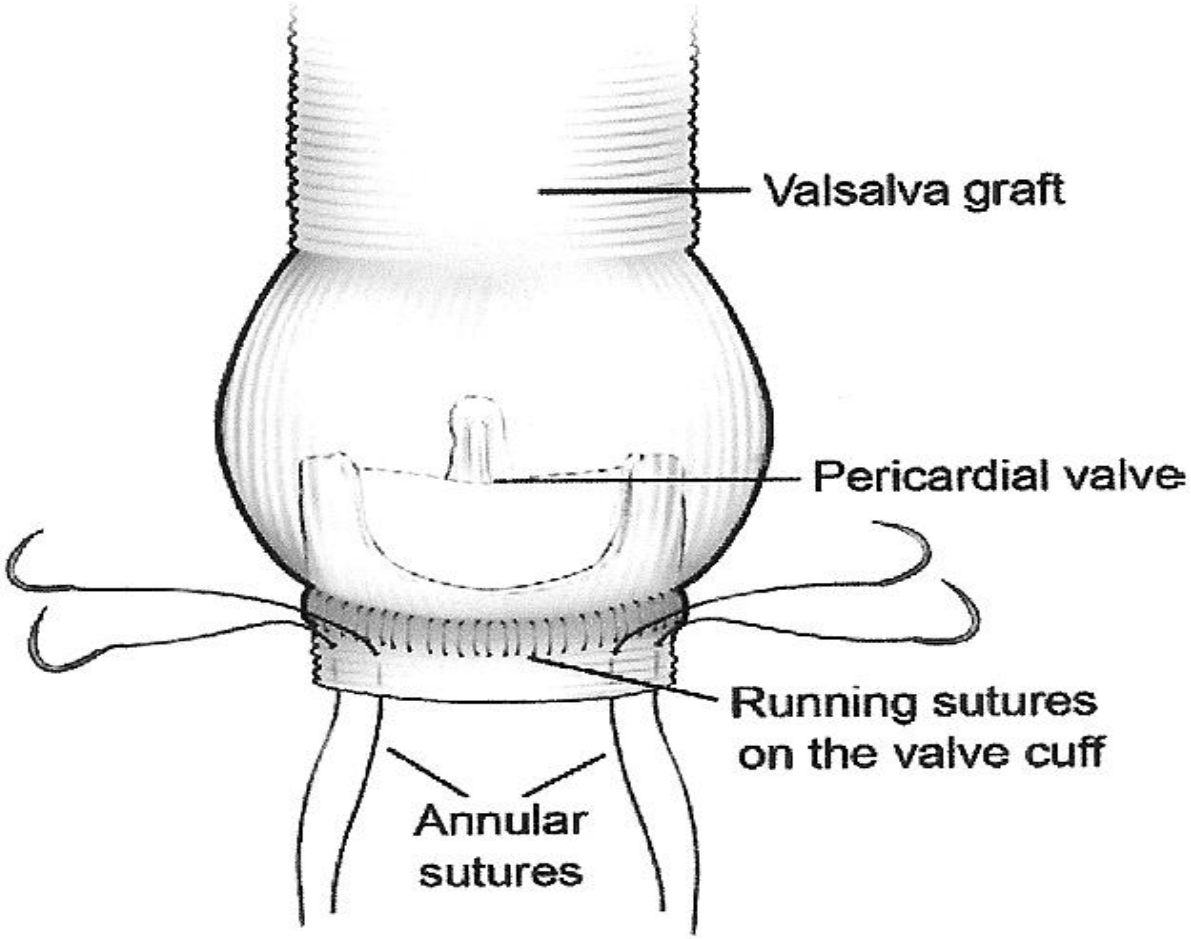


Fig 1. A 2-0 polyester suture is passed through the composite graft collar below the sewing cuff of the prosthetic valve.

Stewart AS et al: Modified Bentall operation with bioprosthetic valved conduit: Columbia University experience. Ann Thorac Surg 2009;87:1969-70

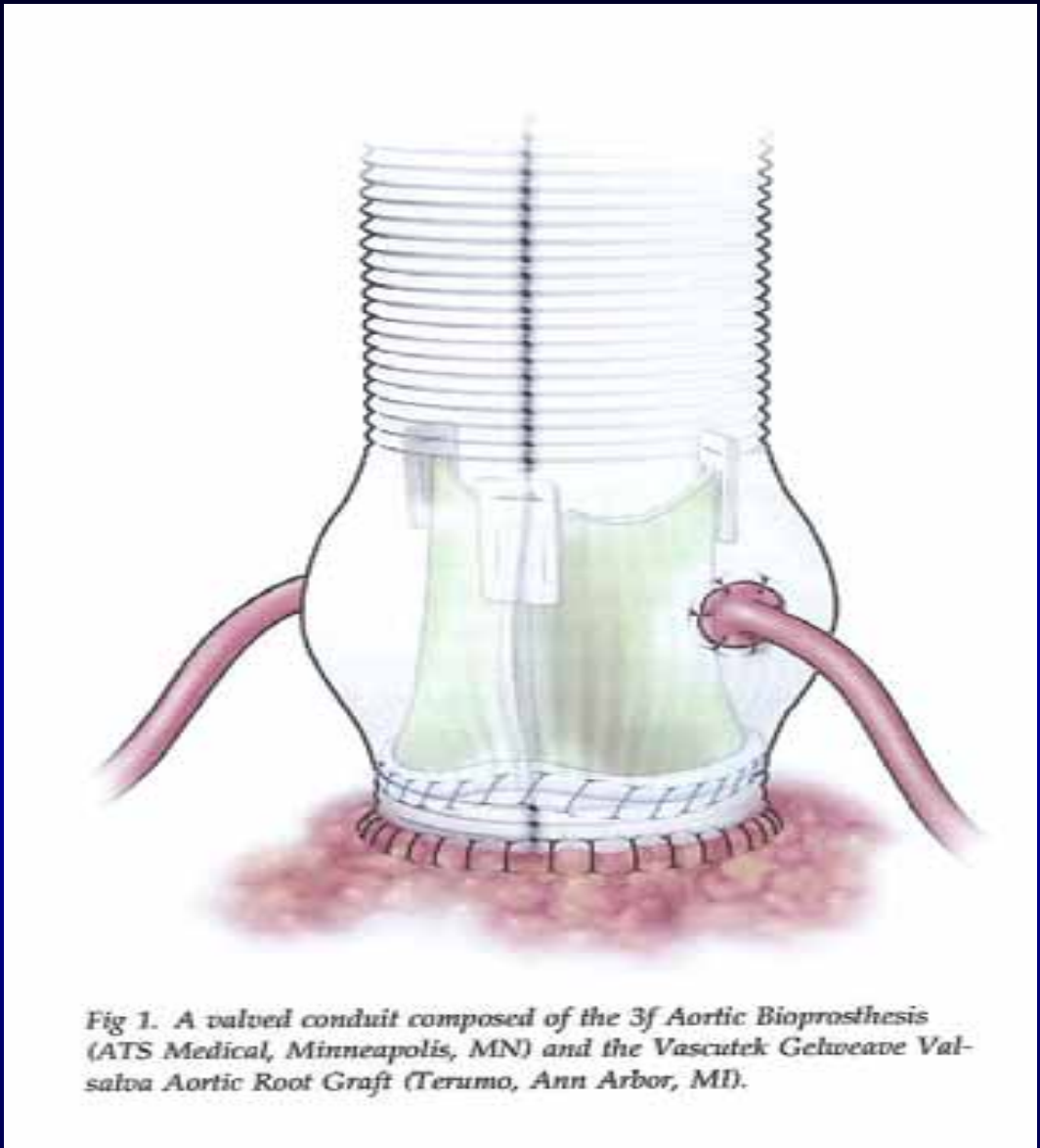


Fig 1. A valved conduit composed of the 3f Aortic Bioprosthesis (ATS Medical, Minneapolis, MN) and the Vascutek Gelweave Valsalva Aortic Root Graft (Terumo, Ann Arbor, MI).

Stewart AS, Takayama H and Smith CR: Modified Bentall operation with a novel biologic valved conduit. Ann Thorac Surg 2010;89:938-42.

