

„Handwerk trifft Hightech“

Operation an der Aorta

10. Patiententag Thorakale Aortenchirurgie



Medizinische Hochschule
Hannover

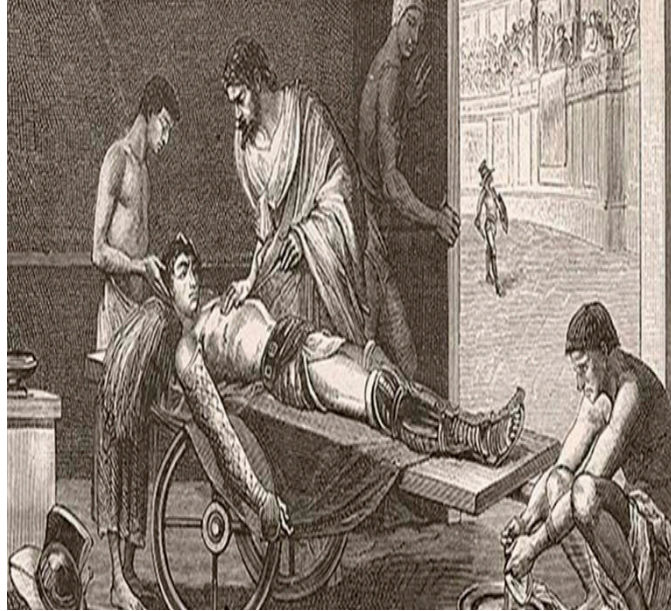
Lebensader Aorta

1511 - 1513



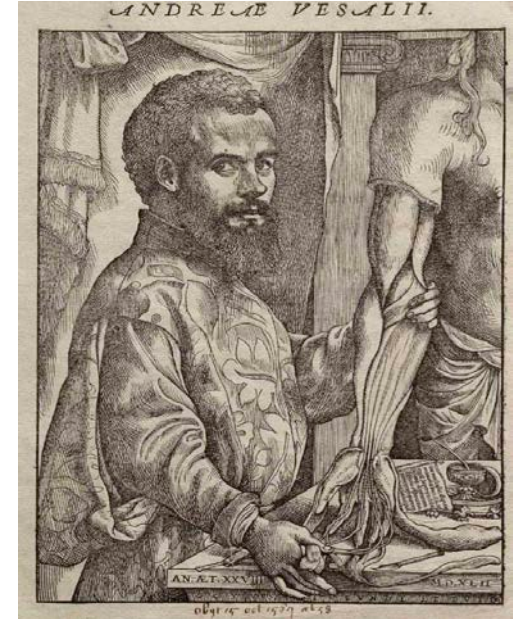
Leonardo da Vinci

128-199n Chr.



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

1514-1564



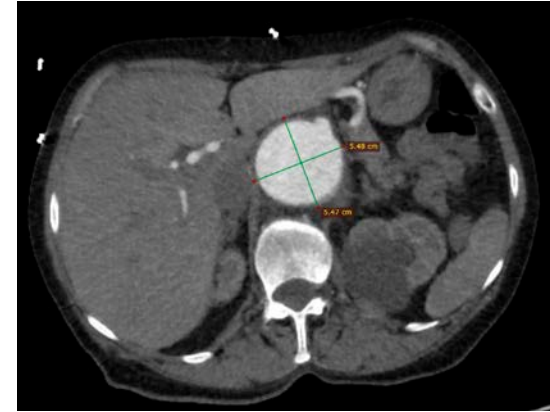
Andreas Vesalius,
Leibarzt Karl V.

1939, Princeton University



Thomas Mann
1875-1955
Rupturiertes
Iliakalaneurysma

Albert Einstein
1879-1955
Rupturiertes
Bauchaortenaneurysma



Geschichte der Aortenchirurgie

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

DENTON A. COOLEY, M.D., and MICHAEL E. DE BAKEY, M.D.

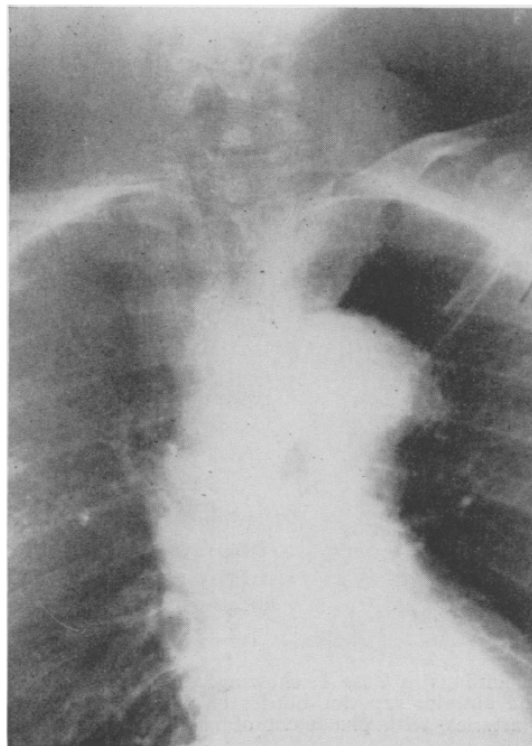
HOUSTON, TEXAS

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. 46	C.M.	12/22/48	Syphilitic	Transverse arch	Proximal ligation with cellophane-reinforced ligature (needle catheter)	Apparently well for 2 months and then developed fatal hemorrhage
2. R.R. 32	W.M.	4/28/50	Spontaneous	Rt. subclavian	Proximal and distal ligation with total excision	Cured
3. J.M. 45	C.M.	7/12/51	Syphilitic	Innominate and ascending aorta	Ligation of subclavian and carotid, aneurysmectomy, and aortorrhaphy	Cured
4. F.D. 57	W.M.	10/ 4/51	Syphilitic	Ascending and transverse arch	Aneurysmectomy and aortorrhaphy	Died 14 hours after operation, diffuse cerebral damage, anesthetic complication
5. L.H. 41	C.M.	9/ 6/51	Syphilitic	Terminal thoracic aorta	Aneurysmorrhaphy and cellophane wrapping, subsequent wiring	Died 18 days after operation, secondary hemorrhage
6. W.F. 56	W.M.	9/ 7/51	Syphilitic and arteriosclerotic	Transverse arch	Cellophane wrapping	Improved

FIG. 1.—Roentgenogram of chest in Case 1 showing widening of superior mediastinal shadow, slight tracheal displacement to the right and dilatation and calcification of the aortic arch.



Geschichte der Aortenchirurgie

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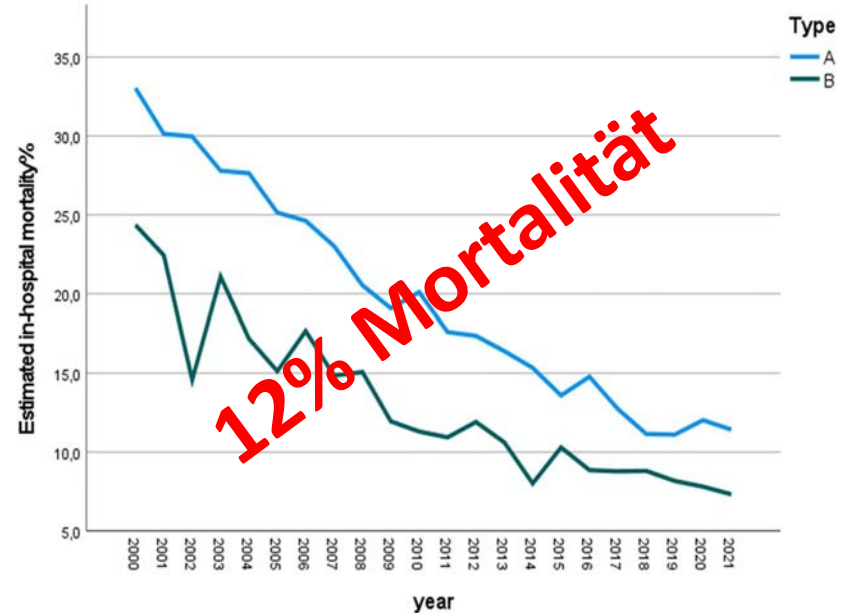
HOUSTON, TEXAS

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

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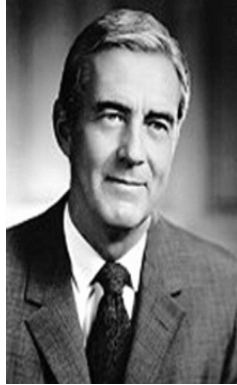
33% → 12%



