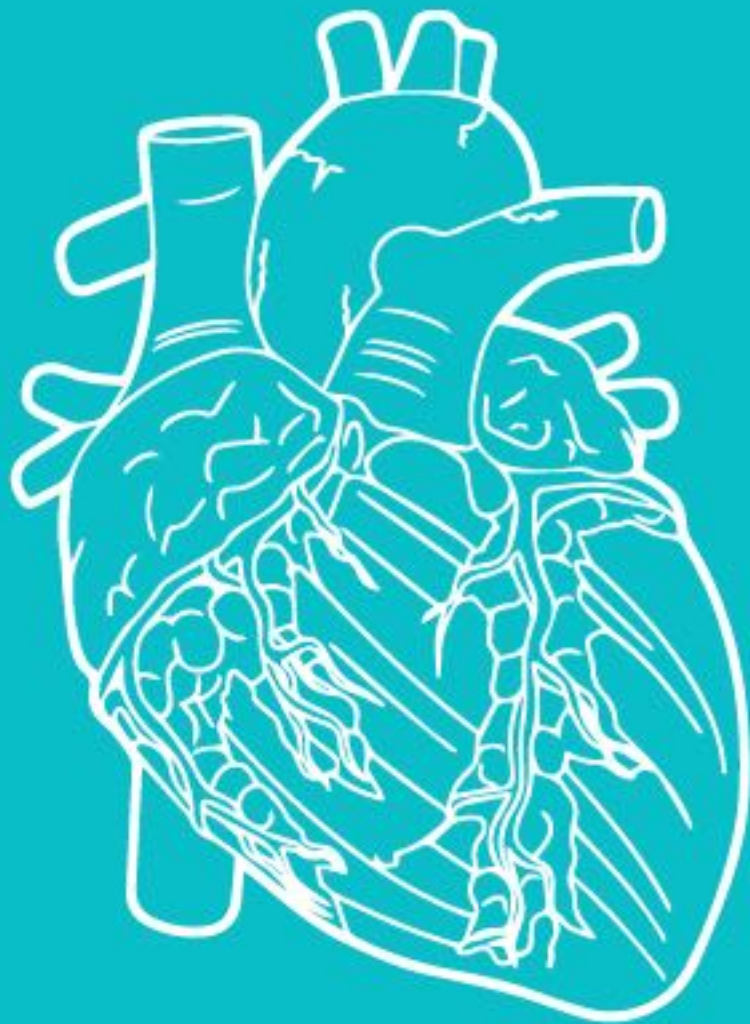




MHH

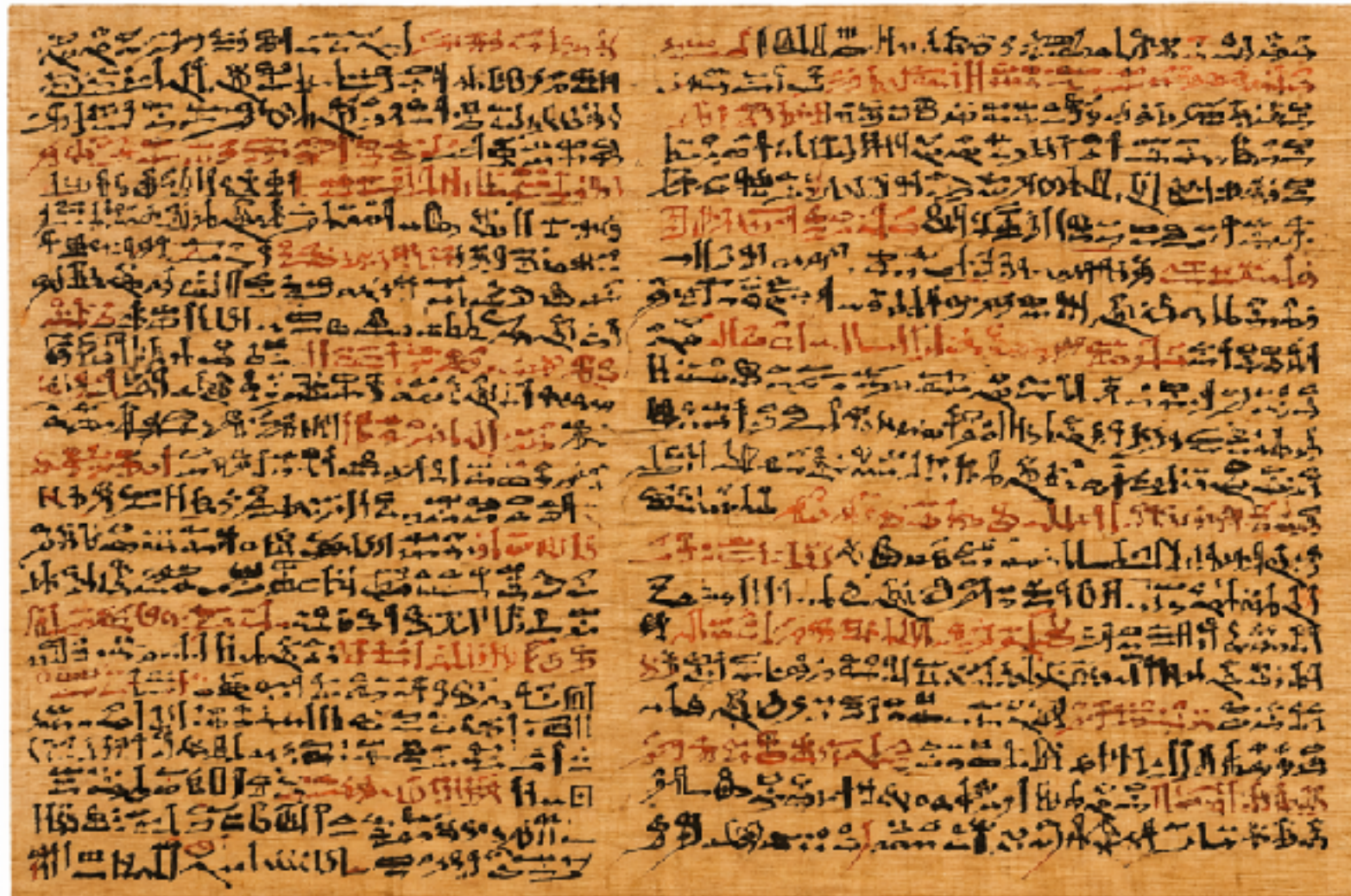
Medizinische Hochschule
Hannover

Herz-, Thorax-,
Transplantations-
und Gefäßchirurgie

Operationen an der Aorta im Wandel der Zeit

Dr. Morsi Arar

Ägypten 1550 v. Chr



Papyrus Ebers: Abhandlung über Herz und Gefäße:
„Nur Magie kann Tumoren der Arterien heilen“

128-199 n. Chr.



Galenus von Pergamon
„4 Säfte Lehre“, „Gladiator-Arzt“

1511 - 1513



Leonardo da Vinci

1514-1564



Andreas Vesalius,
Leibarzt Karl V.

1939, Princeton University



Thomas Mann
1875-1955
Rupturiertes
Iliakalaneurysma

Albert Einstein
1879-1955
Rupturiertes
Bauchaortenaneurysma



Geschichte der Aorten Chirurgie

SURGICAL CONSIDERATIONS OF INTRATHORACIC ANEURYSMS OF THE AORTA AND GREAT VESSELS*

DENTON A. COOLEY, M.D., AND MICHAEL E. DE BAKKY, M.D.

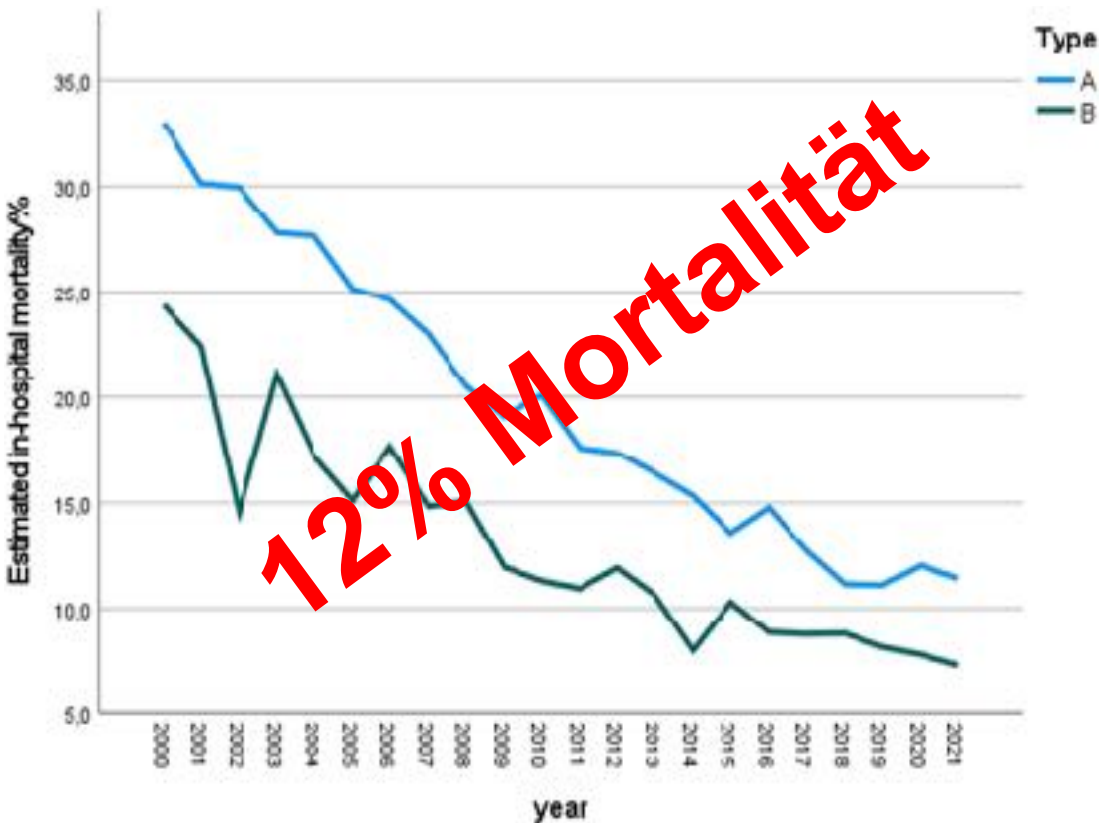
HOUSTON, TEXAS

FROM THE DEPARTMENT OF SURGERY, BAYLOR UNIVERSITY COLLEGE OF MEDICINE, AND THE SURGICAL SERVICES OF THE JEFFERSON DAVIS HOSPITAL AND THE VETERANS ADMINISTRATION HOSPITAL, HOUSTON

TABLE I.

Case No.	Color, Sex, and Age	Date Operated	Aneurysm Nature	Aneurysm Situation	Surgical Procedure	Result and Remarks
1. R.M.	C.M. 46	12/22/48	Syphilitic	Transverse arch	Proximal ligation with cellophane reinforced ligature (rubber catheter)	Apparently well for 2 months and then developed fatal hemorrhage
2. R.R.	W.M. 32	4/28/50	Spontaneous	Rt. subcl.	Proximal and distal ligation with total excision	Cured
3. J.M.	C.M. 46	7/12/51	Syphilitic	Ascending and aortic arch	Ligation of subclavian and carotid, aneurysmectomy, and aortorrhaphy	Cured
4. F.D.	W.M. 57	10/ 4/51	Syphilitic	Ascending and transverse arch	Aneurysmectomy and aortorrhaphy	Died 14 hours after operation, diffuse cerebral damage, anesthetic complication
5. L.H.	C.M. 41	6/ 8/ 51	Syphilitic	Terminal thoracic aorta	Aneurysmorrhaphy and cellophane wrapping, subsequent wiring	Died 18 days after operation, secondary hemorrhage
6. W.P.	W.M. 56	9/ 7/51	Syphilitic and arteriosclerotic	Transverse arch	Cellophane wrapping	Improved

33% → 12%



Geschichte der Aorten Chirurgie

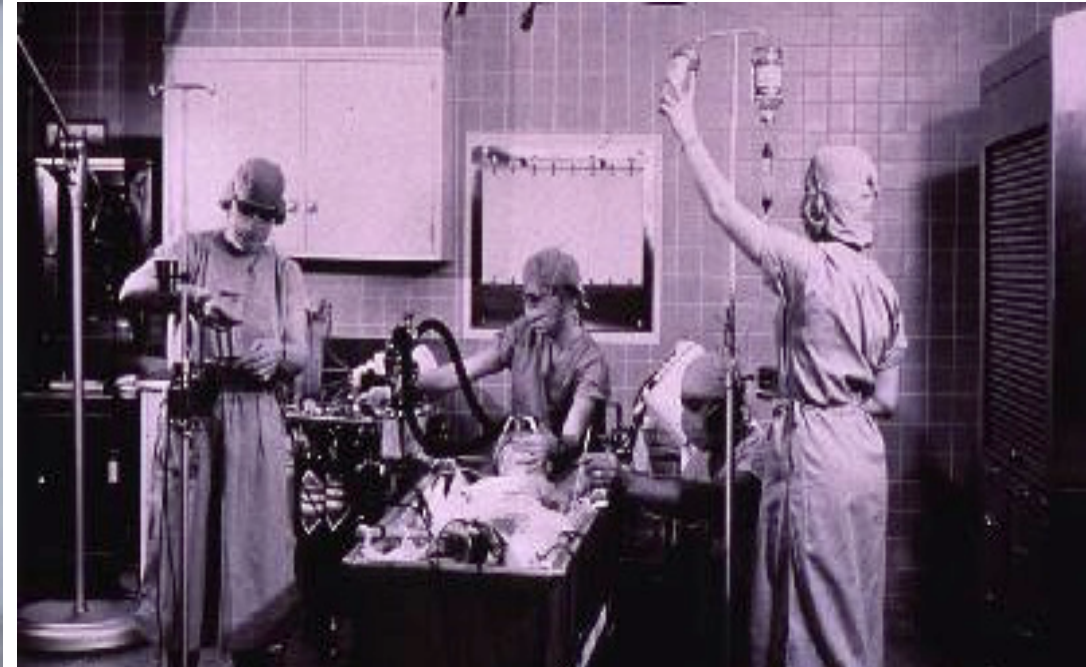
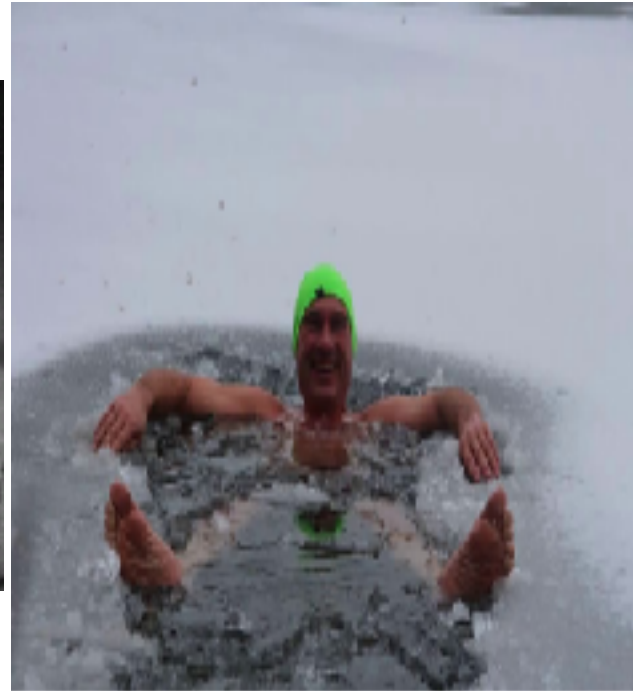
Hypothermie



