
University Heart Center Hamburg
UHC
GERMAN AORTIC CENTER HAMBURG
Ascending Aorta:
Is The Endovascular Approach Realistic?
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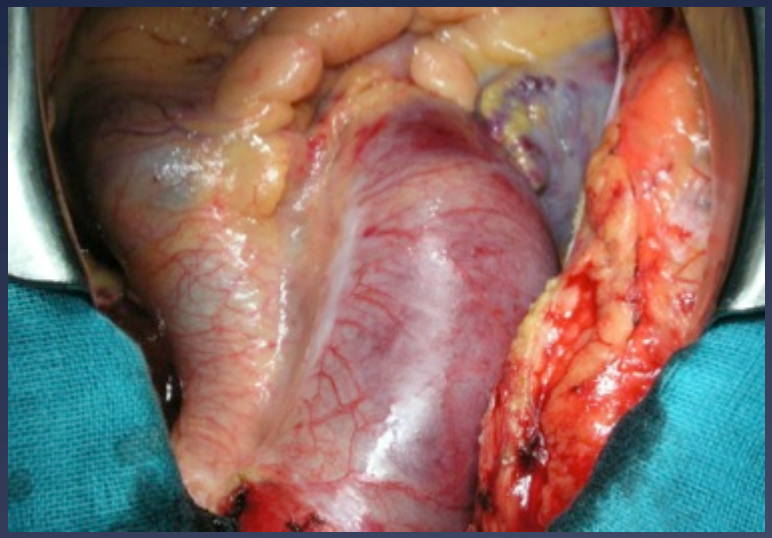
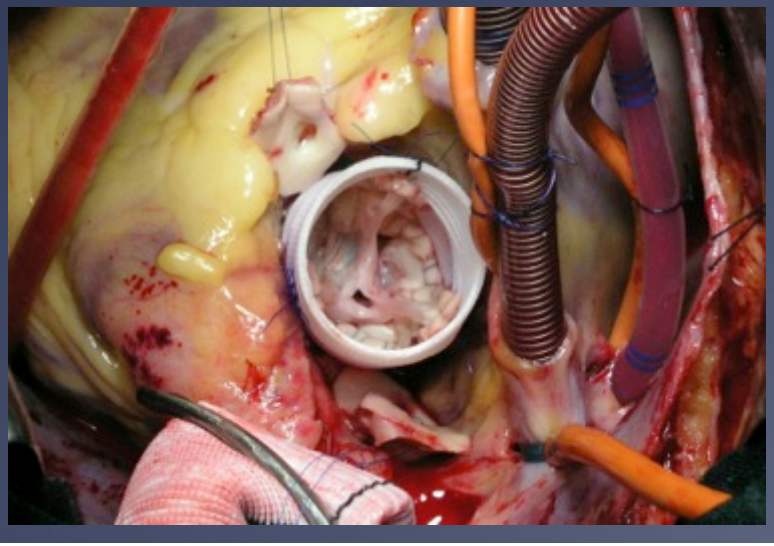
MULTIDISCIPLINARY EUROPEAN ENDOVASCULAR THERAPY

Disclosures

* Research-grants, travelling, proctoring speaking-fees, IP with Cook Medical.

Gold Standard for Ascending Aorta





Open Surgery:

- Sternotomy, CPB
- Ascending replacement
- With/without aortic valve
- Hemiarch/elephant trunk

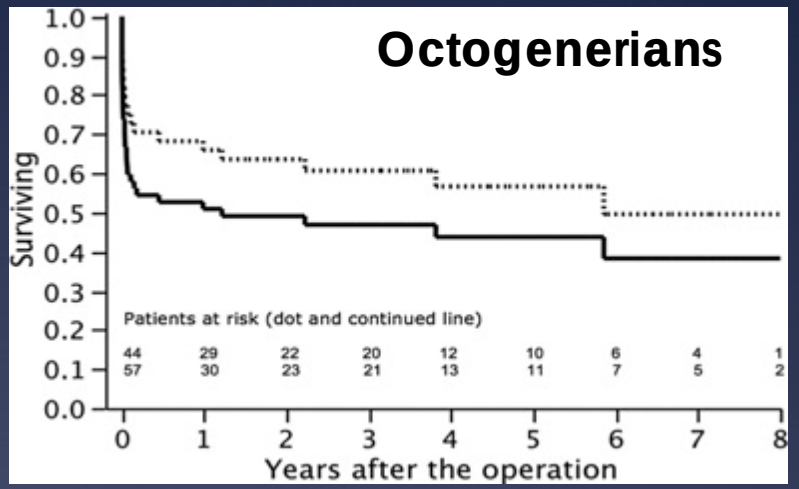
Krüger et al. 2012;Brit J Surg 99:1331-44

Gold Standard for Ascending Aorta

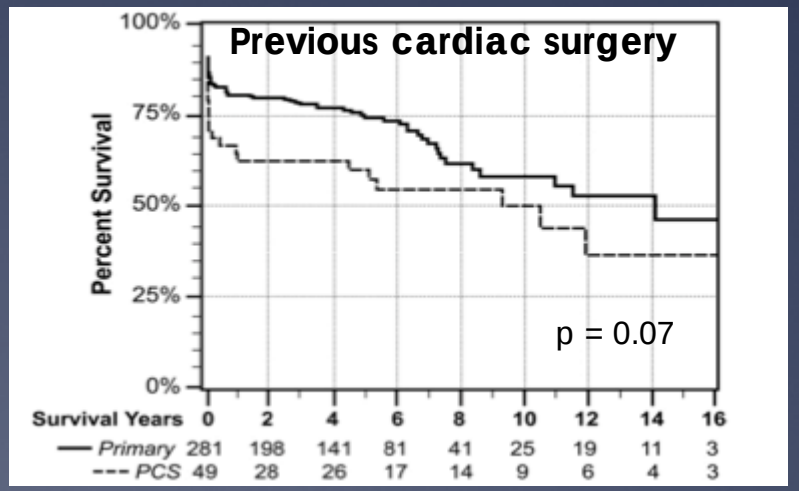
But.....

Patients with

- Old age
- Severe comorbidities
- Previous cardiac surgery
- ...



Piccardo et al. 2009, Ann Thor Surg 88:491-7



Estrera et al. 2010, Ann Thorac Surg 89:1467–74

Gold Standard for Ascending Aorta

But.....

Patients with

- Old age
- Severe comorbidities
- Previous cardiac surgery
- ...

are often turned down for open surgery

and

might benefit from a less invasive therapy.

Table 1 Preoperative Predictors of Mortality Associated With Type A Dissection

Variable	Death Odds Ratio (95% CI)
Age ≥70 yrs	1.98 (1.19–3.29)
History of aortic valve replacement	4.21 (not available)
Presentation with hypotension, shock or tamponade	3.23 (1.95–5.37)
Migrating chest pain	2.42 (1.32–4.45)
Pre-operative tamponade	2.65 (1.48–4.75)
Any pulse deficit	1.75 (1.06–2.88)
ECG infarction or new ischemia	1.76 (1.02–3.03)

Table 2 Intra-Operative Predictors of Mortality Associated With Type A Dissection

Variable	Death Odds Ratio (95% CI)
Age ≥70 yrs	1.79 (1.02–3.15)
History of aortic valve replacement	5.93 (2.07–16.97)
Presentation with hypotension, shock, or tamponade	2.52 (1.40–4.54)
Migrating chest pain	2.02 (1.02–4.02)
Any pulse deficit	1.90 (1.10–3.29)
In operation	
Hypotension or shock	3.81 (2.16–6.71)
RV dysfunction	4.90 (2.00–12.00)
Partial arch	0.52 (0.28–0.98)
CABG	2.54 (1.23–5.24)

