SHOULD ALL THE TYPE B AORTIC DISSECTIONS TREATED ENDOVASCULARY

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Texas Heart Institute
Disclaimer

- Consultant: W.L.Gore and Associates and Terumo Aortic
- Travel expenses paid at the past by Medtronic and Cook Inc
DeBakey Classification of Aortic Dissection
Debate Regarding Treatment Options For Type III Aortic (Stanford B) Dissections
Late aneurysms not uncommon → rupture most common cause of late death

• 29% of all late deaths

• Late aneurysms formed in 30% of Type I and 38% of Type IIIb dissections

Survival Estimates

<table>
<thead>
<tr>
<th>Survival Estimates</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-year</td>
<td>57%</td>
</tr>
<tr>
<td>10-year</td>
<td>32%</td>
</tr>
<tr>
<td>20-year</td>
<td>5%</td>
</tr>
</tbody>
</table>
• 30% of patients came to a late intervention (essentially all for aneurysm formation) at a mean follow-up interval of just 4.5 years after their acute presentation.

• Improved late survival in patients with TBD who undergo surgery (of any type) as contrasted with those treated with medical therapy alone.
TEVAR AND ACUTE TYPE B AORTIC DISSECTION
The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC)

<table>
<thead>
<tr>
<th>Recommendations</th>
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Eur Heart J. 2014 Nov 1;35(41):2873-926
Treatment Considerations
Acute Type B (III) Aortic Dissection

Traditional Medical Trx
• Antihypertensive Therapy
• Observation and serial imaging

Annual survival rate > 80%
Tsai et al (IRAD) Circulation 2006;114:2226-2231
Endovascular Repair of Acute Uncomplicated Aortic Type B Dissection Promotes Aortic Remodelling: 1 Year Results of the ADSORB Trial

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 the proportion 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 included aneurysm, impending rupture, malperfusion. Of the 61 patients randomised, 80% were DeBakey type I. Mean age was 63 years for both groups. The left subclavian artery was revascularised in 7.7% of the cases. During the first 30 days, no deaths occurred from treatment. We compared clinical outcomes from the BMT group with those from the BMT + TAG group.

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 revascularised in 17% of the cases. During the first 30 days, no deaths occurred from treatment. We compared clinical outcomes from the BMT group with those from the BMT + TAG group.

- 1-year: another two failures in the BMT group: one malperfusion and one aneurysm formation (p = 0.056 for all)

- Remodeling with thrombosis of the false lumen (p < 0.001) and reduction of its diameter is induced by the stent graft (p < 0.001), but long term results are needed

Eur J Vasc Endovasc Surg. (2014)
Predictors of aortic growth in uncomplicated type B aortic dissection from the Acute Dissection Stent Grafting or Best Medical Treatment (ADSORB) database.

Kamman AV, Brunswall J, Verhoeven EL, Heijmen RB, Trimarchi S. ADSORB trialists

Abstract

BACKGROUND: The high-risk patient cohort of uncomplicated type B aortic dissections (uTBADs) needs to be clarified. We compared uTBAD patients treated with best medical treatment (BMT), with and without aortic growth, from the Acute Dissection Stent Grafting or Best Medical Treatment (ADSORB) trial database. Furthermore, we looked for trends in outcome for aortic growth and remodeling after BMT and thoracic endovascular aortic repair (TEVAR) and BMT (TEVAR+BMT).

METHODS: BMT patients with false lumen diameter (group II) were compared with BMT+TEVAR for 20 cm (B), 20 to 30 cm (C), and 30 cm (D) in A. The confidence interval, compared with 9.5% decreased in section vs +3.8 mm, respectively). Sections C and D showed minimal and comparable expansion in both treatment groups.

RESULTS: The dissection vessels originating from the false lumen increased confidence interval, compared with 9.5% decreased in section vs +3.8 mm, respectively). Sections C and D showed minimal and comparable expansion in both treatment groups.

CONCLUSIONS: The new imaging analysis of the ADSORB trial patients identified the number of vessels originating from the false lumen as an independent predictor of false lumen growth in uTBAD patients. Increasing age was a negative predictor of aortic growth. Our analysis may help to identify which uTBAD patients are at higher risk and should receive TEVAR or be monitored closely during follow-up.
Predictors of aortic growth in uncomplicated type B aortic dissection from the Acute Dissection Stent Grafting or Best Medical Treatment (ADSORB) database.

