

Grand Rounds

Rigshospitalet



Grand Rounds

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rigshospitalet.dk/grandrounds





Prof. Tim Resch
Karkirurgi
Rigshospitalet



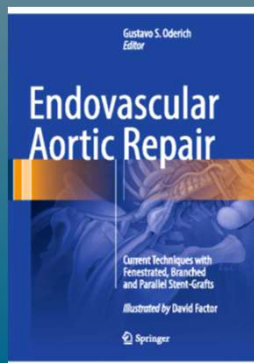
Dr. Anna Axelsson Raja
Kardiologi
Rigshospitalet



Dr. Gintautas Bieliauskas
Invasiv kardiologi
Rigshospitalet

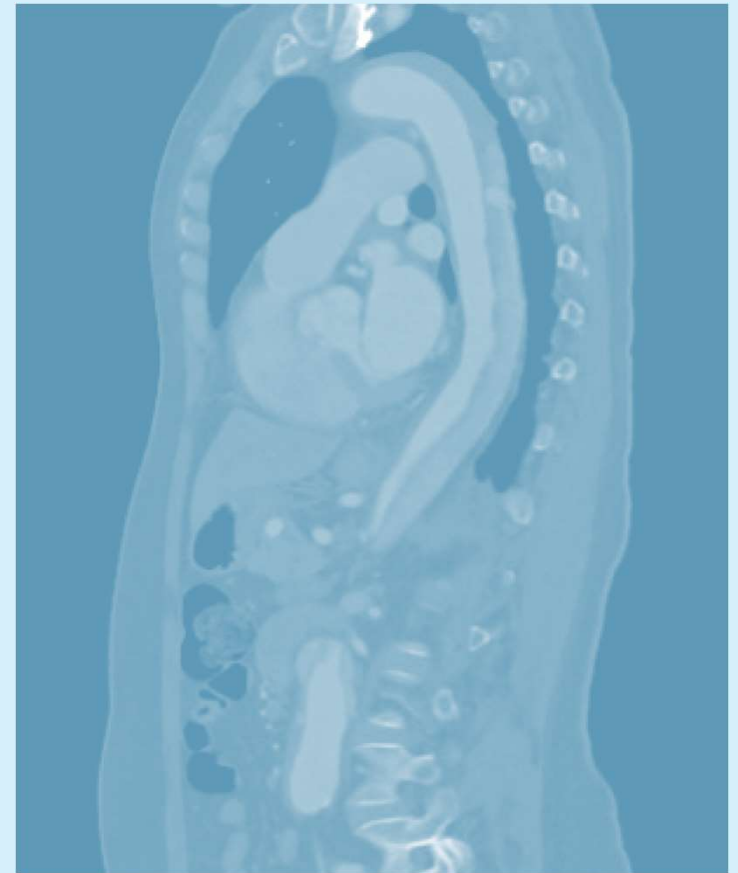


Jacob Budtz-Lilly
Karkirurgi
Aarhus Universitetshospital



Akut opståede aortalidelser

Anna Axelsson Raja
Afdelingslæge
Afdeling for Hjertesygdomme, Rigshospitalet



Forekomst og betydning af aortasygdom

- 1-3% af befolkningen vurderes at have aortasygdom, inkl. aneurisme og dissektion.
- **Aortadissektion** estimeret til **300-500/år i DK**.
- 30-dages **mortalitet** for aorta-dissektion er 23-56% afhængig af bl.a. lokalisation i aorta.

Table 1 Incidence and outcomes of acute aortic dissection in different population-based studies

Study	Melvinsdottir et al. ³	Howard et al. ⁴	Smedberg et al. ⁵	Yeh et al. ⁶	Lee et al. ⁷	Dinh et al. ⁸	Yamaguchi et al. ¹¹
Study period	1992–2013	2002–12	2002–16	2005–12	2005–16	2017–18	2016–18
Population	Iceland	Oxfordshire, UK	Sweden	Taiwan	Korea	NSW, Australia	Miyazaki, Japan
Population	Nationwide	Regional	Nationwide	Nationwide	Nationwide	Regional	Regional
N with AAD	153	52	8057	9092	18 565	273	79
Mean age, years	66.9	72	68	64.4	67	NA	76
Incidence, per 10 ⁵ inhabitants	2.53	6	7.2	5.6	3.76	3.47	17.6
Deaths included	Yes	Yes	Yes	No	No	No	Yes
Emergency surgery, %	43.7	36.5	32	38.3	NA	51	30
30-day mortality, %	45.2	55.8	23	17.7	10.8	35.5	74.5

AAD, acute aortic dissection; NA, not assessed.

Mazzolai, 2024
ESC Guidelines;
Aboyans V, EHJ
ACC 2021;
Hjerteforeningen

Inddeling akut opståede aortalidelser

- Aortadissektion (80-90%)
- Intramuralt hæmatom
- Penetrerende aorta ulcus



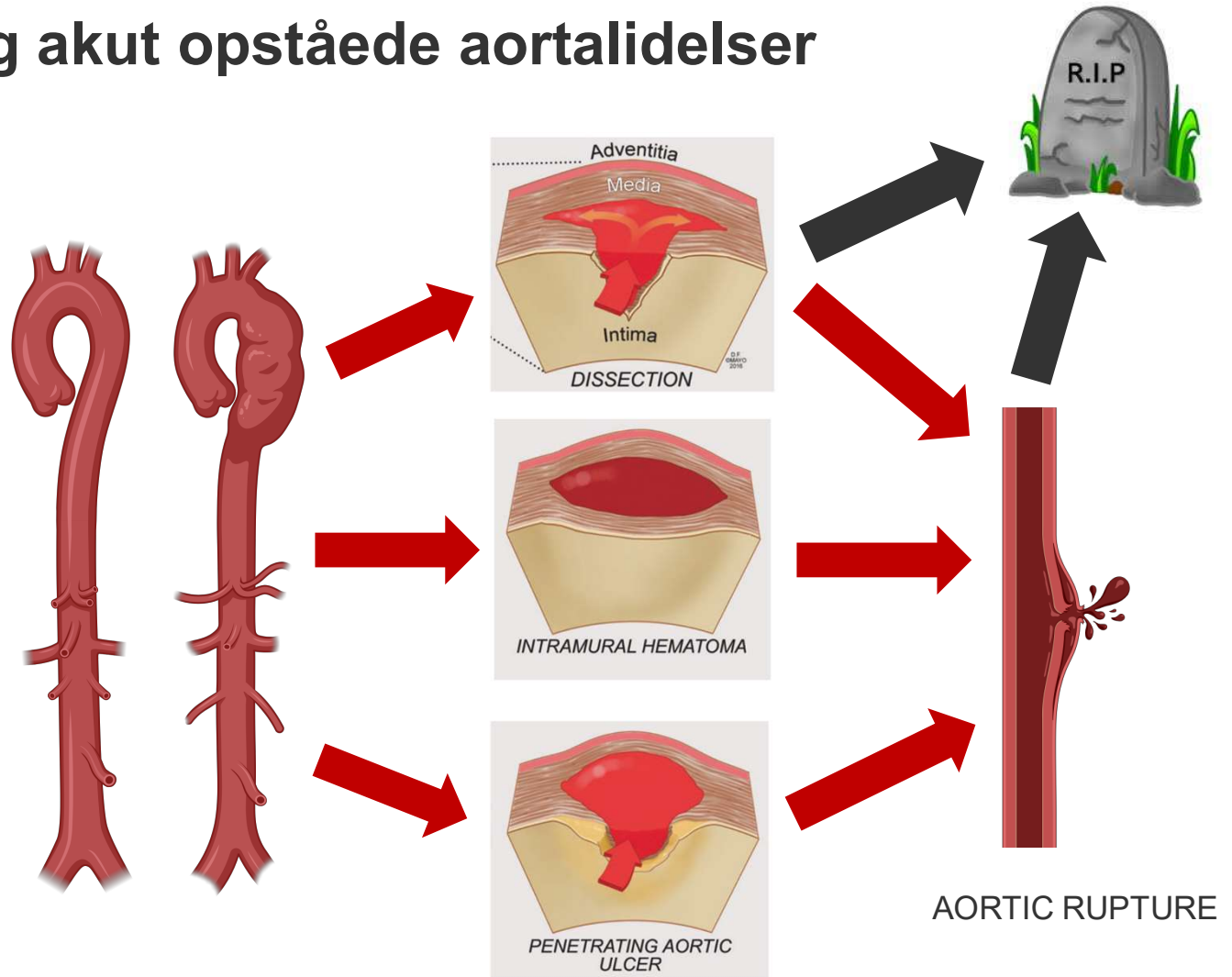
- Aorta ruptur



- Traumatisk aortaskade



- Aorta ruptur



Aortaaneurisme

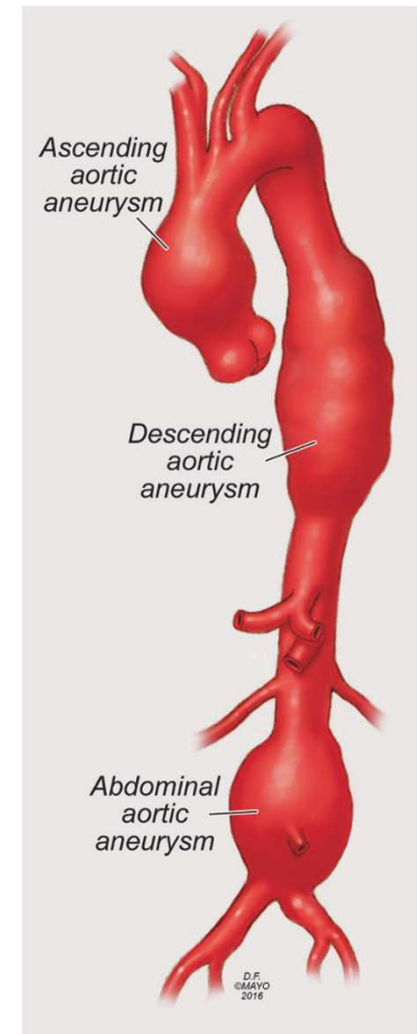
Oftest asymptomatisk indtil et akut event (dissektion, ruptur)

Lokalisationen afgør;

- Risiko ved komplikationer
- Behandlingsindikation
- Alternativ for intervention

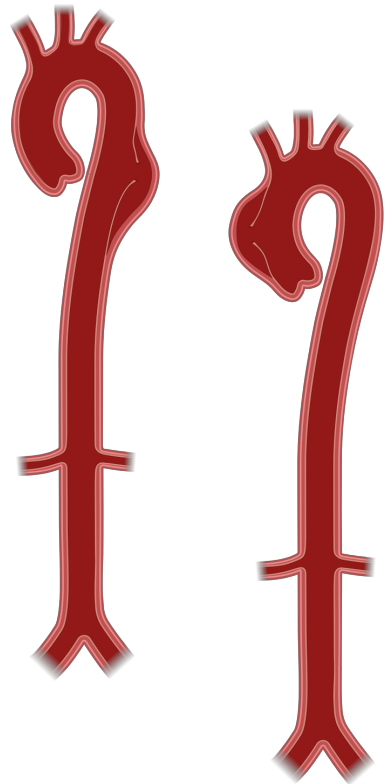
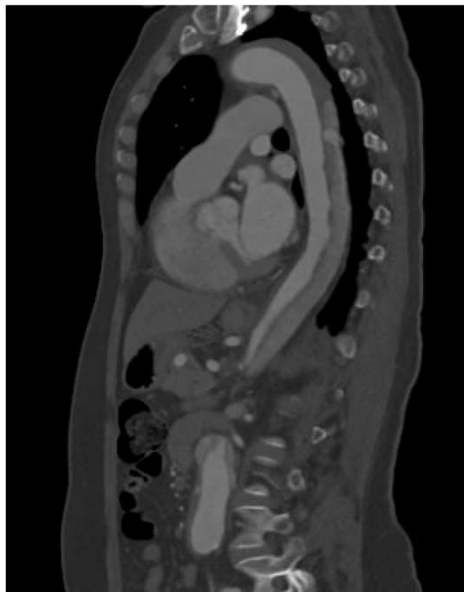
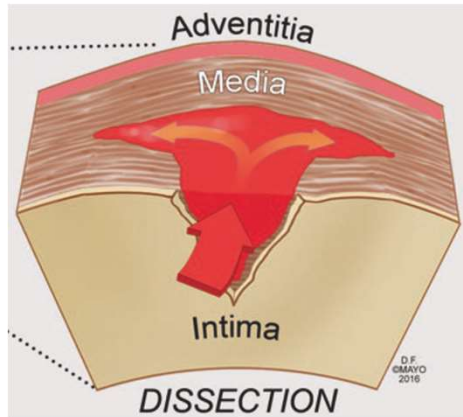
Risikofaktorer:

- Hypertension
- Rygning
- Mandligt køn
- Arvelighed



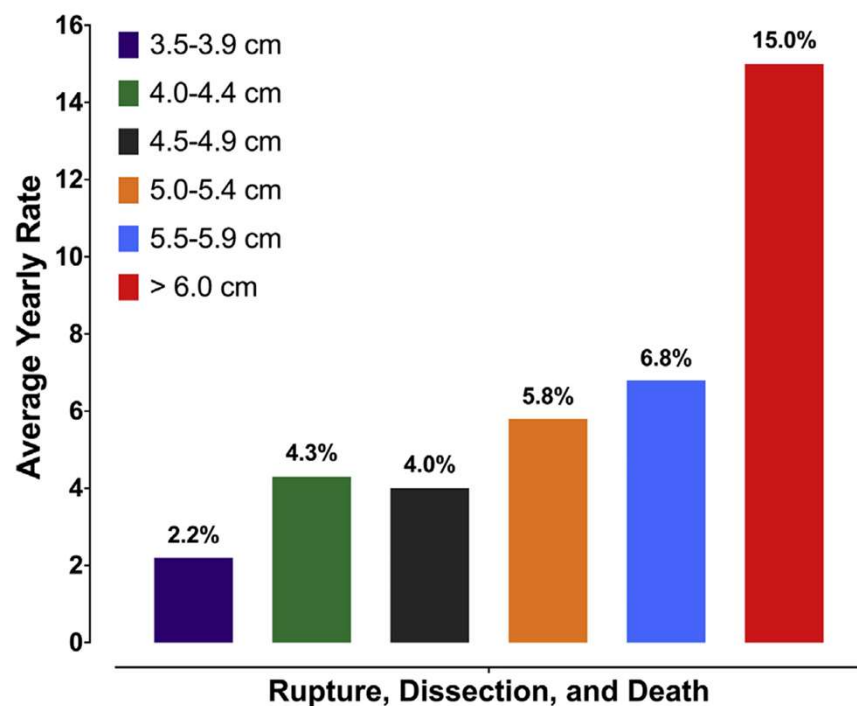
From Oderich, Endovascular aortic repair, Springer 2017

Aortadissektion



- **Rift i intima** med opslitning af aortavæggen
- Som regel akut debut med smerter i bryst/ryg/abdomen
- **Komplikationer** afhænger af lokalisation:
- **Hjerteinsufficiens** pga;
 - Blødning til hjertesækken med tamponade
 - Utæthed af aortaklappen
 - Aflukning af koronarkar
- Iskæmi af **andre organer** grundet aflukning af kar;
 - Hjerne
 - Nyrekar
 - Mave-tarm-gebetet
 - Spinalarterier
 - Arterier til underekstremiteter

Indikation for intervention



Risiko for komplikation, og dermed interventionsindikation, afhænger i høj grad af aortas diameter.

