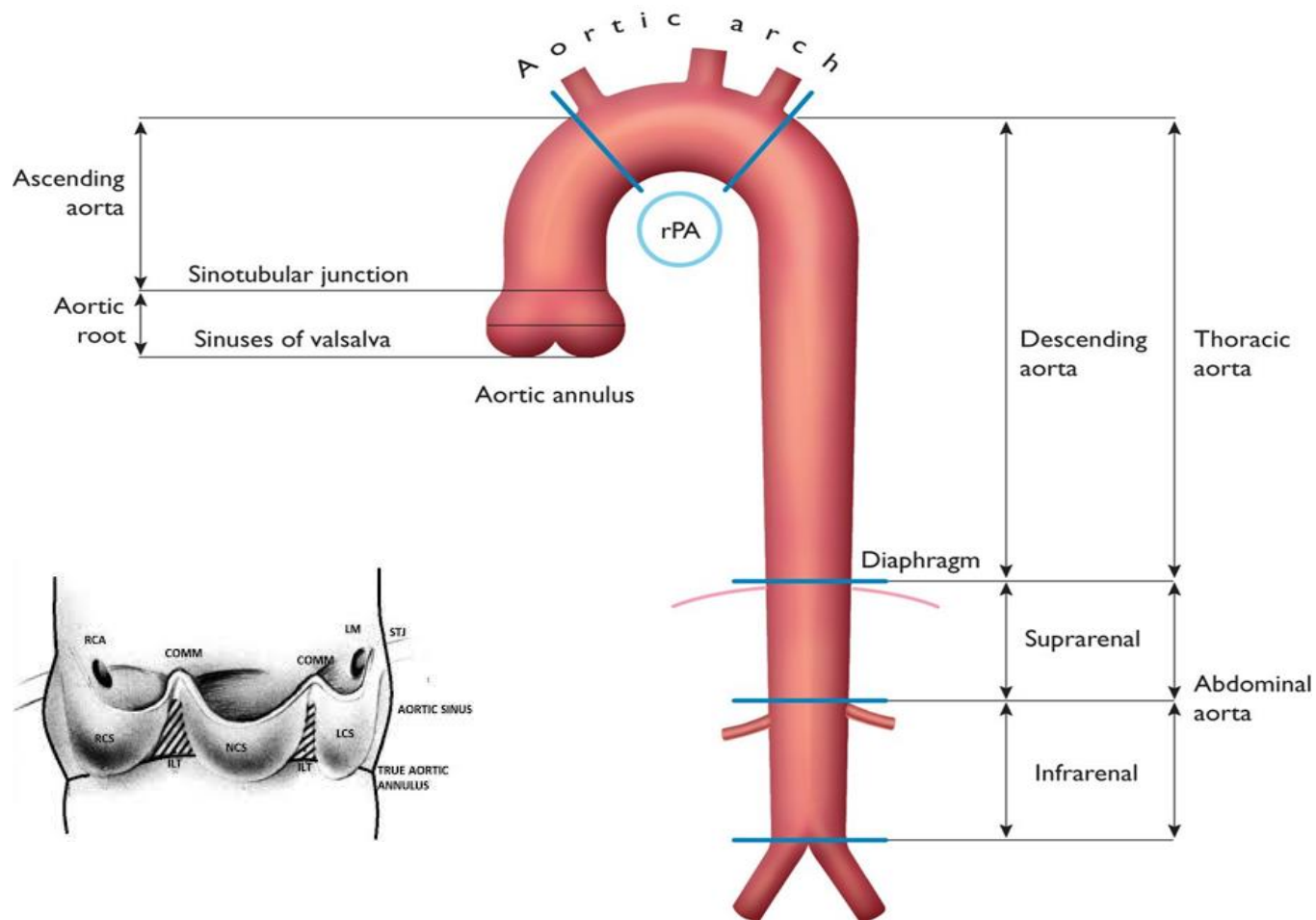


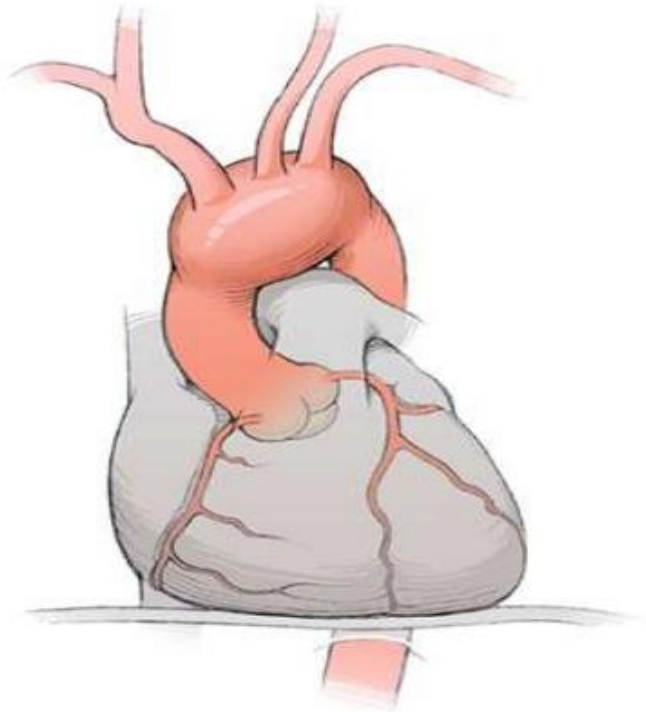
Thoraxkirurgi vid aortasjukdom

Henrik Hultkvist

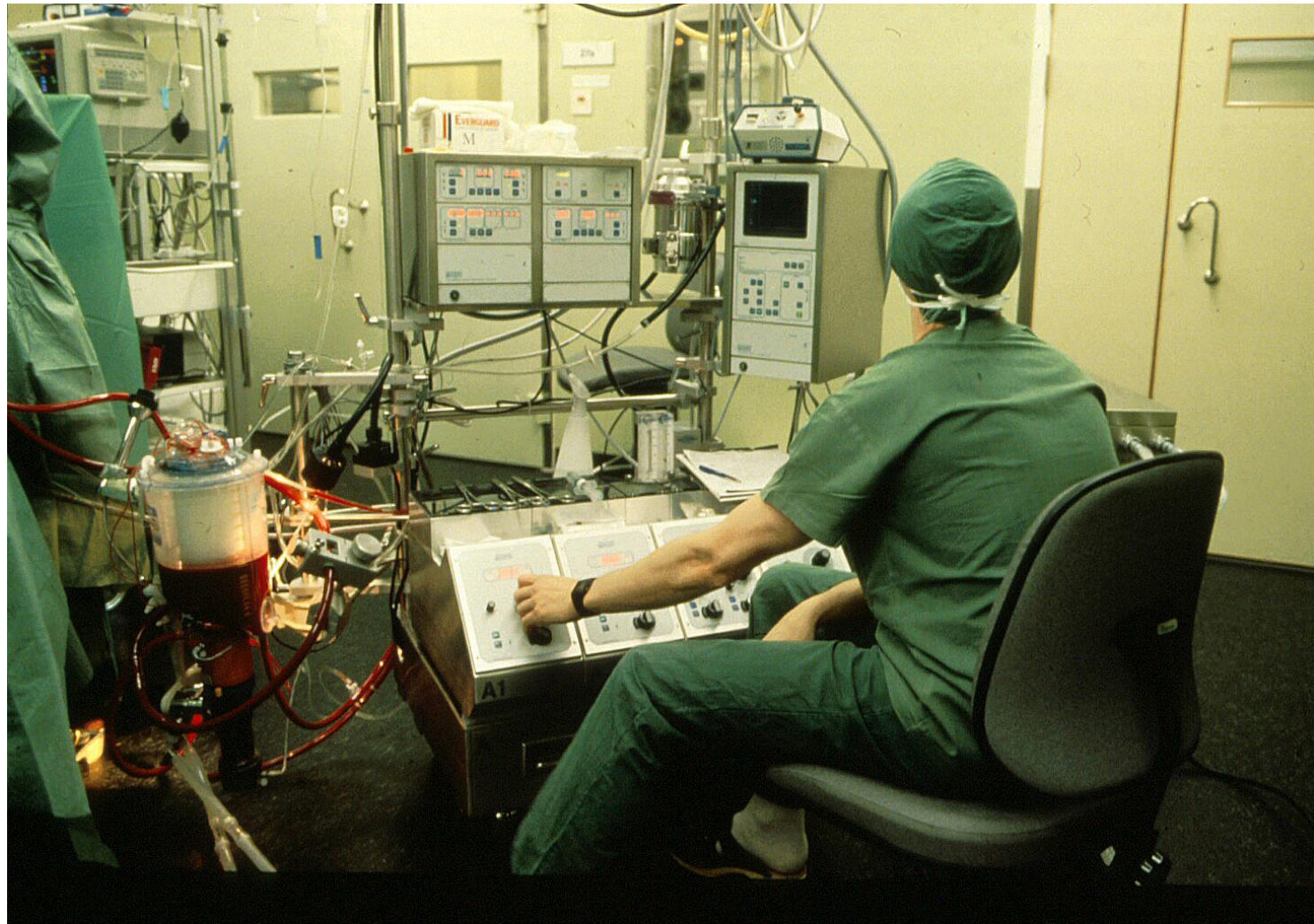
Thorax-kärlkliniken US Linköping



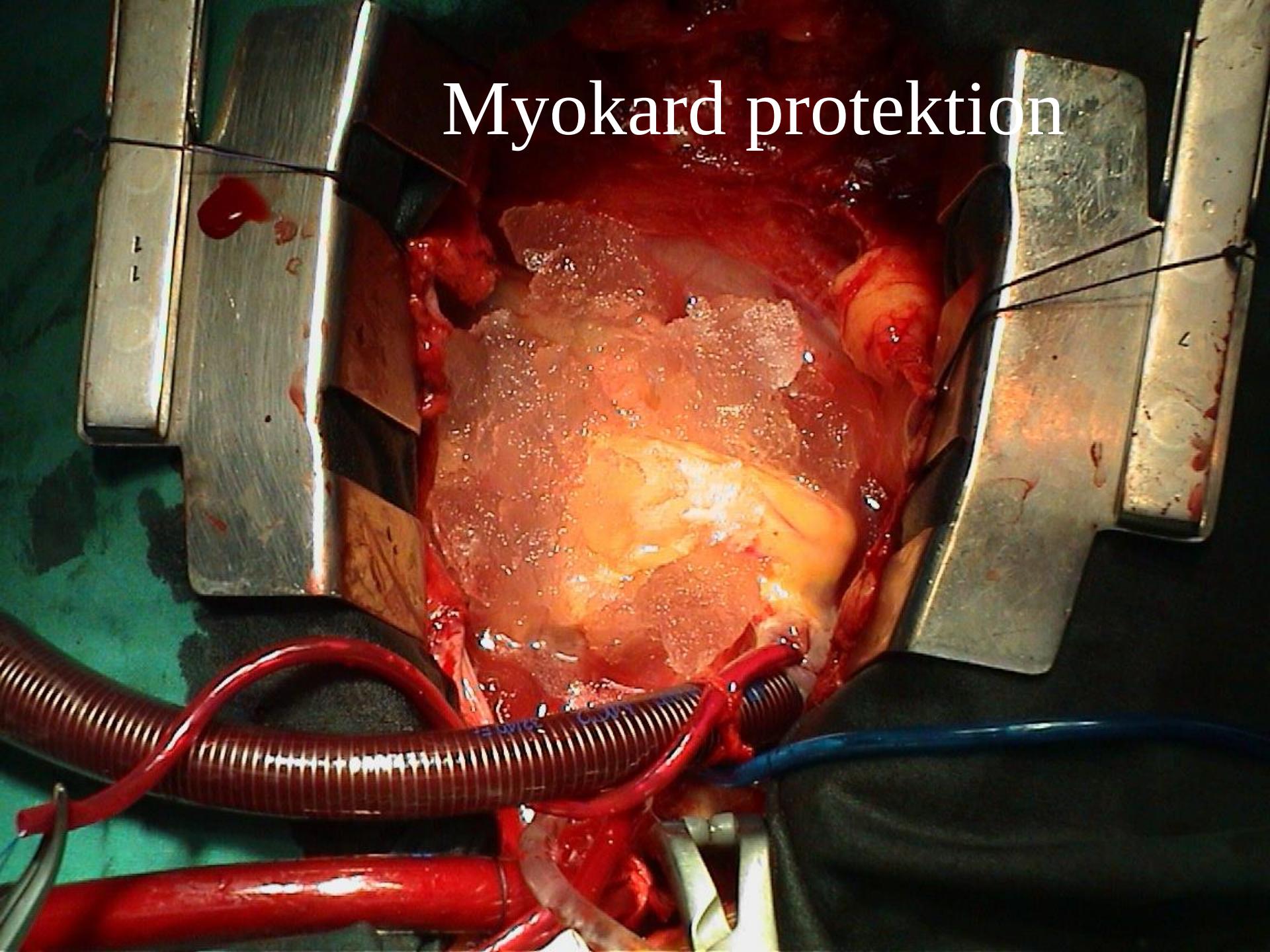
Förutsättningar för aortakirurgi

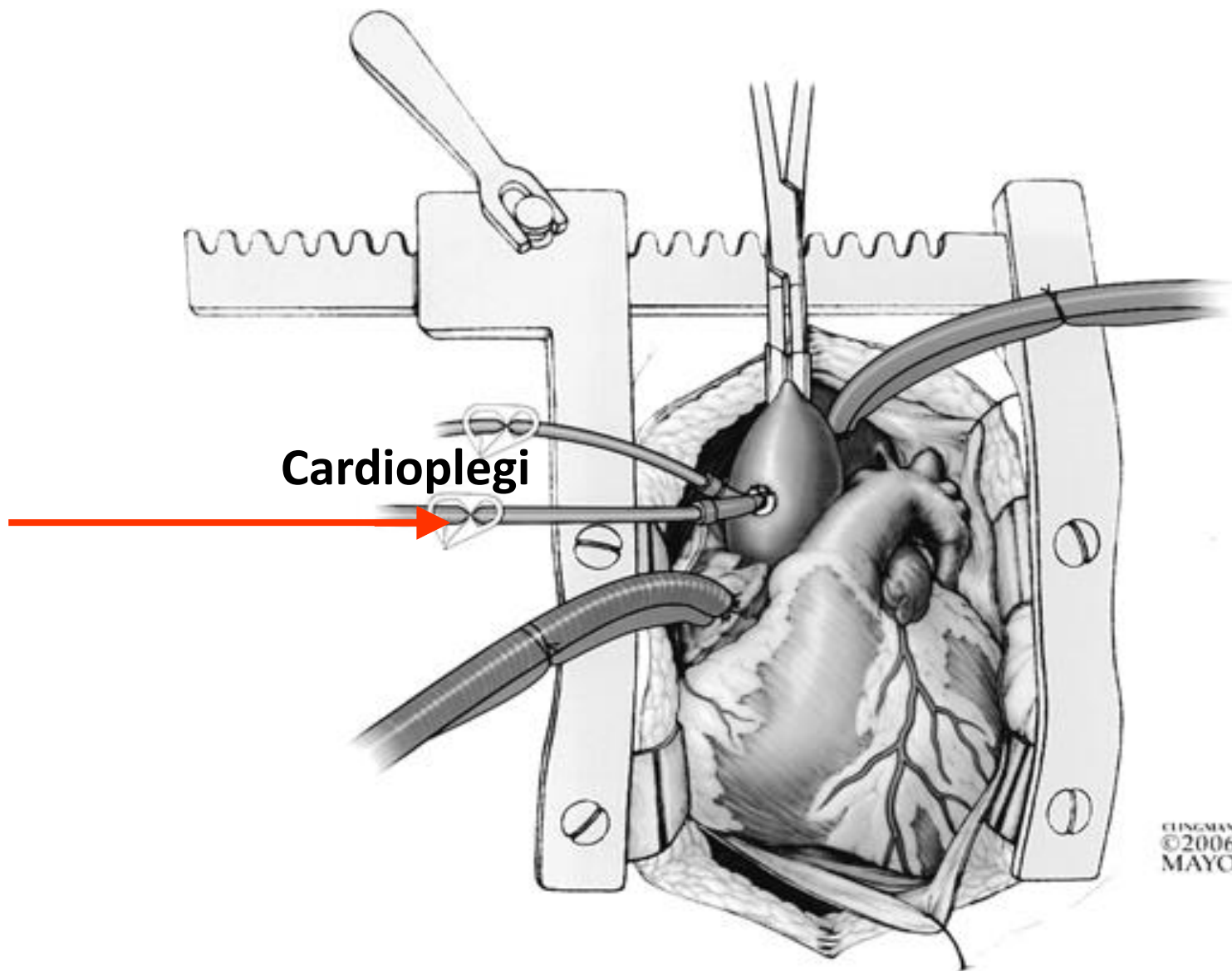


- Skydda hjärna, hjärta och inre organ
- ECC
- Hypotermi
- Antegrad Cerebral Perfusion



Myokard protektion







Thoraxkirurgi vid aortasjukdom

• Indikationer

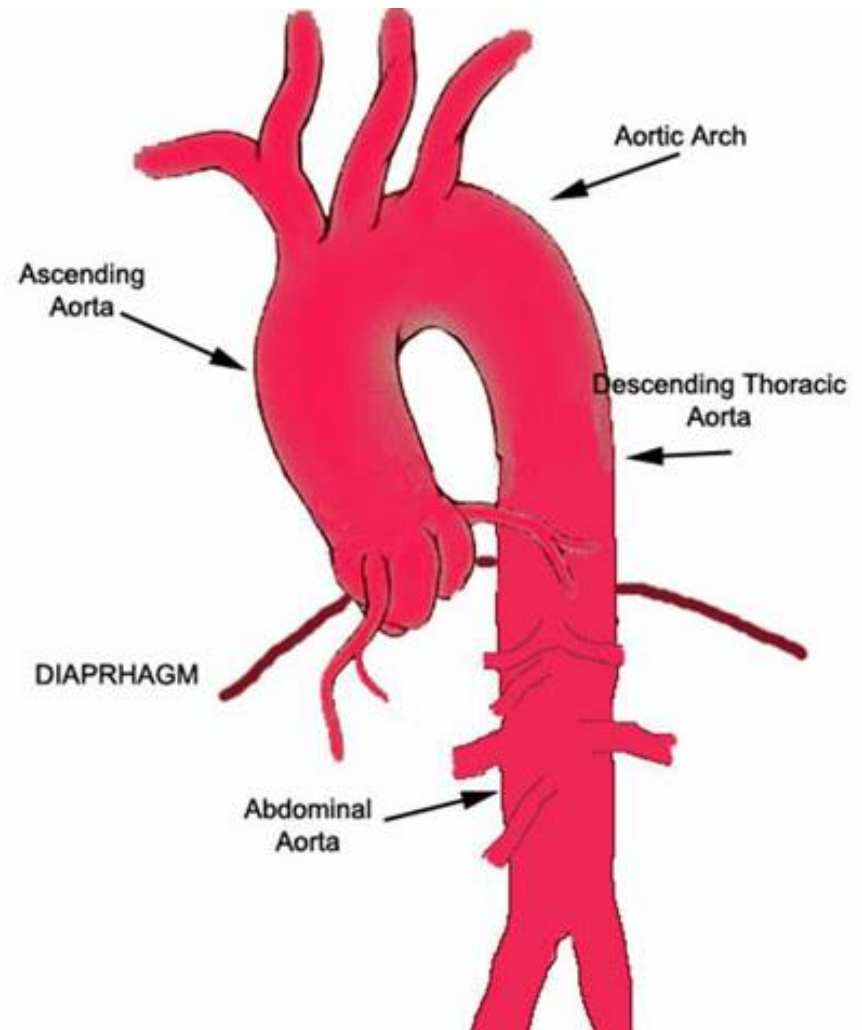
