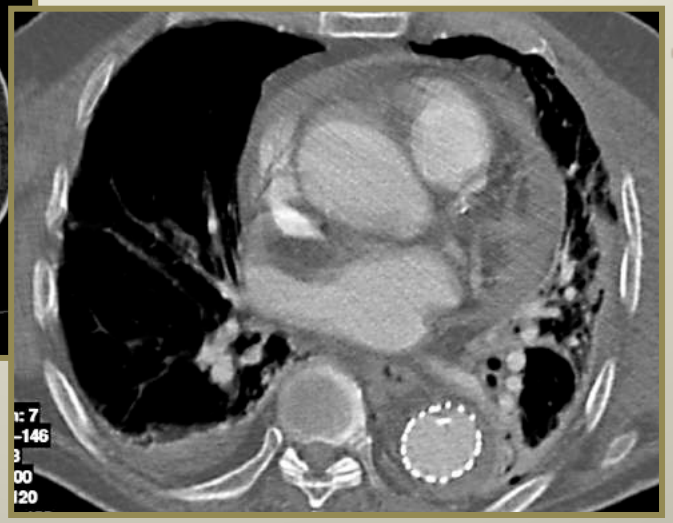
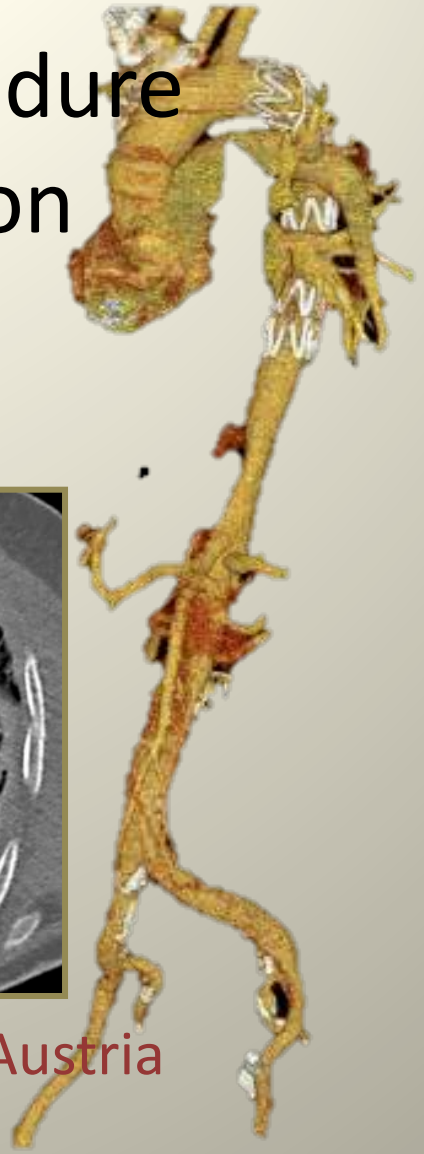
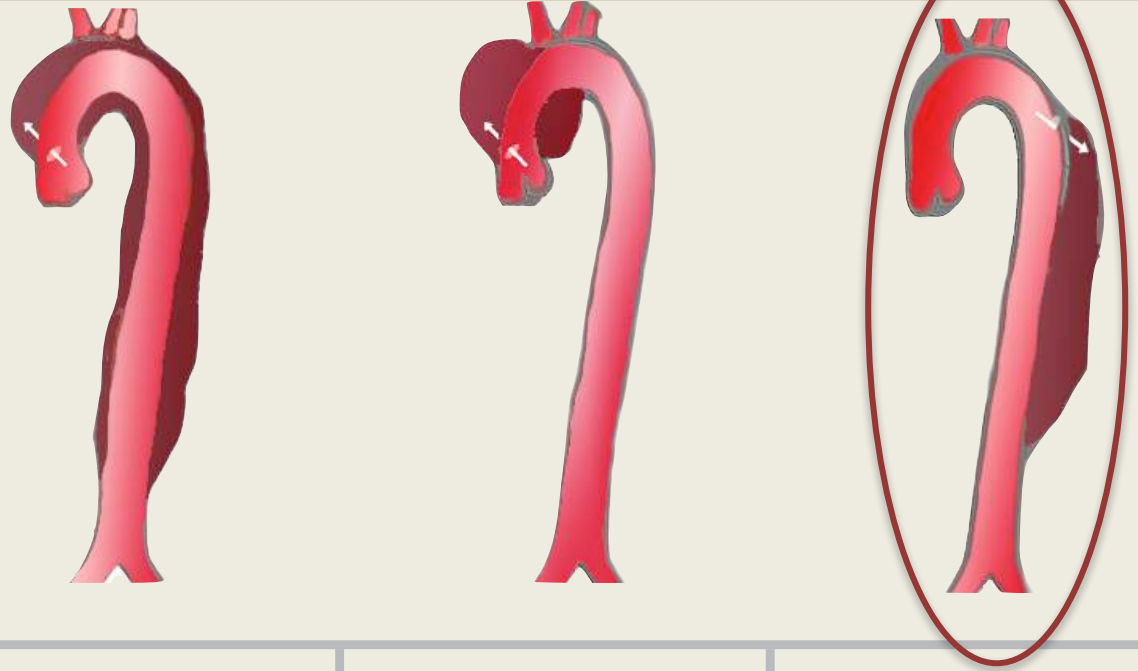
Frozen Elephant Trunk Procedure for Type B Aortic Dissection