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METHODS: BMT patients with false lumen diameters of 0-10 cm (group I) were compared with patients treated with BMT+TEVAR for false lumen diameters of 10-20 cm (B), 20 to 30 cm (C), and 30-40 cm (D). The results are shown in the table below:

<table>
<thead>
<tr>
<th>Diameter Range</th>
<th>Treatment</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 cm</td>
<td>BMT+TAG</td>
<td>80.6%</td>
</tr>
<tr>
<td>10-20 cm</td>
<td>BMT</td>
<td>9.5%</td>
</tr>
<tr>
<td>20-30 cm</td>
<td>BMT</td>
<td>9.3%</td>
</tr>
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<td>20.6%</td>
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RESULTS: The dissection vessels originating from the true lumen were compared with 9.5% of the TEVAR group vs. 20.6% for the BMT group. Sections A and B showed minimal growth in both treatment groups.

CONCLUSIONS: The new imaging analysis of the ADSORB trial patients identified the number of vessels originating from the false lumen as an independent predictor of false lumen growth in uTBAD patients. Increasing age was a negative predictor of aortic growth. Our analysis may help to identify which uTBAD patients are at higher risk and should receive TEVAR or be monitored closely during follow-up.

Vessels originating from the false lumen are PREDICTORS for false lumen growth.
Acute Uncomplicated Type III Aortic Dissection

Various reports

Surrogates of complications and identify subgroup at risk
Acute Uncomplicated Type III Aortic Dissection

Various reports

The location of the primary entry tear in acute type B aortic dissection affects early outcome

Gabriel Weiss*, Ilse Wolner*, Sandra Folkmann, Gottfried Sodeck, Jürg Schmädl, Martin Grabenwöger*, Thien-Huynh and Martin Gramlich

CLINICAL RESEARCH STUDIES

From the Southern Association for Vascular Surgery

Predictors of intervention and mortality in patients with uncomplicated acute type B aortic dissection

Hunter M. Ray, MD, Christopher A. Durham, MD, Danie Anthony L. Estrada, MD, Charles C. Miller III, PhD, Hazim

Abstract

OBJECTIVES: The goal of the study was to identify differences in the primary entry tear size related to the clinical outcomes.

METHODS: A consecutive series of primary entry tear sizes were recorded. The presence of ventricular septal defect and the size of the primary entry tear were analyzed.

RESULTS: Of 54 patients with primary entry tears, 20% had a ventricular septal defect. The mean size of the primary entry tear was 4.3 mm (range, 1.1-7.8 mm). The size of the primary entry tear did not correlate with the presence of ventricular septal defect.

CONCLUSIONS: The presence of ventricular septal defect and the size of the primary entry tear did not affect the outcome of the patients.

Keywords: Type B aortic dissection

A New Mechanism by Which an Acute Type B Aortic Dissection is Primarily Complicated, Becomes Complicated, or Remains Uncomplicated

Christian Loewe, MD, Martin Zerny, MD, MBA, Gottfried H. Sodeck, MD, Julie Ts, MS, Maria Schoder, MD, Martin Funovics, MD, Julia Durnath, MD, Marek Ehrlich, MD, Michael Grimm, MD, and Johannes Lammer, MD

Department of Cardiovascular and Interventional Radiology, Emergency Medicine, and Cardiac Surgery, Medical University of Vienna, Vienna, Austria; Department of Cardiovascular Surgery, University Hospital Bern, Bern, Switzerland; and Department of Cardiovascular Surgery, Medical University of Innsbruck, Innsbruck, Austria

Background. This study is to evaluate if different locations of the primary entry tear result in primary complications, secondary complications, or uncomplicated acute type B aortic dissection.

Methods. Sixty-five patients with acute type B aortic dissection were included. The primary entry tear location was determined by retrospective review of medical records.

Results. Forty-one patients (63%) had primary entry tears located in the ascending aorta, 22 patients (35%) had primary entry tears located in the arch, and 2 patients (3%) had primary entry tears located in the descending aorta. Patients with primary entry tears located in the ascending aorta had a significantly higher rate of complications (p = 0.003) and a significantly higher rate of mortality (p = 0.003) compared to patients with primary entry tears located in the arch or the descending aorta.

