

Aortic Valve Bypass Surgery: Beating Heart Therapy for Aortic Stenosis



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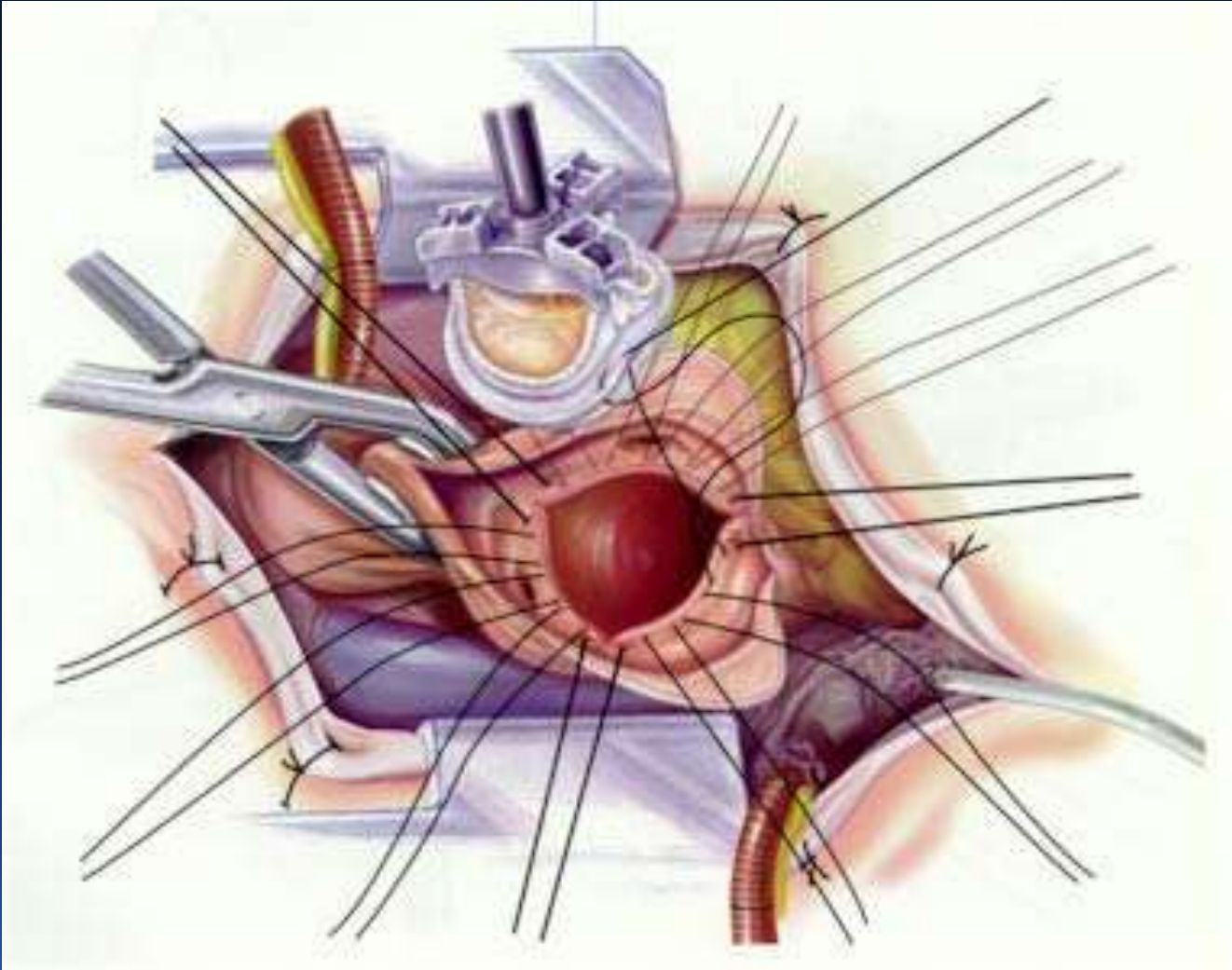
Disclosures

Founder: Correx, Inc.

