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ASCENDING AORTA DISSECTING ANEURYSM

Diagnosis & Management

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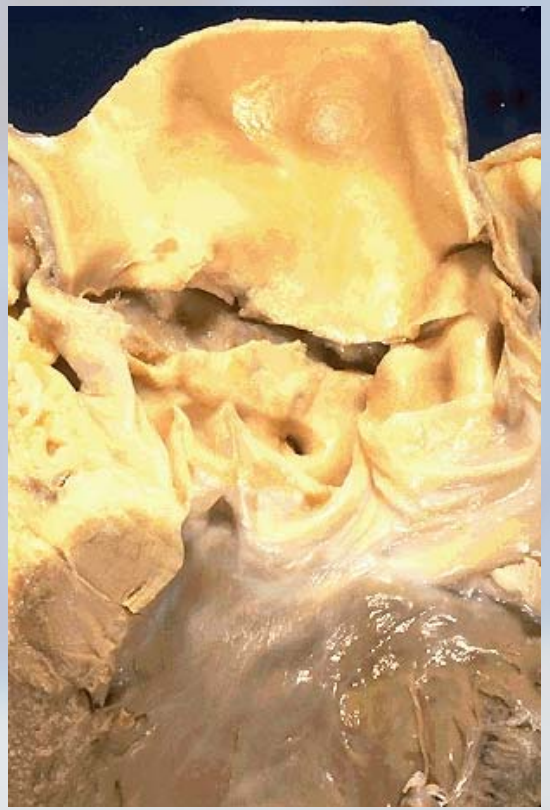
Introduction

- Aortic dissection affects 3-4 per 100.000 people /year
- 20% die before reaching hospital
- 30% die during hospital admission
- Type A dissection carries a “1% per hour” mortality