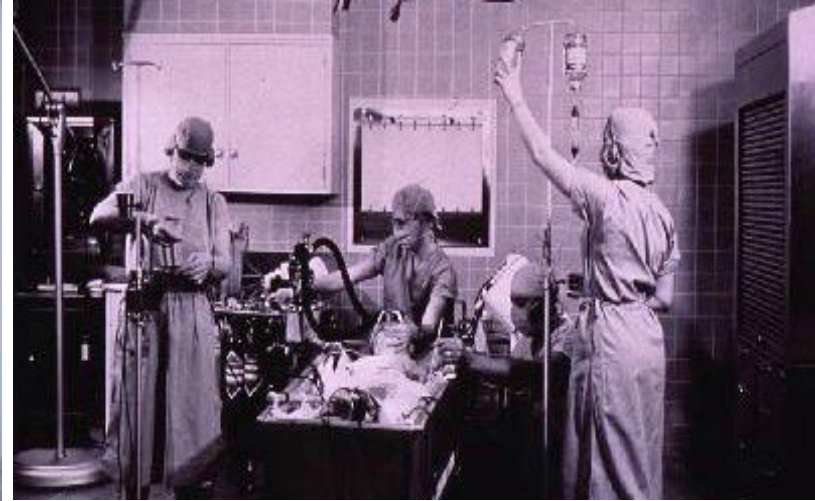
Geschichte der Aortenchirurgie



F. John Lewis
Richard Varco



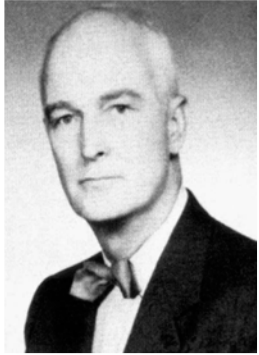
W. Bigelow



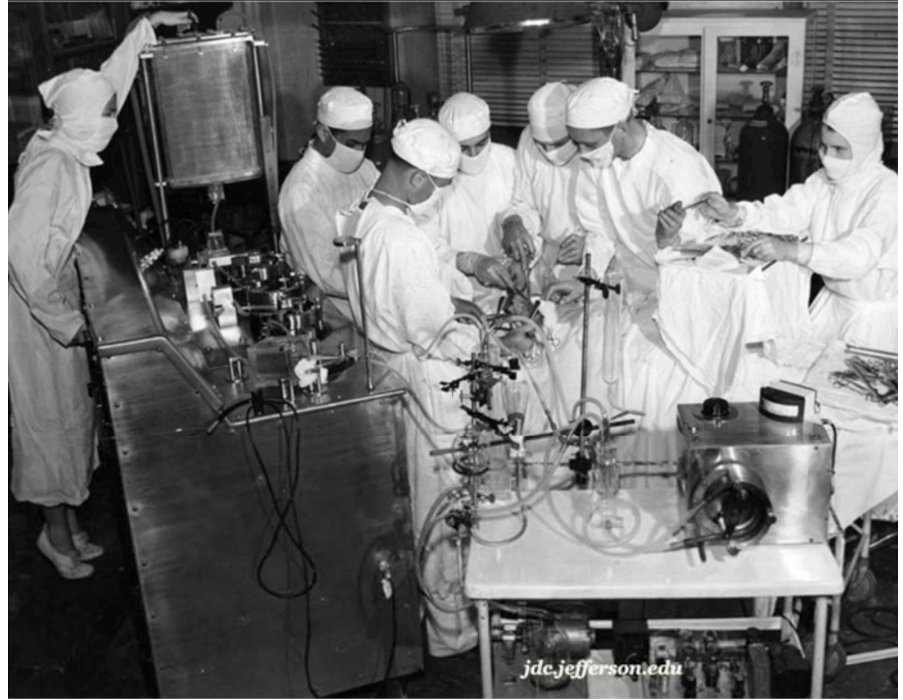
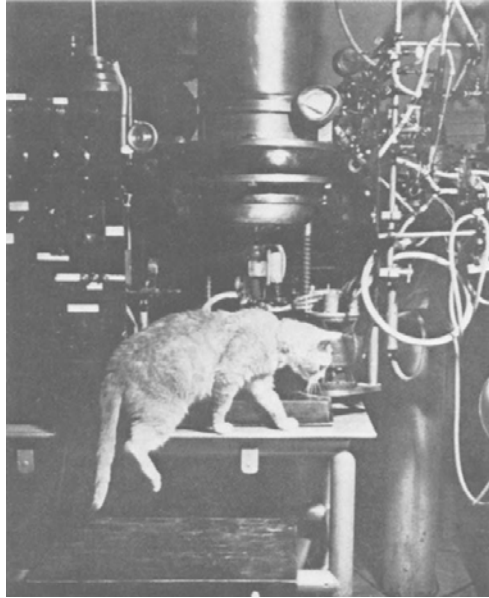
Erste Herzoperation in tiefer Hypothermie
(John Lewis 1952)

Geschichte der Aortenchirurgie

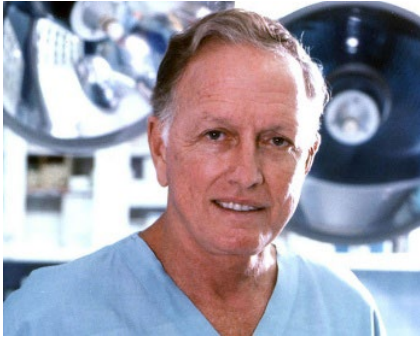
Herz-Lungen-Maschine



John Gibbon
06.05.1953



Geschichte der Aortenchirurgie



Denton A. Cooley
24.08.1955



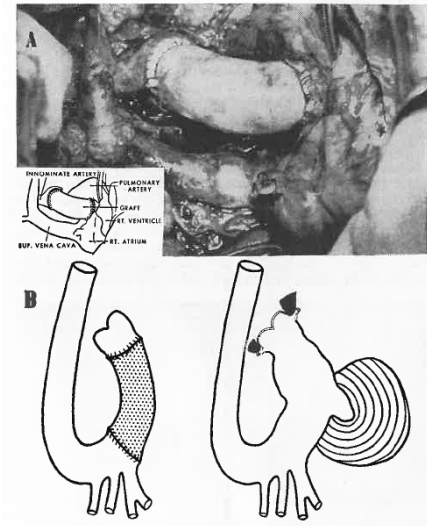
Michael E. DeBakey

DeWall Lillehei

- pump oxygenator, 2800 cc/min
- Cerebral perfusion 200cc/min
- Aorta proximal geklemmt, nach 10min Herzstillstand, 31min

RESECTION OF ENTIRE ASCENDING AORTA IN FUSIFORM ANEURYSM USING CARDIAC BYPASS

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



Geschichte der Aortenchirurgie

DEUTSCHE MEDIZINISCHE WOCHENSCHRIFT

Alle Manuskripte sind direkt an die Schriftleitung zu richten, sie dürfen nicht gleichzeitig anderen Blättern zum Abdruck angeboten werden. – Mit der Annahme des Manuskripts erwirbt der Verlag das ausschließliche Recht der Vervielfältigung, Verbreitung und Übersetzung der in dieser Zeitschrift zum Abdruck gelangten Beiträge, insbesondere auch das Recht, die Herstellung von fotomechanischen Vervielfältigungen in gewerblichen Unternehmen zum innerbetrieblichen Gebrauch nach Maßgabe des zwischen dem Börsenverein des Deutschen Buchhandels und dem Bundesverband der Deutschen Industrie abgeschlossenen Rahmenabkommens zu genehmigen. Der Verlag erwirbt weiter das Recht der Verwendung des Manuskripts für fremdsprachliche Ausgaben. Kein Teil dieser Zeitschrift darf in irgendeiner Form, auch nicht durch Fotokopie, Mikrofilm oder irgendein anderes Verfahren ohne schriftliche Genehmigung des Verlages reproduziert werden; jedoch wird gewerblichen Unternehmen die Anfertigung einer fotomechanischen Vervielfältigung (Fotokopie, Mikrokopie) für den innerbetrieblichen Gebrauch nach Maßgabe des zwischen dem Börsenverein des Deutschen Buchhandels und dem Bundesverband der Deutschen Industrie abgeschlossenen Rahmenabkommens gestattet. Werden die Gebühren durch Wertmarken entrichtet, so ist für jedes Fotokopierblatt eine Marke im Betrag von DM 0,10 zu verwenden. – Die Aufnahme dieser Zeitschrift in Lesezirkel ist nicht gestattet.