F. John Lewis
Richard Varco



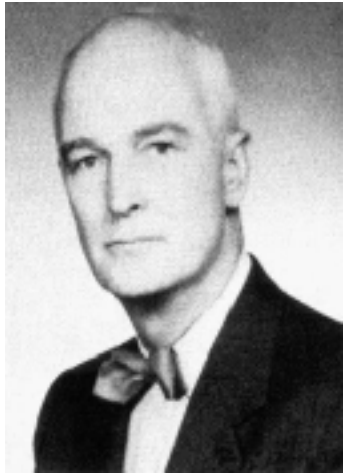
W. Bigelow



Erste Herzoperation in tiefer
Hypothermie (John Lewis 1952)

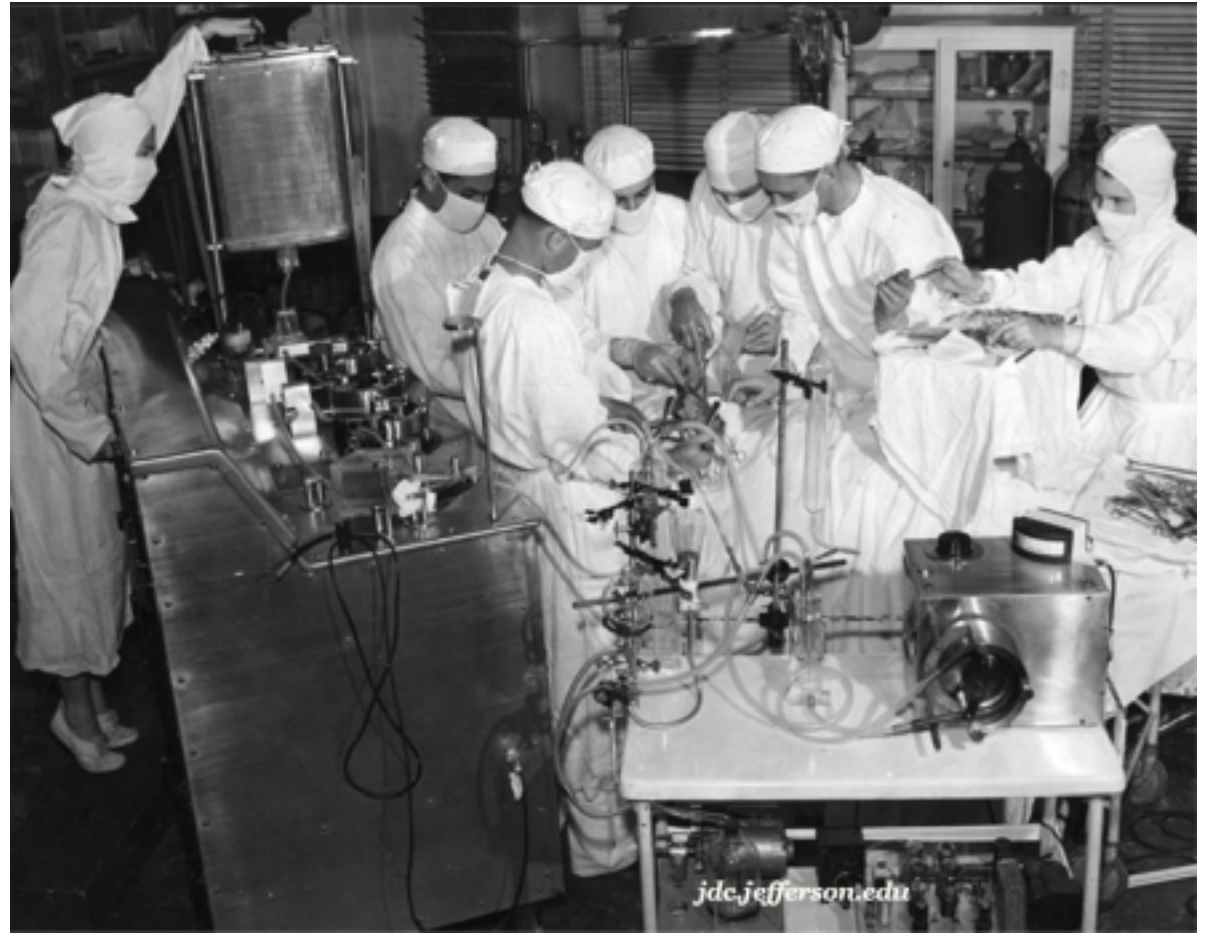
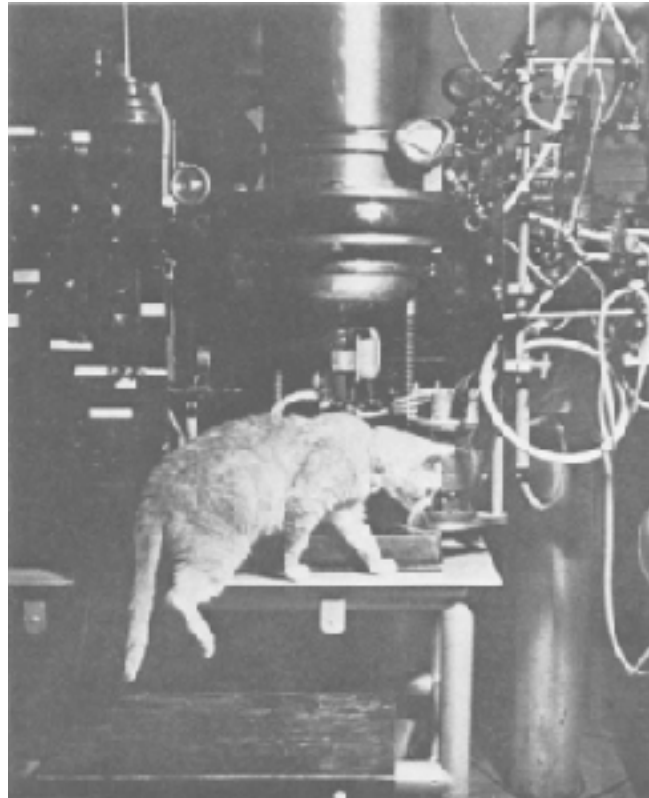
Geschichte der Aortenchirurgie

Herz-Lungen-Maschine



John Gibbon

06.05.1953



Geschichte der Aorten Chirurgie

Prothesenentwicklung

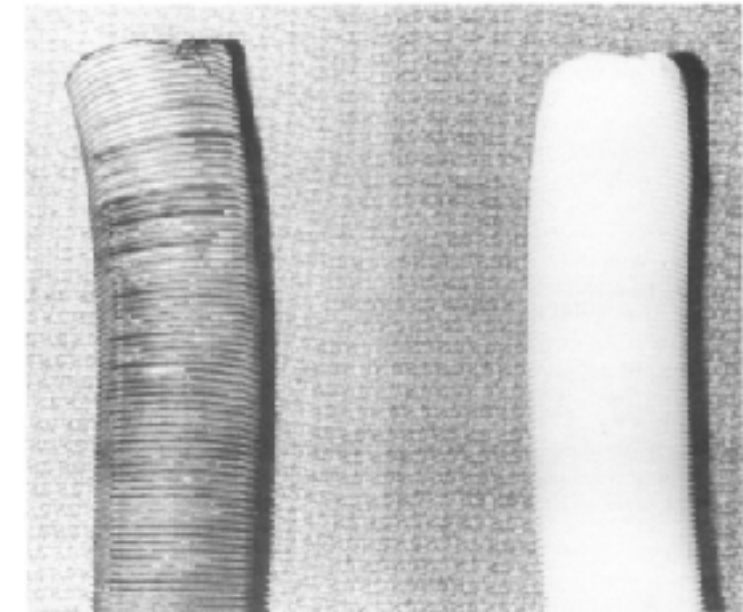


Fig. 1 Photograph of woven Dacron grafts showing (left) a graft that was preclotted with heparinized whole blood and autoclaved, and (right) a graft that was soaked in platelet-rich, erythrocyte-free plasma before autoclaving.

Geschichte der Aorten Chirurgie



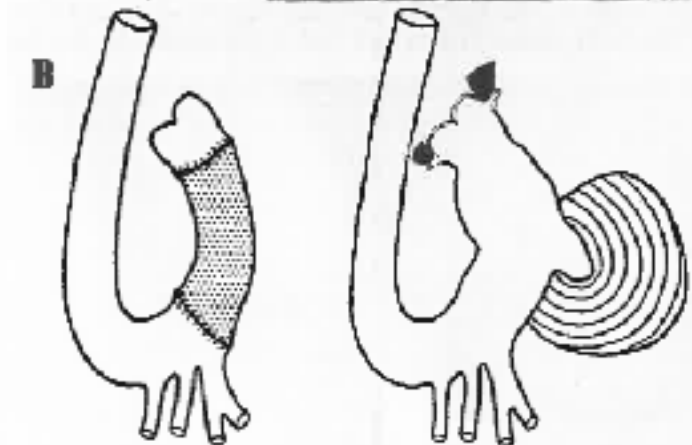
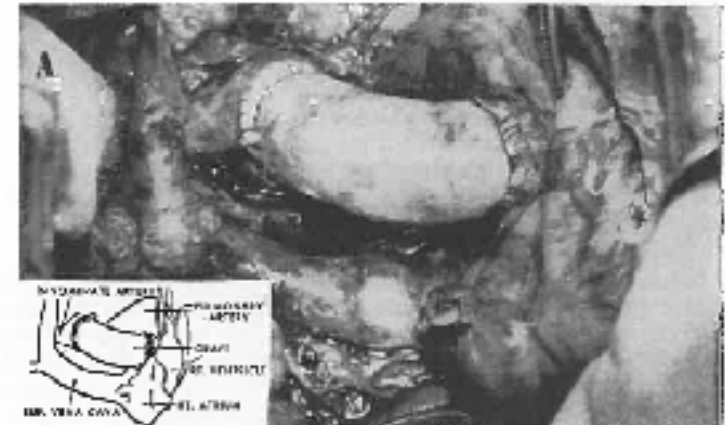
Denton A. Cooley
24.08.1955



Michael E. DeBakey
DeWall Lillehei

RESECTION OF ENTIRE ASCENDING AORTA IN FUSIFORM ANEURYSM USING CARDIAC BYPASS

Denton A. Cooley, M.D.
and
Michael E. DeBakey, M.D., Houston, Texas



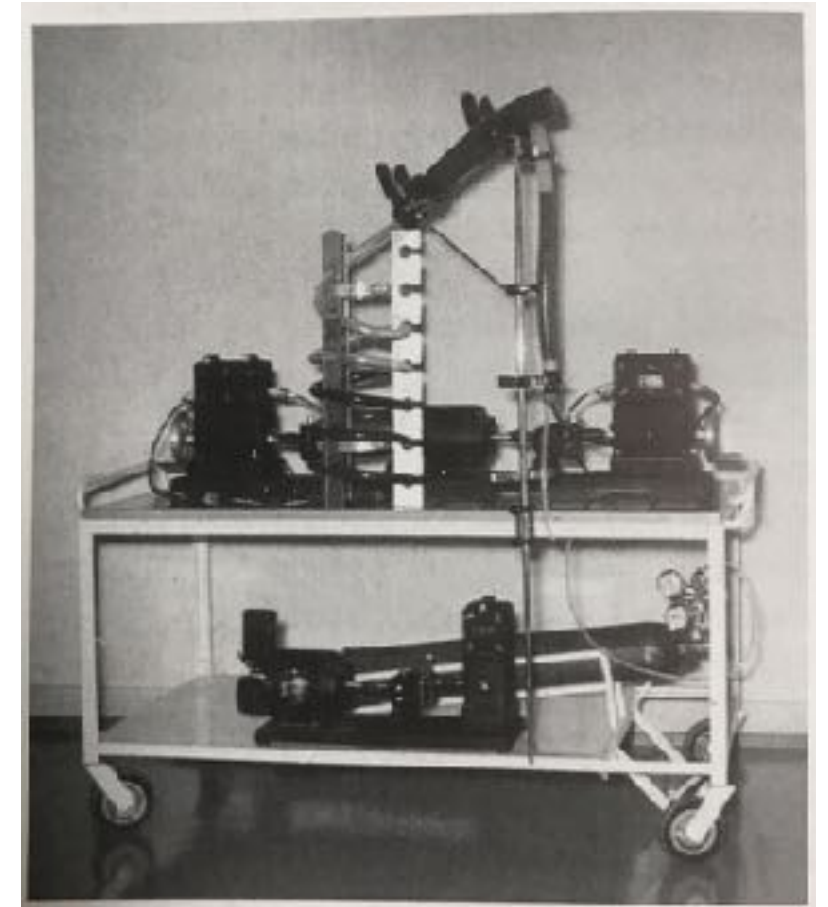
Cooley DA, DeBakey ME. J Am Med Assoc 1956.