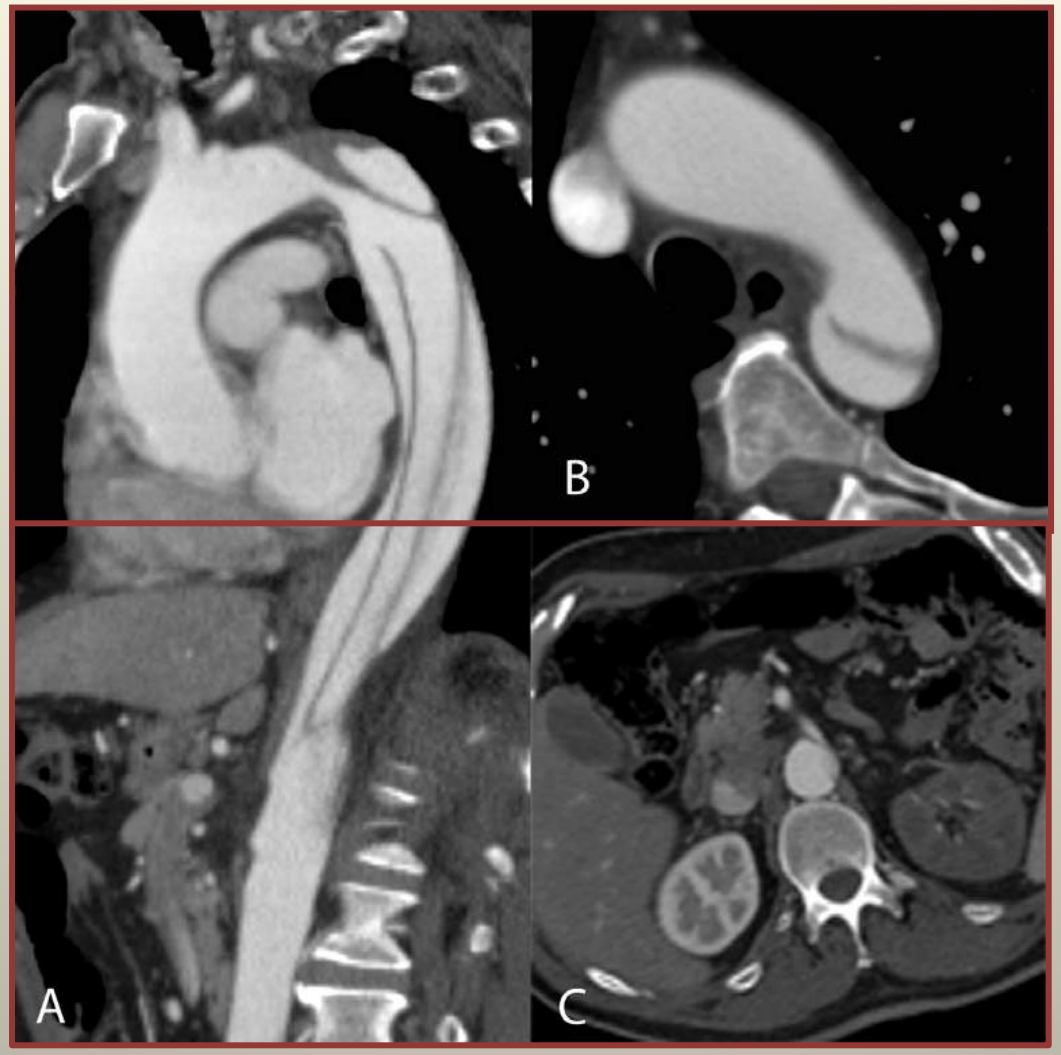
M. Grabenwoger, Hospital Hietzing, Vienna, Austria

Classification



Type	DeBakey I	DeBakey II	DeBakey III
	Stanford Type A		Stanford Type B
%	60 %	10-15%	25-30%

CT-Angiography



Treatment Options

- Uncomplicated
  - Medical Therapy (Blood pressure control)
- Complicated
  - Endovascular Devices
  - Surgery (TEVAR has generally replaced open surgery as the first-line approach based on reduced perioperative morbidity and mortality)
  - Hybrid Procedures (Frozen Elephant Trunk)

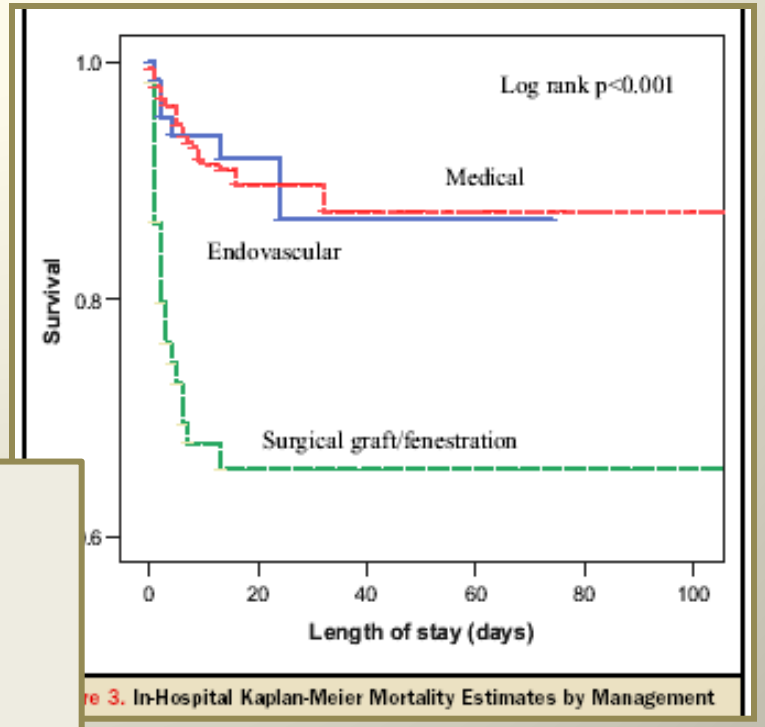
Background

J Am Coll Card 2008; IRAD-registry

Complicated Acute Type B Dissection: Is Surgery Still the Best Option?

A Report From the International Registry of Acute Aortic Dissection

Rossella Fattori, MD,* Thomas T. Tsai, MD,† Truls Myrmel, MD, PHD,‖ Arturo Evangelista, MD, FESC,¶ Jeanna V. Cooper, MS,† Santi Trimarchi, MD,‡ Jin Li, MS,† Luigi Lovato, MD,* Stephan Kische, MD,§ Kim A. Eagle, MD,† Eric M. Isselbacher, MD,# Christoph A. Nienaber, MD, FACC, FESC§



re 3. In-Hospital Kaplan-Meier Mortality Estimates by Management

- 571 pat. acute type B dissection
- 390 pat. medical treatment (Mort.:8,7%)
- 66 pat. Endovascular (Mort.:10,6%)
- 59 pat. open surgery (Mort.:33,9%)

„Tevar seems to offer better outcome in terms of mortality and associated complications than open surgical repair“