- Akut Aortasyndrom
 - Akut Typ-A Dissektion
 - Intramuralt hematom
 - Penetrerande aortalt ulcus
 - Pseudoaneurysm
 - Trauma/latrogen skada
- Aortaaneurysm
 - Över 55mm
 - 42-45 mm (Loeys-Dietz, Marfan mm.)
och vid annan samtidig hjärtkirurgi
 - Snabb progress

• Principer för kirurgi

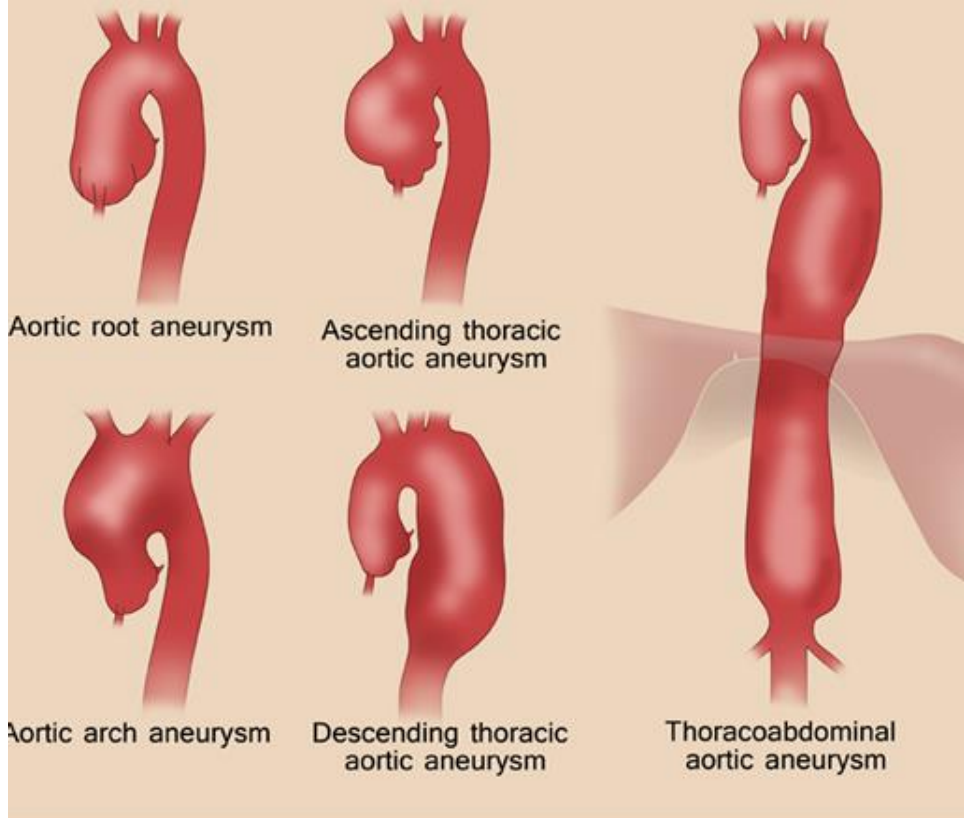
- Vid dissektion, exkludera entry och sörja för trombotisering av falskt lumen.
- Förhindra risk för dissektion eller ruptur genom att återställa normal dimension för aorta.