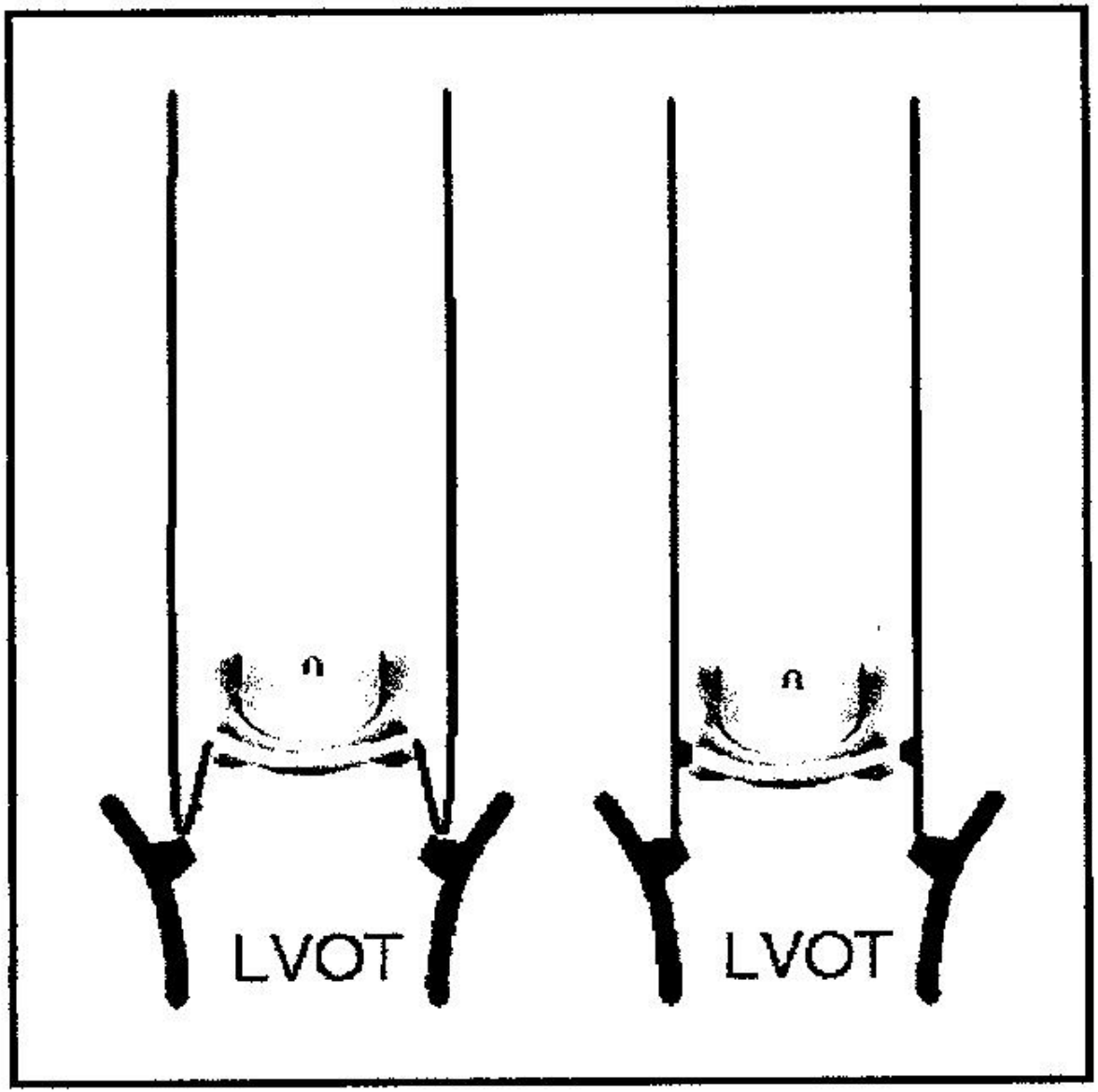
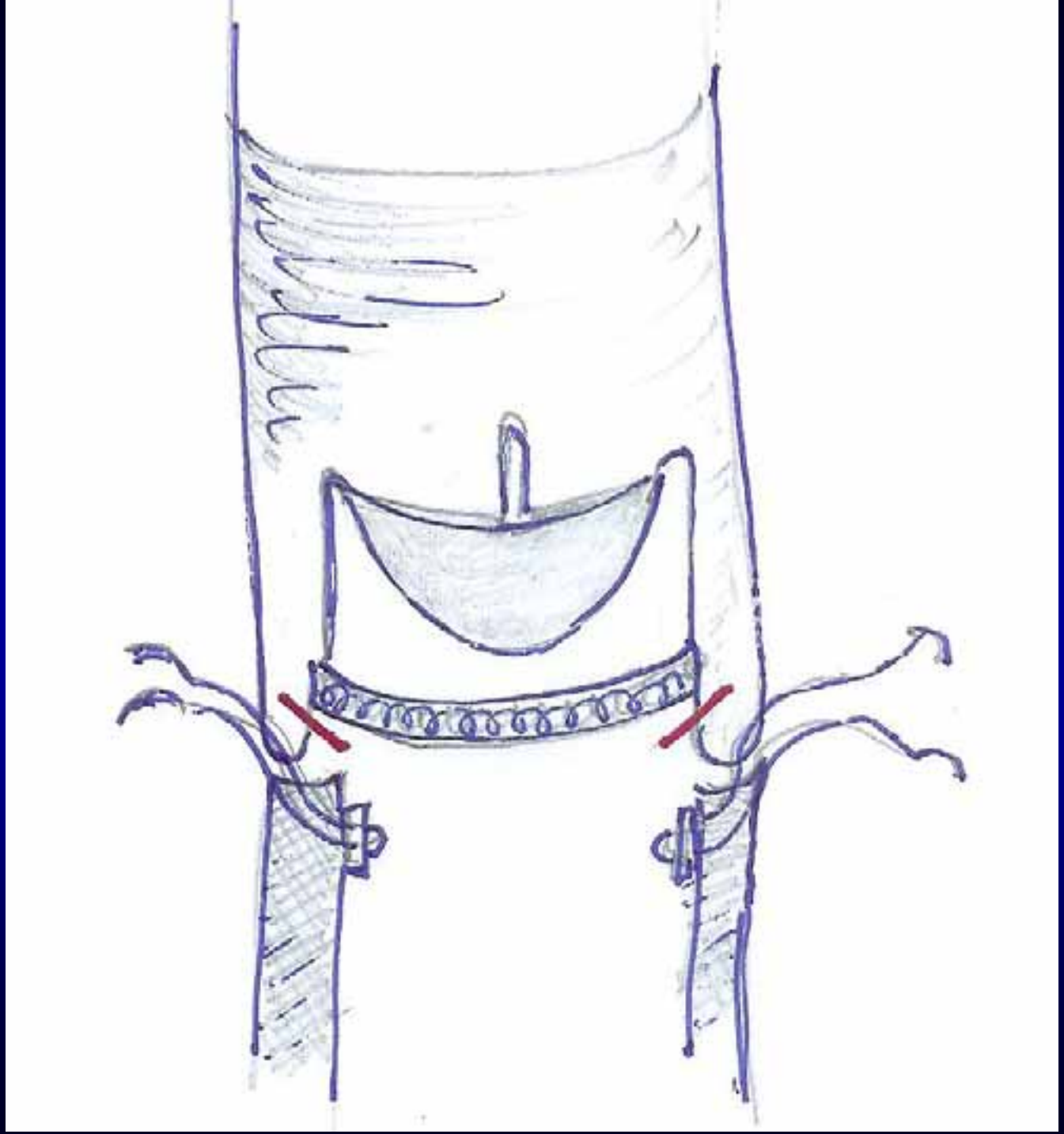
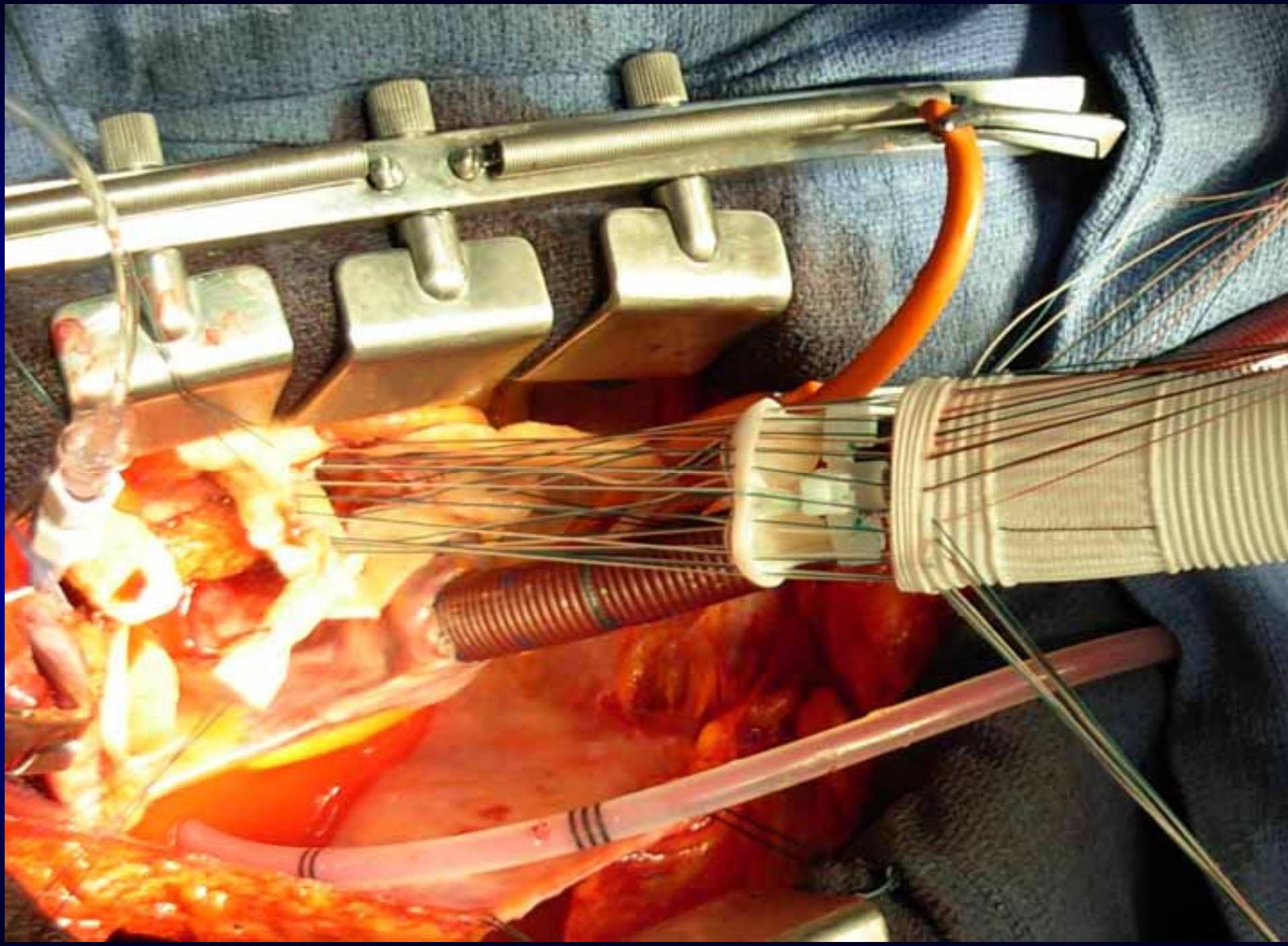
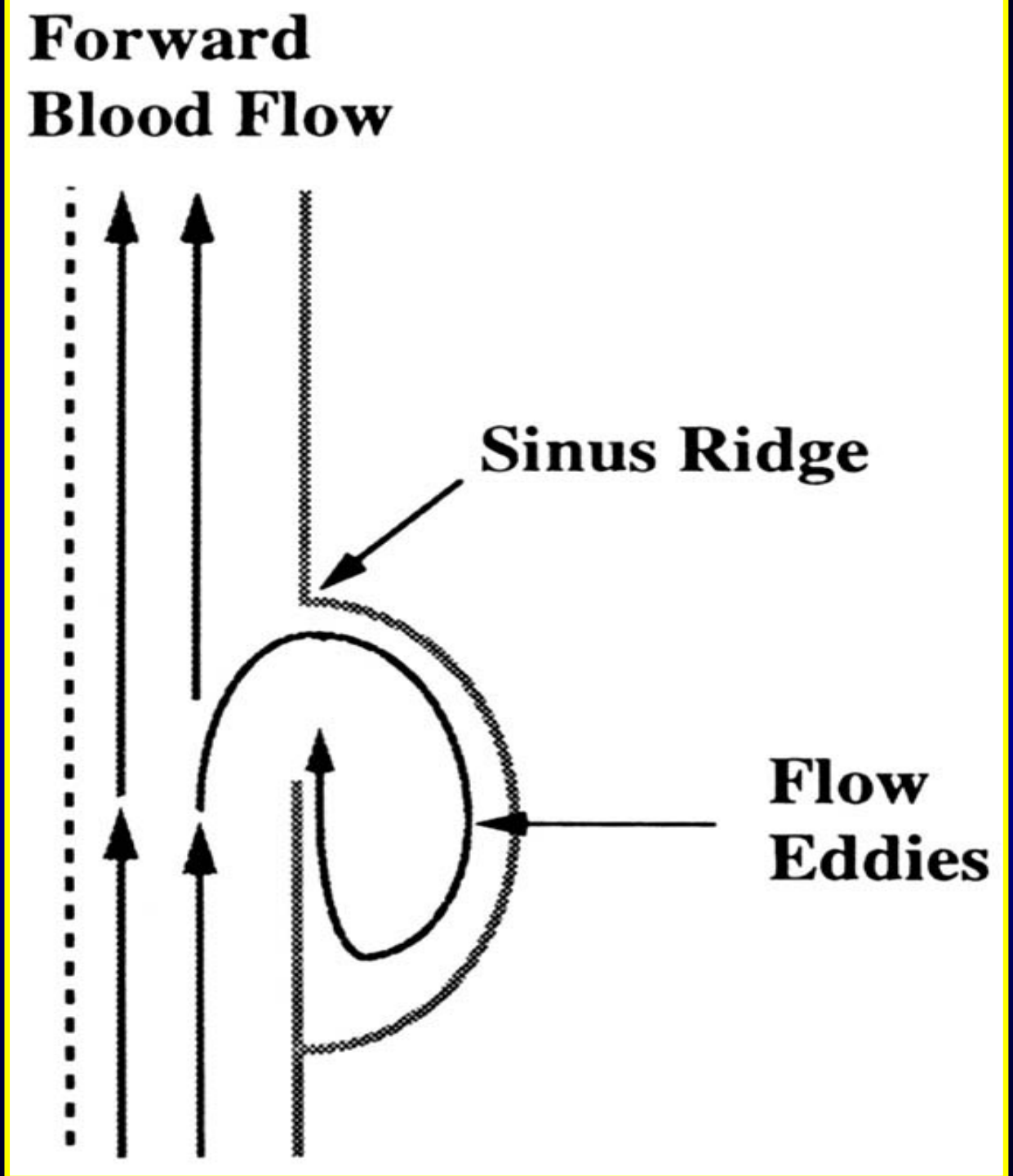
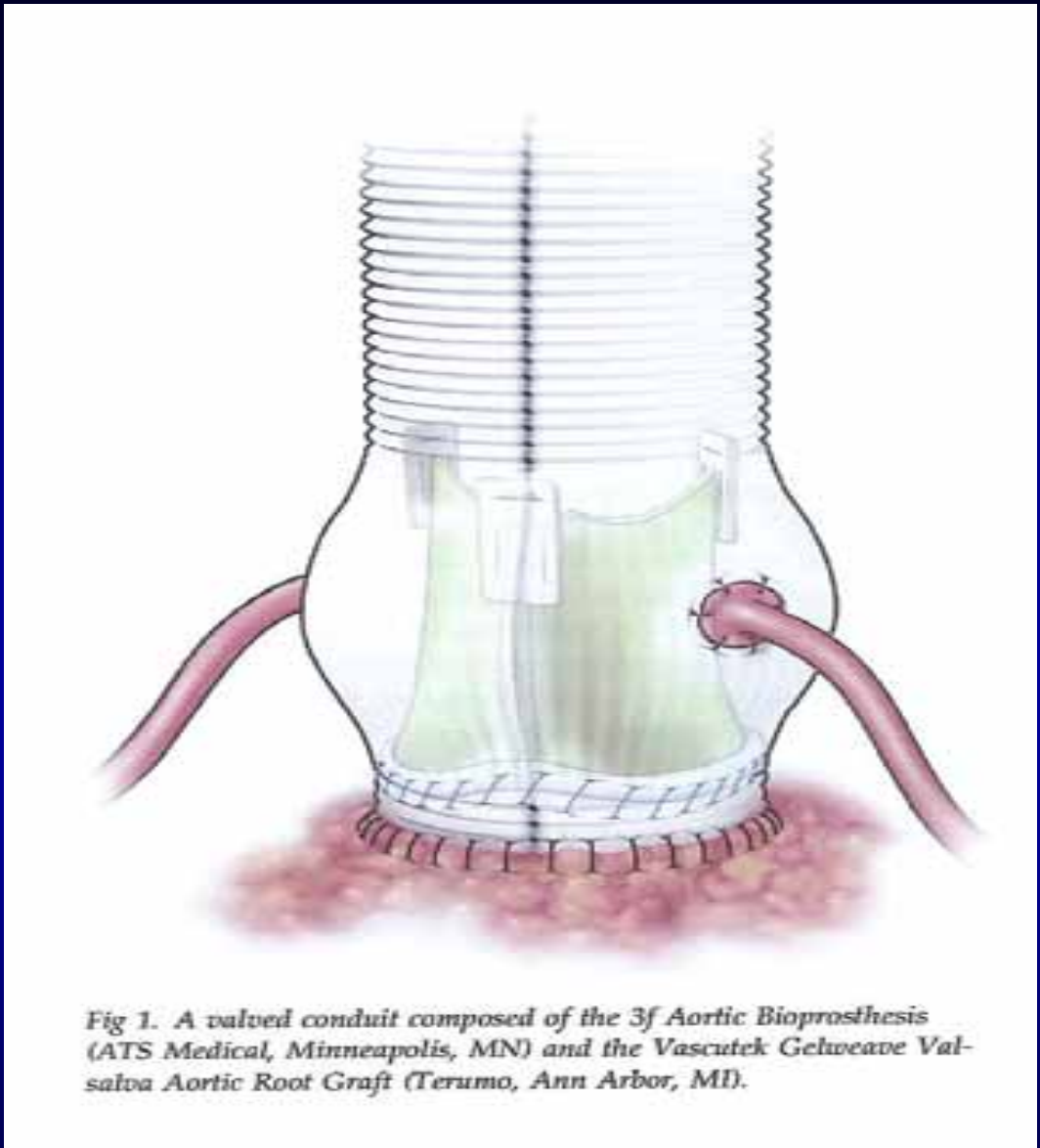