Conclusions. The location of the primary entry tear is an important predictor of complications and mortality in acute type B aortic dissection.

Keywords: Type B aortic dissection

Endovascular or open surgical treatment of acute type B aortic dissection is performed if overt complications such as rupture, malperfusion, or persistent pain do occur [1-4]. Attempts have been made to identify predictors of early and late complications [5-7]. The location of the primary entry tear is not taken into consideration.

Material and Methods

Patients and Imaging

Initially, all patients undergoing computed tomographic (CT) follow-up or initial diagnosis of a type B aortic dissection in our hospital between 2004 and 2009 were...
Pts at risk

- primary entry tear at the concavity
- a short distance to the left subclavian artery
- An overall aortic diameter ≥44 mm
- a false lumen diameter >22 mm (measured in the proximal descending aorta)
Some experts now advocate high intensity imaging in the first 14 days to detect development of complications early in the disease course, with planned elective treatment in the subacute phase.
Complicated Type B aortic dissection
cTBAoD

Malperfusion

Rupture
Acute Complicated Type B aortic dissection
cTBAoD

Treatment options

• open surgical thoracic aortic graft replac.

High morbidity and mortality

• TEVAR was first used for patients with life-threatening complications of acute type B aortic dissection (cTBAoD) in 1990’s
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The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC)
Chronic Type B dissection
Type III Aortic Dissection (traditional nomenclature), (Virtue study)
  - Acute (0-14 days)
    • Uncomplicated, stable
    • Complicated (erg. organ ischemia, malperfusion, rupture)
  - Subacute (2 weeks-3 months)
    • Complicated/symptomatic (aortic expansion > 5.5 cm, diameter > 4.0 cm with true and false lumen patent)
  - Chronic (>3 months)
    complicated/symptomatic dissection, aortic diameter > 5.5 cm or expanding > 0.5 cm/y
Type III Aortic Dissection (Recent IRAD nomenclature)
- Hyper-Acute (24h)
- Acute (2-7 days)
- Subacute (8 days-30 days)
- Chronic (≥ 30 days)

Booher AM et al
Ideal timing of TEVAR in Type B aortic dissection should be in the subacute phase, when the aorta still has aortic plasticity, which leads to similar remodeling and survival rates compared with treatment in the acute setting.
Chronic Type B dissection

Uncomplicated Chronic Type B Aortic Dissection

- Selection Criteria
  - All randomized controlled trials
  - Stenting adjunctive to best medical therapy versus best medical treatment alone
  - A single trial fulfilled the criteria (INSTEAD TRIAL)
Chronic Type B dissection

INvestigation of STEnt grafts in patients with type B Aortic Dissection: Design of the INSTEAD trial - a prospective, multicenter, European randomized trial

Christoph A. Nienaber, MD, Simona Zannetti, MD, Barbara Barbari, MD, Stephan Kische, MD, Wolfgang Schareck, MD, and Tim C. Rehders, MD, on behalf of the INSTEAD study collaborators
Rostock, Germany, and Maastricht, The Netherlands

Circulation

Randomized Comparison of Strategies for Type B Aortic Dissection: The Investigation of STEnt Grafts in Aortic Dissection (INSTEAD) Trial

Christoph A. Nienaber, Hervé Rosseau, Holger Eggebrecht, Stefan Perka, Rossella Fattori, Günther Kundi, Dirk Scheufer, Martin Czerny, Tilo Kleinfeldt, Burkhard Zipfel, Louis Labrousse and Huseyin Ince

Circulation. 2009;120:2513-2514; originally published online December 7, 2009; doi: 10.1161/CIRCULATIONAHA.109.986408

Seminars in Vascular Surgery

Influence and Critique of the INSTEAD Trial (TEVAR Versus Medical Treatment for Uncomplicated Type B Aortic Dissection)

Christoph A. Nienaber, MD, PhD
There is a **survival advantage of intervention over medical therapy which became evident after 2 years of follow-up (5 y follow up)**

The treatment of aneurysms on the basis of chronic type B dissections should be discussed in a multidisciplinary team approach, considering TEVAR versus open surgery.