Operationsmetod

- Lokalisation
- Akuticitet
- Ålder/komorbiditet

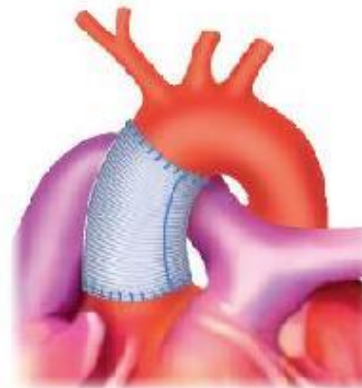


AORTIC ANEURYSM AT DIFFERENT SITES

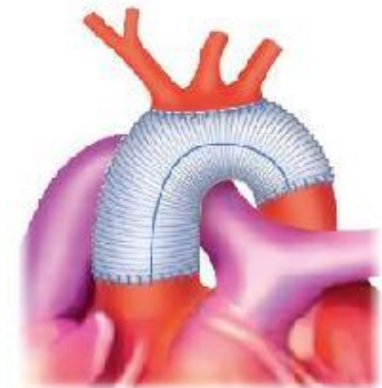


Ascending aortic & aortic arch surgery

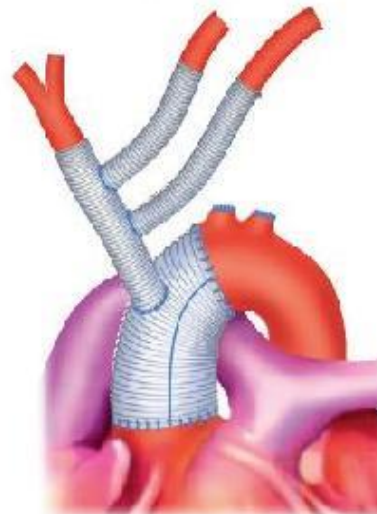
- (A) Ascending aortic replacement from sinotubular junction to cranial ascending aorta.
- (B) Hemi-arch replacement encompassing the concavity of the aortic arch.
- (C) Total arch replacement using a trifurcated technique for the supra-aortic vessels.
- (D) Frozen elephant trunk technique including total arch replacement using the island technique.



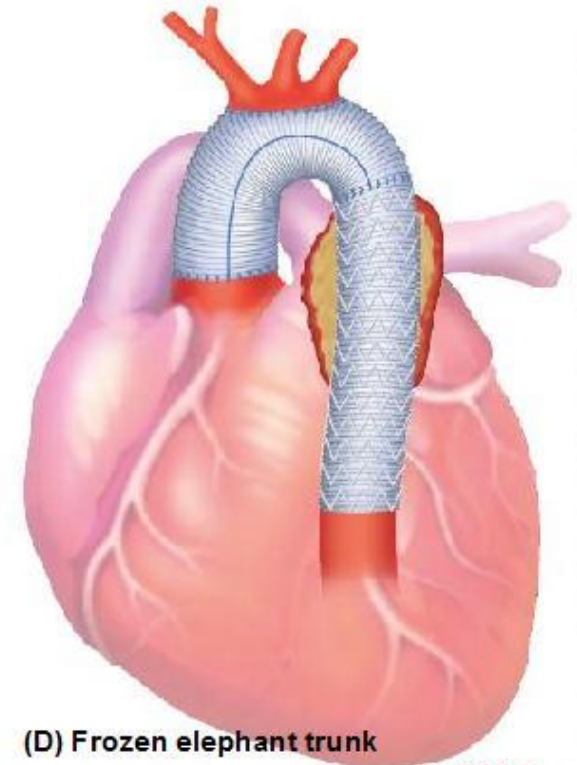
A - Supracommissural ascending aortic replacement



C - Total arch replacement



B - Hemiarch replacement with rebranching of supra-aortic vessels (trifurcated graft)



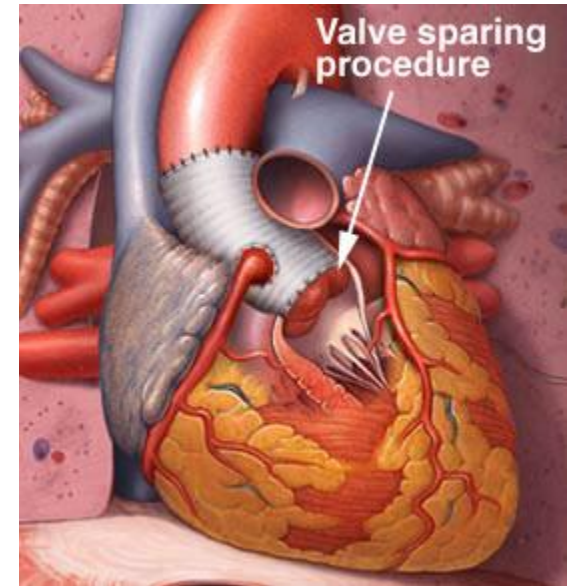
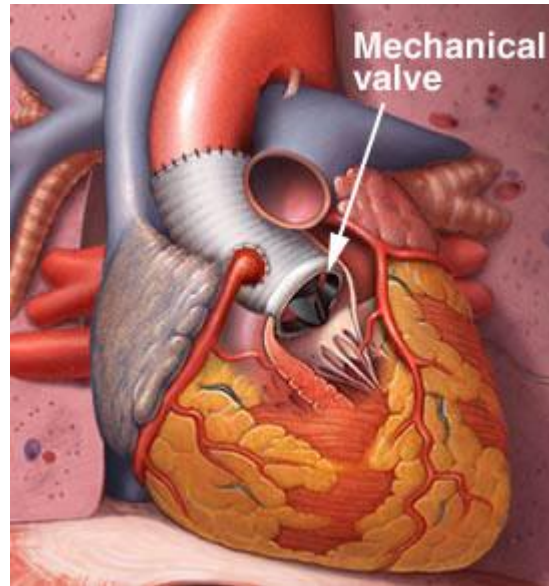
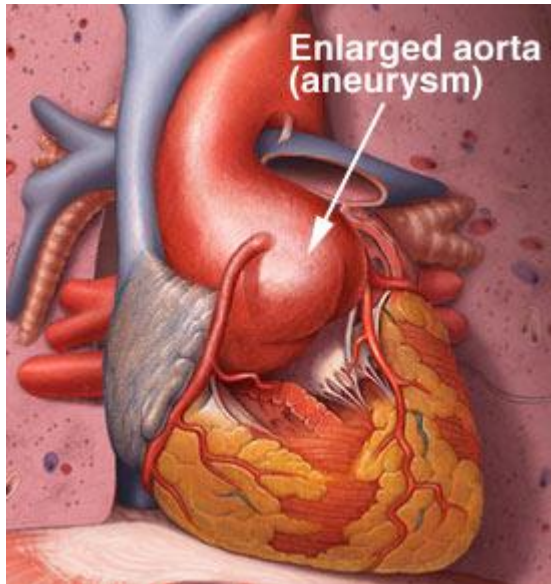
(D) Frozen elephant trunk

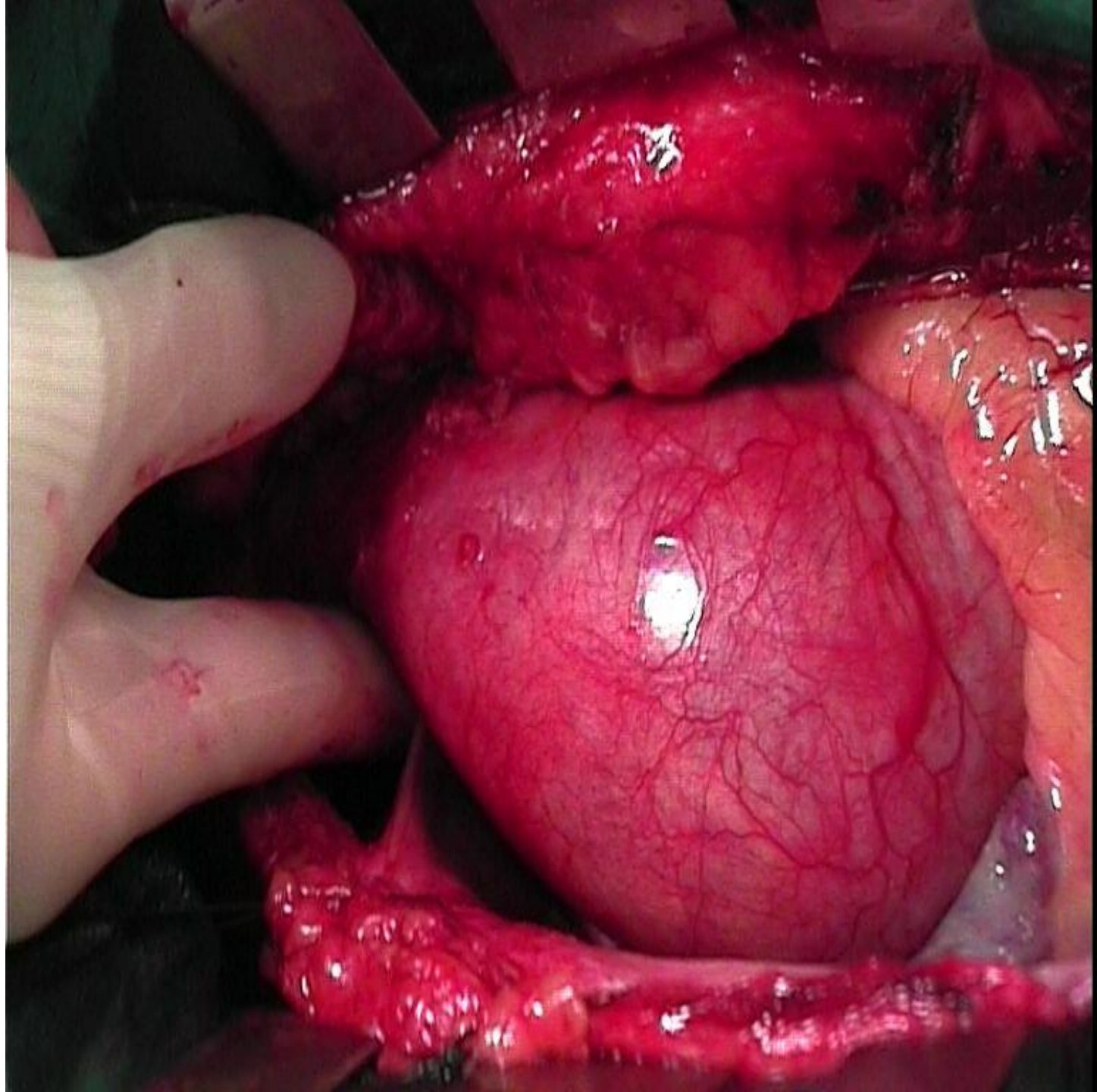
Rakt graft/halvarcus

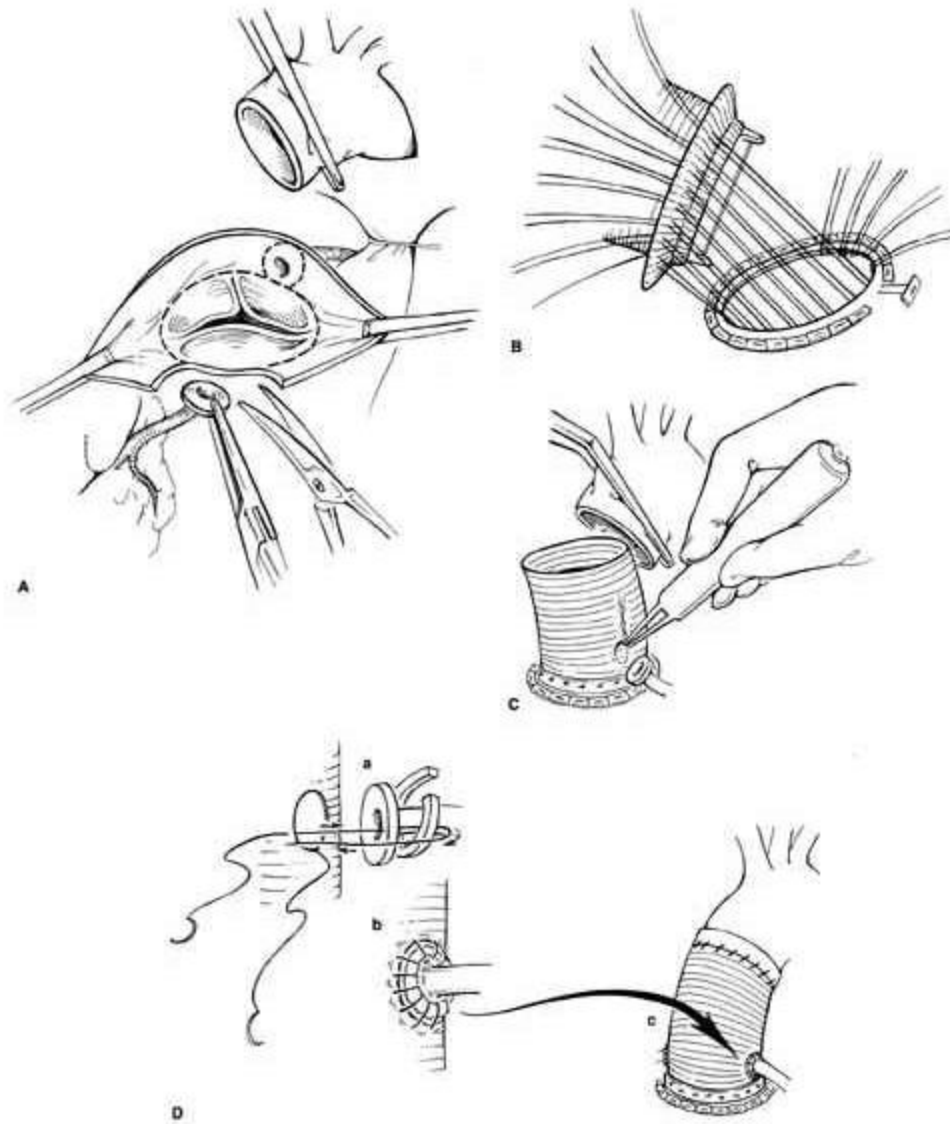
- normal klaff
- normal rot
- ej normaliserad
innan truncus
- Open distal
- Hypotermi (20
grader) med ACP