Bonser et al. 2011, JACC 58: 2455-73

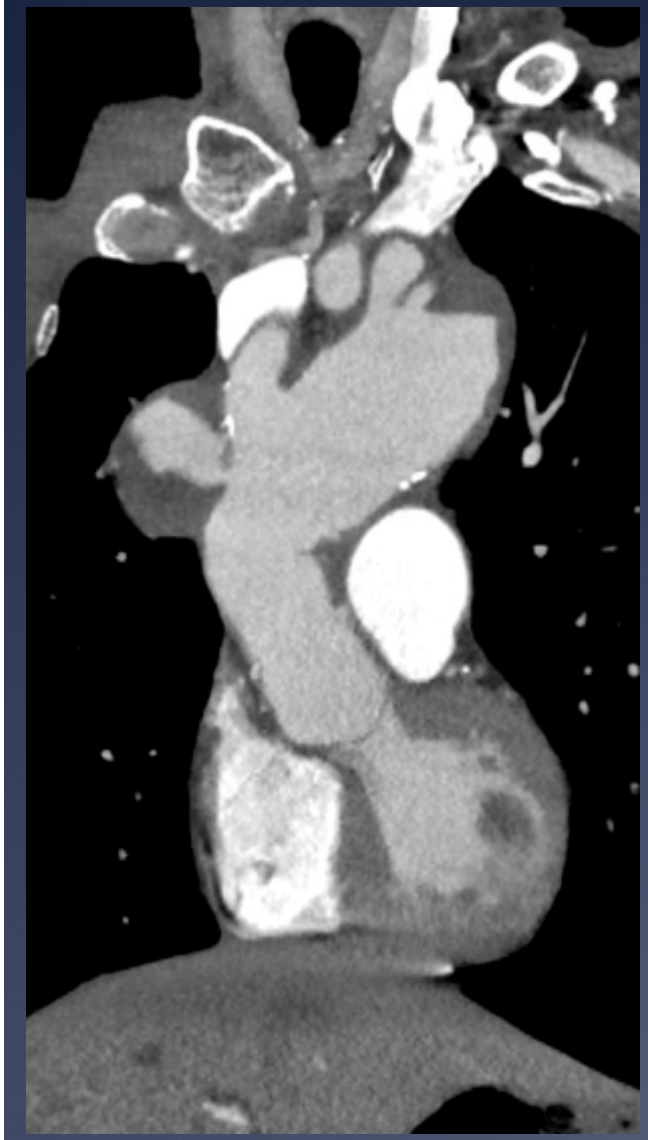
Endovascular Treatment of the Ascending Aorta

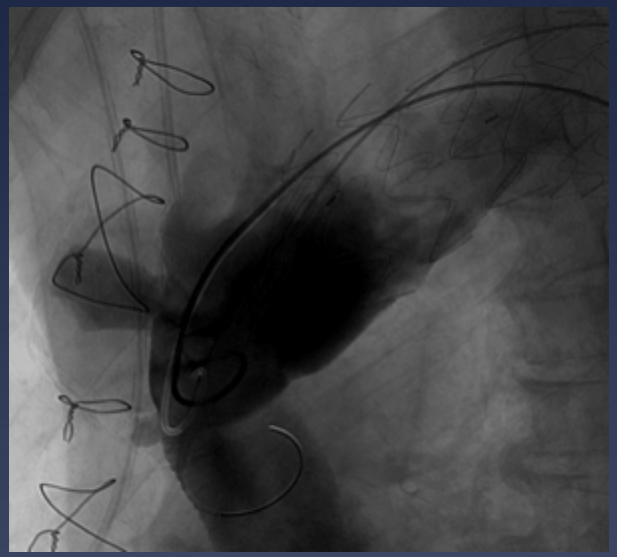
Is there room for Endovascular techniques in ascending pathology?

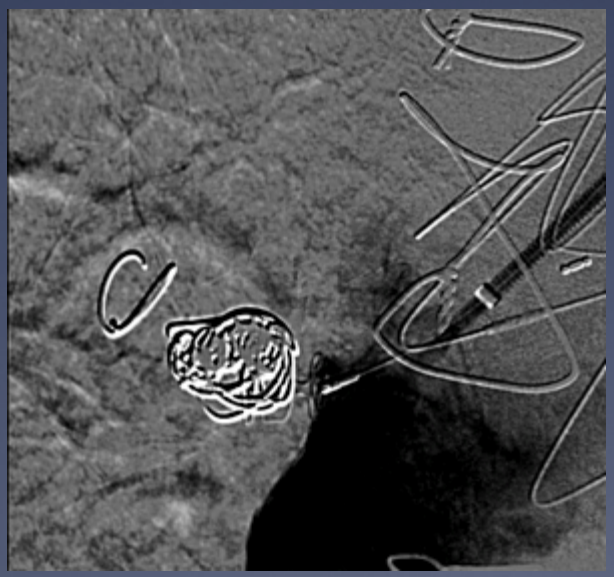
Endovascular Treatment of the Ascending Aorta

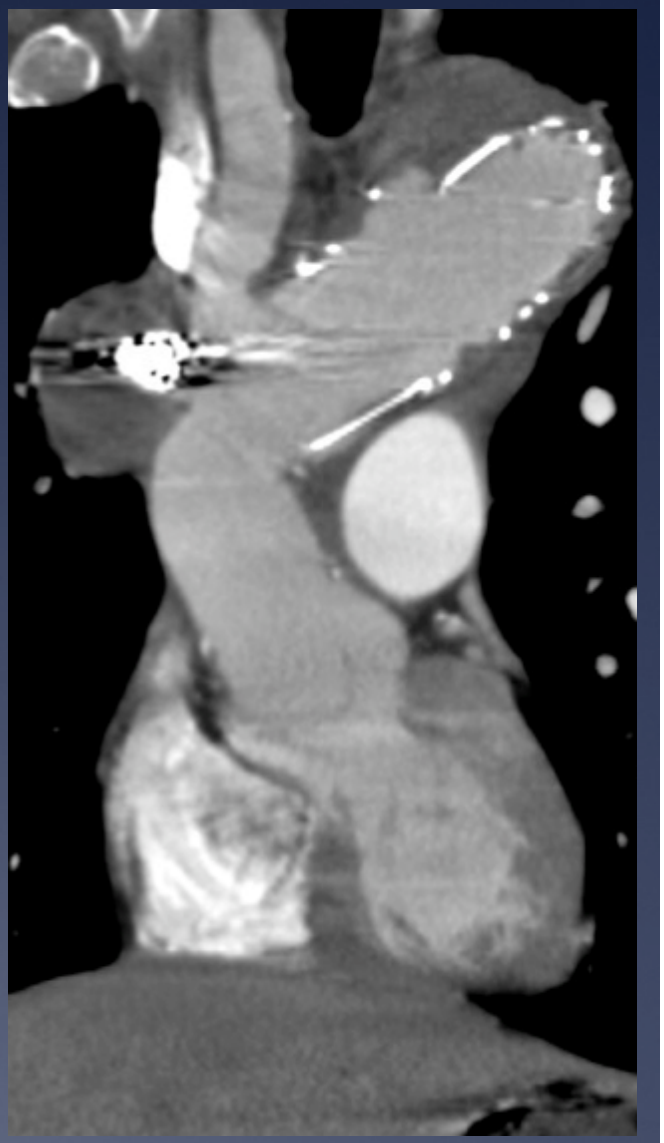
- Lesions post surgery:
  - Pseudoaneurysm
  - Postsurgery bleeding
  - Residual Dissection
  - Lost TAVI
- Ascending aneurysm
- Type A dissection