G.Wayne Miller. King of Hearts. Crown Publishers. NY. 2000

Geschichte der Aortenchirurgie

DeWall Lillehei

Pumpenoxygenator 1956



DEUTSCHE MEDIZINISCHE WOCHENSCHRIFT

[illegible]

84. JAHRGANG

STUTTGART, 17. MARCH 1959

NUMBER 13

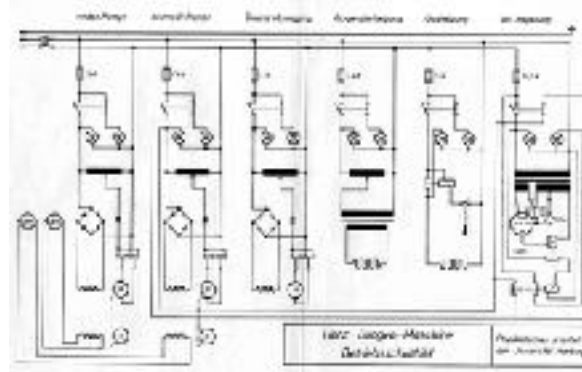
Aus der Chirurgischen Universitätsklinik, Würzburg (Direktor: Prof. Dr. K. Zeisler)

Eingriffe am Herzen unter Sicht¹

Von R. Zentgraf, G. Hebrich, H. G. Bors, H. Cichal, W. Klüner, R. Reur und M. Schmidt-Mende



Rudolf Zenker



Marburg, 1958



Hans-Georg Borst

Zenker R, Heberer G, Borst HG, Gehl H, Klinner W, Beer R *et al.* [Direct vision open heart surgery]. Deutsche medizinische Wochenschrift (1946) 1959;84:577-80 contd.

Geschichte der Aorten Chirurgie

HOW TO DO IT

Thorac. cardiovasc. Surgeon 31 (1983) 37-40

Extensive Aortic Replacement using "Elephant Trunk" Prosthesis*

H.G. Borst, G. Waltherbusch, and D. Schaps¹

Division of Thoracic and Cardiovascular Surgery, Surgical Center, and
¹Institute of Anesthesiology, Hannover Medical School, Hannover, FRG



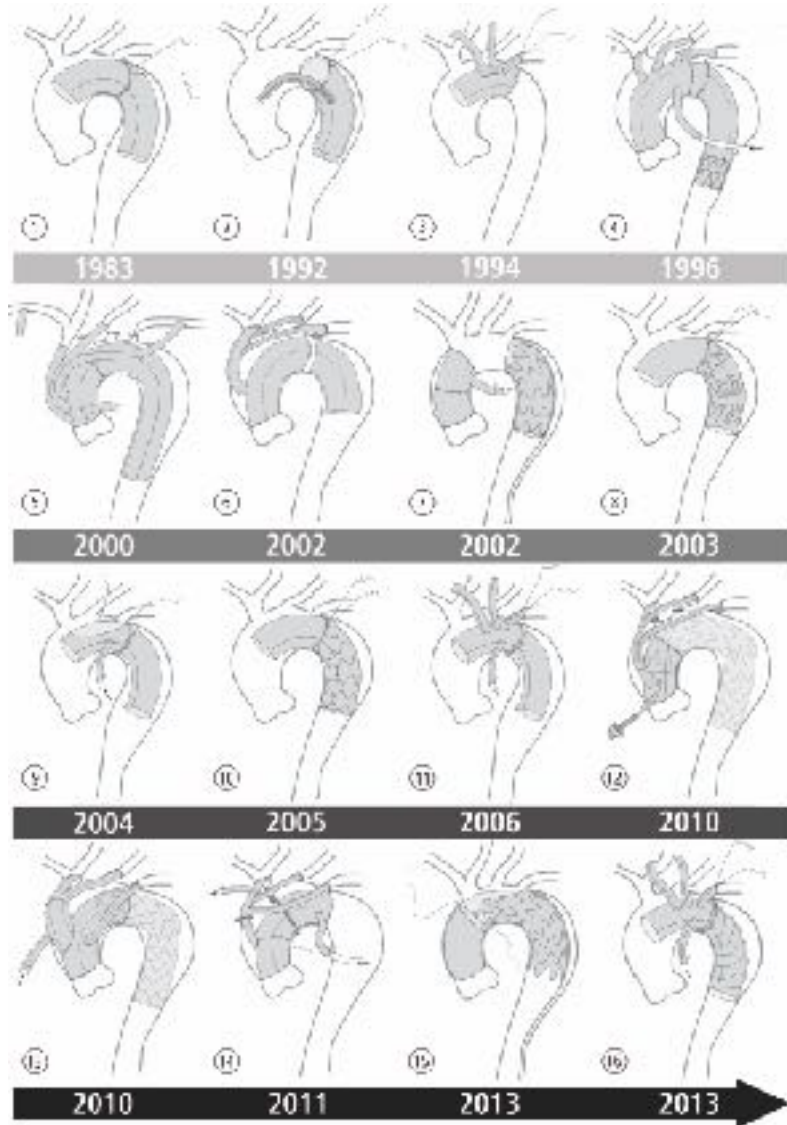
Fig. 1b

Fig. 1 a) Composite angiogram of aneurysm involving the entire supra-renal aorta
b) Diagram depicting the appearance of the reconstruction after ascending aortic and arch replacement. Note "elephant trunk" floating in the descending aortic aneurysm

1983 „Elephant Tunk“



Geschichte der Aortenchirurgie



Martens A. et al. ; 2017.

Tian DH, et al. 2013.



Vom „Elephant Trunk“ zum
„Frozen Elephant Trunk“

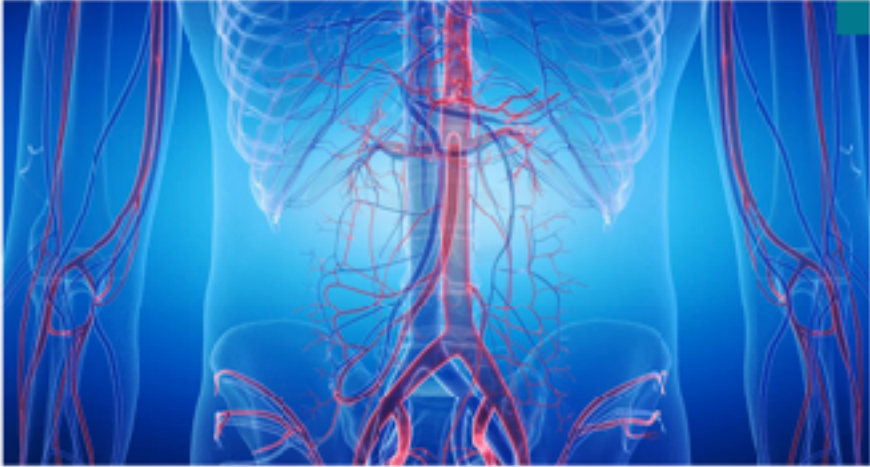
Lebensader Aorta

Deutsches
Ärzteblatt

Ärzteschaft

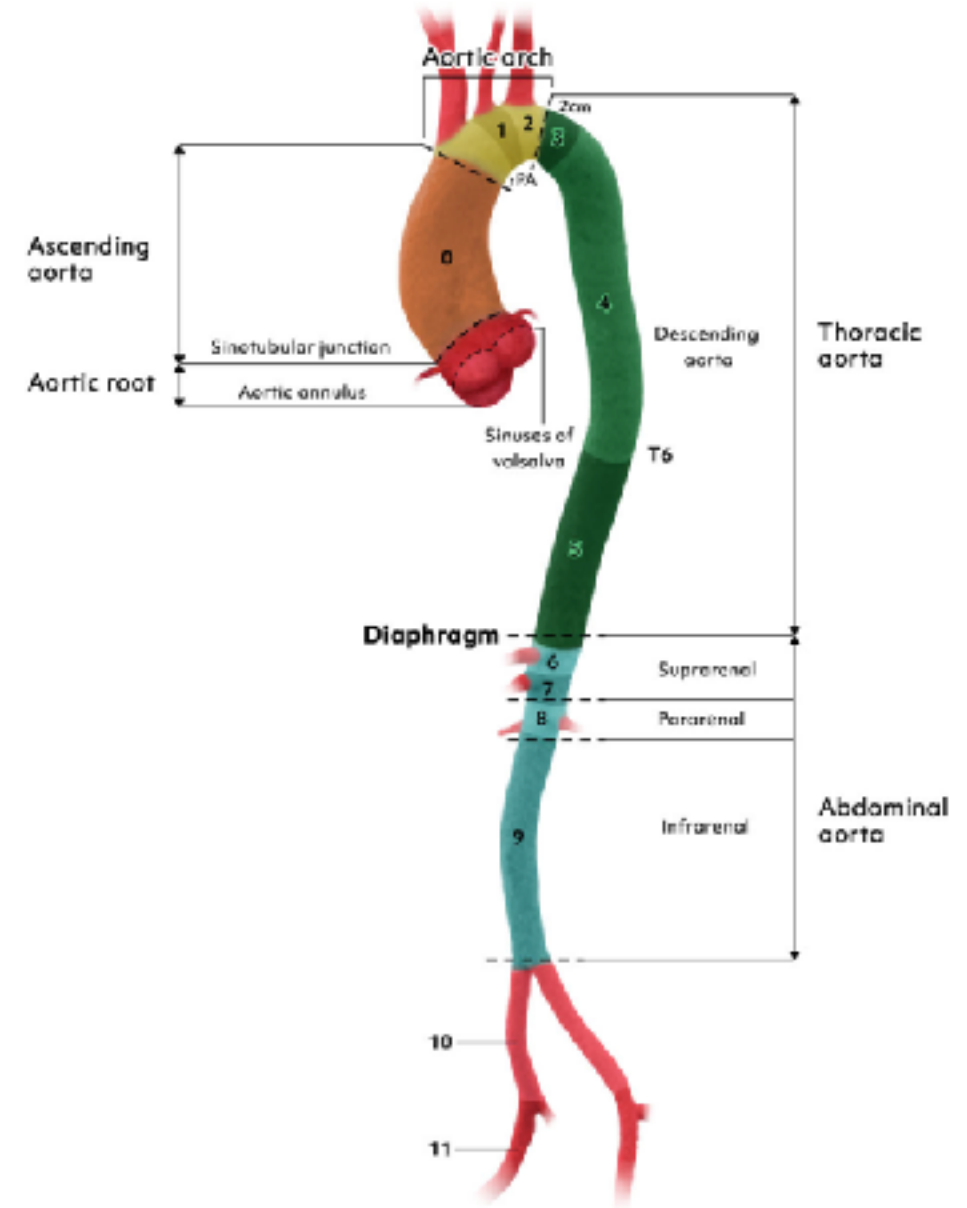
Aorta als eigenständiges Organ eingestuft

