Most patients with Acute/Subacute uncomplicated TBADs should undergo TEVAR:
The INSTEAD-XL RCT shows better long-term survival with TEVAR than with medical treatment

Professor Christoph A. Nienaber
The Royal Brompton and Harefield NHS Trust
Cardiology and Aortic Centre
C.Nienaber@rbht.nhs.uk

 incidental aortic dissection

On October 23, 1760 George III rose at 8 am, asked for his chocolate and repaid his closed-stick. The valet heard a “noise louder than the royal wind and a groan.” The King was

pericardium extended with coagulated blood and a transverse fissure on the inner side of the ascending aorta 3.75 cm...

fissure on the inner side of the ascending aorta 3.75 cm long through which blood had passed to form an echymosis, which was interpreted as an incipient aneurysm

Incidence: Thoracic Aortic Aneurysm and Dissection

Incidence of thoracic aortic aneurysms and dissection is up
Operations for thoracic aortic aneurysms and dissection up

Incidence of acute aortic dissection (UK 2002-2012)

Prospective study and case ascertainment
  - Regional coverage
  - Daily / weekly / monthly reviews
  - Monthly visits to Coroner’s office and review of all death certificates (OOH)
  - Autopsy reports
  - Population based analysis
    - Incidence > hospital-based data from IRAD (2.9-3.5)
    - Premorbid hypertension = important risk factor
**Substrate and Natural History:**
Thoracic aortic dissection

*Thoracic Aortic Dissection Mortality*
- 1 - 3% per hour (Shennan 1934)
- 1/3 within 24 hours (Lindsay 1967)
- 38% within 15 days (IRAD 2000)

Data from International Registry of Acute Aortic Dissection (IRAD)


**Ironically Dr. DeBakey at age 95**
...had some chest pain!

- Finally my 1st AMI...?
- No, a DeBakey Type II Dissection!
- Difficult decision to go for surgery!
- Intermittent loss of consciousness!

**Anatomy and Classification of Aortic Dissection**

DeBakey I II III

Stanford A B

**Acute Type A Dissection: -TEVAR-**

Implantation under rapid RV pacing
Delivery of 36 mm x 6.4 cm TX2 Graft
Interventional approach to proximal PAU

Initial CT  28 Days Later

Ascending case

Hybrid Room

Ascending Aorta + TEVAR

TEVAR: The near future

- Expanding indications
  - Total-arch solutions
  - Ascending aorta
  - Dissection-specific devices
  - Type A dissections
  - More long-term data

Low profile branch technology
Perkutane Klappe ist ins biologische Milieu integriert.
Dauerhafte Fixierung gesichert.
Degeneration?

Ingrown TAVI-Valve

Mortality
- uncomplicated 10%
- complicated 58%

DISSECT consortium
"... Dissection is an ever changing disease and a continuum of anatomic involvement and risk constellation ...
... essentially nobody is at no risk!"

Acute aortic syndromes

- 5-20 pts / mil / yr
- Cause of death in population: 0.5%
- Rate M/F: 2/1 – 5/1

Evolution of Dissection, PAU and IMH

Intramural Haematoma of the Aorta

CT

TEE

LA

C

B

Schematic of aortic dissection (left), penetrating ulcer (middle), and IMH (right) all causing acute aortic syndrome.
IRAD temporal classification:
Survival pattern in type B dissection by acuity

Kaplan-Meier Survival Curve
Dissection Type: B

Survival with acute type B aortic dissection on drugs...


IMH and PAU managed by TEVAR

Progressive dissection forming from intramural hematoma

High risk group: Complicated by malperfusion

Malperfusion syndrome treated with endovascular stent-graft and PETTICOAT:
1) angiography of lower body malperfusion; 2) reperfusion after proximal stent-graft; 3) 3D CT reconstruction of acute complicated dissection with malperfusion; 4) reconstructed aorta and abolished malperfusion after stent-graft and PETTICOAT.
PETTICOAT for malperfusion resolution

Hybrid procedures: Aortic coverage and spinal perfusion

A. Pujara et al, Thoracic Surgery 2012

Complicated Type B dissection: Escalating complexity I-III

Simple Stentgraft  PETTICOAT  Complex branched

INSTEAD: 2 years-outcomes after TEVAR in stable patients

Subacute type B dissection  Remodeling in INSTEAD

Contrast-enhanced MRA of chronic type B dissection originating from the aortic arch region in MIP (A) and as volume-rendered 3D reconstruction (B). Follow-up MRA at 7 days after stent-graft placement shows a completely sealed proximal entry to the thrombosed false lumen. The diameter of the true lumen is normalized and the descending aorta is reconstructed (C).