Pseudoaneurysm

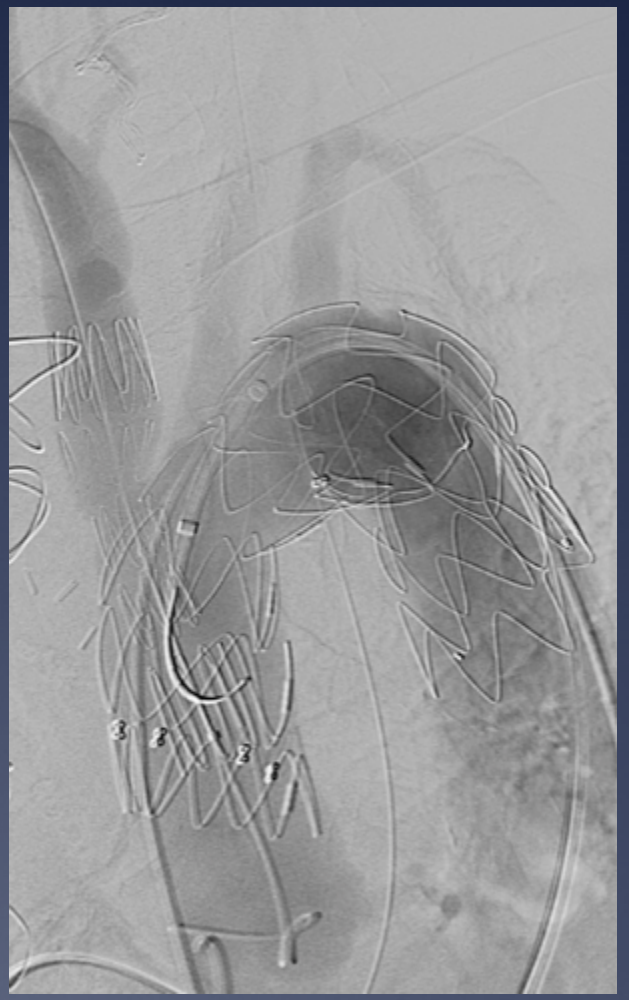




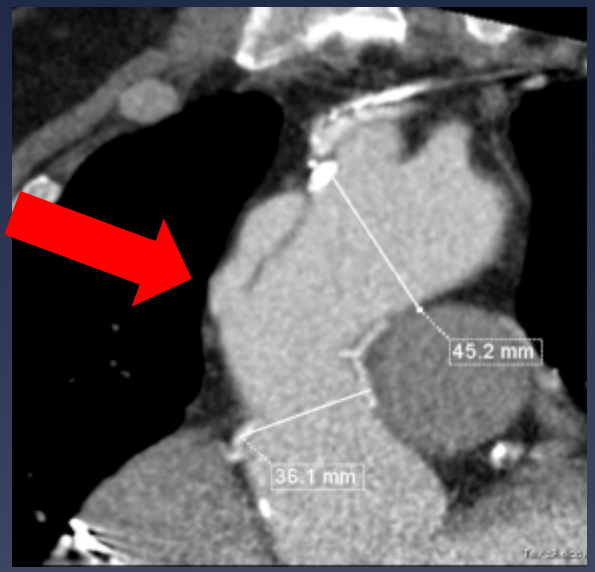


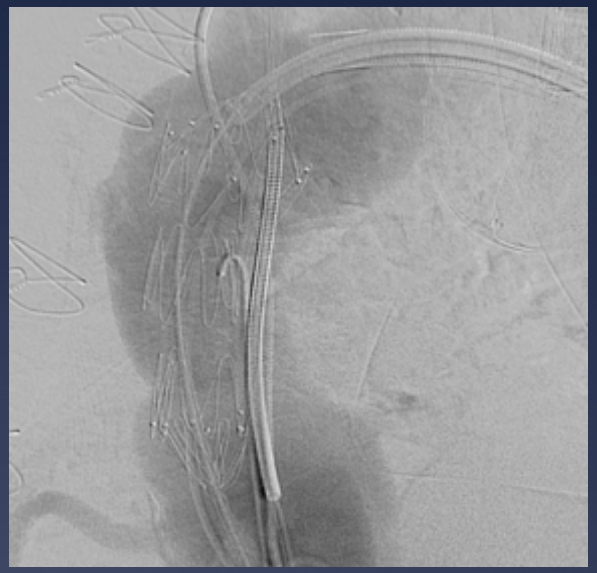


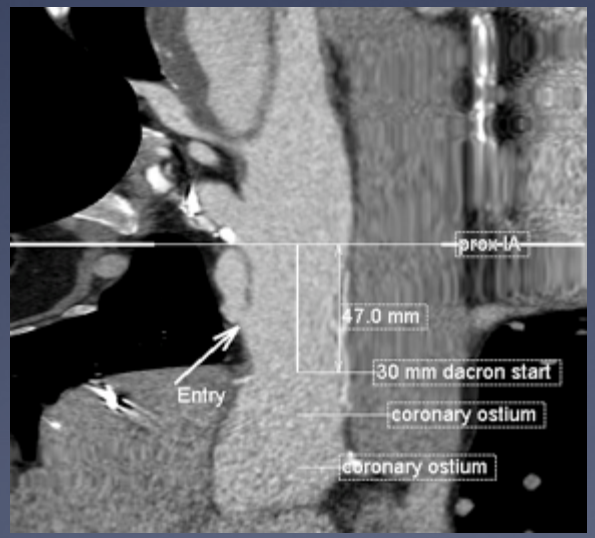
Postsurgery Bleeding

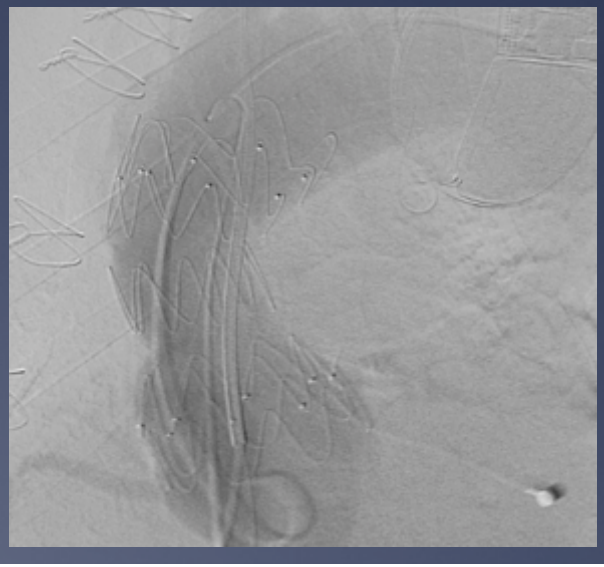


Residual Dissection

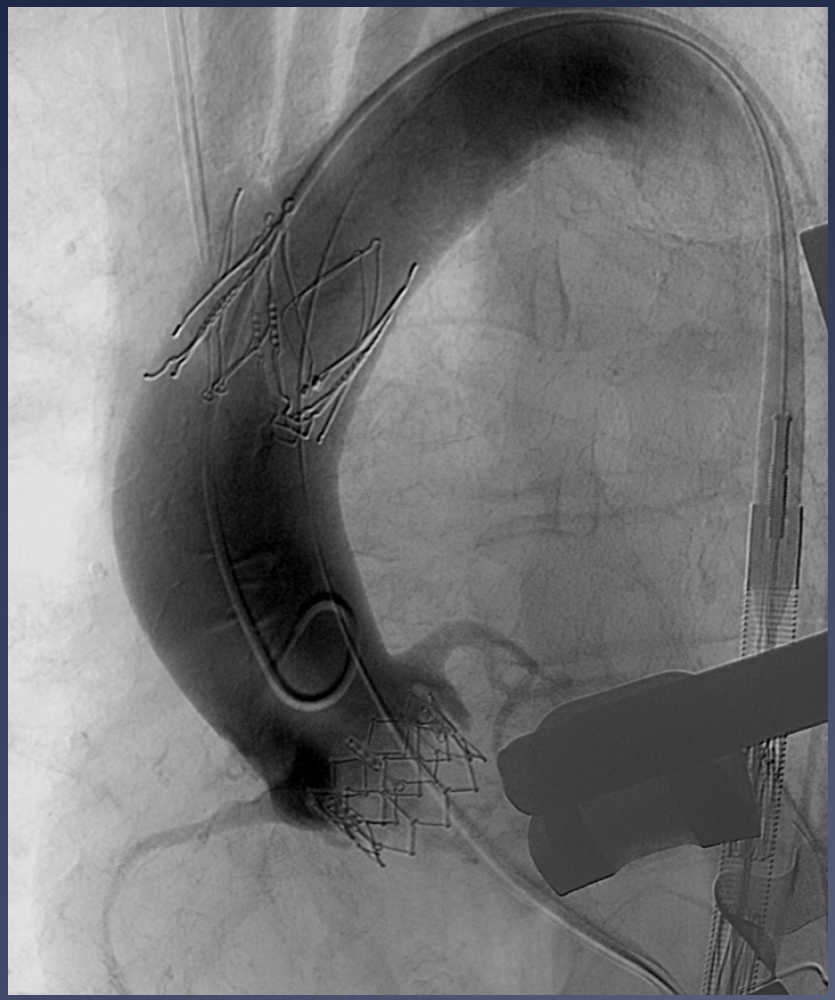


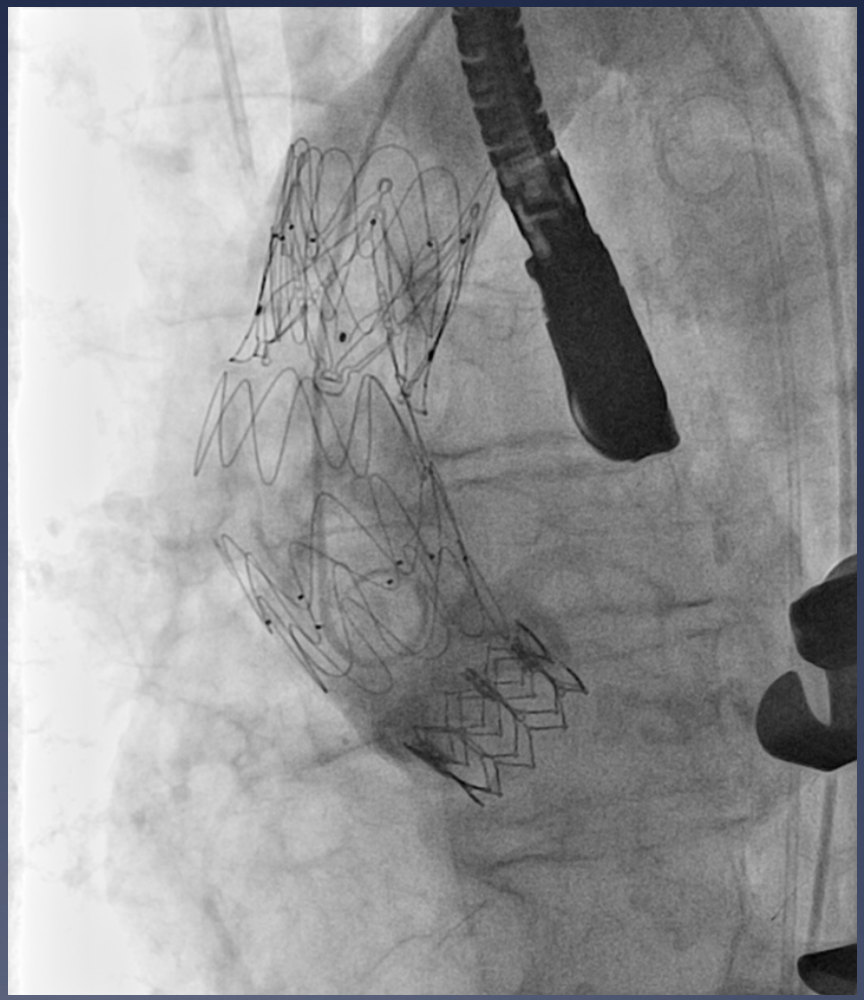






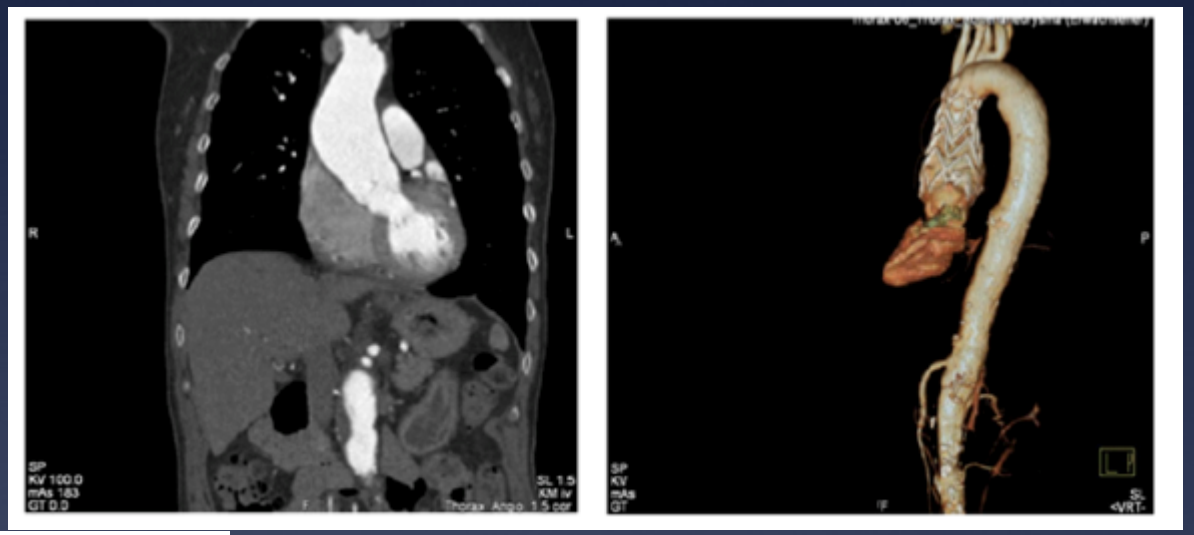
Lost TAVI

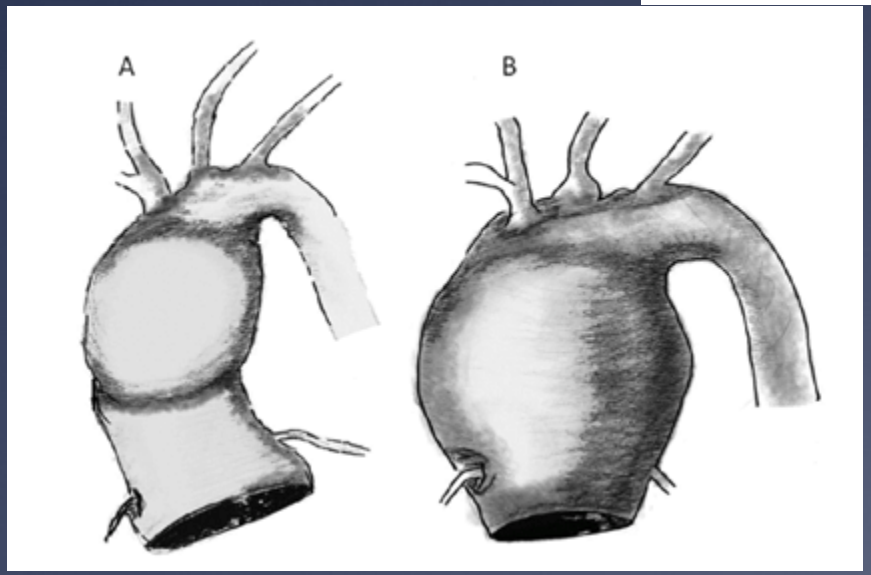




Ascending Aneurysm