Recommendations for treatment of aortic dissection

Recommendations	Class[a]	Level[b]	Ref.[c]
In all patients with AD, medical therapy including pain relief and blood pressure control is recommended.	I	C	
In patients with Type A AD, urgent surgery is recommended.	I	B	1,2
In patients with acute Type A AD and organ malperfusion, a hybrid approach (i.e. ascending aorta and/or arch replacement associated with any percutaneous aortic or branch artery procedure) should be considered.	IIa	B	2,118, 202–204, 227
In uncomplicated Type B AD, medical therapy should always be recommended.	I	C	
In uncomplicated Type B AD, TEVAR should be considered.	IIa	B	218,219
In complicated Type B AD, TEVAR is recommended.	I	C	
In complicated Type B AD, surgery may be considered.	IIb	C	

Emergency Endovascular Stent-Grafting for Life-Threatening Acute Type B Aortic Dissections

Lennart F. Duebener, MD, Peter Lorenzen, MD, Gert Richardt, MD, Martin Misfeld, MD, Axel Nötzold, MD, Franz Hartmann, MD, Hans-Hinrich Sievers, MD, and Volker Geist, MD

Departments of Cardiac Surgery and Cardiology, University Hospital of Schleswig-Holstein, Campus Luebeck, Luebeck, Germany, and Department of Cardiology, Heart Center Bad Segeberg, Bad Segeberg, Germany

Ann Thorac Surg 2004;78:1261-1266

- 10 patients, mean age 59,2 years; TEVAR 4 to 24 hours after diagnosis

- Indication: contained rupture, malperfusion, rapid increase in aortic diameter

refra

- 3 p

dislo

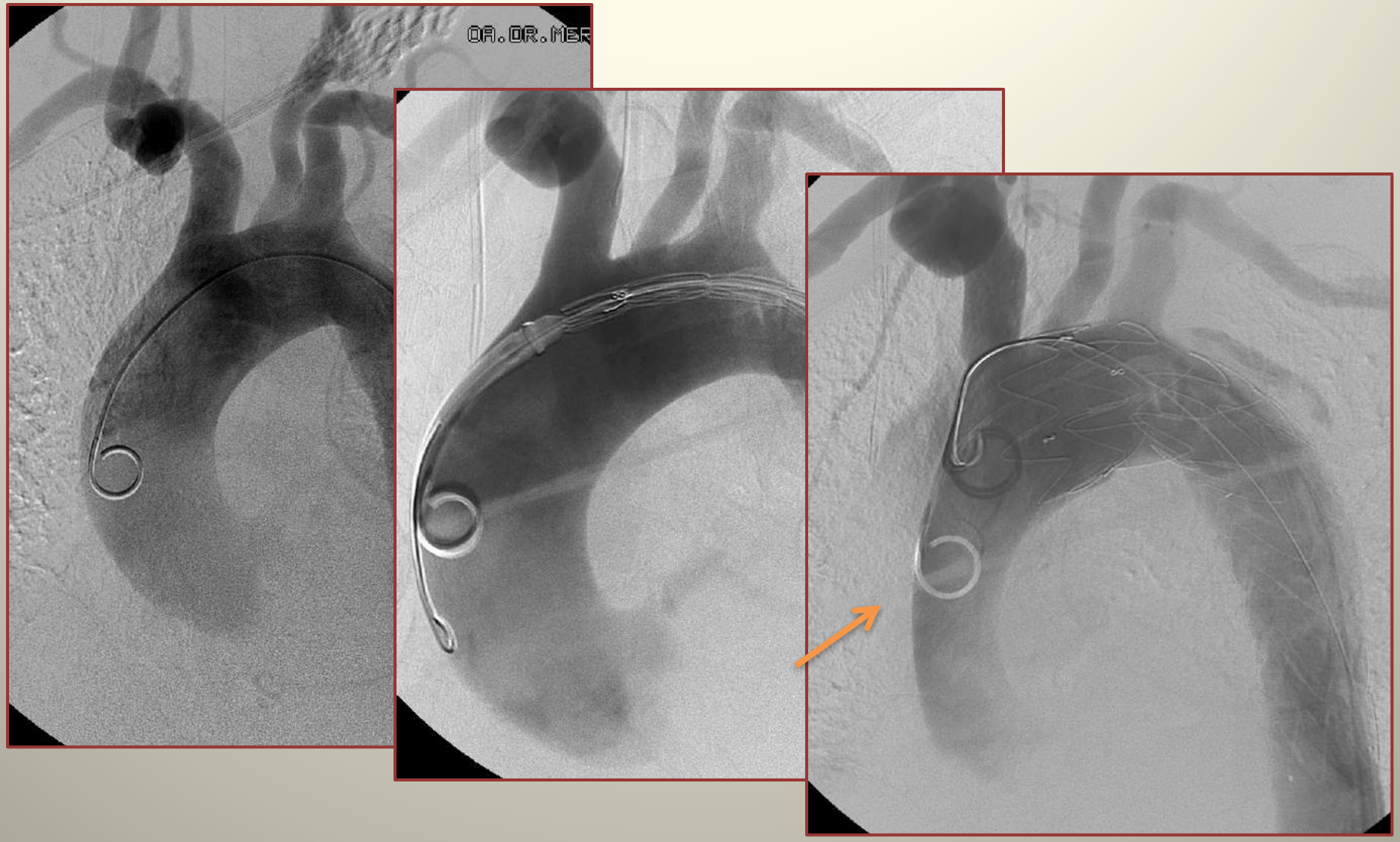
Serious complications following endovascular thoracic aortic stent-graft repair for type B dissection

Beate Neuhauser [a,*], Andreas Greiner [a], Werner Jaschke [b], Andreas Chemelli [b], Gustav Fraedrich [a]

Eur J Cardiothorac Surg 2008;33:58-63

- 28 pat. with acute symptomatic type B dissection
- Secondary intervention 5/28 pat.
- Conversion to open (retro type A): 4 pat (14%)
- Procedure related mortality following secondary intervention 20% (1/5)
- „TEVAR is an alternative to surgical repair, however, not without significant morbidity and mortality“