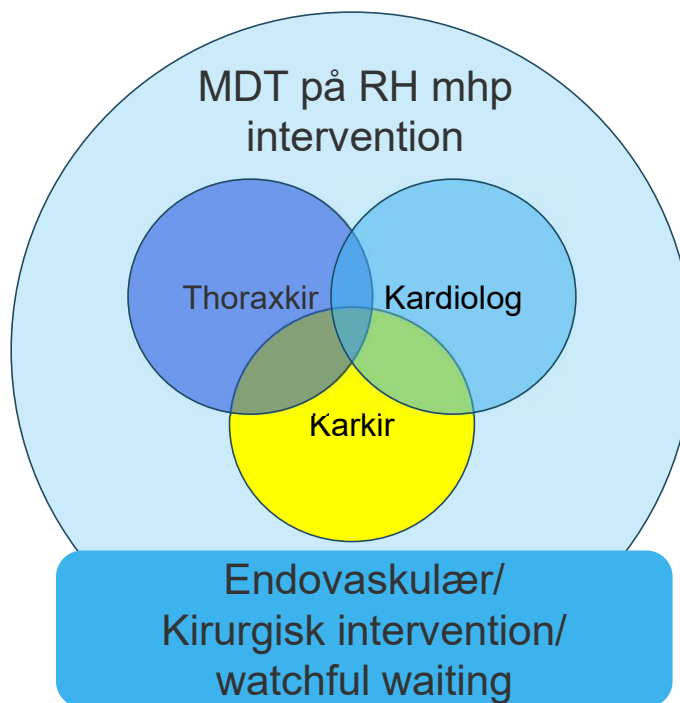
Risiko for
dissektion/ruptur



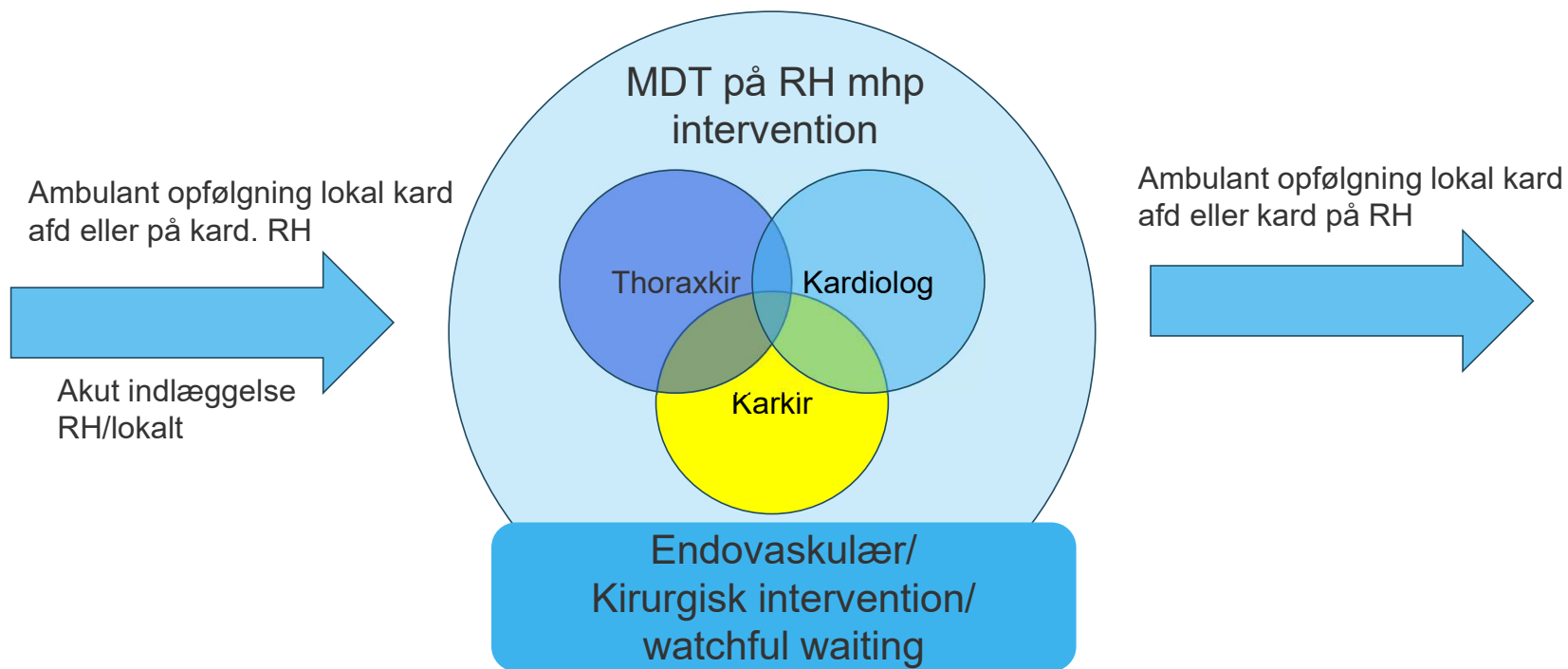
Risiko ved
intervention

Aortateam

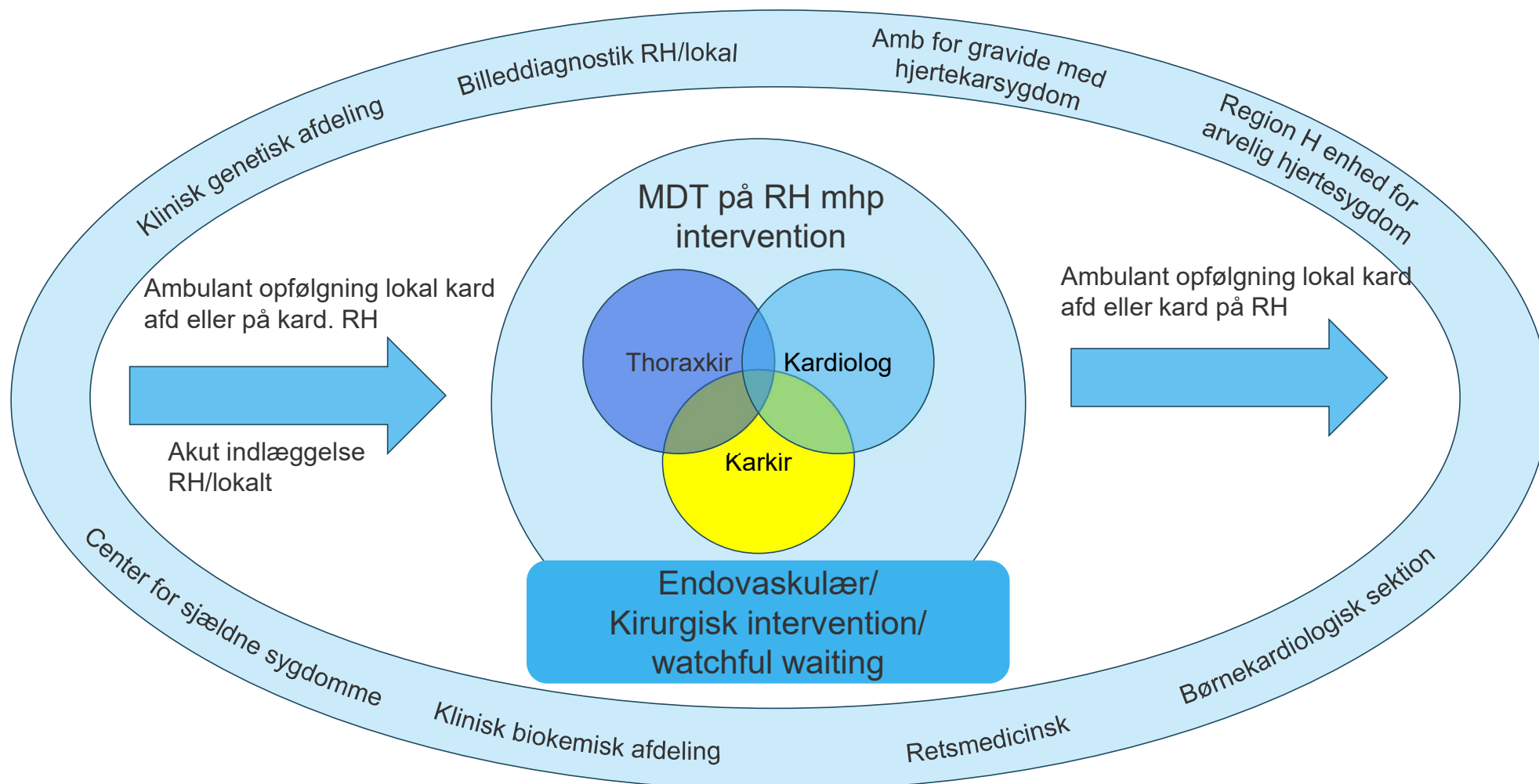
Aortateam og centrale samarbejdspartnere



Aortateam og centrale samarbejdspartnere



Aortateam og centrale samarbejdspartnere



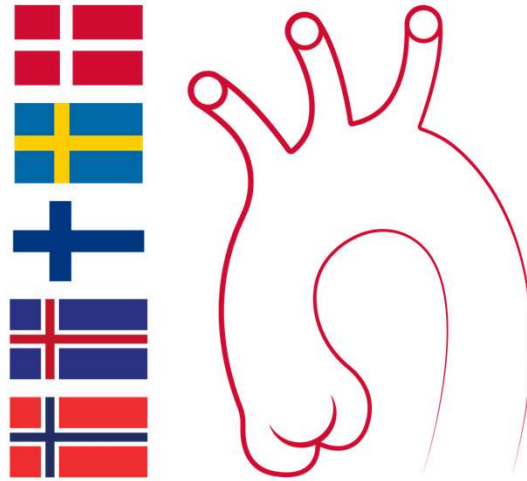
Henvendelse til aortateam: Elektivt henvendelse: In Basket i SP til en af os fra teamet.
Akut henvendelse: Kard BV tlf. 3545 1699

Behandling af type B aortadissektion

Jacob Budtz-Lilly, MD PhD FEBVS

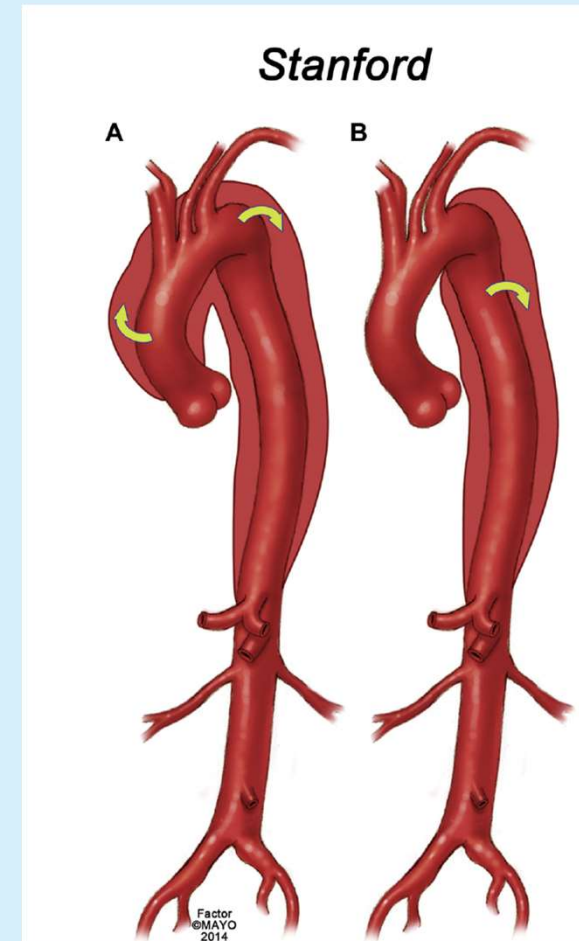
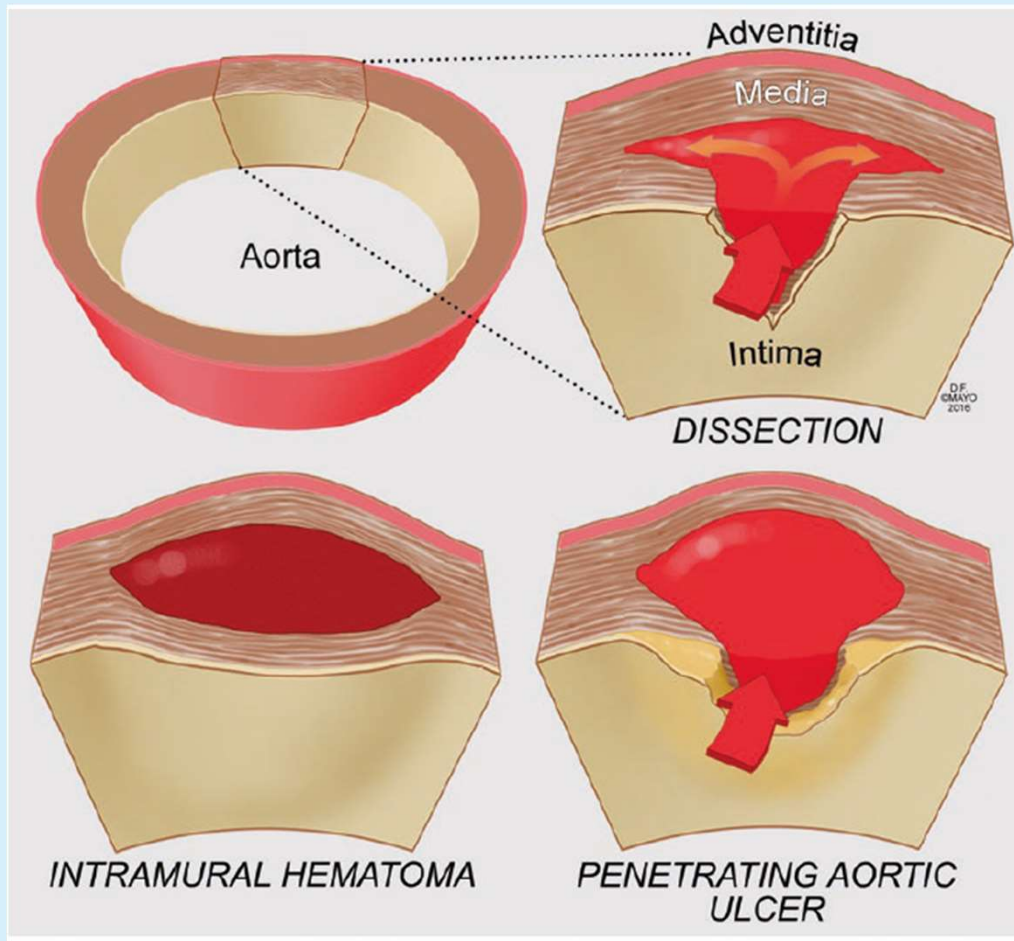
Overlæge, Assoc. professor

Aarhus Universitetshospital, Aarhus



SUNDAY TRIAL

Scandinavian trial of Uncomplicated
Aortic Dissection Therapy



Editor's Choice — Management of Descending Thoracic Aorta Diseases

Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS)

V. Rimbaut^a, D. Böckler^a, J. Brunkwall^a, P. Cao^a, R. Chiesa^a, G. Coppi^a, M. Czerny^a, G. Fraedrich^a, S. Haulon^a, M.J. Jacobs^a, M.L. Lachat^a, F.L. Moll^a, C. Setacci^a, P.R. Taylor^a, M. Thompson^a, S. Trimarchi^a, H.J. Verhagen^a, E.L. Verhoeven^a, ESVS Guidelines Committee^b P. Kolh, G.J. de Borst, N. Chakfé, E.S. Debus, R.J. Hinchliffe, S. Kakkos, I. Koncar, J.S. Lindholt, M. Vega de Ceniga, F. Vermassen, F. Verzini, Document Reviewers^c P. Kolh, J.H. Black III, R. Busund, M. Björck, M. Dake, F. Dick, H. Eggebrecht, A. Evangelista, M. Grabenwöger, R. Milner, A.R. Naylor, J.-B. Ricco, H. Rousseau, J. Schmidli

Keywords: Clinical practice, Descending thoracic aorta, Descending thoracic aortic management, Guideline, Recommendations, Thoracic aorta abnormalities, Thoracic aorta diseases, Thoracic aorta disorders, Thoraco-abdominal aorta

Recommendation 16	Class	Level of evidence	References
In patients with complicated acute type B aortic dissection, endovascular repair with thoracic endografting should be the first line intervention	I	C	6,85–89,92–94,96–99, 103,109
Recommendation 17			
In complicated acute type B aortic dissection, endovascular fenestration should be considered to treat malperfusion	IIa	C	73,100–102
Recommendation 18			
To prevent aortic complications in uncomplicated acute type B aortic dissection, early thoracic endografting may be considered selectively	IIb	B	104

Evidence for type B dissection treatment

INSTEAD trial

Cardiovascular Surgery

Randomized Comparison of Strategies for Type B Aortic Dissection

The INvestigation of STent Grafts in Aortic Dissection (INSTEAD) Trial

Christoph A. Nienaber, MD, PhD; Hervé Rousseau, MD, PhD; Holger Eggebrecht, MD; Stephan Kische, MD; Rossella Fattori, MD, PhD; Tim C. Rehders, MD; Günther Kundt, PhD; Dierk Scheinert, MD, PhD; Martin Czerny, MD, PhD; Tilo Kleinfeldt, MD; Burkhard Zipfel, MD; Louis Labrousse, MD, PhD; Hüseyin Ince, MD, PhD; for the INSTEAD Trial

Background—Thoracic endovascular aortic repair (TEVAR) represents a novel concept for type B aortic dissection. Although life-saving in acute emergencies, outcomes and survival of TEVAR in stable dissection are unknown.

Methods and Results—One hundred forty patients in stable clinical condition at least 2 weeks after index dissection were randomly subjected to elective stent-graft placement in addition to optimal medical therapy (n=72) or to optimal medical therapy alone (n=68) with surveillance (arterial pressure according to World Health Organization guidelines $\leq 120/80$ mm Hg). The primary end point was all-cause death at 2 years, whereas aorta-related death, progression (with need for conversion or additional endovascular or open surgery), and aortic remodeling were secondary end points. There was no difference in all-cause deaths, with a 2-year cumulative survival rate of $95.6 \pm 2.5\%$ with optimal medical therapy versus $88.9 \pm 3.7\%$ with TEVAR ($P=0.15$); the trial, however, turned out to be underpowered. Moreover, the aorta-related death rate was not different ($P=0.44$), and the risk for the combined end point of aorta-related death (rupture) and progression (including conversion or additional endovascular or open surgery) was similar ($P=0.65$). Three neurological adverse events occurred in the TEVAR group (1 paraplegia, 1 stroke, and 1 transient paraparesis), versus 1 case of paraparesis with medical treatment. Finally, aortic remodeling (with true-lumen recovery and thoracic false-lumen thrombosis) occurred in 91.3% of patients with TEVAR versus 19.4% of those who received medical treatment ($P<0.001$), which suggests ongoing aortic remodeling.

Conclusions—In the first randomized study on elective stent-graft placement in survivors of uncomplicated type B aortic dissection, TEVAR failed to improve 2-year survival and adverse event rates despite favorable aortic remodeling.

Clinical Trial Registration—URL: <http://www.clinicaltrials.gov>. Unique identifier: NCT00525356.

Nienaber, *Circ* 2009; *Circ Cardiovasc Int* 2013

ADSORB trial

Endovascular Repair of Acute Uncomplicated Aortic Type B Dissection Promotes Aortic Remodelling: 1 Year Results of the ADSORB Trial

J. Brunkwall ^{a,*}, P. Kasprzak ^b, E. Verhoeven ^c, R. Heijmen ^d, P. Taylor ^d, the ADSORB Trialists ^a

^aDepartment of Vascular and Endovascular Surgery, University Clinics, University of Cologne, Cologne, Germany

^bSection of Vascular Surgery, Department of Surgery, University of Regensburg, Department of Vascular Surgery, Klinikum Nuernberg, Nuernberg, Germany

^cDepartment of Cardiovascular Surgery Antonius Hospital, Nieuwegein, The Netherlands

^dDepartment of Vascular Surgery, St. Guy's Hospital, London, UK

WHAT THIS PAPER ADDS

This is the only prospective randomised trial on acute type B dissection. The definition of the acute dissection is clearly defined as is the outcome. In the highly specialised centres participating, the outcome was good and the rate of thrombosis of the false channel can be estimated and be used as reference. Stent grafts induced thrombosis of the false channel and were safe to implant.

Objectives: Uncomplicated acute type B aortic dissection (AD) treated conservatively has a 10% 30-day mortality and up to 25% need intervention within 4 years. In complicated AD, stent grafts have been encouraging. The aim of the present prospective randomised trial was to compare best medical treatment (BMT) with BMT and Gore TAG stent graft in patients with uncomplicated AD. The primary endpoint was a combination of incomplete/no false lumen thrombosis, aortic dilatation, or aortic rupture at 1 year.

Methods: The AD history had to be less than 14 days, and exclusion criteria were rupture, impending rupture, malperfusion. Of the 61 patients randomised, 80% were DeBakey type IIIB.

Results: Thirty-one patients were randomised to the BMT group and 30 to the BMT+TAG group. Mean age was 63 years for both groups. The left subclavian artery was completely covered in 47% and in part in 17% of the cases. During the first 30 days, no deaths occurred in either group, but there were three crossovers from the BMT to the BMT+TAG group, all due to progression of disease within 1 week. There were two withdrawals from the BMT+TAG group. At the 1-year follow up there had been another two failures in the BMT group: one malperfusion and one aneurysm formation ($p = .056$ for all). One death occurred in the BMT+TAG group. For the overall endpoint BMT+TAG was significantly different from BMT only ($p < .001$). Incomplete false lumen thrombosis was found in 13 (43%) of the TAG+BMT group and 30 (97%) of the BMT group ($p < .001$). The false lumen reduced in size in the BMT+TAG group ($p < .001$) whereas in the BMT group it increased. The true lumen increased in the BMT+TAG ($p < .001$) whereas in the BMT group it remained unchanged. The overall transverse diameter was the same at the beginning and after 1 year in the BMT group (42.1 mm), but in the BMT+TAG it decreased (38.8 mm; $p = .062$).

Conclusions: Uncomplicated AD can be safely treated with the Gore TAG device. Remodelling with thrombosis of the false lumen and reduction of its diameter is induced by the stent graft, but long term results are needed.

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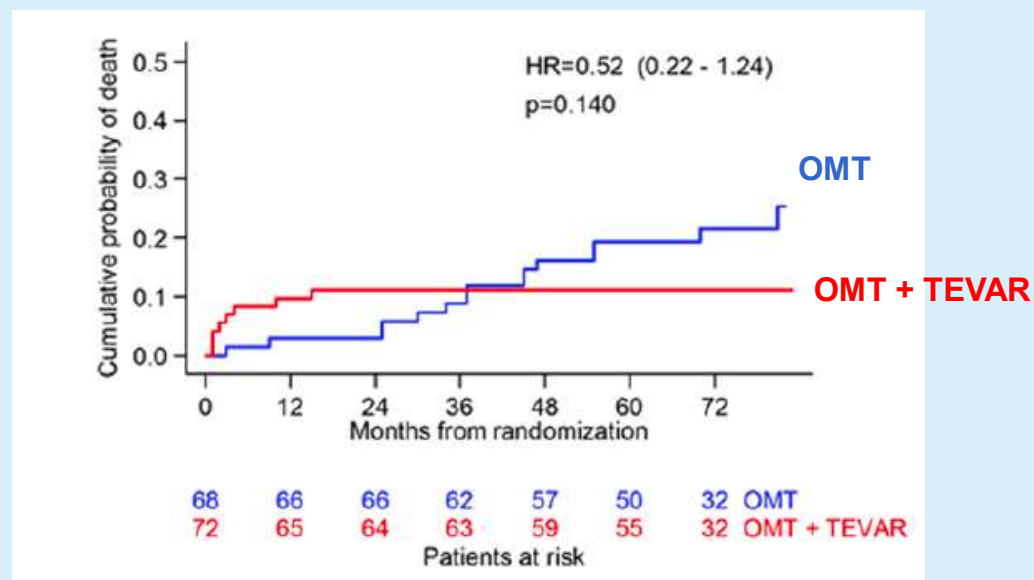
Keywords: Acute type B dissection, Uncomplicated, Stent graft, Thrombosis, Remodelling