* Most are conical and lack proximal landing zone.

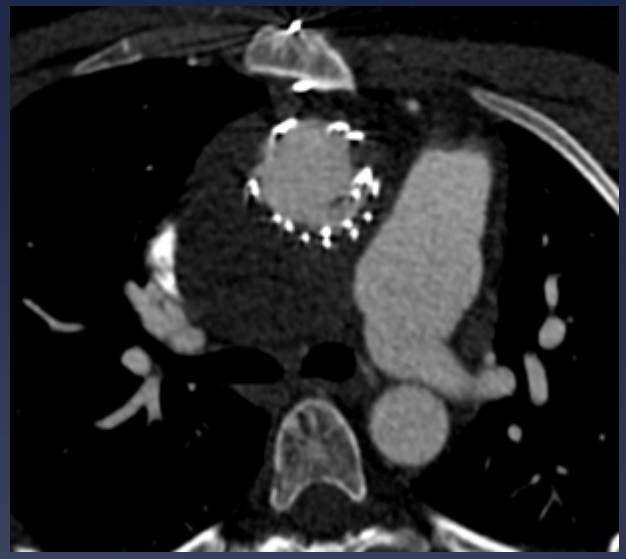


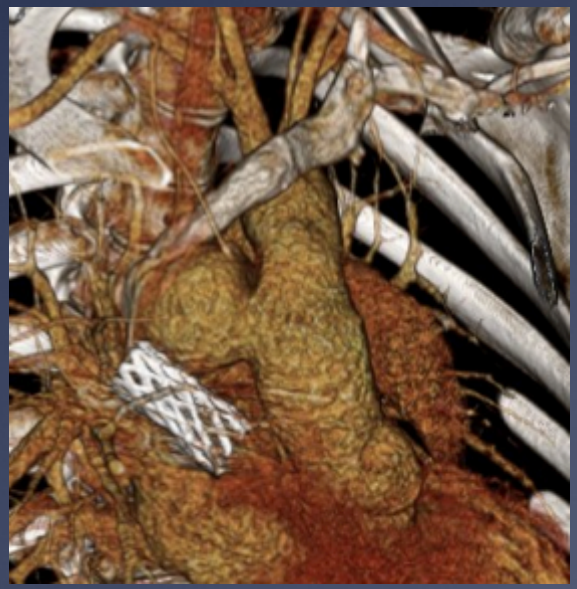


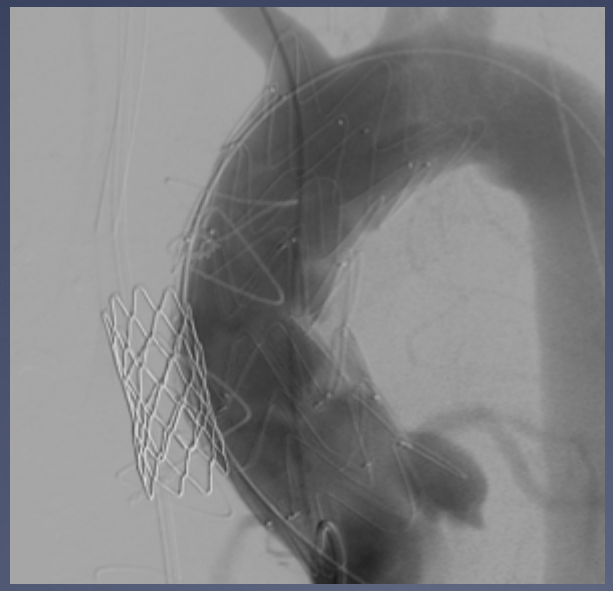
* Endovascular exclusion usually not possible in native vessel

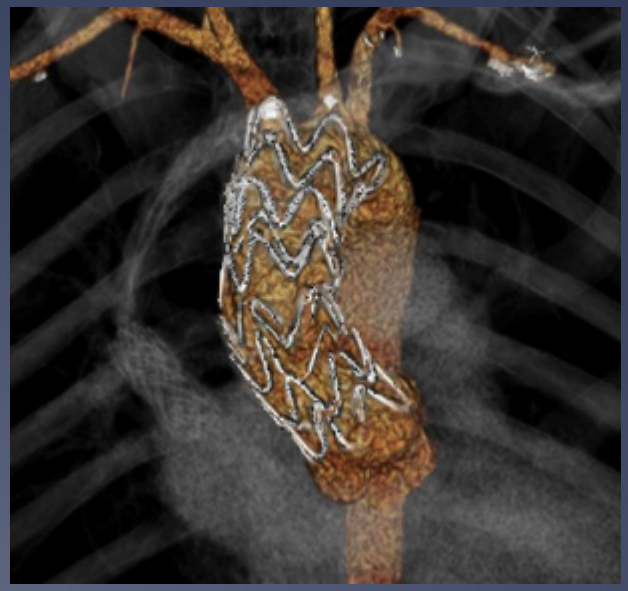
Kolvenbach et al. 2011; J Vasc Surg 53: 1431-8

Ascending Aneurysm









Ascending Aorta and Arch:

☑ ☑ ☒

Endovascular Repair of Type A Aortic Dissection

Is there room for Endovascular techniques in acute Type A Aortic dissection?