Retrograde Type A



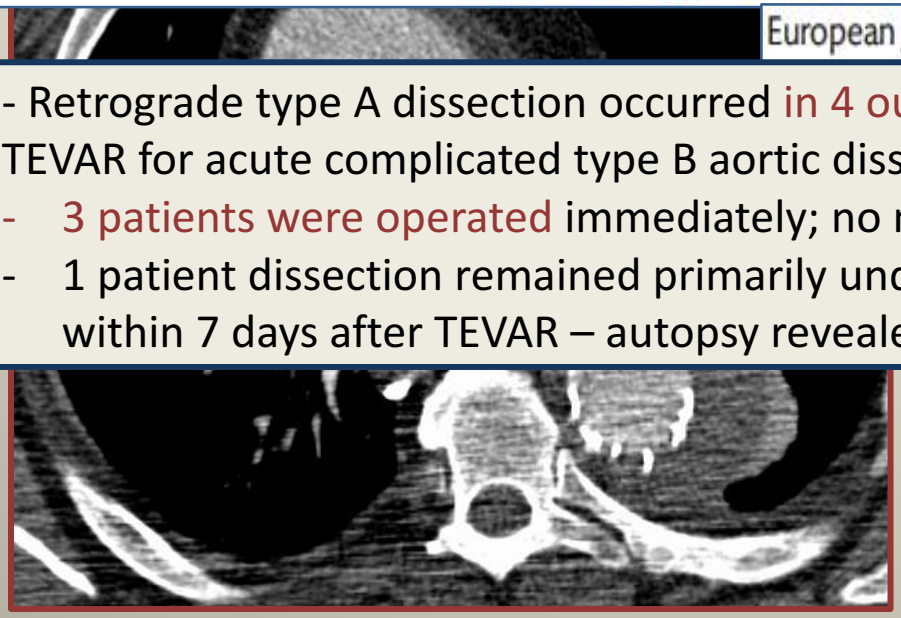
FET as Bail-out Strategy
retro type A after TEVAR

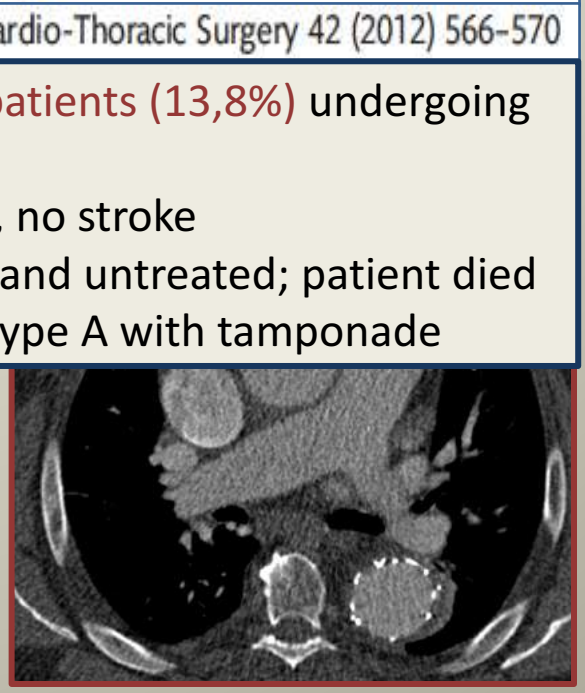
Repair of stent graft-induced retrograde type A aortic dissection using the E-vita open prosthesis†

Michael Gorlitzer[a,*], Gabriel Weiss[a], Reinhard Moidl[a], Sandra Folkmann[a], Ferdinand Waldenberger[a], Martin Czerny[b] and Martin Grabenwöger[a]

European Journal of Cardio-Thoracic Surgery 42 (2012) 566–570

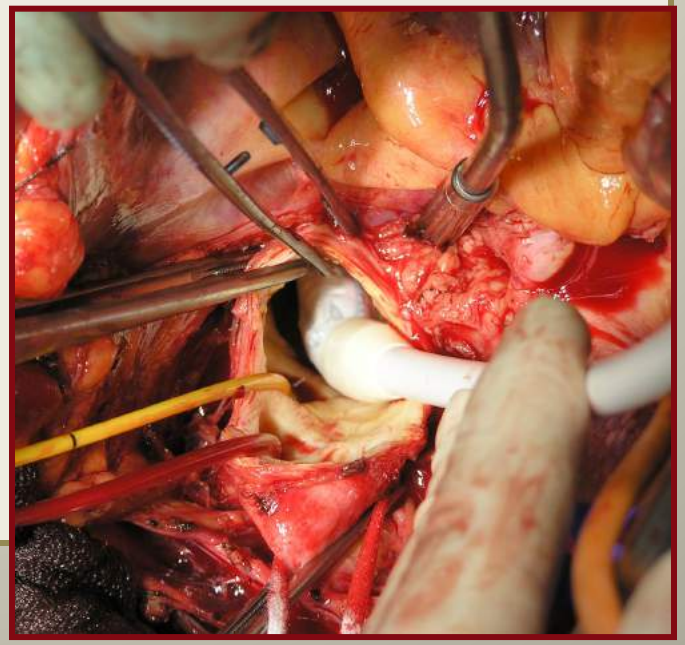
- Retrograde type A dissection occurred in 4 out of 29 patients (13,8%) undergoing TEVAR for acute complicated type B aortic dissection
- 3 patients were operated immediately; no mortality, no stroke
- 1 patient dissection remained primarily undetected and untreated; patient died within 7 days after TEVAR – autopsy revealed retro type A with tamponade





Change in Paradigm

- Operation of a complicated type B dissection via median sternotomy using the frozen elephant trunk technique.
- Advantage
  - Coverage of primary entry tear under direct vision
  - Safe proximal suture line
- Avoidance of
  - Retrograde type A dissection
  - Endoleak Ia formation
  - Vascular complication
  - Guide wire perforations



Complicated Type B
Conventional Surgery

- Drawback
  - Primary entry-tear at the offspring of the left subclavian artery – left heart bypass technique with aortic cross clamping very difficult - not feasible.
  - In most patients the operation has to be performed in deep hypothermic circulatory arrest
- Results
  - In-hospital mortality (25% to 50%); spinal cord ischemia (7%); stroke 9%; renal failure 19%