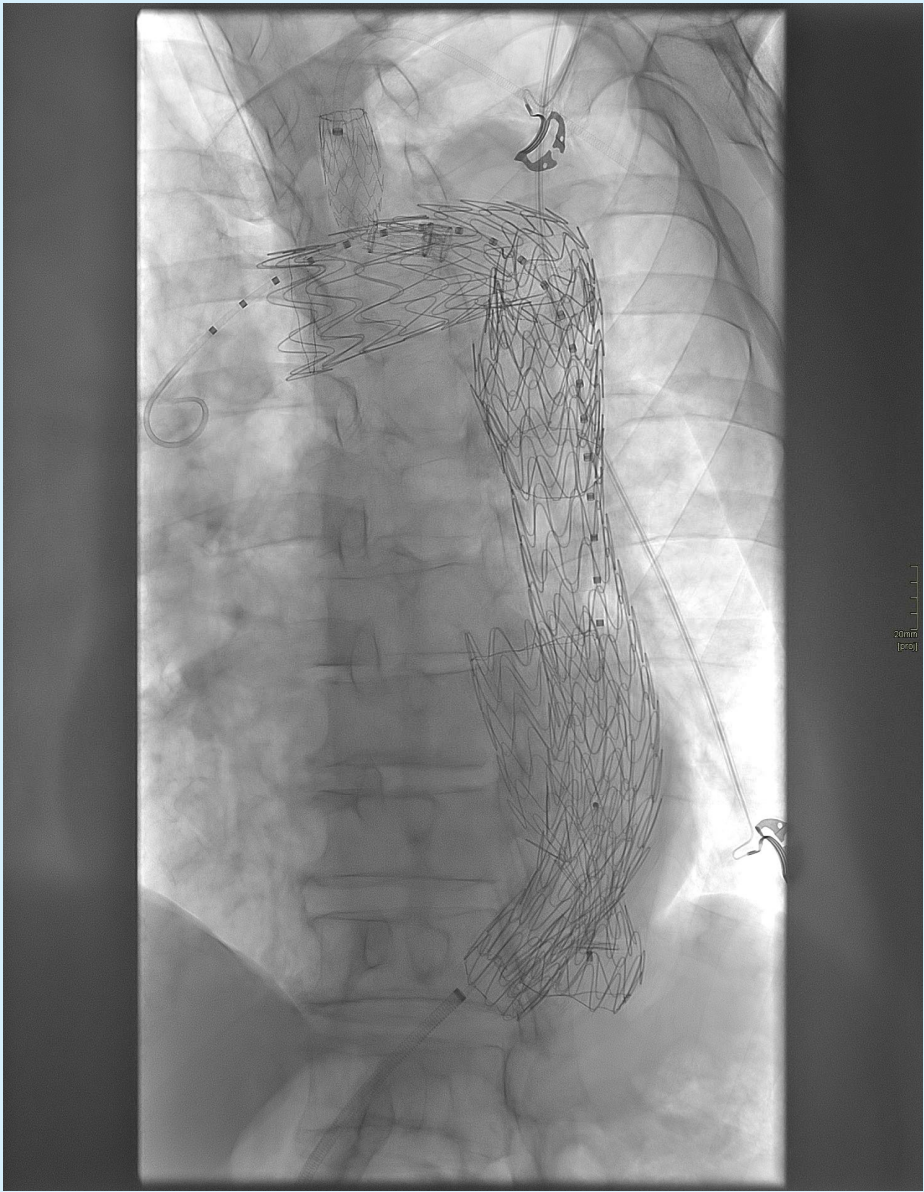
Brunkwall, *EJVES* 2014

Possible survival benefit at 5 years

Endovascular Repair of Type B Aortic Dissection Long-term Results of the Randomized Investigation of Stent Grafts in Aortic Dissection Trial

All cause mortality





Lack of consensus

Aorta and Major Branches

Eur J Vasc Endovasc Surg (2020) 60, 194–200

Surgical Decision Making in Uncomplicated Type B Aortic Dissection: A Survey of Australian/New Zealand and European Surgeons

Bijit Munshi ^{a,b,f,*}, Barry J. Doyle ^{a,c,d,e}, Jens C. Ritter ^f, Shirley Jansen ^{b,g,h,i}, Louis P. Parker ^{a,c}, Vincent Rimbaut ^j, Colin Bicknell ^{k,l}, Paul E. Norman ^{a,b,f}, Anders Wanhainen ^m

For pre-emptive TEVAR



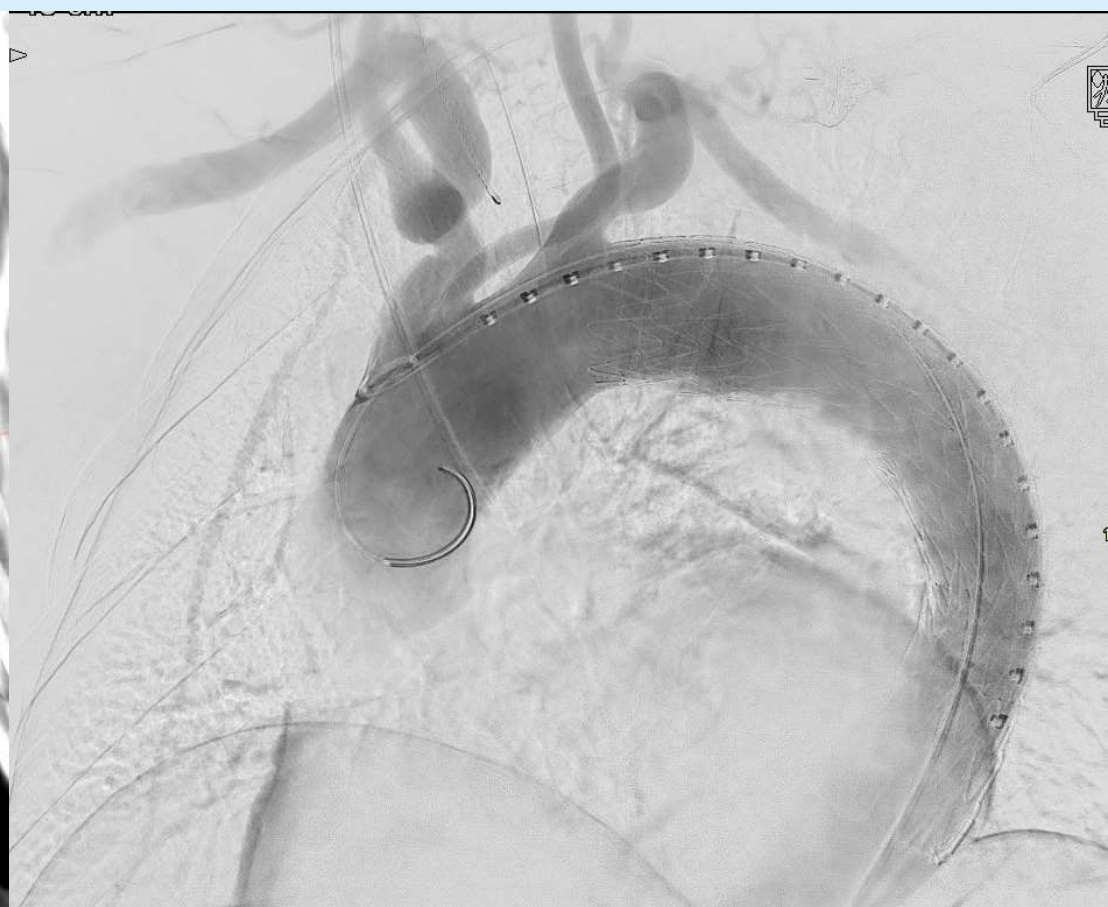
Against pre-emptive TEVAR



49.3% recommended pre-emptive TEVAR in selected cases

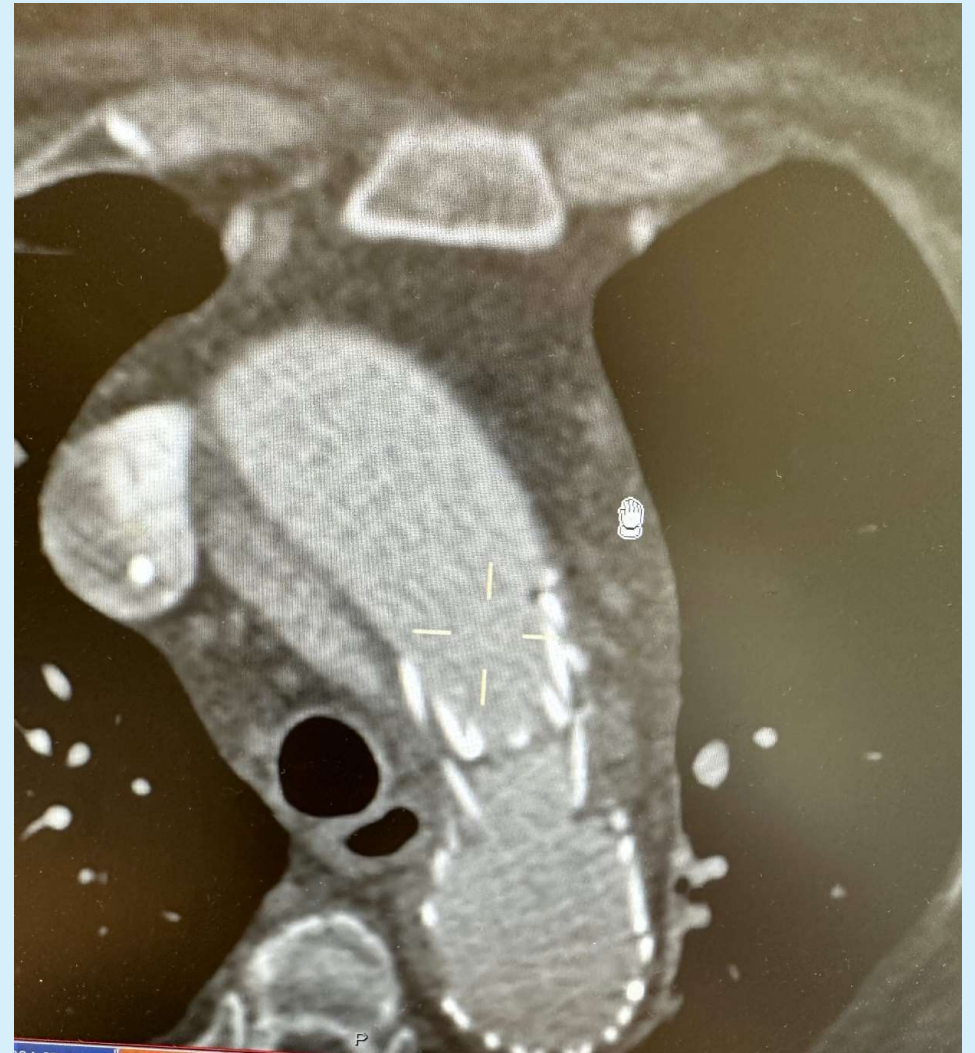
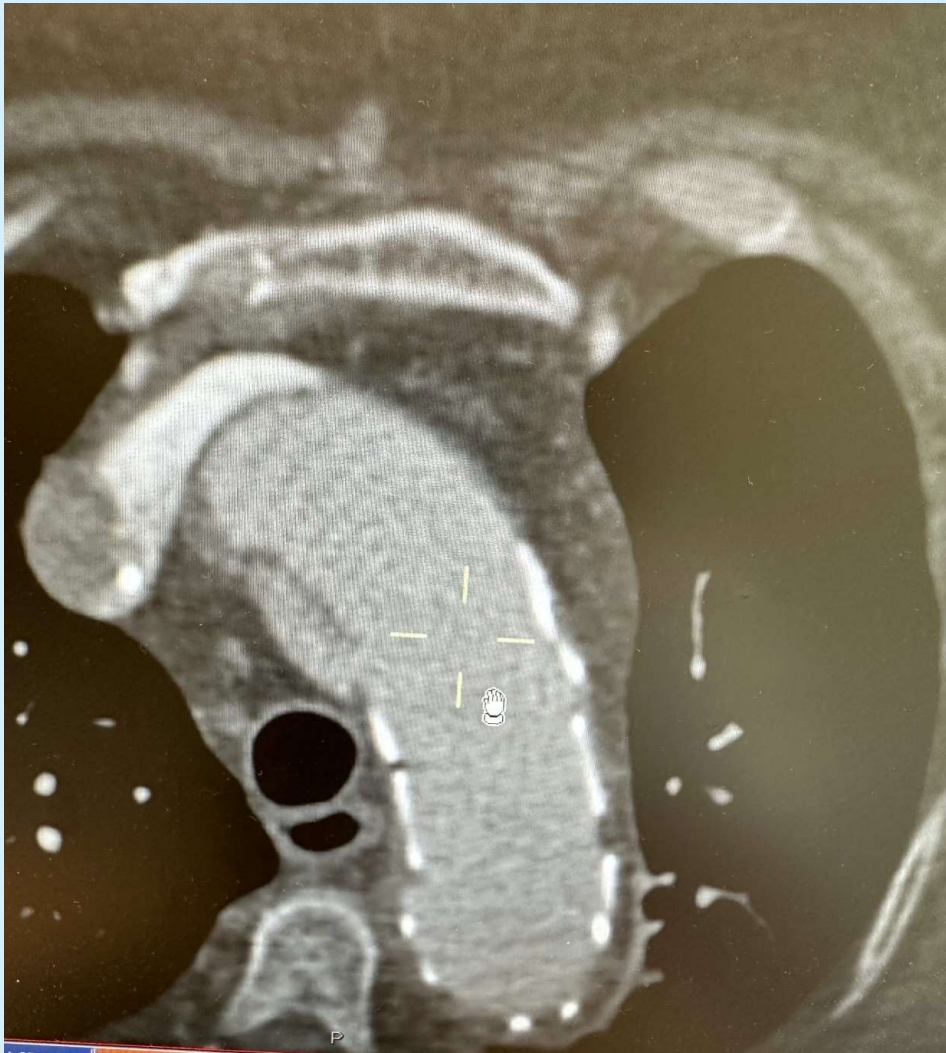
83% preferred this to occur in subacute phase (14 days – 3 months)

64-year old male patient with hypertension



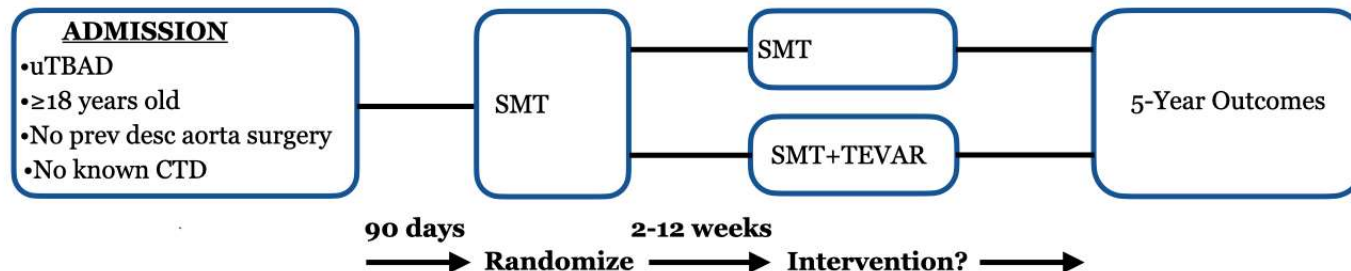


Retrograde Type A dissection



Scandinavian Trial of Uncomplicated Aortic Dissection Therapy SUNDAY Trial

32 centers
554 patients (event driven)
Primary outcome: 5-year survival



Unique aspects

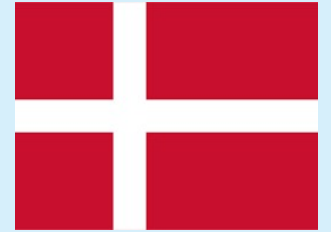
- Home blood pressure



- EQ-5D-5L, SF-12, HADS

Mobility		1	✓	3	4	5
Self-Care		✓	2	3	4	5
Usual Activities		1	✓	3	4	5
Pain/Discomfort		1	2	✓	4	5
Anxiety/Depression		1	2	3	4	✓

Unique aspects



Investigator driven – no industry involvement

Pragmatic – treat as per local strategy

Hard endpoint – no loss to follow-up



SUNDAY TRIAL

Trial Steering Committee

Jacob Budtz-Lilly 

Joost R. Van der Vorst 

Beate Rikken Lindberg 

Timothy Resch 

Kevin Mani 

Manar Khashram 

Henriette Margrethe Beck 

Patrick Björkman 

Gunnar Eriksson, Aortic Dissection Association Scandinavia 

Oscar David Rubio Bermeo 

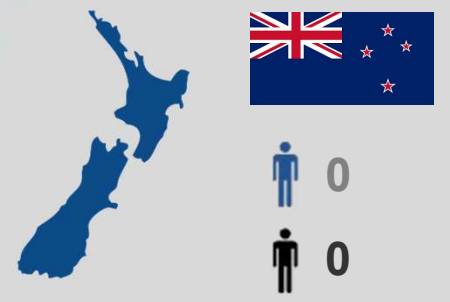
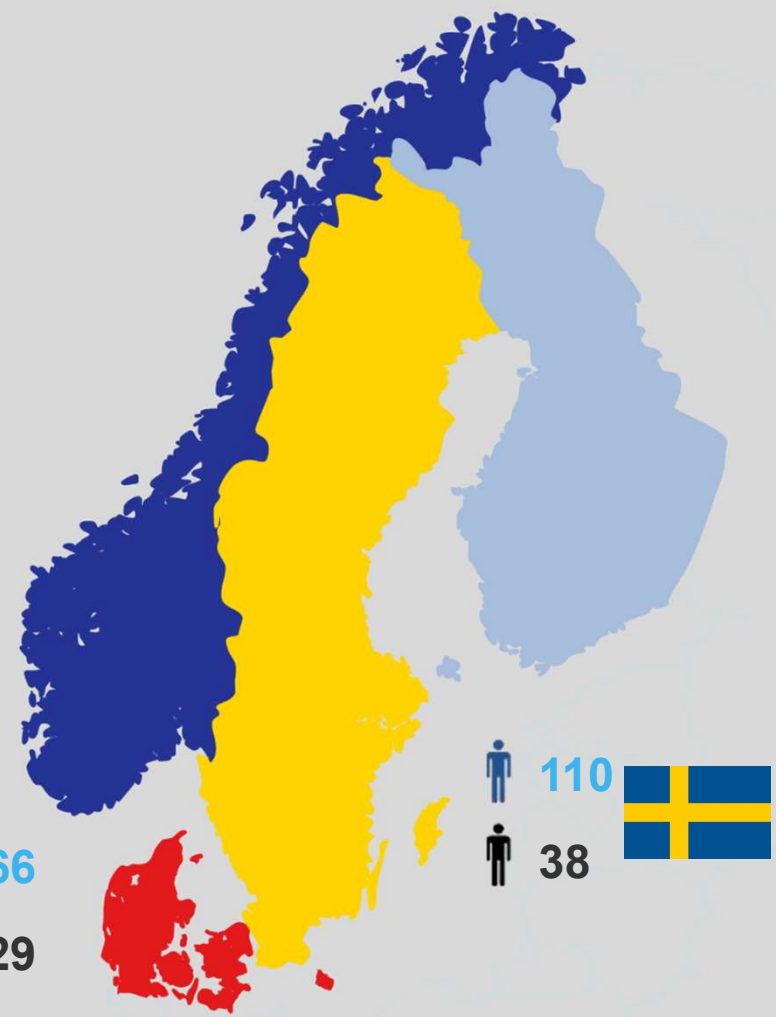
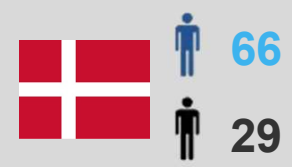
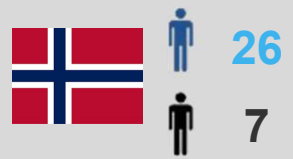
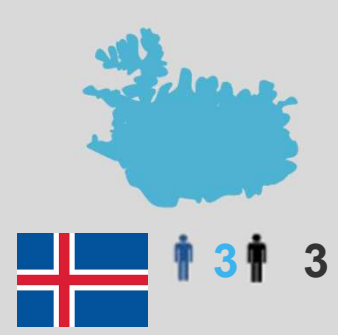
Henrik Støvring 