📅 Dienstag, 27. Februar 2024

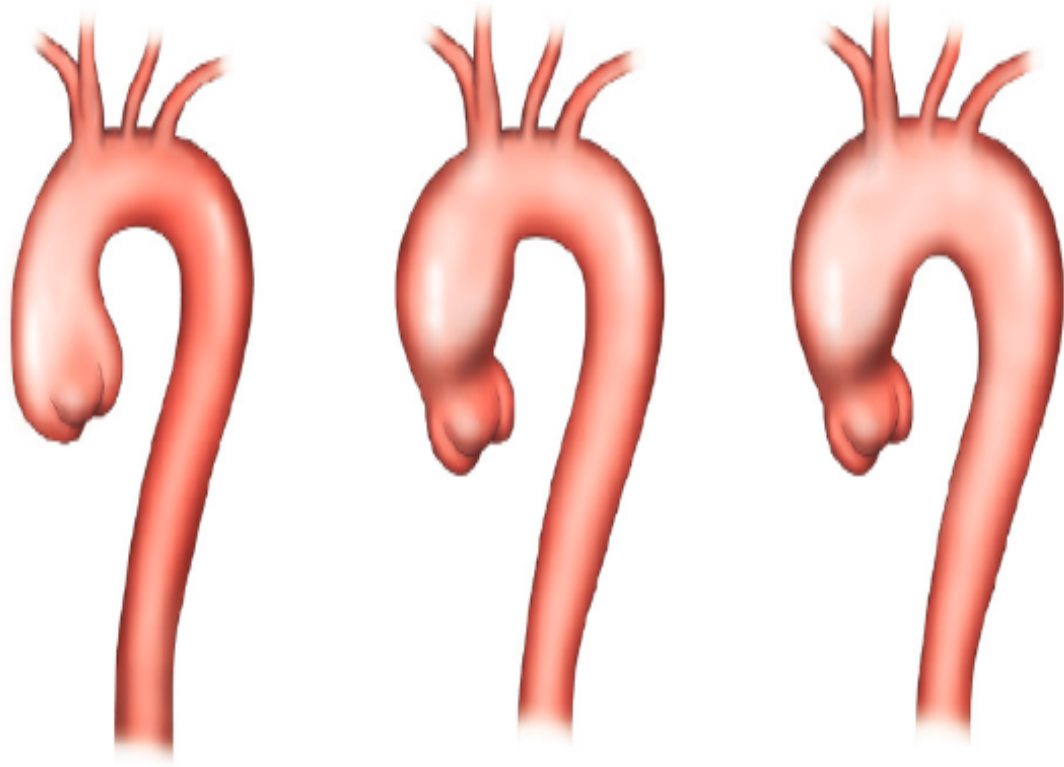


/SchiePro, stock.adobe.com

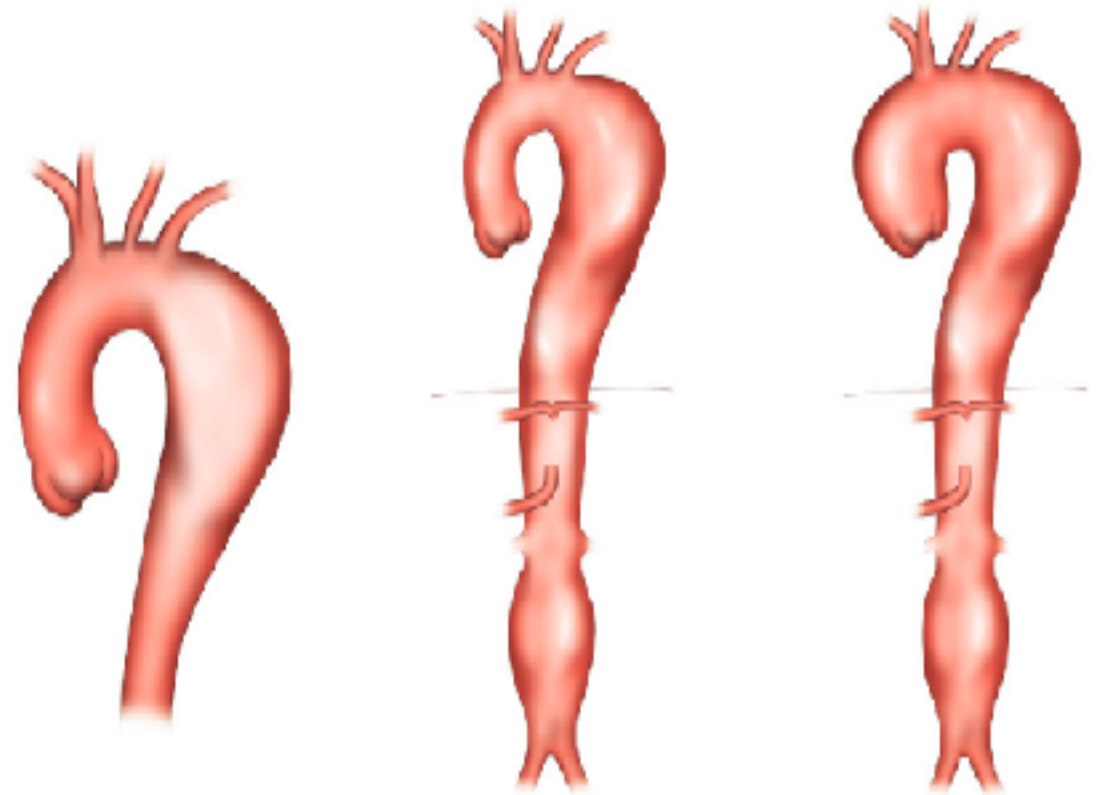
Freiburg – Die Europäische Gesellschaft für Herz-Thorax-Chirurgie ([EACTS](#)) und die US-amerikanische Society of Thoracic Surgeons ([STS](#)) haben die Aorta in ihren Leitlinien zu aortenchirurgischen Behandlungen als eigenständiges Organ des Menschen eingestuft.



Chirurgische Therapie in Abhängigkeit der Lokalisation

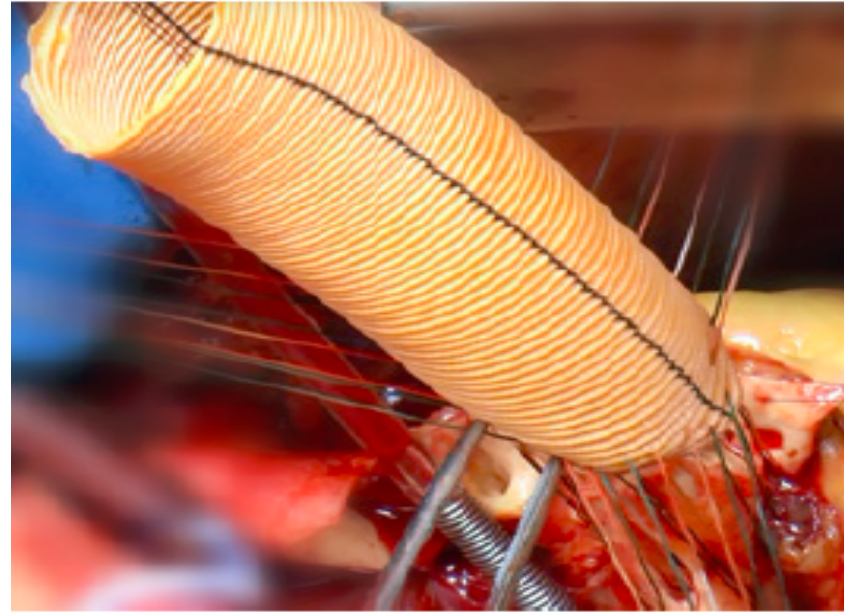
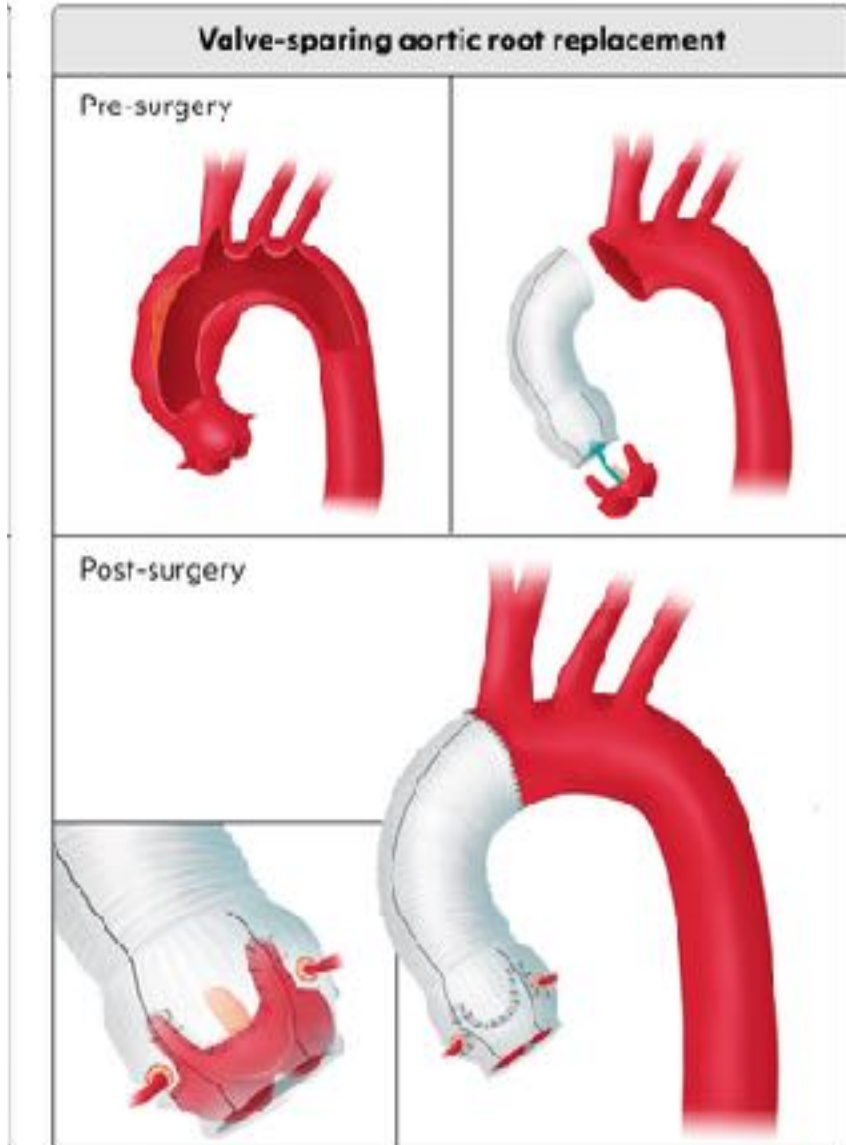


Aorta ascendens / Aortenbogen



Aorta descendens / thorakoabdominelle Aorta

Chirurgische Therapie in Abhängigkeit der Lokalisation



Aortenklappenrekonstruktion nach David

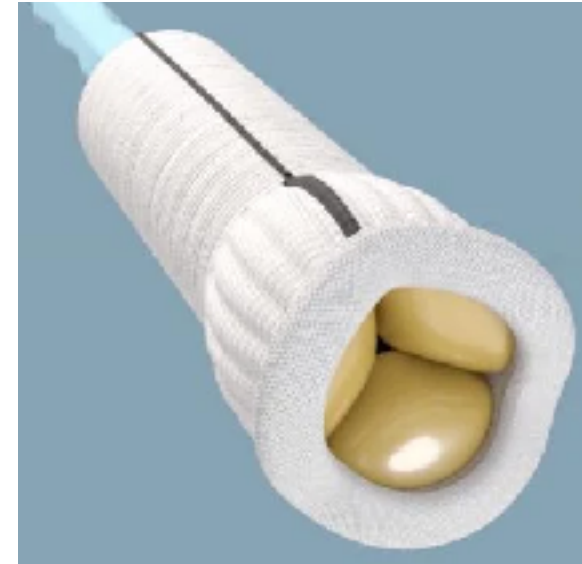
Operative Techniken: Aortenwurzelsersatz mit klappentragendem Conduit (Bentall)



**Mechanisches Conduit
(vorgefertigt)**



**Biologisches Conduit
(handgenäht)**

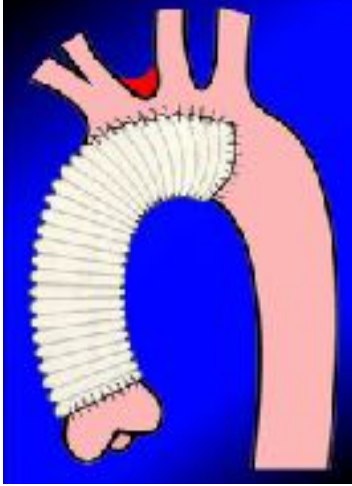


**Biologisches Conduit
(vorgefertigt)**

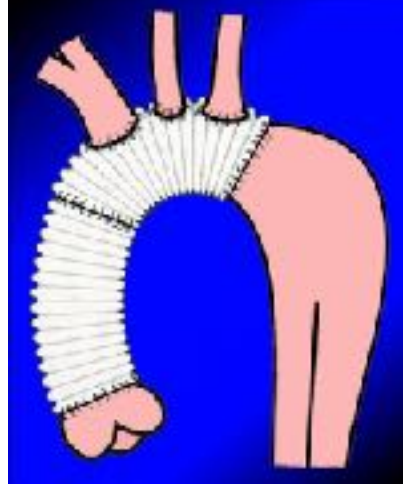


**Biologische Prothese
(„Freestyle“)**

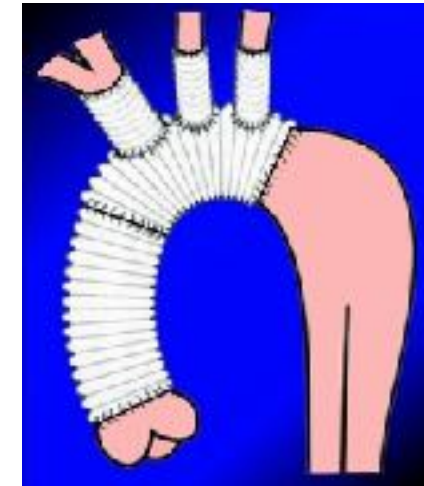
Operative Techniken: Aortenbogensersatz



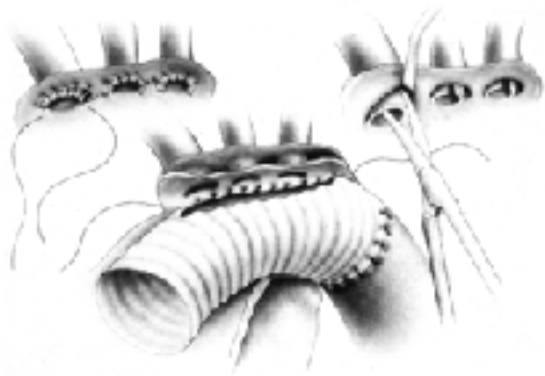
Teil-Aortenbogensersatz



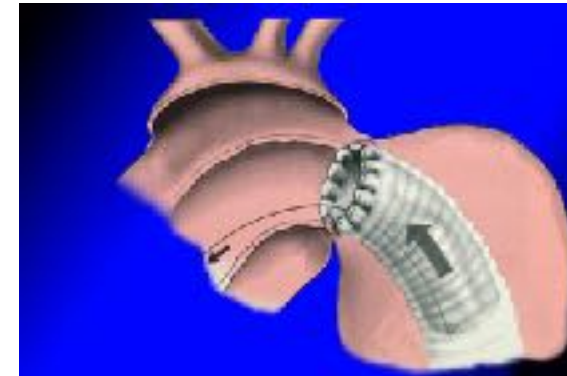
Kompletter Aortenbogensersatz



Kompletter Aortenbogensersatz (branched technique)



