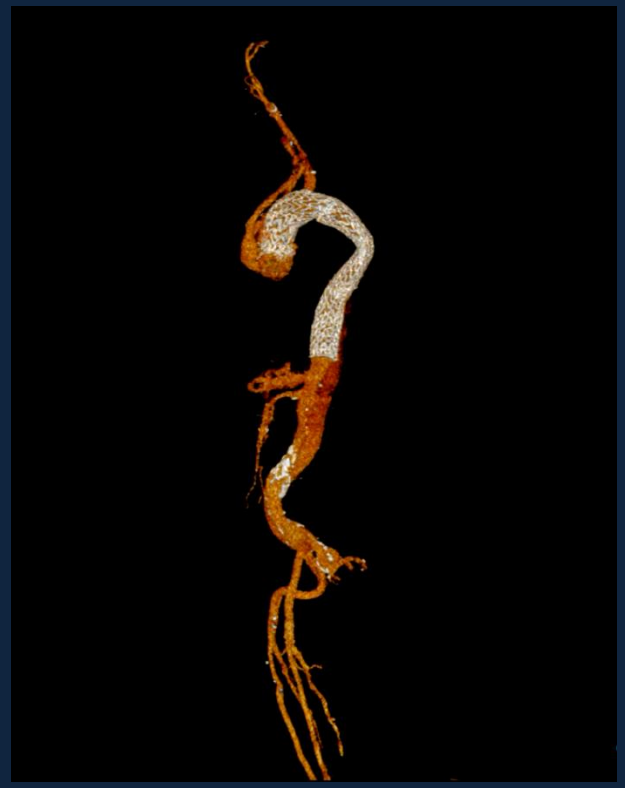
Endovaskuläre Aortenbehandlung



Priv.-Doz. Dr. Rohit Philip Thomas, PhD, EBIR-ES, FCIRSE

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Universitätsinstitut für Diagnostische & Interventionelle Radiologie

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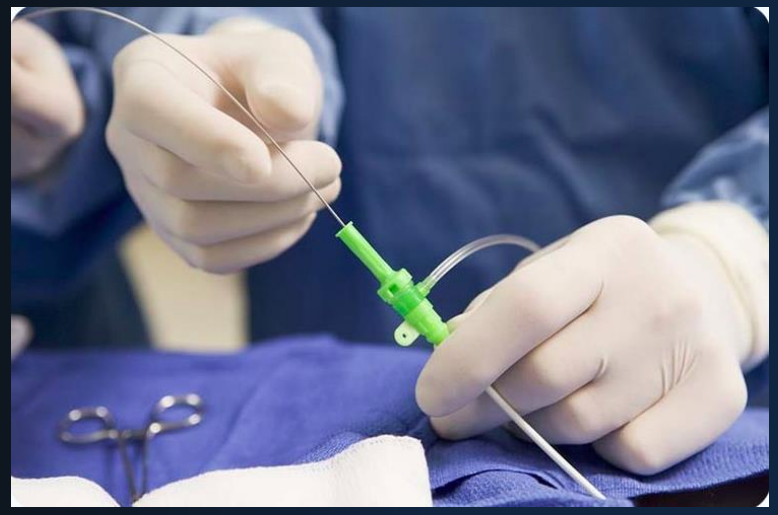
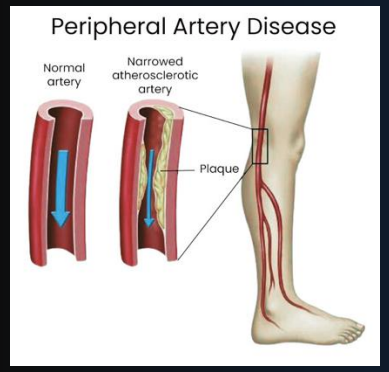
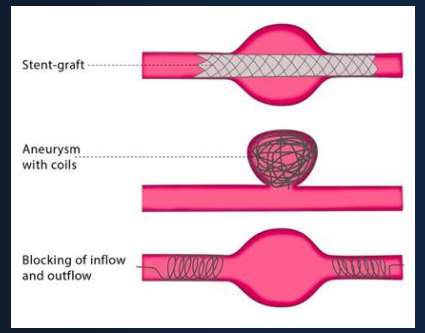
Endovaskuläre Behandlung– Interventionell Radiologie

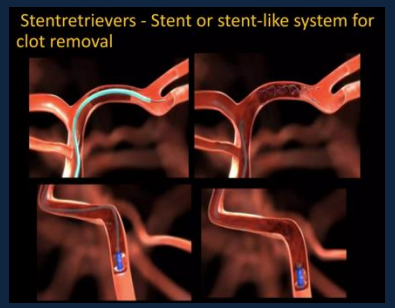
- Chirurgie ohne Messer
- Interventionell Radiologe nutzt die bildgebenden Verfahren
  um mikroinvasiv millimetergenau Präziseeingriffe vorzunehmen
- IR-Eingriffe sind schmerzarm, meistens ohne Narkose
- Risikoarme Eingriffe – schnelle Erholung, meistens kurze Krankenhautaufenthalt

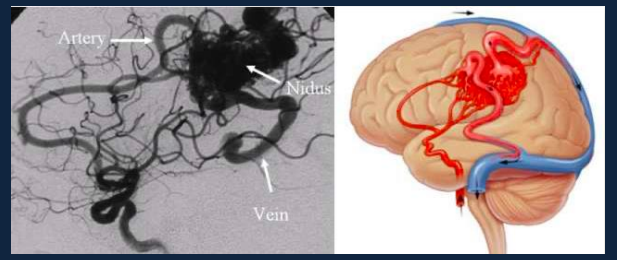


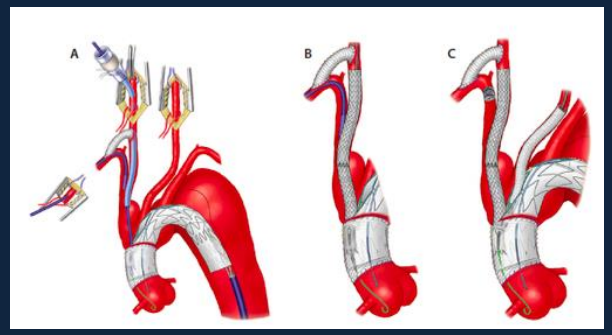
Spektrum der Interventionelle Radiologie

