Die Komplexität der Typ B Dissektion – Behandlungsstrategien für die Zukunft

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AAS – Classic aortic-Dissection

Distal DeBakey IIIa and IIIb
Stanford B

Proximal DeBakey I and II
Stanford A

Proximal Stanford B

Ascending Arch and Descending

Descending

Arch and Descending

Descending penetrating ulcer

Latrogenic
Neurological symptoms and aortic dissection

Dramatic evolution of SX may dominate the clinical picture

- Brain associated symptoms (type A)

- Spinal cord ischemia (type A and B)

- Peripheral neuropathy (type A and B)
Neurological symptoms and aortic dissection

Symptoms of Peripheral Nerve Involvement

- Ischemic neuropathy
- Ischemic plexopathy
- Direct compression of nerval structures by expanding FL
  - Horner’s syndrome
  - Hoarseness of voice (N. recurrens sinistra)
Diagnosis in Acute Aortic Syndromes at CPU

- ACS
  - STEMI
  - NSTEMI / UA
  - coronary spasm

- Aortic syndrome
  - Dissection
  - IMH
  - PAU

- Pericarditis
- Pulmonary embolism

- Incidence 20,000 cases/year in EU
- 30 day mortality from 0 – 30%
- 30 % missed diagnosis on initial work-up
Type B aortic dissection: Survival and predictors

High risk group: Complicated type B dissection

Malperfusion syndrome treated with endovascular stent-graft and PETTICOAT; a) angiography of lower body malperfusion; b) reperfusion after proximal stent-graft; c) 3D CT reconstruction of acute complicated dissection with malperfusion; d) reconstructed aorta and abolished malperfusion after stent-graft and PETTICOAT.
Schematic of aortic dissection (left), penetrating ulcer (middle), and IMH (right) all causing acute aortic syndrome.
~ 5 minutes later

1st measurement
IMH – Evolution II
IMH – Evolution III
- Induced remodeling -
Spätkomplikation bei Typ B-IMH der Aorta descendens
Complicated Type B dissection: Escalating complexity I-III

Simple Stentgraft

PETTICOAT

Complex branched
EVIDENCE SUMMARY

Jan D. Blankensteijn, MD, PhD, Section Editor

Thoracic endovascular aneurysm repair for complicated type B aortic dissection

Christoph A. Nienaber, PhD, MD,1 Stephan Kische, MD,1 Hüseyin Ince, PhD, MD,1 and Rossella Fattori, PhD, MD,2 Rostock, Germany; and Bologna, Italy

Endovascular reconstruction of the true lumen by use of minimally invasive stent grafting or stenting is becoming increasingly popular and may have the potential to emerge as the first-line therapy for acute complicated type B dissection. Thoracic aortic dissection can be classified as complicated vs uncomplicated (stable), or anatomically according to the origin of the intimal tear or whether the dissection involves the ascending aorta. Although the outcomes of so-called complicated type B dissection are known to be disastrous with open surgery and disappointing with medical management alone, those patients with complications, such as organ malperfusion syndrome, impending rupture, ongoing pain, and resistant hypertension, may qualify preferentially for endovascular reconstruction of the true lumen. Cumulative extraction of currently available outcomes data and meta-analytic interpretation of the available observational evidence suggest that endovascular stent grafts provide improved survival in the setting of complicated type B dissection today. (J Vase Surg 2011;54:1529-33.)
Type B aortic dissection: Survival and predictors

Medical: Survival after acute type B aortic dissection

Objective:
1yr outcomes of uncomplicated type B aortic dissection treated by Talent® Stentgraft in addition to best medical tx versus best medical tx alone (tailored/monitored)

Initial Centers
- Rostock
- Berlin
- Bologna
- Essen
- Leipzig
- Vienna
- Bordeaux

INSTEAD: Investigation of Stent-grafts in Aortic Dissection
- complicated
  - resection
  - stentgraft
    ± peripheral stents
    ± fenestration
- uncomplicated
  - INSTEAD
  - OMT + stentgraft
INSTEAD: Patient flow

597 chronic patients (> 14 days) screened for INSTEAD

293 patients refused randomization
164 patients were not eligible for INSTEAD

140 Patients were enrolled for randomization

72 Patients were randomized to OMT and TEVAR
1 Patient died before TEVAR; 1 Patient opted out for OMT
All 72 Patients included in the INSTEAD analysis

68 Patients were randomized to OMT
2 Patients opted out for TEVAR
All 68 Patients included in the INSTEAD analysis

The Medtronic Talent thoracic endograft.