84. JAHRGANG

STUTTGART, 27. MÄRZ 1959

NUMMER 13

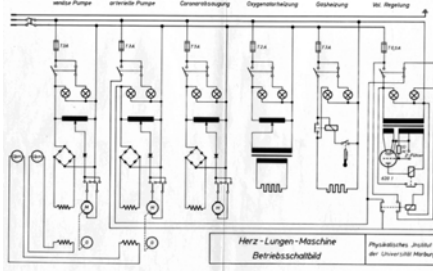
Aus der Chirurgischen Universitätsklinik München (Direktor: Prof. Dr. R. Zenker)

Eingriffe am Herzen unter Sicht¹

Von R. Zenker, G. Heberer, H. G. Borst, H. Gehl, W. Klinner, R. Beer und M. Schmidt-Mende



Rudolf Zenker

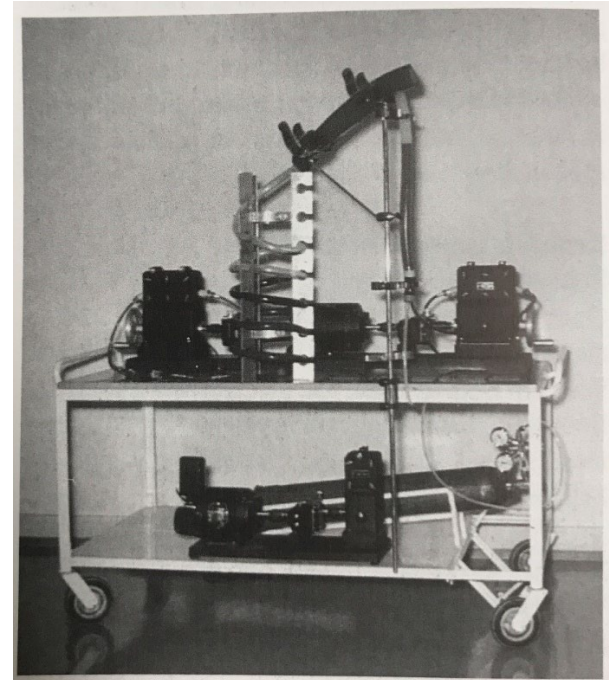


Marburg, 1958



Hans-Georg Borst

DeWall Lillehei Pumpenoxygenator 1956



Geschichte der Aortenchirurgie

HOW TO DO IT

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

Extensive Aortic Replacement using "Elephant Trunk" Prosthesis*

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

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

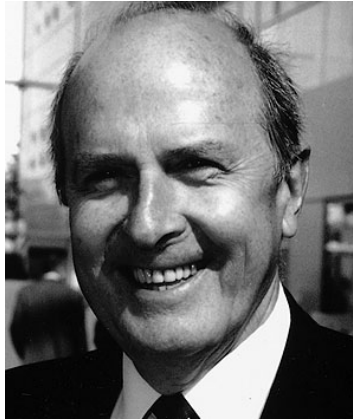
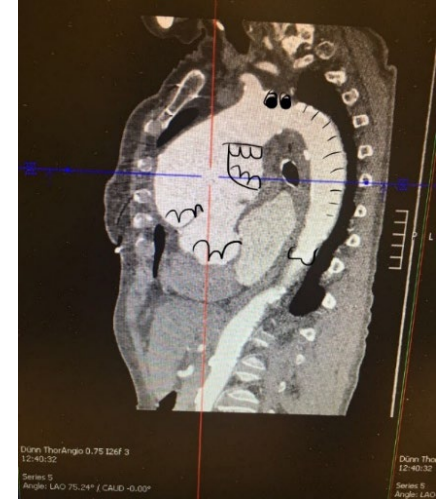
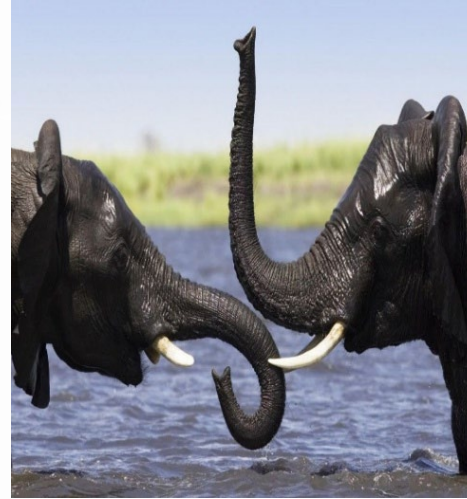


Fig. 1b

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

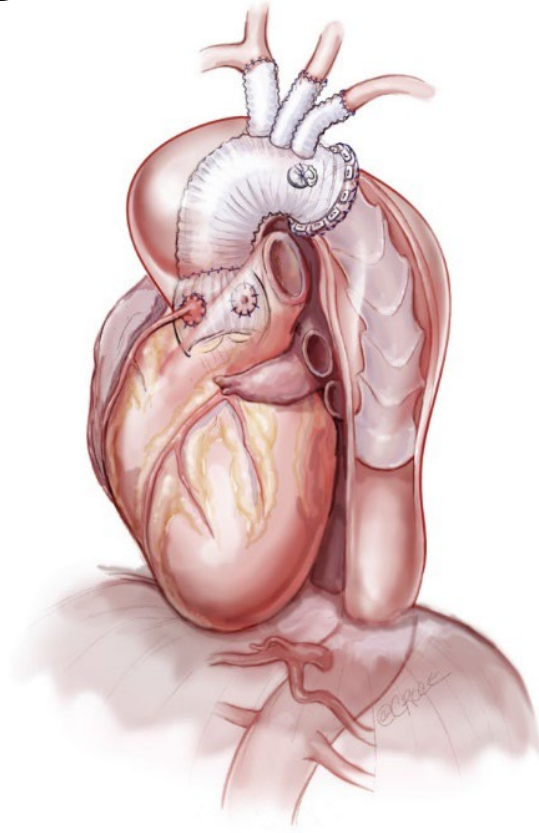
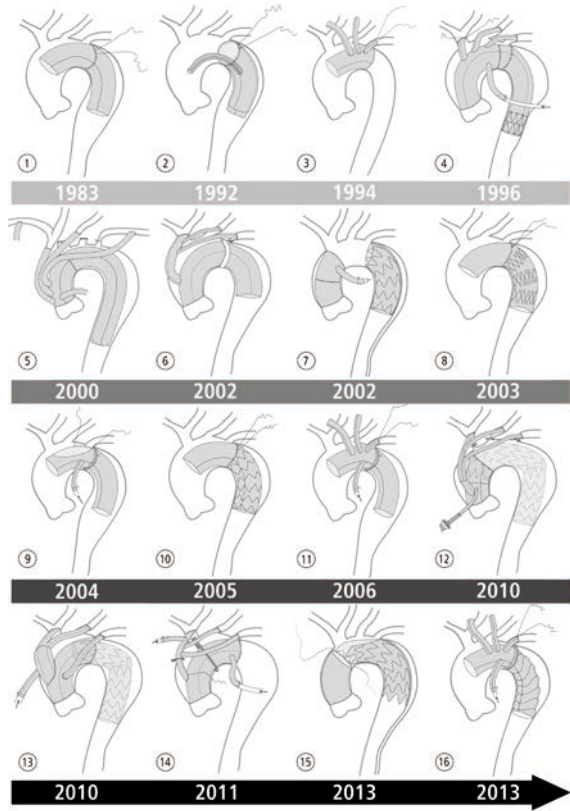
1983 „Elephant Tunk“



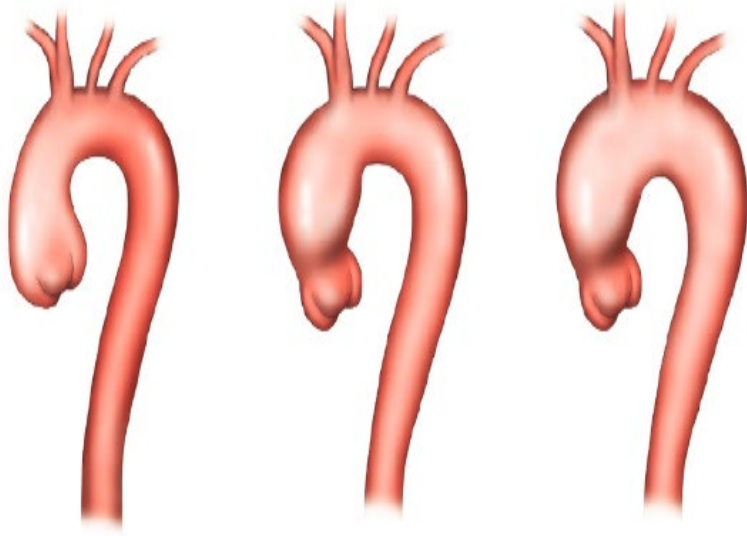
Doren ThorAngio 0.75 52sf 3
12:40:32
Series 5
Angles: LAO 75.24° / CAUD -0.00°

