

16. November 2024

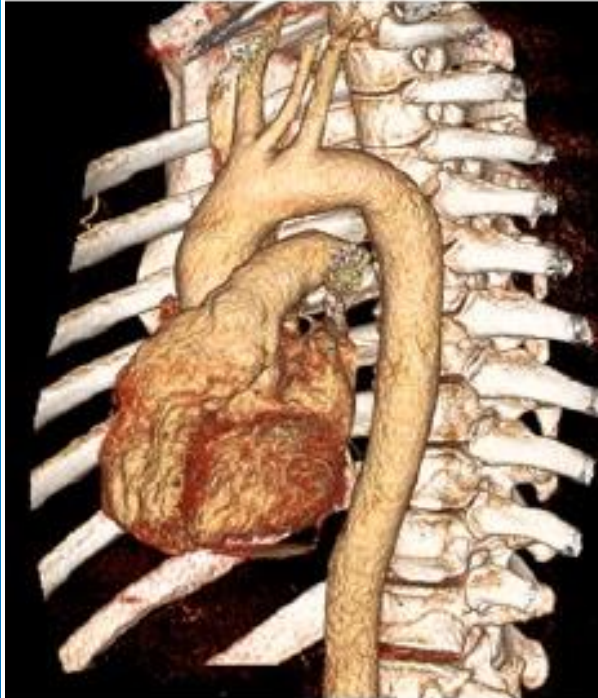
# Aktuelle Behandlungsstandards Aortenerkrankungen

**Dr. med. Morsi Arar**

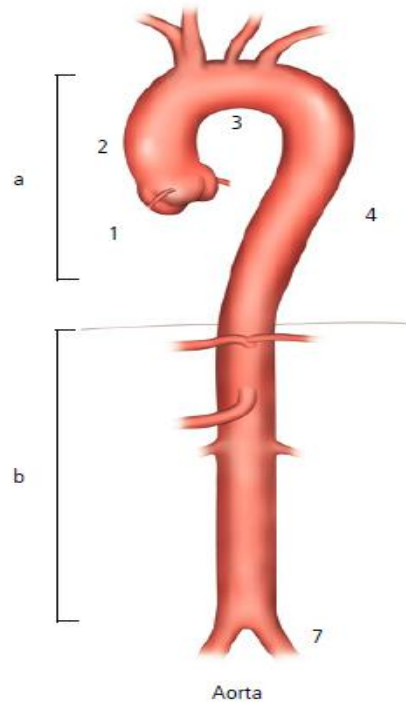
Universitätsklinik für Herzchirurgie, Klinikum Oldenburg



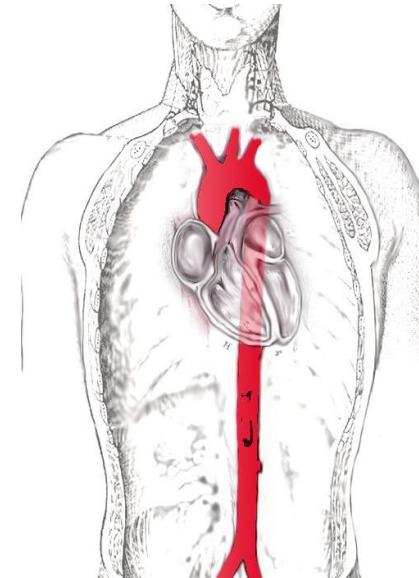
# Lebensader „Aorta“



Aorta thoracalis

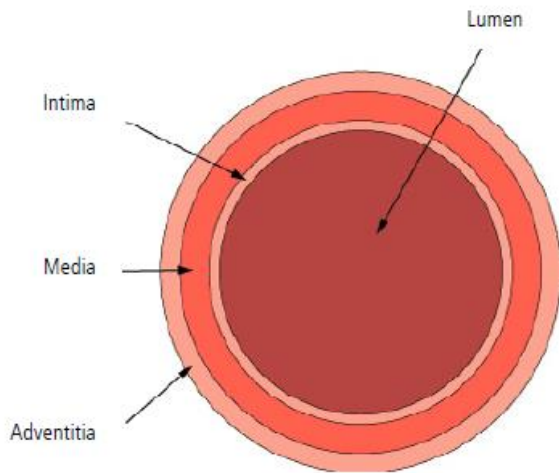


Aorta abdominalis



1: Aortenwurzel, 2: Aorta ascendens, 3: Aortenbogen, 4: Aorta descendens

# Anatomie der Aorta



Normalwerte thorakale Aorta des Erwachsenen in der Computertomografie (CT) (in cm)

Lokalisation	Weiblich	Männlich
Aortenwurzel	3,5-3,7	3,6-3,9
Aorta ascendens	2,9	2,9
Aorta descendens	2,4-2,6	2,5-3,0
thorako-abdomineller Übergang	2,4	2,4-2,7

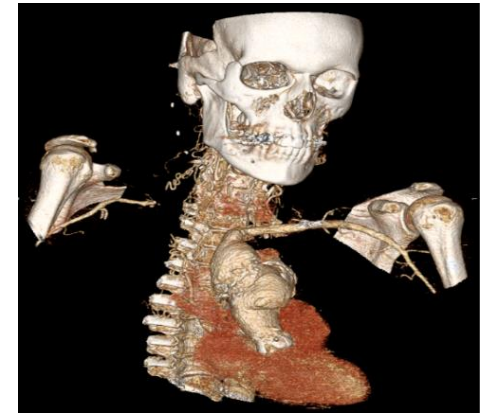
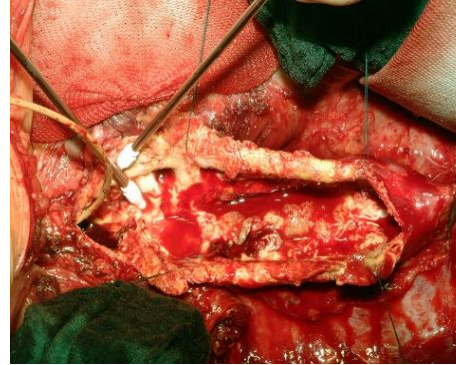
(nach Elefteriades et al.)



CTA: Normalbefund

# Genese der Aortenerkrankungen

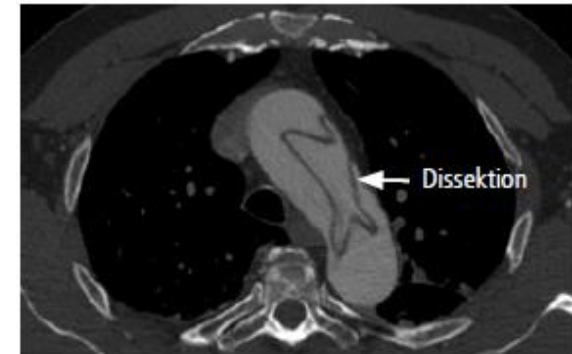
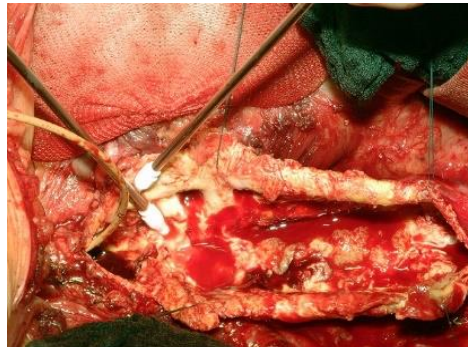
- Atherosklerose
- Degeneration
- Bindegewebserkrankungen
- Trauma
- Autoimmunerkrankungen