Classification

- According to anatomical extent

  Stanford or De Bakey system

- According to underlying pathology

  European Society of Cardiologists

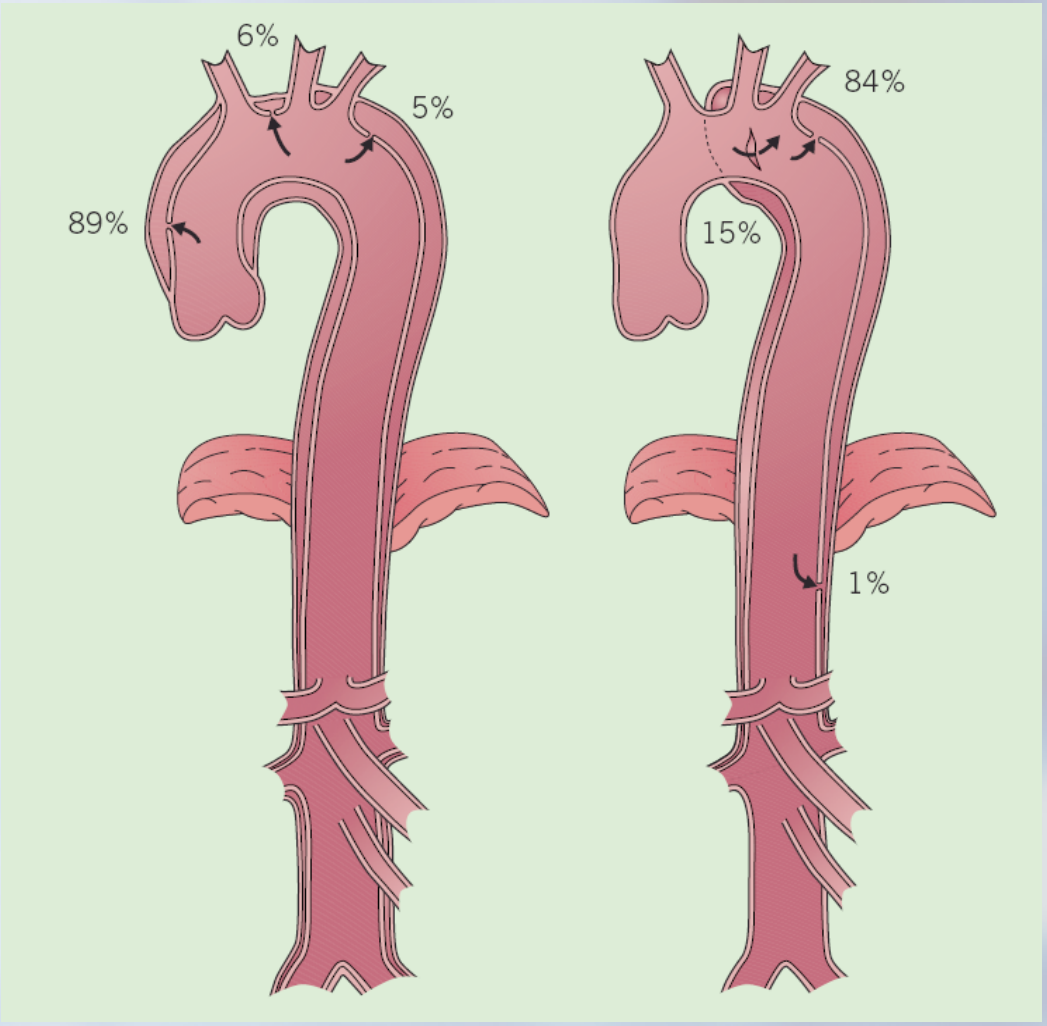
- According to time of onset

  Acute or Chronic

Stanford Classification

Type A:
ascending aorta

Type B:
descending aorta

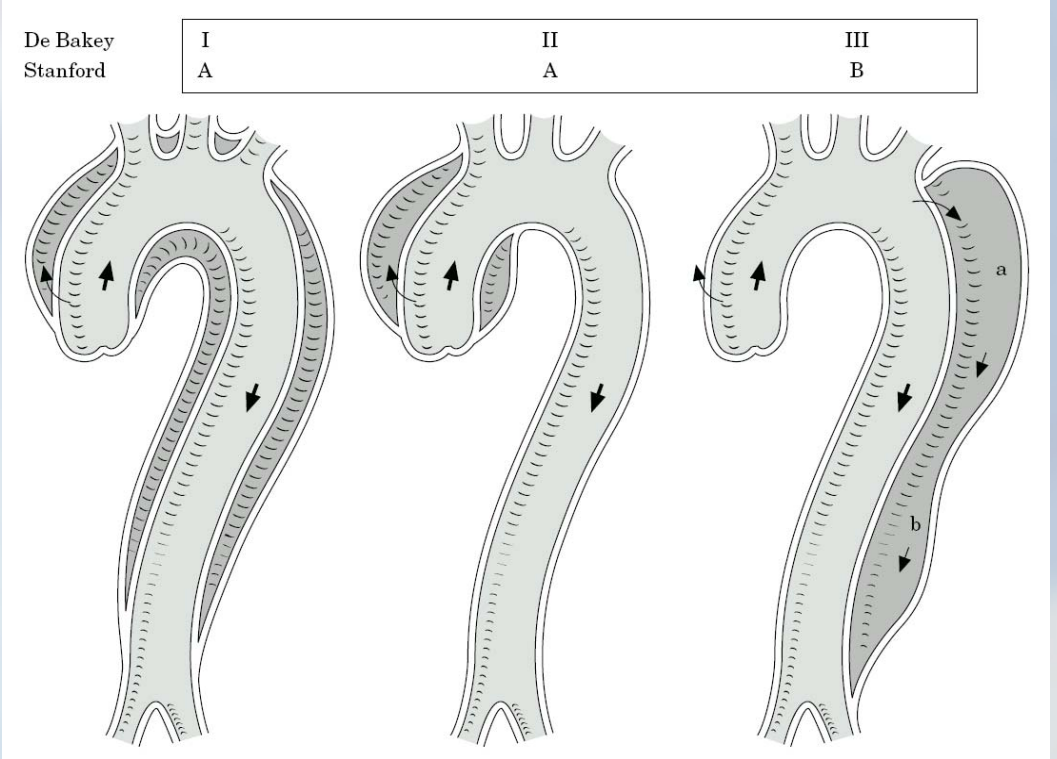


De Bakey Classification

Type I:
ascending & descending aorta

Type II:
ascending aorta

Type III:
descending aorta



ESC Classification

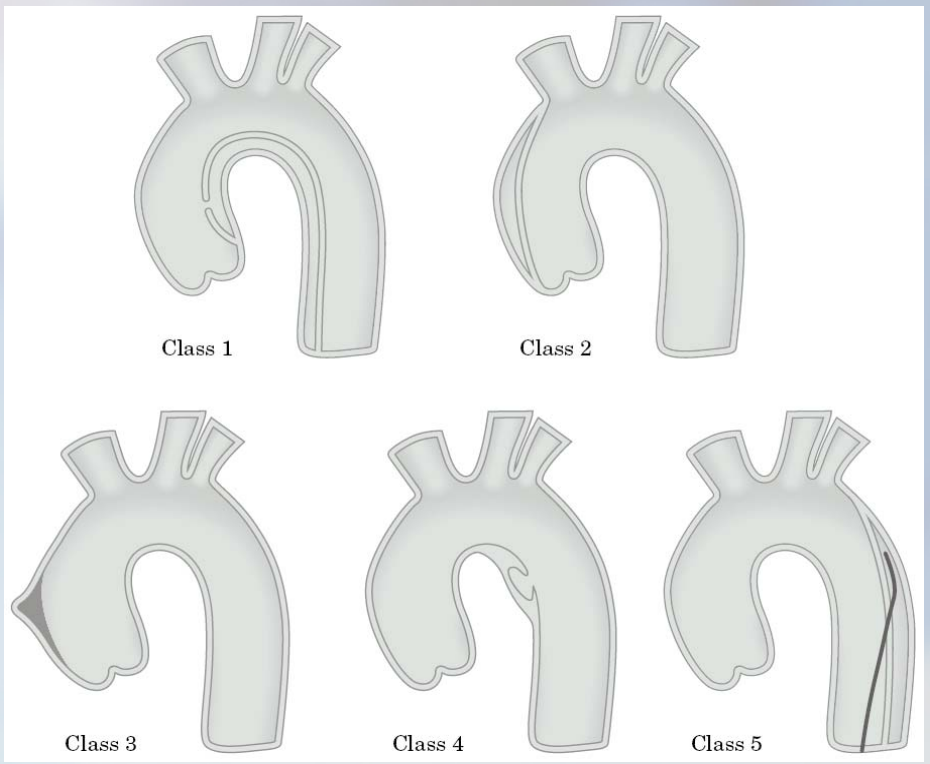
Type 1: intimal flap

Type 2: medial disruption by intramural hematoma

Type 3: discrete or subtle dissection without hematoma eccentric bulge at the entry site

Type 4: penetrating aortic ulcer

Type 5: traumatic or iatrogenic



Classification: Timing of Onset

- Acute: first 14 days
- Chronic: after 14 days

Predisposing Risk Factors

- Hypertension
  - Idiopathic
  - Secondary: Polycystic kidney disease
    - Pheochromocytoma
    - Sheehan syndrome
    - Cushing syndrome
- Genetically triggered thoracic aortic disease
  - Marfan syndrome
  - Bicuspid aortic valve
  - Loeys –Dietz syndrome
  - Hereditary TAA/D
  - Vascular Ehlers – Danlos syndrome
- Congenital diseases – syndromes
  - Coarctation of the aorta
  - Tumer syndrome
  - Tetralogy of Fallot
- Atherosclerosis
  - Penetrating atherosclerotic ulcer
- Trauma, blunt, or iatrogenic
  - Catheter/stent
  - Intraaortic balloon pump