Consultant: Medtronic, Edwards Lifesciences, NeoChord,
ATS Medical



Background: Conventional AVR

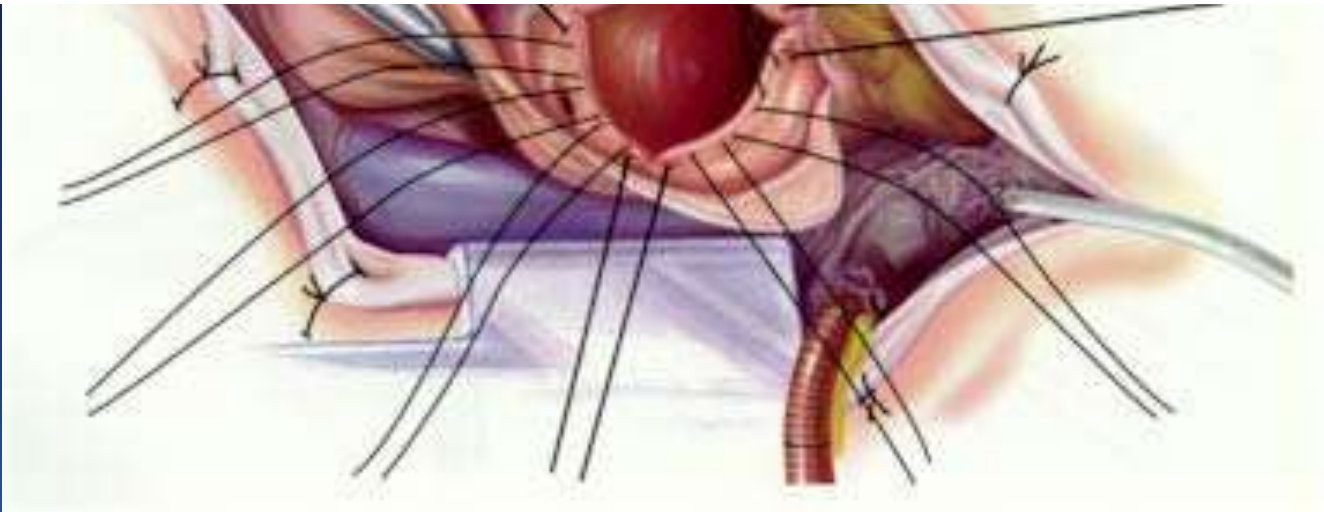




Background: Conventional AVR

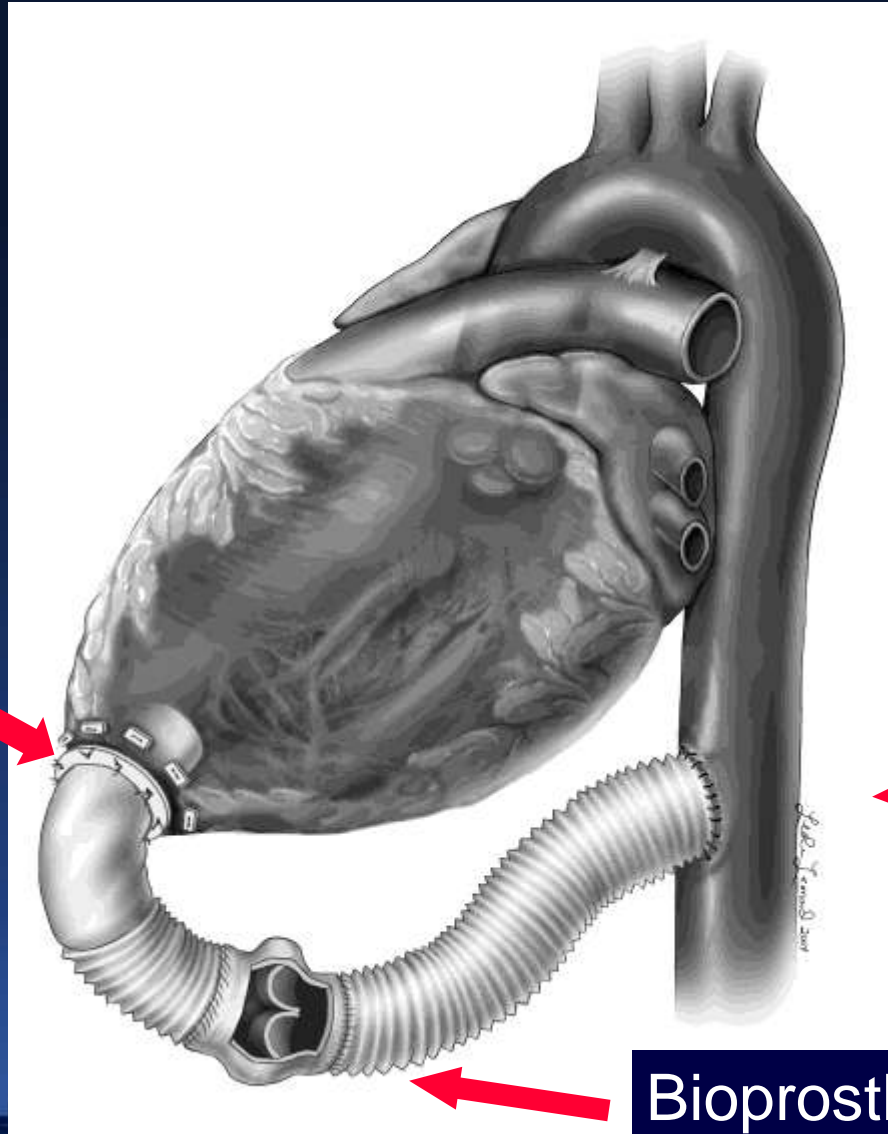


**FUNDAMENTALS UNCHANGED
IN > 40 YEARS**





Aortic Valve Bypass Surgery



Connector in apex
of left ventricle

Anastomosis to
descending aorta

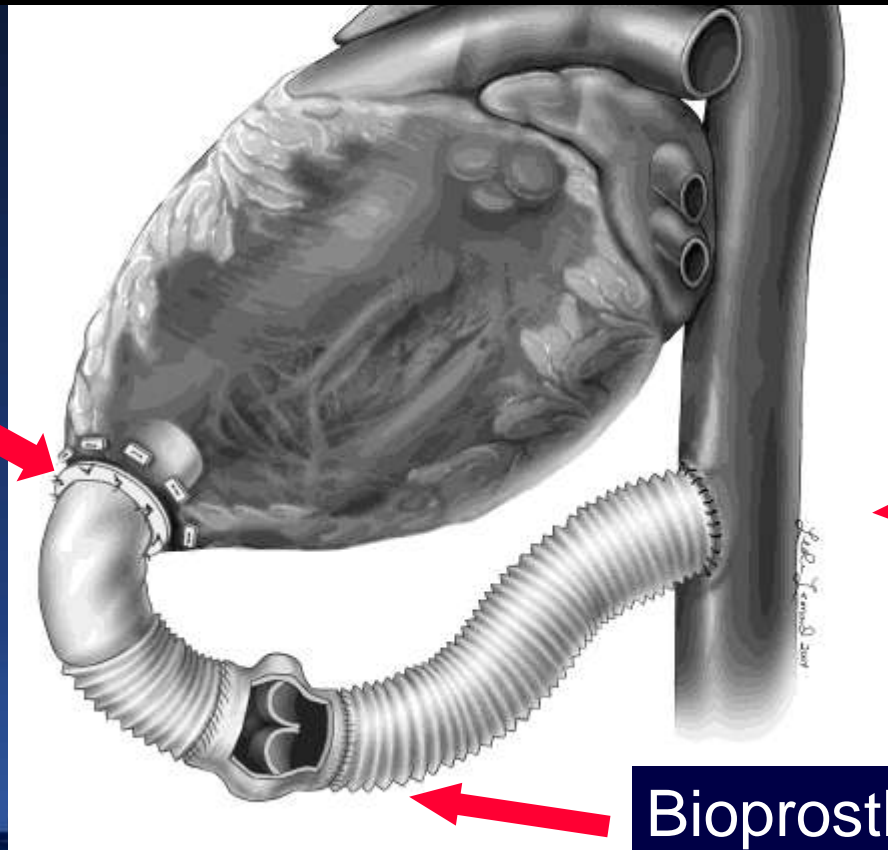
Bioprosthetic
Valve



Aortic Valve Bypass Surgery