**INSTEAD: Endpoints**

**Primary endpoint**
- All-cause mortality at 2 years

**Secondary endpoints**
- Thrombosis of False Lumen
- Degree of Aortic Expansion
- Cardiovascular morbidity
- Quality of life
- Lenght of ICU and hospital stay
- Crossover

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Nienaber CA et al. Circulation 2009;120:2519-2528
INSTEAD: Time from Impact to Randomization

- Mean: 10.5
- Std Deviation: 11.0
- Median: 4.43
- Minimum: 0.86
- Maximum: 34.0

- Mean: 7.45
- Std Deviation: 9.10
- Median: 3.50
- Minimum: 0.43
- Maximum: 34.0
INSTEAD: 2 years-outcomes after TEVAR in stable patients

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

Mortality (1st EP)
Landmark analysis

CV death (2nd EP)
Landmark analysis

Progression (2nd EP)

Overall
HR=0.55 (0.32 - 0.98)
p=0.041

Circulation CV Inv 2013 (in press)
Medical: Survival after acute type B aortic dissection

--- INSTEAD SG
--- INSTEAD Medical

Survival in patients with acute type B aortic dissection

Blood pressure in treated patients with acute type B aortic dissection

Longterm outcomes in IRAD

TEVAR vs. medical management of type B dissection
Remodeling after Stentgraft

Type B aortic dissection before and after TEVAR

at time of randomization  3 months after stent-graft  12 months after stent-graft

90% remodeling with TEVAR (p ≤ 0.001) after 2 years
New risk group: Partial false lumen thrombosis?

31.6% mortality @ 3 years

22.6% mortality @ 3 years

New risk group: Local Inflammation, Partial FL thrombosis, rupture?

- Partial FL thrombosis
- Expanding FL
- Ongoing metabolic activity on FDG-PET
- Rupture?
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).

Entry size: Long-term outcome of aortic dissection?

- Entry tear of aortic dissection visualized 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 tranverse 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
Long-term outcome of aortic dissection

Cumulative survival free from sudden death and surgical/endovascular treatment by entry tear size

A

Cumulative survival

(Large, >15 mm)
Long-term outcome of aortic dissection

Cumulative survival free from sudden death and surgical/endovascular treatment by entry tear pattern (size and location)
INSTEAD … at high risk!

**Primary endpoint**
- All-cause mortality at 2 years

**Secondary endpoints**
- Thrombosis of False Lumen
- Degree of Aortic Expansion
- Cardiovascular morbidity
- Quality of life
- Length of ICU and hospital stay
- Crossover

Complication according to recent criteria

Nienaber CA et al. Circulation 2009;120:2519-2528
Risk profiles of type B aortic dissection (update 2012)

Classic Criteria for complicated type B dissection:

- Total aortic diameter ≥ 5.5 mm
- Malperfusion Syndromes
- Impending rupture (extraaortic blood)
- Early false lumen expansion

Recent Criteria…

- Partial false lumen thrombosis
- Focal FDG-uptake (inflammation)
- Ongoing episodes of pain
- Intractable hypertension
- **Large entry size (> 15 mm)**

What is left as uncomplicated dissection?
Long-term Follow up of INSTEAD and type B Aortic Dissection reveals:

- Uncomplicated type B dissection is a misnomer, is not stable and medical management is not safe
- Isolation of the false lumen leads to remodeling to avoid new (late) acute scenarios
- Successful remodeling (usually completed after 2 years) ensures longterm stability
- Preemptive TEVAR in type B dissection sets the stage for remodeling and may become a therapeutic option.
Are there patients that should not be treated with TEVAR?.....may be a few!

- Stable chronic patients with complete False Lumen thrombosis (IRAD; NEJM 2007)
- Stable chronic patients with tiny entry tears (<10mm) and no FL expansion (Evangelista et al., Circulation 2012; Song et al., JACC 2007)
- Stable patients with a life expectancy of less than 2 years (INSTEAD-XL, Circulation CVInt 2013 in press)
- „Stable“ chronic dissection without FDG-uptake on PET imaging LIEGE/Rostock project (under review)
- Need for proximal arch/zone 0 debranching/consider open surgery or branched TEVAR (Bünger et al., JVS 2013 in press)
Residual dissection after open treatment of the type A dissection

Branched Stent-graft repair
• "Off pump" procedure

• Low dose heparin
  (50 IU / Kg)

• Controlled hypotension
  (MAP < 70 mmHg)
Zone 0 right aortic arch

TX2 2P 38 x 202 mm

INSTEAD-XL and IRAD-LT encourages stent-graft induced remodeling in any type B aortic dissection.
Survival in type B dissection

Kaplan-Meier Survival Curve
Dissection Type: B

Log Rank Chi-Sq p<0.001 between management types

Survival

Time from Symptom Onset (days)

0-24 hours (hyperacute) 2-7 days (acute) 8-30 days (subacute) greater than 30 days (chronic)

Endovascular Management Medical Management Surgical Management

IRAD unpublished
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).

90% remodeling after TEVAR

Subacute type B dissection -TEVAR for uncomplicated?
**INSTEAD:** TEVAR in chronic uncomplicated type B dissection?

69 y, male, acute type B 12/98, SG 9/99, uneventful F/U

**Typical INSTEAD-patient**

- initial para-graft perfusion
- delayed closure of FL
- aortic remodeling