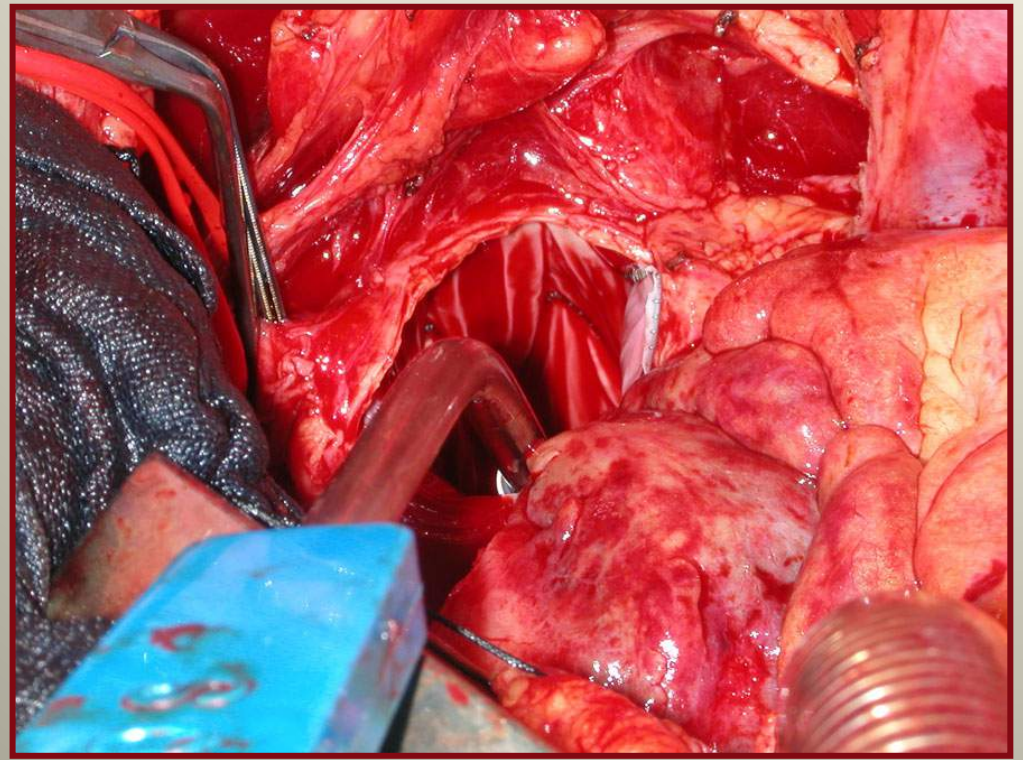
Indication for Antegrade Approach

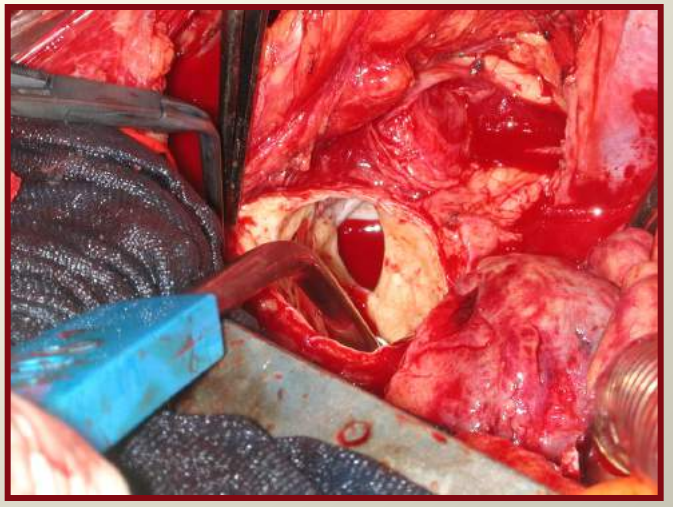
- When TEVAR cannot be performed safely
  - Acute type B with retrograde component (hematoma, dissection) – no „healthy“ landing zone
  - Diameter of ascending aorta or aortic arch > 4cm
  - Acute angled aortic arch, hostile anatomy
  - No distal access available (tortuosity of iliac arteries)
- Advantage of FET as compared to conventional surgery
  - Treatment of arch and descending aorta possible
  - No posterolateral thoracotomy
  - No profound hypothermic circulatory arrest