  - Aortic/vascular surgery
  - Motor vehicle accident
  - Coronary artery bypass surgery/ aortic valve replacement
- Cocaine use
- Inflammatory/infectious diseases
  - Giant cell arteritis
  - Takayasu arteritis
  - Behet disease
  - Aortitis
  - Syphilis
- Pregnancy

Clinical Characteristics of Patients Presenting with Type A Thoracic Aortic Dissections

	Type A
Frequency	60-75%
Sex (M:F)	1.7-2.6:1
Age (y)	50-56
Hypertension	++
Connective tissue disorder	++
Pain (10% no pain)	
Retrosternal	+++
Interscapular	+,-
Hypotension (25%)	
Syncope	++
Cerebrovascular accident	+
Congestive heart failure	+
Aortic valve regurgitation (31%)	++
Pulse deficit (15%)	
Myocardial infarction	+
Pericardial effusion	+,-
Pleural effusion	+,-
Abdominal pain	+,-
Peripheral pulse deficit	upper and lower extremities

Diagnostic Strategy

- Evaluation of hemodynamic stability
- ECG (rule out acute MI)
- Intubation – Ventilation
- TOE
- CT arteriogram, aortography, intravascular ultrasound

Normal aortic dimensions in adults

Diameter	**Aortic annulus**		
	Male	2.6±0.3 cm	TTE
	Female	2.3±0.2 cm	TTE
	Sinus of Valsalva		
	Male	3.4±0.3 cm	TTE
	Female	3.0±0.3 cm	TTE
	Aortic root	<3.7 cm	TTE
	Proximal ascending aorta		
	Male	2.9±0.3 cm	TTE
	Female	2.6±0.3 cm	TTE
	Ascending aorta	1.4-2.1 cm . m^{-2}	TEE
		<3.8 cm (2.5-3.8)	CT
		<3.7 cm	TTE
	Descending aorta	1.0-1.6 cm . m^{-2}	TEE
		<2.8 cm (1.7-2.8)	CT
Wall thickness	**Aortic wall**	<4 mm	CT
		<3 mm	Angio
		<4 mm	TEE