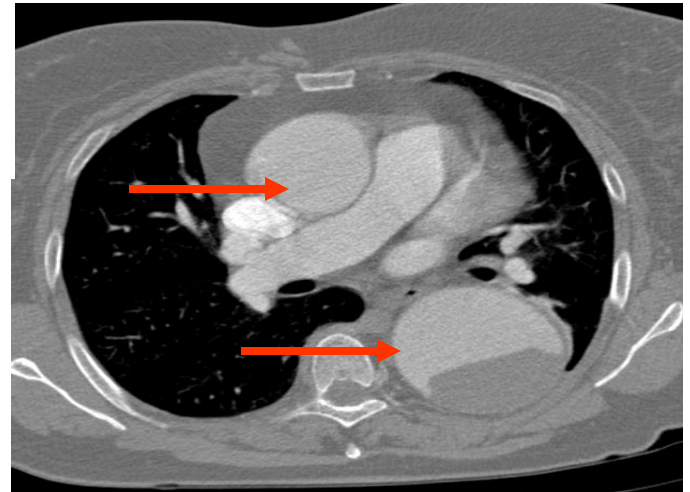
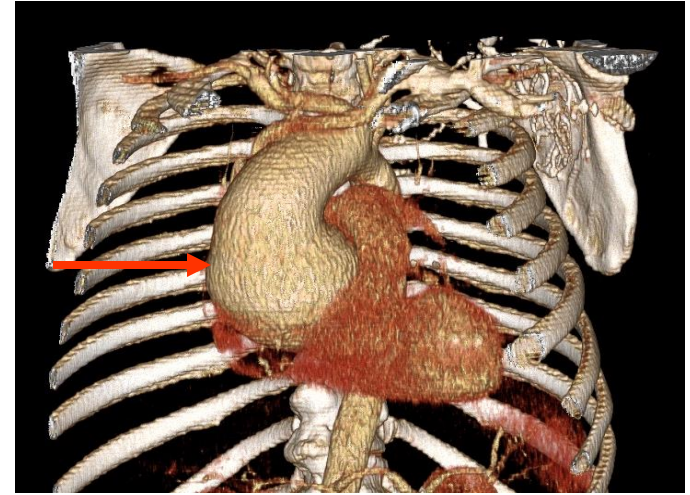
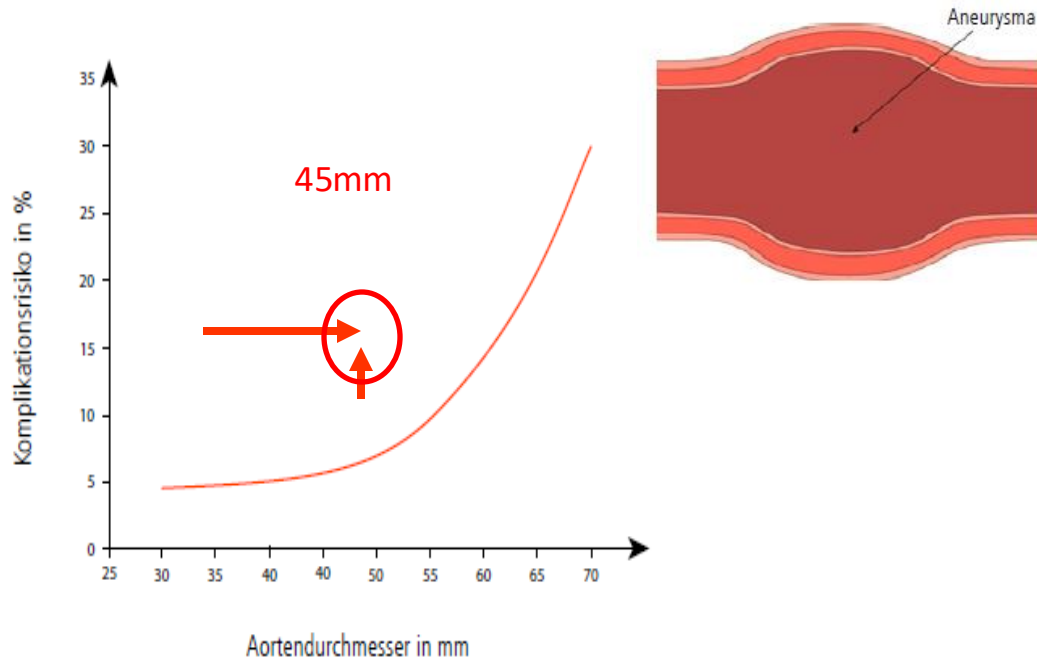
# Welche Erkrankungen gibt es?

- Aneurysma
- Dissektion
- IMH
- PAU
- Traumatische AD



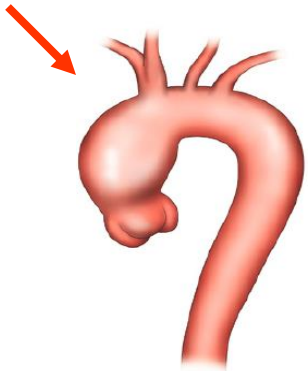
# Aortenaneurysma

Meistens chronisch und Zufallbefund  
Keine Symptome

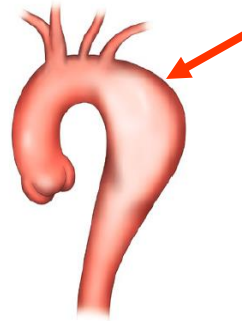


CTA: Megaaortensyndrom

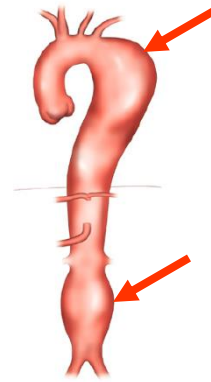
# Aortenaneurysma



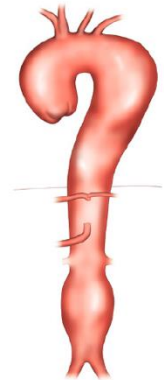
Ascendens-Aneurysma



Descendens-Aneurysma



Thorakoabdominelles  
Aortenaneurysma  
(TAAA)



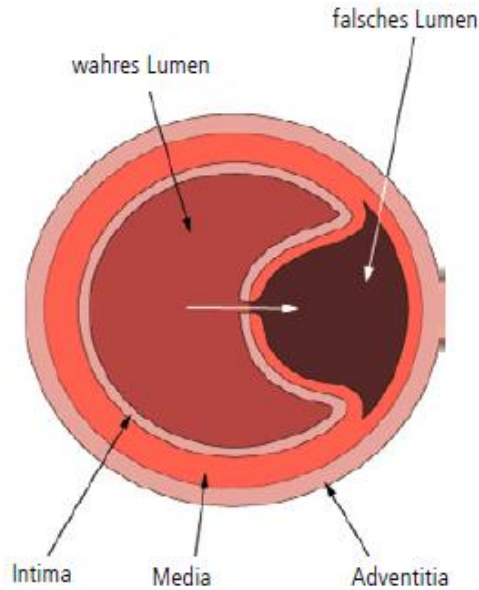
Megaaortensyndrom

# Aortendissektion



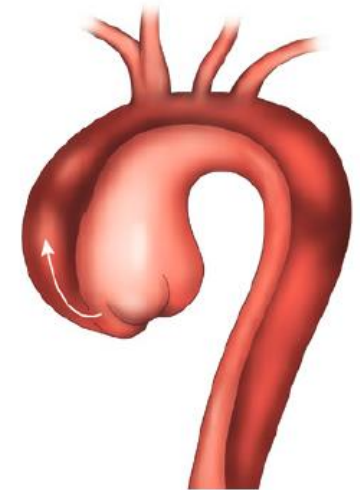
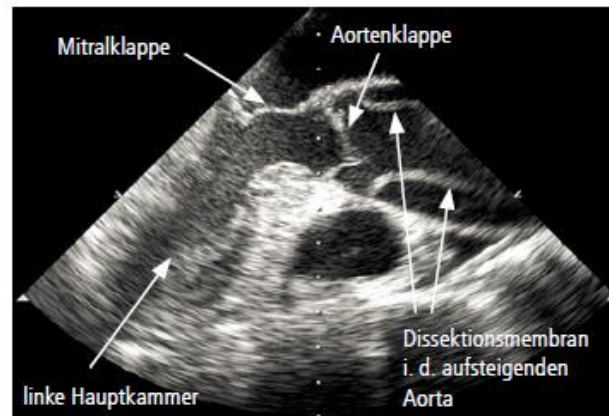