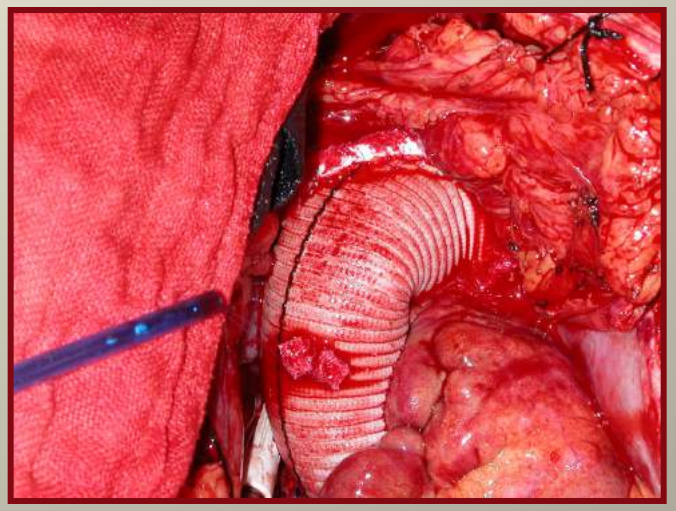
Acute Type B
with retrograde type A

Type B Dissection – Retro A

- Type B dissection with pathology of ascending aorta and arch





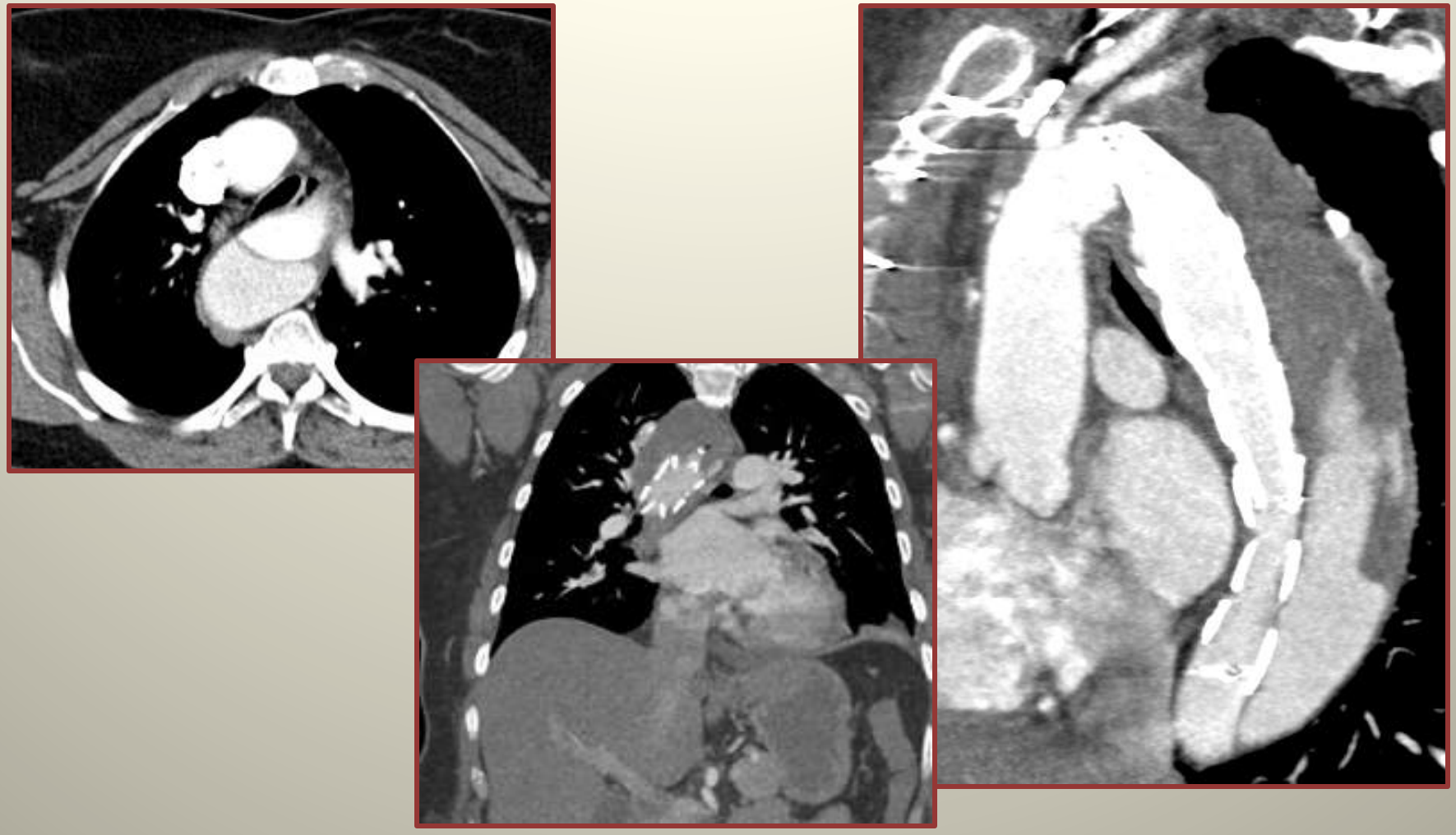


Antegrade Stenting
no distal access

Type B dissection with complete obliteration of the true lumen

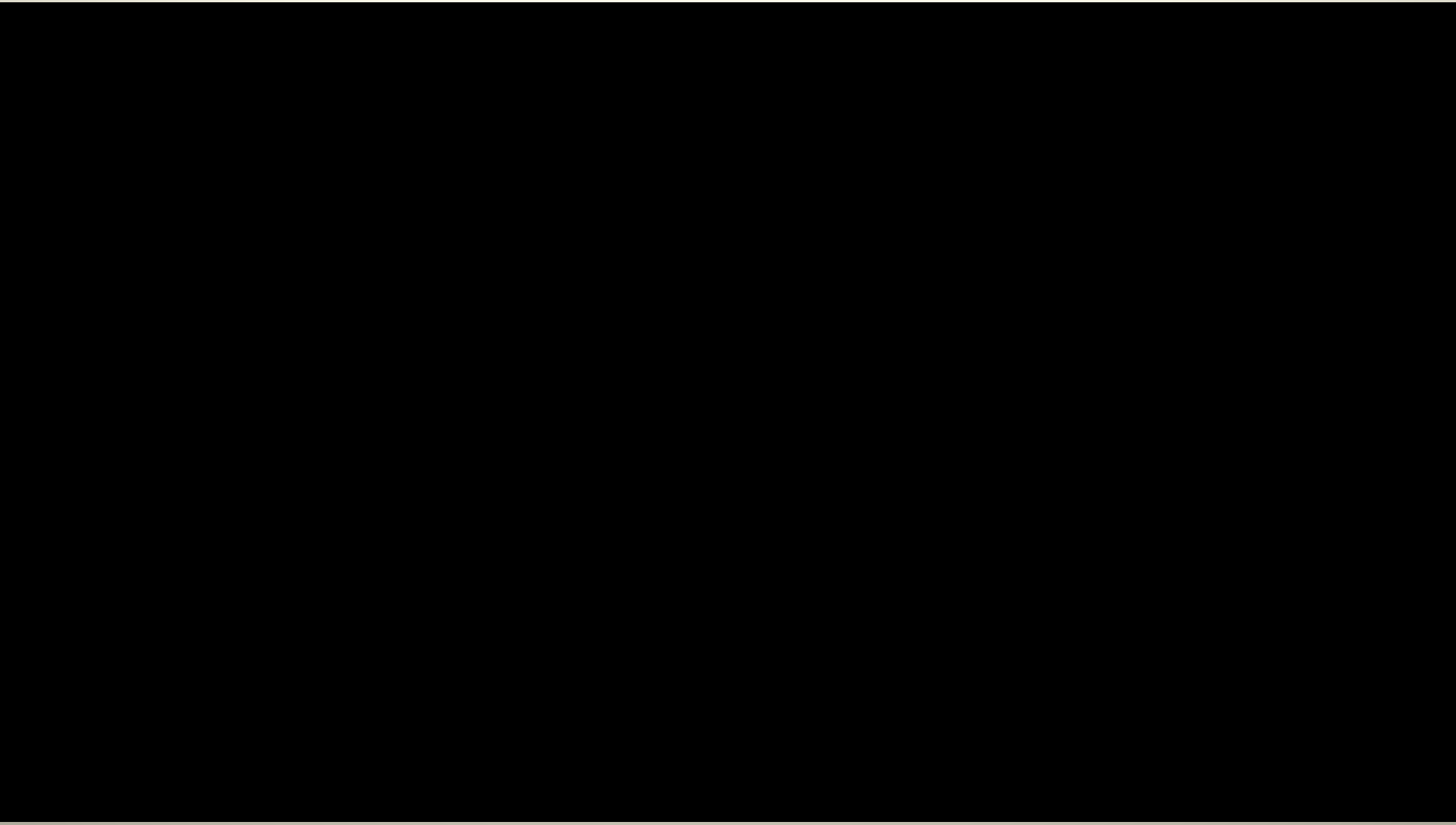
Antegrade Stenting

acute angled aortic arch




WL: 27 WW: 1012
Abdomen
_Thorax_Angio
AR
PL

Angioscopy of Descending Aorta



KH HIETZING
NZ ROSENHÜGEL

The frozen elephant trunk technique for the treatment of complicated type B aortic dissection with involvement of the aortic arch: multicentre early experience†

Gabriel Weiss[a,*], Konstantinos Tsagakis[b], Heinz Jakob[b], Roberto Di Bartolomeo[c], Davide Pacini[c], Giuseppe Barberio[c], Jorge Mascaro[d], Carlos-A. Mestres[e], Thanos Sioris[f] and Martin Grabenwoger[a]

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Current status and recommendations for use of the frozen elephant trunk technique: a position paper by the Vascular Domain of EACTS†