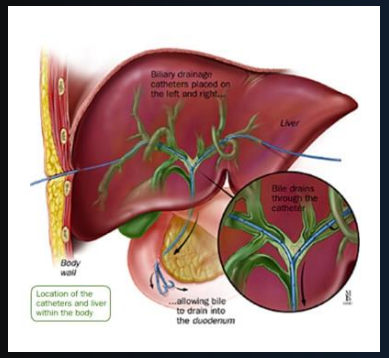


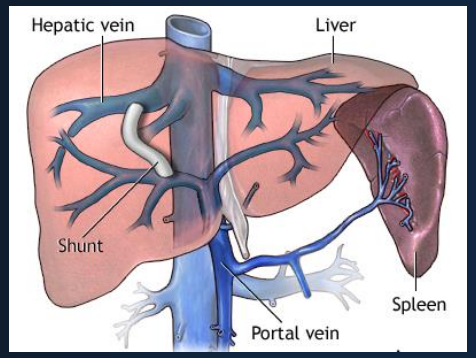


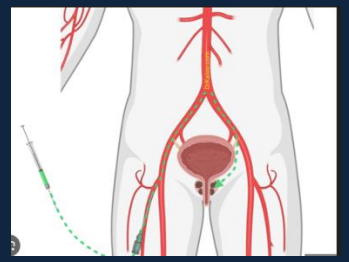


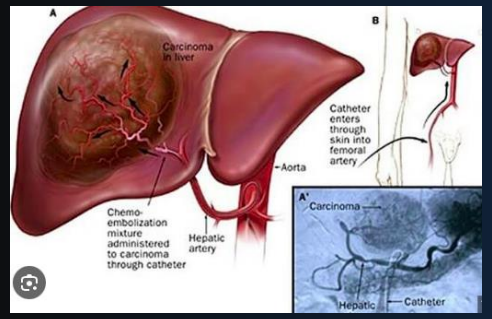


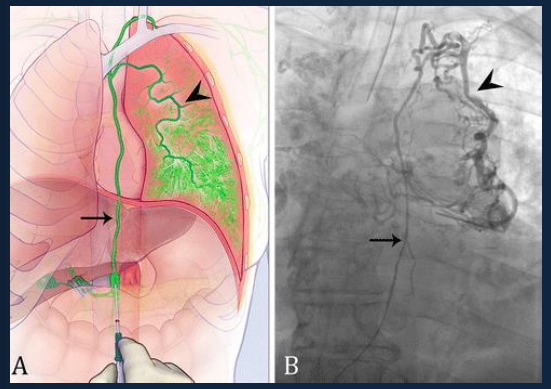


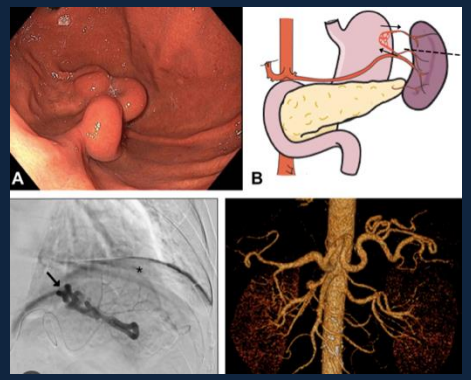


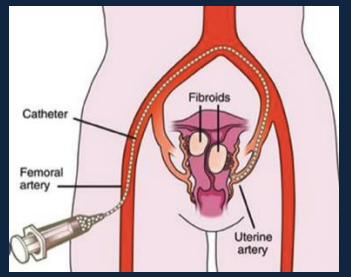












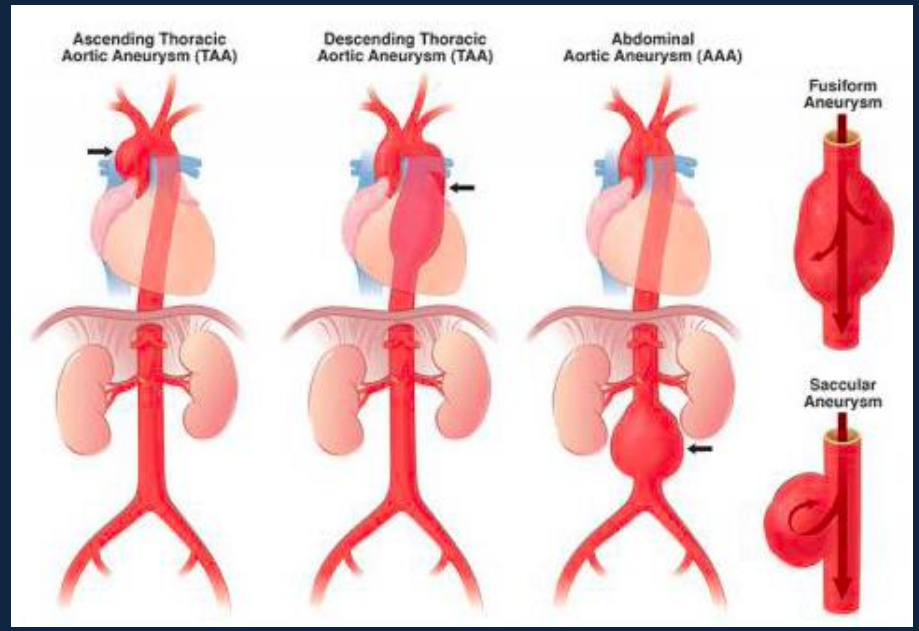
Aorten Pathologien

- Aorten Aneurymen
- Aortic Dissektion mit oder ohne Malperfusion / Durchblutungsstörung
- Aorten Ruptur
  - Traumatisch
  - Folge der Dissektion oder Aneurysmen

Aorten Aneurysma

- Dilatation des thorakalen Aortensegments > 50 % von normalen Durchmesser

Aortic Segment	*Men: Mean ± SD (cm)*	*Women: Mean ± SD (cm)*	*Imaging Technique*
Aortic valve annulus	2.6 ± 0.3	2.3 ± 0.2	Echo
Sinuses of Valsalva	3.4 ± 0.3	3.0 ± 0.3	Echo
Sinotubular junction	2.9 ± 0.3	2.6 ± 0.3	Echo
Proximal ascending aorta	3.0 ± 0.4	2.7 ± 0.4	Echo
Mid-descending aorta	2.7 ± 0.3	2.5 ± 0.3	CT
Distal descending aorta	2.6 ± 0.3	2.4 ± 0.3	CT



- Relativ Erweiterung des Aortensegments um mehr als 1,5 mal
- Fusiforme oder Sakkulares Aneurysma

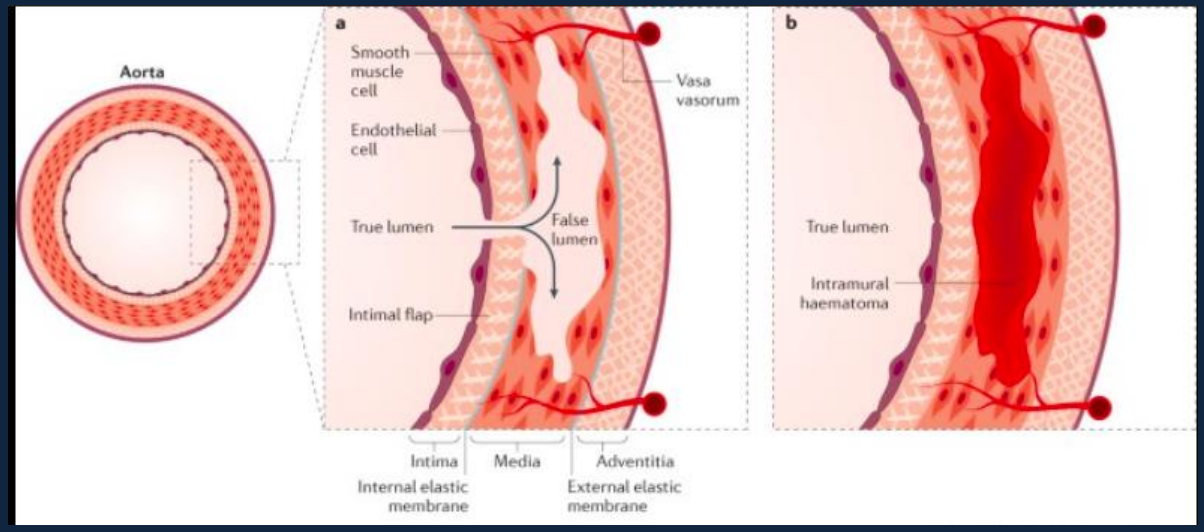
Thorakale Aneurysmen

Etiology

- Degenerative (70-80%, AAA Beteiligung)
- Posttraumatisch – pseudoaneurysm
- Mykotisch – sekundär zu anderen Infektionen
- Syphilitisch – 10-15 Jahren nach Infektion sekundär zu periaortitis / mesoaortitis
- Bindegewebeserkrankungen–
  - Marfan Syndrom, Ehler Danlos Syndrom,
  - Loeys-Dietz Syndrom
- Post-Stenotisch
- Inflammatorische Erkrankungen der Aorta
  - Takayasu Arteritis, Behcets Disease
  - Periarterielle inflammation

Aortendissektion

Intimales Einriss mit resultierendem Blutfluss in die media und Trennung der Intima von adventitia