Screened



Included

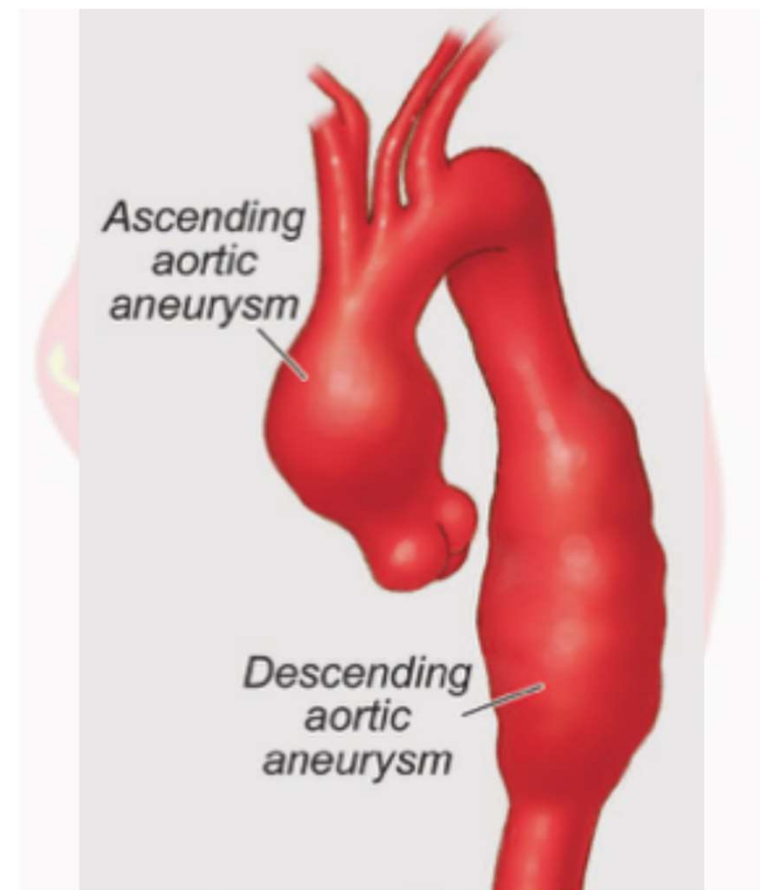
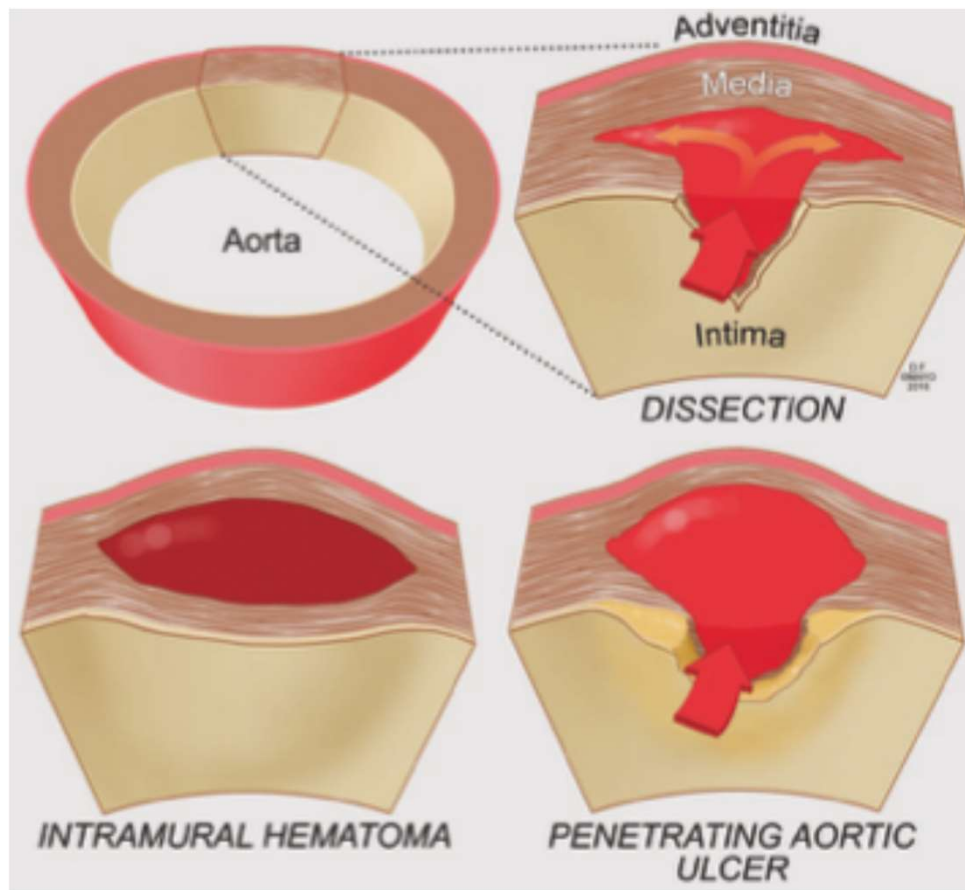




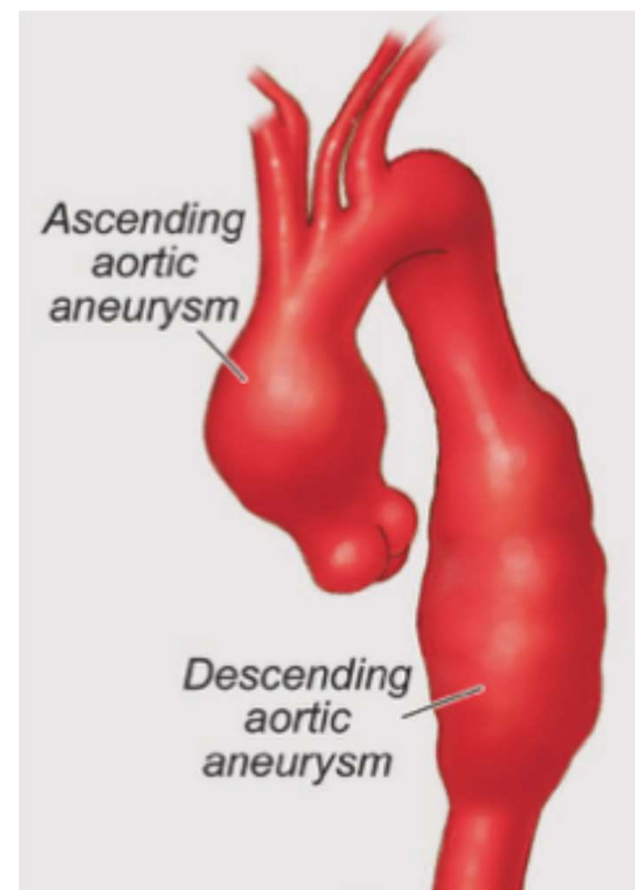
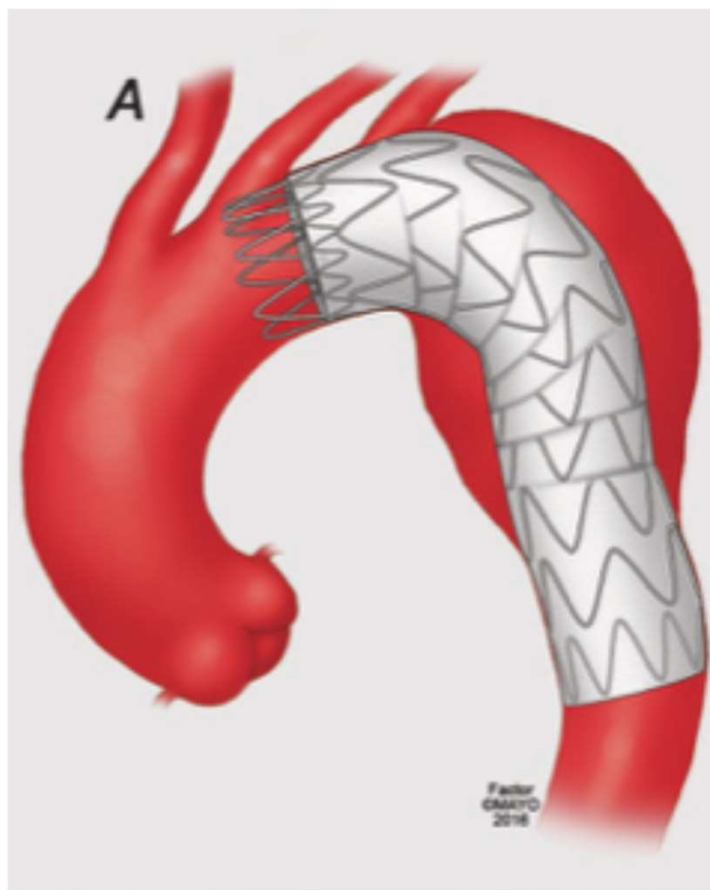
Tekniske udfordringer tæt på aortahalsgrene

Gintautas Bieliauskas, MD
Overlæge
Afdeling for Hjertesygdomme, Rigshospitalet

Akutte aortalidelser

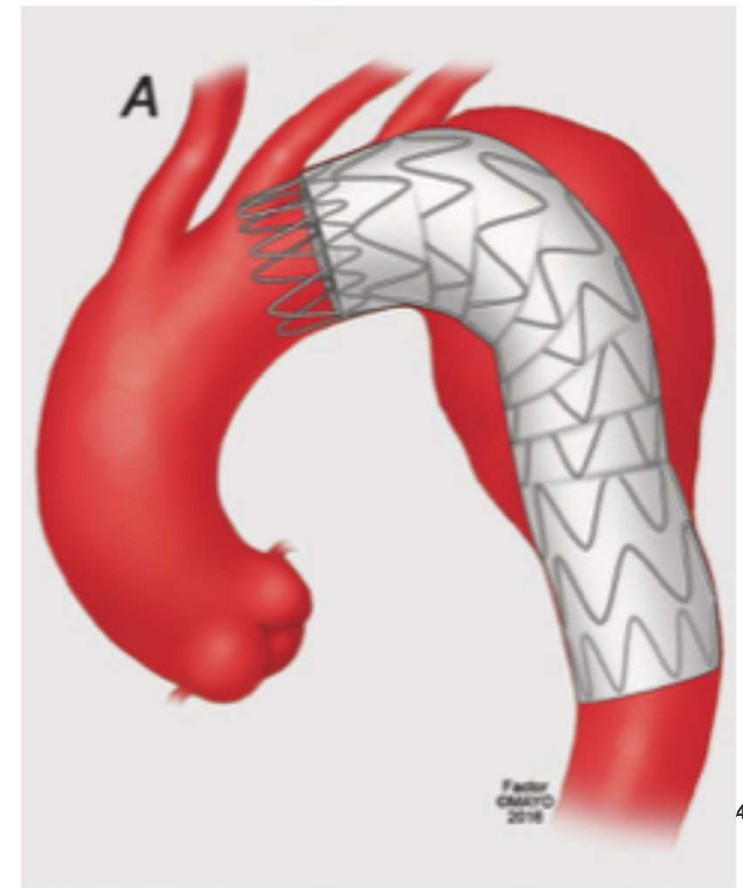


TEVAR



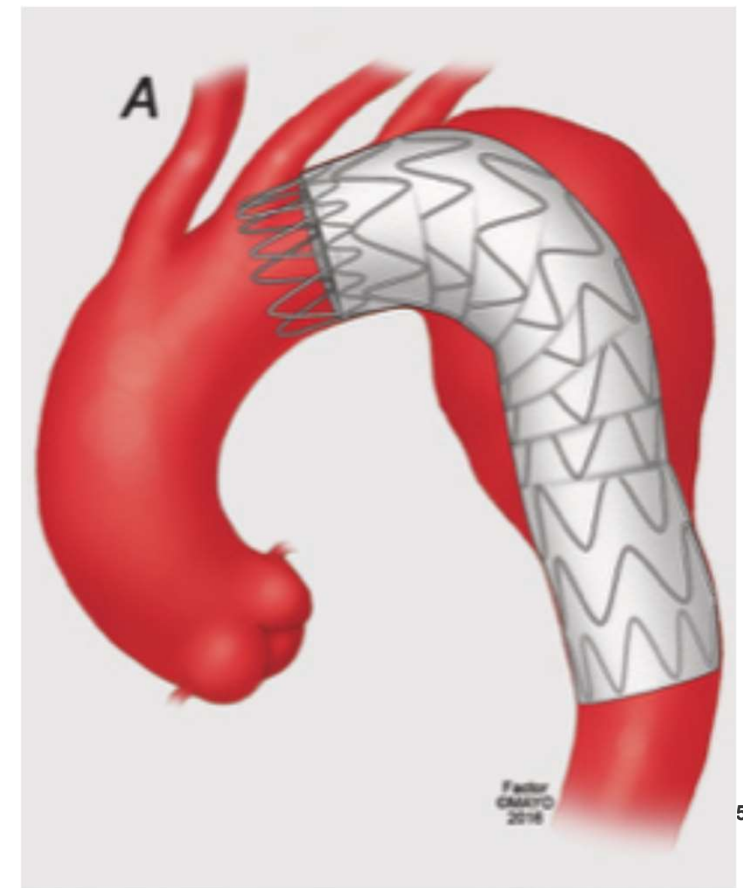
TEVAR - tekniske udfordringer tæt på aortahalsgrene

- Dynamisk område tæt på aortaklappen
- Skarp vinkling og kort landingszone
- Behov for at dække vigtige aortagrene



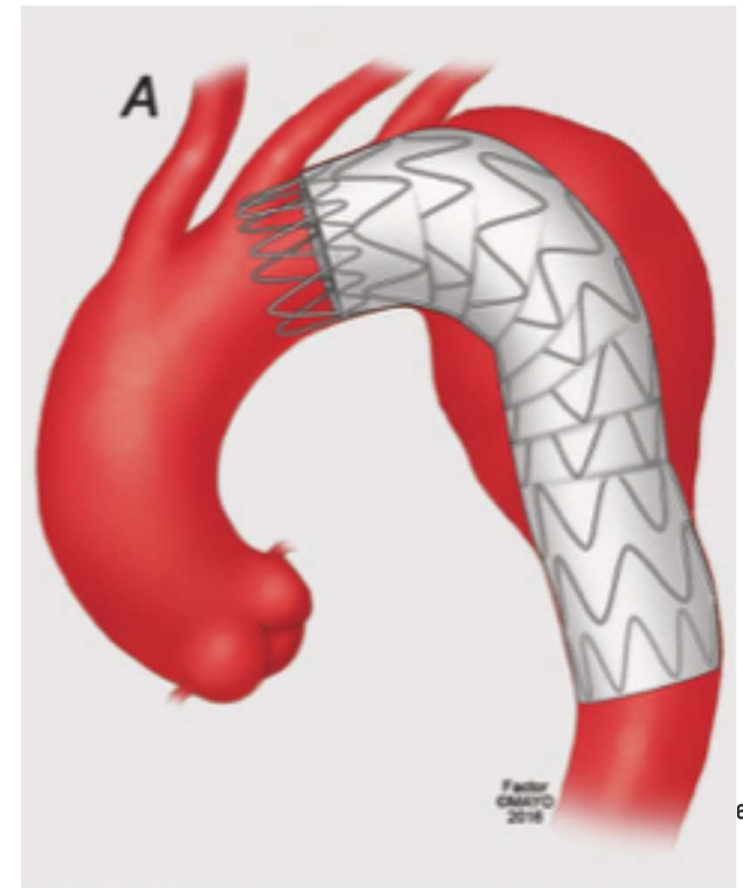
Har vi en ordentlig løsning på disse udfordringer?

- Dynamisk område tæt på aortaklappen
 - **Hurtig pacing af hjertet**
- Skarp vinkling og kort landingszone
 - **Dedikeret design af stentgrafts**
- Behov for at dække vigtige aortagrener
 - **Udvikling af dedikeret TEVAR-teknik**

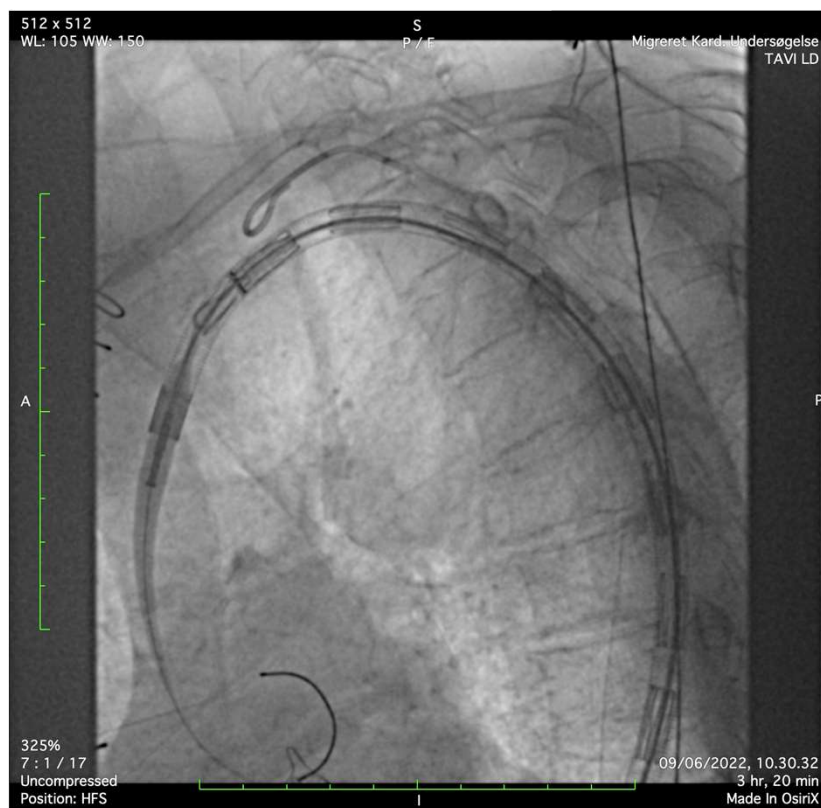


Hvordan kan man opnå en præcis stentgraft-position?

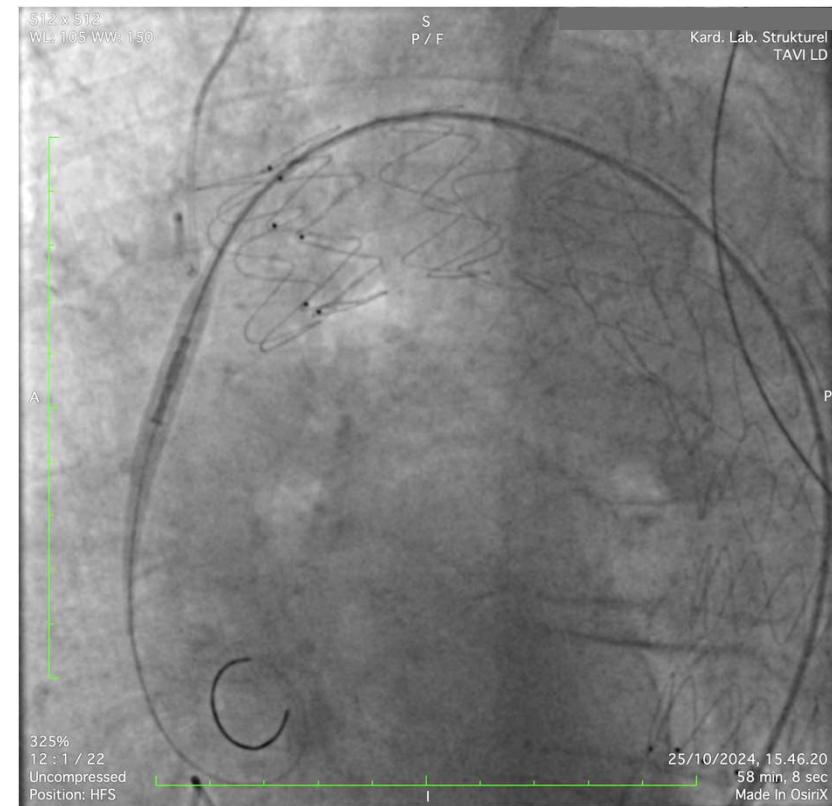
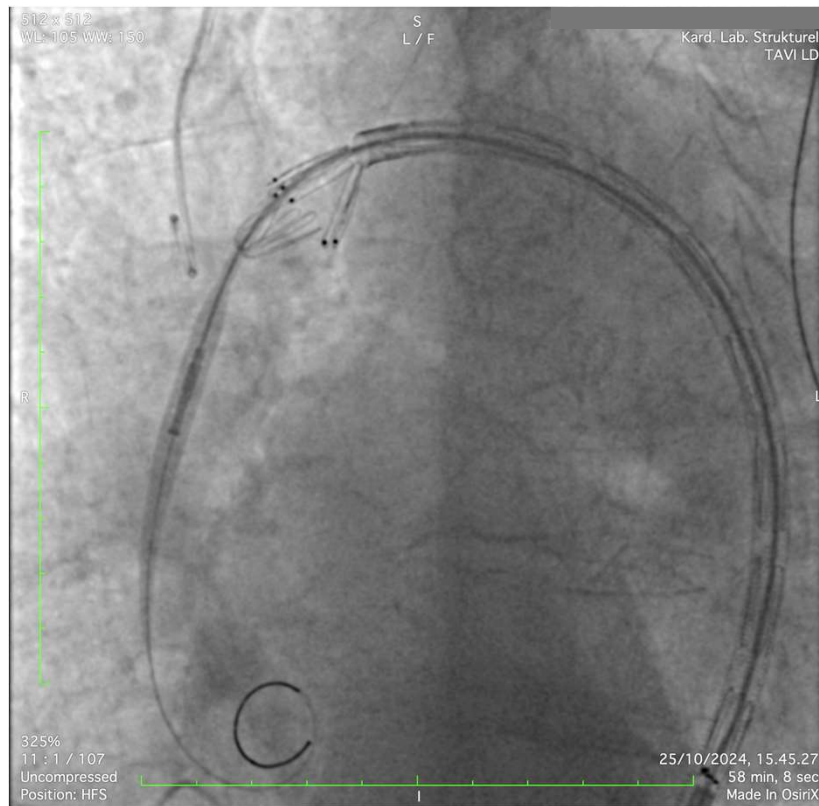
- Selektiv angiografi på vigtige steder til positionering
- Hurtig RV-pacing for at reducere hjertets output