Fig. 1. Schematic drawing of two technical options to construct a bioprosthetic valved conduit using a stented valve with creation of a sub-valvular Dacron skirt. LVOT, left ventricular outflow tract.






Forward
Blood Flow
Sinus Ridge
Flow
Eddies



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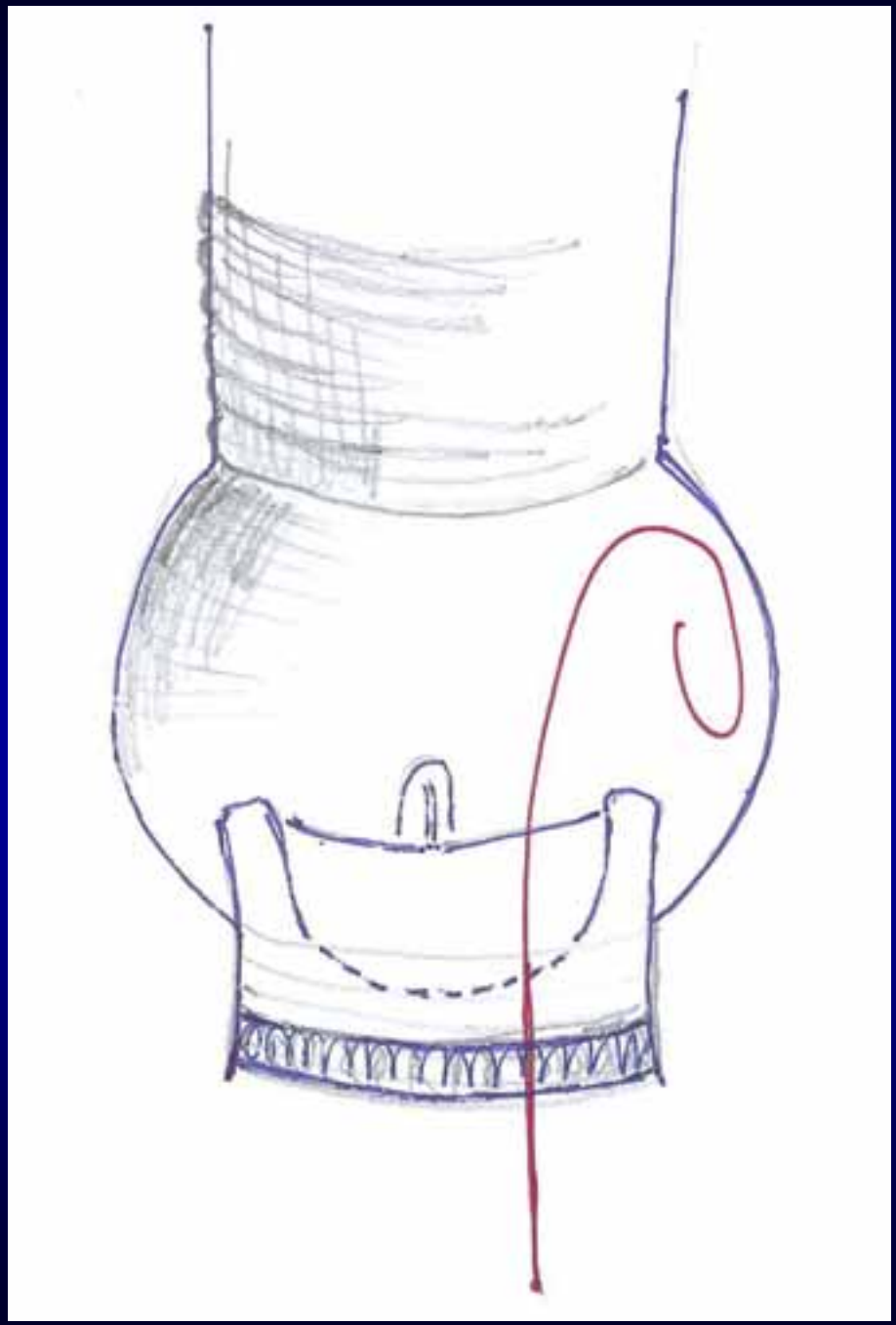
Impianto “basso”

Protesi “bassa”



Opzioni biologiche per la Sostituzione della radice aortica : homograft e Shelhigh