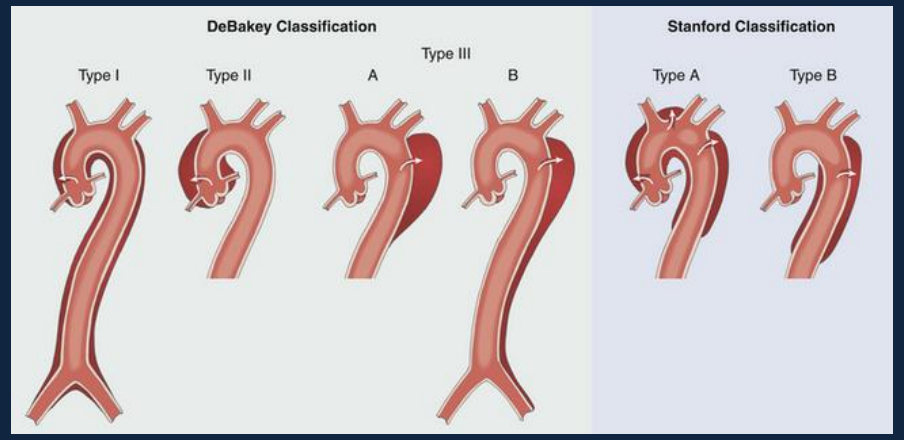


Symptom Beginn – geteilt als

Akute	– innerhalb 2 Wochen
Subakute	– 2-6 Wochen
Chronisch	– mehr als 2 Wochen

Klassifikation

- DeBakey
- Standford



TEVAR – Prinzip / Technik

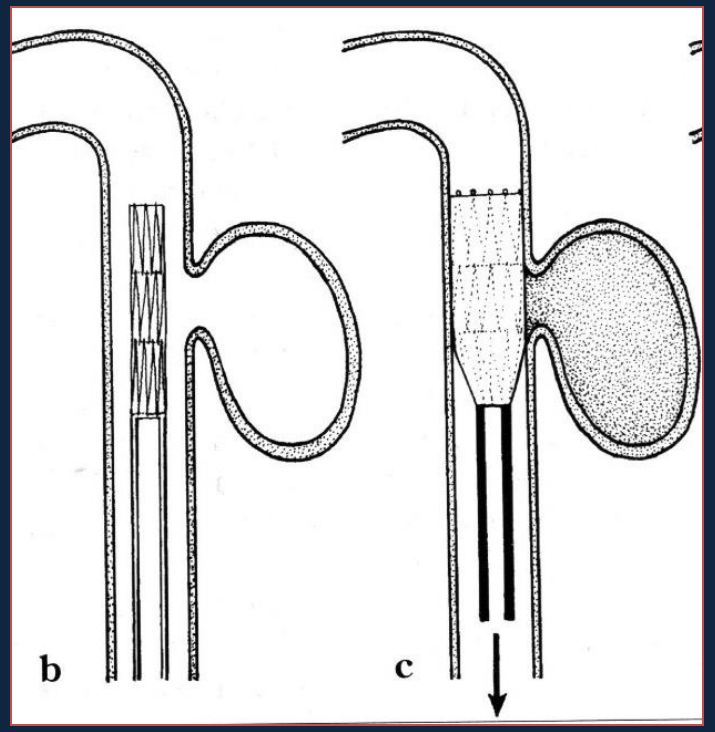
Prinzip

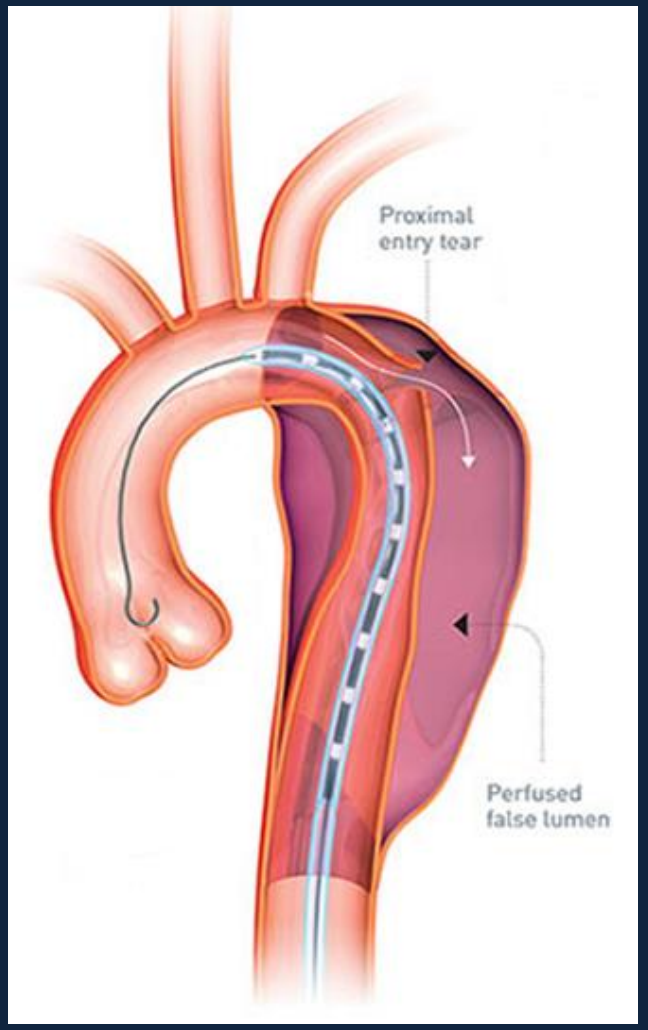
Ausschaltung des Aneurysmas von Zirkulation

Abdeckung des Intimaeinrisses mittels Endograft

Endovaskuläres Vorgehen

Proximale & distale Landung zone von mindestens 2 cm





Aortale Landung Zonen für **TEVAR**

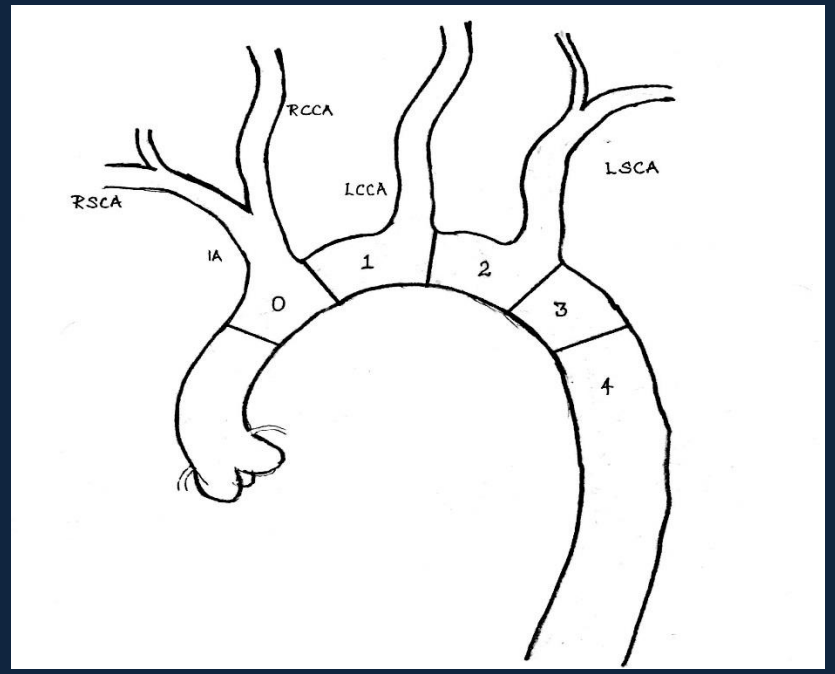
Zone 0 Ascending Aorta / aortic arch proximal to innominate artery (IA)

Zone 1 Aortic segment b/w IA & LCCA

Zone 2 Segment b/w LCCA & LSCA

Zone 3 Curved Segment of distal aortic arch / proximal descending aorta beyond LSCA

Zone 4 Straight part of descending thoracic aorta from level of 4th thoracic vertebra



Criado FJ, Abdul-Khoudoud OR et al. Ann Thorac Surg 2005 Sep 80(3): 857-63

TEVAR Possible in all these conditions –
Anatomical requirements should be addressed

TEVAR – Step by Step

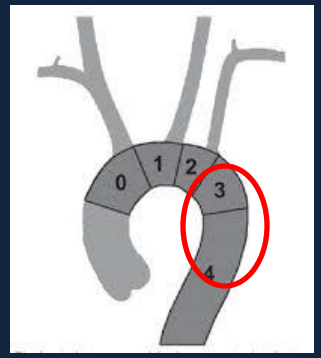
Information Notwendig fur TEVAR von der CT Untersuchung

Wie viel Aorta soll abgedeckt werden, Wo genau ist die Pathologie
Moglichkeit einer ausreichenden proximalen / distalen Landungszone 2 cm
Zugangsgefäss vorhanden

Größe /Kinking /Kalzifikation – Moglichkeit einer TEVAR
Zugangsgefaß mindestens 8 mm / Endograft diameter
Ob chirurgische Zugang notwendig
Andere Zugänge - Transapikal TEVAR [x]

[x]Mahnken AH, Irqsusi et al. Rofo 2017; 189 (8): 760-764
[y]Chavan A, Thomas RP et al. CVIR 2020, 43(2):1798-1807

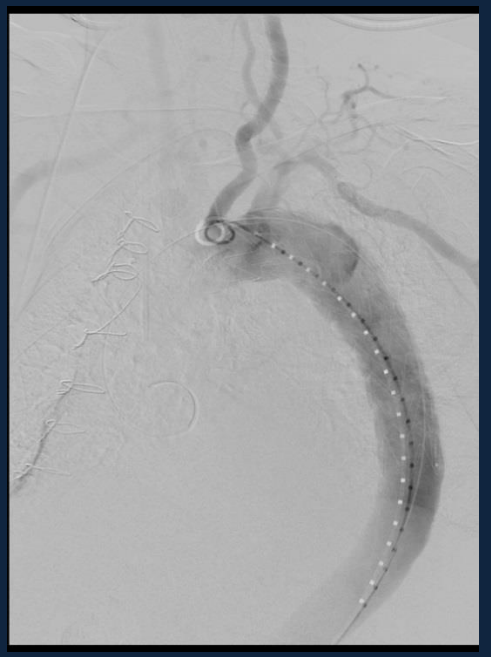
TEVAR in Landungszone 3/4

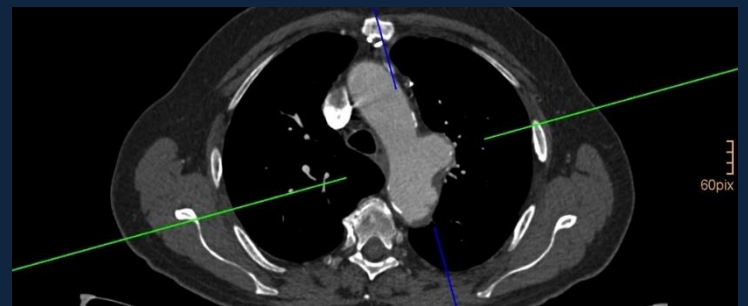


Ausreichende Länge der proximalen Landungszone (≥ 2 cm)

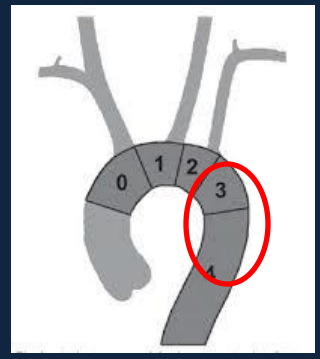
- Primäre Erfolgrate – meistens 100%
- Perioperative mortalität 5-6%
- Paraplegia 2-3%