Acute Type A Dissection

Endovascular Approaches to Acute Aortic Type A Dissection: A CT-Based Feasibility Study

J. Sobocinski [a], N. O'Brien [a], B. Maurel [b], M. Bartoli [c], Y. Goueffic [d], T. Sassard [e], M. Midulla [f], M. Koussa [a], A. Vincentelli [a], S. Haulon [a,*]

Conclusion

It is reasonable to extrapolate that the same proportion of patients who currently refused surgery on the basis of being unfit for open repair would have anatomy suitable for an endovascular repair. Clinical studies should be conducted in this subgroup of patients to determine a potential future role of endovascular repair in acute type A dissections.

Sobocinski et al 2011, EJVES 42: 442-7

Anatomical Suitability

50% potential candidates !

- Entry-tear [illegible] ubular jun[illegible]
- [illegible]arlanding [illegible]m
- True lumen diameter ≤ 38mm
- Total lumen diameter ≤ 46mm
- Appropriate access vessels
- No significant Aortic regurge

Sobocinski et al 2011, EJVES 42: 442-7

Literature Review
Endo-Repair of Type A

Endovascular Stenting of the Ascending Aorta for Type A Aortic Dissections in Patients at High Risk for Open Surgery

S. Ronchey [a], E. Serrao [a], V. Alberti [a], S. Fazzini [a], S. Trimarchi [b], J.L. Tolenaar [b], N. Mangialardi [a,*]

[a] Department of Vascular Surgery, San Filippo Neri Hospital, Via Martinotti 20, 00135 Rome, Italy
[b] Thoracic Aortic Research Center, Policlinico San Donato IRCCS, Milan, Italy

Conclusion: Endovascular treatment of TAAD is challenging but feasible in a selected subset of patients. Further research remains mandatory.

First author	Year	Stentgraft	Number of patients	Acute (%)	30-day Mortality (%)	Endoleak (%)	CVA (%)	Late mortality (%)	Prev. interv	FU (m)
Dorros et al.	2000	Lacteba	1	1(100)	0(0)	0(0)	0(0)	0(0)	—	—
Kato et al.	2001	Home-made	7						0	3—42
Wang et al.	2003	COV Z-STENT	1	1(100)	0(0)	0(0)	0(0)	0(0)	—	—
Ihnken et al.	2004	GENERIC BARE, GORE	1	1(100)	0(0)	0(0)	0(0)	0(0)	0	—
Zhang et al.	2004	GIANTURCO Z	1	0(0)	0(0)	0(0)	0(0)	0(0)	0	12
Rayan et al.	2004	GORE			1(MPA)				—	—
Verhoye et al.	2006	COOK-Z	1	1(100)	0(0)	0(0)	0(0)	0(0)	—	—
Zimpfer et al.	2006	JOTEC	1	1(100)	0(0)	0(0)	0(0)	0(0)	0	0
Senay et al.	2007	GORE TAG	1	1(100)	0(0)	1(100)	0(0)	0(0)	0	0
Mussa et al.	2007	GORE TAG	1		1				1	0
Palma et al.	2008	BRAILE BIOMED	1	0(0)	0(0)	0(0)	0(0)	0(0)	—	—
Kische et al.	2008	COOK	2						—	—
Nienaber et al.	2011	VARIOUS	6						0	9—39
Ye et al.	2011	VARIOUS	10	6(60%)	1(10)	1(10)	2(20)	10	0	35.5
Metcalfe et al.	2012	Cook	1	1(100)	0(0)	0(0)	0(0)	0(0)	—	—

N ≈13

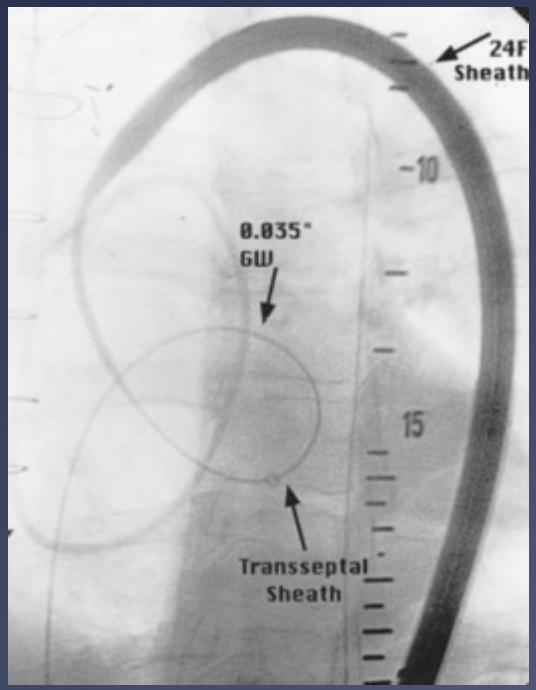
Acute Type A

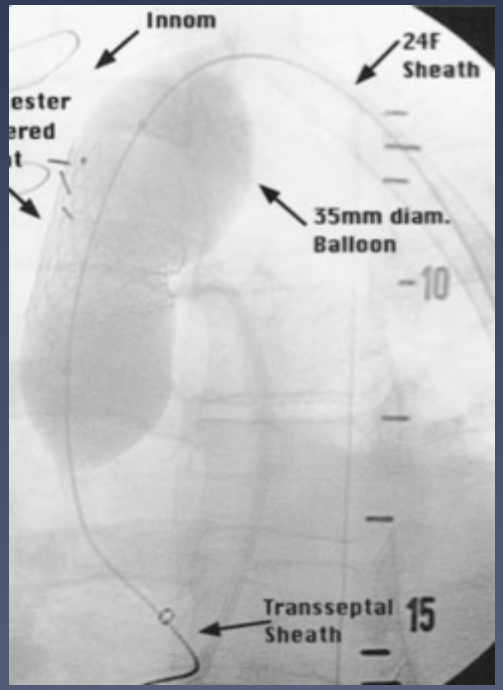
Ronchey et al. 2013, Eur J Vasc Endovasc Surg 45: 475-80

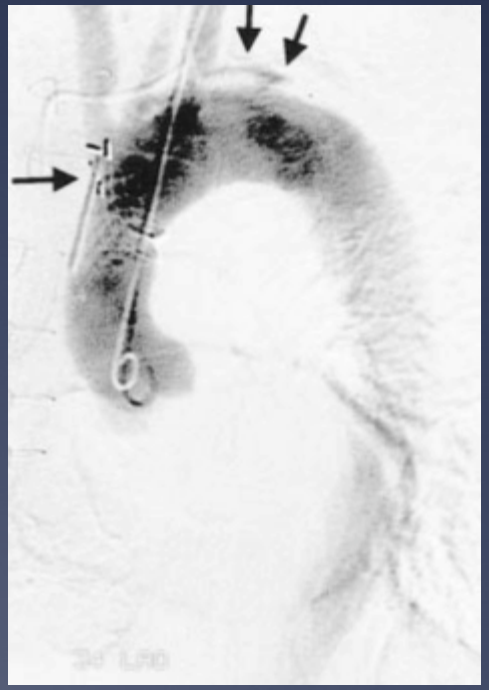
Chronic Type A Dissection

Transseptal Guidewire Stabilization Facilitates Stent-Graft Deployment for Persistent Proximal Ascending Aortic Dissection

Gerald Dorros, MD; Ari M. Dorros, MD; Sara Planton, RN; Daniel O'Hair, MD; and Mahmoud Zayed, MD