Creates second outflow tract

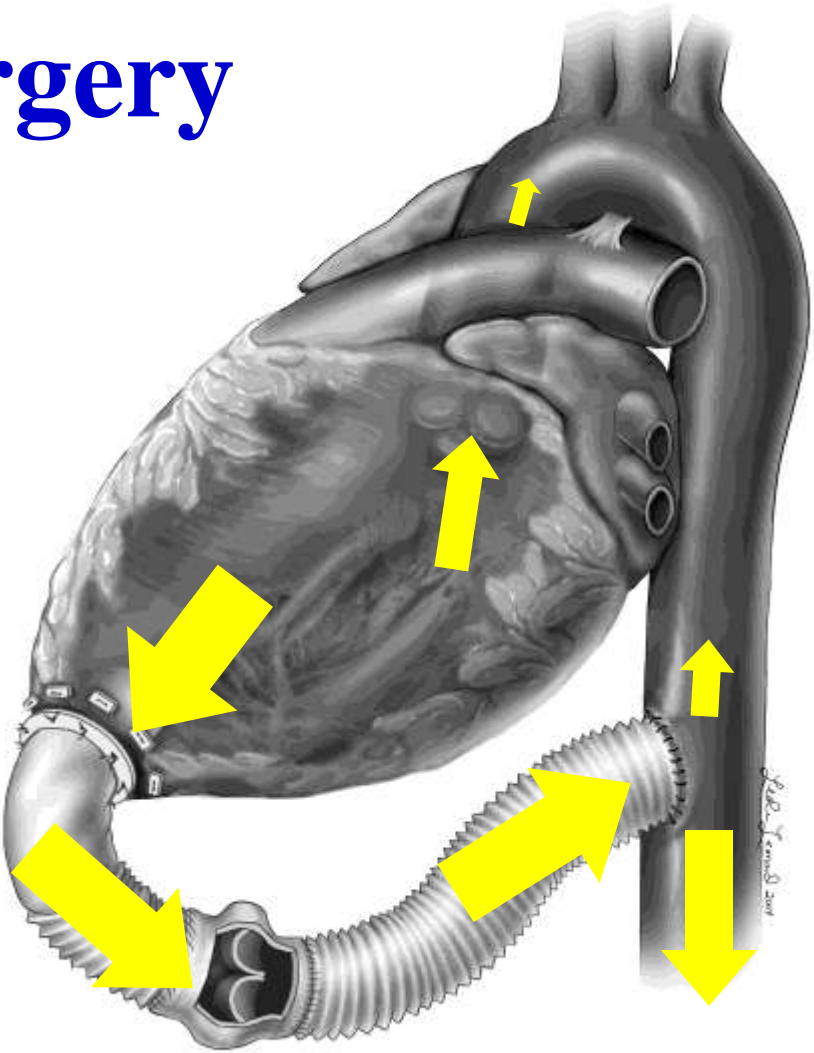
Connector in apex
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Anastomosis to
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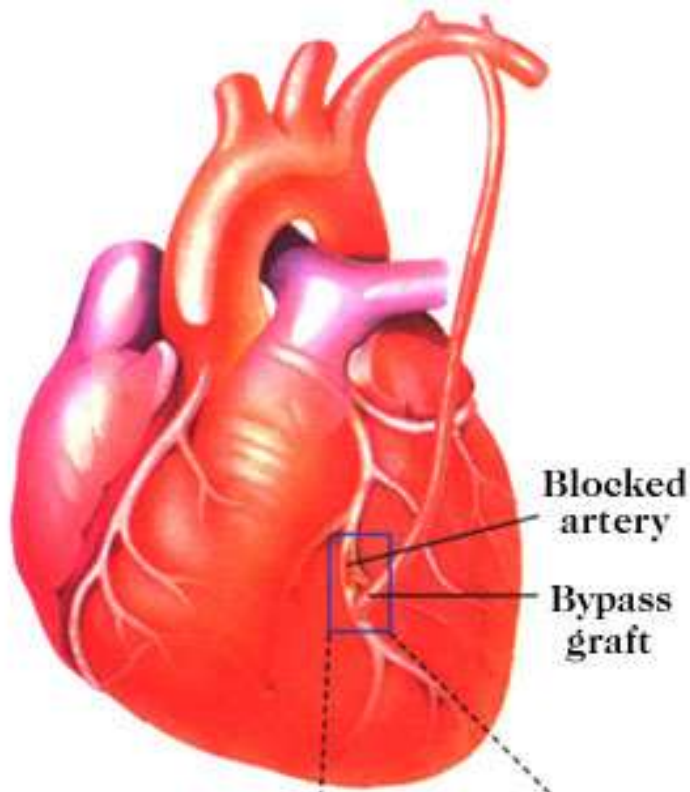
Bioprosthetic
Valve

Blood Flow after AVB Surgery



Aortic Valve Bypass

Bypassing, rather than replacing an obstruction to blood flow is a concept familiar cardiac surgeons and cardiologists