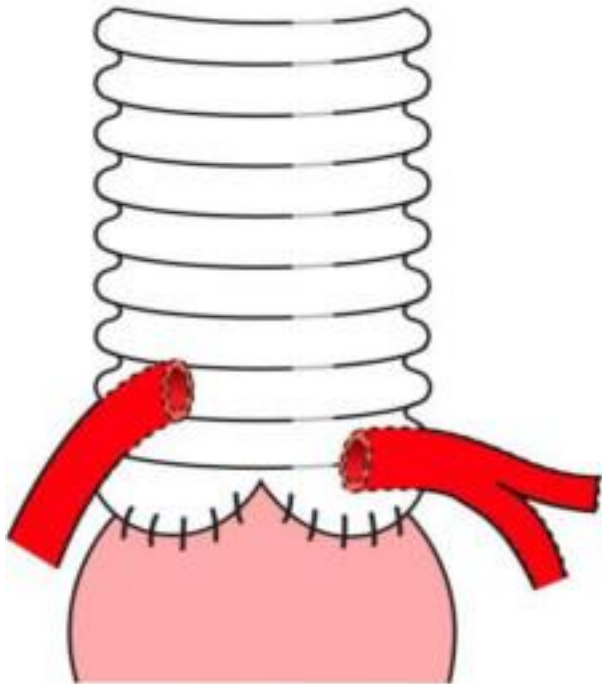


Sinus valsalva aneurysm

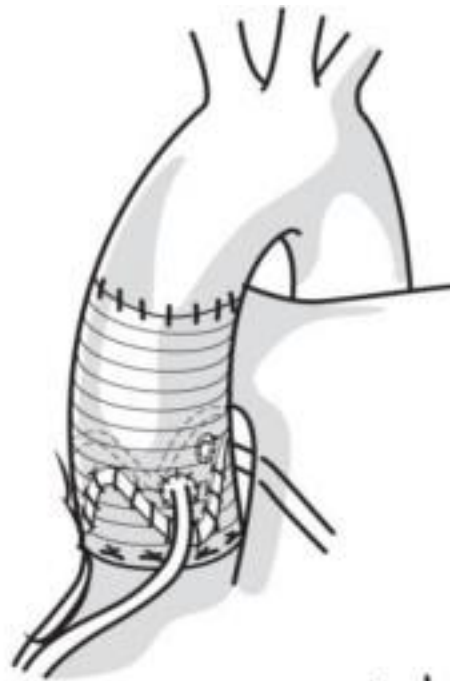




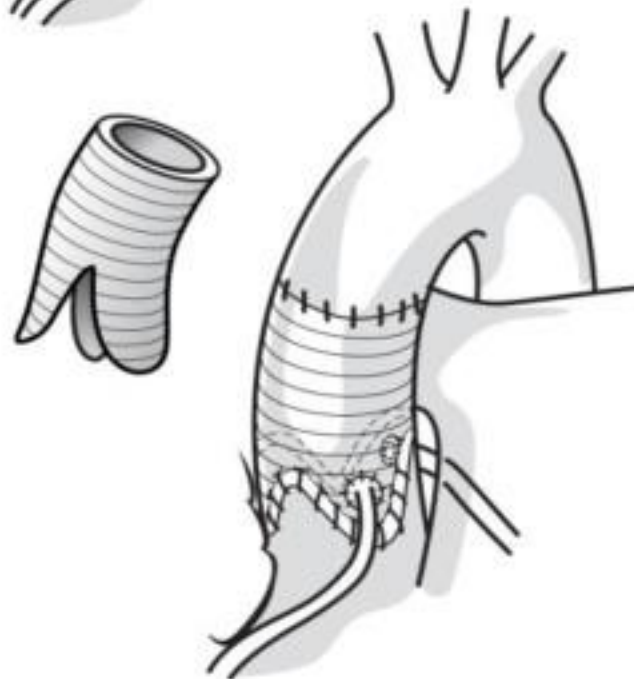




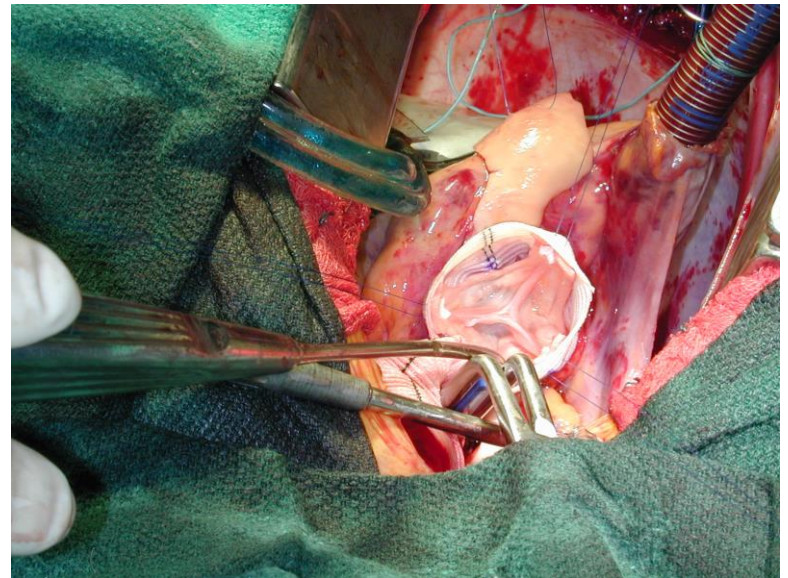
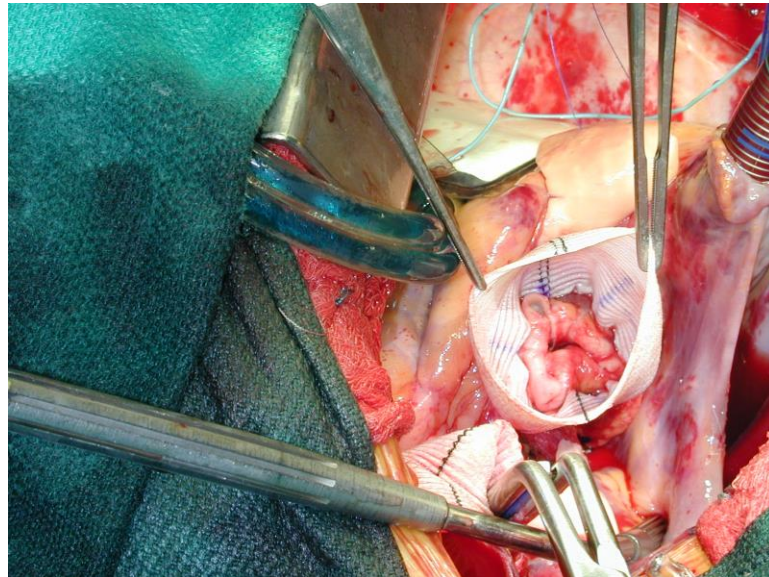
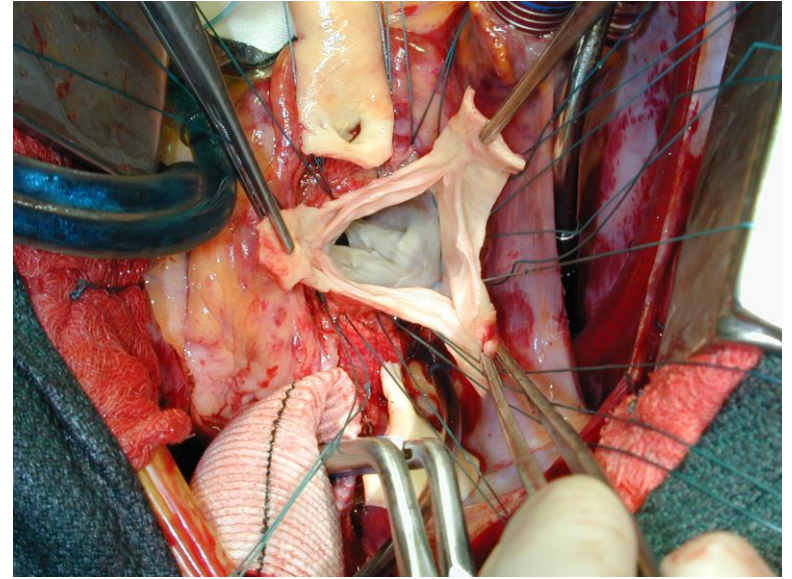
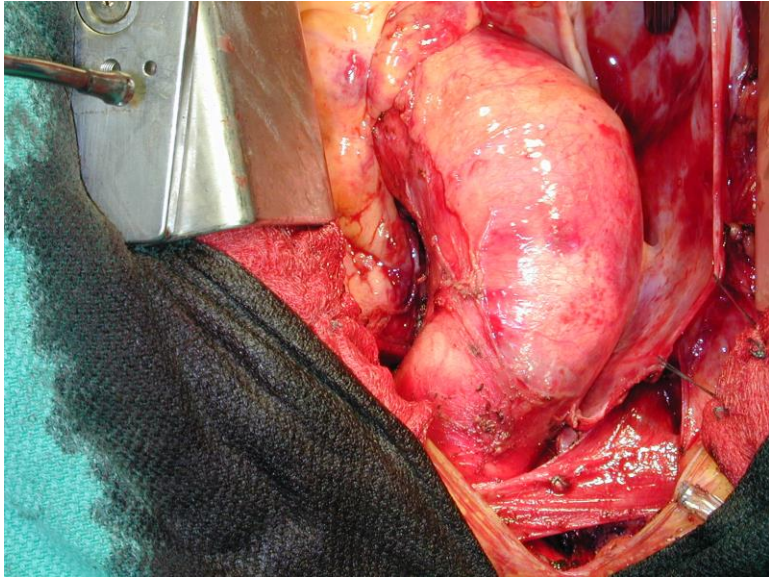
Valve sparing