NEJM 1994, Ann Thorac Cardivasc Surg 2011, Canad J Cardiol 2014

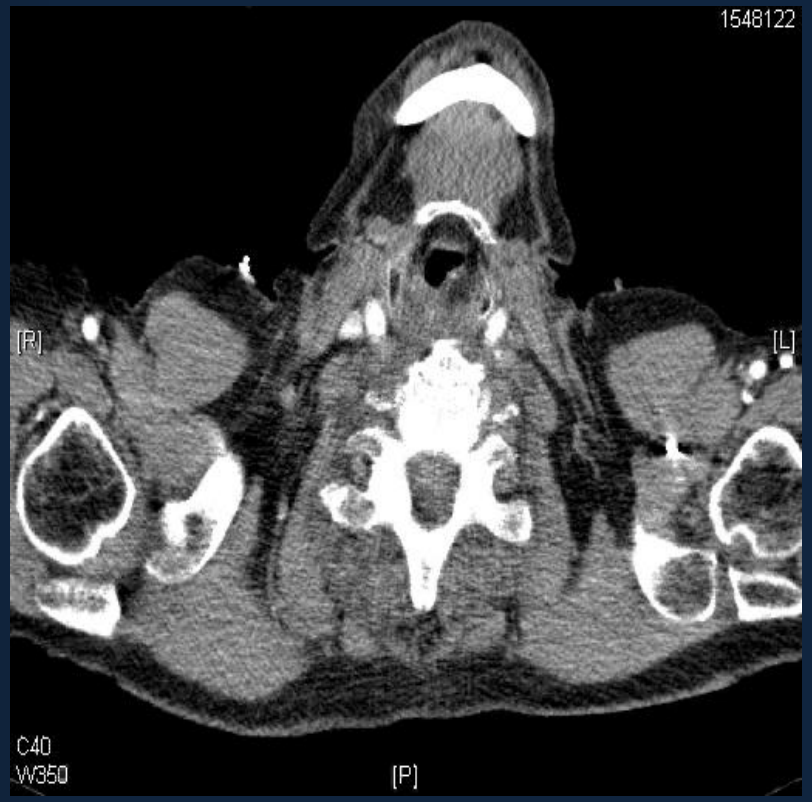


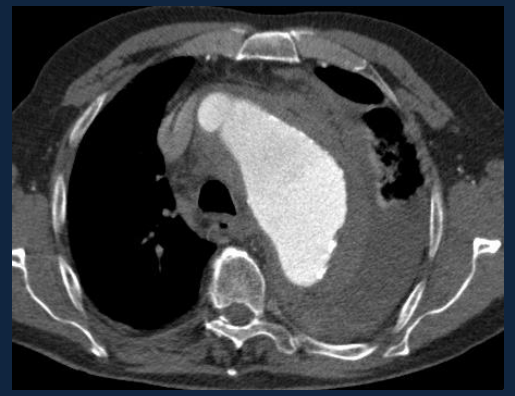


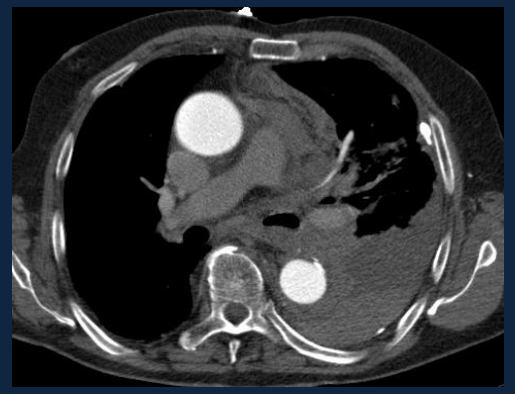
TEVAR Landing zone 3/4



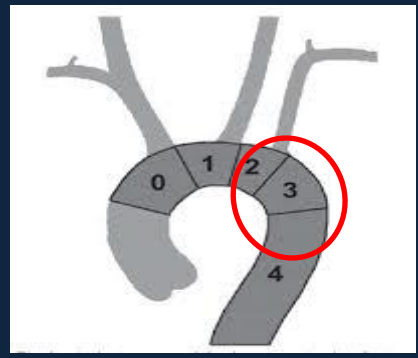
68 Jahre
HT on Antihypertensives
Akute Schmerzen
Klinisch Zeichen einer Schock







TEVAR in Landungszone 2



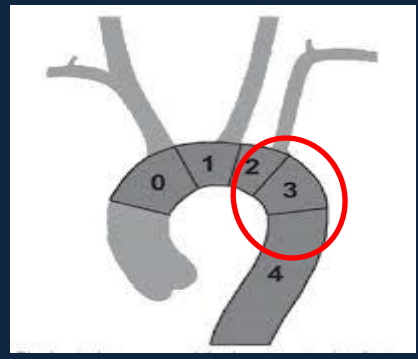
- Emergency Setting
  - Kann linke Subklavia abgedeckt werden [x]
- Indicationen für Pre-TEVAR linke Arteria Subklavia Revascularisation
  - LIMA Coronary Bypass Graft
  - Nicht vorhandenen kontralateralen Arteria vertebralis
  - Dominante linke Arteria vertebralis
  - Funktionelle linke AV Fistula / linke Axillo-femoral bypass

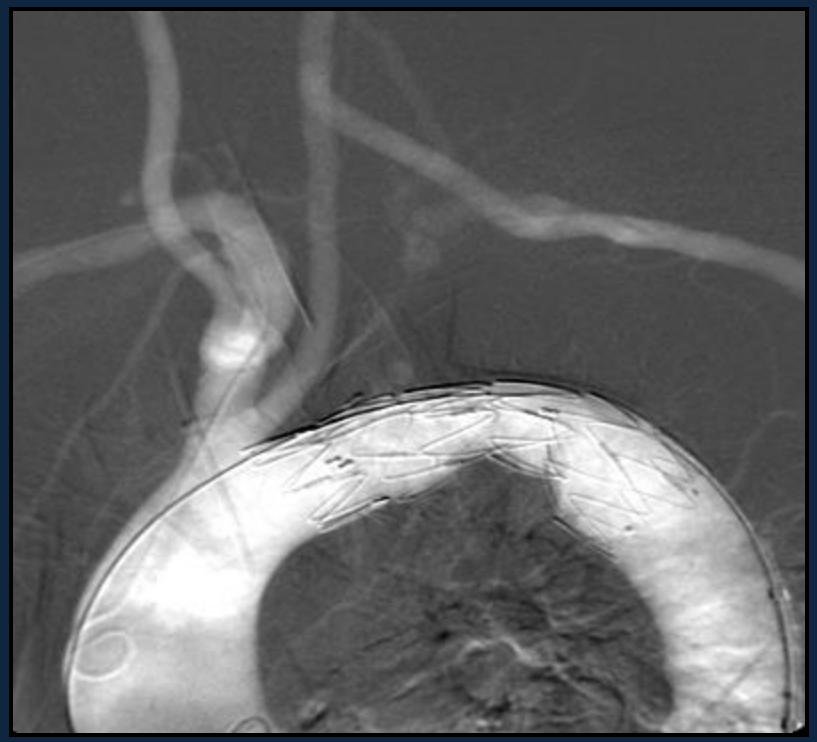
[X] Thomas RP, Amin SS et al. Cardiovasc Intervent Radiol 2018: 41(9):1318-1328
[y] Buth J, Harris PL et al. J Vasc Surg 2007; 46:1103-1110
[z] Chavan A, Thomas RP et al. CVIR 2020, 43(2):1798-1807

TEVAR in Landing Zone 2

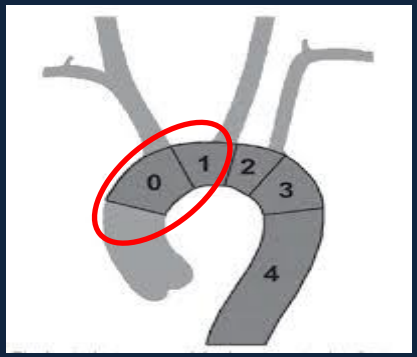
Notfallmäßige TEVAR mit Embolization der linken Arteria subklavia zur Vermeidung eines Endoleaks

TEVAR in Landing Zone 2

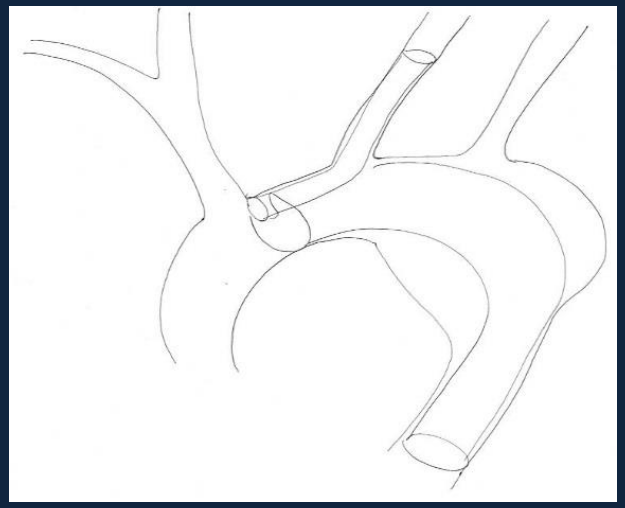


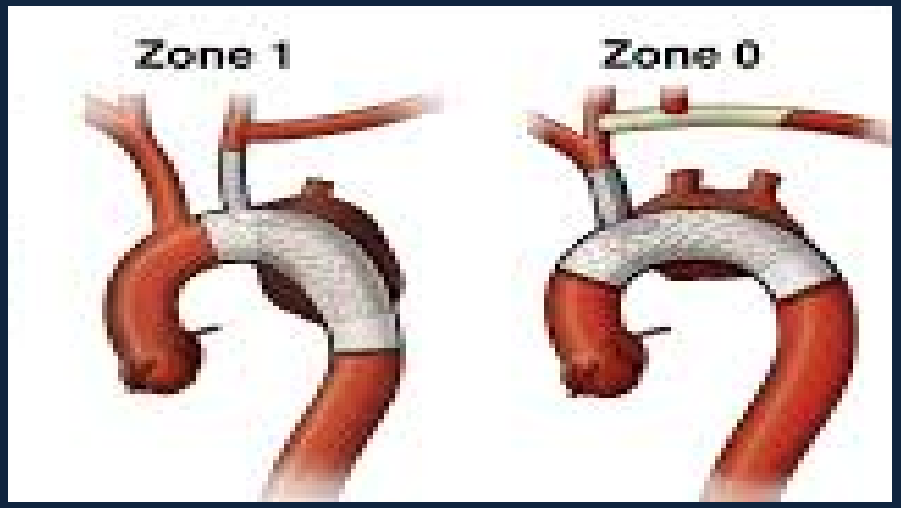


TEVAR in Landing Zones 0,1



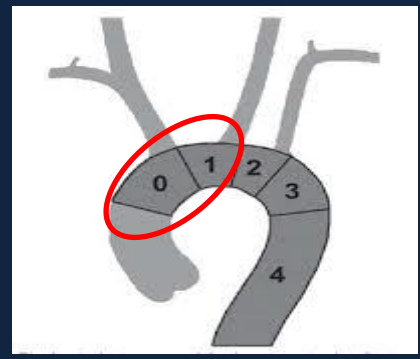
- Chirurgische Debranching vor der geplanten TEVAR
- Chimney TEVAR
- Branched TEVAR
- In Situ Fenestration