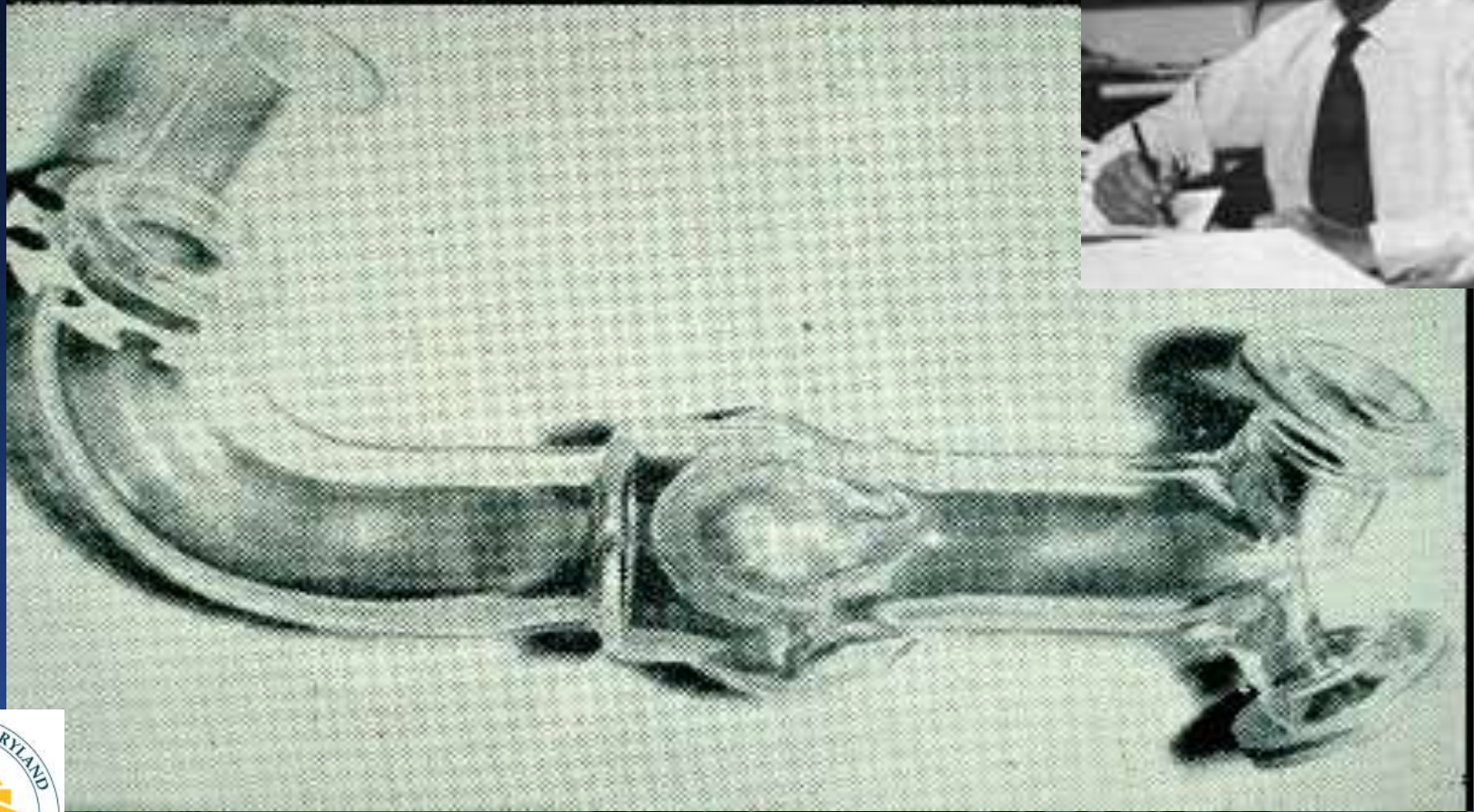


A blocked artery is bypassed with a vessel taken from another part of your body.

This allows blood to flow freely to your heart again.



SARNOFF AORTIC VALVE BYPASS (DOGS) 1955



Courtesy J.W. Brown, MD

TCT2009

The Surgical Relief of Aortic Stenosis by Means of Apical–Aortic Valvular Anastomosis

By STANLEY J. SARNOFF, M.D., THOMAS J. DONOVAN, M.D. AND ROBERT B. CASE, M.D.

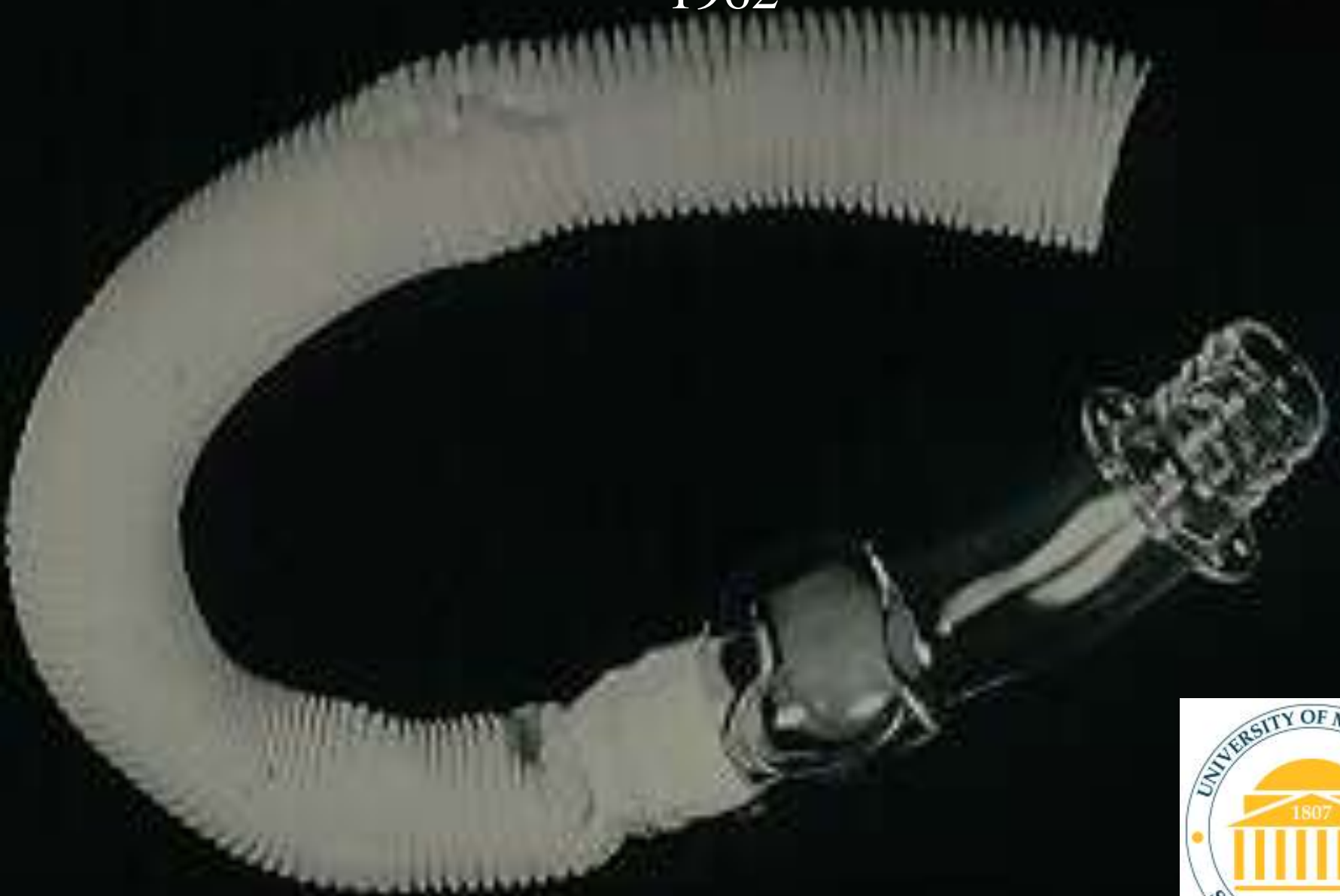
(With the Technical Assistance of PHILIP E. WAITHE)

Circulation, 11:564-5575, 1955

Survivals. Seven dogs have survived from two to four months after the operation and are in robust health at the present time. The longest survivor, Clicka, has become a household pet. During a three-month stay in Vermont he frequently swam across a one-mile lake and back. He has acquitted himself creditably in several vigorous dog fights.



TEMPLETON AORTIC VALVE BYPASS PROSTHESIS- 1962



Courtesy J.W. Brown, MD



AVB: How is it different from conventional AVR?

- No Aortic Cross-clamping
- No Debridement Diseased Aortic Valve
- No Ascending Aortic Cannulation
- No Cardiopulmonary Bypass



AVB: How is it different from conventional AVR?