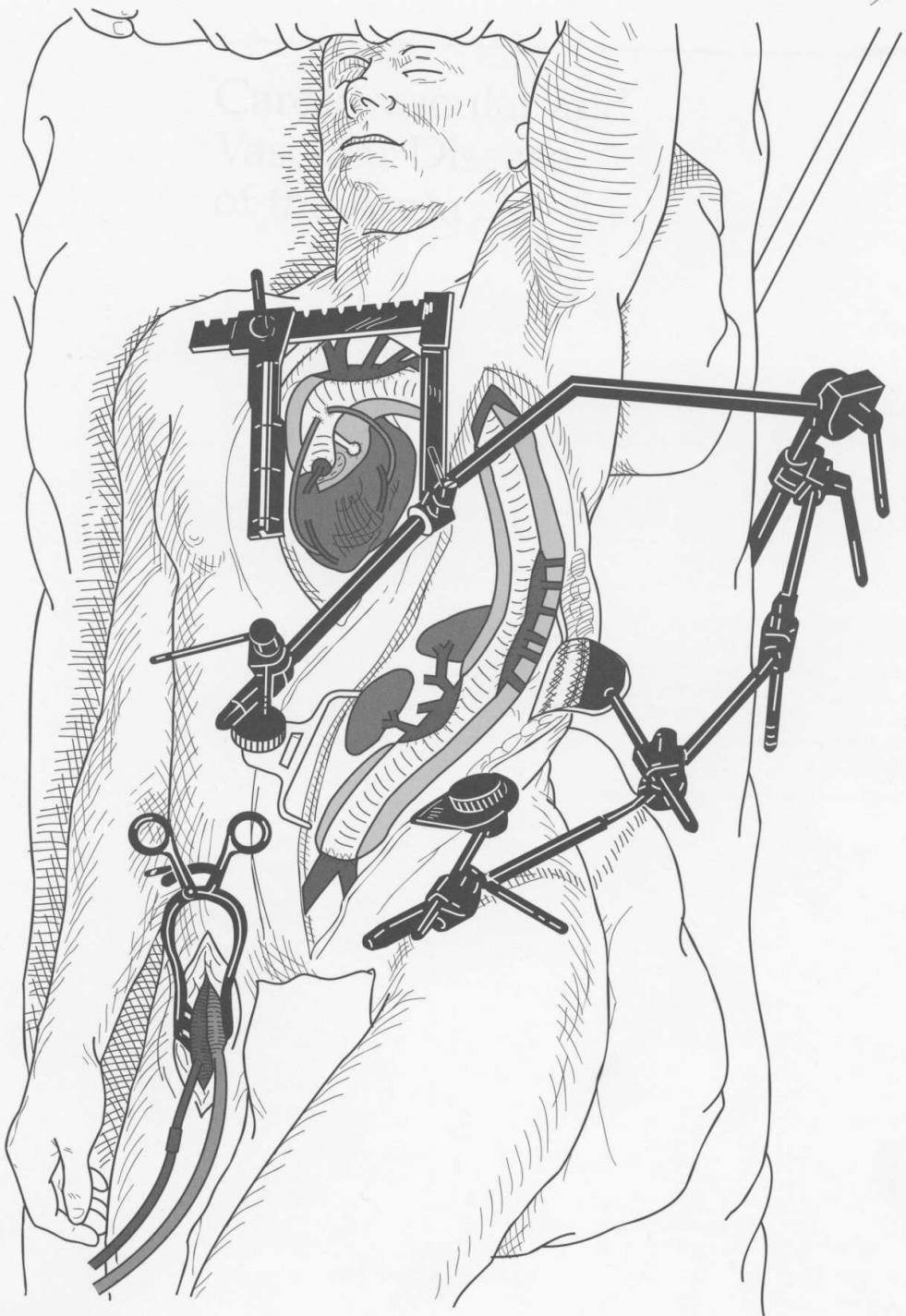


Reimplantation
David T.

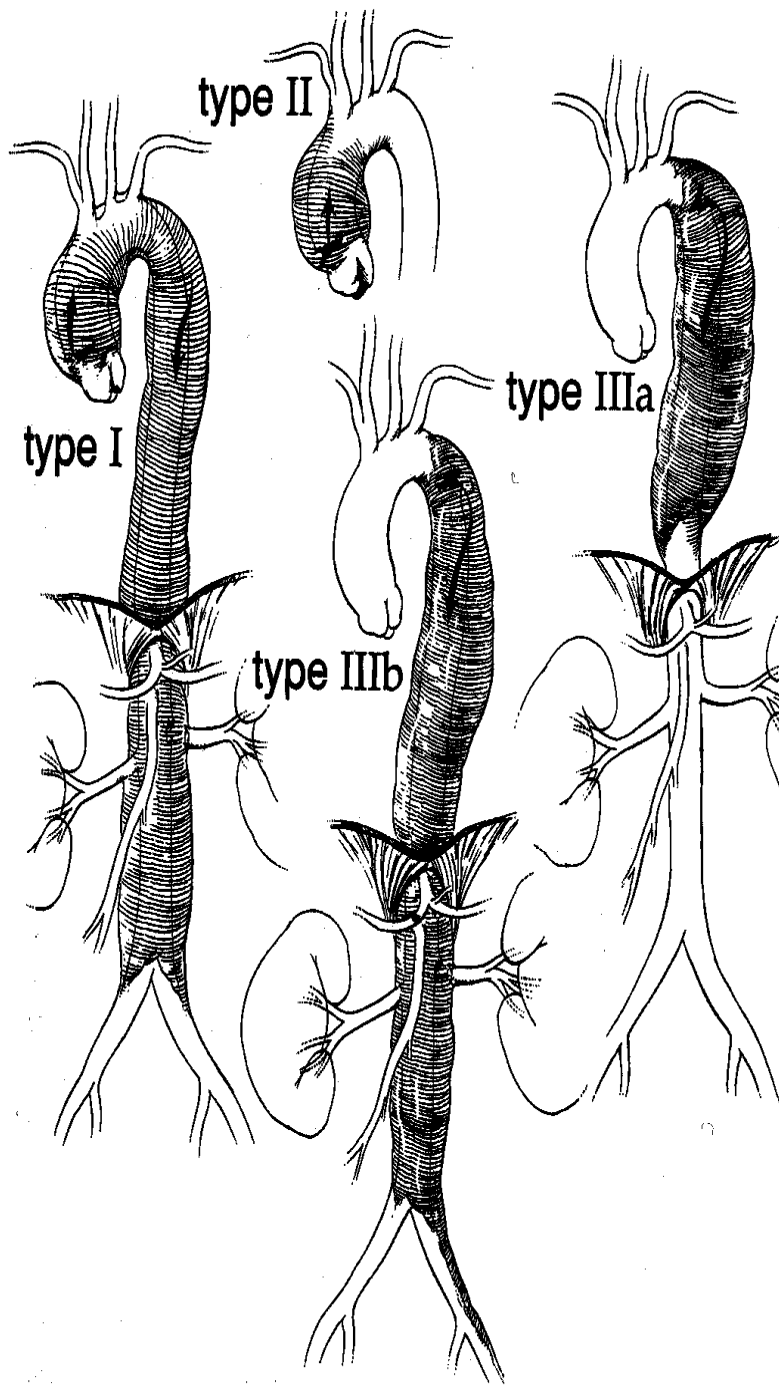


Remodelling
Yacoub M.





Thorakoabdominala
aneurysm



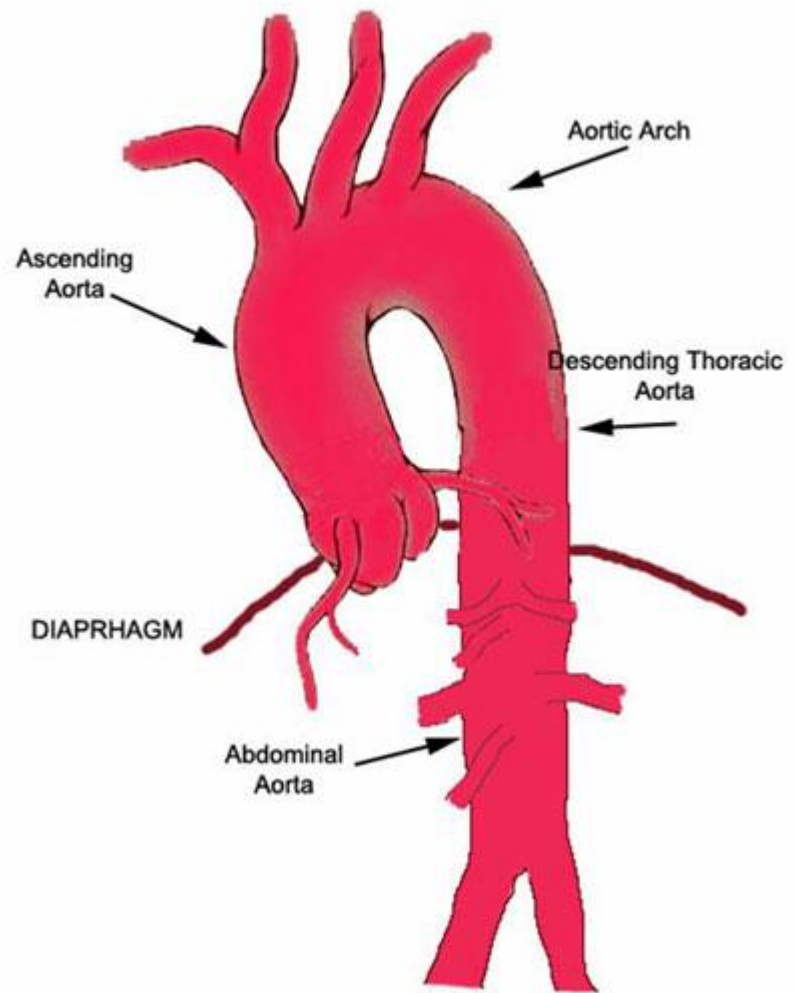
Aorta-aneurysm i thorax

Risk för

- Dissektion
 - Aortaklaff insuff
 - Pericardtamponad
 - Ruptur
 - Infarkt
 - Malperfusion

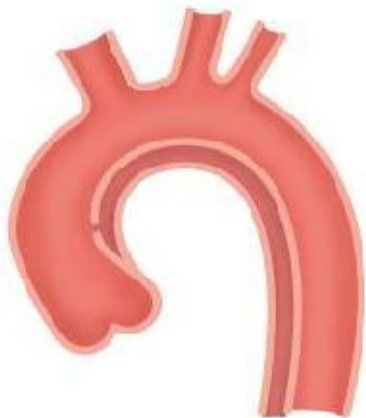
“Guilt by Association”

- Cerebrala aneurysm
- Bukaorta aneurysm
- Bicuspid aortaklaff
- Temporalis arterit
- Pos. “Thumb-palm sign”
- Njurcystor
- Familje anamnes
- Bovin aorta

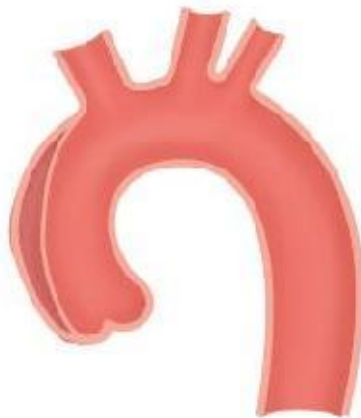


Classification of acute aortic syndromes (AAS)

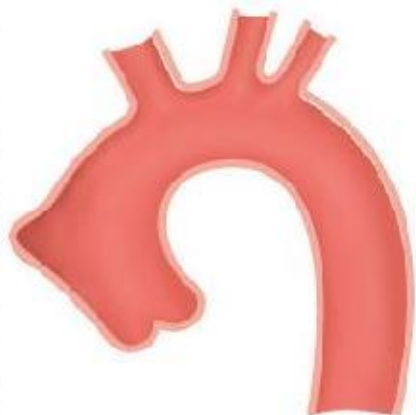
Class 1



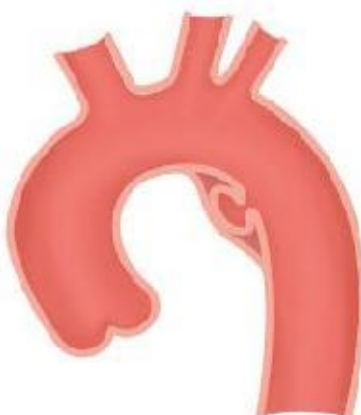
Class 2



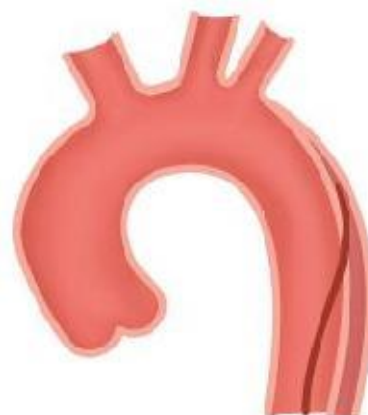
Class 3



Class 4



Class 5



Class 1: Classic AD with true and FL with or without communication between the two lumina.