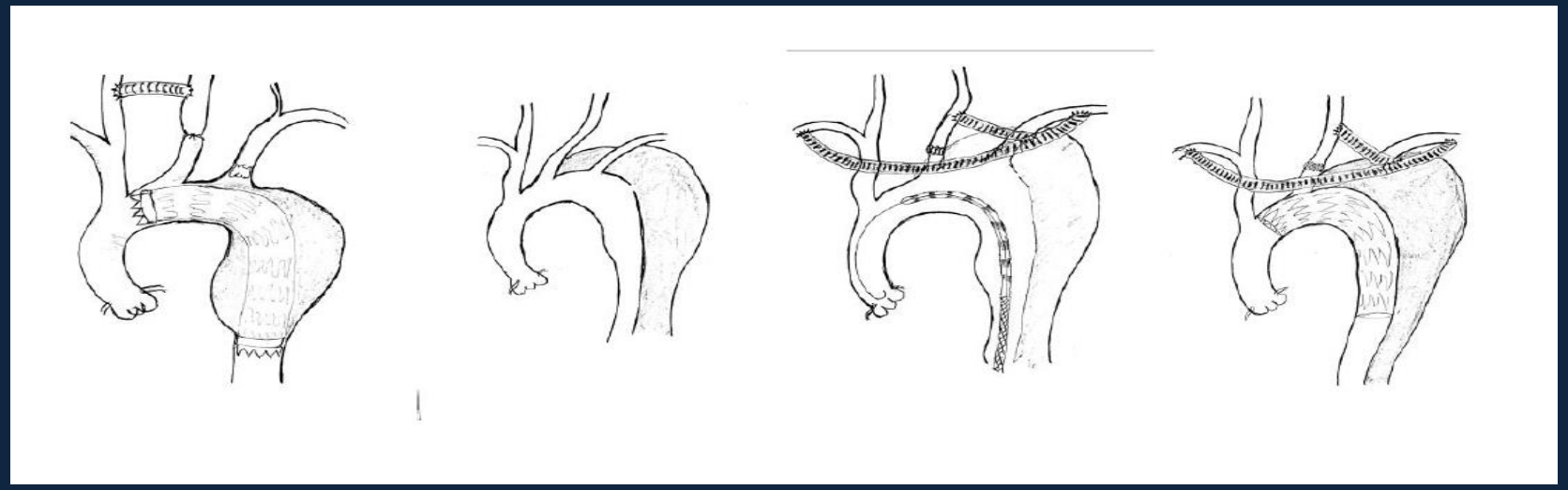




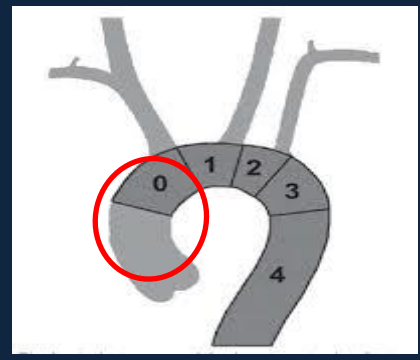
TEVAR in Landing Zone 1

- Chirurgische Debranching
  - ➢ Carotid-Carotid Crossover Bypass mit oder ohne LSA Revascularization
  - ➢ Subclavian – Subclavian & Axilloaxillary Artery Bypass

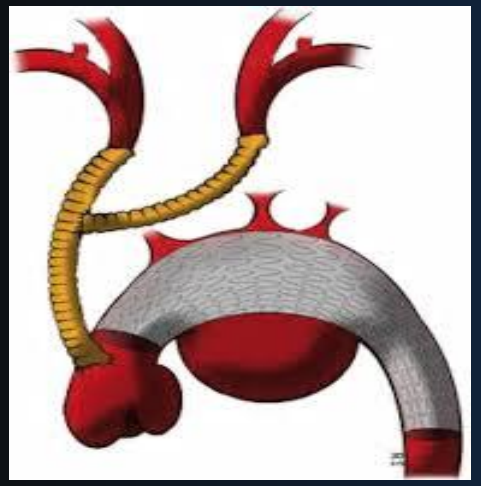


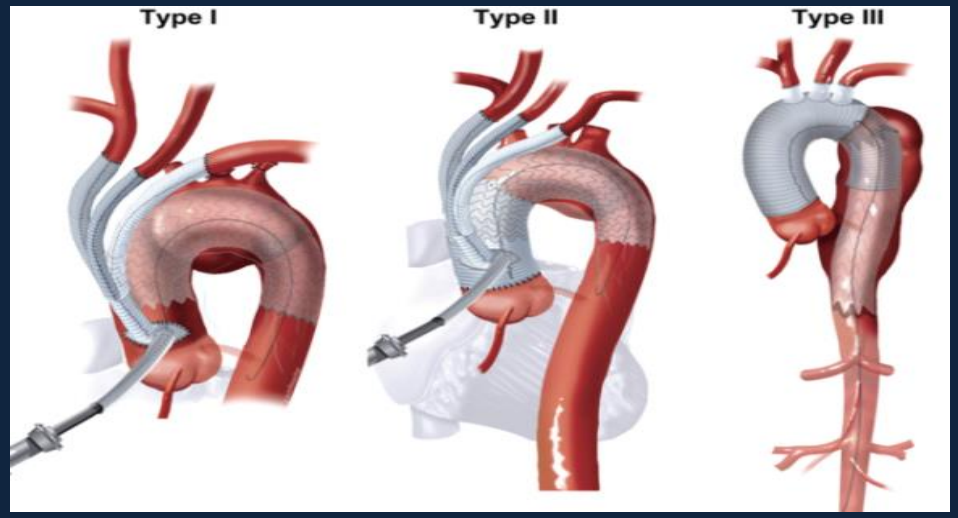


TEVAR in Landing zone 0

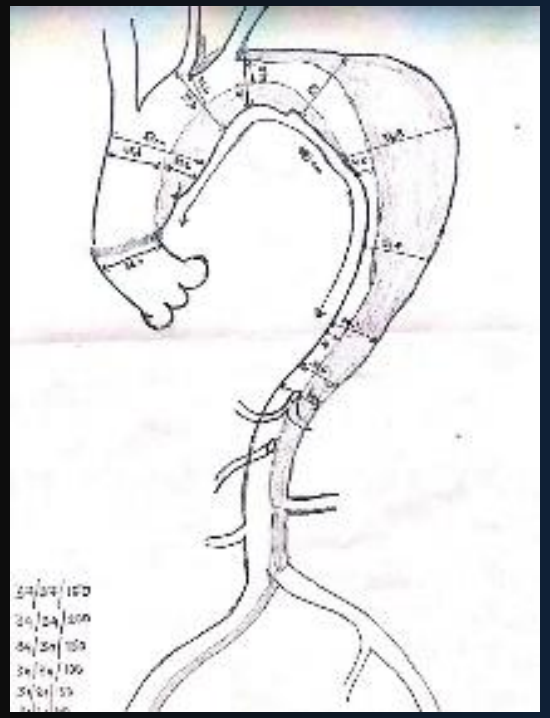


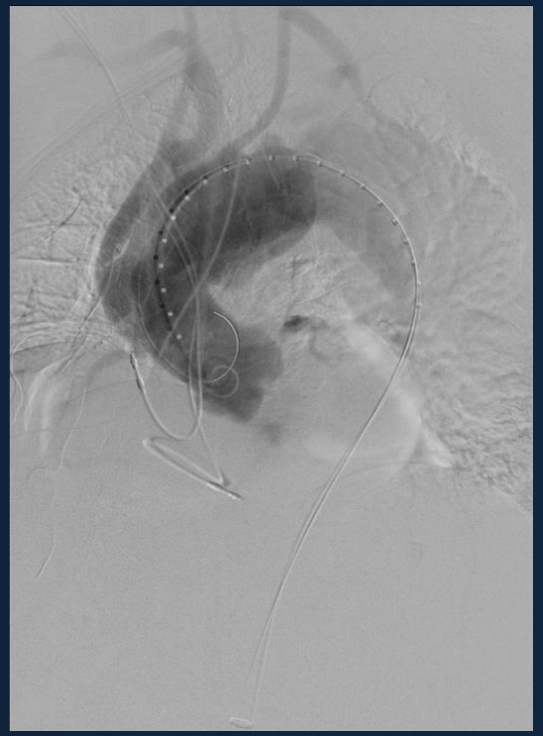
- Chirurgische Debranching ascending aorta
  - Type 1 – Debranching of great vessels
  - Type 2 – Debranching of vessels / creation of Zone 0
  - Type 3 – Complex Surgery – Creation of Zone 0/1 & FET