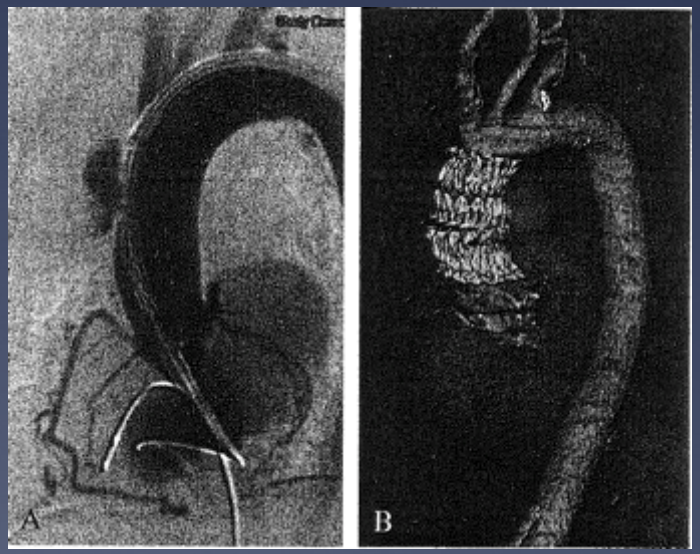
Dorros et al. 2000, JEVT 7: 506-12

Chronic Type A Dissection

Indication, timing and results of endovascular treatment of type A aortic dissection

C. A. NIENABER, S. KISCHE, I. AKIN, A. LIEBOLD, B. WEIDTMANN, H. INCE, T. C. REHDERS

- Subacute / chronic
- n = 6
- Technical success 5/6
- Mortality 1/6

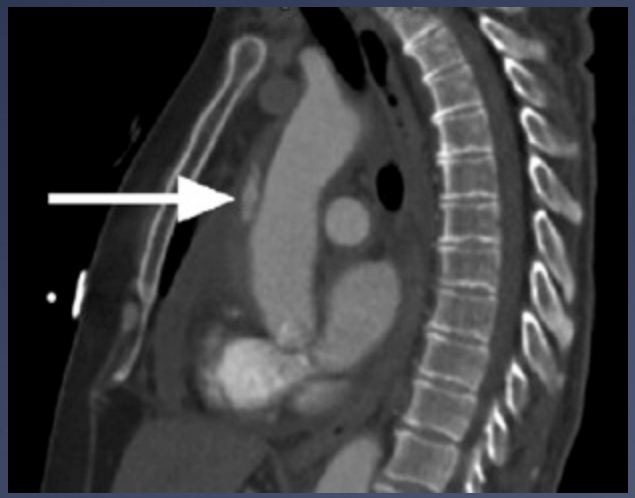


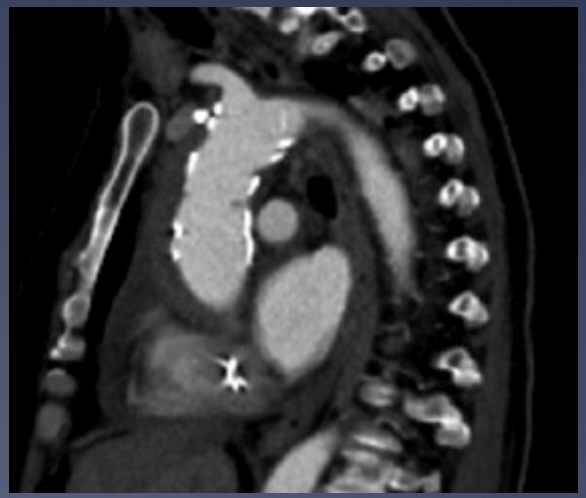
Nienaber et al. 2011; J Vasc Endovasc Surg (It) 18: 187-91

Acute Type A Dissection

The first endovascular repair of an acute type A dissection using an endograft designed for the ascending aorta

Matthew J. Metcalfe, MD, MRCS, Alan Karthikesalingam, MRCS, Steve A. Black, FRCS, Ian M. Loftus, MD, FRCS, Robert Morgan, FRCR, and Matt M. Thompson, MD, FRCS,
London, United Kingdom





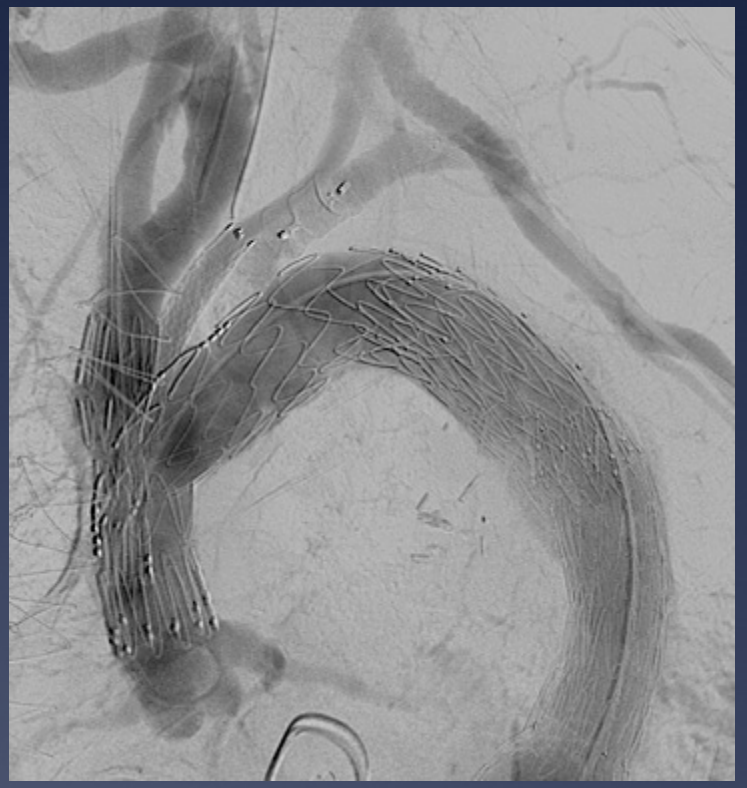
Metcalfe et al. 2012, J Vasc Surg 55: 220-2

Branched Arch Endograft

Global experience with an inner branched arch endograft

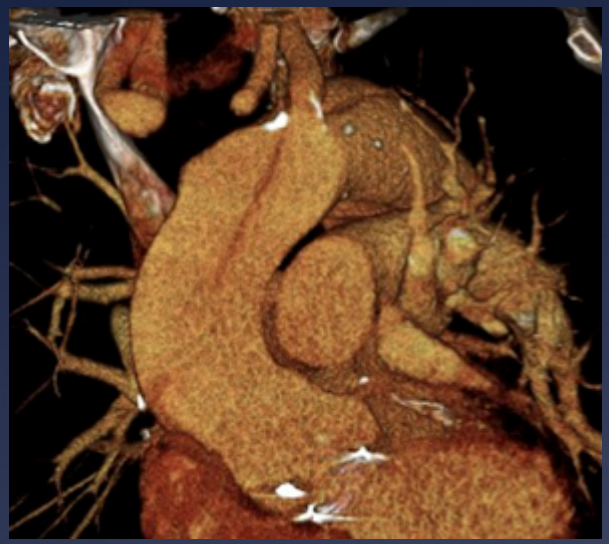
Stéphan Haulon, MD, PhD,[a] Roy K. Greenberg, MD,[b] Rafaëlle Spear, MD,[a] Matt Eagleton, MD,[b] Cherrie Abraham, MD,[c] Christos Lioupis, MD,[c] Eric Verhoeven, MD, PhD,[d] Krassi Ivancev, MD,[e] Tilo Kölbel, MD, PhD,[f] Brendan Stanley, MD,[g] Timothy Resch, MD,[h] Pascal Desgranges, MD, PhD,[i] Blandine Maurel, MD,[a] Blayne Roeder, PhD,[j] Timothy Chuter, MD,[k] and Tara Mastracci, MD[b]