Diagnosis: Sensitivity and specificity of various imaging modalities

Imaging study	Sensitivity (%)	Specificity (%)
Aortography	*80-90*	*88-95*
CT	*90-100*	*90-100*
IVUS	*94-100*	*97-100*
Echocardiogram		
TTE	*60-80*	*80-96*
TEE	*90-99*	*85-98*
MRI	*98-100*	*98-100*

Cohn LH, Edmunds LH Jr, eds. Cardiac Surgery in the Adult. New York: McGraw-Hill, 2003

Operative Indications

Goals of surgery in Acute type A dissection are:

- to prevent aortic rupture into pericardium, pleural space
- to avoid involvement of coronary ostia – aortic valve

- Comatose patients are unlikely to improve with surgical repair
- Complications such as stroke or paraplegia are not contraindications to surgical correction

Operative Indications for Acute and Chronic Type A Thoracic Aortic Dissection

Dissection type	Operative indication
Acute	
Type A	Presence
Chronic	
Type A	Symptoms related to dissection (congestive failure, angina, aortic regurgitation, stroke, pain)
	Malperfusion
	Aneurysm

Frequency and Location of Malperfusion in Acute type A Thoracic Aortic Dissection

Vascular System	Frequency
Renal	23-75%
Extremities (upper and lower)	25-60%
Mesenteric	10-20%
Coronary	5-11%
Cerebral	3-13%
Spinal	2-9%

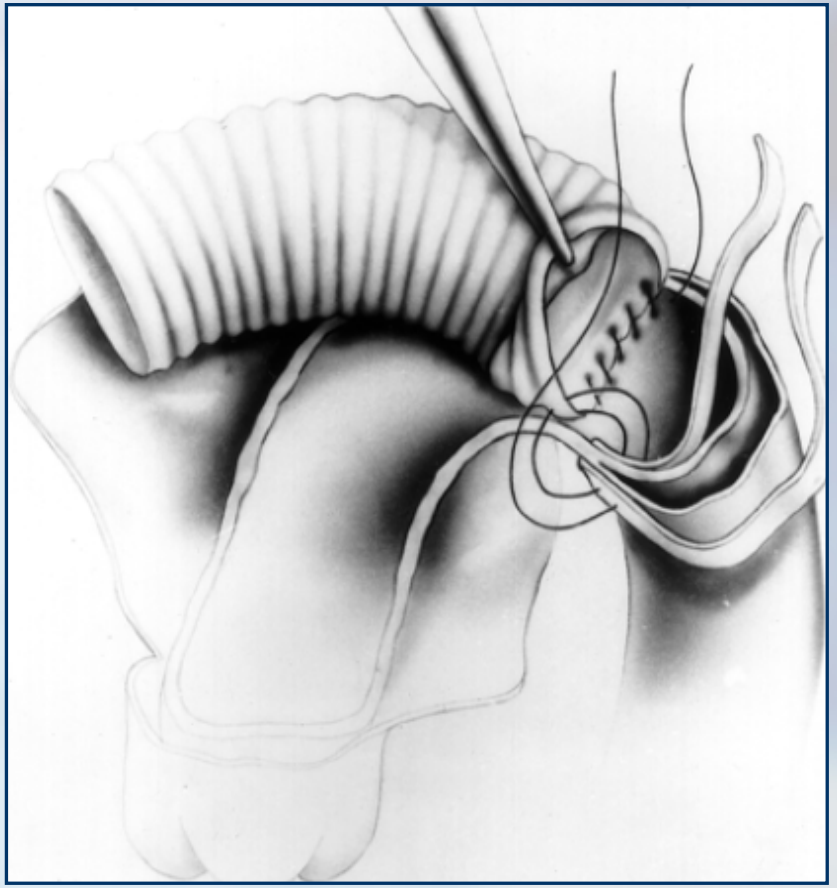
Operative Strategy

- Anaesthesia – monitoring
- Cardiopulmonary bypass
- Cerebral protection
- Haemostasis