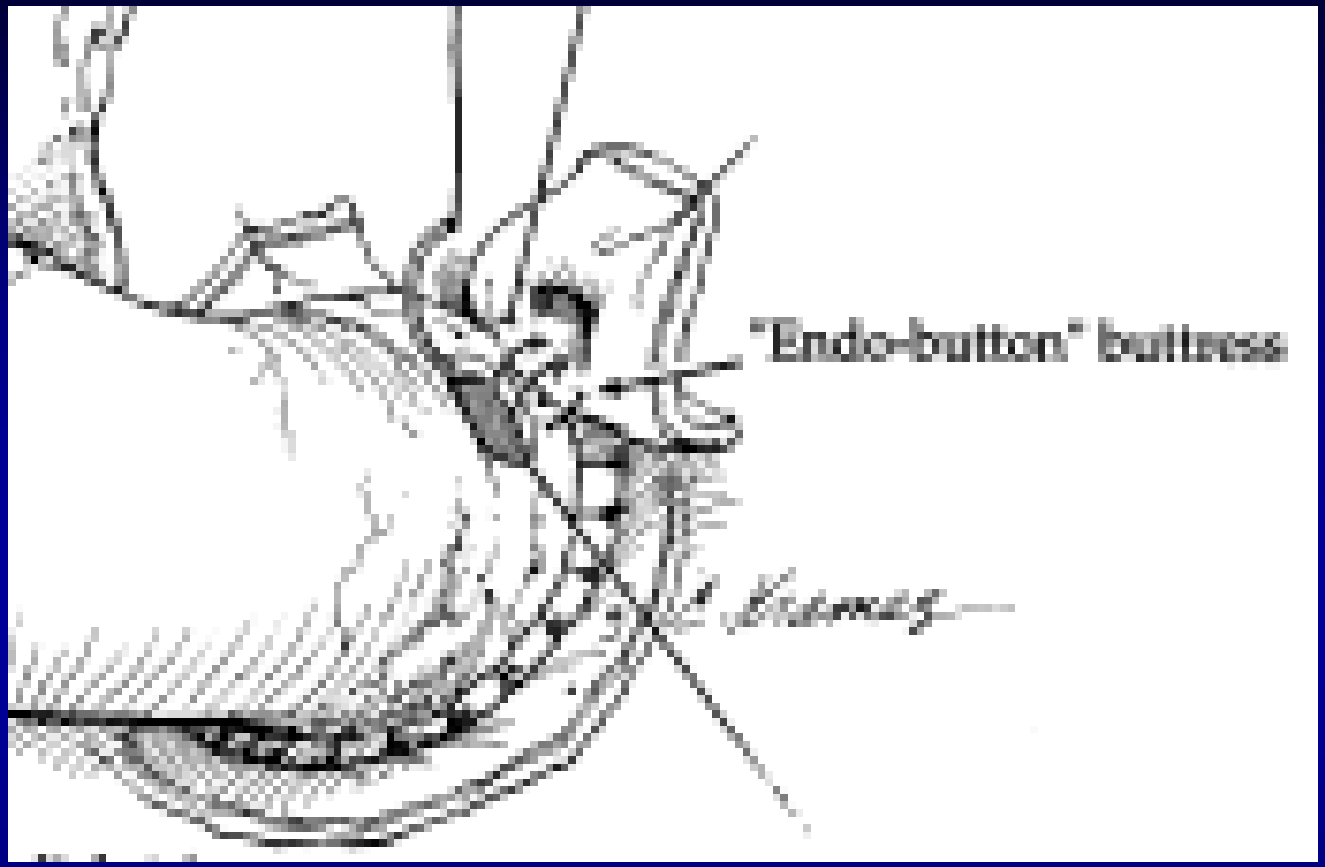
La protesi BioValsalva

Posizione dell’ostio coronarico, vincolata dalla presenza della bioprotesi

Problemi di sanguinamento

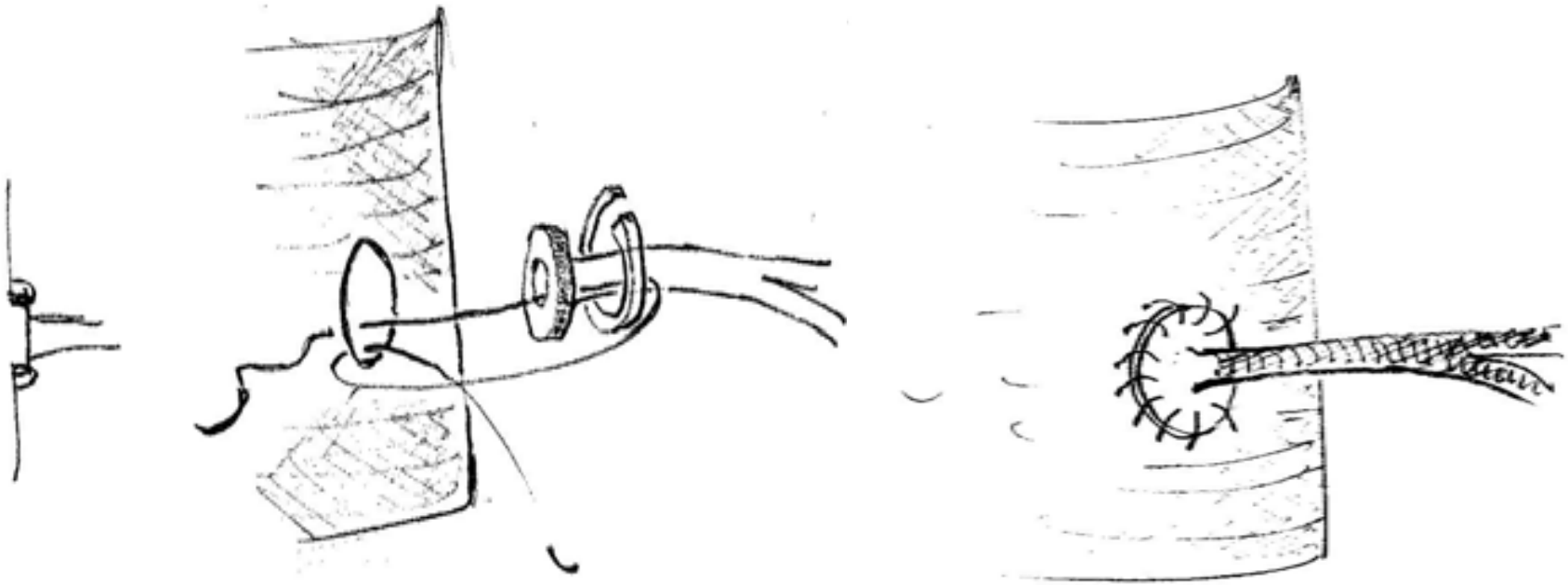
A livello dei botttoni

A livello della anastomosi prossimale

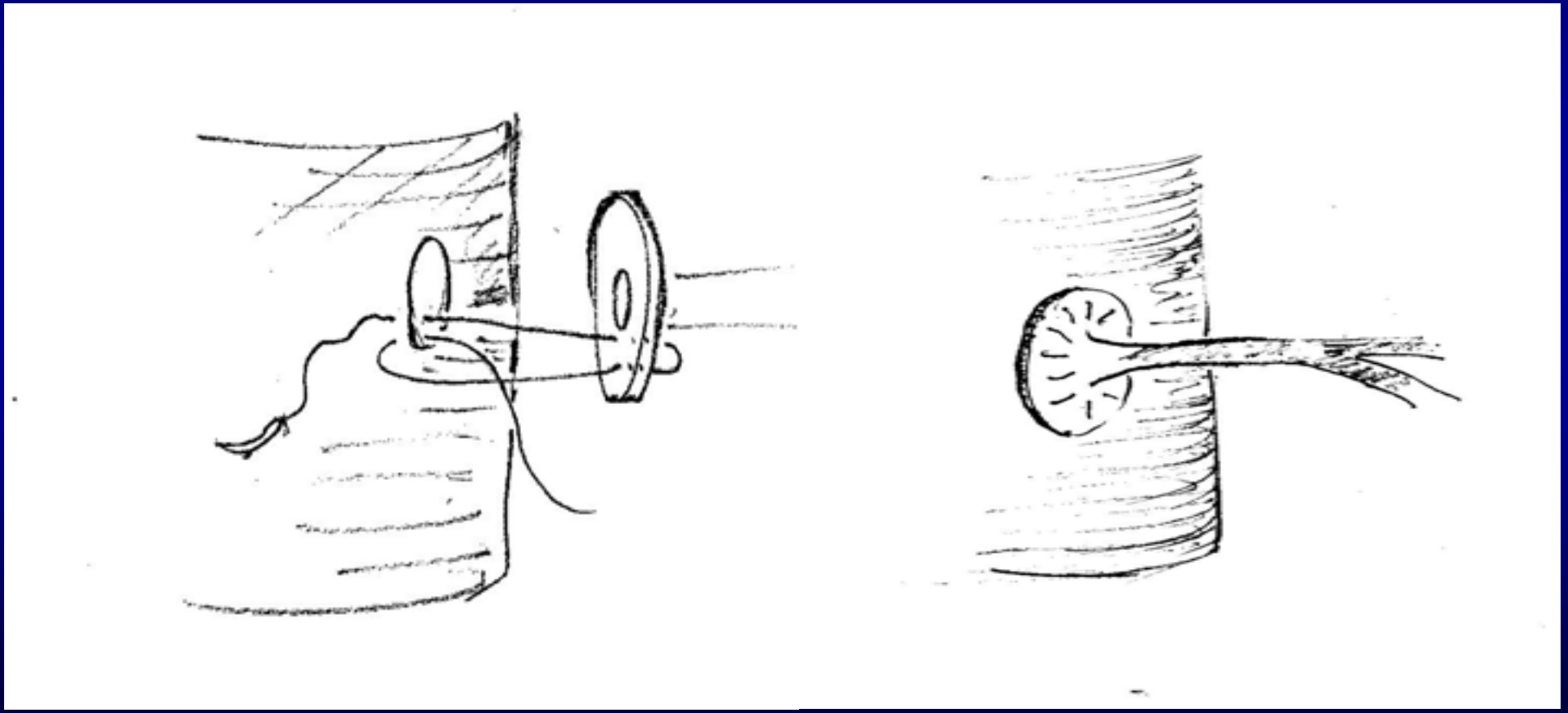


William F. Northrup, and Vibhu R. Kshettry
Implantation technique of aortic homograft root: emphasis on matching the host root to thr graft
Ann Thorac Surg 1998;66:280-284