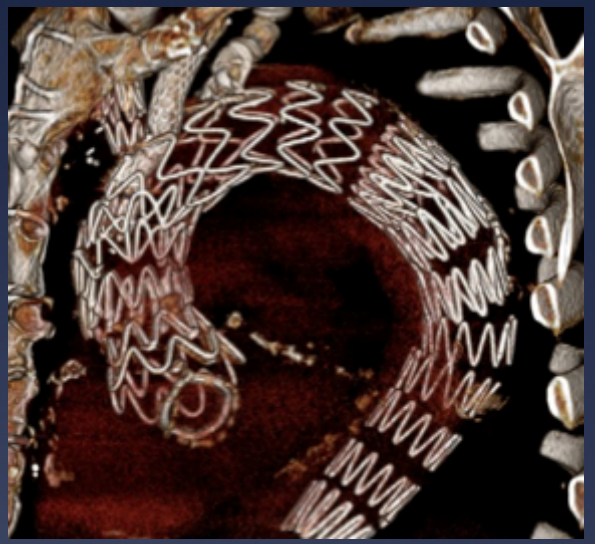
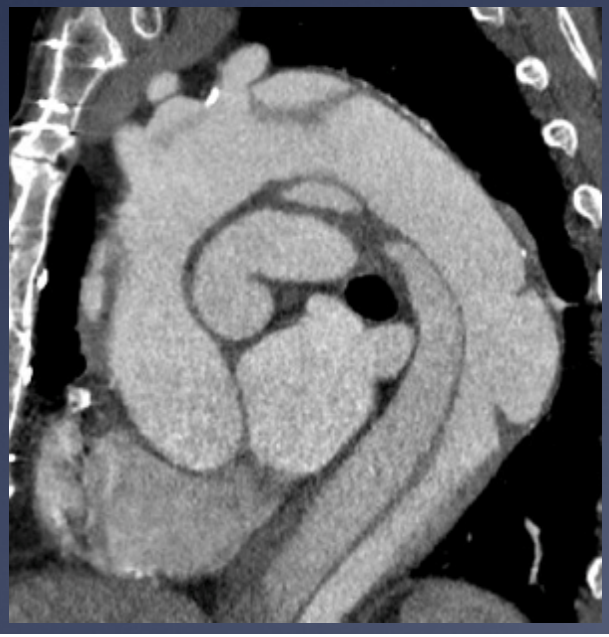
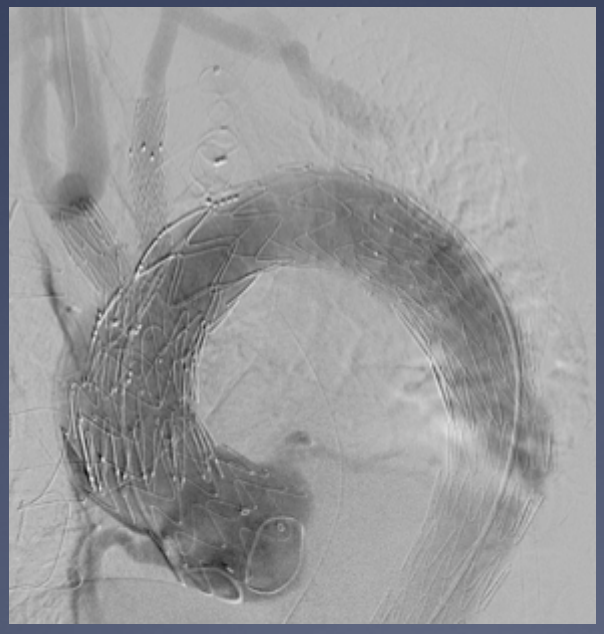
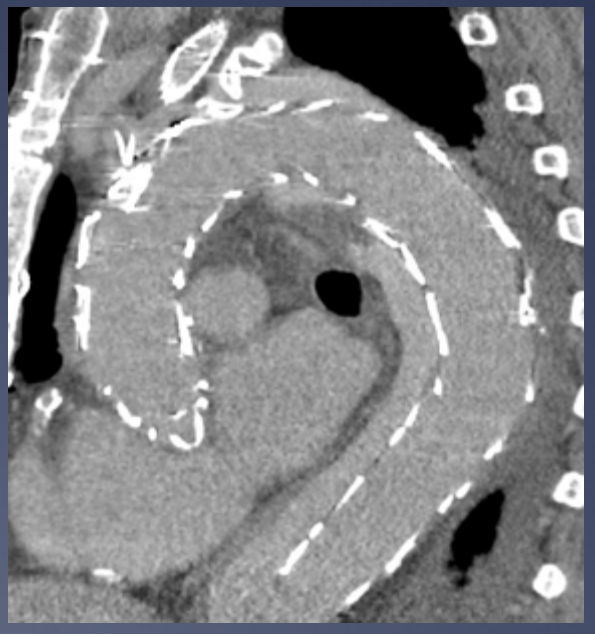
- Multicenter Study
- n = 38
- Technichal success 32/38
- Mortality 5/38 (13%)
- Stroke/TIA 6/38



Haulon et al. 2013; J Thor Cardiovasc Surg 148:1709-16

Acute Type A Dissection
Branched Arch Endograft

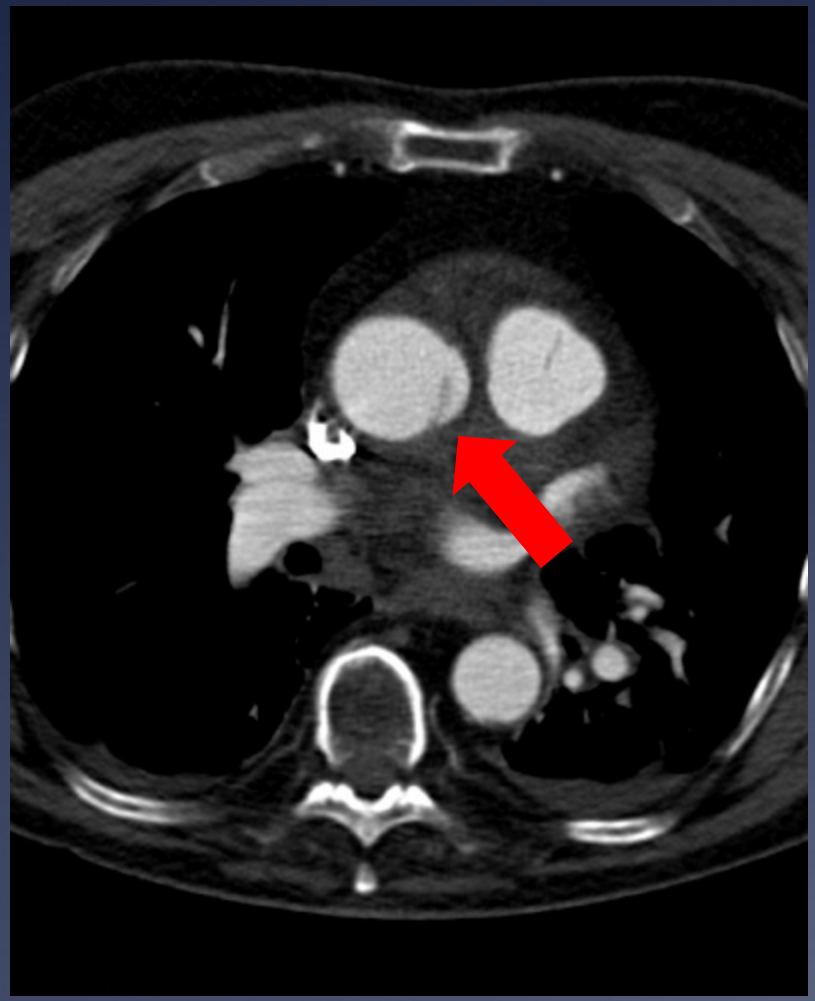


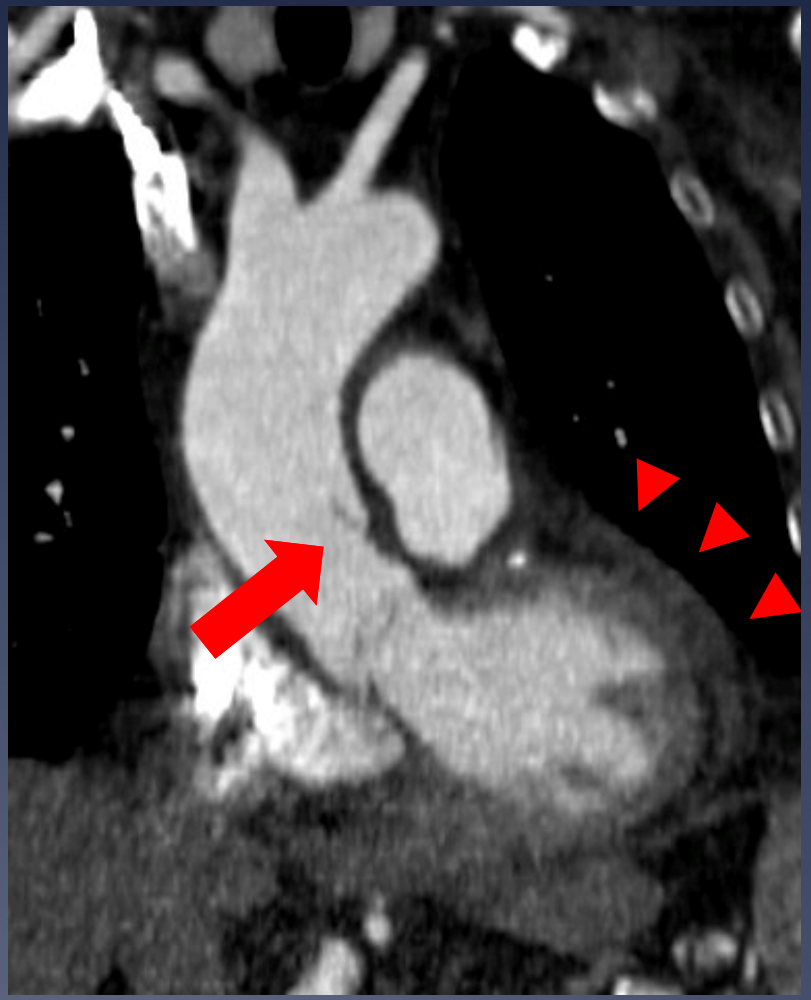





Limitations of Femoral Access

- Distance to ascending and arch
- Tortuosity and kinking
- Left ventricular wire-position
- Difficult true lumen access
- Apposition