Doren Thor
12:40:32
Series 5
Angles: LAO

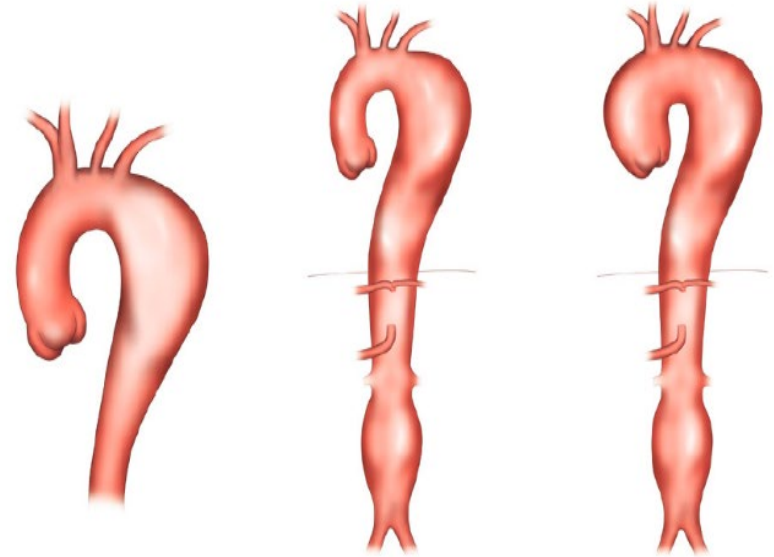
Geschichte der Aortenchirurgie



Chirurgische Therapie in Abhängigkeit der Lokalisation

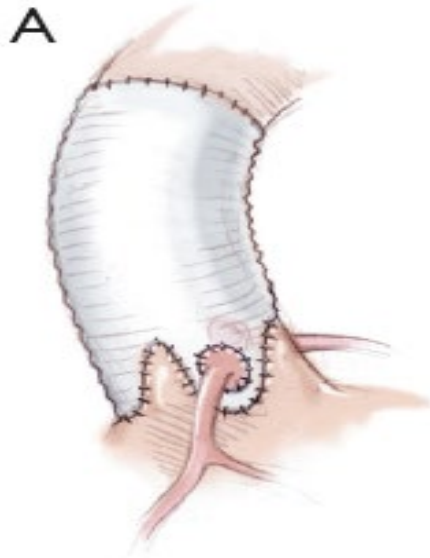


Aorta ascendens / Aortenbogen



Aorta descendens / thorakoabdominelle Aorta

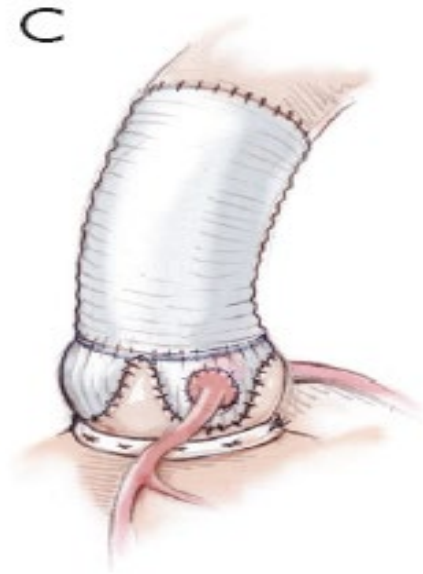
Operative Techniken: Aortenklappenrekonstruktion



**Yacoub
(Remodeling)**

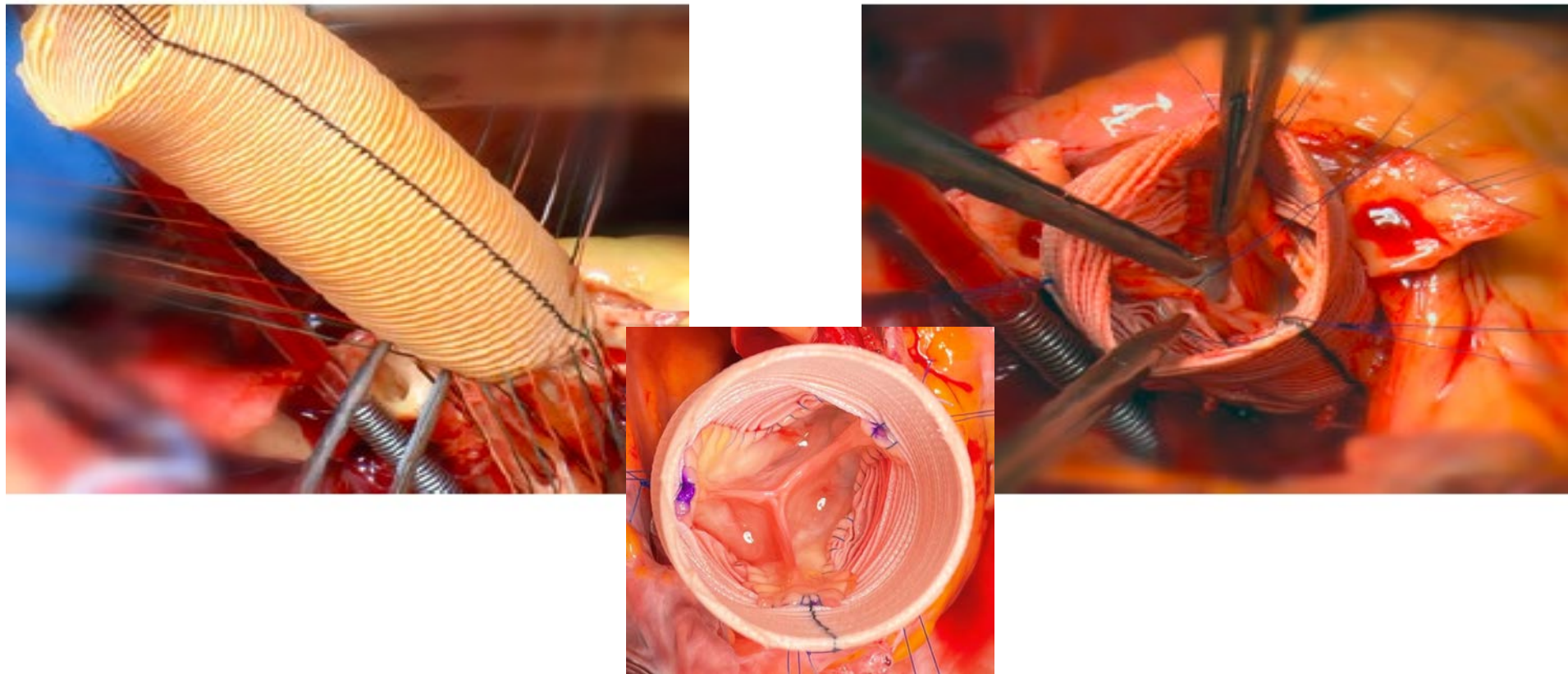


**David
(Reimplantation)**



**Yacoub + Stabilisation
(e.g. Lansac, Rankin, Schäfers)**

Operative Techniken: Aortenklappenrekonstruktion nach David



Operative Techniken: Aortenwurzelersatz mit klappentragendem Conduit (Bentall)



Mechanisches Conduit
(vorgefertigt)



Biologisches Conduit
(handgenäht)

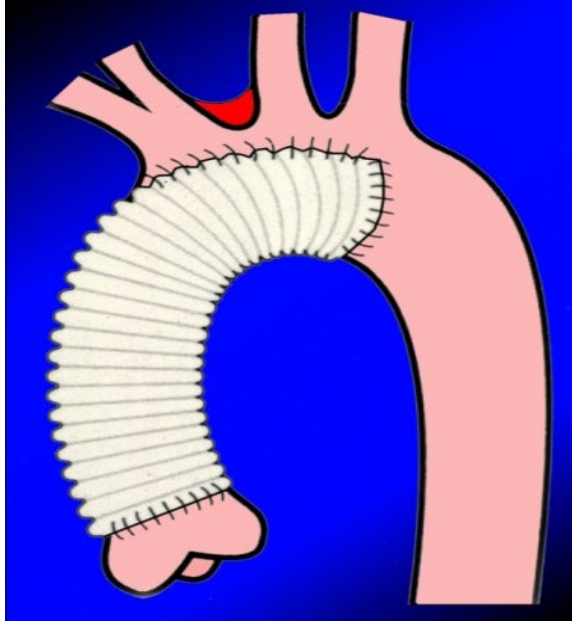


Biologisches Conduit
(vorgefertigt)