Nienaber et al; Circ 2009; 120:2519-2528

Hypotension/Shock  Malperfusion

Type B aortic dissection: Survival and predictors


90% remodeling after TEVAR

Low risk type B aortic dissection

@ 1 year crossover rate 14% (p=0.02)
@ 2 years crossover rate 20% (p=0.02)

Remodeling with TEVAR…

Pre-procedure

Post-procedure

24 months

Complete false lumen thrombosis in the descending thoracic aorta

Remodeling…or rupture!

- FL open and no isolation
- FL expansion
- TL compression
- Impending rupture

Uncomplicated type B aortic dissection on drugs

INSTEAD-XL

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

Nienaber CA et al, Circ Cardiovasc Interv. 2013

INSTEAD-XL / Landmark analysis

CV death (2nd EP)

Progression (2nd EP)
IRAD experience with TEVAR

![Graph showing survival after endovascular therapy in patients with type B aortic dissection.](Image)

**Aortic Dissection**

**Observations**

- Type B aortic dissection patients treated with TEVAR had improved survival compared to medical therapy alone.

**Methods**

- Retrospective analysis of data from a large international registry.

**Results**

- Kaplan-Meier curves of freedom from late events after TEVAR of type-B aortic dissection patients were subdivided into 2 groups (TEVAR vs. medical therapy), and the cumulative freedom from all post-procedure events was analyzed.

**Recommendations**

- In all patients with AD, medical therapy including pain relief and blood pressure control is recommended.
- In patients with type A AD, urgent surgery is recommended.
- In patients with uncomplicated type-B AD, medical therapy should always be recommended.
- In uncomplicated type-B AD, TEVAR should be considered.
- In complicated type-B AD, surgery may be considered.

**Facts**

- **Aortic dissection**
  - TEVAR is effective and safe in complicated type B dissection.
  - TEVAR improves 5-years survival in uncomplicated type B dissection.
  - W/o TEVAR no aortic remodeling.
  - Case for non-believers…!
Diagnostic CTA
Before TEVAR

After TEVAR PET-CAT
CTA at 4-yr FU

Therapy 2015
New high Risk: Aortic inflammation

CT
PET-CT
**New Treatment Paradigm**

- Dissected aortas on drugs don’t remodel and heal
- Long-term and late complications are difficult to treat
- Preemptive TEVAR ensures long-term stability
- Rather than justifying TEVAR in type B dissection, “today, we have to justify not to offer endovascular scaffolding.”

**Team Mission**

God created the aorta with ONE lumen….it should stay that way…”

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**Optimizing patient outcomes in Type-B dissection – The Instead XL results**

Professor Christoph A. Nienaber
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**New high risk group: Pain & persisting hypertension**

- Two patients with a small initial false lumen diameter at the upper descending thoracic aorta showed a complete resorption of the false lumen (left) or did not show an aneurysm for approximately 3 years (middle), while another patient with a large initial false lumen diameter developed an aorta aneurysm after approximately 2.5 years (right).

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**New high risk group: Large entry size - outcome?**

- Entry tear of aortic dissection visualised by 2-dimensional (left) and color-Doppler (right) TEE
- Type B dissection with an entry tear located in the proximal part of the descending aorta (arrow) by transverse view
- Type A dissection with an entry tear in the proximal part of the residual dissection (arrow) in the upper ascending aorta by longitudinal view
Diagnosis & Risk of rupture

Useful tools:

- **Functional imaging**
  - TEE with color doppler interrogation
  - TEE with contrast
  - Dynamic 4D MRI
  - FDG uptake on PET
- **Hemodynamics**
- **Integration of Biomarkers**
  - Serial & D-Dimer (>500 µg/l)
  - MMP-9
  - SM myosin heavy chains

Quotation from 2002...

Personal communication:

“... If hypertension is a silent killer, leaving dissection untreated is controlled mass murder ...!”