Rinforzo della sutura con anello di Teflon esterno



“Endo-button” technique



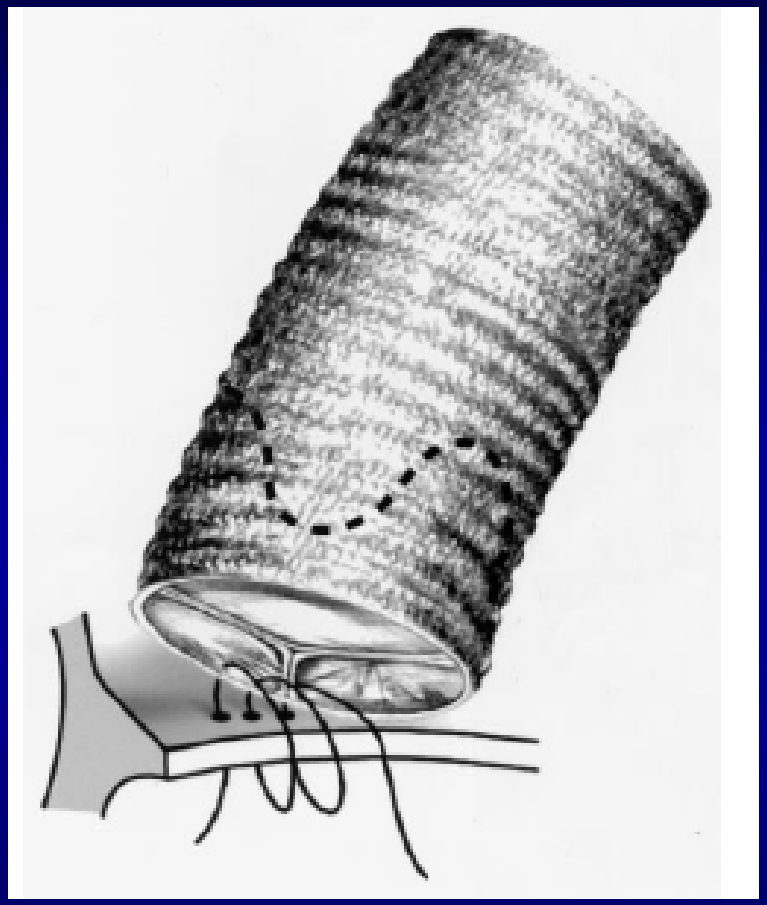
Crochets (o nerve kooks), tanto più utili quanto più tessuto è compreso nella sutura continua (endobutton technique)

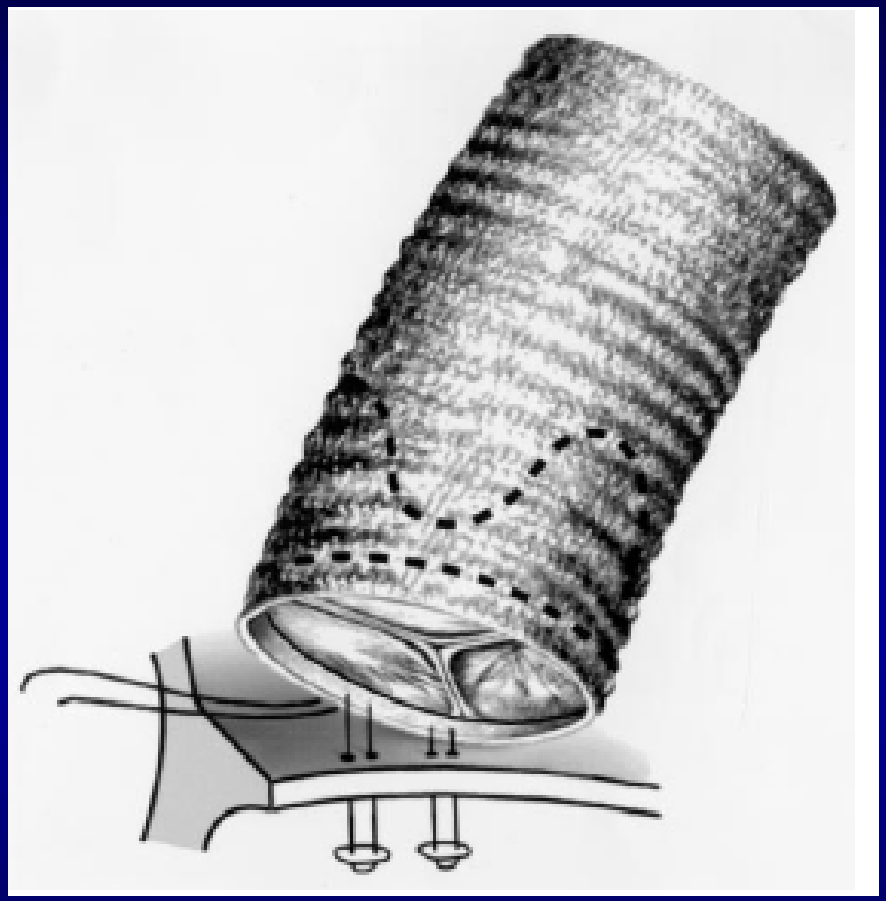
Sutura prossimale

Continua: tre sovraggitti prolene 2-0

Punti staccati (con pledgets):

- endoventricolari
- soprannulari
- esterni alla aorta





Paul P. Urbanski, MD, and Robert W. Hacker, MD
Replacement of the Aortic Valve and Ascending Aorta With a Valved Stentless Composite Graft:Technical Considerations and Early Clinical Results . Ann Thorac Surg 2000;70:17–20

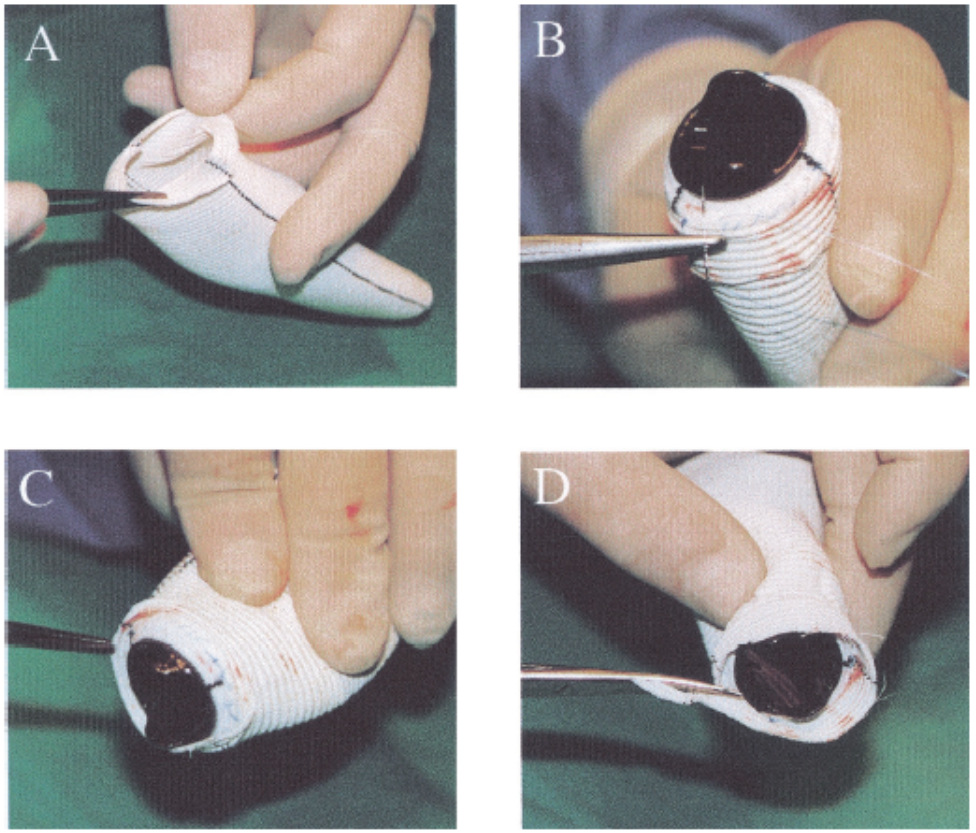
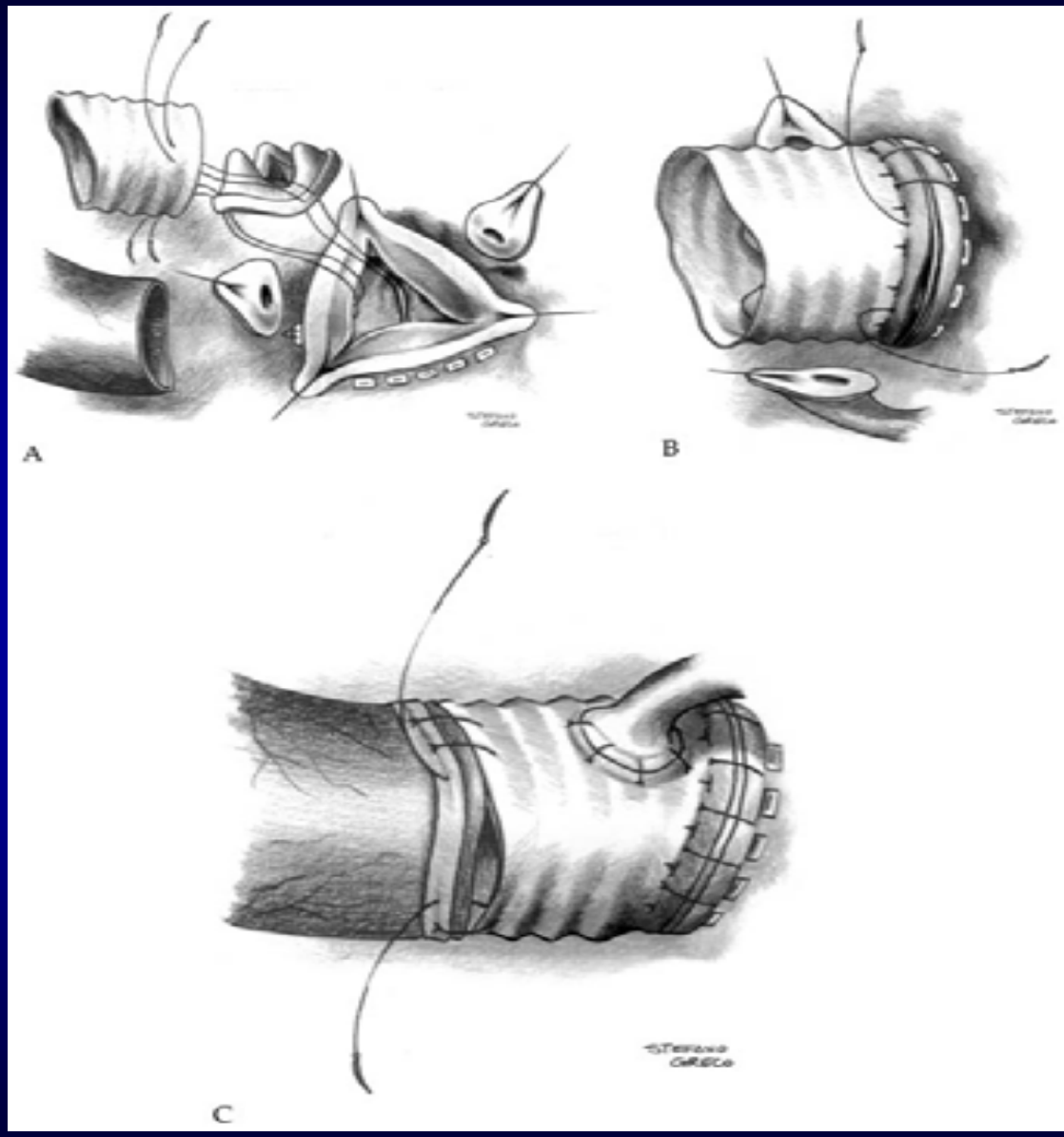
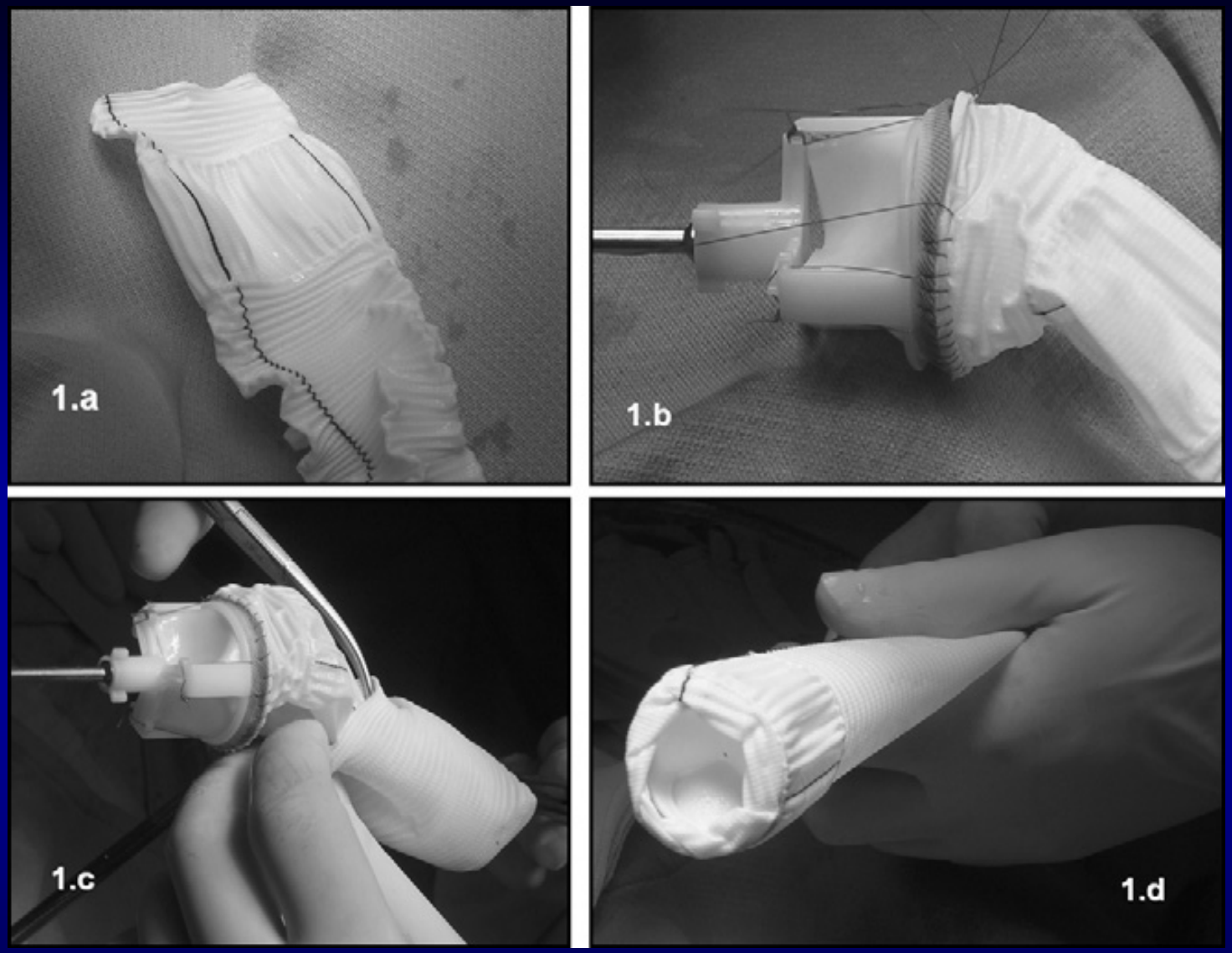