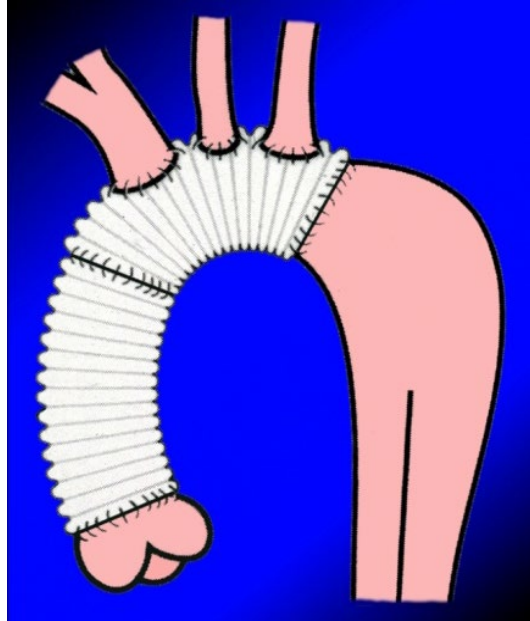


Biologische Prothese
(„Freestyle“)

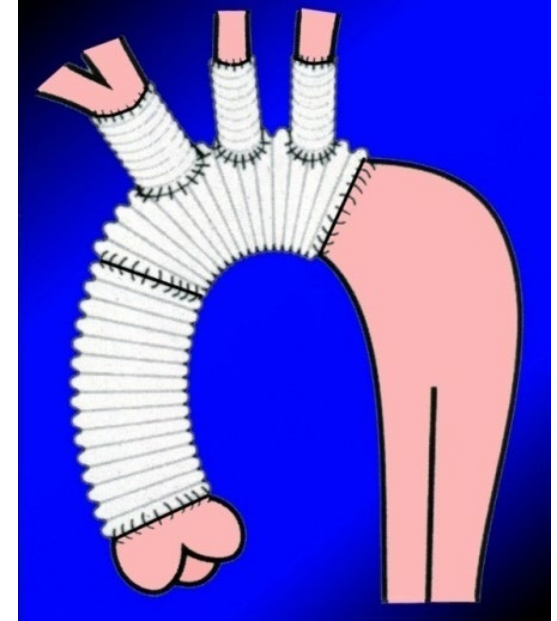
Operative Techniken: Aortenbogenersatz



Teil-Aortenbogen-Ersatz



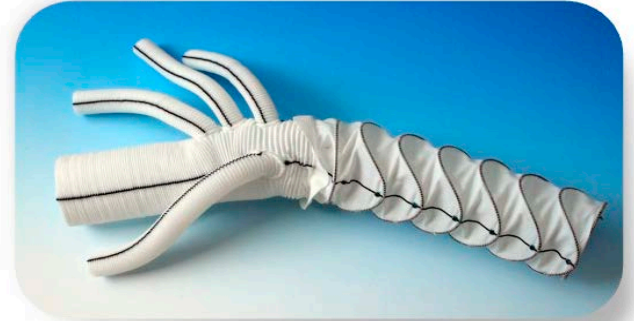
Kompletter Aortenbogen-Ersatz



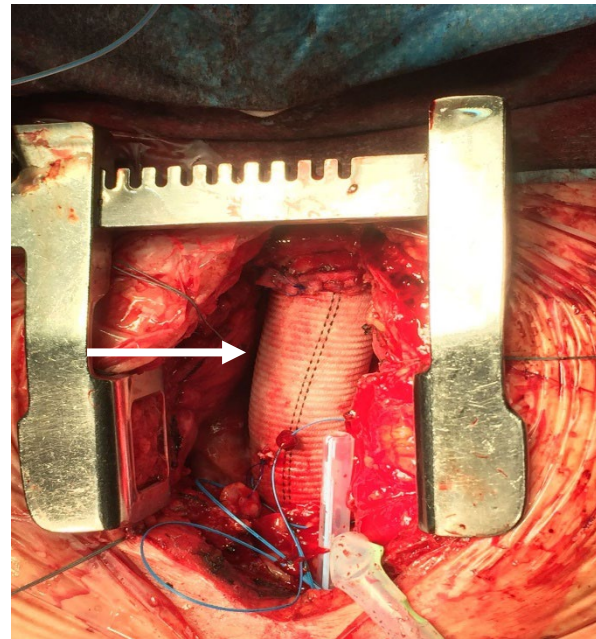
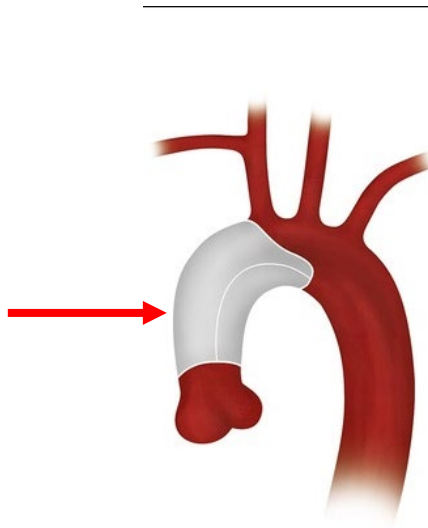
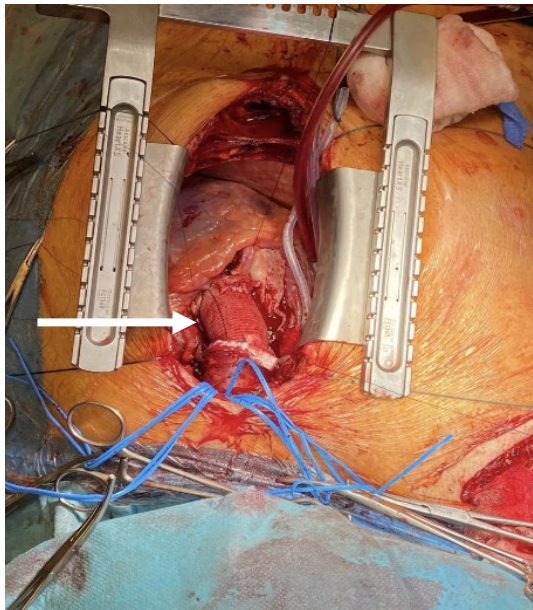
Kompletter Aortenbogen-Ersatz (branched technique)

Operative Techniken: Aortenbogenenersatz

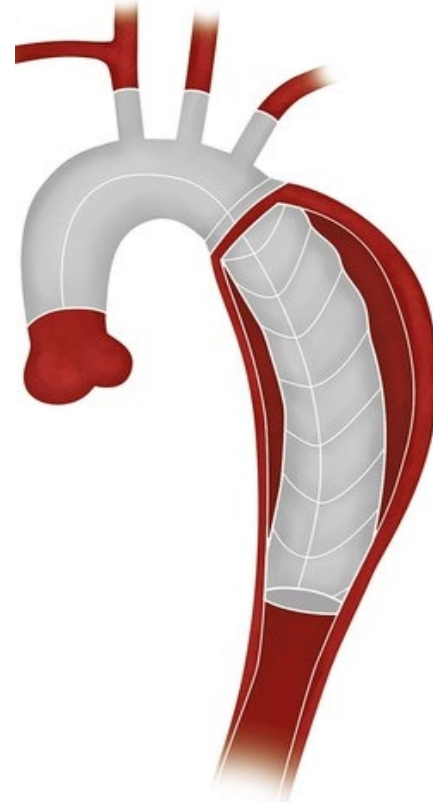
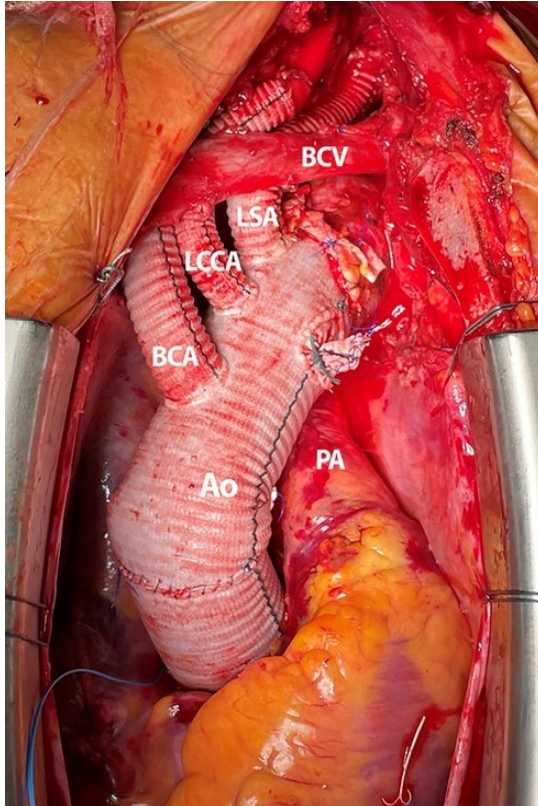
Frozen Elephant Trunk (FET)
Moderne Hybridprothese