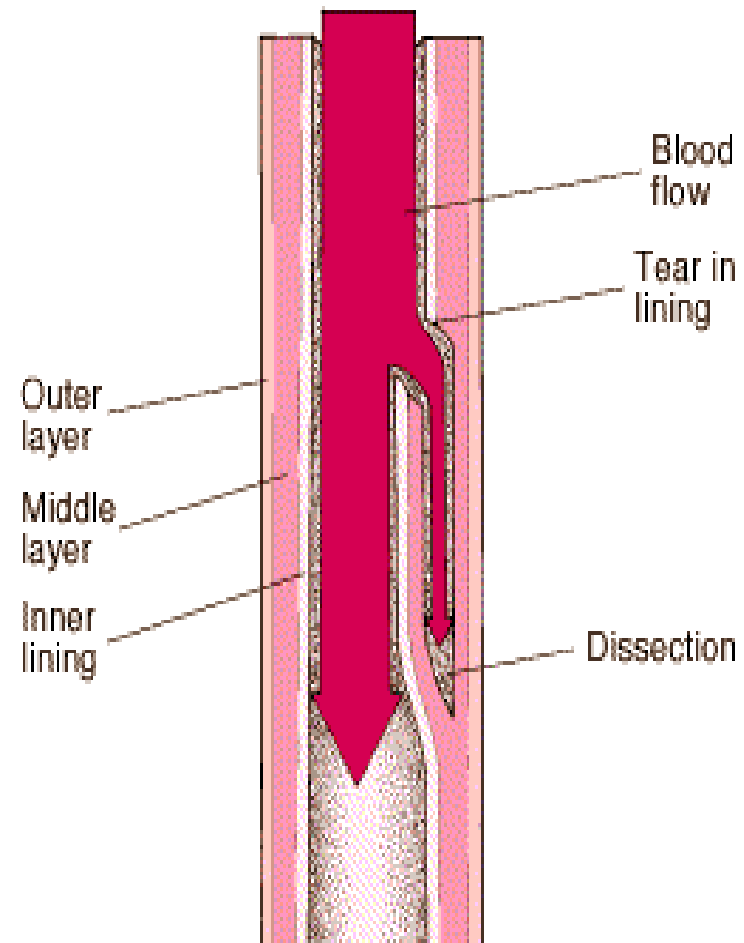
Class 2: Intramural haematoma.

Class 3: Subtle or discrete aortic dissection with bulging of the aortic wall.

Class 4: Penetrating aortic ulcer following plaque rupture.

Class 5: Iatrogenic or traumatic AD, illustrated by a catheter-induced separation of the intima.

Aortadissektion



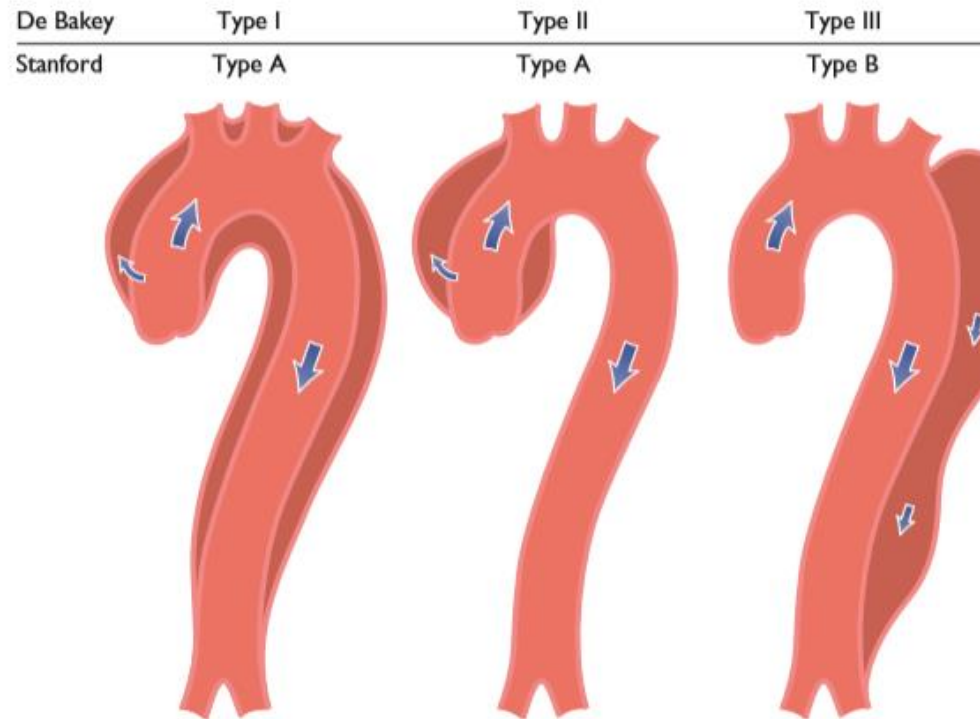


Figure 4 Classification of aortic dissection localization. Schematic drawing of aortic dissection class 1, subdivided into DeBakey Types I, II, and III.¹ Also depicted are Stanford classes A and B. Type III is differentiated in subtypes III A to III C. (sub-type depends on the thoracic or abdominal involvement according to Reul et al.¹⁴⁰)

Handläggning akut aortasjukdom

ANAMNES!

D-dimer, CRP

D-dimer främst vid låg misstanke för att utesluta dissektion

Oftast men inte alltid positivt - sensitivitet 94%

CT aorta – sensitivitet > 95%

TTE – sensitivitet ca 80% för ascendensdissektion (40% för hematoma)

TEE – sensitivitet ca 89-99%

Vid diagnos dissektion: smärtlindring, blodtryckskontroll och ställningstagande till akut kirurgi



Typ A dissektion – thoraxkirurg

Typ B dissektion – kärlkirurg

Aortic Dissections

Type A

Type B

Open Heart Surgery

Complicated

Uncomplicated

TEVAR

Medical Therapy

Sänka blodtrycket
Smärtlindring

Kontroll-CT efter 1v eller vid nya smärtor/komplikationsmisstanke
2v vårdtid om okomplicerat

1. Trandate
2. Nitroglycerin

Ge helst inte nitro före betablockad, risk
reflextachykardi och ökad belastning på
aortaväggen

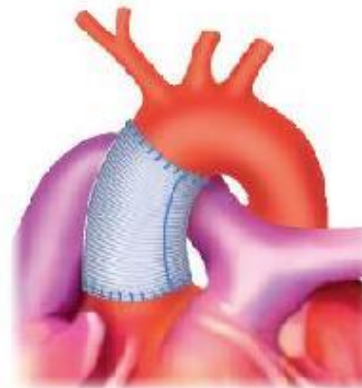
Systoliskt målblodtryck <120 mmHg
Puls < 60/minut

ACEI/A-II block, Kalciumhämmare, Diuretika,
alfa-1-blockad

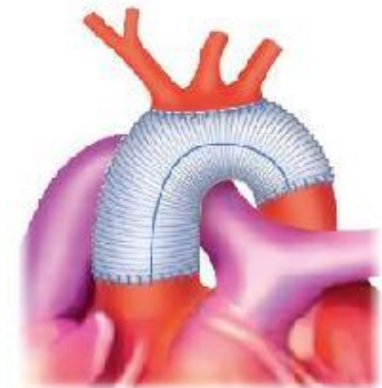
5-10 mg morfin i.v. vid behov

Ascending aortic & aortic arch surgery

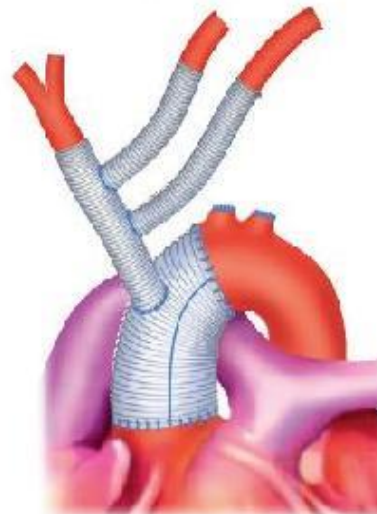
- (A) Ascending aortic replacement from sinotubular junction to cranial ascending aorta.
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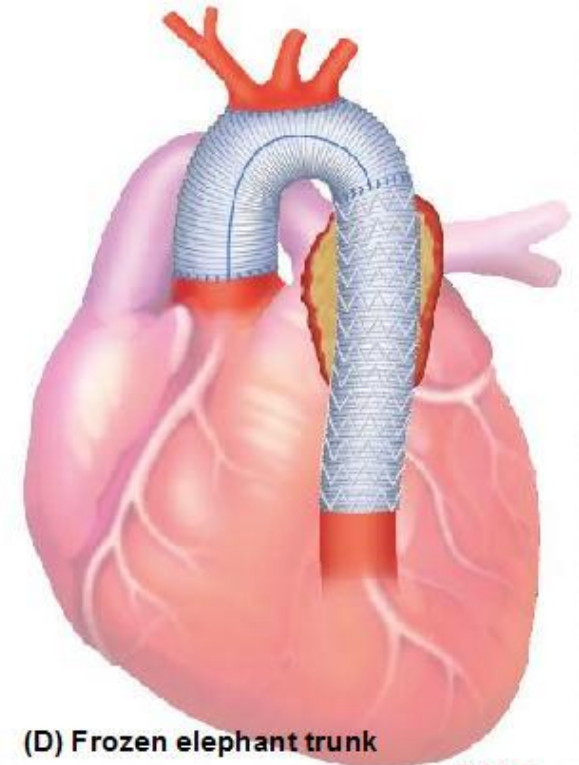
A - Supracommissural ascending aortic replacement



C - Total arch replacement



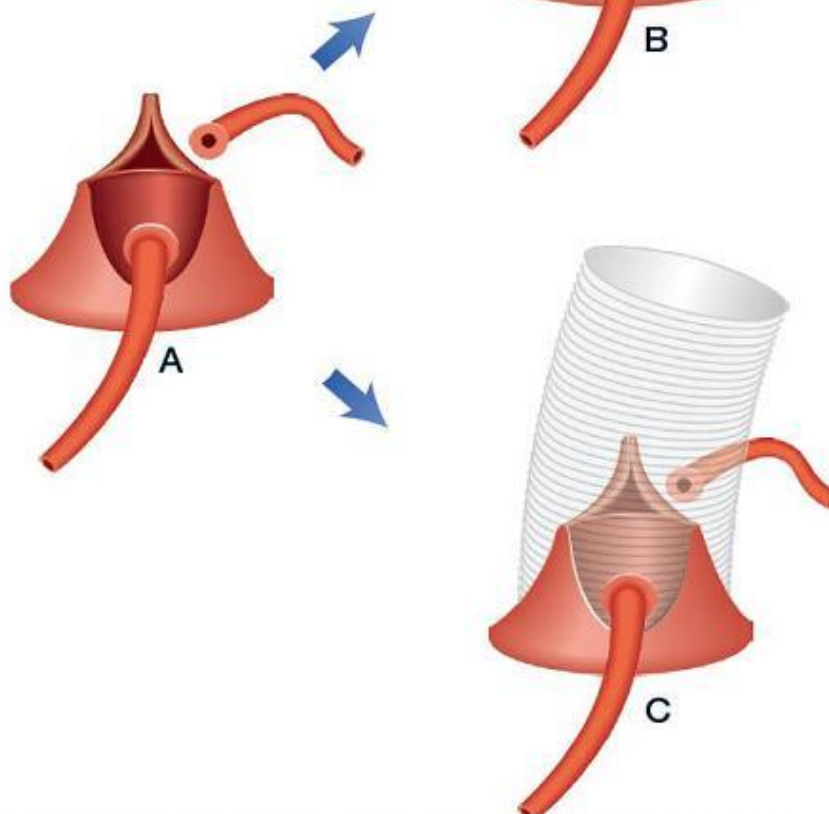
B - Hemiarch replacement with rebranching of supra-aortic vessels (trifurcated graft)