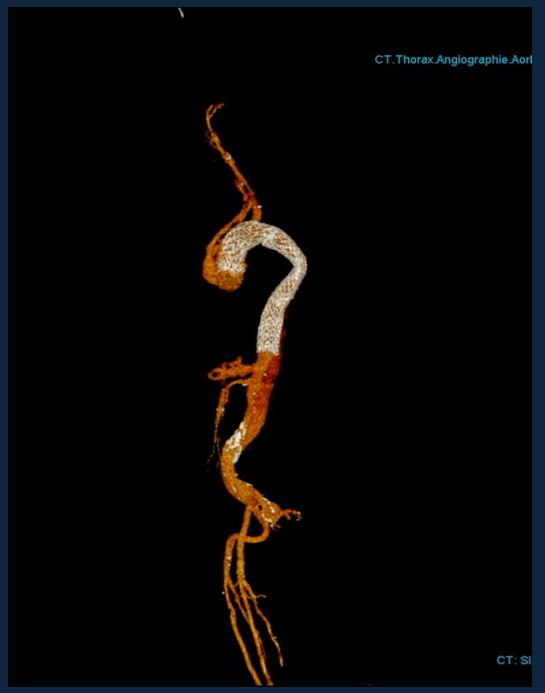


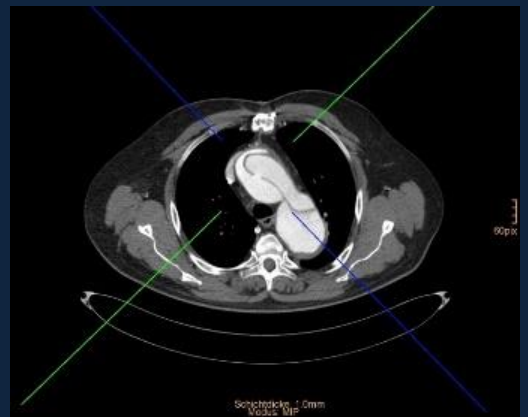


TEVAR in Zone 0/1

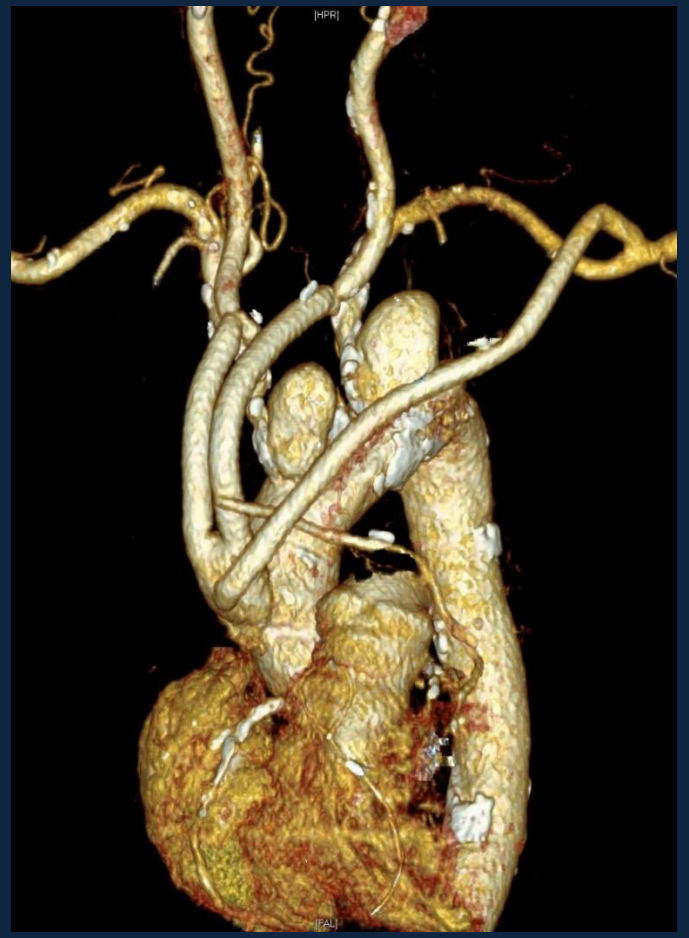


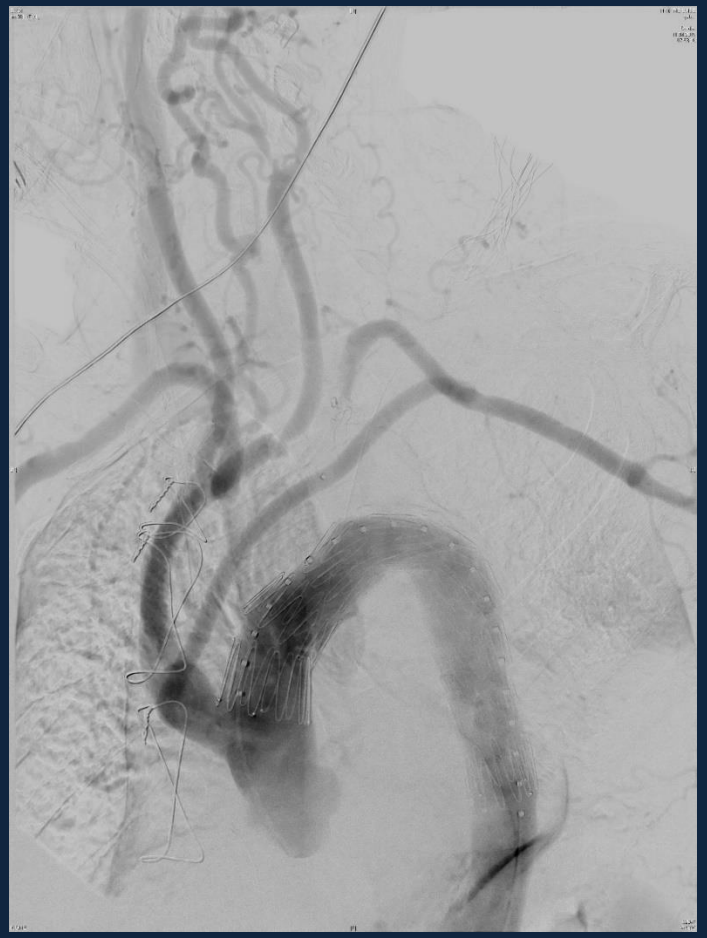




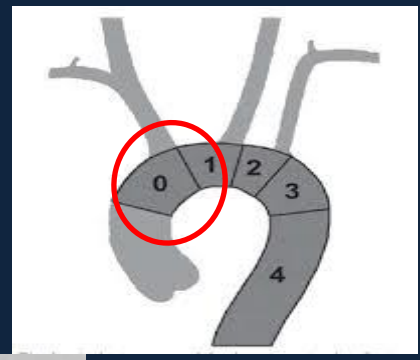


TEVAR in Zone 0/1

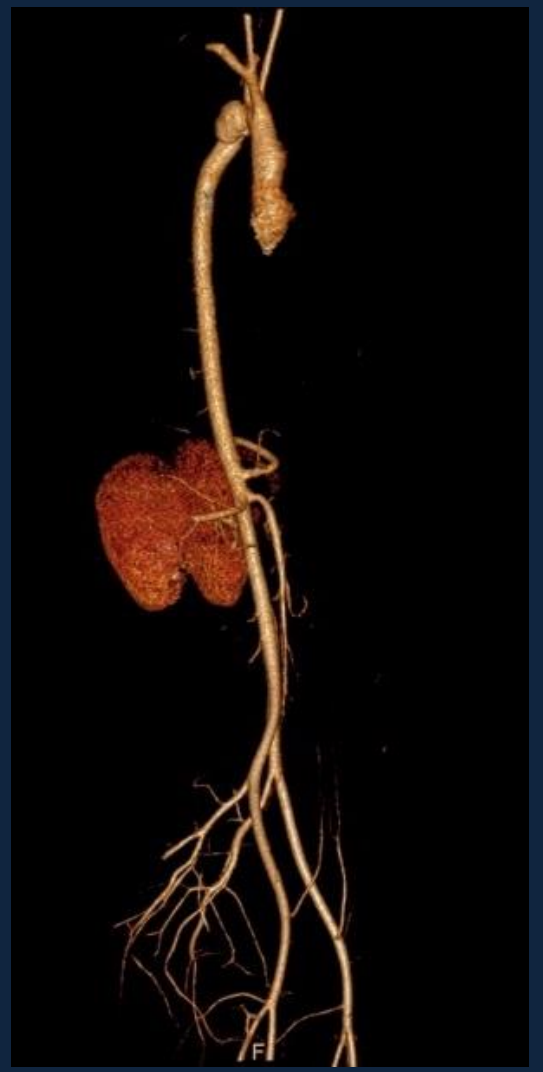




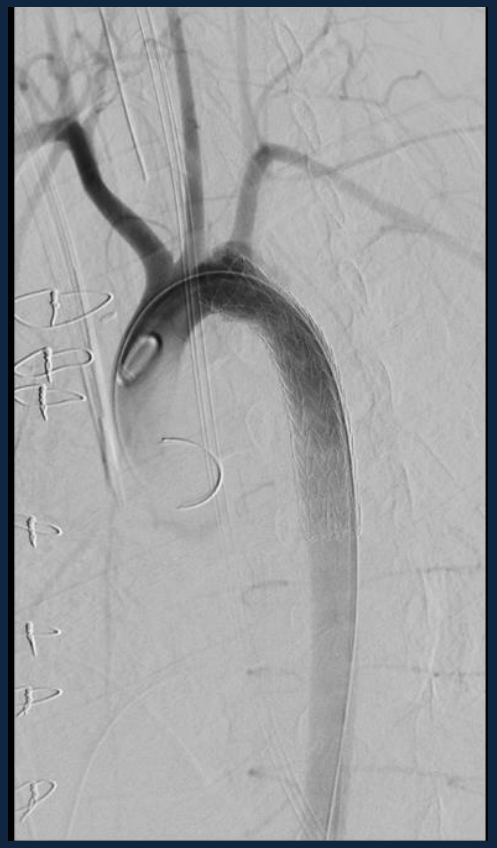
Ch-TEVAR in Landing Zone 0/1

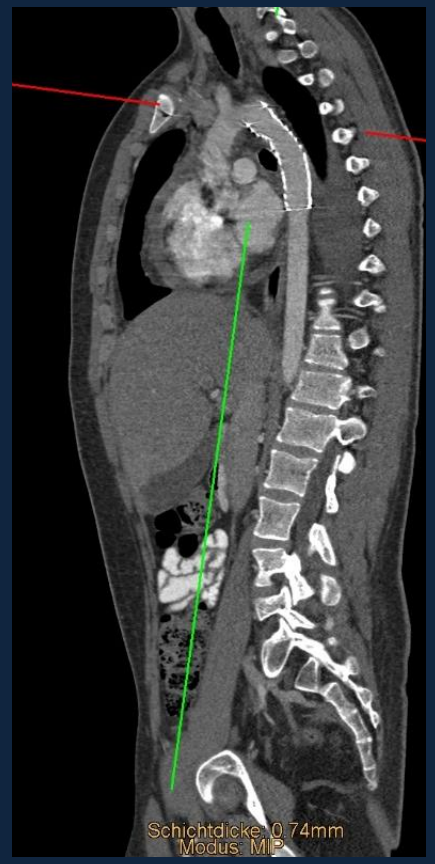


17 Jahre junge
Unfall –80 km /h
CT Trauma
Thorax trauma



Traumatic Thoracic Injury



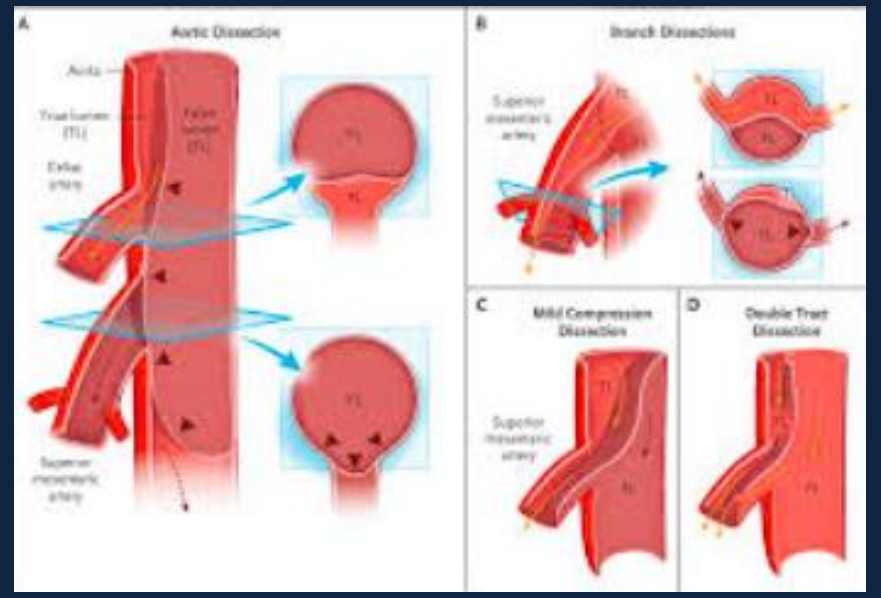