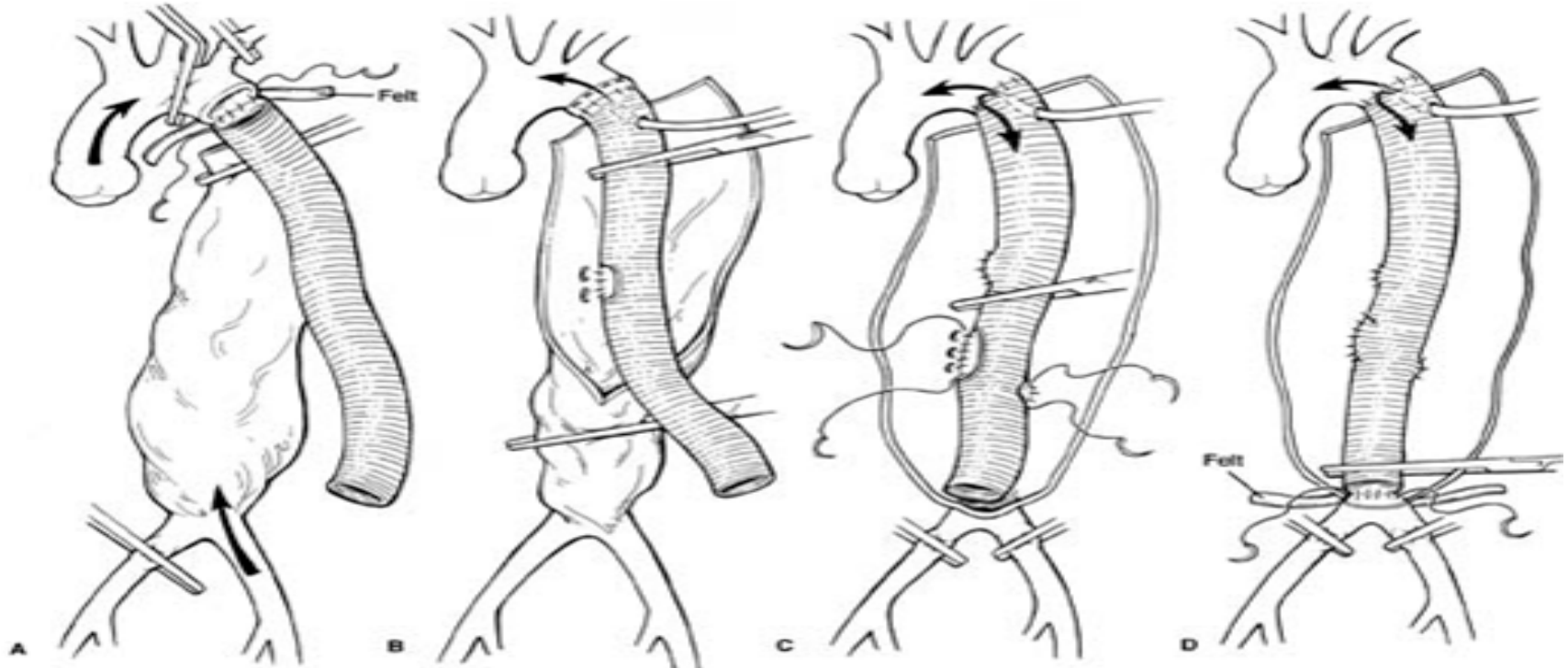
Teilbogenersatz bei Aortendissektion



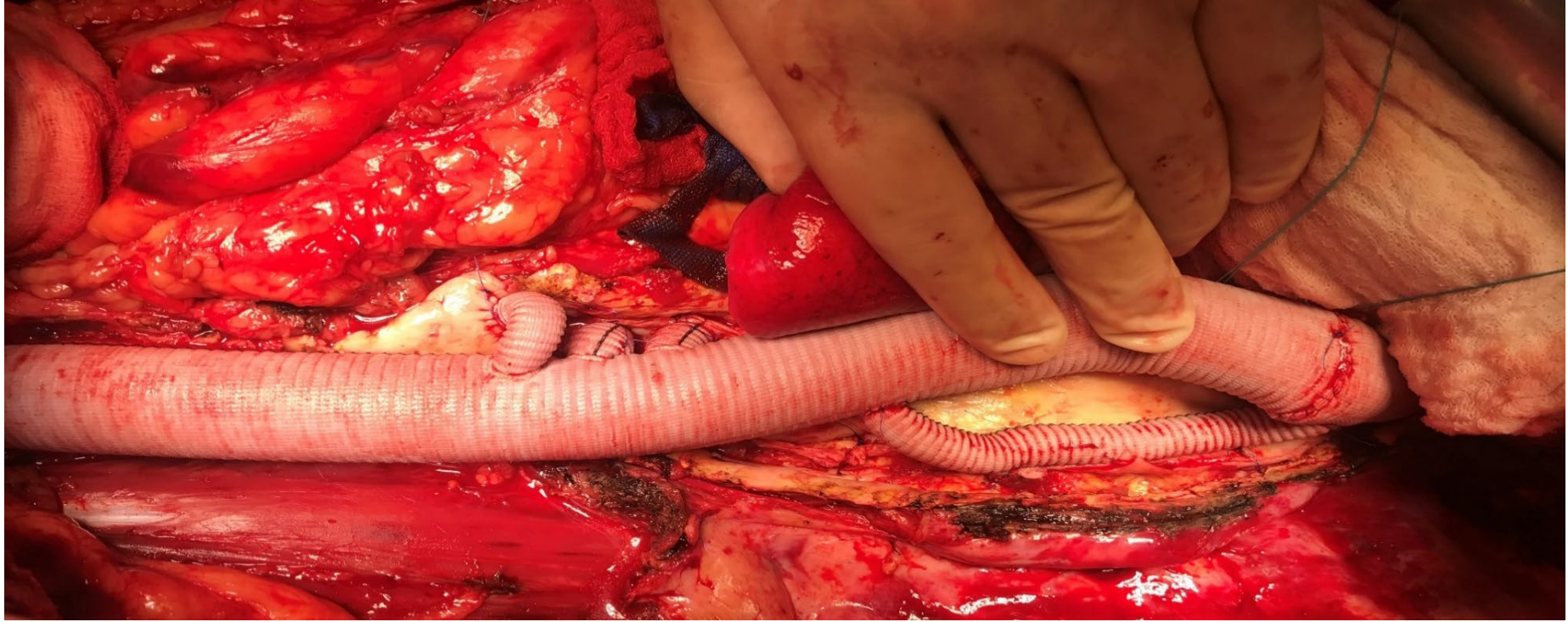
Operative Techniken: Aortenbogensersatz



Operative Techniken: Thorakoabdomineller Aortenersatz



Operative Techniken: Thorakoabdomineller Aortenersatz



Ausblick - Aortenchirurgie



Mehr Interventionen?

Mehr Chirurgie?