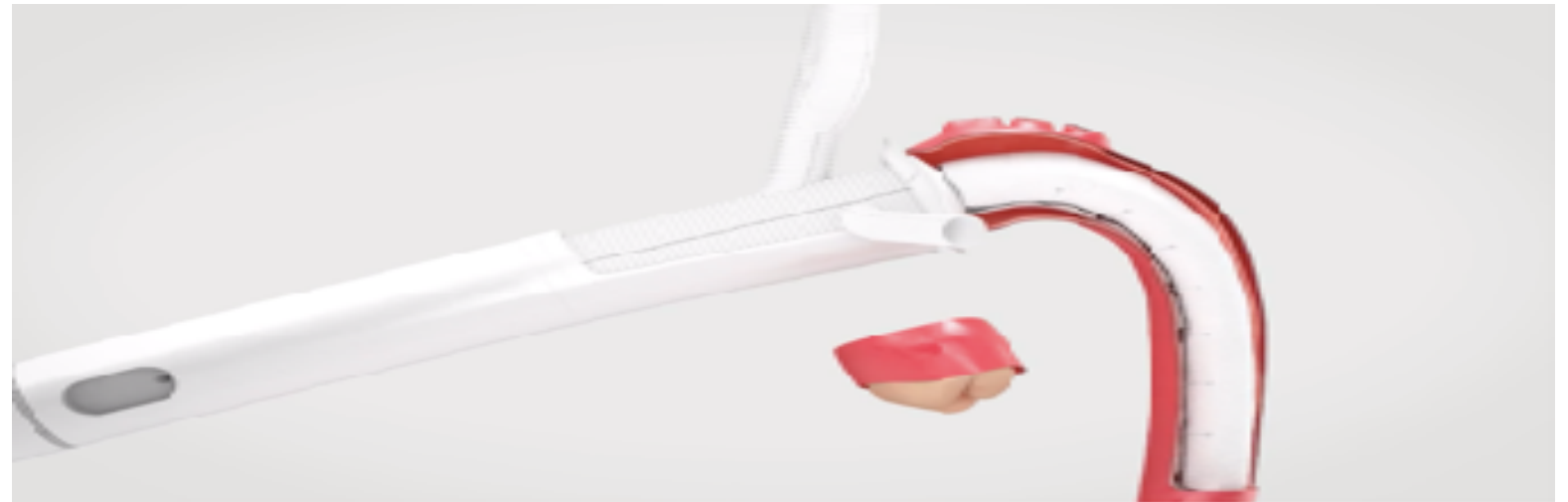
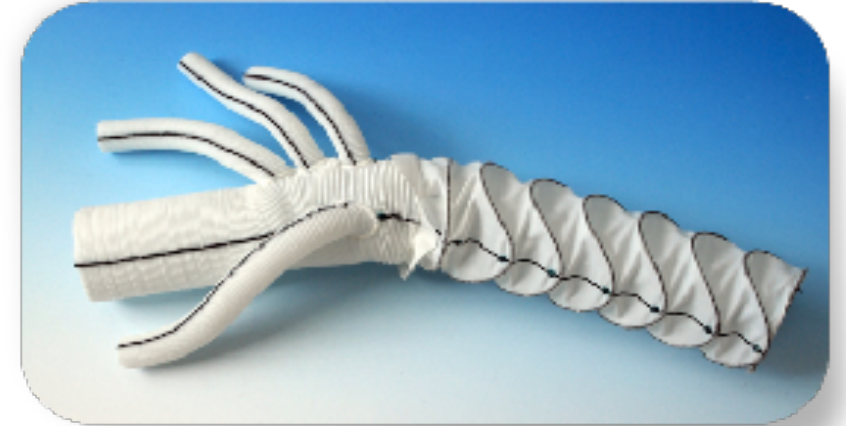
Kompletter Aortenbogensersatz (Insel Technik)



Elephant Trunk Technik

Operative Techniken: Aortenbogenersatz

Frozen Elephant Trunk (FET)
Moderne Hybridprothese



EACTS/STS Guidelines for diagnosing and treating acute and chronic syndromes of the aortic organ

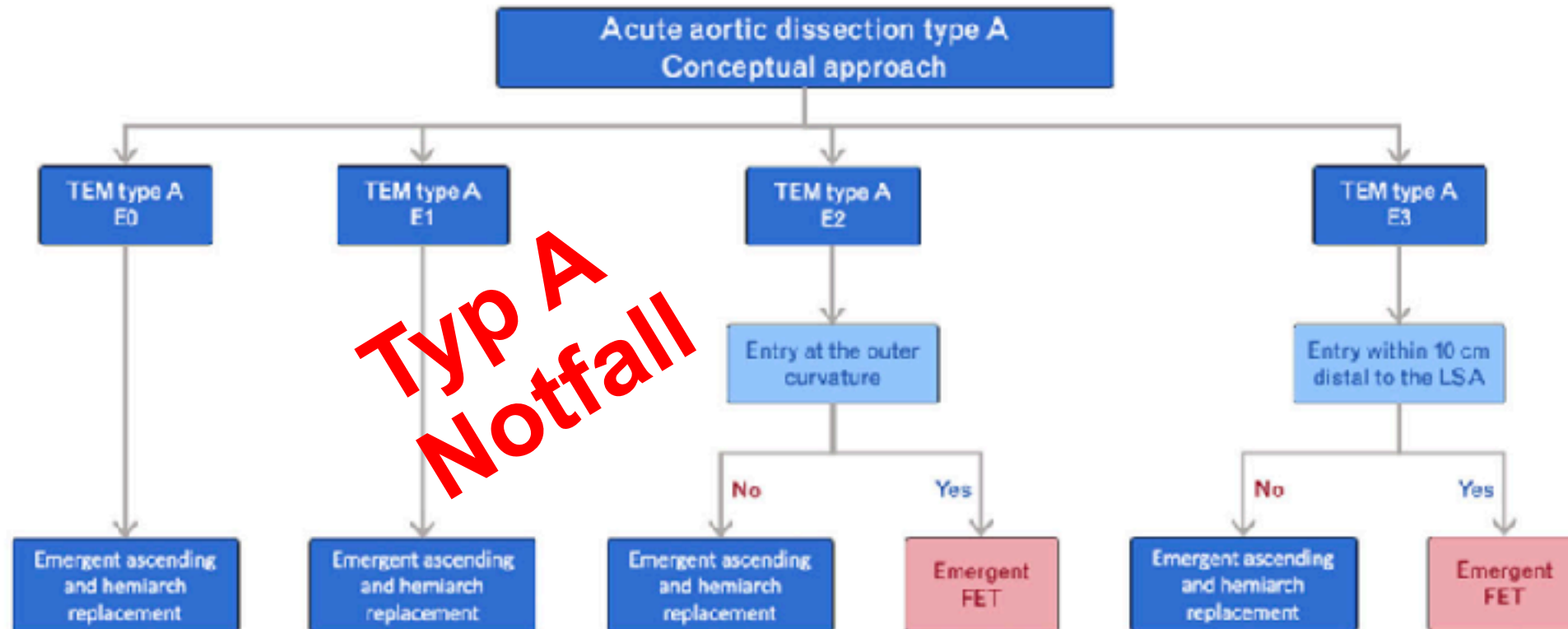
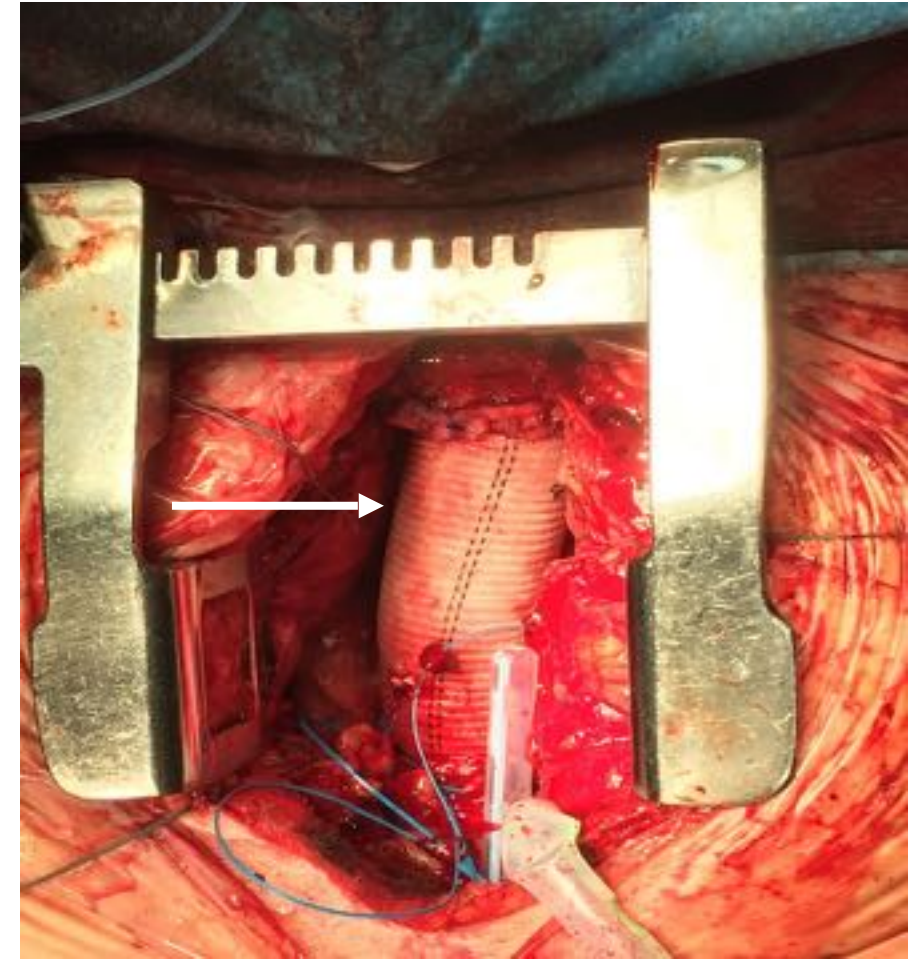
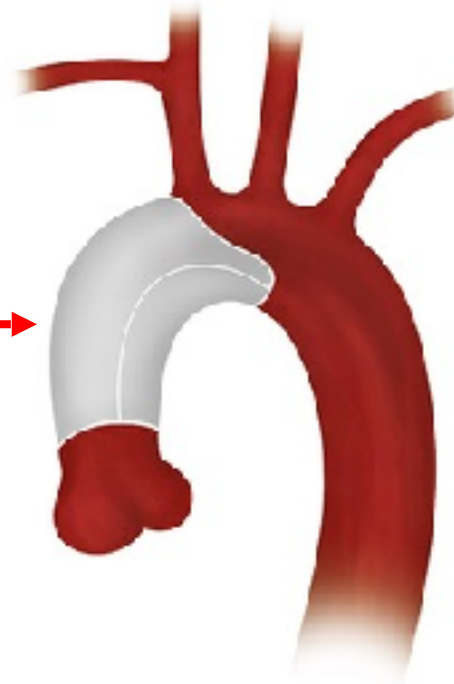
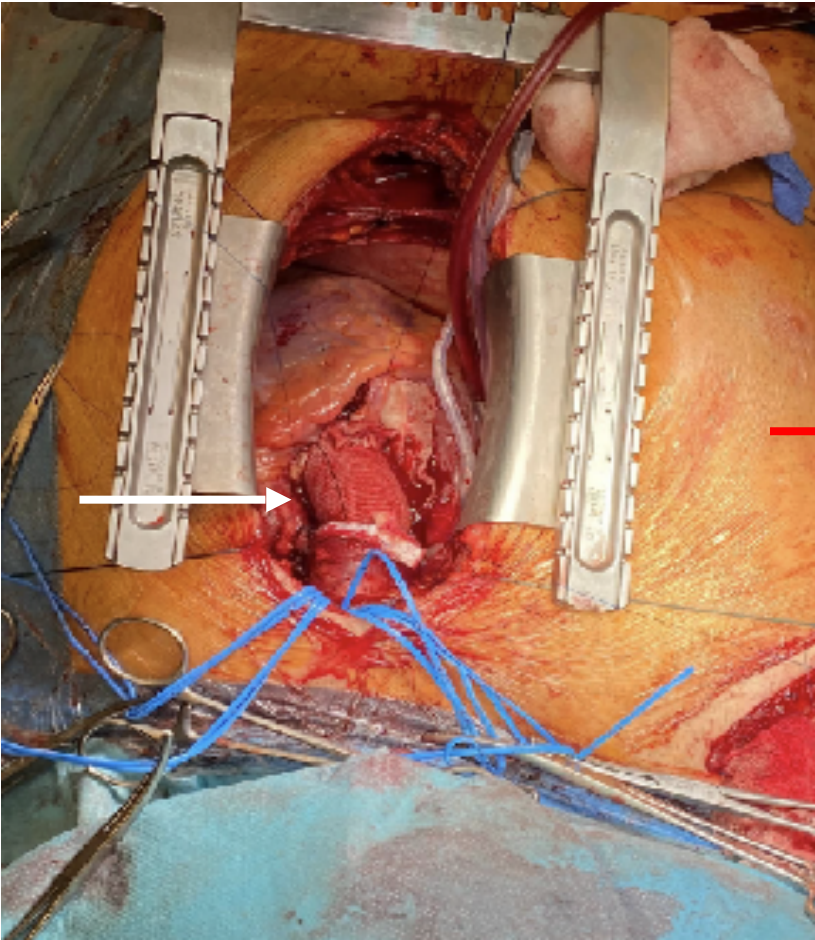
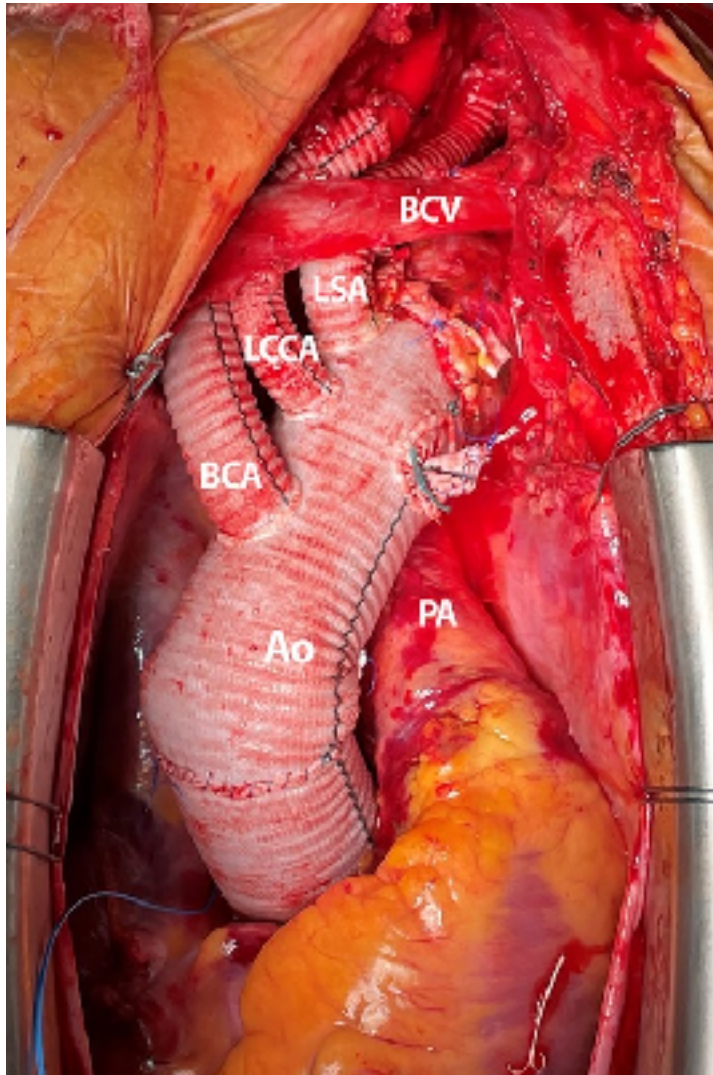


Figure 11: Extent of treatment for acute type A aortic dissection. E0, no entry visible; E1, ascending entry; E2, arch entry; E3 descending entry; FET: frozen elephant trunk; LSA: left subclavian artery; TEM: type, entry, malperfusion.