Position statement from Europe EACTS, ESC, EAPCI

Grabenwoger et al: EACTS 42 (2012)
Outcomes of thoracic endovascular aortic repair for chronic aortic dissections.

Conway MA, Qato K, Mondry LR, Stoffels GJ, Giangola G, Carroccio A.

Abstract

BACKGROUND: Open surgical repair remains the "gold standard" treatment for thoracic endovascular aortic repair (TEVAR) has gained popularity in recent years. The Vascular Quality Initiative (VQI) database is a large, prospective, multicenter registry that has collected data on TEVAR procedures. We assessed the effectiveness of TEVAR in the treatment of cTBD.

METHODS: The VQI registry identified 4713 patients treated with TEVAR. We analyzed TEVAR outcomes in this cohort per the Society for Vascular Surgery (SVS) guidelines.

RESULTS: Median age was 65.0 years (interquartile range [IQR], 56.0-72.0 years), and 85 (68.0%) were male. Median aneurysm diameter was 5.5 cm (IQR, 4.8-6.3 cm). Sixty-two (49.6%) patients presented with rupture. Median length of stay was 25.6 minutes. The distal landing zone was aortic zone 2 in 123 (98.4%) patients. Conversion to open repair occurred in one (1.6%), type Ia endoleak in two (1.6%), and type Ib endoleak in three (2.4%) patients. Reintervention was performed in 21 (16.9%) patients. Extent of stent graft coverage did not affect sac shrinkage (P = .65). Patients with aneurysms ≥5.5 cm compared with <5.5 cm were more likely to demonstrate shrinkage (-0.6 cm vs 0.0 cm; 95% confidence interval, 0.3-11.7; P = .04).

CONCLUSIONS: TEVAR for cTBD may be performed with acceptable rates of morbidity and mortality. Changes in sac diameter in the midterm are promising. Long-term data are needed to determine whether this approach is durable.

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PMID: 29157682 DOI: 10.1016/j.jvs.2017.08.098

Vascular Quality Initiative (VQI) database
Retrospective analysis

125 patients: 49.6% asymptomatic, 50.4% symptomatic
TEVAR can be performed safely with reasonable rates of aneurysm sac shrinkage at a median of 8 months.
Open repair of the enlarged dissected aorta remains the best option for good-risk patients and patients with connective tissue disorders in high-volume centers with respective expertise.

Endovascular management of chronic type B aortic dissection with postdissection aneurysms has significantly gained ground in the past years.
### Chronic Type B Aortic Dissection

#### Outcome data after TEVAR
- 22 studies
- 1098 pts
- Early mortality: 6.6%
- Early stroke: 1.9%
- Early SCI: 1.5%
- 5 year survival: 77-84%
- Freedom reinterv: 83% 1 y, 72% 3 y

#### Outcome data after Open
- 3 studies
- 177 pts
- Early mortality: 8.0%
- Early stroke: 5.7%
- Early SCI: 5.5%
- 5 year survival: 68-92%
- Freedom reinterv: 99% 1 y

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Chronic Type I and Type III aortic dissections: a propensity analysis of outcomes after open distal repair

Ouraia Preventza, Matt D Price, Hiruni S Amarasekara, Adam Tullos, Peter Chen, Michael R Reidy, Gregory Pattakos, Kim I de la Cruz, Qianzi Zhang, Joseph S Coselli

European Journal of Cardio-Thoracic Surgery, ezy039,
https://doi.org/10.1093/ejcts/ezy039
Published: 02 March 2018   Article history ▼

OBJECTIVES
To compare short-term outcomes, long-term survival and reinterventions in patients requiring surgery after chronic Type I and chronic primary Type III aortic dissections.

METHODS
Over an 11-year period, 466 patients underwent thoraco-abdominal aortic aneurysm repair for chronic Type III (n = 239) and Type I (n = 227) aortic dissections. Short-term outcomes and reinterventions were evaluated by multivariable regression analysis for the entire group; propensity matching produced 169 pairs.