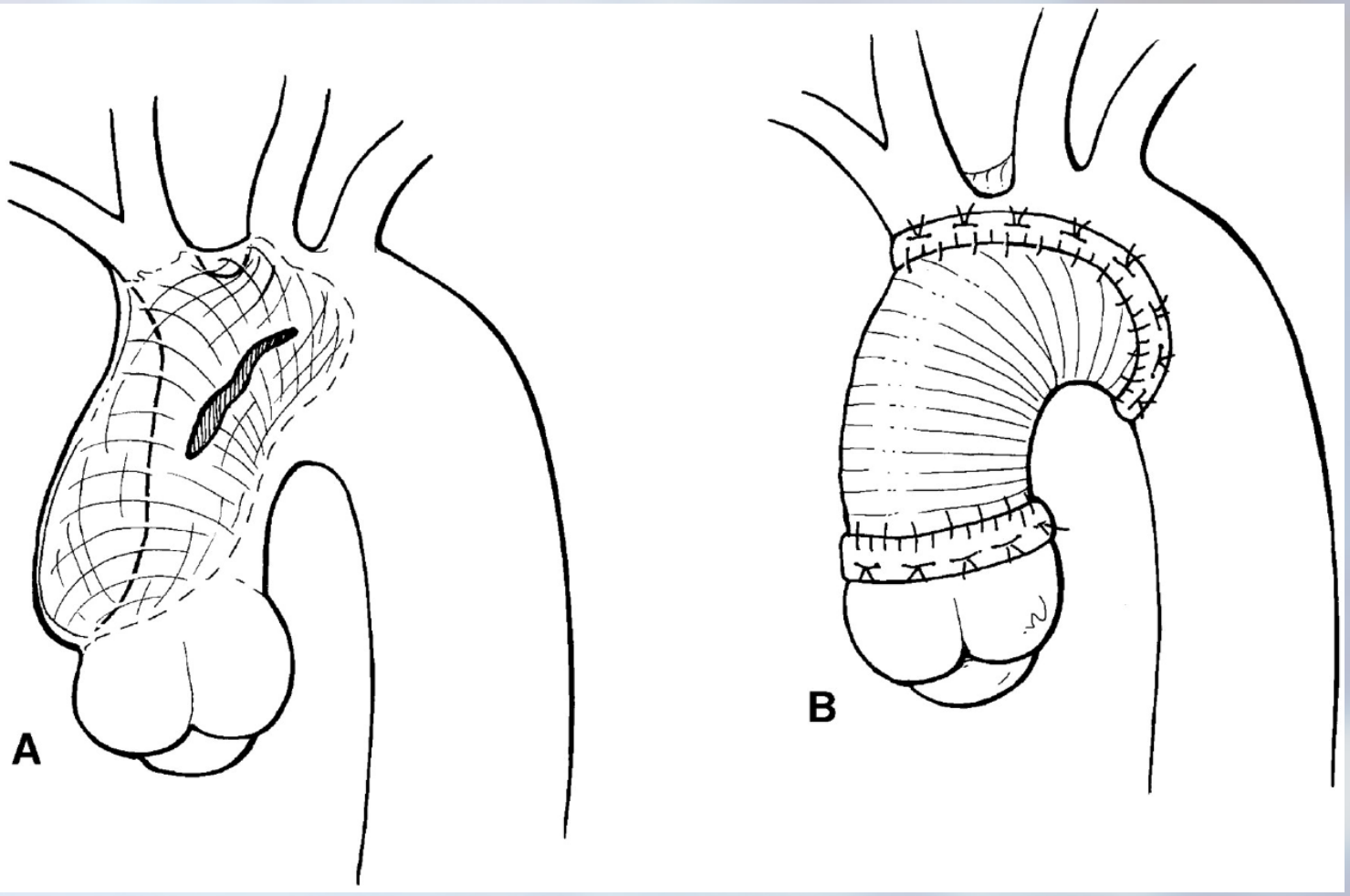
Operative Techniques

- Replacement of ascending aorta
  - straight graft
  - valve plus graft
  - composite graft (Bentall-De bono, Cabrol)
    (Ross procedure not recommended)
- BioGlue