Fig 1. Preparation of a flanged composite graft. (A) First, a segment of the proximal end of vascular graft is everted outward to form the flange of the graft. (B) A mechanic valve is inserted into the graft and sutured to the graft with a continuous 4-0 polypropylene suture to fix the bottom border of prosthetic valve to the graft. (C) The flange of the conduit is returned to its original position. (D) The flanged composite graft is ready for aortic root replacement. The length of the flange can be adjusted accordingly depending on the procedure to be performed.

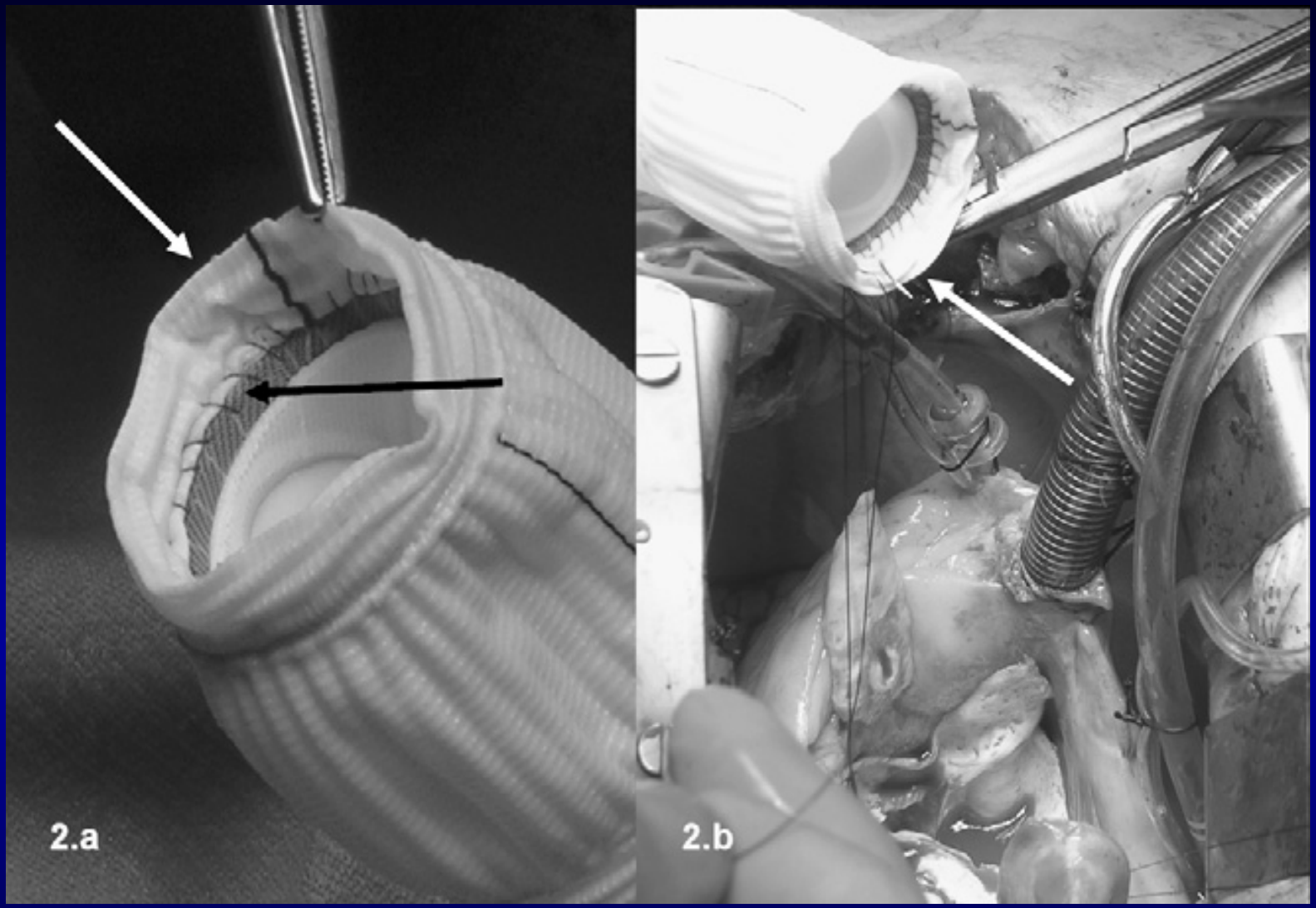
Cevat Yakut, MD
A New Modified Bentall Procedure: The Flanged Technique. Ann Thorac Surg 2001; 71: 2050–2

Michielon G, Salvador I, DaCol U and Valfrè C: Modified button-Bentall operation for aortic root replacement: the miniskirt technique. Ann Thorac Surg 2001;72:1059-64





Alberto Albertini, Andrea Dell'Amore *, Claudio Zussa, Mauro Lamarra
Modified Bentall operation: the double sewing ring technique
European Journal of Cardio-thoracic Surgery 32 (2007) 804—806



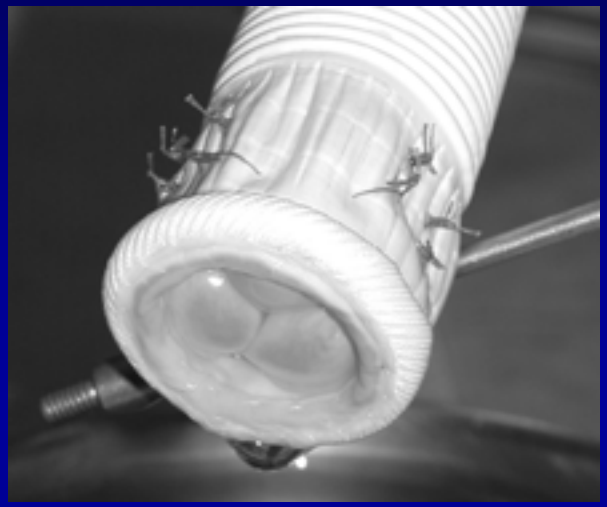
Alberto Albertini, Andrea Dell'Amore *, Claudio Zussa, Mauro Lamarra
Modified Bentall operation: the double sewing ring technique
European Journal of Cardio-thoracic Surgery 32 (2007) 804—806