# Aortendissektion

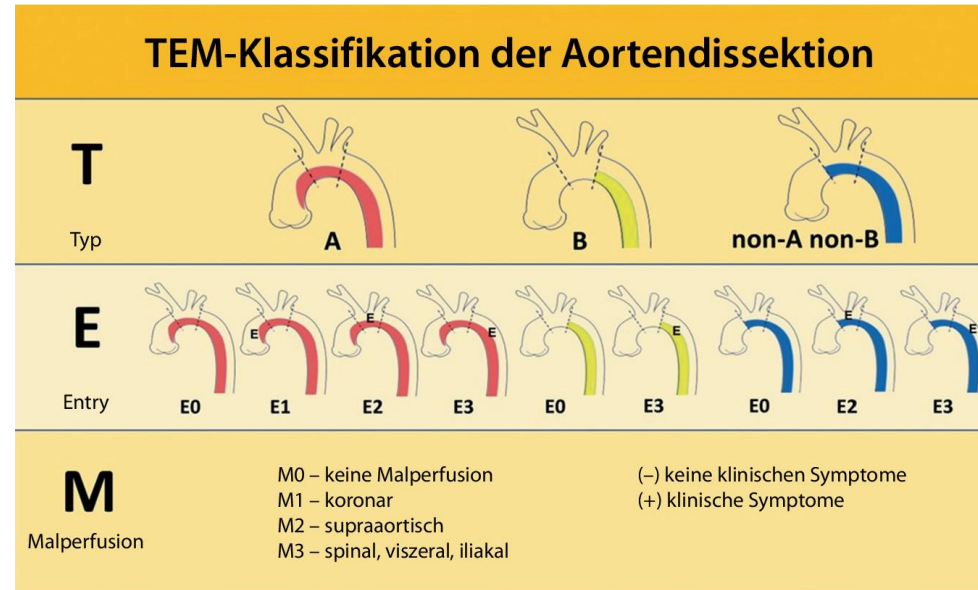
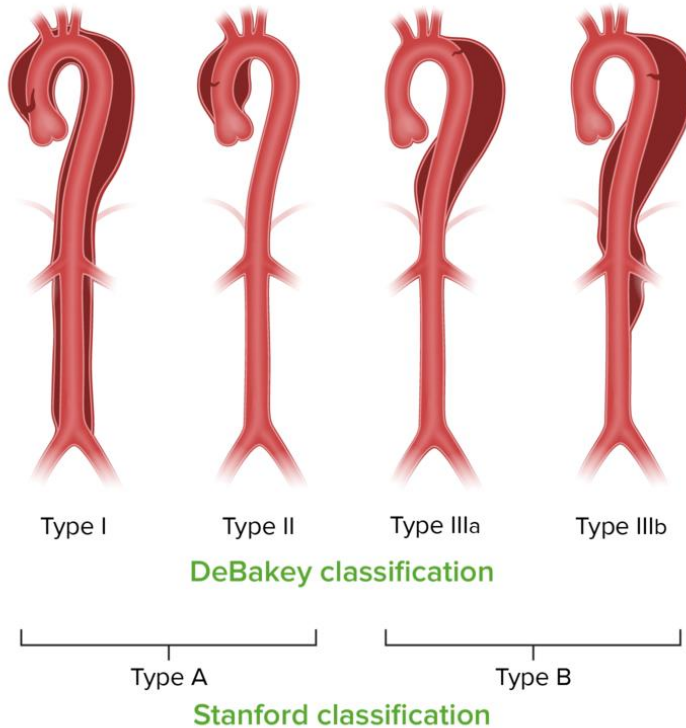


## Symptome:

- Thorakaler Vernichtungsschmerz/ Wanderschmerz
- Periphere Durchblutungsstörungen
- Neurologische Symptome
- Schock



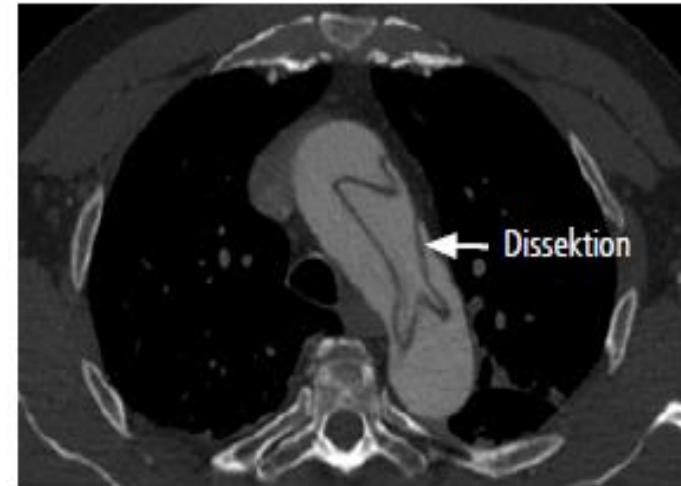
# Aortendissektion



# Aortendissektion

## Etiology of out-of-hospital cardiac arrest diagnosed via detailed examinations including perimortem computed tomography

Yoshihiro Moriwaki <sup>1</sup>, Yoshio Tahara, Takayuki Kosuge, Noriyuki Suzuki



## Aortendissektion mit 8% Hauptursache für außerklinische Reanimationen

Die unbehandelte „Typ A-Dissektion“ hat aufgrund der Komplikationsmöglichkeiten eine extrem hohe Sterblichkeit, die in den ersten 48 Stunden bei ca. 40-60% liegt (ca. 1% pro Stunde!)

Moriwaki Y et al. J Emerg Trauma Shock 2013

# Chirurgische Therapie „ESC Guidelines 2014-2023“



European Heart Journal (2014) 35, 2873–2926  
doi:10.1093/eurheartj/ehu281

ESC GUIDELINES

## 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases

Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult

The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC)

**Authors/Task Force members: Raimund Erbel\* (Chairperson) (Germany), Victor Aboyans\* (Chairperson) (France), Catherine Boileau (France), Eduardo Bossone (Italy), Roberto Di Bartolomeo (Italy), Holger Eggebrecht (Germany), Arturo Evangelista (Spain), Volkmar Falk (Switzerland), Herbert Frank (Austria), Oliver Gaemperli (Switzerland), Martin Grabenwöger (Austria), Axel Haverich (Germany), Bernard Iung (France), Athanasios John Manolis (Greece), Folkert Meijboom (Netherlands), Christoph A. Nienaber (Germany), Marco Roffi (Switzerland), Hervé Rousseau (France), Udo Sechtem (Germany), Per Anton Sirnes (Norway), Regula S. von Allmen (Switzerland), Christiaan J.M. Vrints (Belgium).**

Erbel R, et al. *European heart journal* 2014; 35(41): 2873-926.