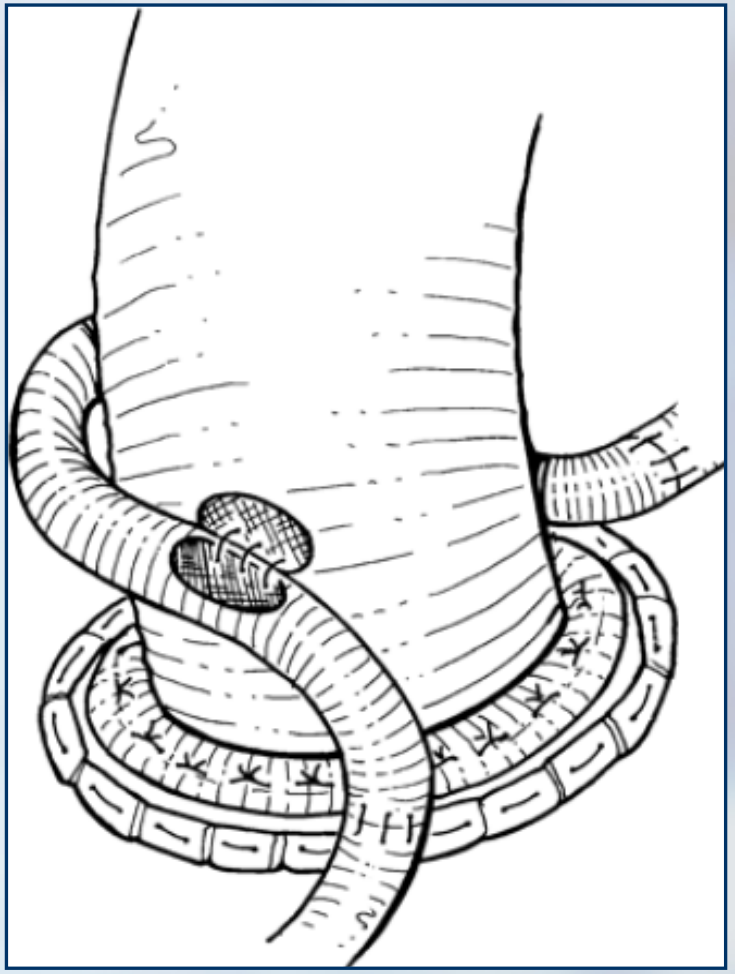
Operative Techniques: Straight Graft



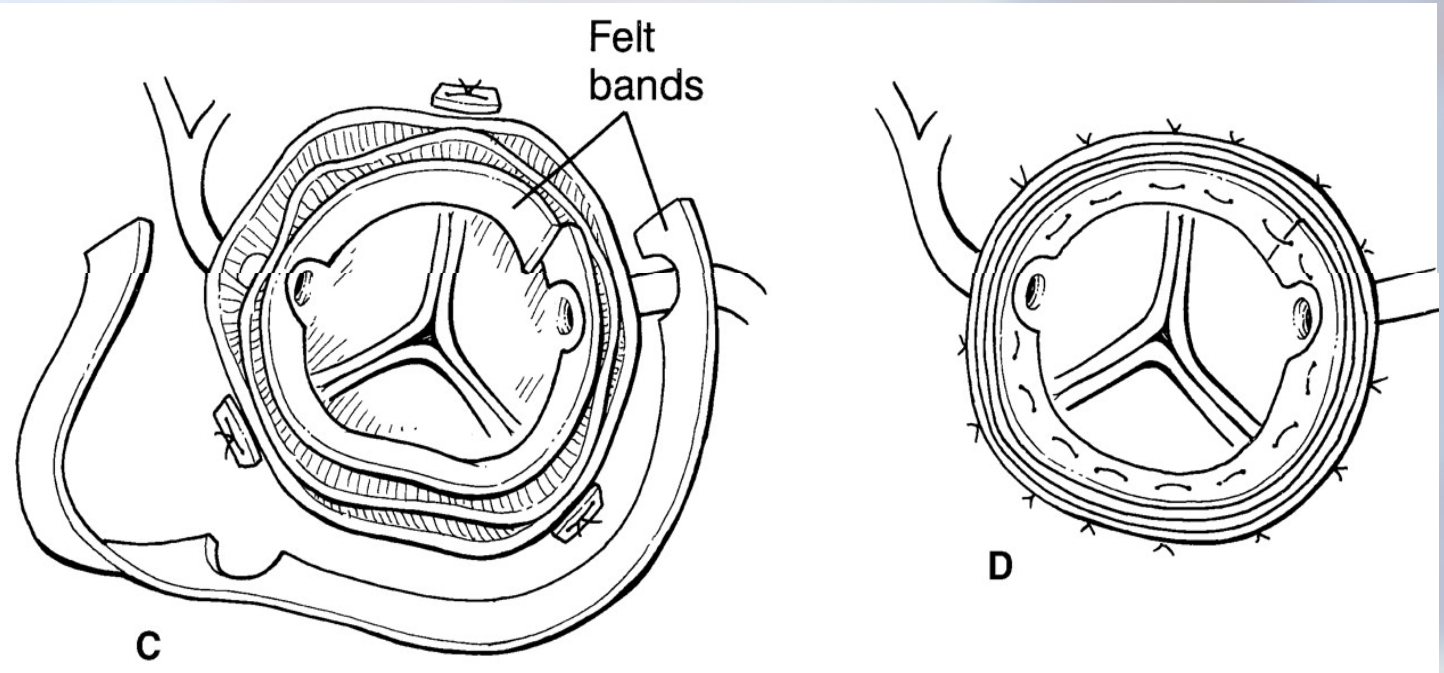
Operative Techniques: Straight Graft



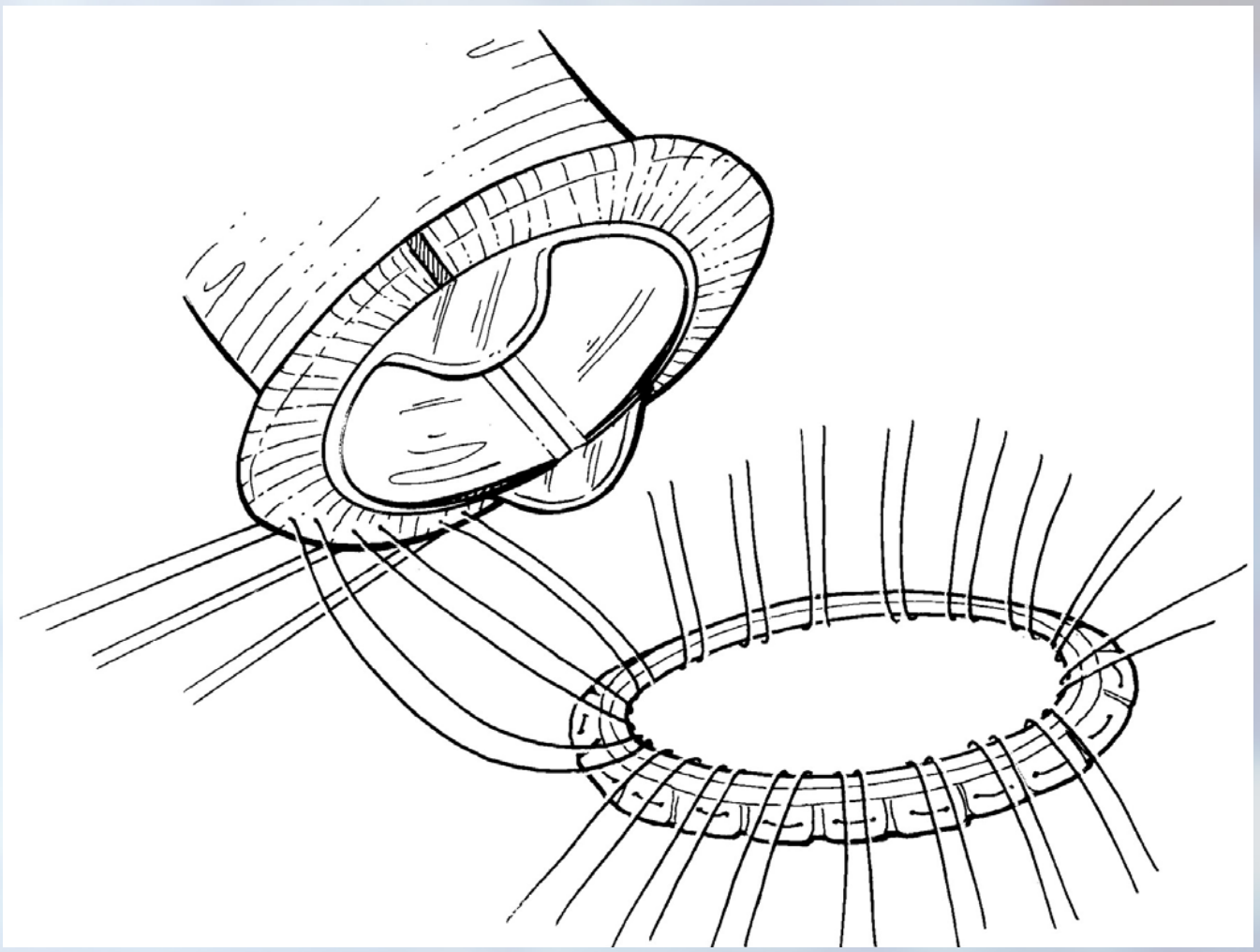
Operative techniques: Cabrol



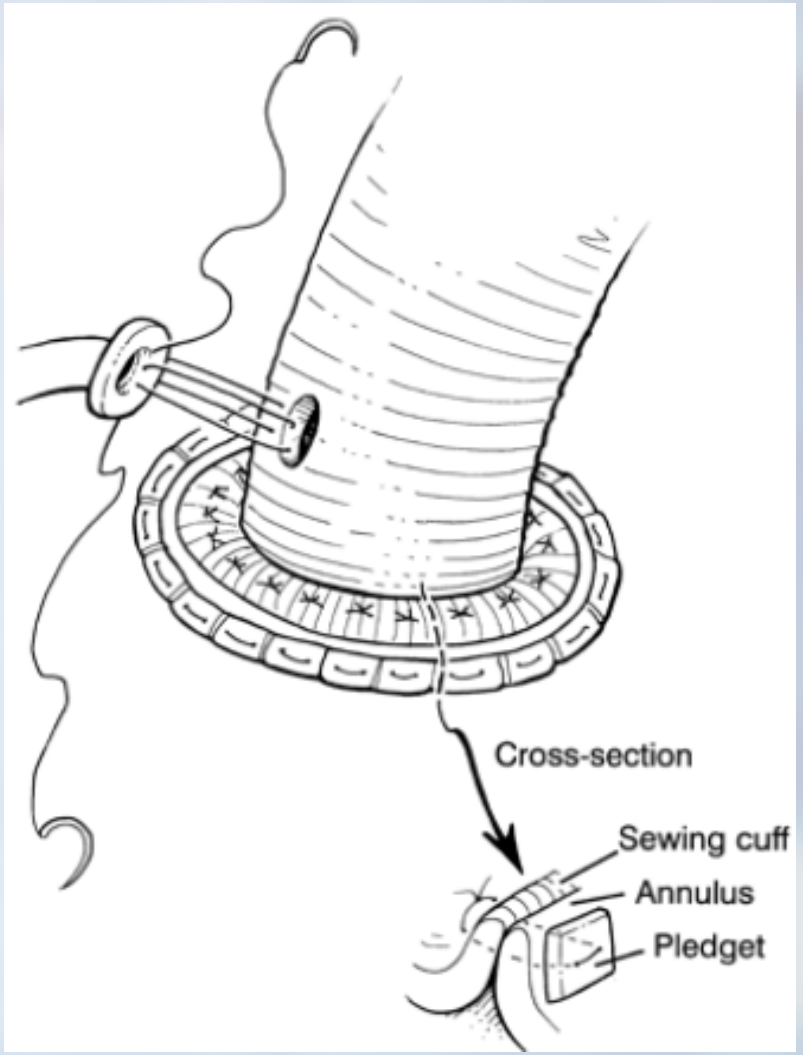