Selektiv kontrastindsprøjtning til positionering

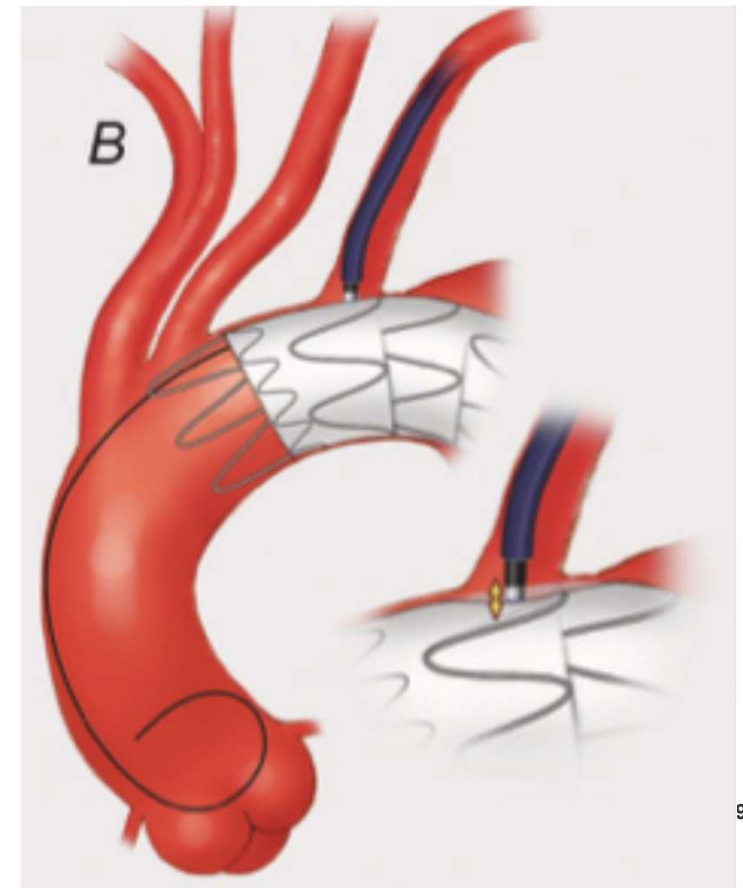


Hurtig RV-pacing for at reducere hjertets output

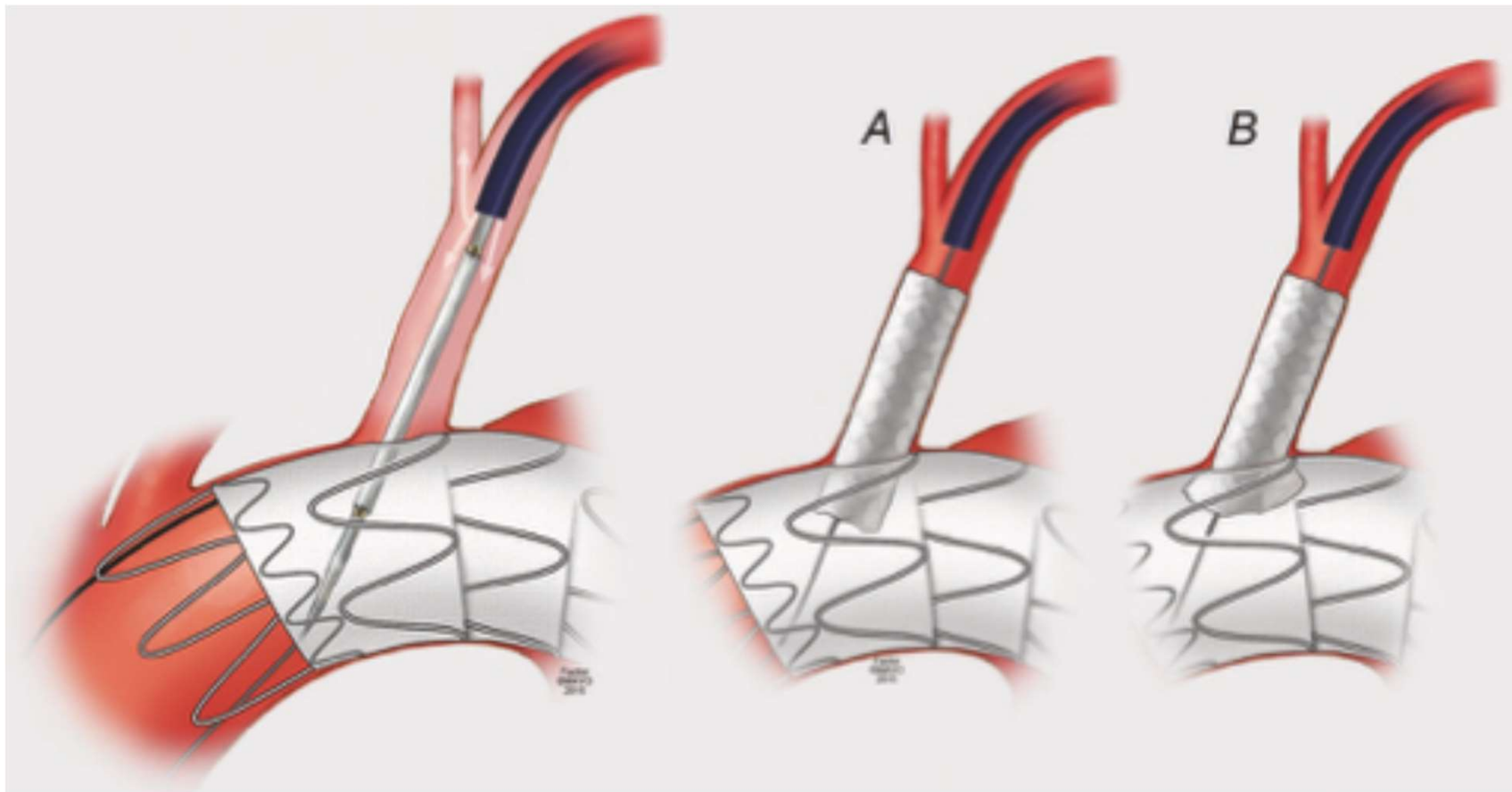


Hvordan kan man holde vigtige aortagrene åbne?

- Åben kirurgisk bypass
 - **Historisk teknik**
- In-situ laser-fenestrering
 - **Vores favorit i det seneste årti**

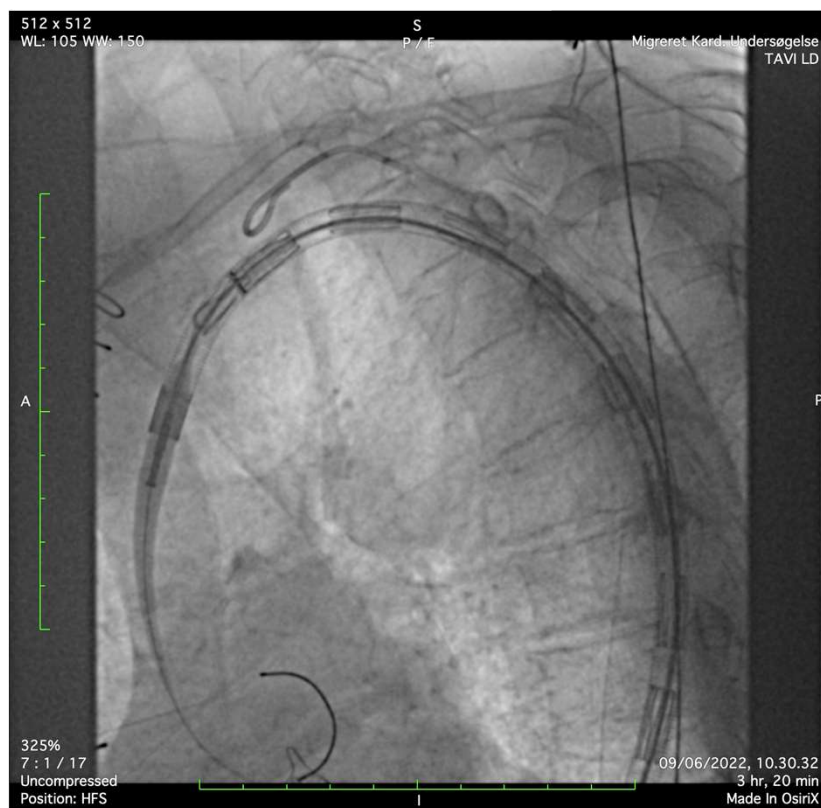


In-situ laser fenestrering

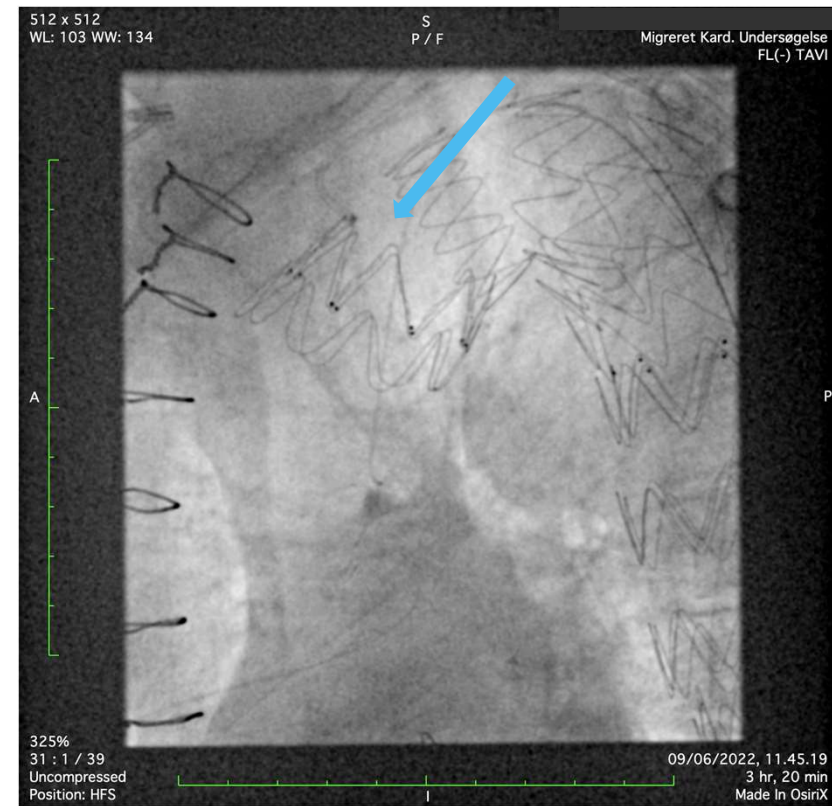
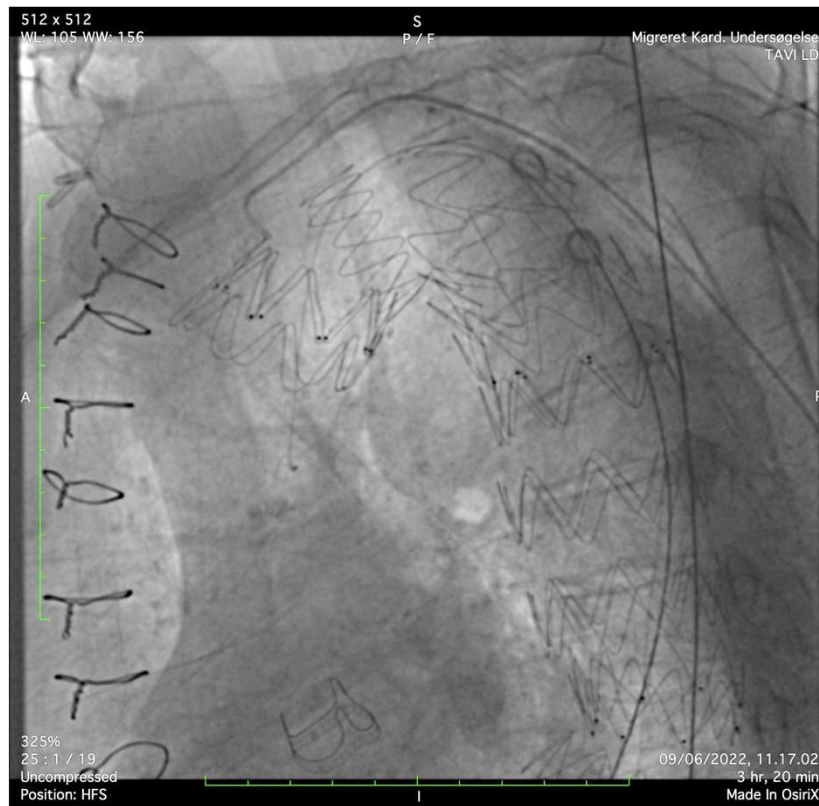


In-situ laser-fenestring case-eksempel

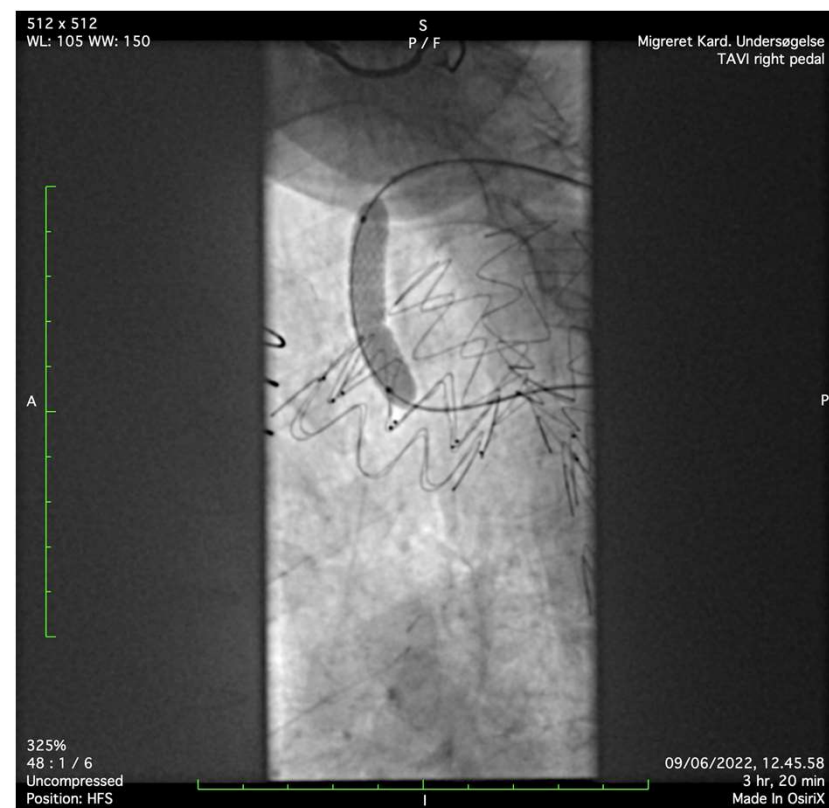
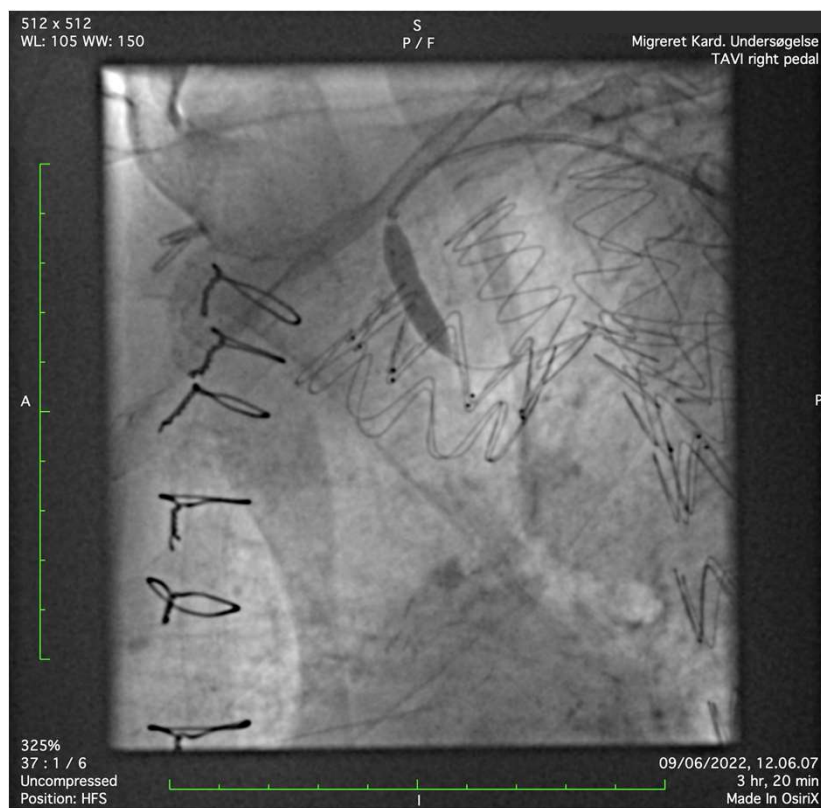
Indledende placering af stentgraft



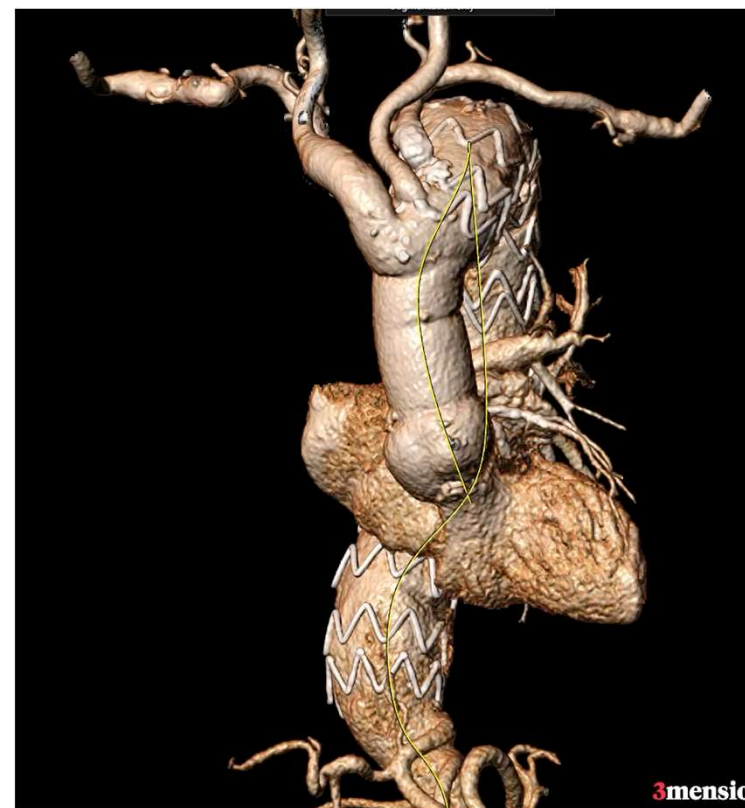
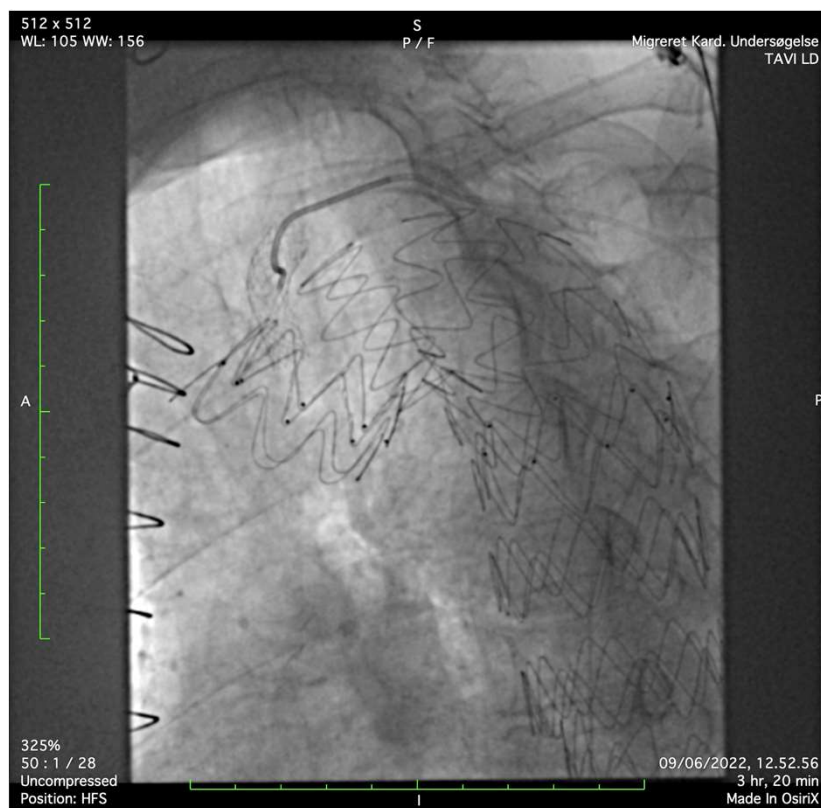
Laser-fenestrering af stentgraft



Laserfremstillet åbning udvides og stentes

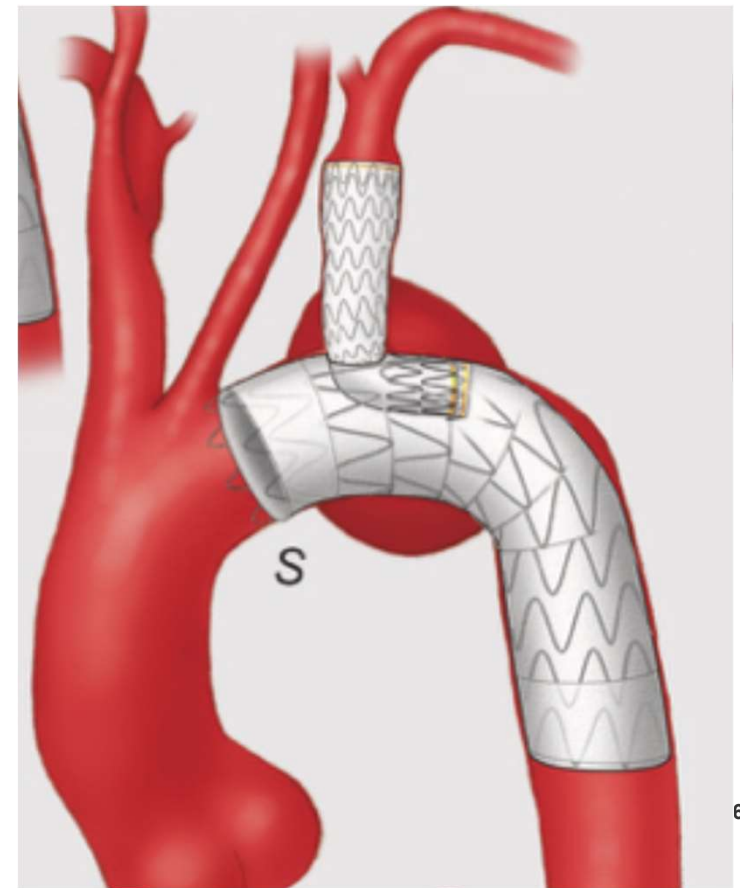


Endeligt resultat med en åben sidegren



Hvordan kan man holde vigtige aortagrene åbne?