# Chirurgische Therapie „ESC Guidelines 2014-2023“

## Recommendations on interventions on ascending aortic aneurysms

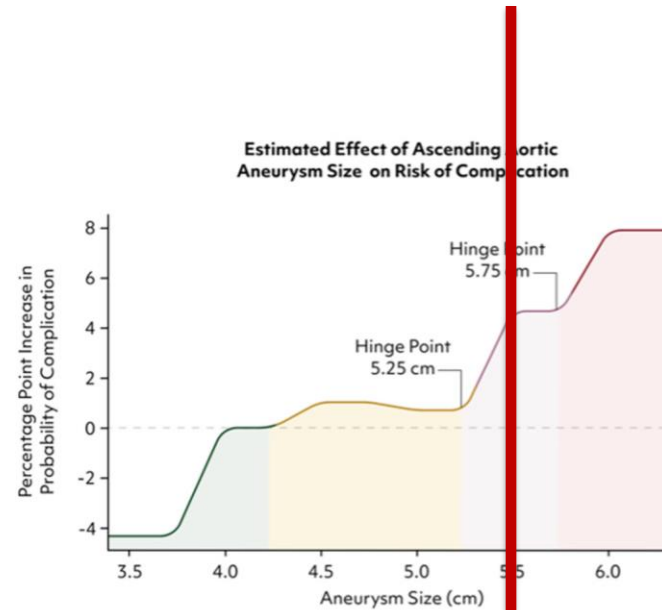
Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Surgery is indicated in patients who have aortic root aneurysm, with maximal aortic diameter <sup>c</sup> $\geq 50$ mm for patients with Marfan syndrome.	I	C
Surgery should be considered in patients who have aortic root aneurysm, with maximal ascending aortic diameters: <ul style="list-style-type: none"> <li>• <math>\geq 45</math> mm for patients with Marfan syndrome with risk factors.<sup>d</sup></li> <li>• <math>\geq 50</math> mm for patients with bicuspid valve with risk factors.<sup>e,f</sup></li> <li>• <math>\geq 55</math> mm for other patients with no elastopathy.<sup>g,h</sup></li> </ul>	IIa	C
Lower thresholds for intervention may be considered according to body surface area in patients of small stature or in the case of rapid progression, aortic valve regurgitation, planned pregnancy, and patient's preference.	IIb	C

- Aortenaneurysma: 55mm
- Bicuspide Aortenklappe: 55mm
- Aortenwurzel: 55mm
- Herz OP: AI und 50mm

Erbel R, et al. *European heart journal* 2014; **35**(41): 2873-926.



# Chirurgische Therapie „ESC Guidelines 2014-2023“

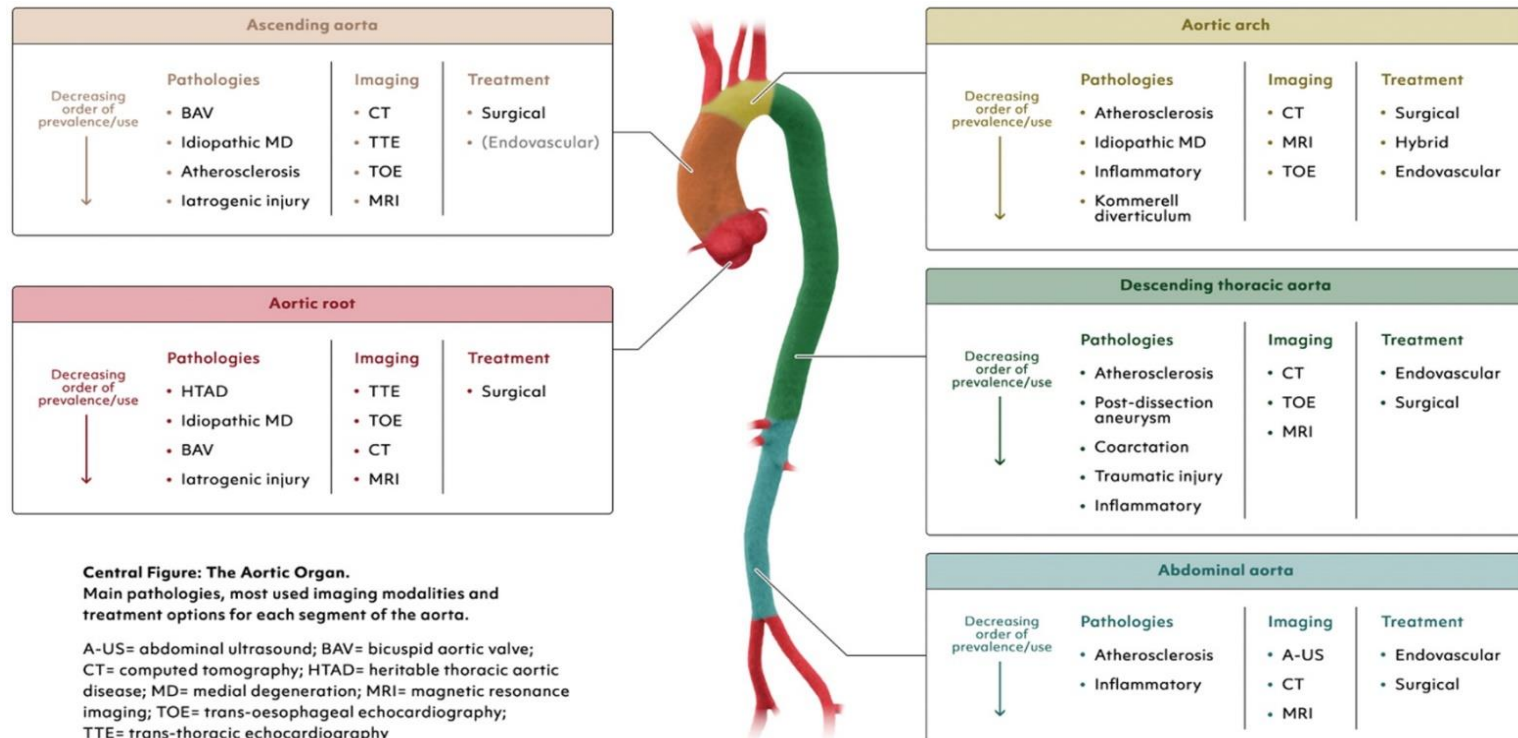


**55  
mm**

Czemy M, et al. *Eur J Cardiothorac Surg* 2024; **65**(2).

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

Authors/Task Force Members: Martin Czerny <sup>ID a,b,x,t</sup> (Co-Chairperson) (Germany), Martin Grabenwöger <sup>c,d,x,t</sup> (Co-Chairperson) (Austria), Tim Berger <sup>a,b</sup> (Task Force Coordinator), Victor Aboyans <sup>e,f</sup> (France), Alessandro Della Corte <sup>g,h</sup> (Italy), Edward P. Chen <sup>i</sup> (USA), Nimesh D. Desai <sup>j</sup> (USA), Julia Dumfarth <sup>k</sup> (Austria), John A. Elefteriades <sup>l</sup> (USA), Christian D. Etz <sup>m</sup> (Germany), Karen M. Kim <sup>n</sup> (USA), Maximilian Kreibich <sup>a,b</sup> (Germany), Mario Lescan <sup>o</sup> (Germany), Luca Di Marco <sup>p</sup> (Italy), Andreas Martens <sup>q,r</sup> (Germany), Carlos A. Mestres <sup>s</sup> (South Africa), Milan Milojevic <sup>t</sup> (Serbia), Christoph A. Nienaber <sup>u,v</sup> (UK), Gabriele Piffaretti <sup>w</sup> (Italy), Ourania Preventza <sup>x</sup> (USA), Eduard Quintana <sup>y</sup> (Spain), Bartosz Ryłski <sup>a,b</sup> (Germany), Christopher L. Schlett <sup>b,z</sup> (Germany), Florian Schoenhoff <sup>aa</sup> (Switzerland), Santi Trimarchi <sup>ab</sup> (Italy) and Konstantinos Tsagakis <sup>ac</sup> (Germany), EACTS/STS Scientific Document Group