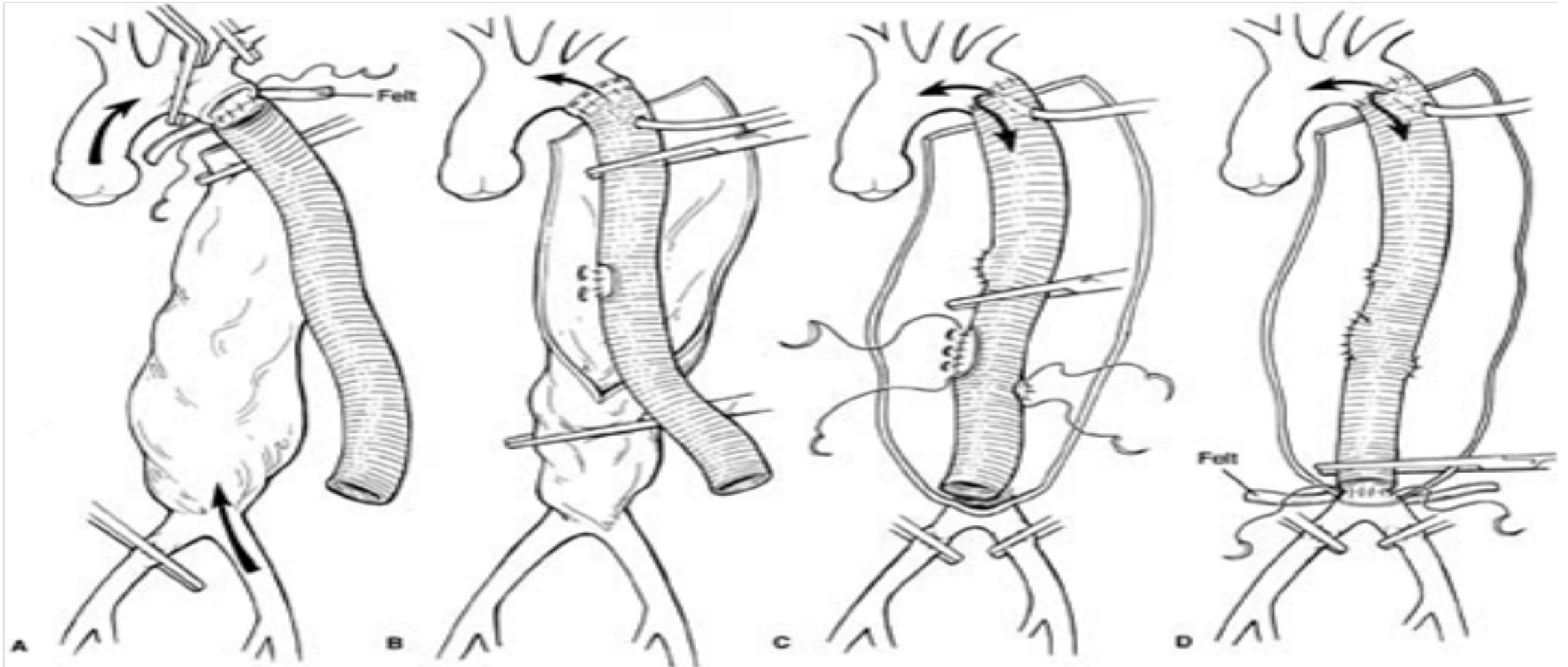
Teilbogenersatz bei Aortendissektion



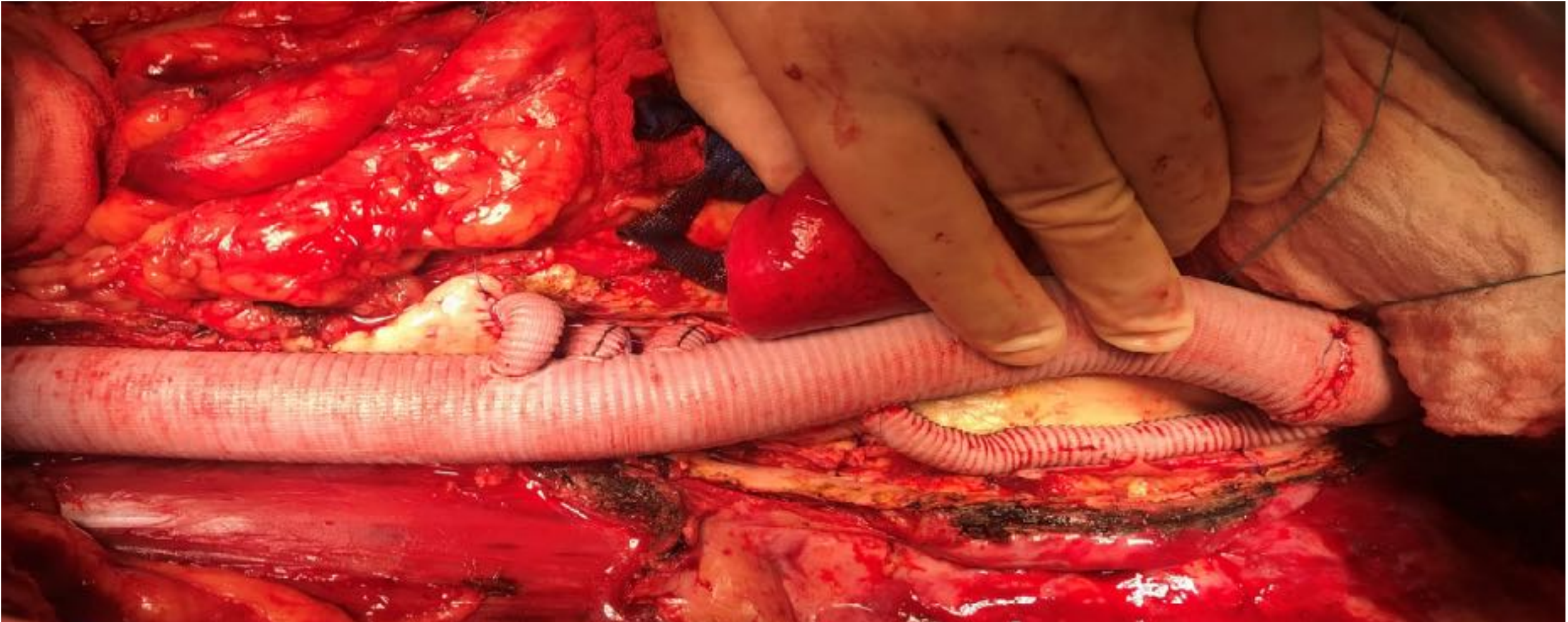
Operative Techniken: Aortenbogenenersatz



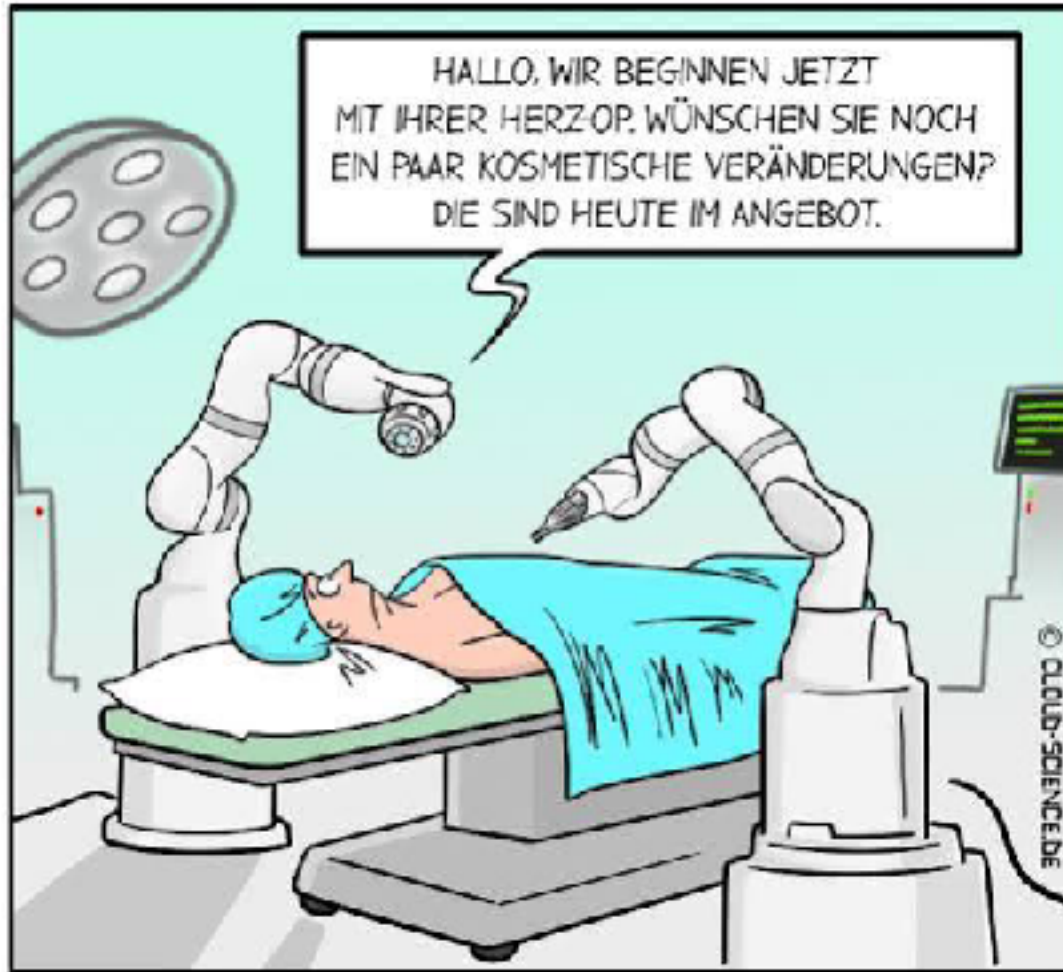
Operative Techniken: Thorakoabdomineller Aortenersatz



Operative Techniken: Thorakoabdomineller Aortenersatz



Ausblick - Aortenchirurgie



Mehr Interventionen?

Mehr Chirurgie?

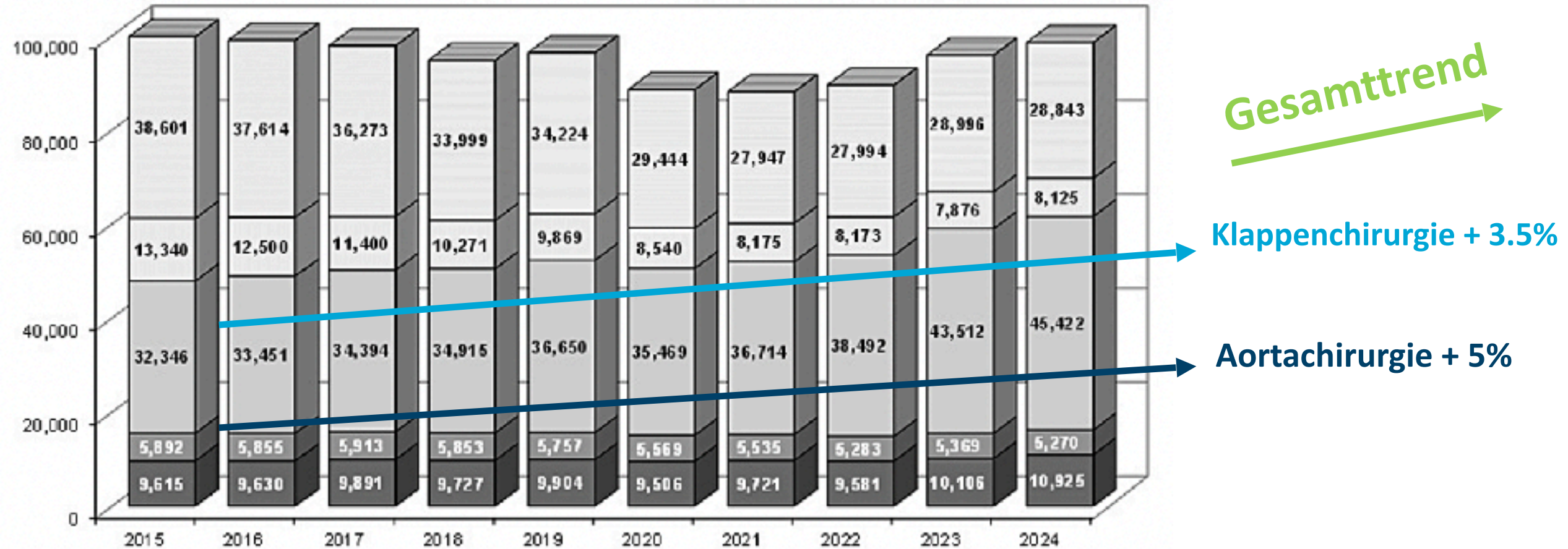
Genetische Behandlung?

Neue Prothesen?

Künstliche Intelligenz?

Interdisziplinärer Ansatz?