Malakh Shrestha[a], Jean Bachet[b], Joseph Bavaria[c], Thierry P. Carrel[d], Ruggero De Paulis[e], Roberto Di Bartolomeo[f], Christian D. Etz[g], Martin Grabenwöger[h], Michael Grimm[i], Axel Haverich[a], Heinz Jakob[j], Andreas Martens[a], Carlos A. Mestres[k,l], Davide Pacini[f], Tim Resch[m], Marc Schepens[n],

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The frozen elephant trunk technique for the treatment of acute complicated Type B aortic dissection

Maximilian Kreibich*†, Tim Berger†, Julia Morlock, Stoyan Kondov, Johannes Scheumann, Fabian A. Kari, Bartosz Rylski, Matthias Siepe, Friedhelm Beyersdorf and Martin Czerny

Department of Cardiovascular Surgery, Heart Centre Freiburg University, Faculty of Medicine, University of Freiburg, Freiburg, Germany

European Journal of Cardio-Thoracic Surgery 0 (2017) 1–6

- 14 pat. with acute complicated type B dissection treated by FET procedure
- ectatic aorta in 6 pat., lack of landing zone in 8 pat.
- mortality: none, none-disabling stroke in 2 pat.
- repair extension by additional stent in 3 patients

HZH
Herz und Gefäßchirurgie
www.herzzentrum-hietzing.at

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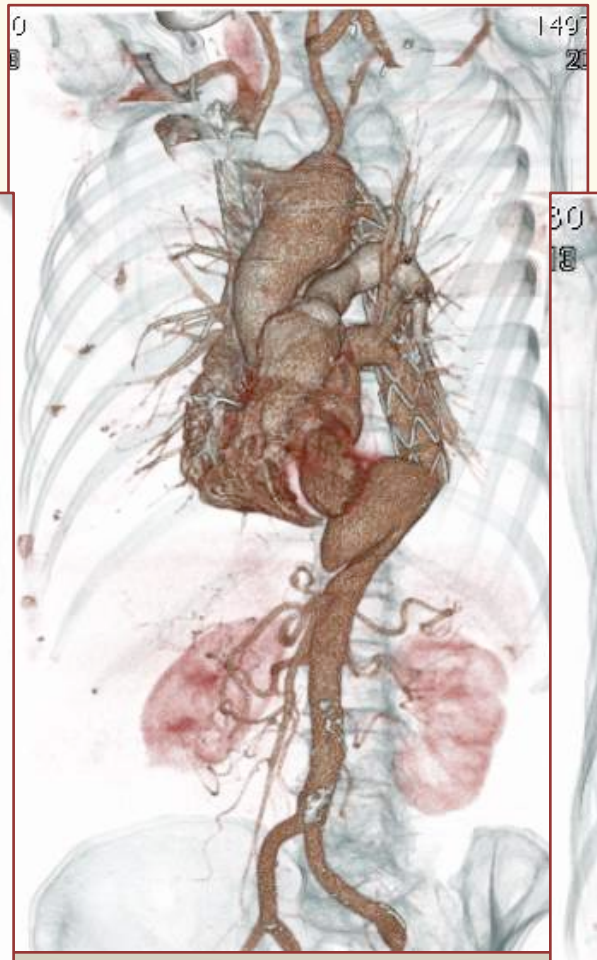
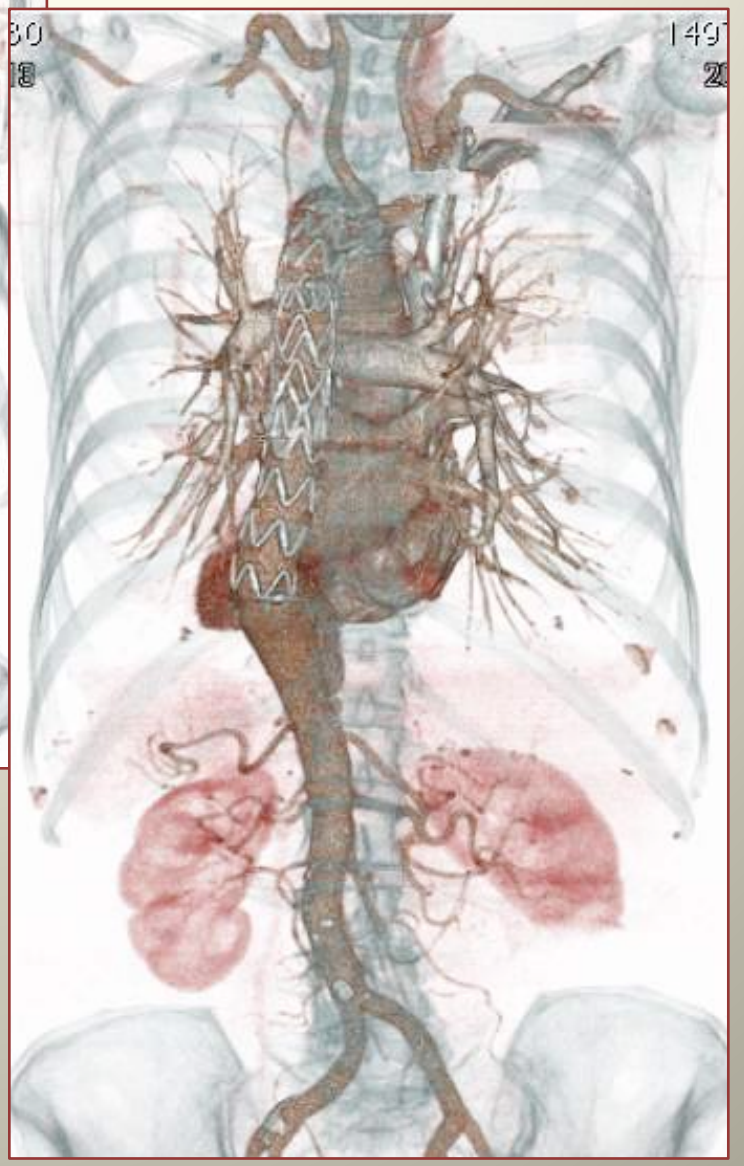