➤ No Aortic Cross-clamping

➤ No Debr

➤ No Asc

➤ No Cardiopulmonary Bypass

**Minimizes Embolic Risk:
Protects the Brain**



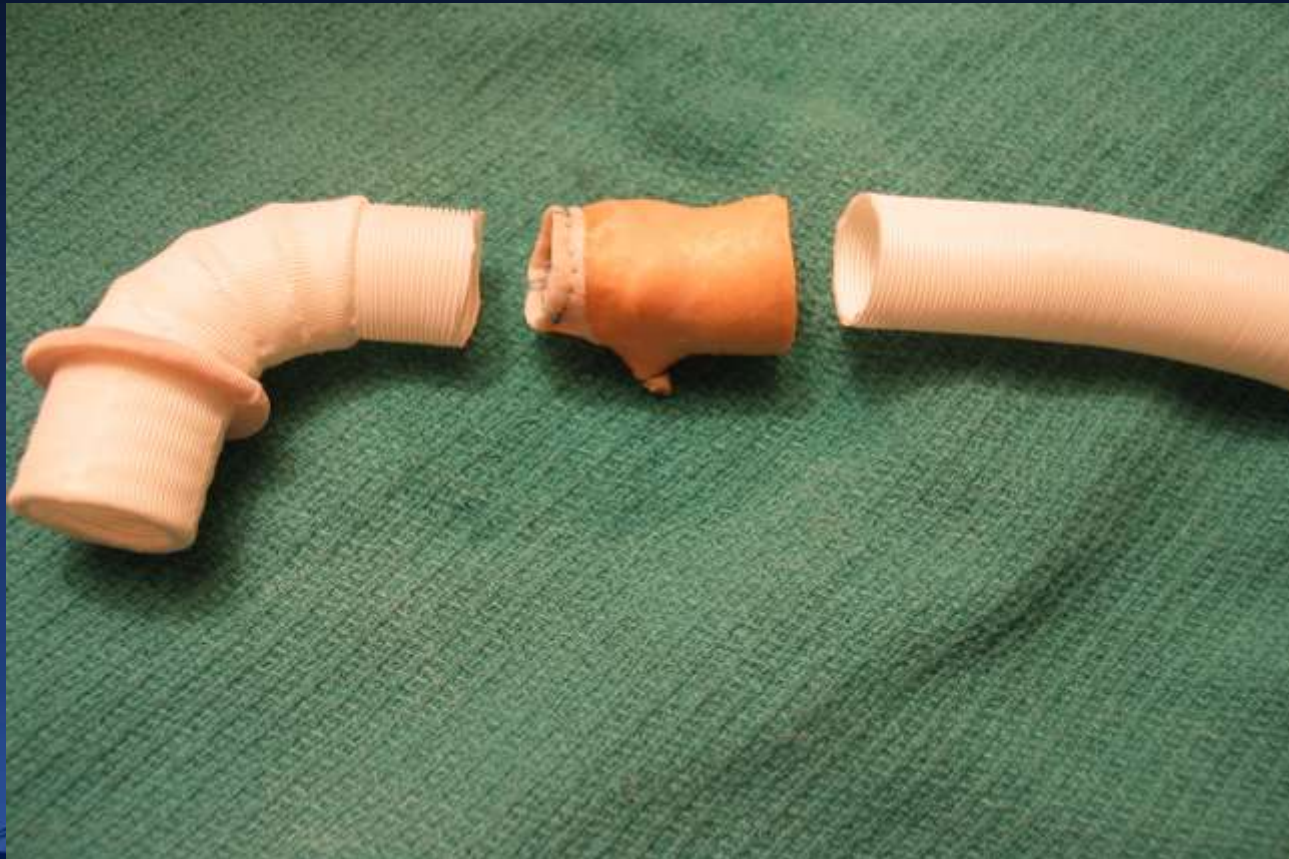
AVB: How is it different from conventional AVR?

- No Sternotomy (Small Thoracotomy)
- No Cardioplegic Arrest (Beating Heart)
- “Patient-prosthesis Mismatch” Impossible
- No Heart Block