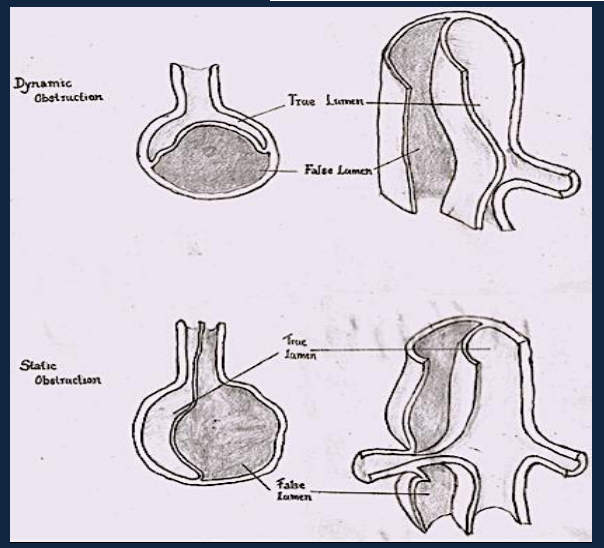
Malperfusion Syndrom

Ischämische Komplikationen assoziert mit Typ B Dissektion

Je nach Beteilung – Nierenarterien oder Arteria mesenterica superior / inferior und Becken/ Beingefaßen

Statisch vs. Dynamische Obstruktionen

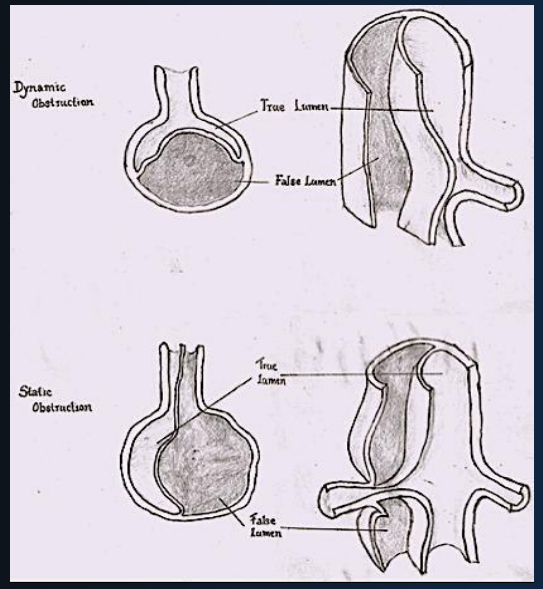




Chavan A, Thomas RP et al. CVIR 2020, 43(2):1798-1807

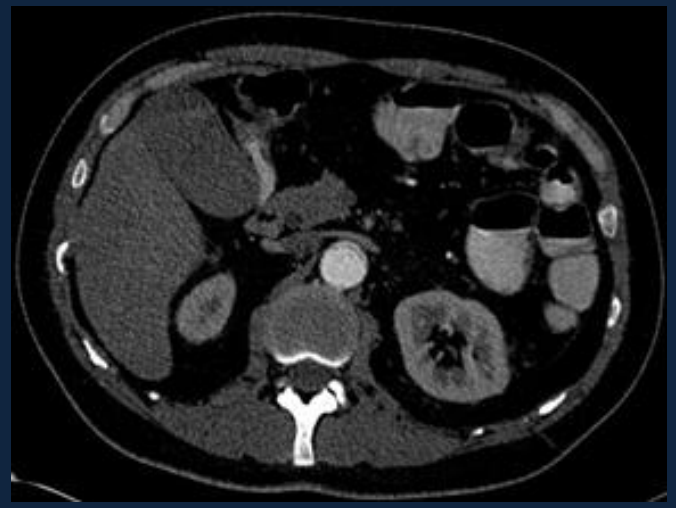
Statische Obstruktion - Behandlung

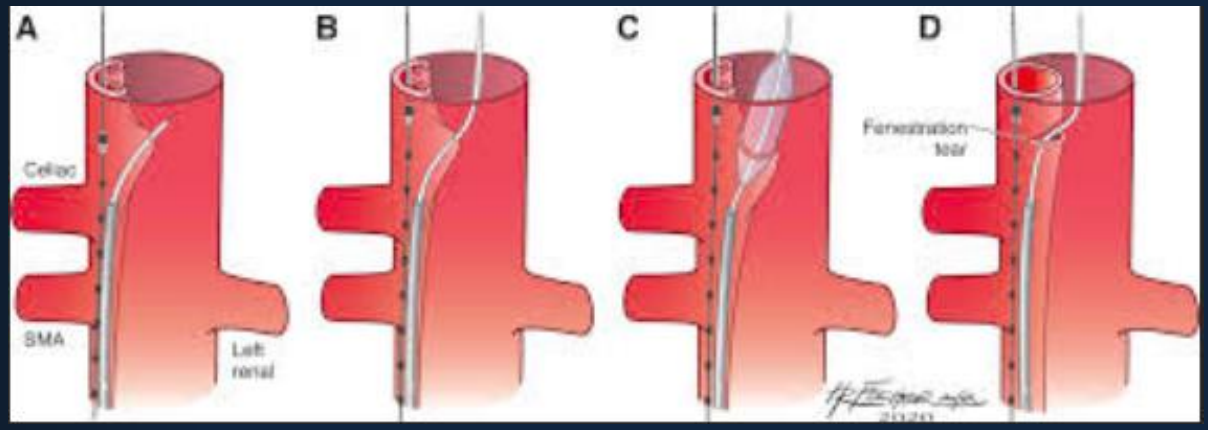
Behandlung des gefässes selber mittels Stentimplantation