(D) Frozen elephant trunk

Aortic root surgery in aortic dissection

- (A) Concept of valve-sparing aortic root repair, excision of diseased aorta, and isolation of coronary ostia.
- (B) Reimplantation technique supporting the aortic annulus by the Dacron prosthesis – David
- (C) Remodelling technique without annular support – Yacoub



TYP-A DISSEKTION

6 per 100 000 och år (20-30/år)

Vanligare hos män

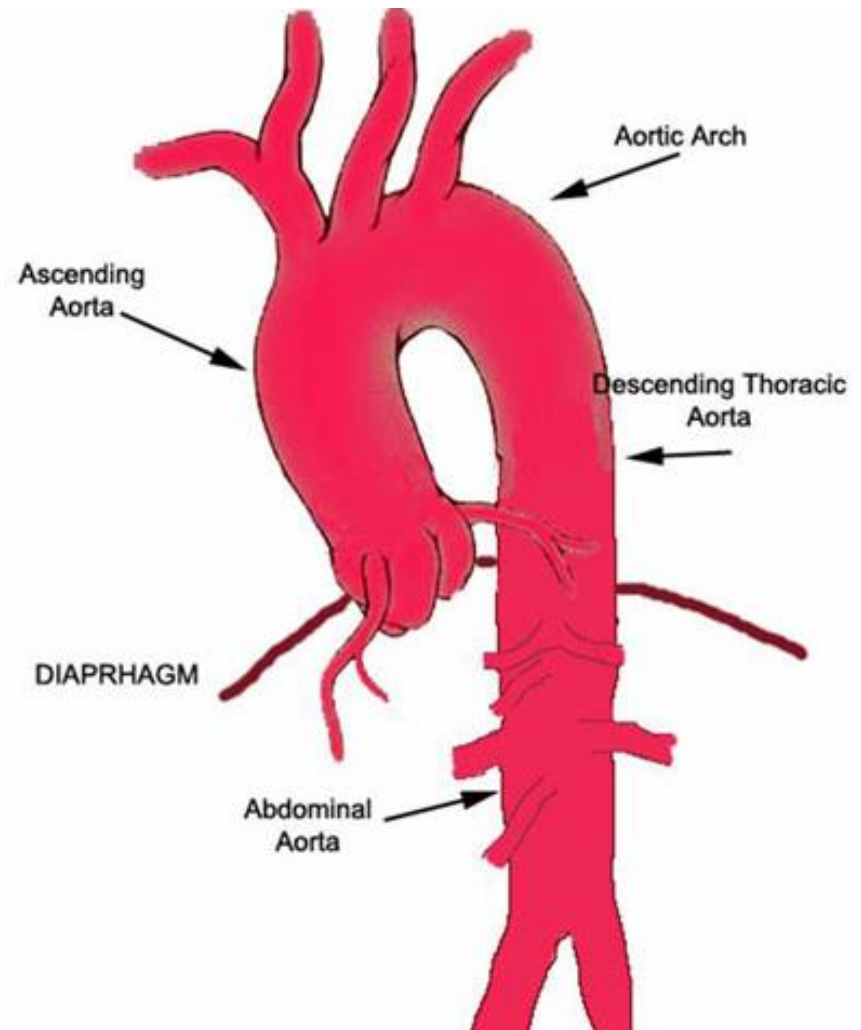
Obehandlad eller dåligt reglerad hypertoni

SMÄRTA

50% döda inom 48 timmar

1-3% döda per timme första dygnet

AKUT KIRURGI – reducerar 30 dagars mortalitet från 90% till 30%

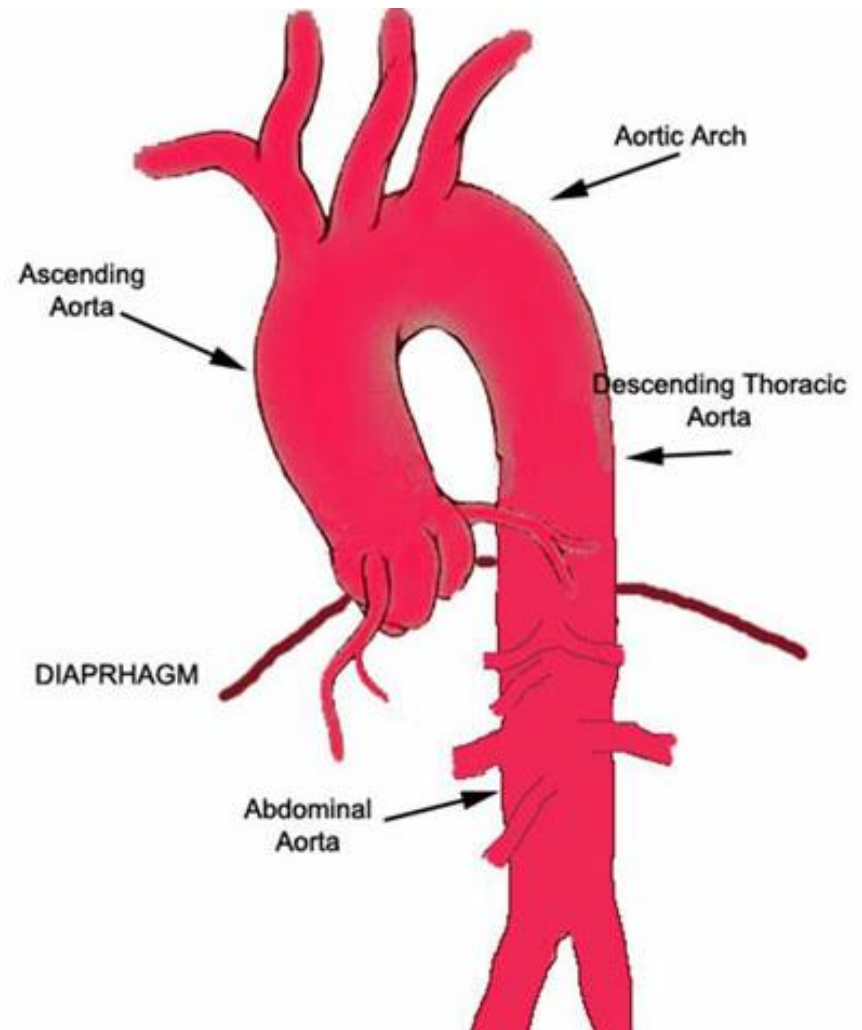


Bakgrund/litteratur

- Historiskt, små serier/single center
- Focus på "short-term complications" och 30-dagars eller sjukhus mortalitet.
- Långtidsuppföljningar mer ovanligt
- Reoperationsfrekvens 8,7 % till 13,5 %

TYP-A DISSEKTION

- Operationsmetoder/omfattning
- Perfusionsstrategier
- Temperaturer
- Strategier vid malperfusion
- Farmaka för cerebralprotektion



3 stora register

- The German Registry for Acute Aortic Dissection Type A (GERAADA)
- the International Registry of Acute Aortic Dissection (IRAD)
- the Nordic Consortium for Acute type A Aortic Dissection (NORCAAD)

3 stora register

- GERAADA, 50 center i Tyskland, Österrike och Schweiz bildad 2006
- IRAD, >50 aktiva center i Europa, Nord-Sydamerika samt Asien bildad 1996
- NORCAAD, Danmark, Finland, Island och Sverige bildad 2005

3 stora register

- Utvärdera olika kirurgiska tekniker/endovaskulära (IRAD)
- Utvärdera komplikationer och utfall
- Etiologi
- Symtomatologi
- Diagnostik
- Kliniska fynd
- Genetik

Utfall/GERAADA

- 2 137 patienter op. 2006-2010
- 30 dagars mortalitet 16,9 %
- För 70-åringar 15,8 %
- För 80-åringar 34,9 %

Utfall/GERAADA

- Ny neurologi 9,5 %
- Malperfusion, dissektion av halskärl, lång op.tid
- HCA och ACP likvärdiga resultat < 30 min

Conclusions—

This study reflects current surgical practice for acute aortic dissection type A in Central Europe. For arrest times less than 30 minutes, hypothermic circulatory arrest and ACP lead to similar results. For longer arrest periods, ACP with sufficient pressure is advisable. Outcomes with unilateral and bilateral ACP were equivalent.

Utfall/GERAADA

- Barbiturater har ingen effekt på vare sig neurologi eller mortalitet
- Steroider kan ha effekt på bättre neurologiskt utfall och Mannitol associerad med lägre mortalitet (svaga sb. Mer forskning)

Utfall/IRAD

- Sedan 1996 >7 300 fall, A och B dissektioner

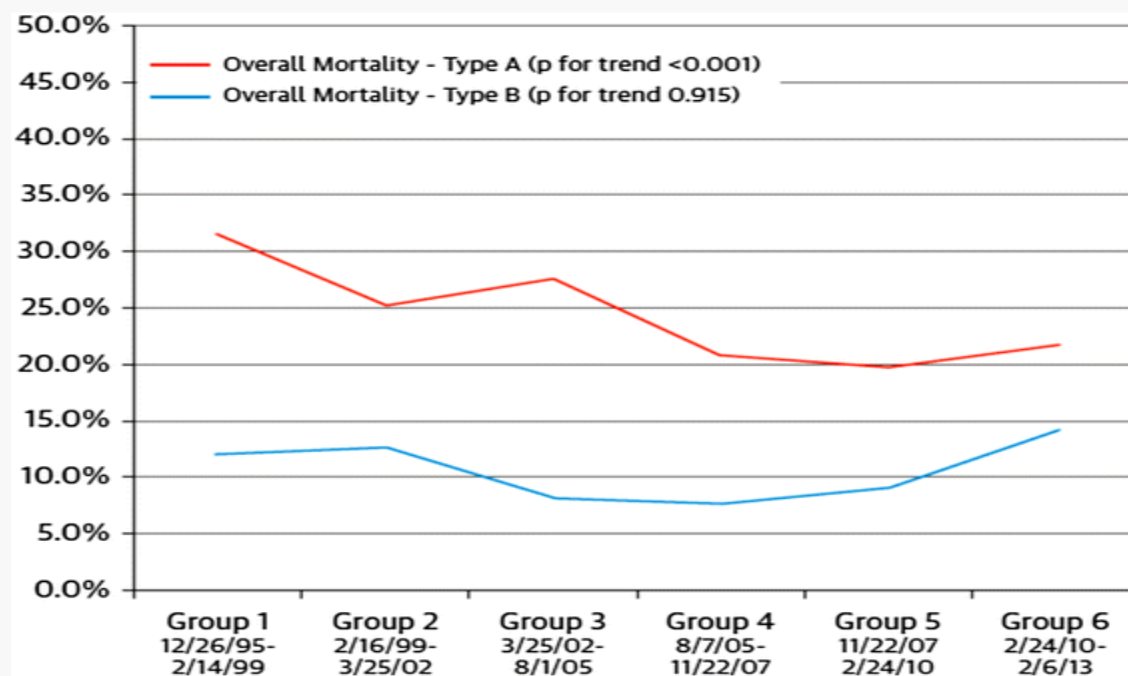
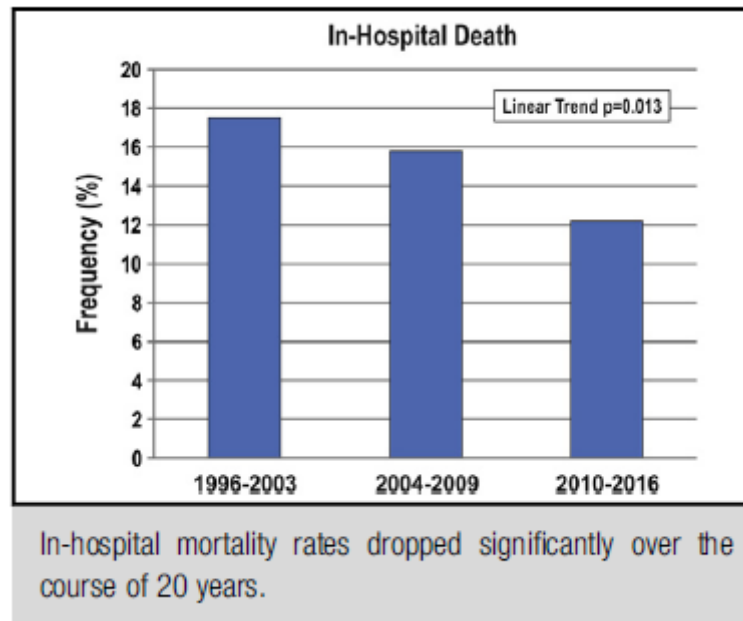


Fig. 2

Mortality over time by dissection type. Trends in mortality among patients with type A and type B acute aortic dissection over 17 years of IRAD.