# Aortic Guideline EACTS/STS 2024

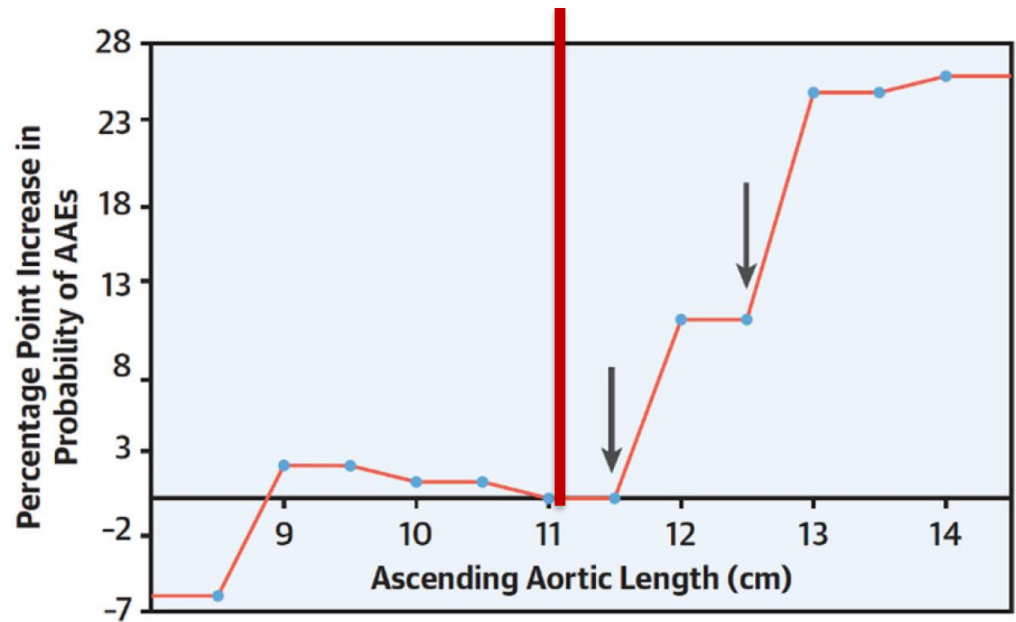
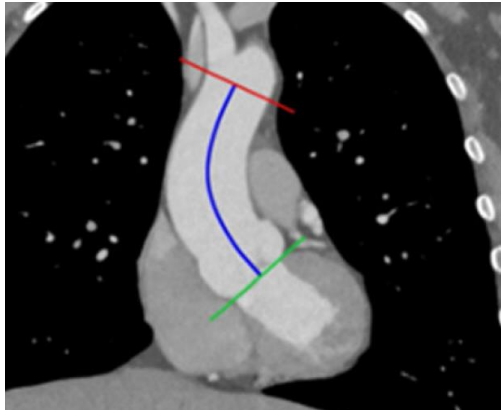
Recommendation Table 12: Chronic aortic diseases: root and ascending aorta

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>	Ref <sup>c</sup>
Surgery for an ascending aortic aneurysm located at the root or tubular tract, either with TAV or BAV, is recommended when the maximum aortic diameter is $\geq 55$ mm.	I	B	[333, 334]
Surgery for BAV-related aortopathy with 'root phenotype' is recommended when the maximum aortic diameter is $\geq 50$ mm.	I	B	[82, 84-87, 335]
Surgery for TAV-associated aneurysms with 'root phenotype' should be considered when the maximum aortic diameter is $\geq 50$ mm in a low-surgical-risk setting. <sup>d</sup>	IIa	B	[87, 336-338]
In patients with low surgical risk <sup>e</sup> and 'ascending phenotype' dilatation, both with TAV and BAV, surgical treatment should be considered when the maximum aortic diameter is $>52$ mm.	IIa	C	-
In patients with low surgical risk and 'ascending phenotype' BAV-related aortopathy, surgery should be considered at a maximum diameter $\geq 50$ mm if any of the following is present: <ul style="list-style-type: none"> <li>• age <math>&lt; 50</math> years</li> <li>• short stature (<math>&lt; 1.69</math> m)<sup>f</sup></li> <li>• ascending aortic length <math>&gt; 11</math> cm<sup>g</sup></li> <li>• aortic diameter growth rate <math>&gt; 3</math> mm/year</li> <li>• family history of the acute aortic syndrome</li> <li>• aortic coarctation</li> <li>• refractory hypertension</li> <li>• shared decision with the patient<sup>h</sup></li> <li>• concomitant non-aortic valve cardiac surgery</li> </ul>	IIa	C	-
In patients with non-syndromic TAV with 'ascending phenotype', in a low-surgical-risk setting, <sup>d</sup> surgery may be considered at a maximum diameter $\geq 50$ mm if any of the following is present: <ul style="list-style-type: none"> <li>• age <math>&lt; 50</math> years</li> <li>• short stature (<math>&lt; 1.69</math> m)<sup>f</sup></li> <li>• ascending aortic length <math>&gt; 11</math> cm<sup>g</sup></li> <li>• aortic diameter growth rate <math>&gt; 3</math> mm/year</li> <li>• refractory hypertension</li> <li>• shared decision with the patient<sup>h</sup></li> </ul>	IIb	C	-
Surgery for aortic dilatation in TAV patients undergoing non-aortic valve cardiac surgery should be considered at a root or ascending diameter $> 50$ mm.	IIa	C	-
Surgery for aortic dilatation in patients undergoing aortic valve surgery should be considered at a root or ascending diameter $\geq 45$ mm.	IIa	C	-
Surgery for aortic root dilatation in patients undergoing surgery for ascending aortic aneurysm should be considered at an aortic root diameter $\geq 45$ mm.	IIa	C	-
In patients with young age, a family history of the acute type A aortic dissection or known HTAD who are undergoing ascending replacement, a lower threshold than 45 mm may be considered for concomitant root replacement on an individual basis.	IIb	C	-

## Risiko Faktoren:

- Alter  $< 50$  Jahre
- Körpergröße ( $< 1,69$  m)
- Aorta Asc  $> 11$  cm lang
- Wachstumsrate  $> 3$  mm/Jahr
- Familienanamnese
- Aortenkoarktation
- refraktärer Bluthochdruck
- Patientenwunsch
- begleitende Herzoperationen ohne Aortenklappe

Czerny M, et al. *Eur J Cardiothorac Surg* 2024; **65**(2).



**11 cm**

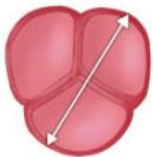
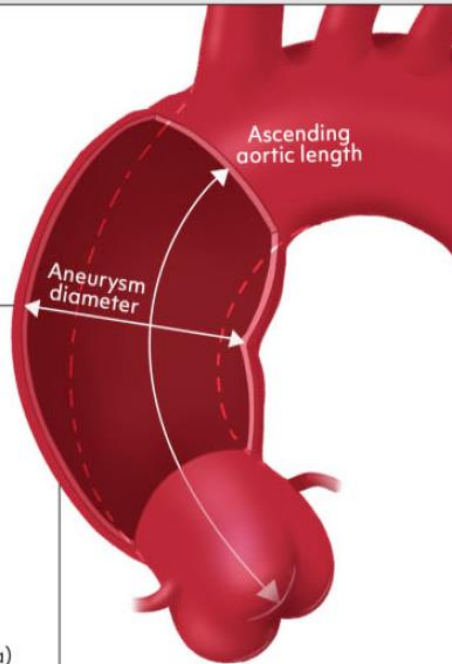
Czerny M, et al. EACTS/STS Guidelines for diagnosing and treating acute and chronic syndromes of the aortic organ. *Eur J Cardiothorac Surg.* 2024

Thresholds for intervention in aortic root and ascending aortic aneurysm

Tricuspid aortic valve (TAV)

Thresholds ascending phenotype:

- $\geq 55\text{mm}$  (I)
- $> 52\text{mm}$  (IIa)
- $\geq 50\text{mm}$  in low-risk patients with RF\* (IIb)
- $\geq 45\text{mm}$  when undergoing AV surgery (IIa)



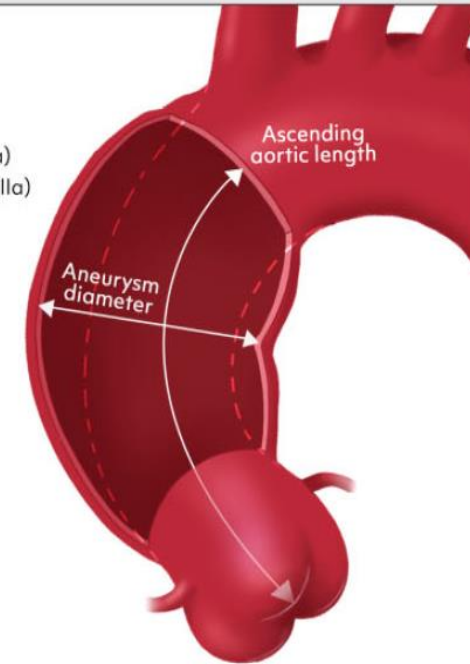
Thresholds root phenotype:

- $\geq 55\text{mm}$  (I)
- $\geq 50\text{mm}$  in low-risk patients (IIa)
- $\geq 45\text{mm}$  when undergoing AV surgery (IIa)

Bicuspid aortic valve (BAV)

Thresholds ascending phenotype:

- $\geq 55\text{mm}$  (I)
- $> 52\text{mm}$  (IIa)
- $\geq 50\text{mm}$  in low-risk patients with RF (IIa)
- $\geq 45\text{mm}$  when undergoing AV surgery (IIa)



Thresholds root phenotype:

- $\geq 50\text{mm}$  (I)
- $\geq 45\text{mm}$  when undergoing AV surgery (IIa)

\*Risk factors (RF)



Length of ascending aorta  $\geq 11\text{cm}$



$> 3\text{mm}$  diameter increase per year



Height  $< 1.69\text{m}$



Age  $< 50$  years old



Arterial hypertension

Czerny M, et al. *Eur J Cardiothorac Surg* 2024.








# OP-Indikation ab 2024



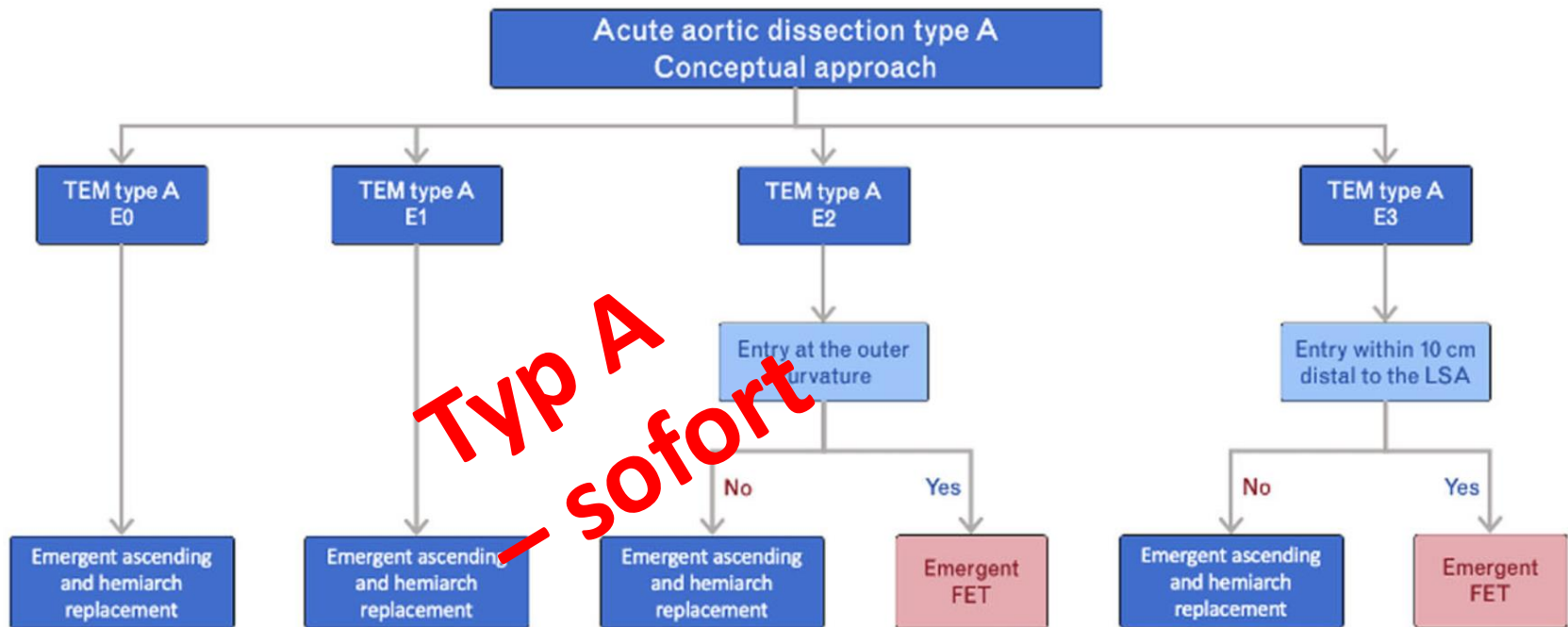
- Aortenwurzel: BAV und TAV ab 45mm bzw. 50mm
- Aorta Ascendens: ab 52mm
- Bei Risikofaktoren: ab 50mm
- Anatomische Besonderheiten: ab 50mm
- Prophylaktische Indikation: ab 50 mm (Patientenwunsch)
- Im Rahmen einer Herzoperation: ab 45mm
- Bindegewebserkrankungen: ab 45 mm

\*Risk factors (RF)

 Length of ascending aorta $\geq 11$ cm	 $>3$ mm diameter increase per year	 Height $< 1.69$ m	 Age $< 50$ years old	 Arterial hypertension
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# Aortic Guideline EACTS/STS 2024

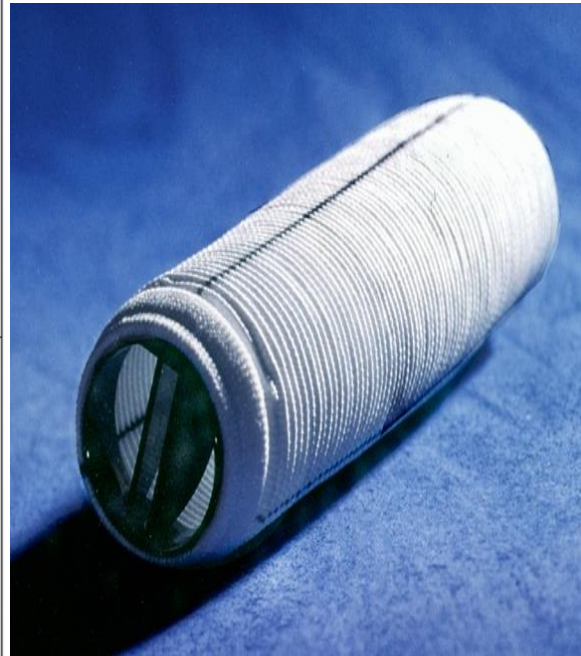
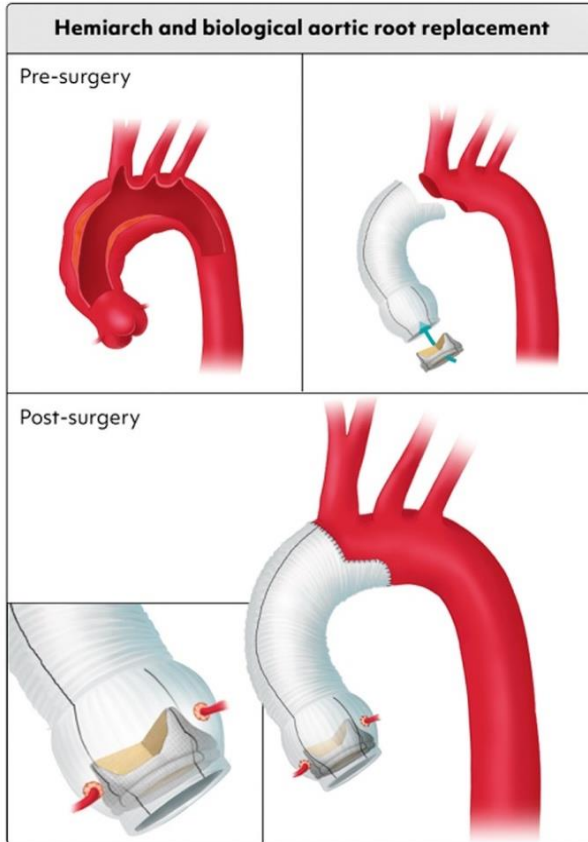
EACTS/STS Guidelines for diagnosing and treating acute and chronic syndromes of the aortic organ