Management: Operative techniques



Operative techniques: Bentall – de Bono



Operative techniques: Bentall – de Bono



Results: Acute aortic dissection - Long term survival

	Type A
5 years	55-75 %
10 years	32-65 %

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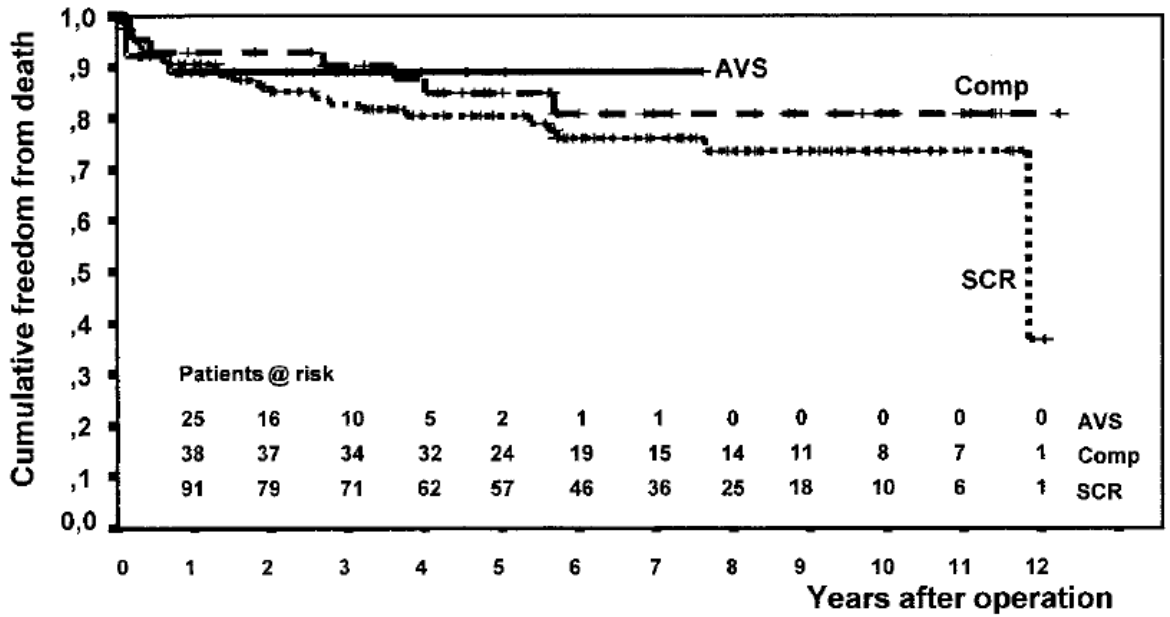
Results: Type A acute aortic dissection – actuarial survival



actuarial survival @	AVS	Comp	SCR	
3 years	89 ± 5 %	90 ± 5 %	83 ± 4 %	
5 years	89 ± 5 %	85 ± 6 %	80 ± 4 %	log rank = 0.61
10 years	-	81 ± 7 %	73 ± 5 %	

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