Reproduced with permission of Pape et al. [[3](#)]

Utfall/IRAD typ A



Utfall/IRAD typ A

Central Message

Operative strategy in the management of type A [aortic dissection](#) changed and in-hospital mortality dropped significantly over a 20-year timespan.

Perspective Statement

Over 20 years an increase was seen in the use of valve-sparing procedures, bioprosthetic [aortic valve](#) substitutes, antegrade cerebral perfusion strategies, and hypothermic circulatory arrest. With ever-evolving techniques, outcomes of [surgical management](#) of type A aortic dissection will continue to improve.

Utfall/NORCAAD

- 1 159 patienter op. 2005-2014
- 30 dagars mortalitet 17,6 %
- 1 års överlevnad 95 % (95%CI 93-96)
- relativ överlevnad 95 % (95%CI 94-97)
- 8 års överlevnad 76 % (95%CI 72-81)
- relativ överlevnad 85 % (95%CI 80-90)

Utfall/NORCAAD

CONCLUSION

In conclusion, long-term survival after ATAAD in the NORCAAD registry is acceptable and compares favourably to several previous reports. Relative survival, compared to a matched normal population, appears clearly better than previously found. Medium-term survival improved in the later (2010–2014) study period. Similar improvements over time have not been consistent with the findings in earlier studies. As the sole modifiable factor, open distal anastomosis was associated with decreased risk of medium-term mortality.

Utfall/NORCAAD

- DeBakey I (asc.+desc.) 73,8 %
- DeBakey II (asc.) 26,2 %
- 73,7 % supracoronara graft
- 25,2 % byte av rot/klaflbevarande
- 22 % halv-arkus
- 5,9 % hel-arkus

Utfall/NORCAAD

- Neurologi 18,6 %
- Reop.blödning 21,1 %
- DSWI 2,2 %
- Proximala reoperationer 2,3 %
- Distala reoperationer 2,7 %

Utfall/NORCAAD

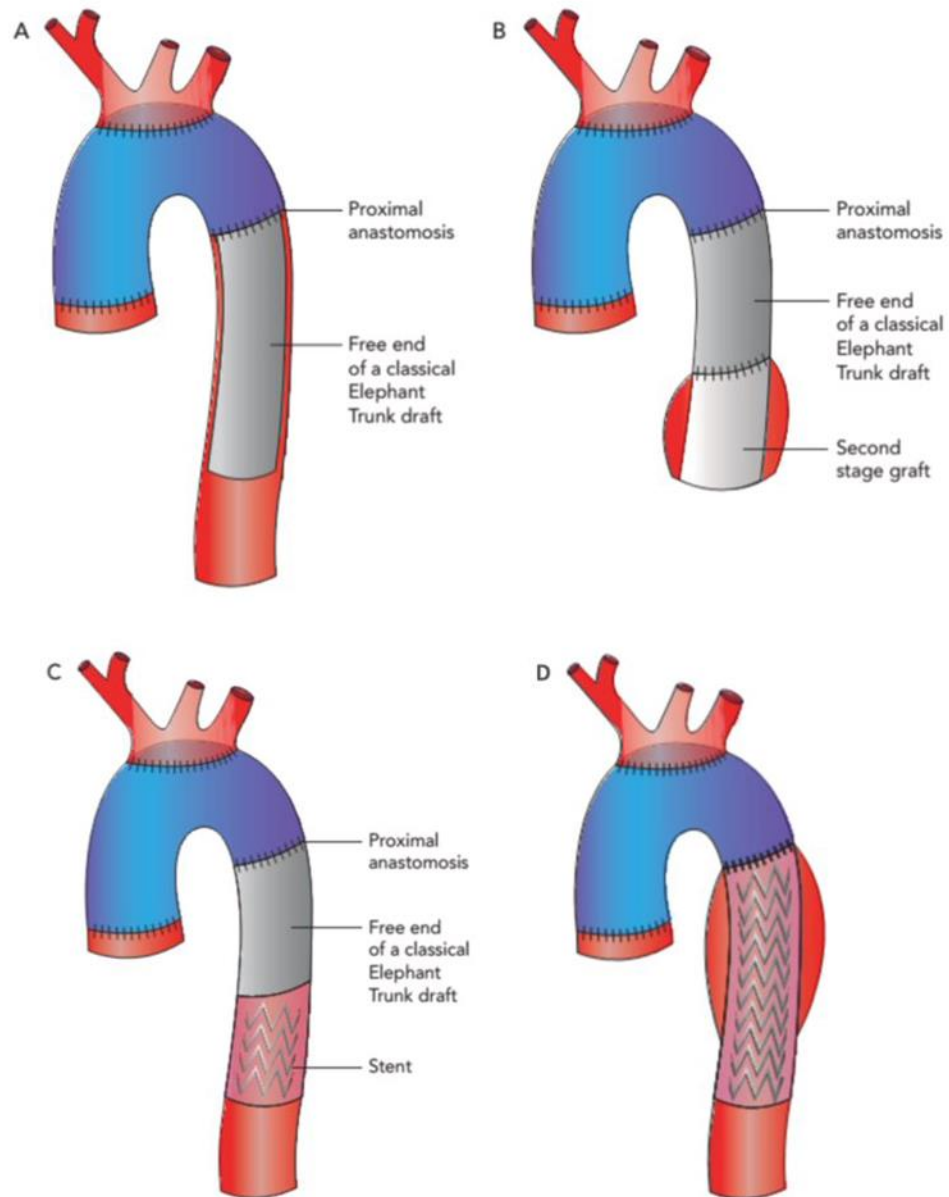
- Proximal reop. 1 år 1,1%, 5 år 2,2 %, 8 år 3,9 %
- Distal reop. 1 år 0,8 %, 5 år 3,1 %, 8 år 5,3 %

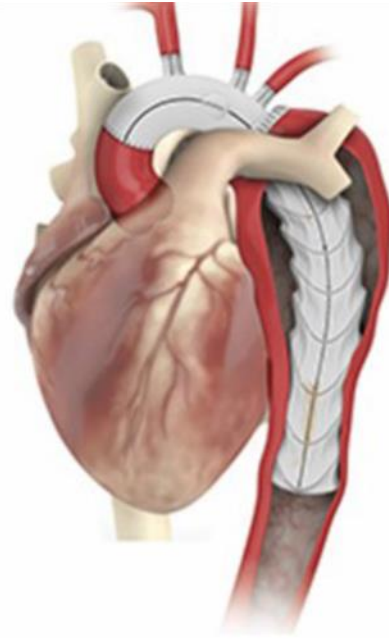
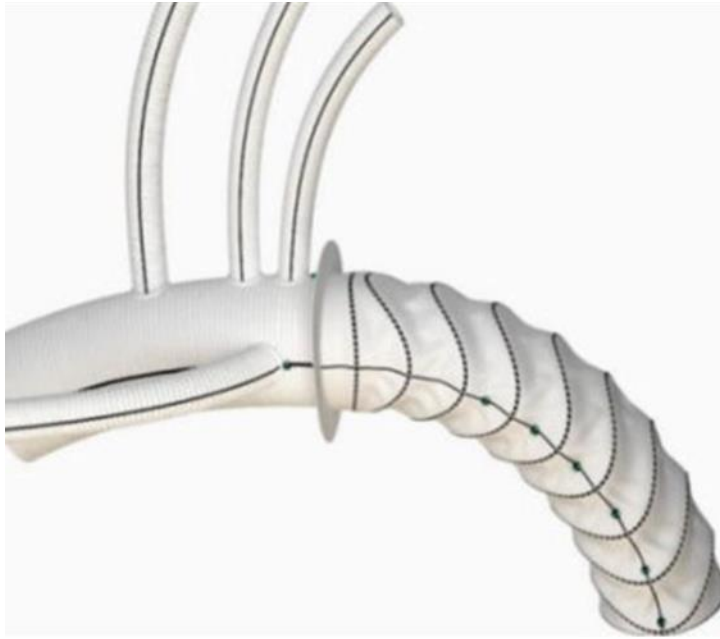
Central Message

The midterm reoperation rate after acute type A [aortic dissection](#) surgery is low.

The extent of proximal or distal repair did not significantly influence the cumulative incidence of reoperation.













Långtidsuppföljning efter aortadissektion

Risk för aneurysm, ruptur, ny dissektion, aortainsufficien

Blodtrycksbehandling

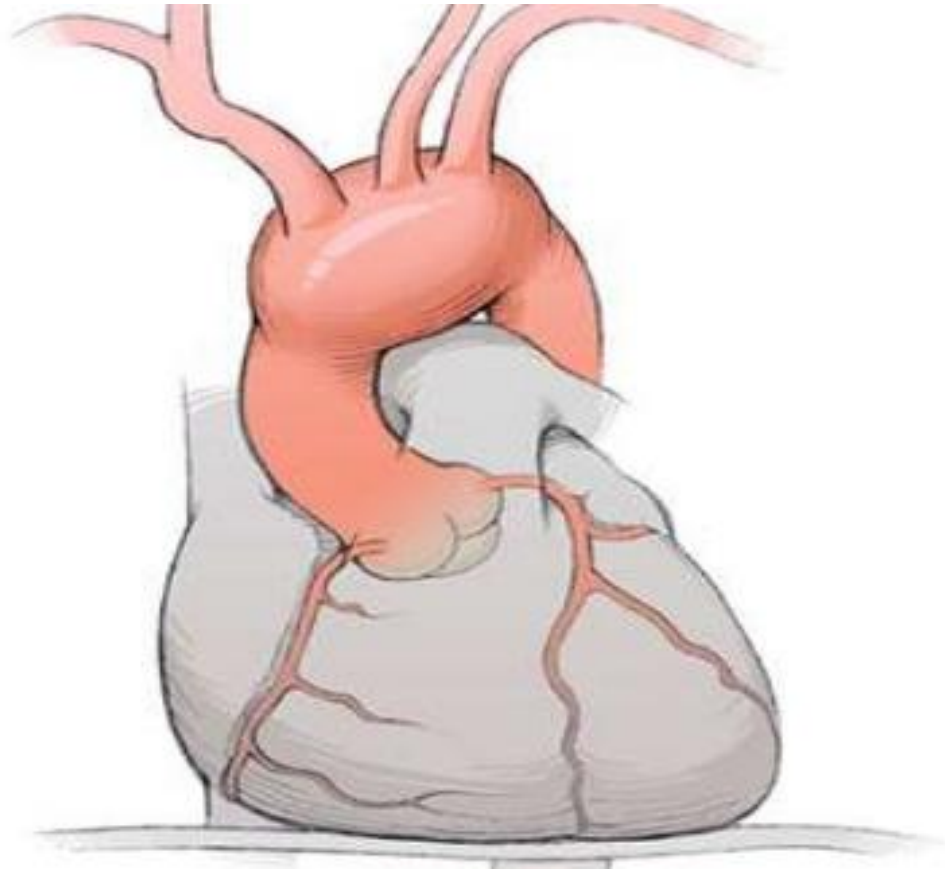
< 130mmHg

Dissektioner som engagerar descendens

- Vanligast aneurysmutveckling i prox descendens
- Falska lumendiametern i prox desc starkaste riskfaktor för aneurysmutveckling ($\geq 60\text{mm}$)
→ 22mm falskt lumen i prox descendens → Sensitivitet 100%, specificitet 76%

Song J-M et al JACC 2007;50(8):799-804.

Kontroll 1, 3, 6, 12 månader varefter årskontroller



Tack för er uppmärksamhet