**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.

Czemy M, et al. *Eur J Cardiothorac Surg* 2024;

# Chirurgische Therapie in Abhängigkeit der Lokalisation



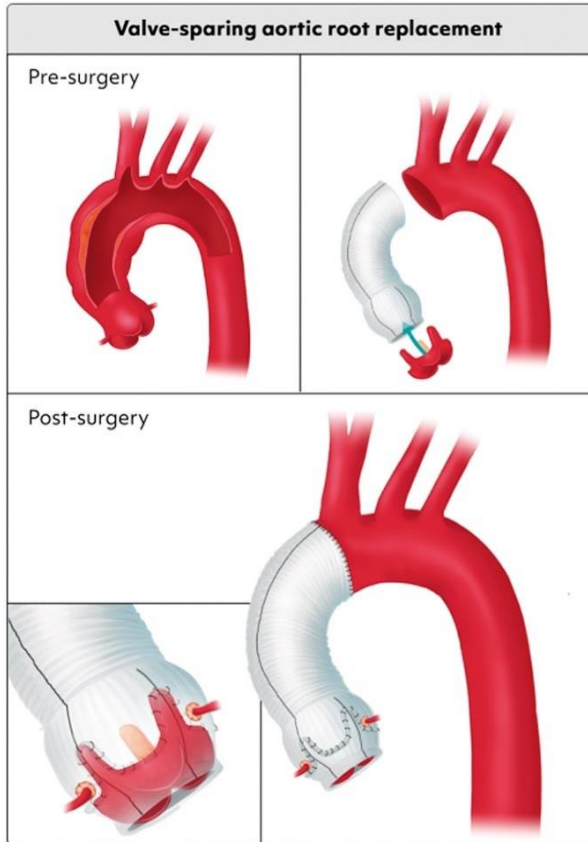
Mechanisches klappentragendes Conduit  
(vorgefertigt)



Biologisches klappentragendes Conduit  
(zusammengesetzt, handgenäht)

Czemy M, et al. *Eur J Cardiothorac Surg* 2024;

# Chirurgische Therapie in Abhängigkeit der Lokalisation

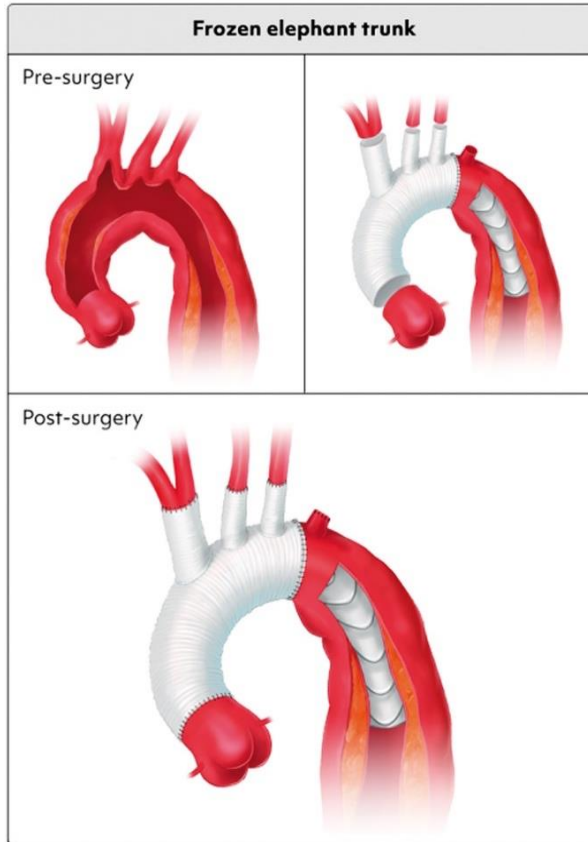


Aortenklappenrekonstruktion n. David

Czemy M, et al. *Eur J Cardiothorac Surg* 2024;



# Chirurgische Therapie in Abhängigkeit der Lokalisation



BRANCHED  
CONFIGURATION



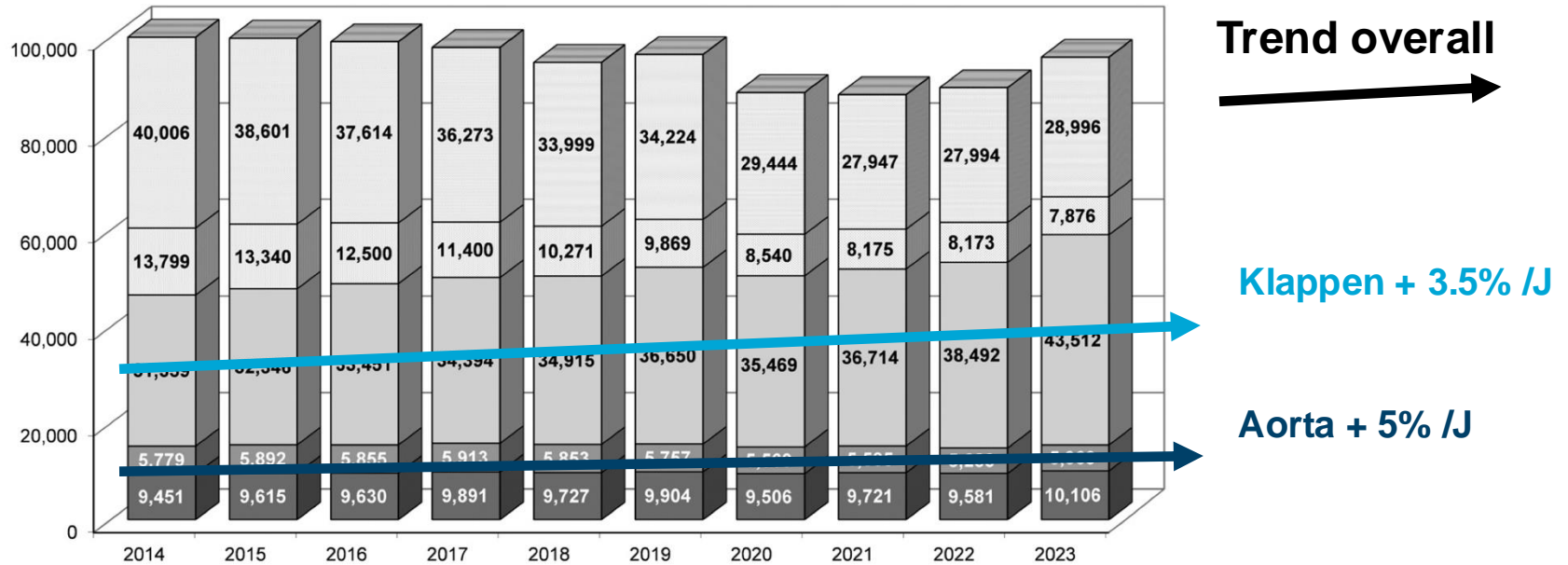
Frozen Elephant Trunk Technik

Czemy M, et al. *Eur J Cardiothorac Surg* 2024;



# Herzchirurgie

## Eingriffe - Deutschland 2023



Verteilung der Herzoperationen mit und ohne HLM 2023  
 Grundlage der Leistungsstatistik der DGTHG

Beckmann A, et al. Thorac Cardiovasc Surg. 2022;70(5):362-76.