- Åben kirurgisk bypass
 - **Historisk teknik**
- In-situ laser-fenestrering
 - **Vores favorit i det seneste årti**
- Single-branch stentgrafter
 - **Nyeste udvikling**

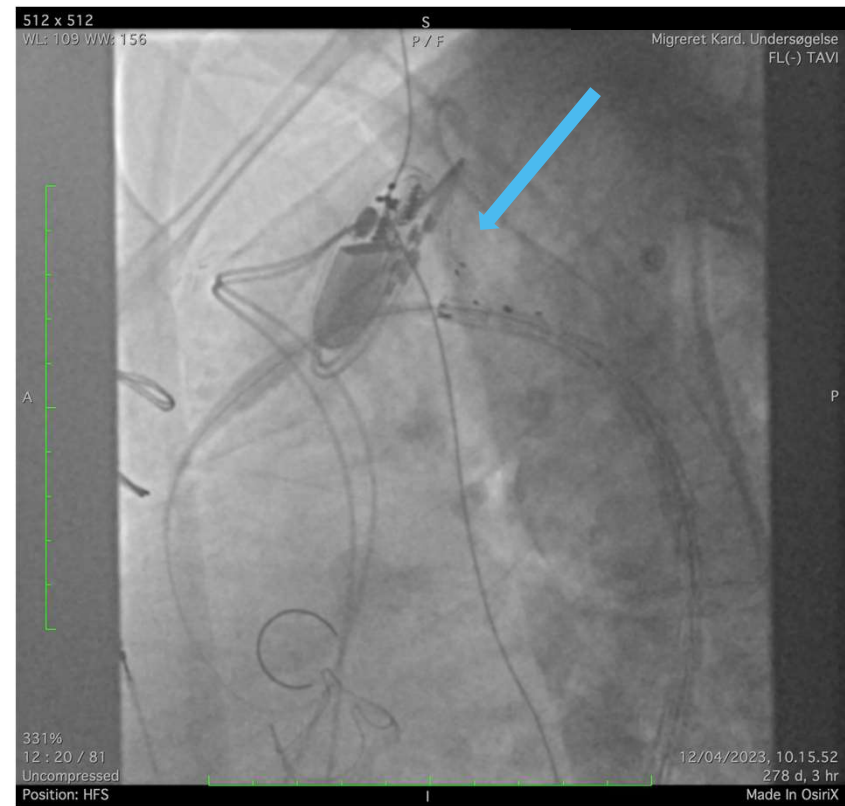
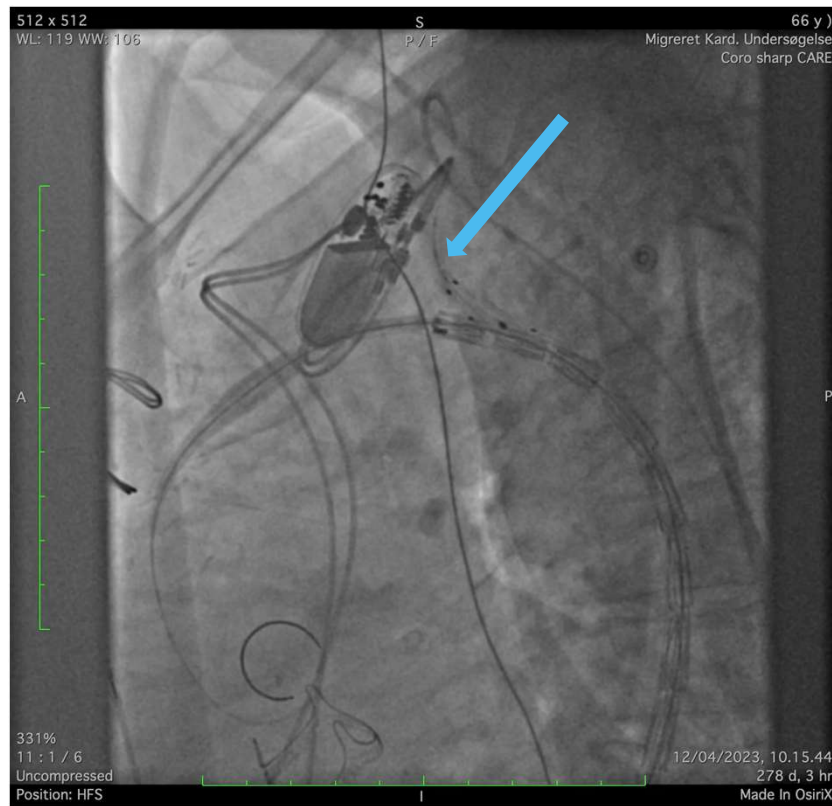


Single-branch stentgrafter

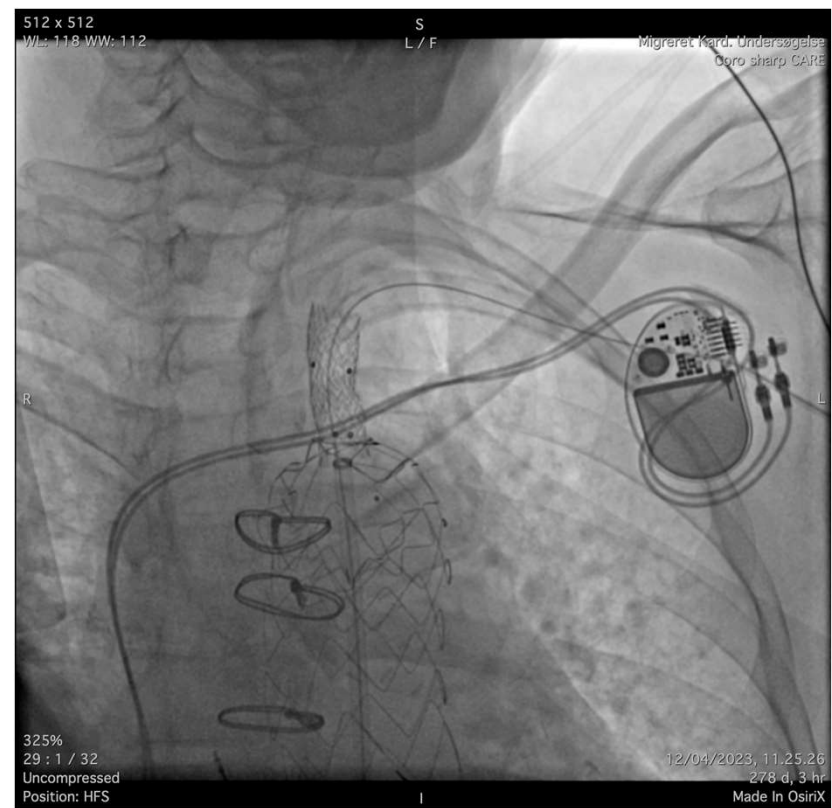
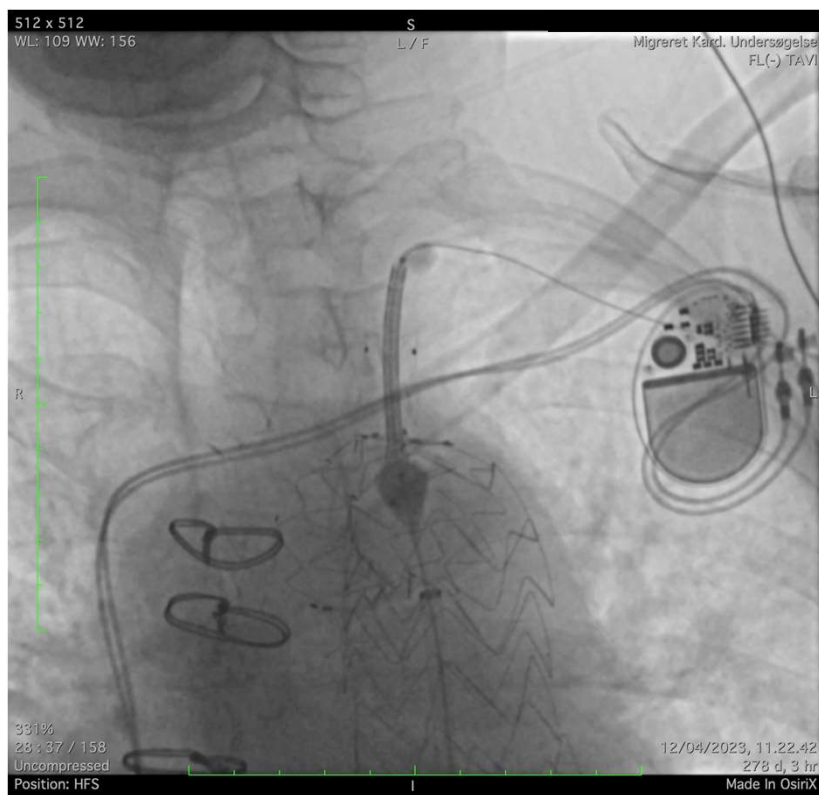


Single-branch stentgraft case-eksempel

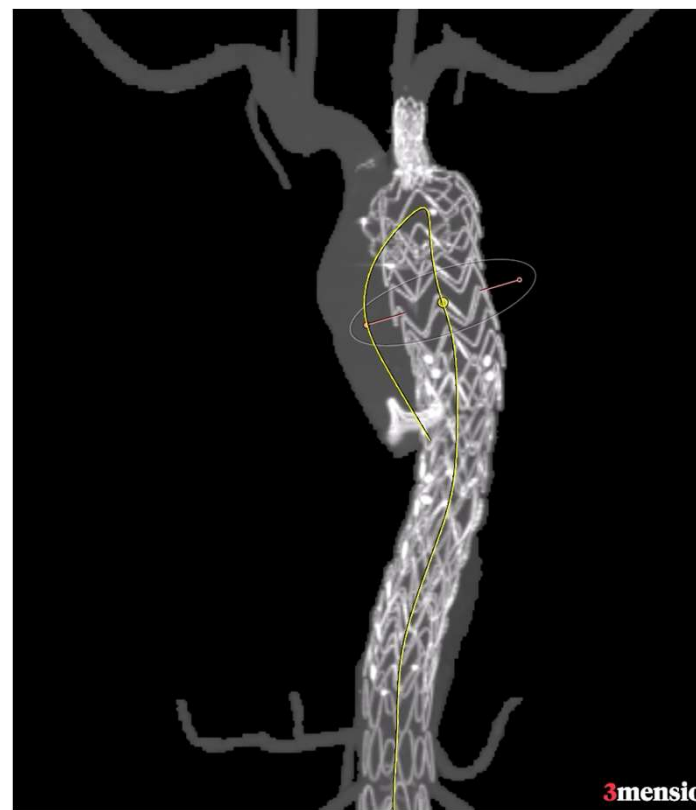
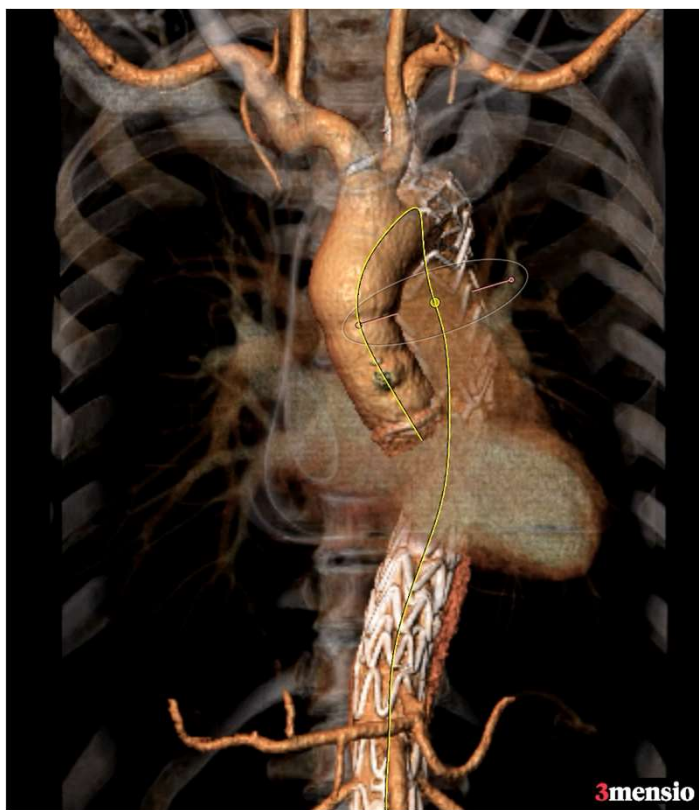
Indledende placering af stentgraft med indbygget sidegren



Forlængelse af den indbyggede sidegren



Kontrol-CT-scanning viser det endelige resultat



Nøglepunkter

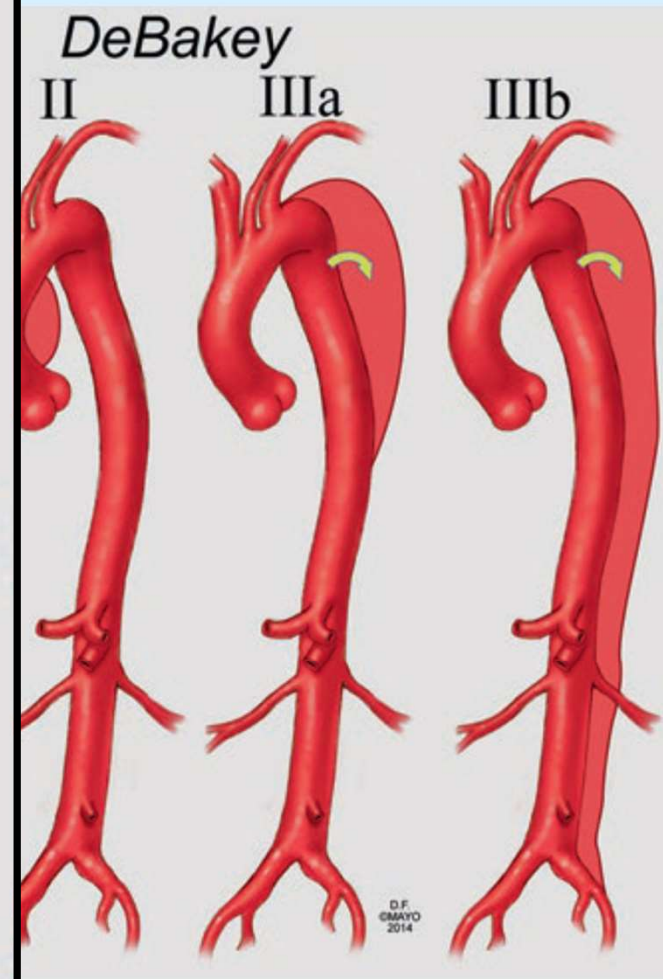
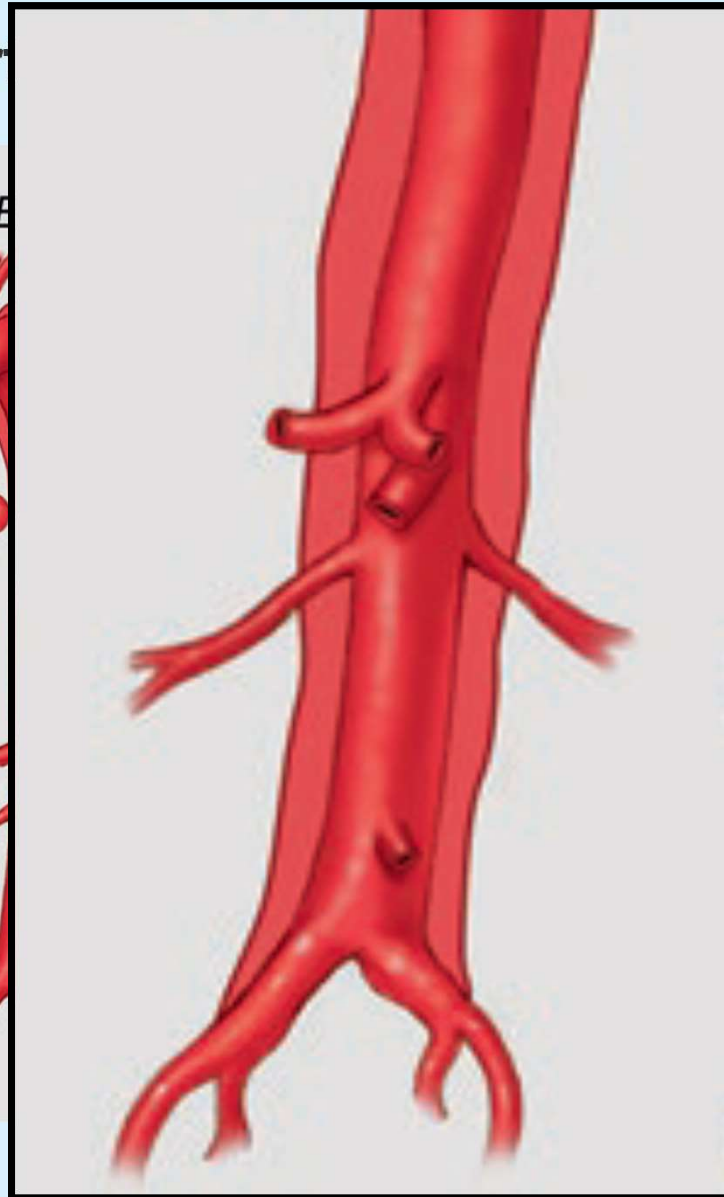
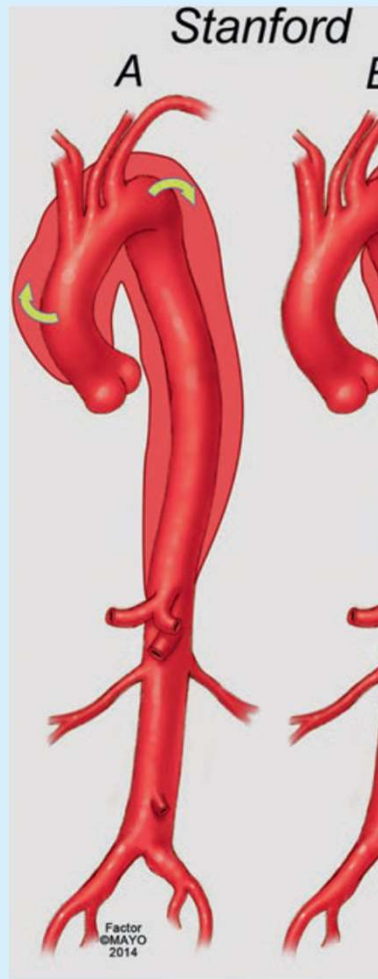
- Endovaskulære minimal-invasive teknikker er i konstant udvikling
- TEVAR tæt på aortahalsgrene har specifikke tekniske udfordringer
- Udvikling af TEVAR-teknologien hjælper med at løse mange problemer

Tekniske udfordringer ved TEVAR: Hvordan man sætter en stentgraft i torakoabdominal aorta?