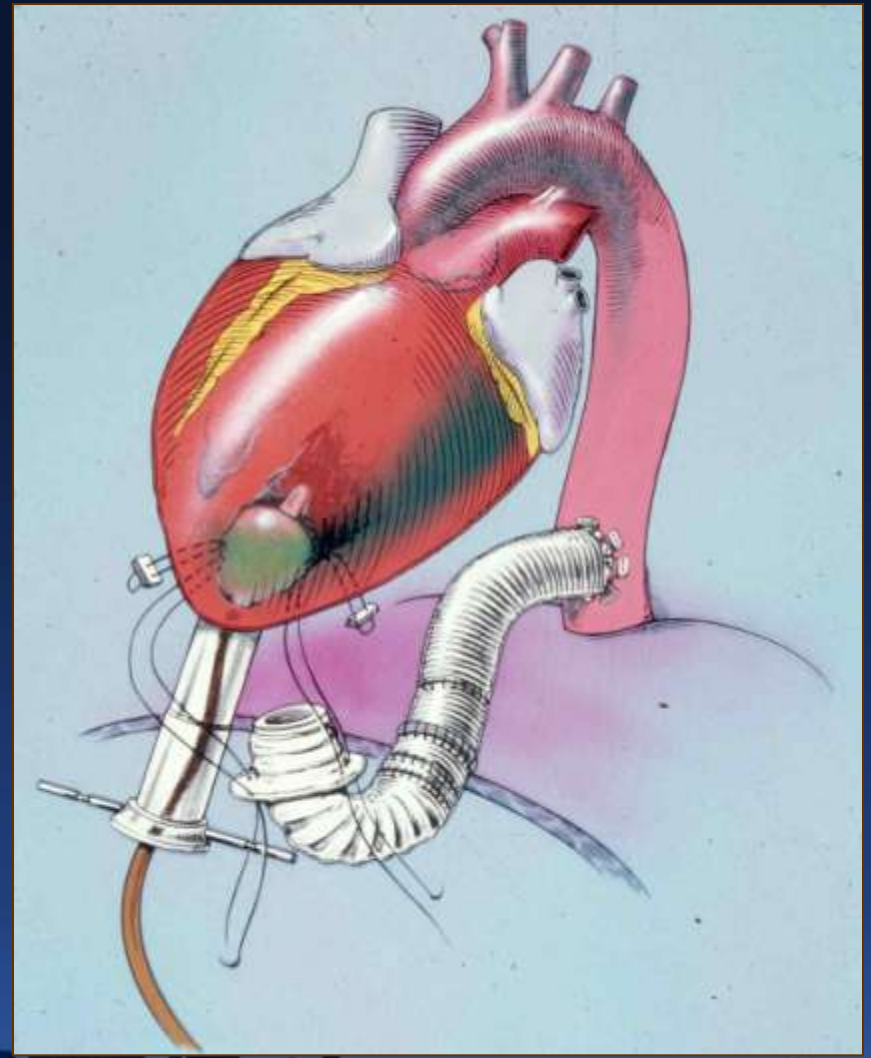
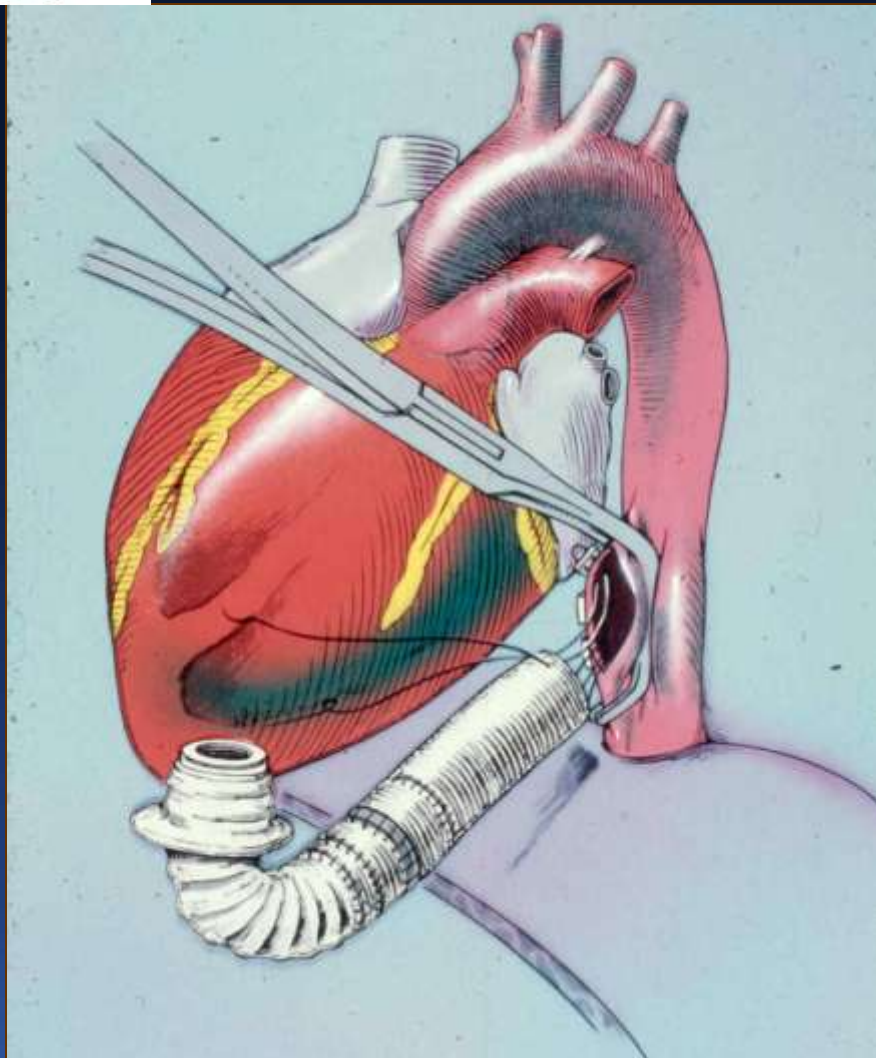


AVB Components

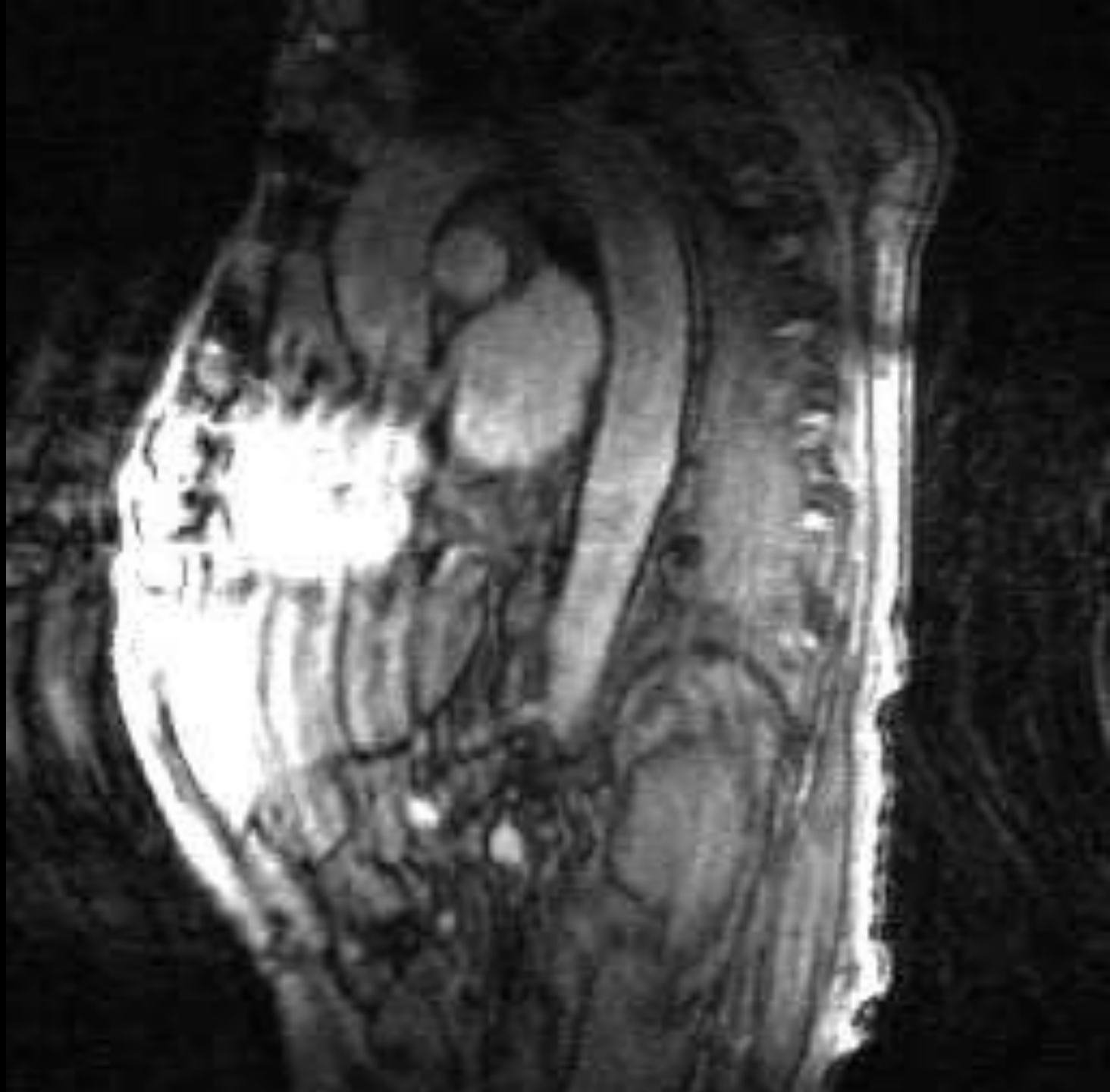
- Left Ventricle Connector (LV connector)
- Prosthetic Valve
- Vascular Graft (if not part of valve)