Pericardiche stented

Bioprotesi aortica	protesi tubulare
Perimount	+5
Magna	+3
Mitroflow	+3
3F (Stewart)	+1
Albertini	two sizes larger
Gatti	+3-5

La degenerazione della bioprotesi

Bioprotesi rimuovibile



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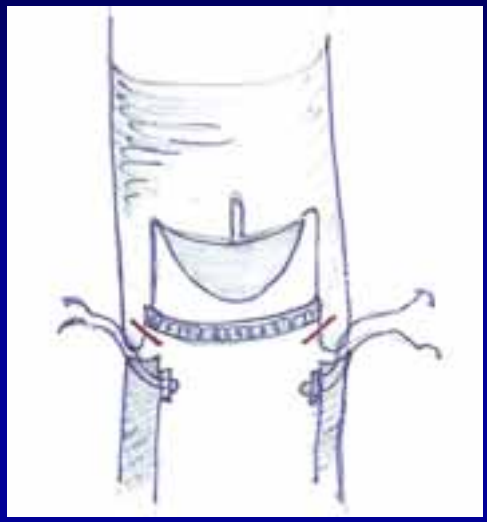
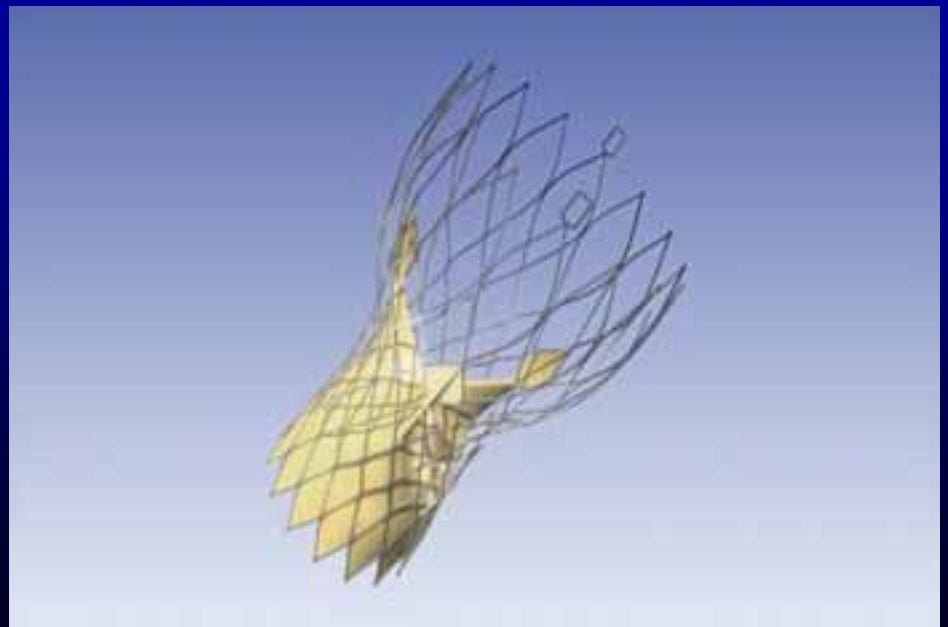




Endoprotesi valvolare

Bicuspidia aortica

Natural History of Asymptomatic Patients With Normally Functioning or Minimally Dysfunctional Bicuspid Aortic Valve in the Community

Hector I. Michelena, MD; Valerie A. Desjardins, MD; Jean-François Avierinos, MD; Antonio Russo, MD; Vuyisile T. Nkomo, MD; Thoralf M. Sundt, MD; Patricia A. Pellikka, MD; A. Jamil Tajik, MD; Maurice Enriquez-Sarano, MD

Circulation 2008;117:2776-2784

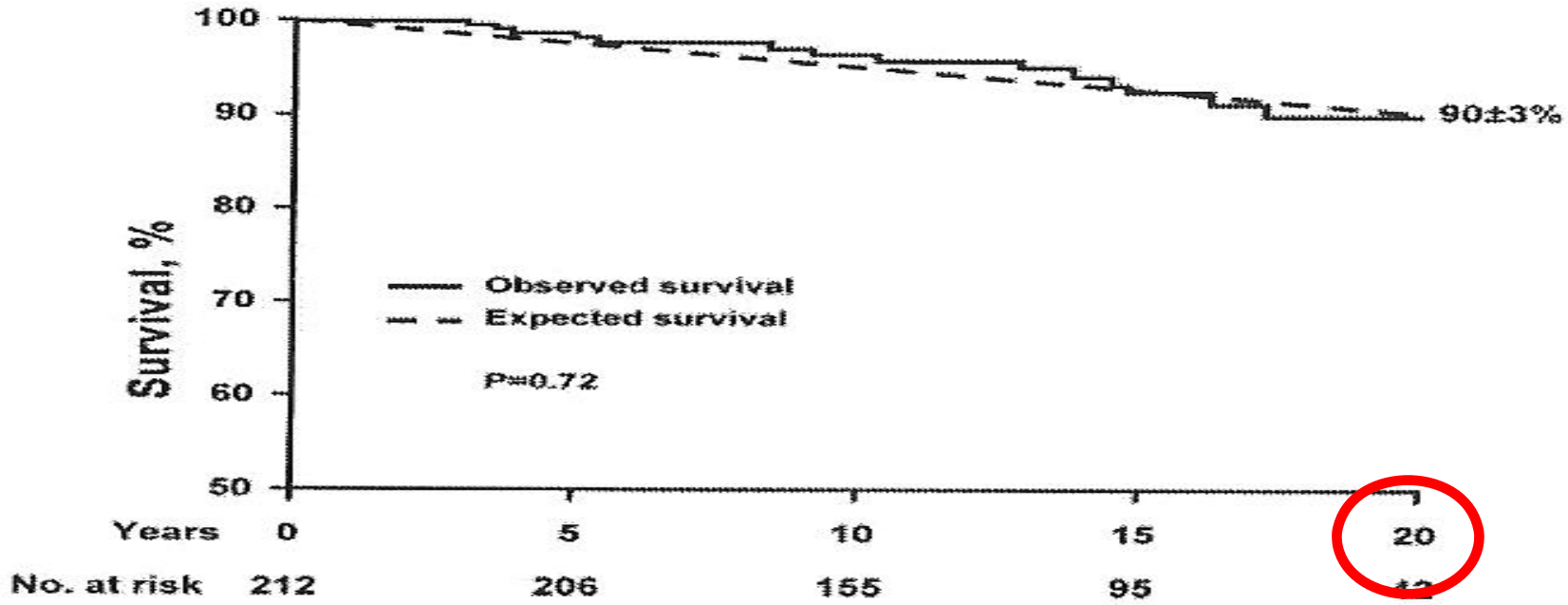


Figure 2. Survival after diagnosis of asymptomatic community members with BAV (solid line) vs expected survival in the same community (dashed line). The numbers at the bottom indicate the patients at risk for each interval. The survival (±SE) 20 years after diagnosis is indicated.

JAMA 2008;300 (11): 1317-13

Outcomes in Adults With Bicuspid Aortic Valves

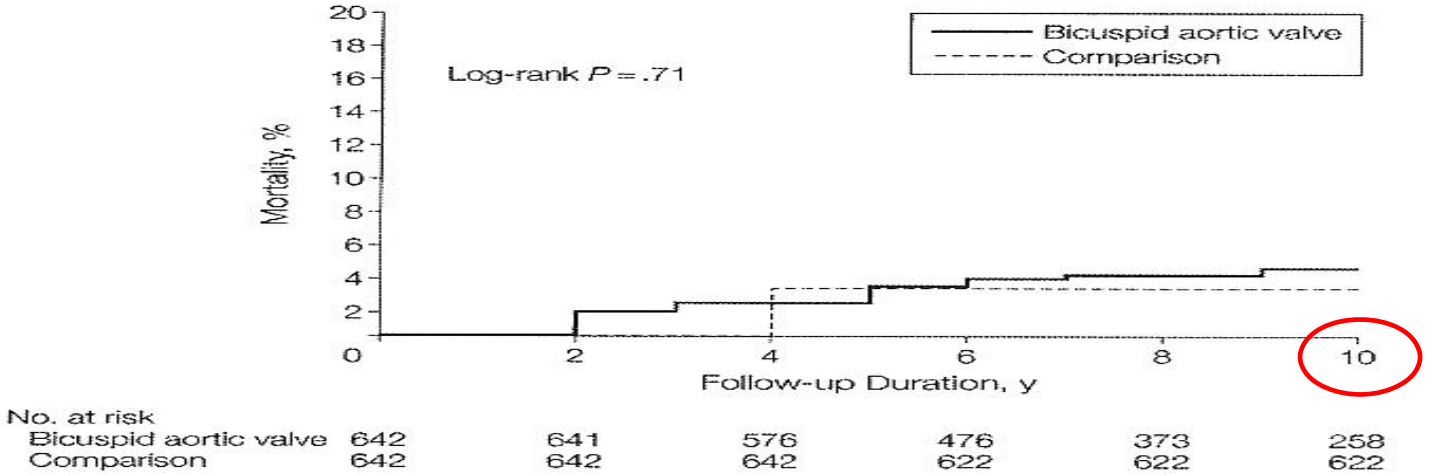
Nikolaos Tzemos, MD
Judith Therrien, MD
James Yip, MD
George Thanassoulis, MD
Sonia Tremblay, MD
Michal T. Jamorski, BSc
Gary D. Webb, MD
Samuel C. Siu, MD, SM

Context Bicuspid aortic valve is the most common congenital cardiac anomaly in the adult population. Cardiac outcomes in a contemporary population of adults with bicuspid aortic valve have not been systematically determined.

Objective To determine the frequency and predictors of cardiac outcomes in a large consecutive series of adults with bicuspid aortic valve.