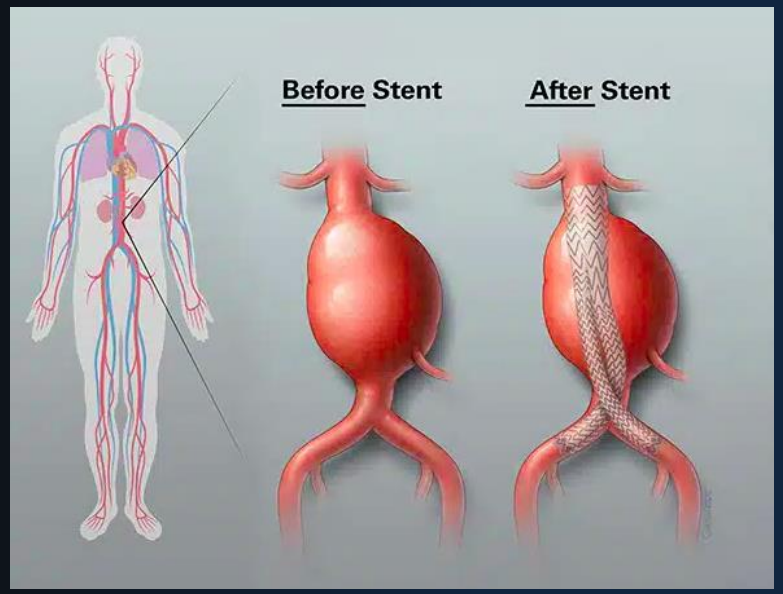
Dynamische Obstruktion - Behandlung

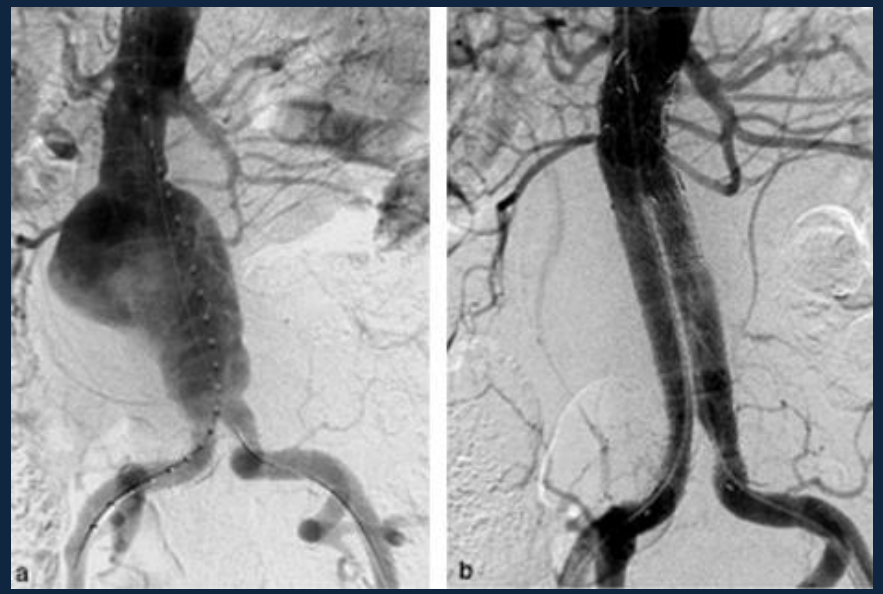
Behandlung mittels Infrarenalen Fensterung sofern nach der TEVAR keine Verbesserung zeigt



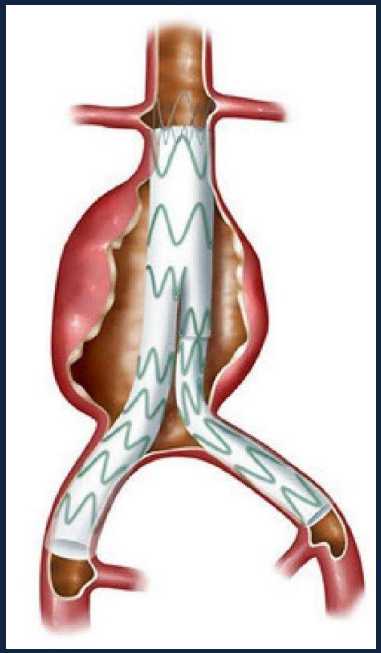


Standard EVAR



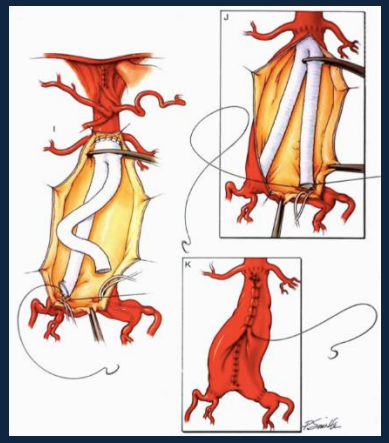


- Ca. 15 mm paralleler infrarenaler Hals ohne Kalzifikation oder Thrombus
- < 28 mm in Durchmesser
- < 60/90° in Angulation
- Stent-Grafts – Minimum Hals 15 mm (10 mm)

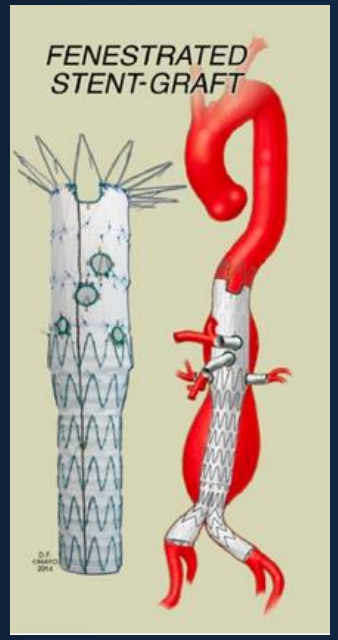


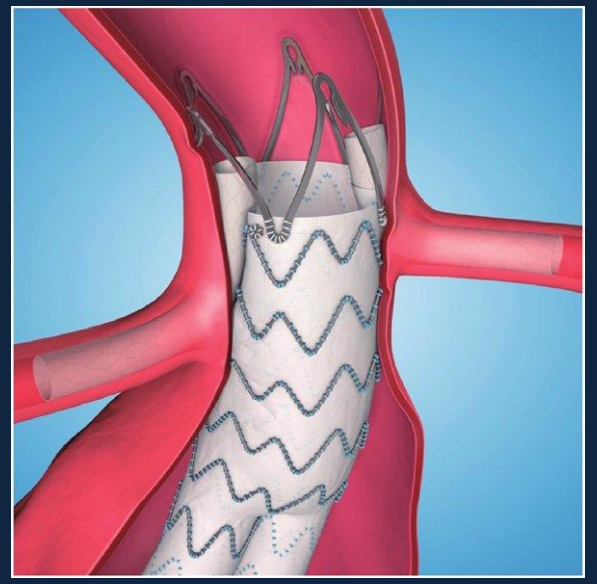
Juxtarenales AAA – Behandlungsoptionen

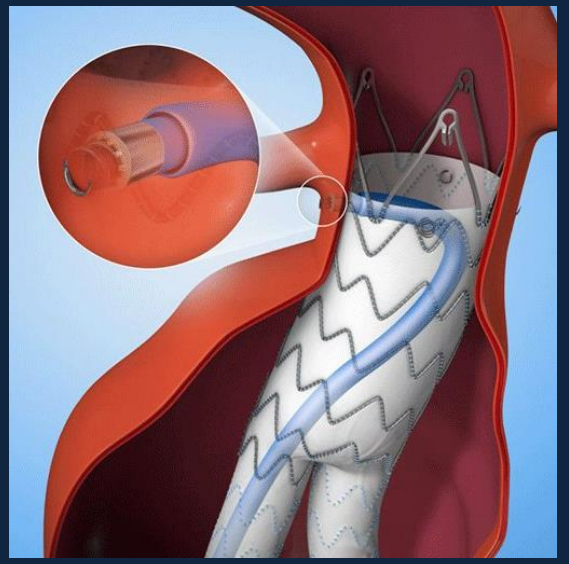
- Chirurgie – Open Repair
- Endovaskuläre Optionen
  - Fenstrierte EVAR (FEVAR)
  - Chimney EVAR (Ch-EVAR)



Branched EVAR – assoziierte TAAA








Endkontrolle
post Stentgraft

Klinikum Oldenburg – Aorten Pathologie

- Historisch bekanntes Krankenhaus in Region mit schwierigen Behandlungsspektrum
- Etablierte Herzchirurgie als Überregionales Zentrum
  - Herzchirurgische Intensivstation
  - Komplettes Spektrum der Aorten Pathologie inklusive Diagnostik
- 24/7 Service 365 Tagen
- Jahr 2023 - 41 endovaskulär Aorten Eingriffe
- Jahr 2024 - 43 bis aktuell
- Neu erfahrenes Herzchirurgisches Team !!!!

Klinikum Oldenburg – Interdisziplinär