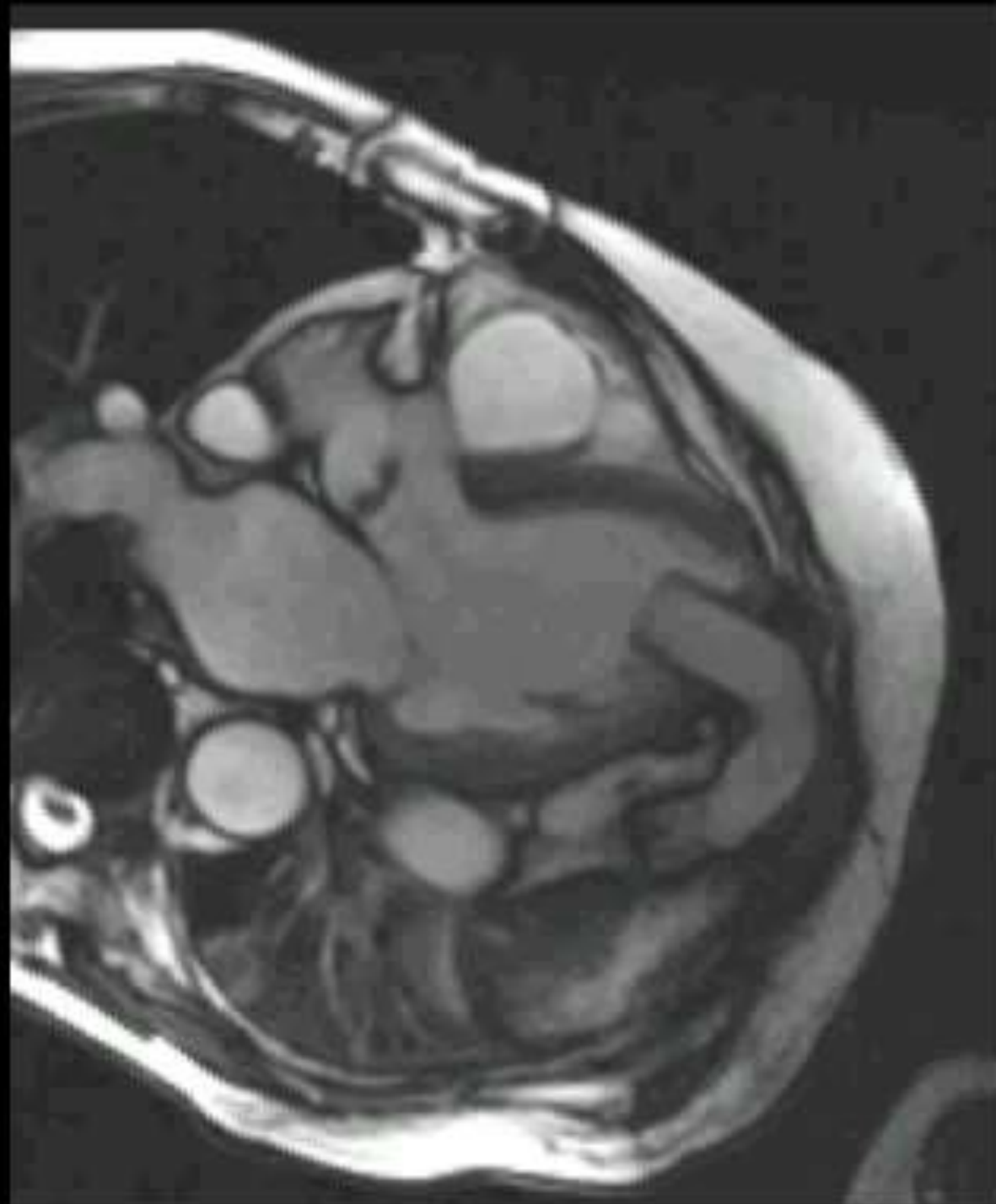


AVB: How to Do It











Valvular Heart Disease

Aortic Valve Bypass Surgery

Midterm Clinical Outcomes in a High-Risk Aortic Stenosis Population

James S. Gammie, MD; Leandra S. Krowsoski, BA; James M. Brown, MD; Patrick N. Odonkor, MD; Cindi A. Young; Mary J. Santos, PA-C; John S. Gottdiener, MD; Bartley P. Griffith, MD

Background—Aortic valve bypass (AVB; apicoaortic conduit) surgery relieves aortic stenosis (AS) by shunting blood from the apex of the left ventricle to the descending thoracic aorta through a valved conduit. We have performed AVB surgery as an alternative to conventional aortic valve replacement for high-risk AS patients.

Methods and Results—Between 2003 and 2007, 31 high-risk AS patients were treated with AVB surgery. Twenty-two patients (71%) were undergoing reoperation with patent coronary bypass grafts, and 5 (16%) had a porcelain ascending aorta. The average age was 81 years. Cardiopulmonary bypass was used for 19 of 31 patients (61%); the median duration of cardiopulmonary bypass was 19 minutes. Cross-clamp time for all patients was 0 minutes. Perioperative mortality was 13% (4 of 31 patients); no perioperative deaths occurred in the last 16 consecutive patients. One patient experienced a stroke related to intraoperative hypotension. No strokes have occurred during follow-up. Renal function was unchanged after AVB (preoperative creatinine, 1.3 ± 0.5 mg/dL; postoperative creatinine, 1.2 ± 0.5 mg/dL). The mean gradient across the native aortic valve decreased from 43.5 ± 15 to 10.4 ± 5.4 mm Hg. Echocardiographically determined conduit flow expressed as a percentage of total cardiac output was $72 \pm 12\%$.