RESULTS
Mortality was 6% (n = 28) in the overall cohort and 6.2% (n = 14) and 5.9% (n = 14) in those with chronic Type I and Type III aortic dissections, respectively.
Chronic Type I and Type III Aortic Dissection: Propensity Analysis of Contemporary Outcomes After Open Distal Repair

Methods

• 11 yr period
• 466 pts with distal aortic dissection
  – 37.1% Crawford extent I

Preventza, Coselli and al: EJCTS 2018
Chronic Type I and Type III Aortic Dissection: Propensity Analysis of Contemporary Outcomes After Open Distal Repair

Methods

- 11 yr period
- 466 pts with distal aortic dissection
  - 37.1% Crawford extent I
  - 48.3% Crawford extent II

Preventza, Coselli and al: EJCTS 2018
Chronic Type I and Type III Aortic Dissection: Propensity Analysis of Contemporary Outcomes After Open Distal Repair

Methods

• 11 yr period
• 466 pts with distal aortic dissection
  – 37.1% Crawford extent I
  – 48.3% Crawford extent II
  – 9.2%  Crawford extent III
Chronic Type I and Type III Aortic Dissection: Propensity Analysis of Contemporary Outcomes After Open Distal Repair

Methods

• 11 yr period
• 466 pts with distal aortic dissection
  – 37.1% Crawford extent I
  – 48.3% Crawford extent II
  – 9.2% Crawford extent III
  – 5.4% Crawford extent IV

Preventza, Coselli and al: EJCTS 2018
Chronic Type I and Type III Aortic Dissection: Propensity Analysis of Contemporary Outcomes After Open Distal Repair

<table>
<thead>
<tr>
<th>Short term complications</th>
<th>Overall (n=466)</th>
<th>Chronic Type I dissection (n=227)</th>
<th>Chronic Type III dissection (n=239)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative death</td>
<td>28 (6.0)</td>
<td>14 (6.2)</td>
<td>14 (5.9)</td>
<td>0.99</td>
</tr>
<tr>
<td>Overall stroke</td>
<td>12 (2.6)</td>
<td>9 (4.0)</td>
<td>3 (1.3)</td>
<td>0.12</td>
</tr>
<tr>
<td>Permanent spinal cord isc</td>
<td>15 (3.2)</td>
<td>6 (2.6)</td>
<td>9 (3.8)</td>
<td>0.67</td>
</tr>
<tr>
<td>Composite adverse event</td>
<td>53 (11.4)</td>
<td>25 (11.0)</td>
<td>28 (11.7)</td>
<td>0.93</td>
</tr>
</tbody>
</table>
Chronic Type I and Type III Aortic Dissection: Propensity Analysis of Contemporary Outcomes After Open Distal Repair

Long-term Outcomes and Reinterventions

Preventza, Coselli and al: EJCTS 2018
Chronic Type I and Type III Aortic Dissection: Propensity Analysis of Contemporary Outcomes After Open Distal Repair

<table>
<thead>
<tr>
<th>LONG TERM INTERVENTION</th>
<th>Overall 466</th>
<th>Type I 227</th>
<th>Type III 239</th>
<th>p</th>
<th>Propensity Type I</th>
<th>Propensity Type III</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsequent open distal repair</td>
<td>9 (1.9) 0</td>
<td>5 (2.2)</td>
<td>4 (1.7)</td>
<td>0.94</td>
<td>2 (1.2)</td>
<td>3 (1.8)</td>
<td>0.99</td>
</tr>
<tr>
<td>Subsequent endovascular distal repair</td>
<td>13 (2.8) 0</td>
<td>7 (3.1)</td>
<td>6 (2.5)</td>
<td>0.93</td>
<td>6 (3.6)</td>
<td>3 (1.8)</td>
<td>0.50</td>
</tr>
</tbody>
</table>
Chronic Type III Dissecting Aneurysm

41 y old Symptomatic
Chronic Type III Dissecting aneurysm

41 y old symptomatic
Conclusion

• These are exciting times in the application of TEVAR for patients with TBD

• “High Risk features acute dissection ” (FL>22 mm, aortic diameter >44 mm, primary entry tear at the concavity, entry size>10mm )

  —MAY JUSTIFY PROACTIVE USE OF PROPHYLACTIC TEVAR TO AVOID LATE COMPLICATIONS
Thank You!

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MICHAEL E. DEBAKEY
DEPARTMENT OF SURGERY

St. Luke’s Texas Heart Institute