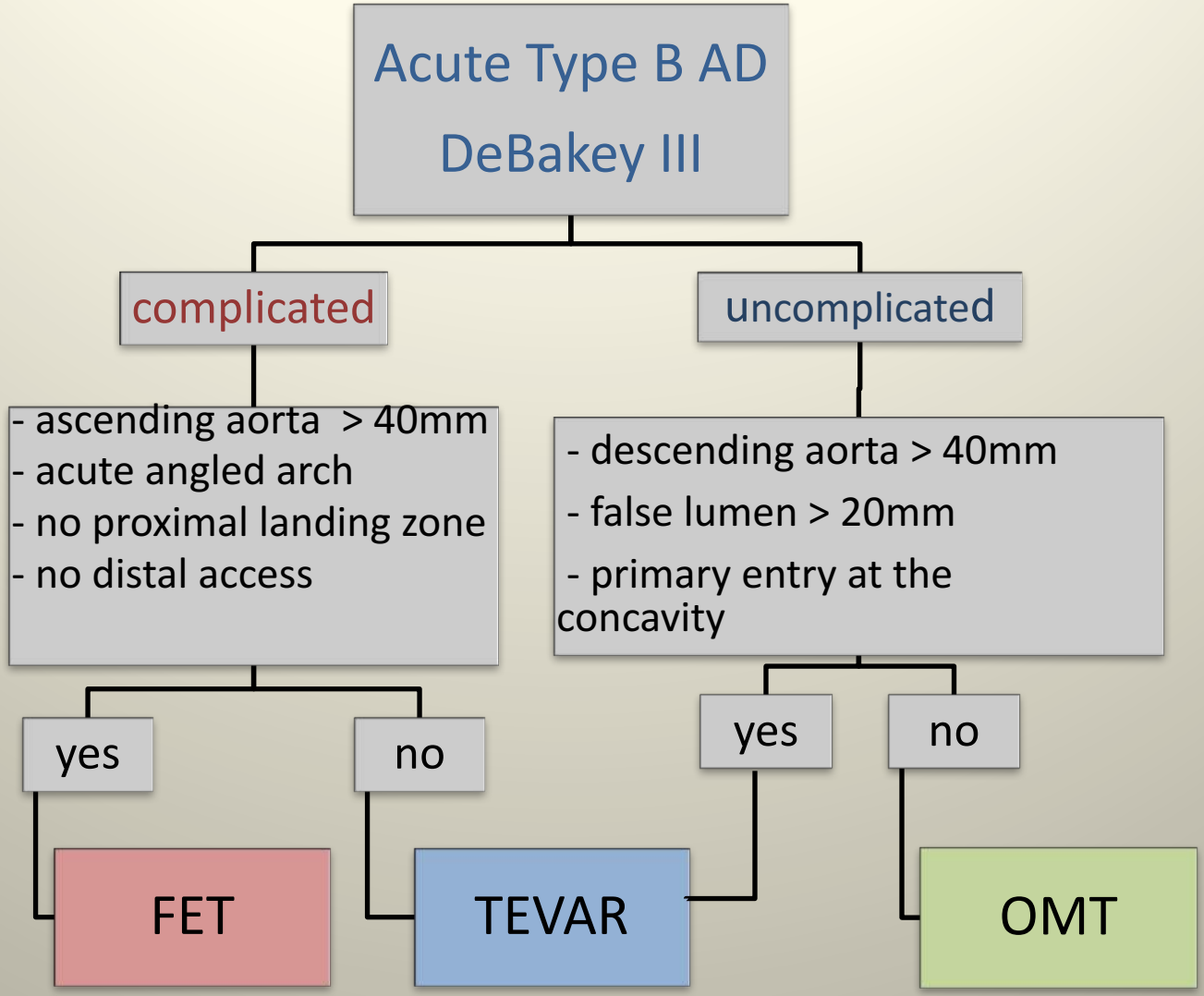
Preliminary Experience FET for Type B Hospital Hietzing

- 16 patients (8 female, 8 male patients; 59 years)
  - 10 chronic type B
    - 8 pat. with rapid increase and no proximal landing zone
    - 1 pat. retro-A after TEVAR – interval of 6 weeks
    - 1 pat. no distal access
  - 6 acute
    - 3 pat.: retrograde Type A after TEVAR of complicated type B
    - 3 pat.: acute complicated type B with retrograde component

Results Hospital Hietzing

- Mean SCAP time: 54 min (42-75)
- Median ICU stay: 4 days
- Median hospital stay: 18 days
- Hospital Mortality: 6% (1/16)
- Minor Stroke: 6% (1/16)
- Paraplegia: 0

HZH Algorithm



Conclusion

- Stent graft placement for complicated type B dissections is associated with significant morbidity and mortality (retro type A not an infrequent complication)
- Frozen elephant trunk technique should be considered as first line therapy for complicated dissection type B, when TEVAR cannot be performed safely
- FET-procedure is superior to conventional surgery in DHCA via posterolateral thoracotomy