Conclusions—AVB surgery is an important therapeutic option for high-risk patients with symptomatic AS. Ventricular outflow is distributed in a predictable fashion between the conduit and the left ventricular outflow tract, and AVB surgery reliably relieves AS. Stroke and renal dysfunction were uncommon. (*Circulation*. 2008;118:1460-1466.)

Key Words: aorta ■ stenosis ■ surgery ■ valves



Clinical Experience

University of Maryland Medical Center

April 2003 – October 2007

- 31 patients
- 6.6 % of isolated AVRs
- Age: mean 81 (62 – 88)
- Mean STS risk score: 9.3 +/- 4.5





Clinical Experience

University of Maryland Medical Center

Reasons for AVB

- Prior CABG, patent grafts: 22 (71 %)
- Porcelain ascending AO: 5 (16 %)
- Refused by another surgeon: 12 (41 %)

Clinical Experience

University of Maryland Medical Center

Operative Data:

Cross-clamp (ischemic time): 0 minutes

Bypass: 19 / 31 patients (61 %)

CPB time: 19 minutes



Clinical Experience

University of Maryland Medical Center

Overall Operative Mortality 4 / 31 (13 %)

Operative Mortality Oct 05 – November 07:

0 / 16 patients = **0 Percent**



Clinical Experience

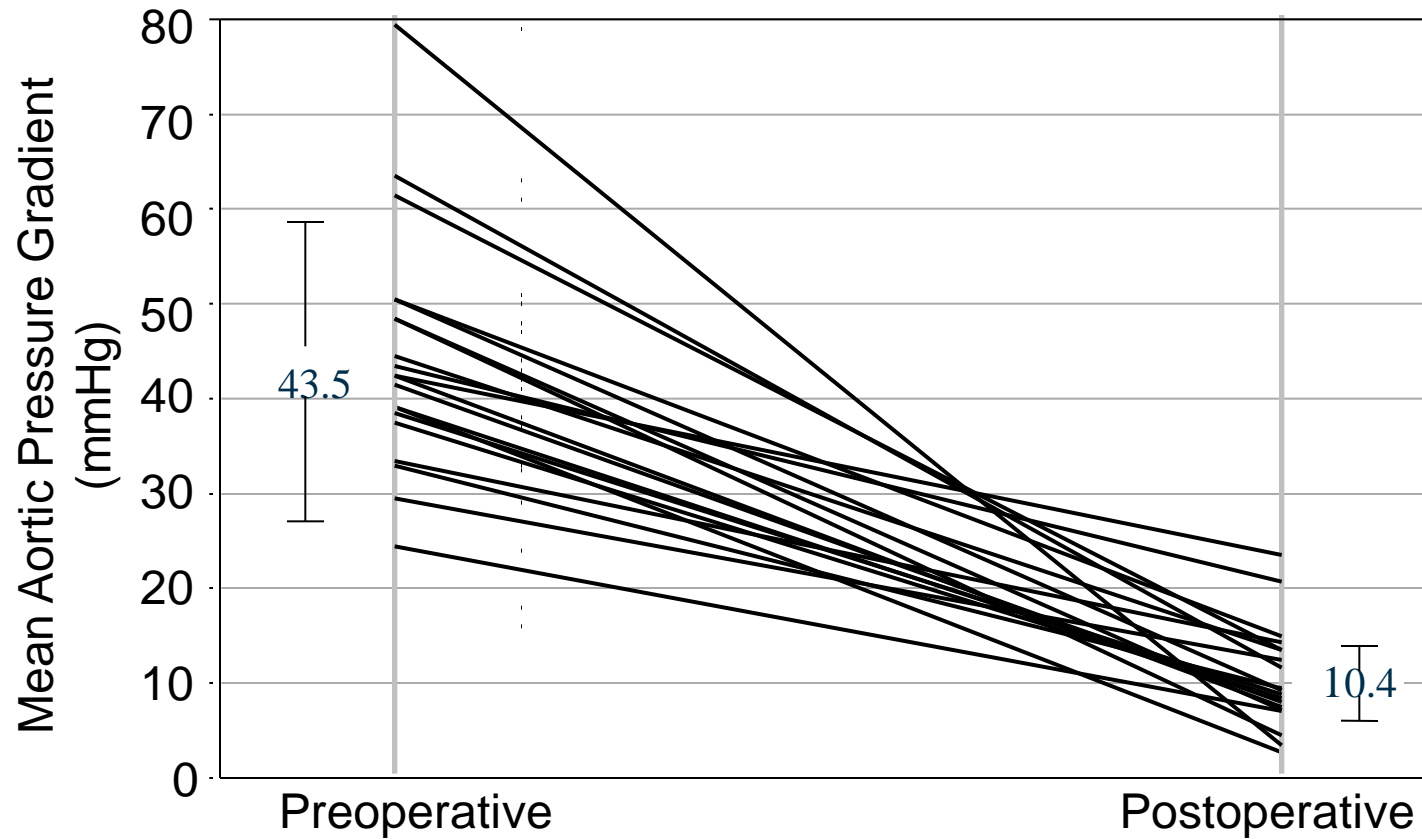
University of Maryland Medical Center

Outcomes:

- Strokes: none
- Permanent renal failure requiring hemodialysis: none
Cr 1.3 admission ----- 1.2 dismissal
- No HB/pacemakers



Mean Aortic Gradient



$p < 0.0001$

Is Aortic Valve Bypass Durable ?



The Longest Functioning Apical Left Ventricular to Descending Aortic Valve Conduit

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Department of Cardiology, Norfolk and Norwich University Hospital NHS Trust, Norwich, Cardiothoracic Unit, Great Ormond Street Hospital for Children NHS Trust, London, and Institute of Child Health, University College London, London, United Kingdom

J.W. Brown (Indiana): 3 patients > 25 years



A
Fig 1.



B

A 36-year-old woman has had an apical left ventricular to descending aortic valve conduit for 24 years that is functioning well and that is probably, to our knowledge, the longest surviving conduit. The patient

ular splint at the apex of the left ventricle, and this was in turn attached to a number 20 Hancock valve conduit anastomosed to the descending aorta, just above the diaphragm. Recent angiography demonstrated no conduit









Aortic Valve Bypass Surgery:

Beating Heart Therapy for Aortic Stenosis

Conclusions:

- AVB valuable option for high-risk AS patient
- AVB uses established valves
- 30 year clinical experience
- Treat AS without CPB, X-clamp, sternotomy
- Minimize Brain Injury