Tim Resch MD, ph.d.
Professor i karkirurgi
Copenhagen Aortic Center

Aor

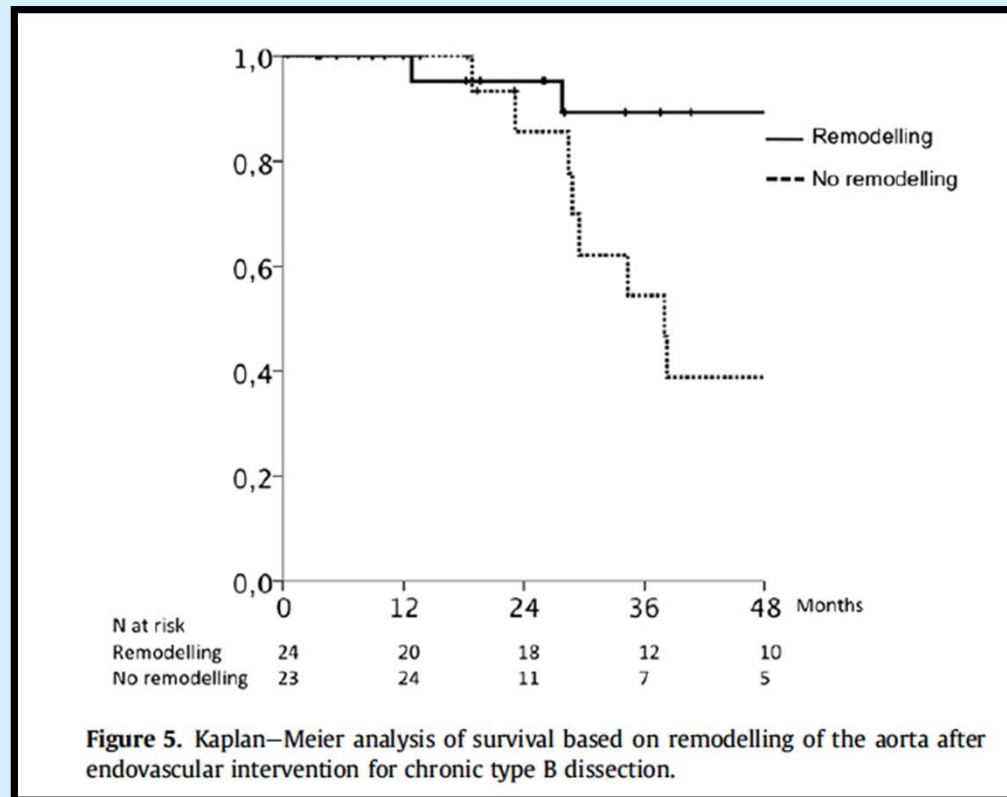
ring



Predictors of Outcome after Endovascular Repair for Chronic Type B Dissection

K. Mani^{a,d,*}, R.E. Clough^{a,b}, O.T.A. Lyons^{a,c}, R.E. Bell^a, T.W. Carrell^{a,b}, H.A. Zayed^a, M. Waltham^{a,c},
P.R. Taylor^{a,b}

EJVES 2012:43



Ikke eksklusion

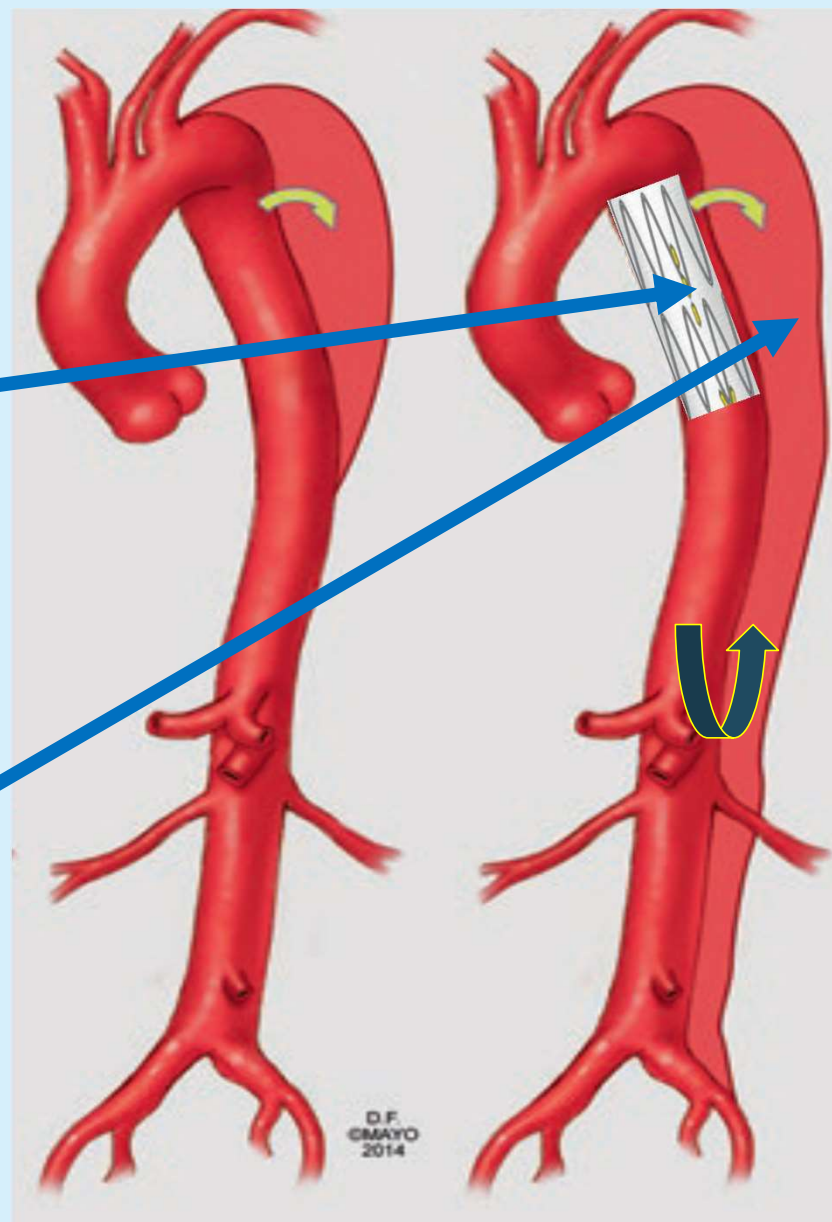


Død

Proximal aneurisme mest frekvent!

Sandt lumen

Falsk lumen

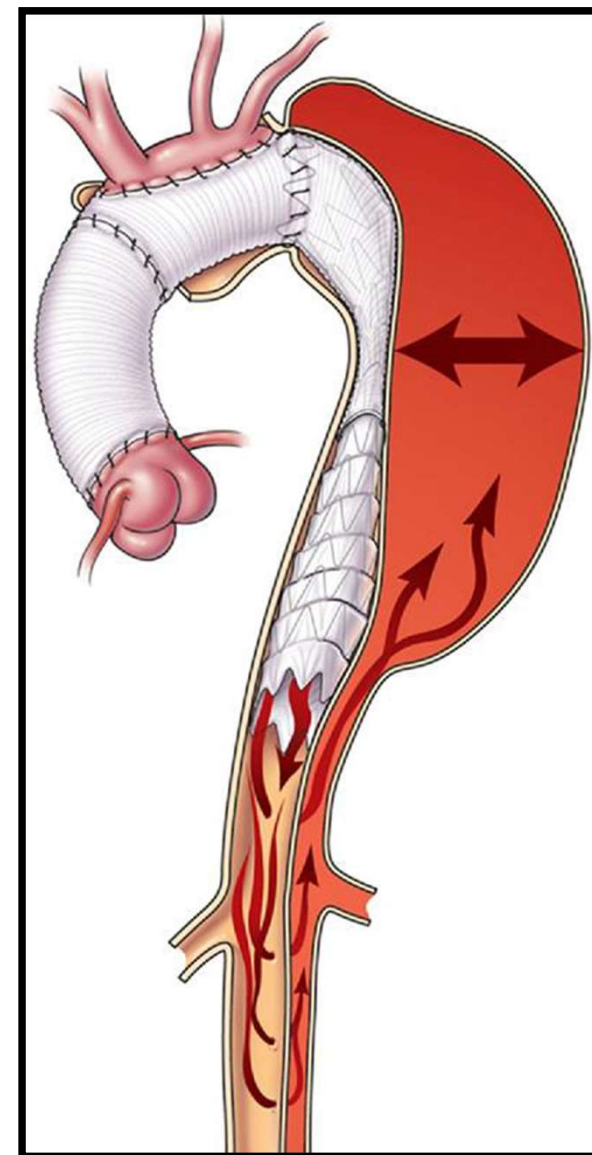


Teknikker til behandling af falsk lumen

- Falsk lumen-lukning

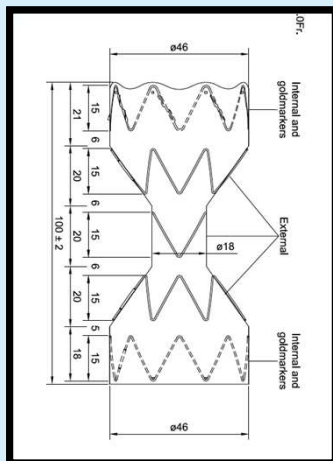


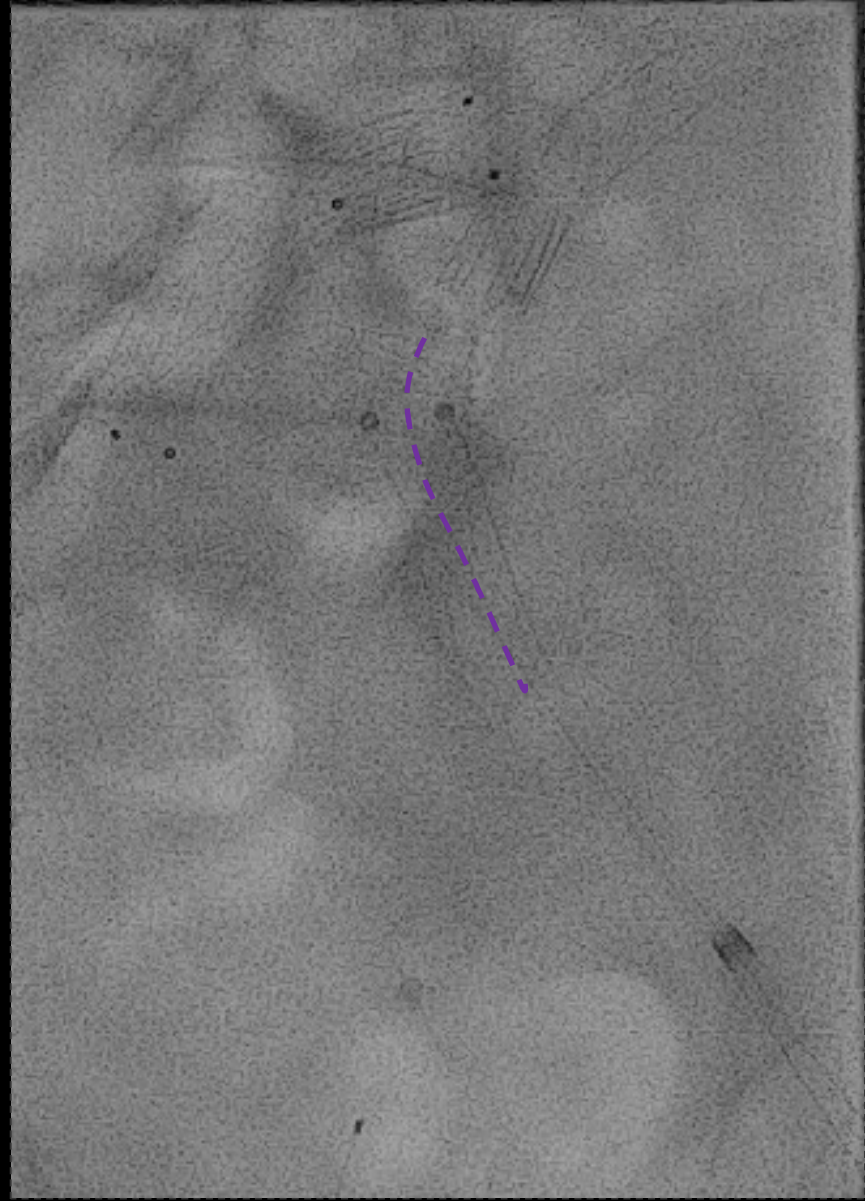
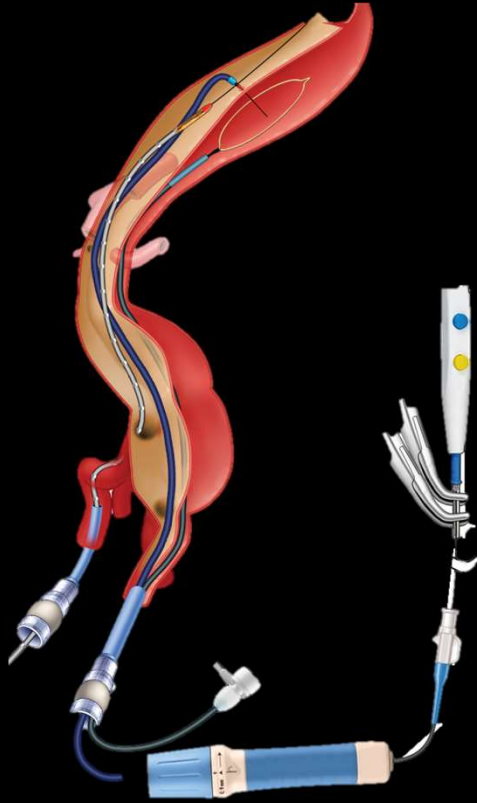
- Septektomi

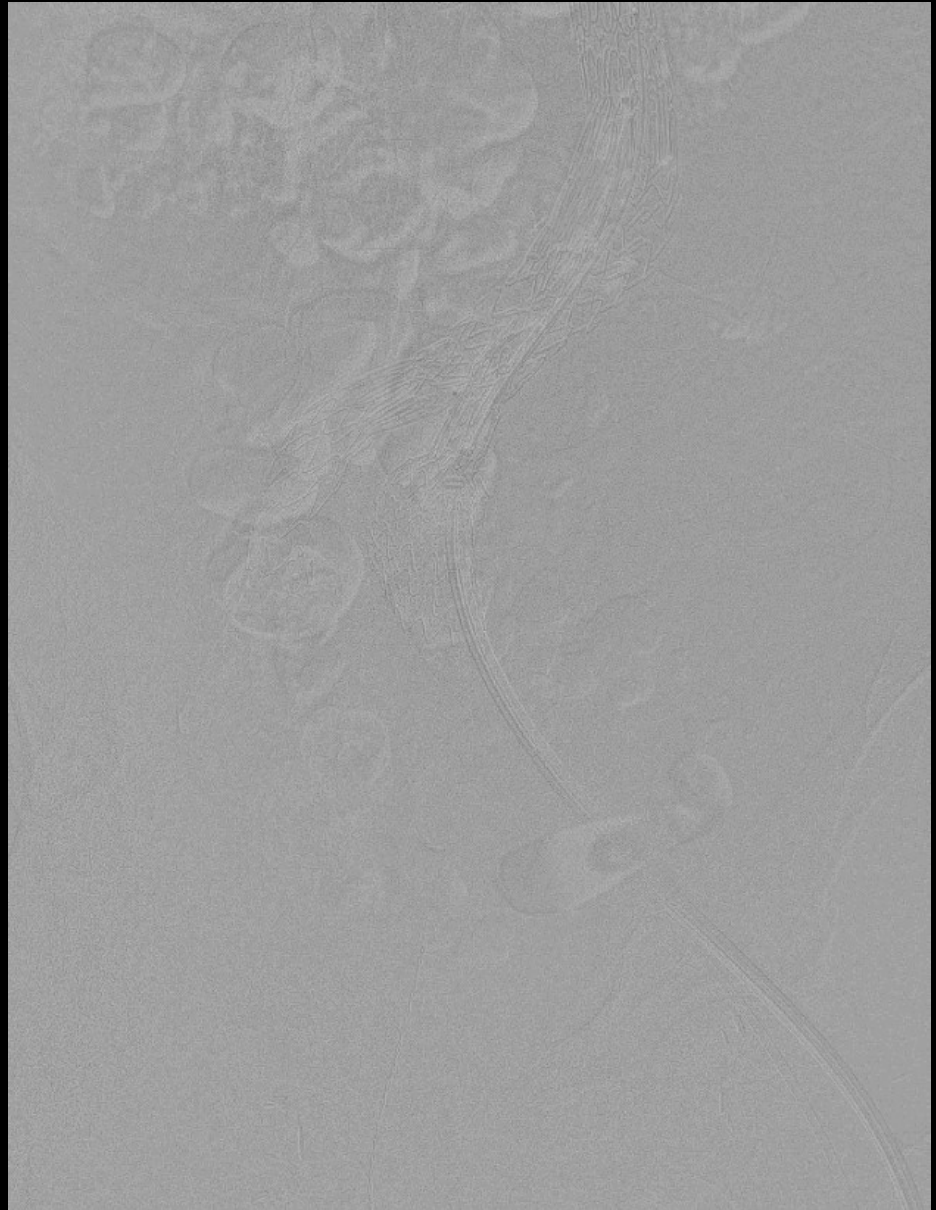
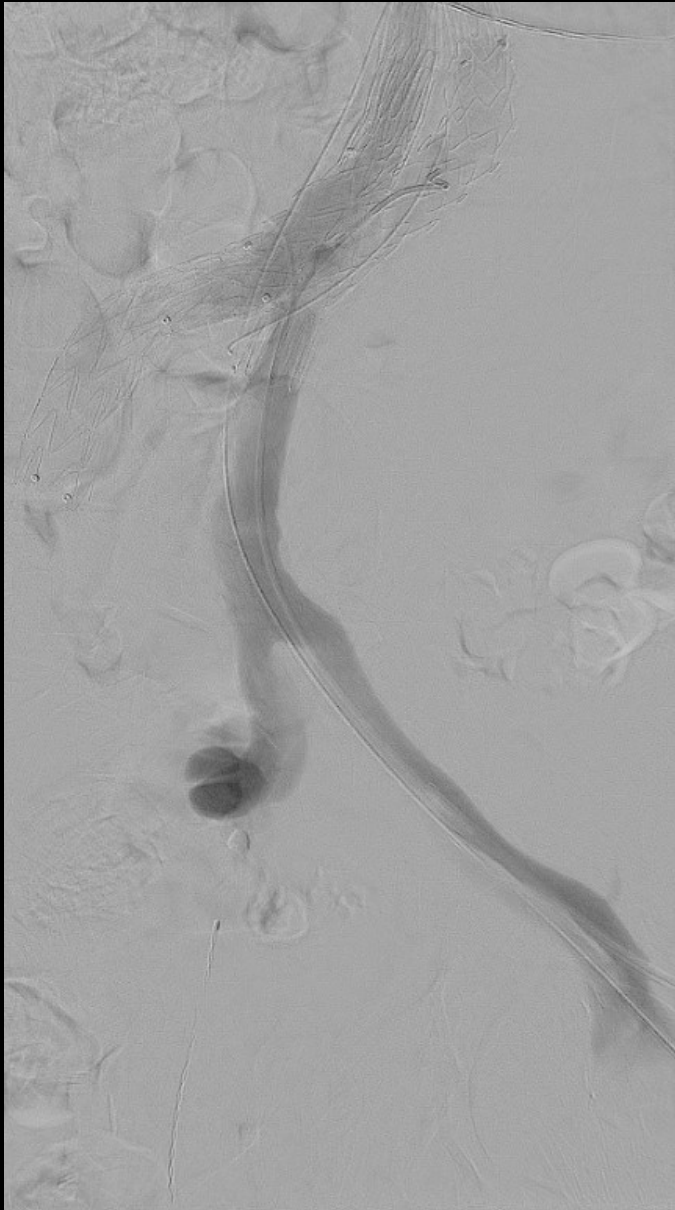