Ausblick – herzchirurgische Eingriffe in Deutschland 2024



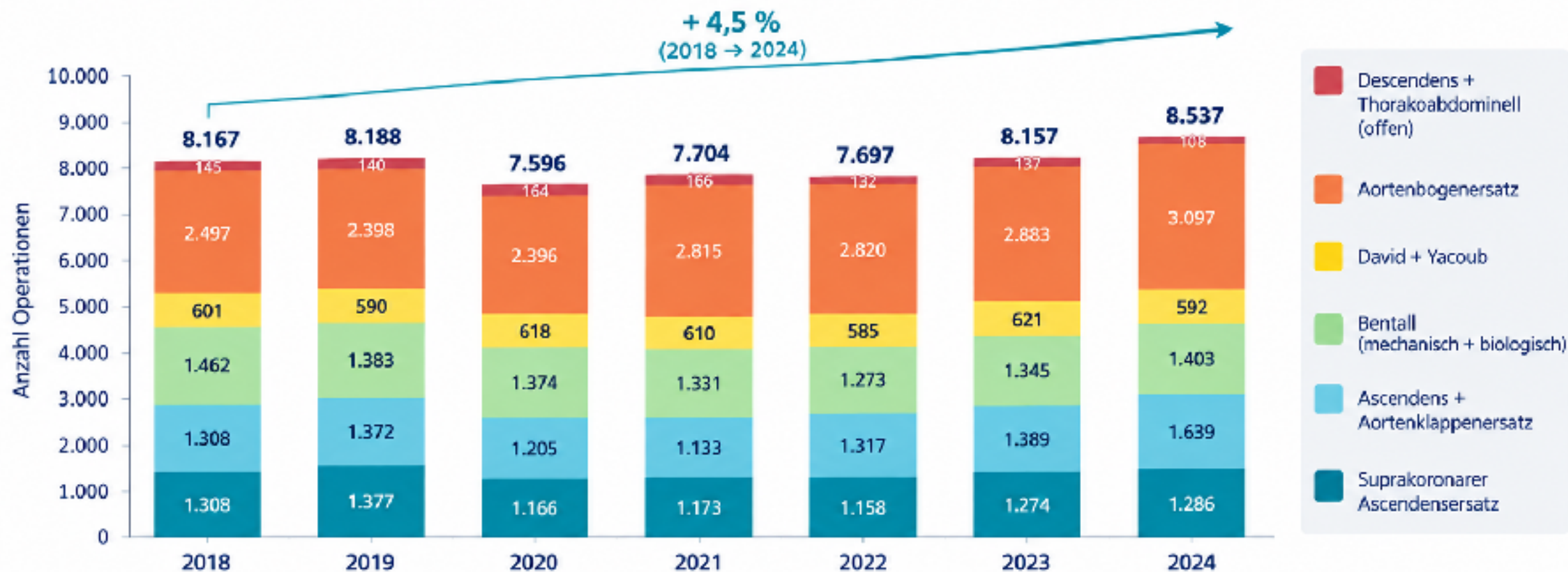
Verteilung der Herzoperationen mit und ohne HLM 2024. Grundlage der Leistungsstatistik der DGTHG

Beckmann A, et al. Thorac Cardiovasc Surg 2025;73:595–608.

Offene Aortenchirurgie in Deutschland 2018 – 2024

Entwicklung der Aortenoperationen nach Eingriffsart (ohne endovaskuläre Eingriffe)

Daten aus den German Heart Surgery Reports der DGTHG (2018–2024)



Die Zahl der offenen Aortenoperationen ist in Deutschland von 8.167 im Jahr 2018 auf 8.537 im Jahr 2024 gestiegen (+ 4,5 %). Besonders zugenommen haben Aortenbogenersatz und der kombinierte Ascendens- und Aortenklappenersatz.

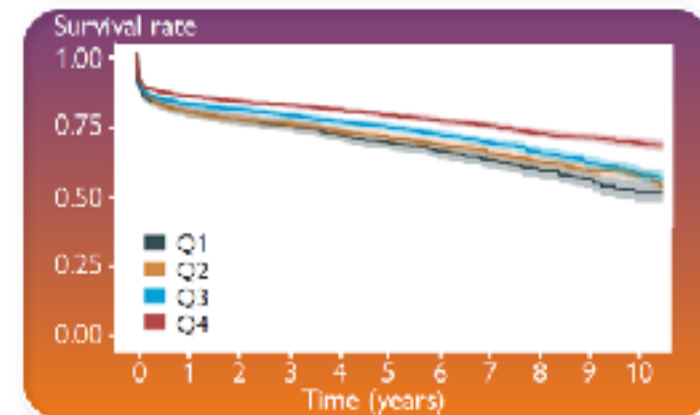
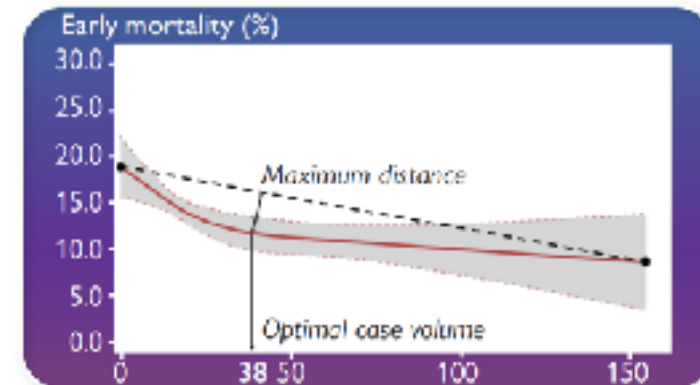
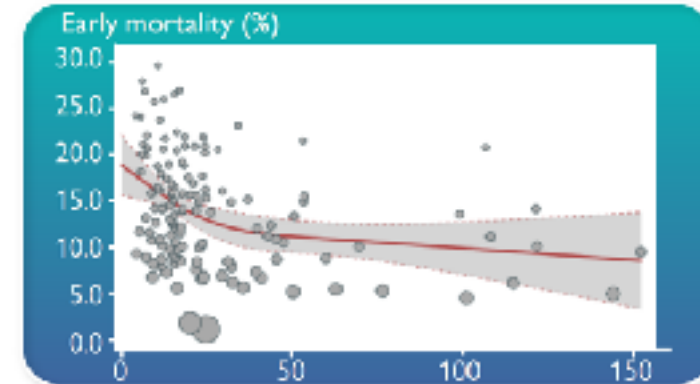
Ausblick – spezialisierte Zentren

Recommendations	Class ^a	Level ^b	Ref ^c
Shared decision-making for the optimal treatment of aortic pathologies by a multidisciplinary aortic team is recommended.	I	C	-
In patients with multisegmental aortic disease, treatment is recommended in aortic centres providing open and endovascular cardiac and vascular surgery on site.	I	C	-
Transfer to an aortic centre should be considered for patients with complex aortic pathologies.	IIa	B	[105–118]
For endovascular aortic procedures, a hybrid operating room, including an integrated imaging system, is recommended.	I	C	-

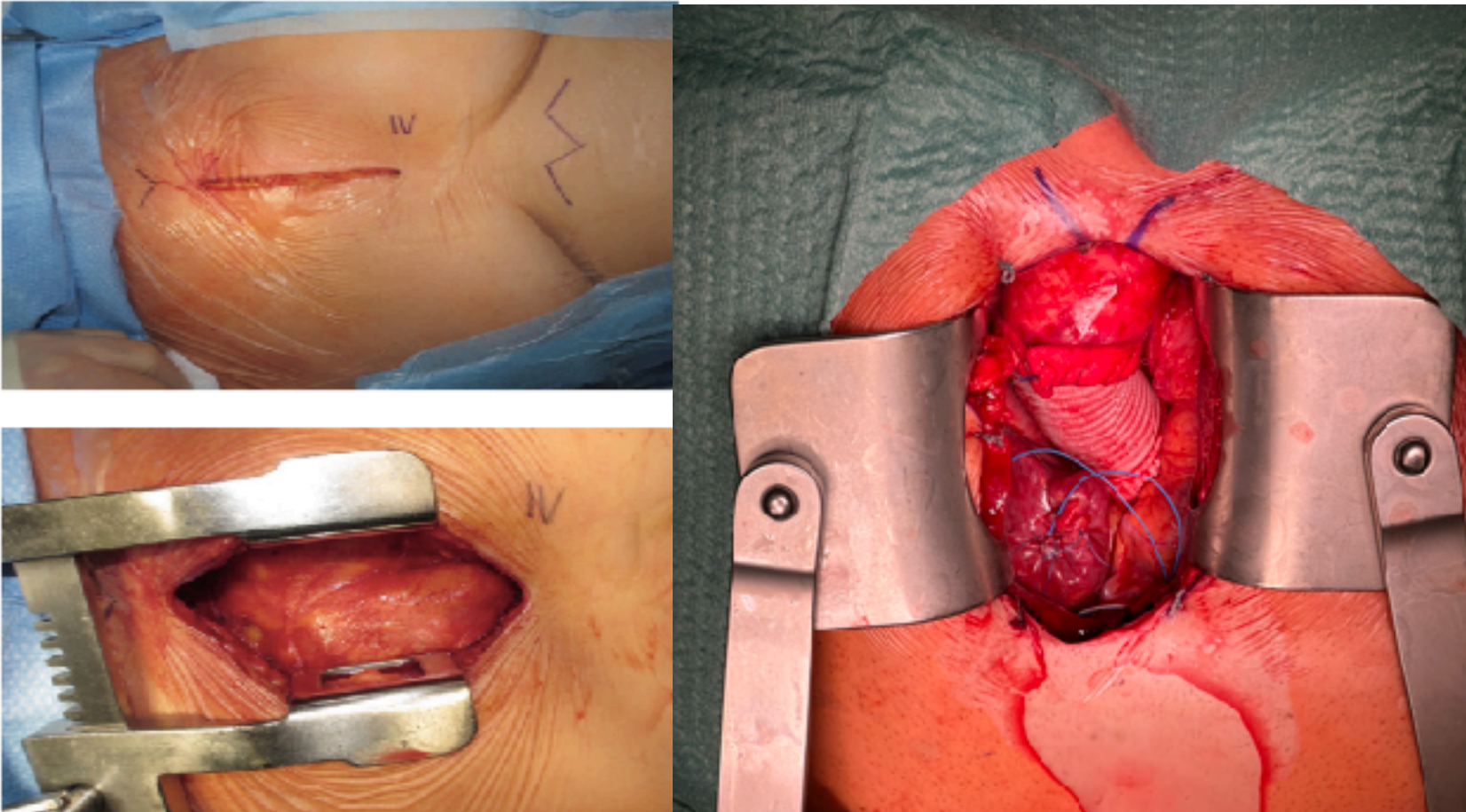
^aClass of recommendation.

^bLevel of evidence.

^cReferences.

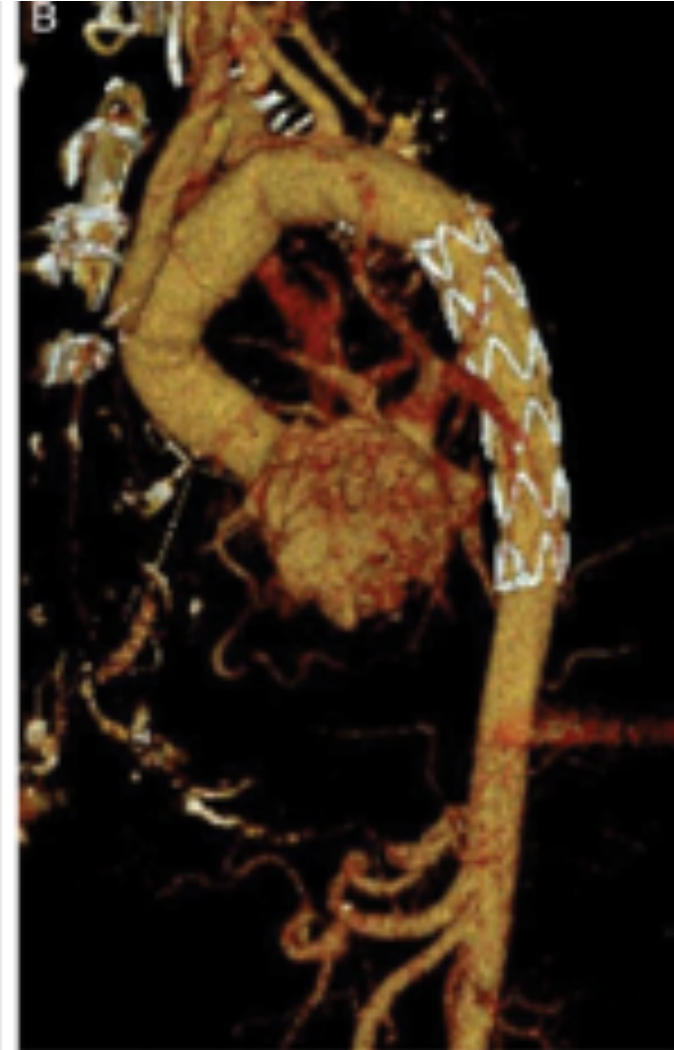
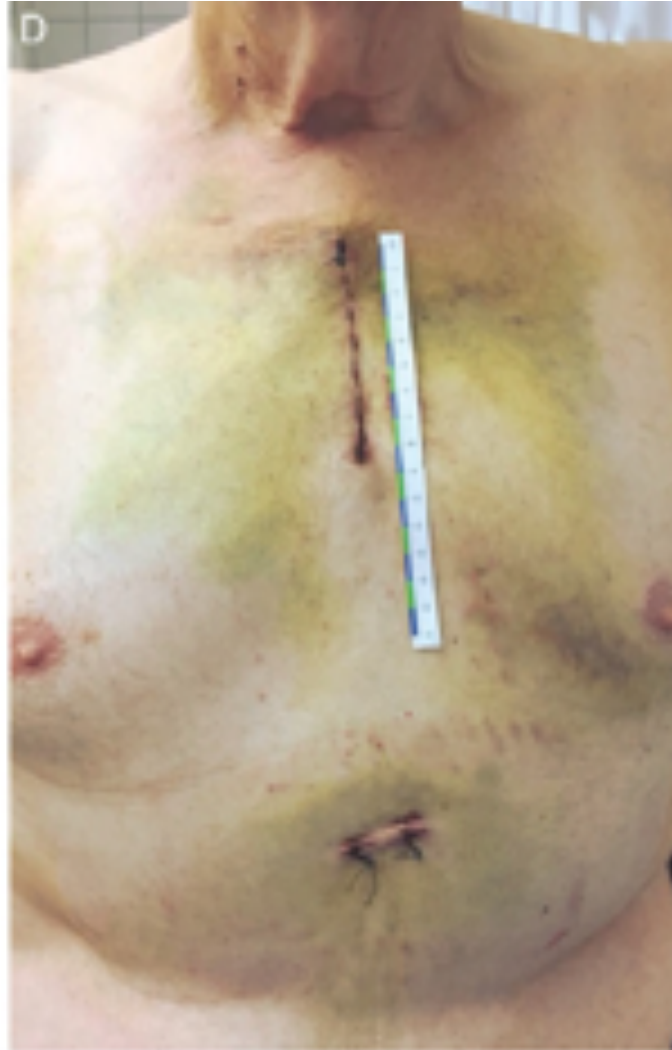
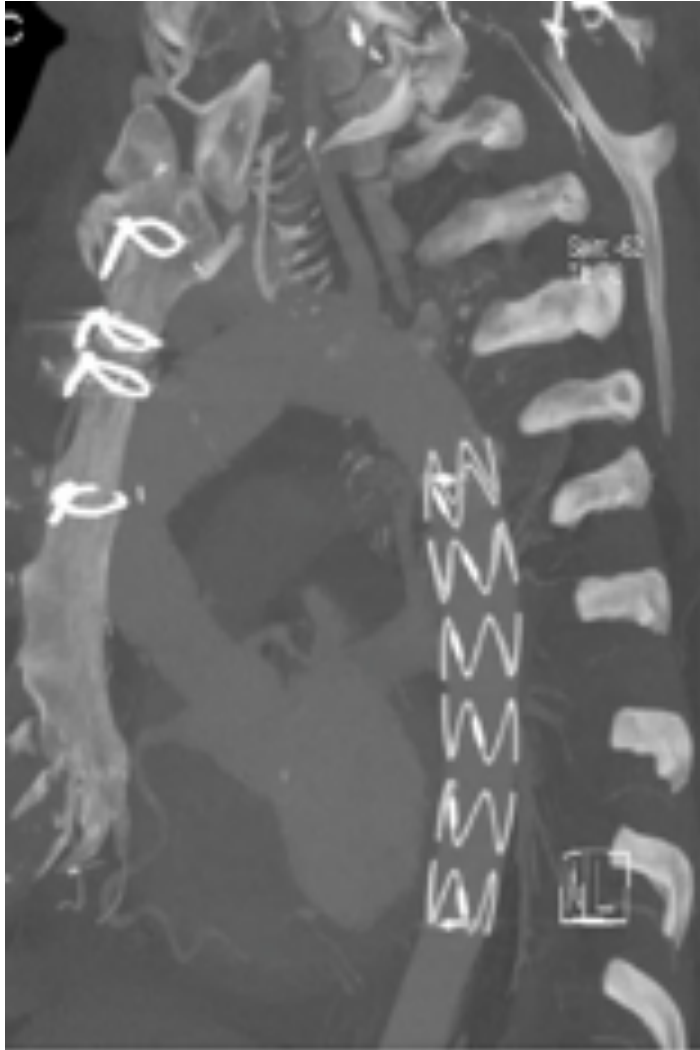