Design, Setting, and Participants Cohort study examining cardiac outcomes in 642 consecutive ambulatory adults (mean [SD] age, 35 [16] years; 68% male) with bicuspid aortic valve presenting to a Canadian congenital cardiac center from 1994 through 2001 and followed up for a mean (SD) period of 9 (5) years. Frequency and predictors of major cardiac events were determined by multivariate analysis. Mortality rate in the

Figure 2. All-Cause Mortality of Adults With Bicuspid Aortic Valves



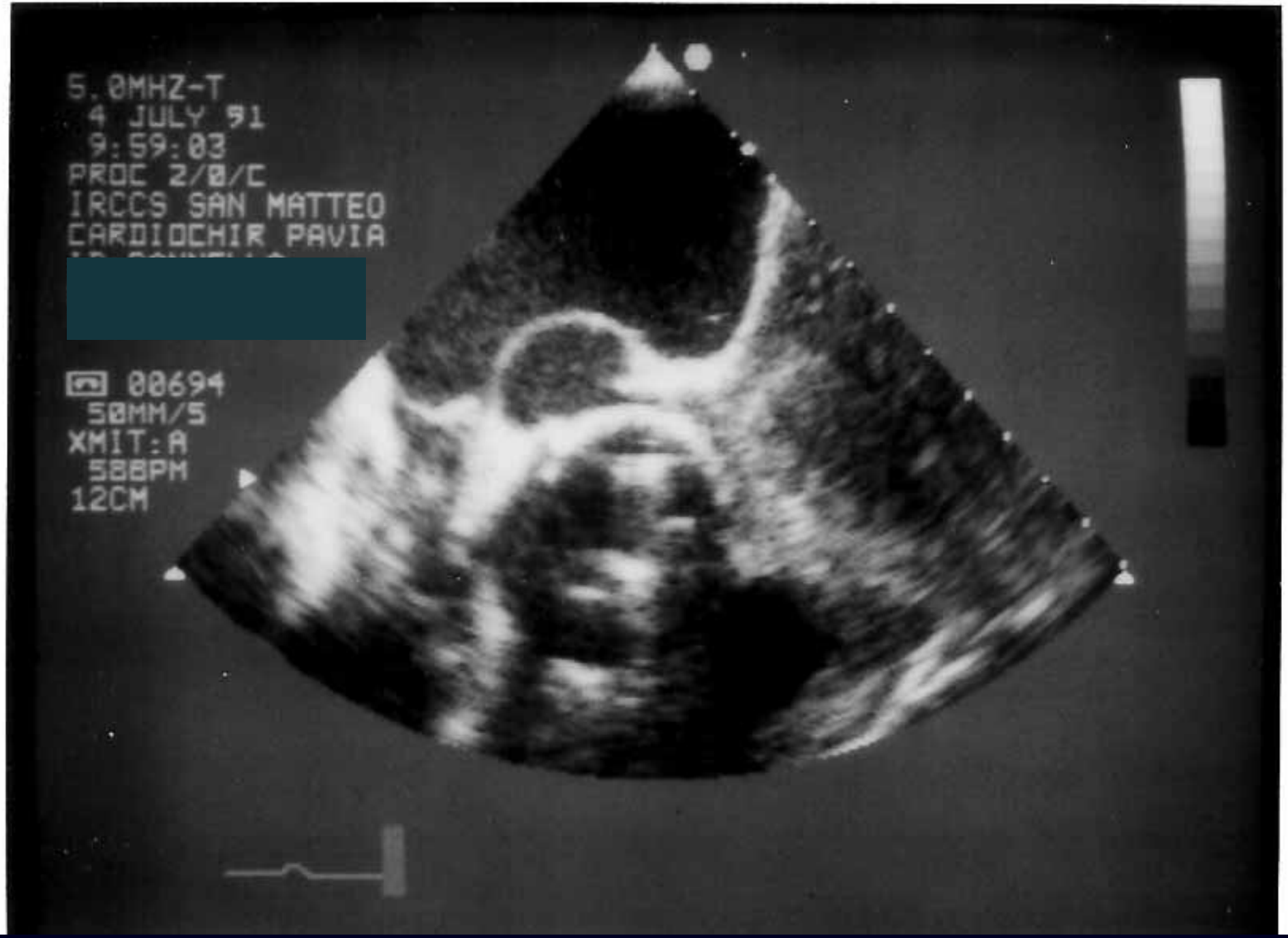
The all-cause mortality in bicuspid aortic valve group (n = 642) was 4% (SD, 1%). In the comparison group (n = 642), which was a sex- and age-matched population with life expectancy estimates from Ontario, the all-cause mortality was 3% (SD, 1%).

ACC/AHA PRACTICE GUIDELINES
ACC/AHA 2006 Guidelines for the Management of Patients With Valvular Heart Disease

Class I:
Surgery to repair the aortic root or replace the ascending aorta is indicated in patients with bicuspid aortic valves if the diameter of the aortic root or ascending aorta is greater than 5.0 cm* or if the rate of increase in diameter is 0.5 cm per year or more. ***(Level of Evidence: C)***

In patients with bicuspid valves undergoing AVR because of severe AS or AR (see Sections 3.1.7 and 3.2.3.8), repair of the aortic root or replacement of the ascending aorta is indicated if the diameter of the aortic root or ascending aorta is greater than 4.5 cm.* ***(Level of Evidence: C)***

Endocardite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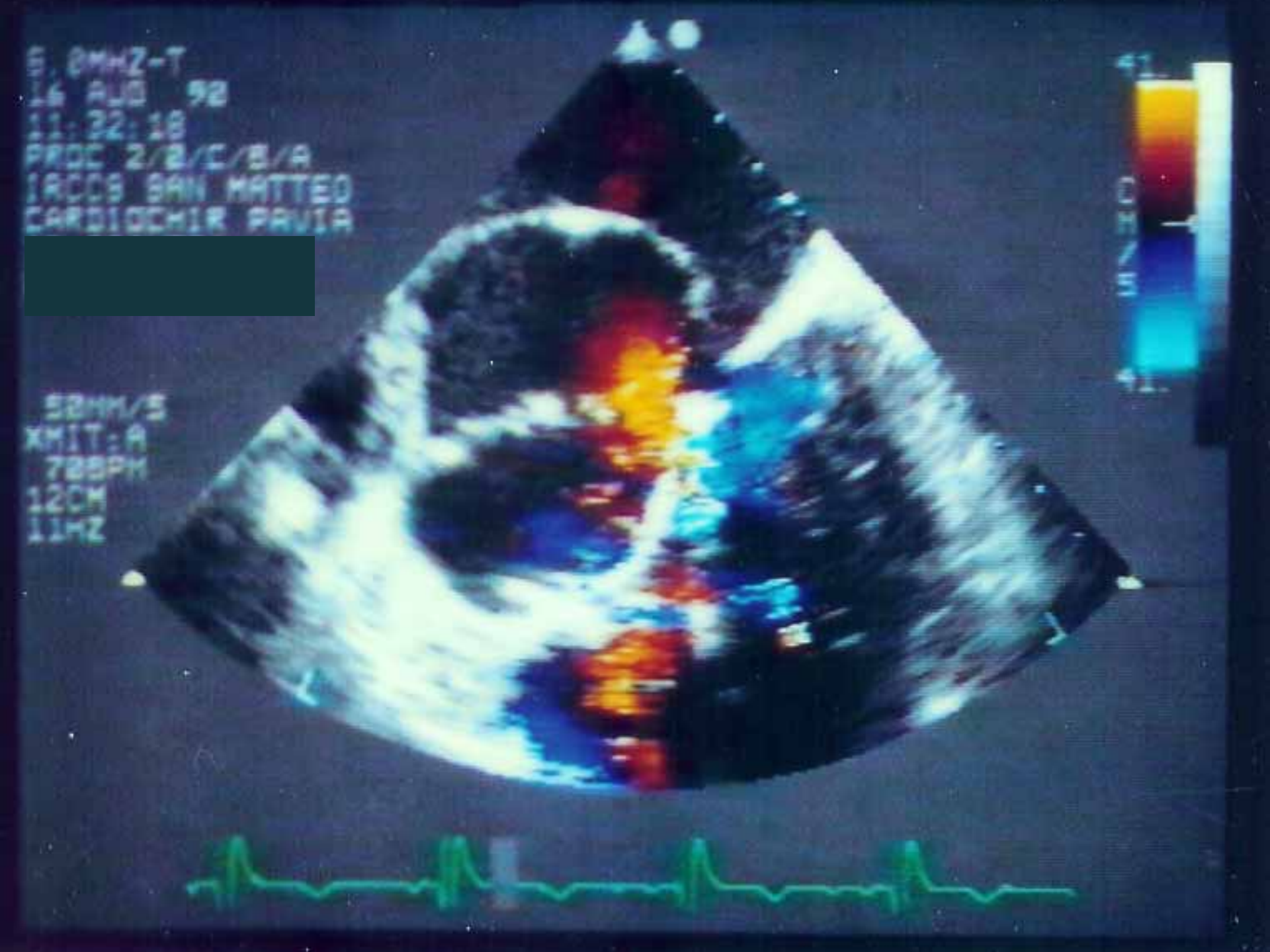
9:59:03
PROC 2/0/C
IRCCS SAN MATTEO
CARDIOCHIR PAVIA
[redacted]
00694
50MM/S
XMIT:A
588PM
12CM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16 AUG 92
11:22:18
PROC 2/2/C/B/A
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52MM/S
XMIT:A
72BPM
12CM
11MZ
41
CM/S
-41

Bentall ed Endocardite

Replacing the Ascending Aorta and Aortic Valve for Acute Prosthetic Valve Endocarditis: Is Using Prosthetic Material Contraindicated?

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Conclusions. These results indicate that prosthetic root replacement may be superior to use of a homograft for acute aortic prosthetic valve endocarditis, with only a 4% incidence of recurrent endocarditis and reoperation.

(Ann Thorac Surg 2002;74:S1781–5)

Bentall e Valsalva

- riduzione dello stress di chiusura dei lembi
- riduzione del rischio di contatto sistolico dei lembi con la protesi :

→ maggior durata dei lembi

- riduzione della tensione della anastomosi del bottone :

→ minor sanguinamento intraoperatorio

→ meno pseudoaneurismi postoperatori

Bentall e Valsalva

Vantaggi in protesi meccaniche ?

- Emodinamici ?
- Durata ?

Perché Valsalva ?

- più facile l'anastomosi dei bottoni
- più facile verificare la linea di sutura

Bentall: considerazioni conclusive

L'intervento di Bentall, nelle sue varie presentazioni, conserva ancora a distanza di oltre 40 anni la sua validità. Offre :

- risultati stabili nel tempo
- mortalità e morbilità contenute
- tecnica standardizzata anche nelle varianti proposte
- compatibile con soluzione meccaniche e biologiche
- utilizzabile anche nelle endocarditi