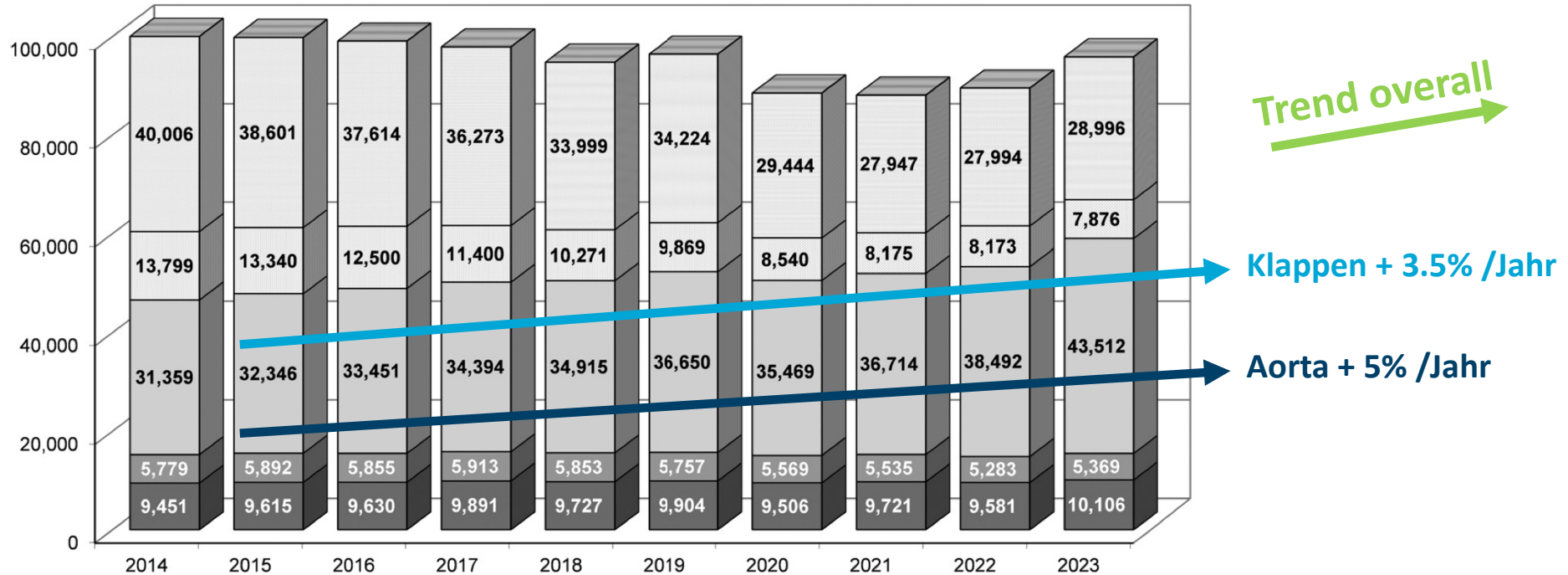
Genetische Behandlung?

Neue Prothesen?

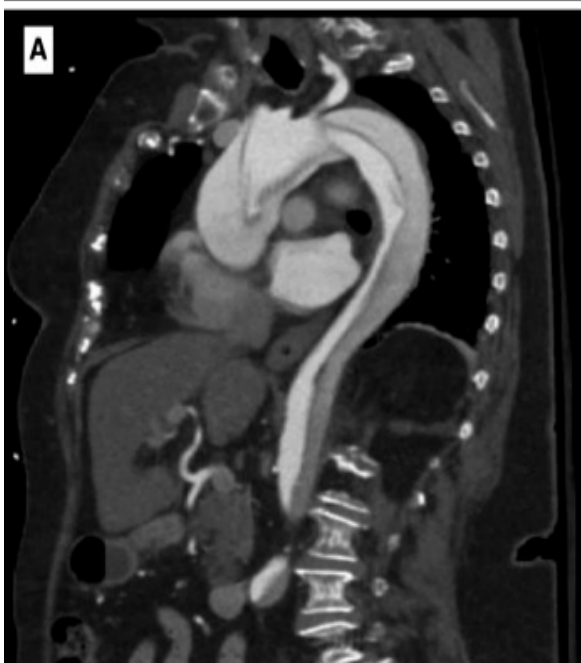
Künstliche Intelligenz?

Interdisziplinärer Ansatz?

Ausblick – herzchirurgische Eingriffe in Deutschland 2023



Weiterentwicklung: AMDS Hybridprothese



Präoperativ

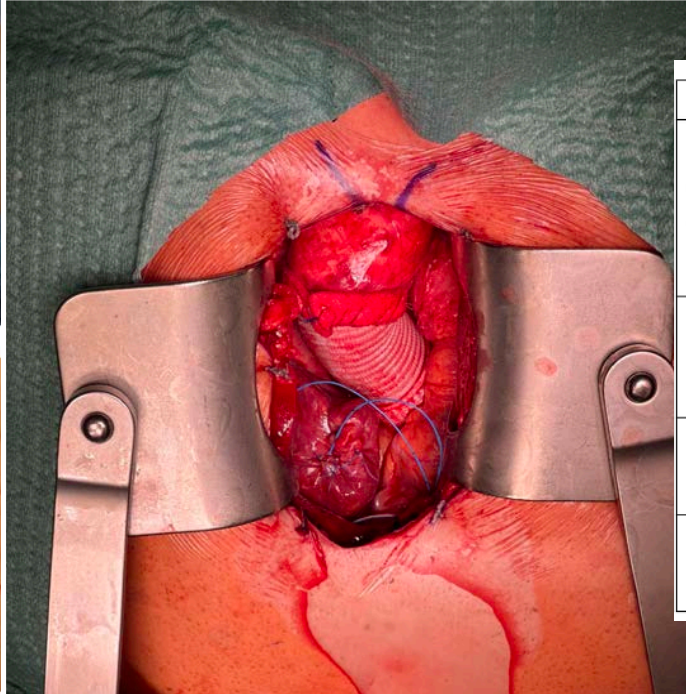
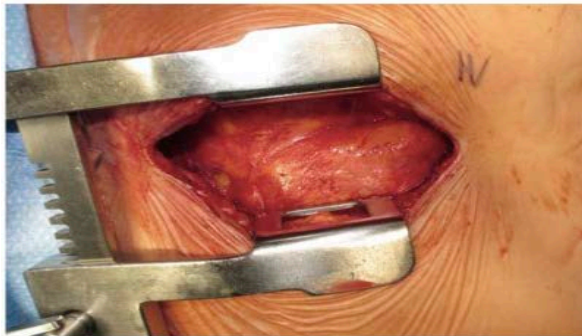


Postoperativ



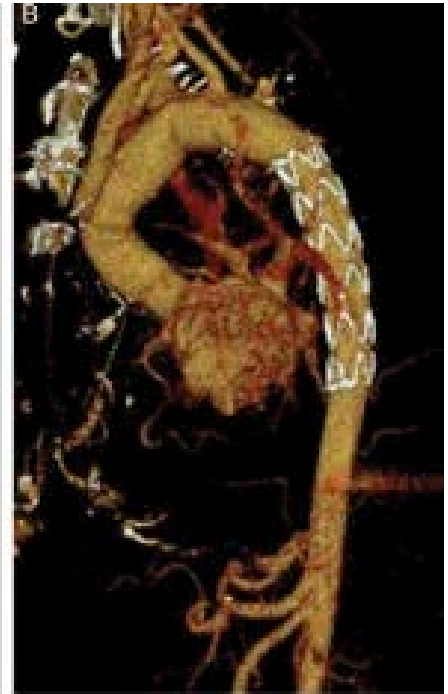
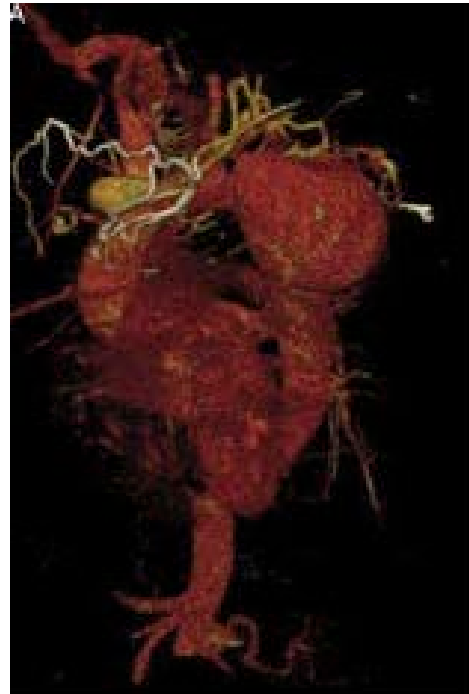
ARTIVION | **AMDS**
Hybrid Prosthesis

Weiterentwicklung: Minimalinvasive Aortenchirurgie



	J-shaped upper hemisternotomy	T-shaped upper hemisternotomy	V-/ Arrow- shaped hemisternotomy	Right anterior/ lateral thoracotomy
schematic				
advantages	• Frequently used, largest experience • lowest sternal trauma among hemisternotomies • Good horizontal stability	• Excellent exposure for complex aortic morphologies • Facilitates direct arterial and venous cannulation and venting	• Excellent exposure for complex aortic morphologies • Facilitates direct arterial and venous cannulation and venting • Better horizontal stability compared to T-shaped hemisternotomy	• Avoids sternal trauma • Immediate postoperative load stability of the thorax
disadvantages	• Limited exposure for abnormal ascending aorta and aortic arch positions	• relatively extensive sternal trauma • Low horizontal / translational stability	• relatively extensive sternal trauma	• Selective antegrade cerebral perfusion is not possible
references	Haunschild 2022 Kaneke 2012 Tabata 2007 Svensson 2001 Byrne 2000	Haunschild 2022	Stramoliński 2020	LaPiarta 2017 Lamelas 2018