Weiterentwicklung: Minimalinvasive Aortenchirurgie



	J-shaped upper hemithoracotomy	T-shaped upper hemithoracotomy	V-Y Arrow-shaped hemithoracotomy	Right anterior/ lateral thoracotomy
schematic				
advantages	• Frequently used, long-term success • Lowest sternal trauma • Good horizontal stability	• Good anteroposterior for coronal work, morphologies • Facilitates circumferential and ventral aortic anastomosis	• Good anteroposterior for coronal work, morphologies • Facilitates circumferential and ventral aortic anastomosis • Better horizontal stability compared to T-shaped hemithoracotomy	• Axillobrachial trauma • Immediate postoperative horizontal stability of the thorax
disadvantages	• Limited exposure for circumferential work with circumferential anastomosis	• relatively extensive circumferential work • Good horizontal/ transverse stability	• relatively extensive circumferential work	• Selective axillobrachial anastomosis possible
references	Hauschild 2022 Kunze 2012 Tobias 2007 Sennhauser 2001 Oyama 2006	Hauschild 2022	Sennhauser 2001	UPH 2013 Lemstra 2018

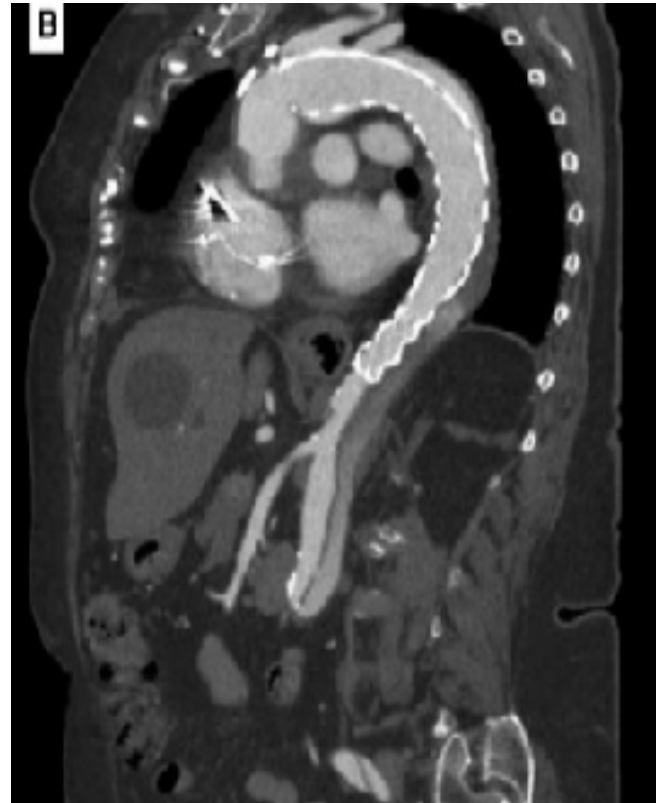
Weiterentwicklung: Minimalinvasiver „frozen elephant trunk“



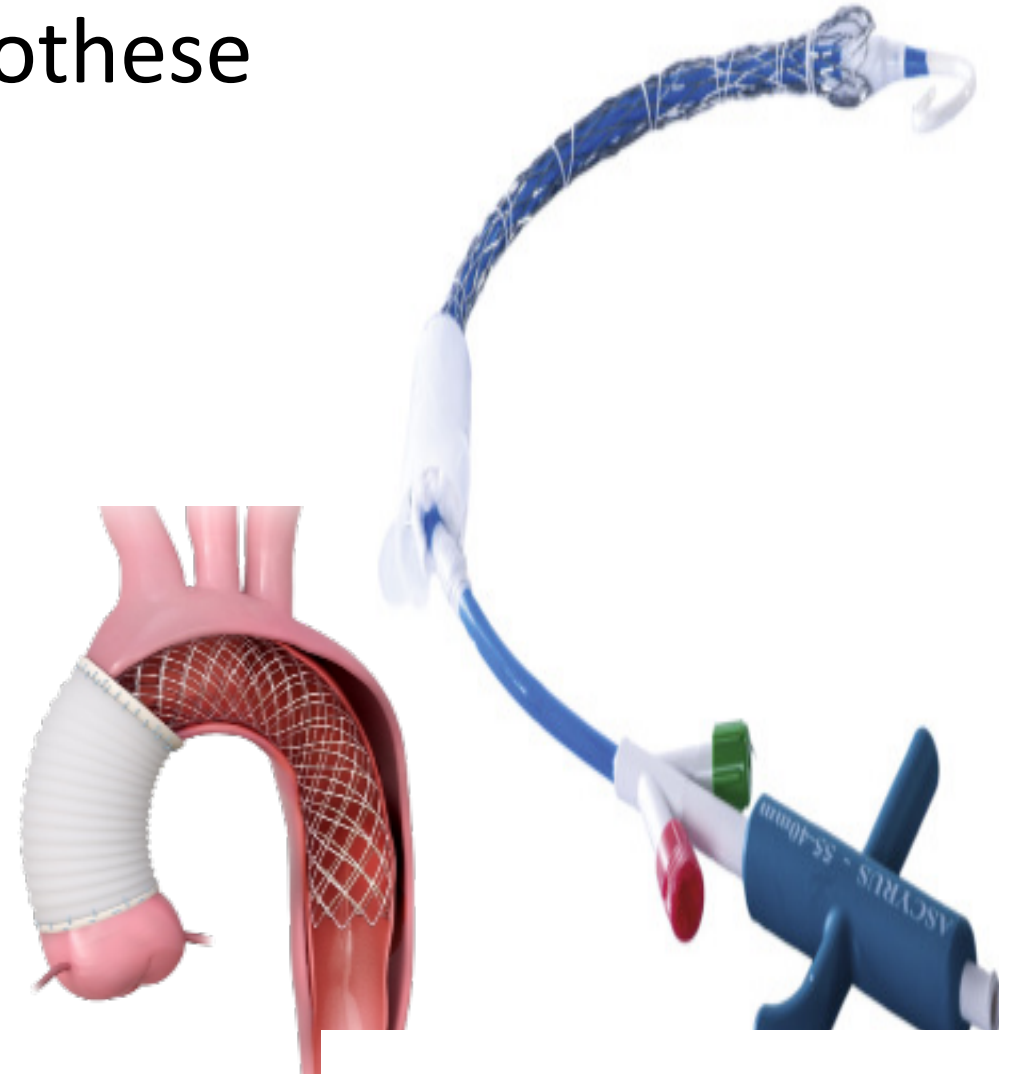
Weiterentwicklung: AMDS Hybridprothese



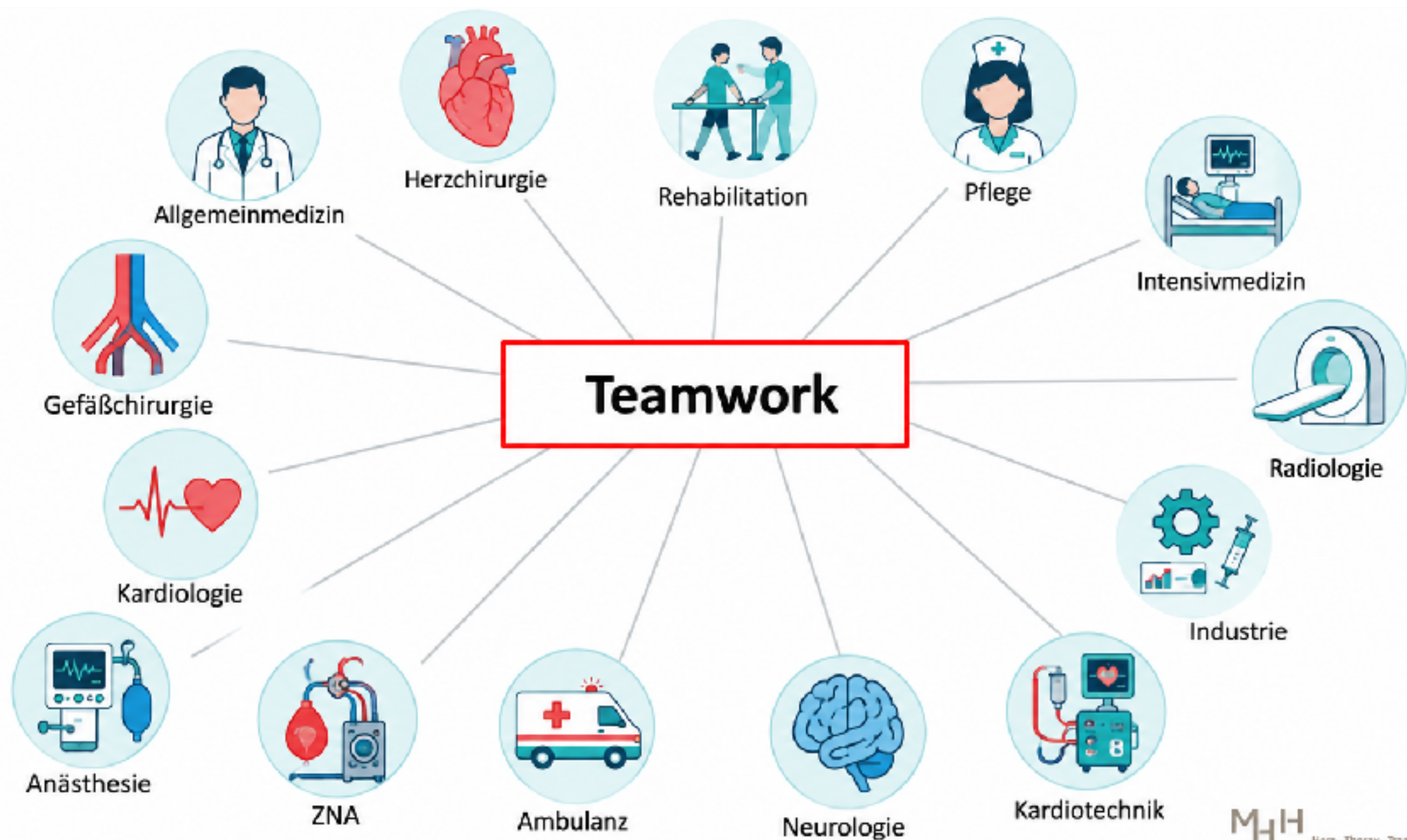
Präoperativ



Postoperativ



ARTIVION | **AMDS™**
Hybrid Prosthesis®





Vielen Dank für Ihre Aufmerksamkeit



von links nach rechts: F. Helms, H. Krüger, M. Arar, E. Deniz, D. de Manna,
nicht auf dem Foto: Frau S. Postol

Aortic Team Hannover

von links:

F. Helms

H. Krüger

M. Arar

E. Deniz

D. De Manna

S. Postol (nicht auf dem Foto)

Kontakt

Heike Krüger

☎ 0511 532-5064 / 0176 1532-5965

✉ Krueger.Heike@mh-hannover.de