# Aortenzentrum

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>	Ref <sup>c</sup>
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	-

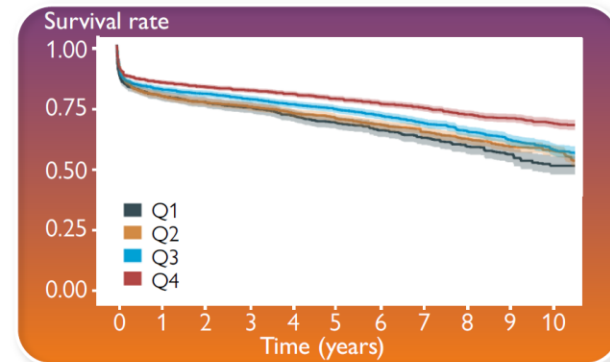
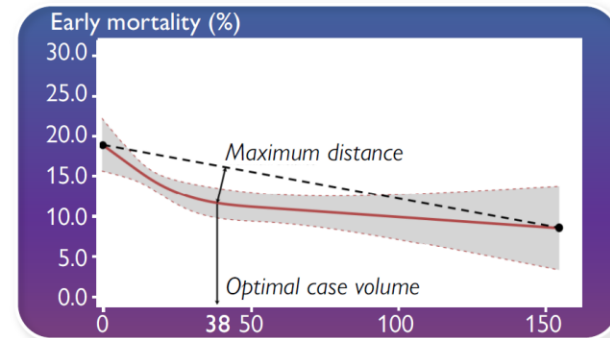
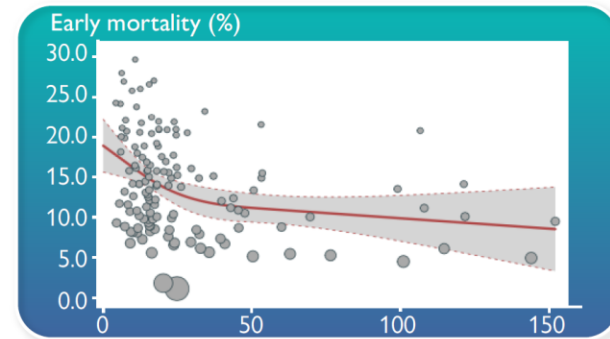
<sup>a</sup>Class of recommendation.

<sup>b</sup>Level of evidence.

<sup>c</sup>References.

Czemy M, et al. *Eur J Cardiothorac Surg* 2024;

Kawczynski MJ et al. *Eur Heart J* 2023



## Oldenburger Klinikum bietet ab 2025 das einzige Aortenzentrum in der Region

Sie sind spezialisiert auf die Behandlung von Erkrankungen der Hauptschlagader: Die Mediziner des neuen Aortenzentrums am Oldenburger Klinikum. Bei einem Patiententag informieren die Spezialisten über die Aorten Chirurgie. Was erwartet die Besucher?

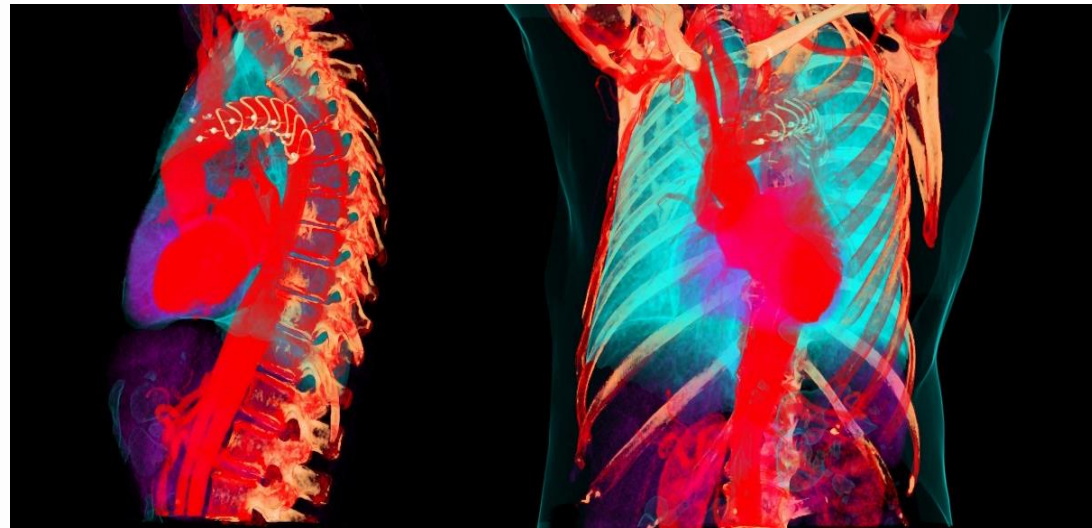
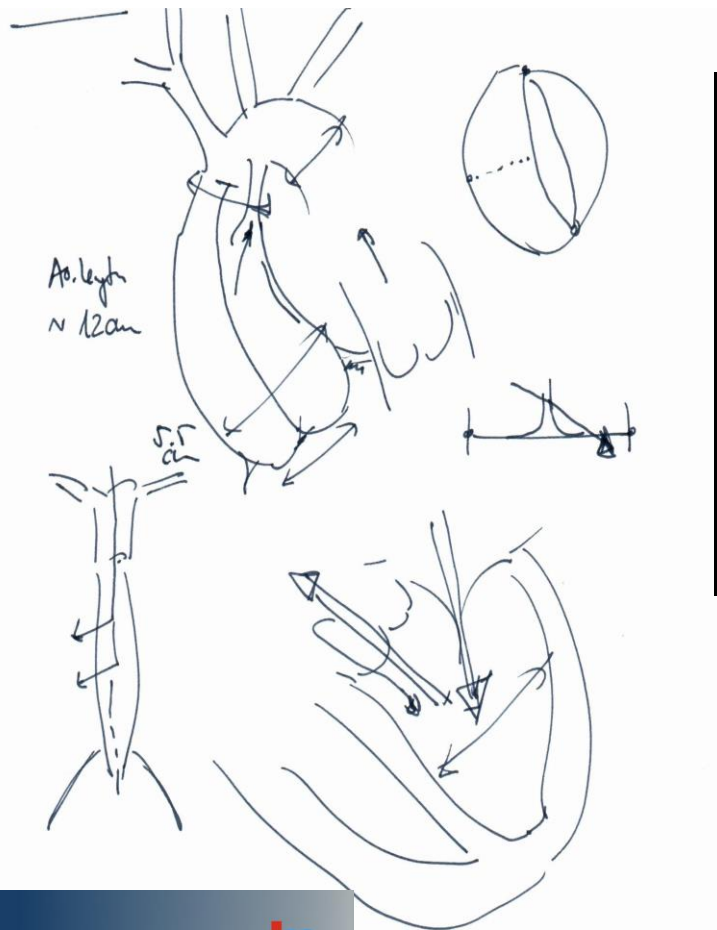


Anja Biewald 12.11.2024, 18:02 Uhr



Prof. Dr. Andreas Martens, Direktor der Klinik für Herzchirurgie am Klinikum Oldenburg und Professur für Herzchirurgie am Department für Humanmedizin der Universität Oldenburg, führt einen Patiententag zur Aorten Chirurgie in Oldenburg ein. Der erste findet am 16. November ab 9.30 Uhr im Core statt.

Bild: Anja Biewald



## Nordwestdeutsches Aortenzentrum

- Prof. A. Martens, PD Dr. Fleissner, Dr. M. Arar, Dr. R. Natanov
- Dr. K. Kangarlou, Gefäßchirurgie (ab 1/25)
- Prof. M. Maurer, PD Dr. R. Philip Thomas
- Kooperation: PD Dr. Hazem El Beyrouti, CA GCH Pius Hospital
- Prof. M. Hitz (Humangenetik), Prof. A. Elsässer (Kardiologie/Angiologie), Prof. S. Schäfer (AINS)
- Dr. D. Heidkamp (Rehazentrum)

HERZ- UND  
GEFÄßZENTRUM



→ A: David BAV  
B: (med/biol.) / Paris Mr. Free style

# Aortenzentrum





# Aortenzentrum

Neurologie

Allgemeinmedizin

Ambulanz

Rehabilitation

Herzchirurgie



Gefäßchirurgie

Kardiologie

Anästhesie

Pflege

ZNA

Radiologie

Industrie

Intensivmedizin

**Aortenpatient**

Kardioteknik



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