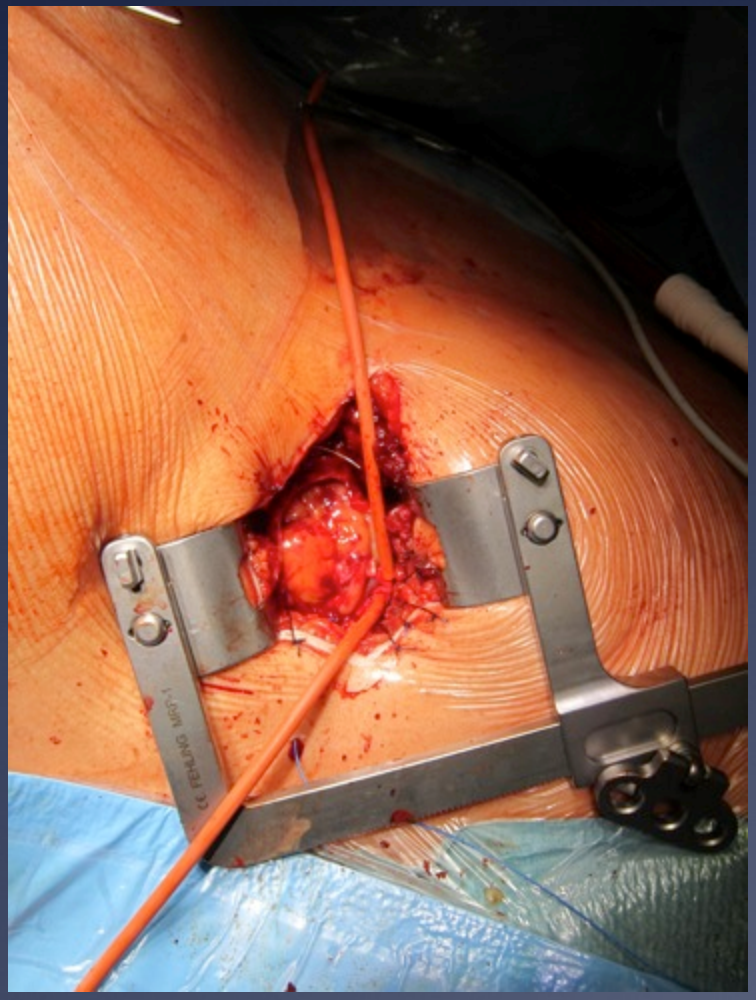
Acute Type A Dissection
Transapical TEVAR





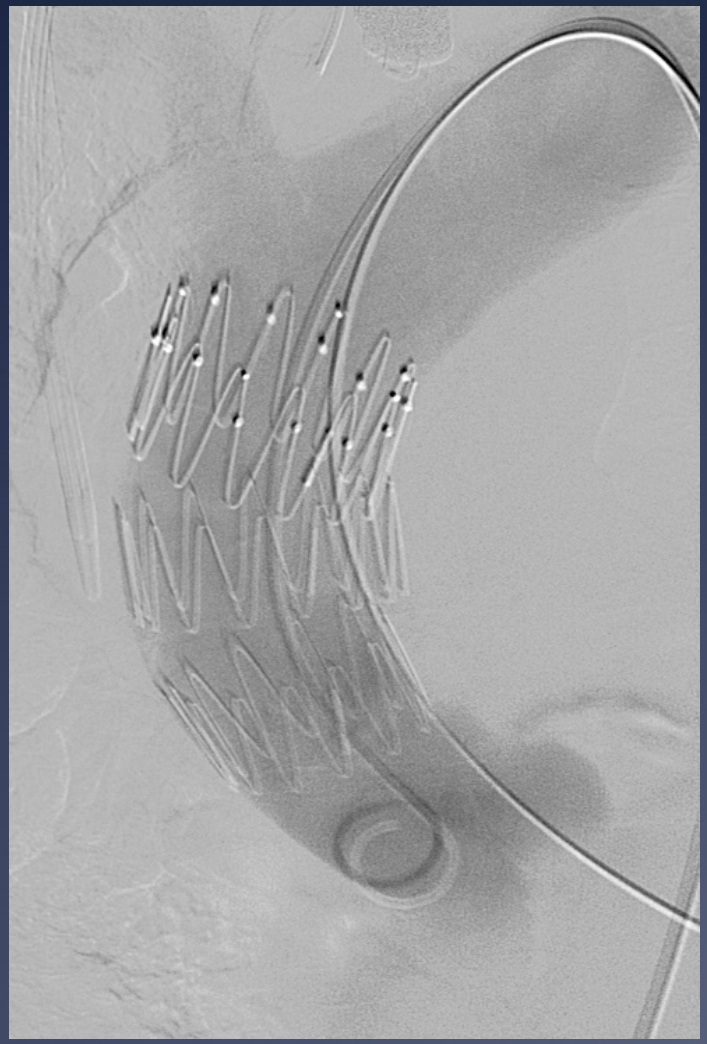
Kölbel et al. 2013; Ann Thor Surg 95:694-6

Acute Type A Dissection
Transapical TEVAR



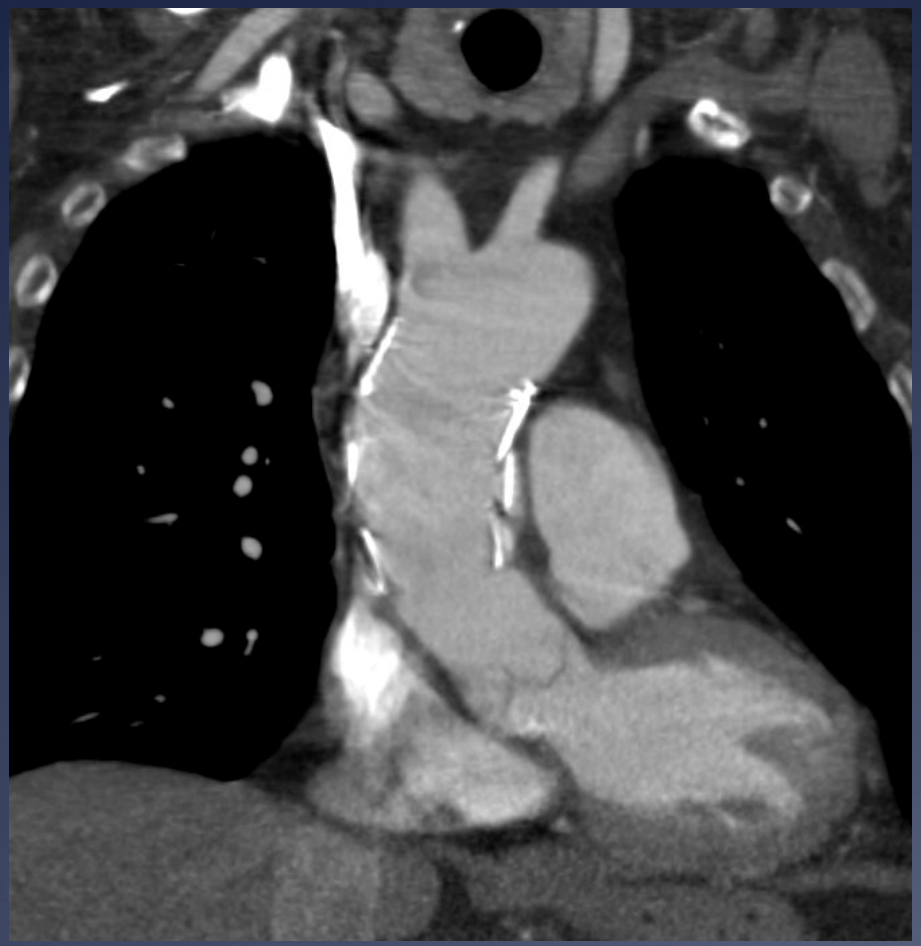
Kölbel et al. 2013; Ann Thor Surg 95:694-6

Transapical TEVAR



Kölbel et al. 2013; Ann Thor Surg 95:694-6

Transapical TEVAR



24m postop.

Is the Endovascular Approach Realistic?

- Yes, in selected cases.
- Remaining problems:
  - Pulsatility, movement of aortic arch
  - Impact of endografts on AV unknown
  - Proximal seal
  - Patient selection
  - Best access
  - Referral and interdisciplinarity
- Most beneficial after previous surgery:
  - Higher risk in Redo-surgery
  - Safe proximal landing.

Summary

- Endovascular Treatment of ascending aorta potentially beneficial in selected patients.
- Postsurgery lesions and Type A dissection work.
- Ascending aneurysms in native vessel do not.
- Transfemoral delivery challenging, transapical access route potentially easier.
- Currently available stent-grafts do not meet requirements.
- Role of endovascular treatment in the ascending aorta yet to be defined.