The Candy-Plug Technique: Technical Aspects and Early Results of a New Endovascular Method for False Lumen Occlusion in Chronic Aortic Dissection

Fiona Rohlfes, MD¹, Nikolaos Tsilimparis, MD¹, Beatrice Fiorucci, MD^{1,2}, Franziska Heidemann, MD¹, Eike Sebastian Debus, MD, PhD¹, and Tilo Kölbel, MD, PhD¹

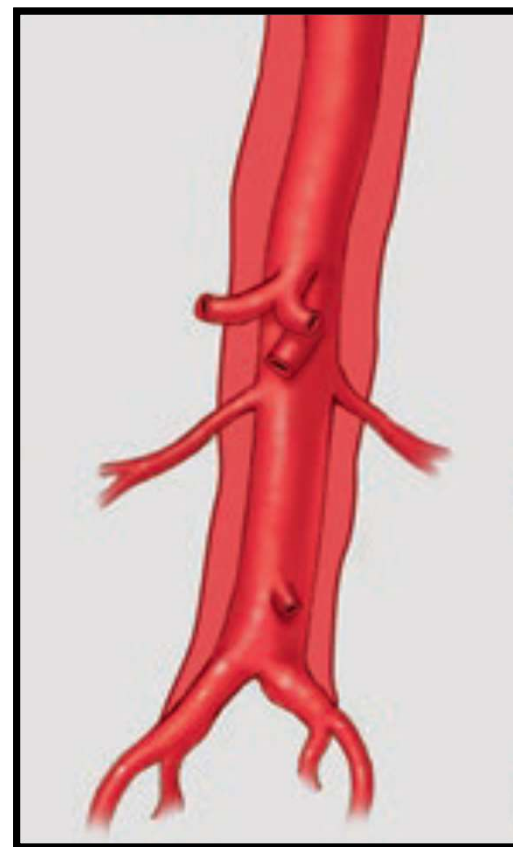






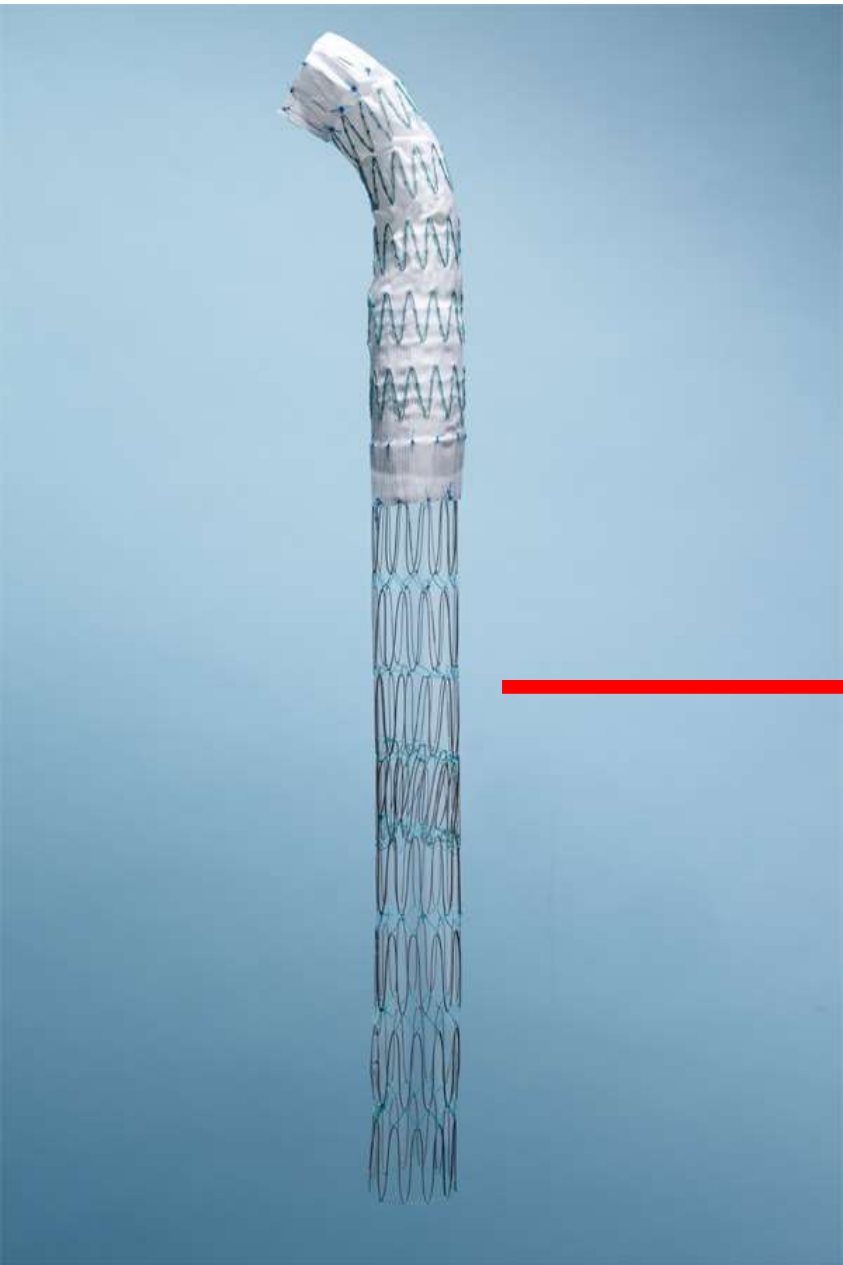
Teknikker til eksklusion af visceral aorta

- Kun metal-stent
- Grenet stentgraft

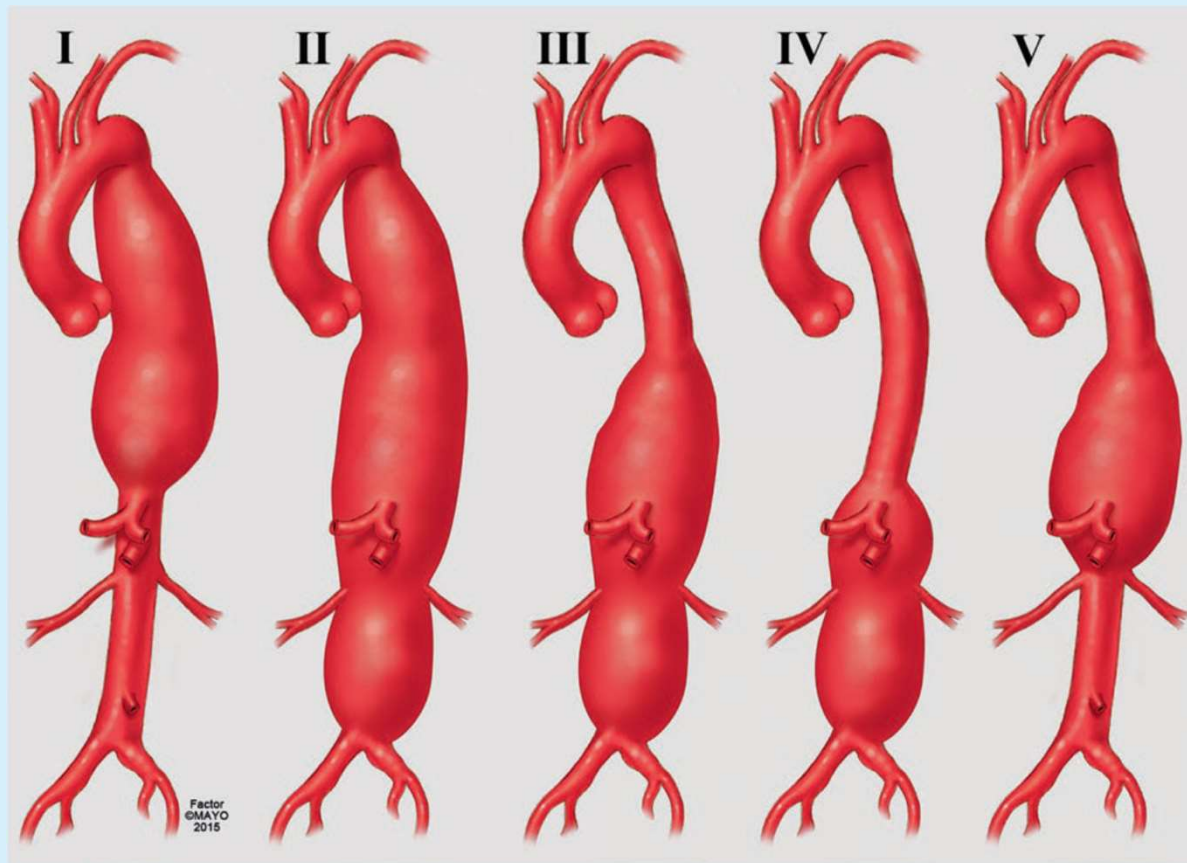


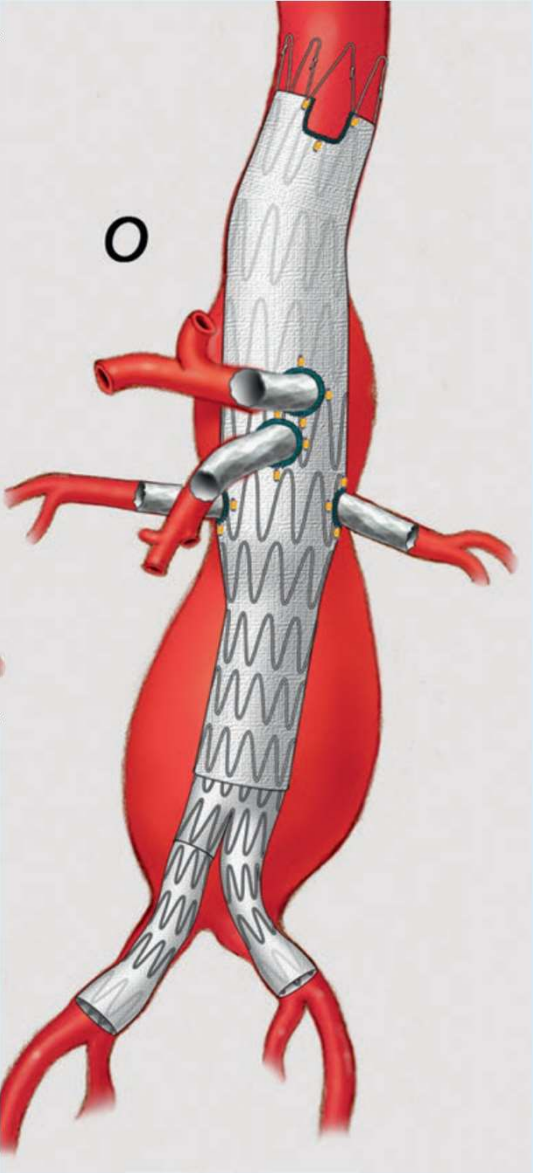
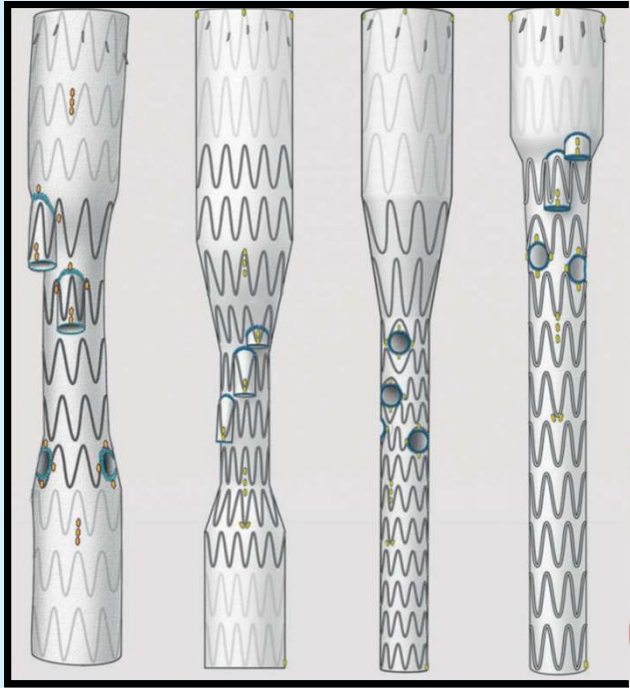
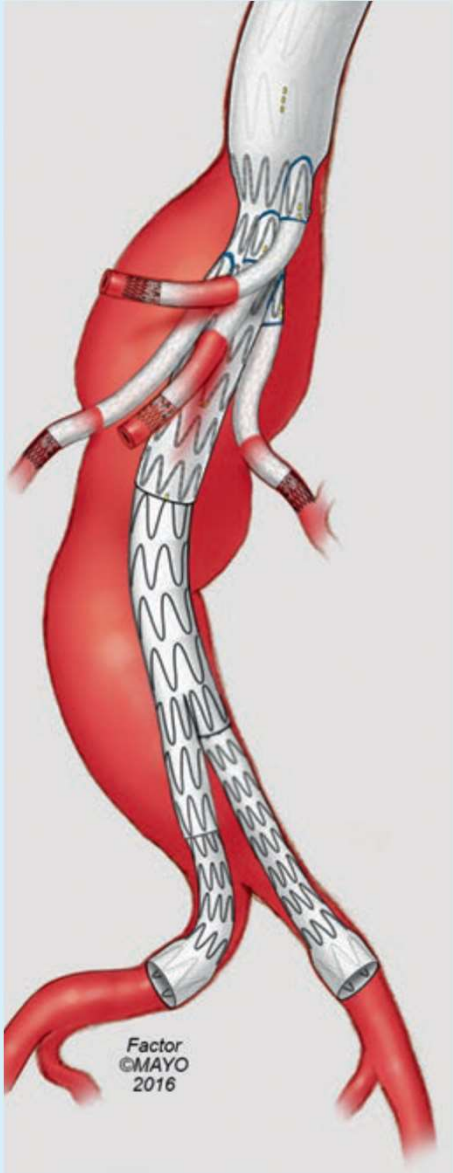
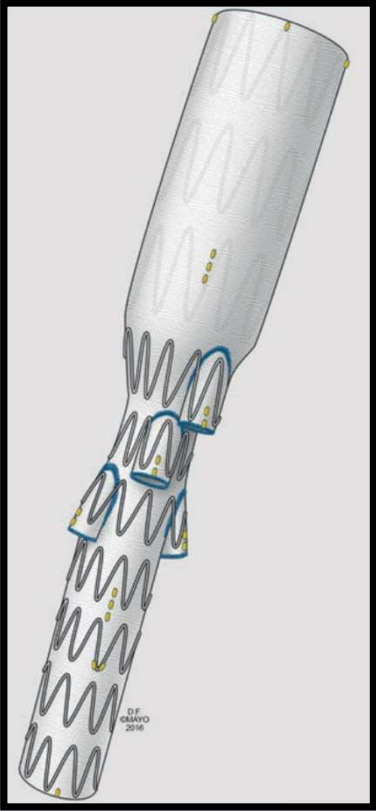
Akut

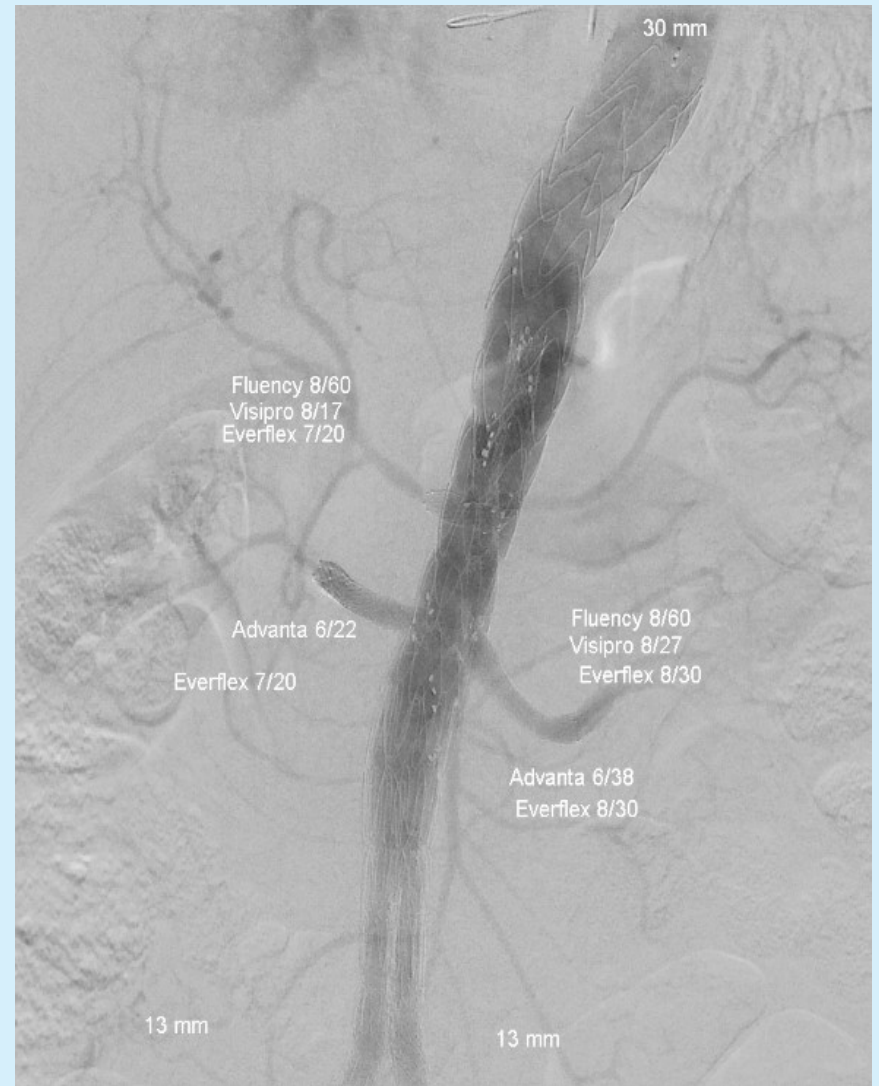
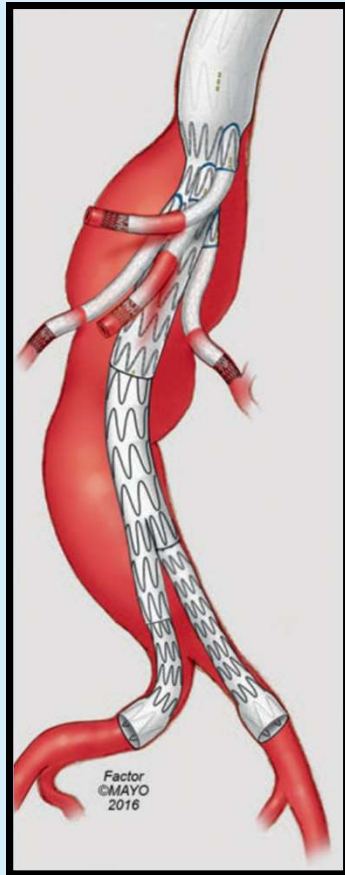




Kronisk - aneurismeudvikling







Take home

- Aorta-team centralt
 - Patientselektion!
- Endovaskulær behandling er førstevalg
- Hurtig udvikling af endovaskulære tekniker for komplekse patologier

Paneldiskussion

- Balance mellem åben og endovaskulær aortakirurgi?
- Balance mellem forebyggende aortabehandling ved asymptomatisk lidelse vs. behandling af kompleks aorta-patologi?
- Hvordan sikrer vi den bedste opfølgning af vores aortapatienter?

Grand Rounds

Rigshospitalet

Paneldebat



Grand Rounds

Rigshospitalet

Paneldebat

rigshospitalet.dk/grandrounds

Grand Rounds

Rigshospitalet

Næste gang:
Nyretransplantationer
den 27. marts

Grand Rounds

Rigshospitalet

Tak for i dag