Weiterentwicklung: Minimalinvasiver „frozen elephant trunk“



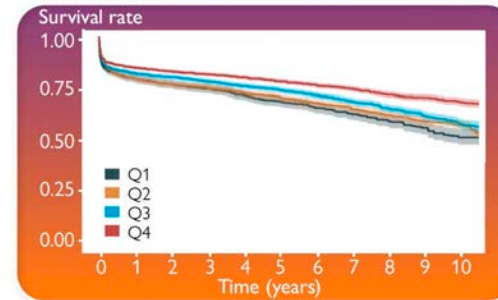
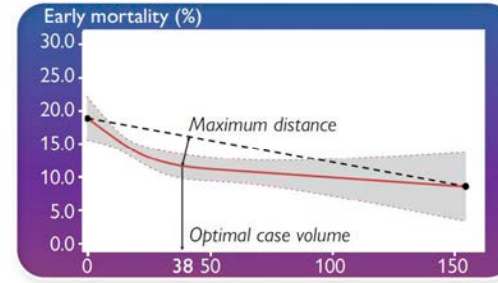
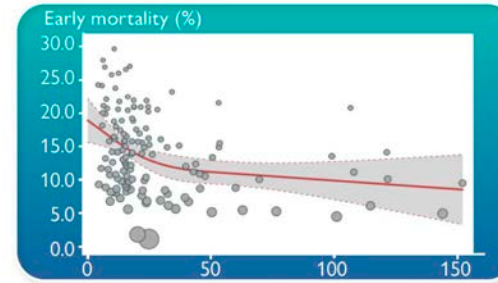
Ausblick – spezialisierte Zentren

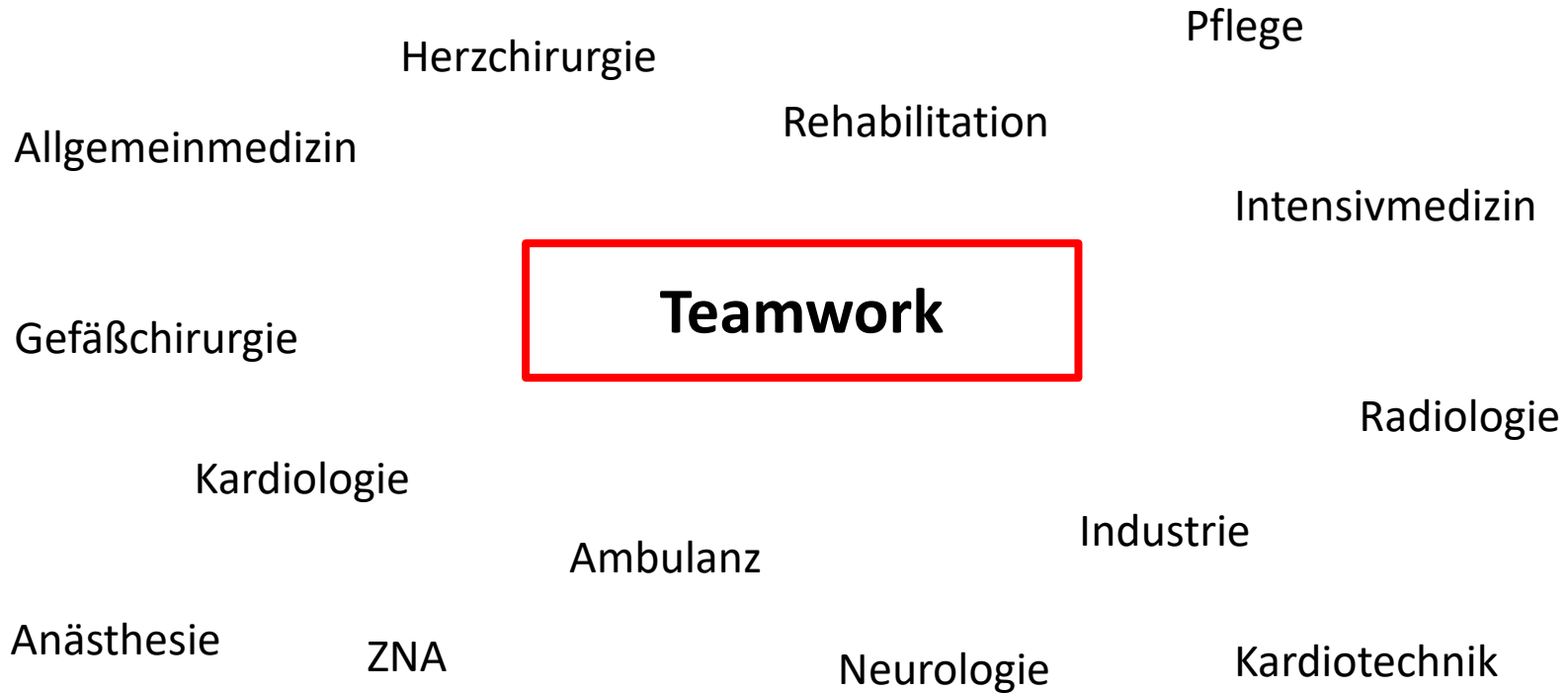
Recommendations	Class ^a	Level ^b	Ref ^c
Shared decision-making for the optimal treatment of aortic pathologies by a multidisciplinary aortic team is recommended.	I	C	-
In patients with multisegmental aortic disease, treatment is recommended in aortic centres providing open and endovascular cardiac and 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.

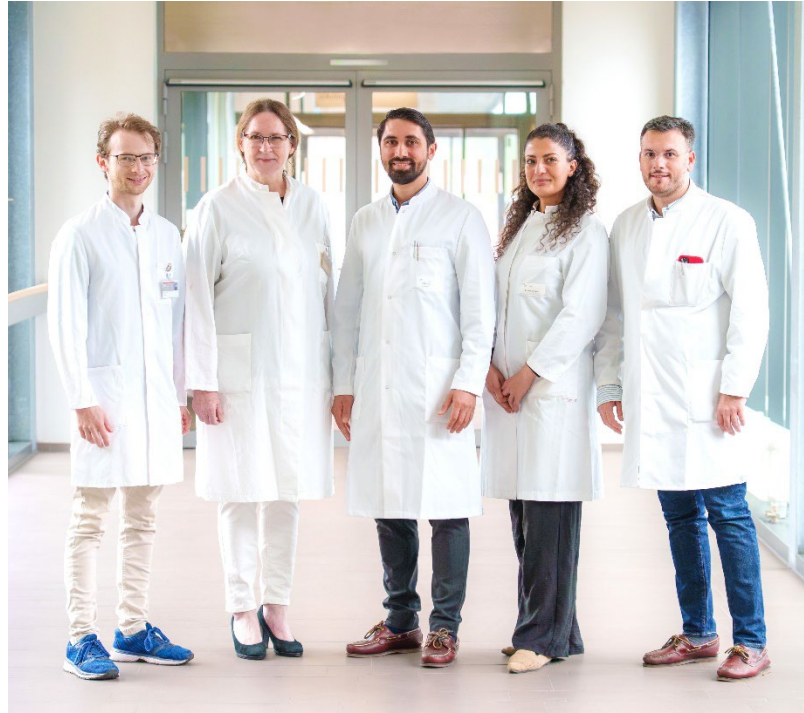




Aorten-Patiententag in Hannover 2024



**Vielen Dank für die Aufmerksamkeit
und bis zum nächsten Jahr!**



Ihr Aortenteam

- 10:00 – Begrüßung
- 10:30 Uhr **Dr. M. Arar**, Bereichsleiter Aorten Chirurgie
Prof. Dr. F. Lammert, Vizepräsident
Prof. Dr. B. Schmack, Leitender Oberarzt
- 10:30 – Bilder, Befunde, Entscheidungen – Der Weg zur OP
- 10:45 Uhr **Dr. E. Deniz**, Funktionsoberärztin Herzchirurgie
- 10:45 – Handwerk trifft Hightech – Operation an der Aorta
- 11:00 Uhr **Dr. M. Arar**, Bereichsleiter Aorten Chirurgie
- 11:00 – Endovaskulär – Wenn das Messer Pause hat
- 11:15 Uhr **Dr. V. Arar**, Assistenzärztin Gefäßchirurgie
- 11:15 – Die Aorta in der Familie – Genetik verstehen
- 11:30 Uhr **Prof. Dr. N. Di Donato**, Klinikdirektorin
Humangenetik
- 11:30 – Wie geht's weiter nach der Operation?
- 11:45 Uhr **Dr. F. Helms**, Assistenzarzt Herzchirurgie

