Is there a way to predict the risk in uncomplicated Type B aortic dissections?

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Disclosures:

- Consultant Philips Health Care
- Best Doctors
Overview

• “Uncomplicated” type B aortic dissection (TBAD)?

• Incidence and predictors of in-hospital complications

• Predictors of aortic growth

• Optimal management of chronic TBAD
“Uncomplicated” type B aortic dissection

- Uncomplicated TBAD defined as freedom from:
  - Persistent or recurrent pain
  - Uncontrolled hypertension
  - Early aortic expansion
  - Malperfusion (renal, visceral, limb)
  - (Impending) rupture

- Complicated TBAD $\rightarrow$ TEVAR (or open surgical..)

- Uncomplicated TBAD $\rightarrow$ medical therapy (MT)
Medical therapy for uncomplicated TBAD

- Medical management has acceptable outcomes
  - In-hospital mortality of about 10%

- However....
  - Survival rates 48% to 82% after 5 years
  - Large percentage of late mortality is aorta-related
  - Aneurysmal degeneration in about 30-40% after 5 years
Medical therapy: Still ideal solution?

- Should we be more aggressive with using TEVAR?

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>In uncomplicated Type B AD, medical therapy should always be recommended.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>In uncomplicated Type B AD, TEVAR should be considered.</td>
<td>IIa</td>
<td>B</td>
</tr>
</tbody>
</table>

- Subcohort does not show aneurysmal degeneration
  - Subjected to TEVAR risks (retrograde dissection, endoleaks)

- Better patient selection and risk stratification
Known high-risk features of complications and/or growth

• Large diameter of proximal Entry Tear
• Partial false lumen thrombosis
• Number of entry tears
• Saccular false lumen formation
• Circular false lumen formation
Incidence and Predictors of In-hospital Complications in Initially Uncomplicated Acute Type B Aortic Dissections

Kamman et al. short title: In-hospital complications in type B dissection

Arnoud V. Kamman123, MD, Alan C. Braverman6, MD, Eduardo Bossone5, MD, PhD, Toru Suzuki6, MD, PhD, Reed E. Pyeritz7, MD, PhD, Kevin M. Harris8, MD, Hans-Henning Eckstein9, MD, PhD, Thomas G. Gleason10, MD, Gilbert R. Upchurch11, MD, Himanshu J. Patel2, MD, Dan G. Montgomery2, BS, Eric M. Isselbacher12, MD, Christoph A. Nienaber13, MD, PhD, Kim A. Eagle2, MD, Santi Trimarchi1, MD, PhD

Submitted to Circulation
Methods (1)

- **Goal:** To investigate incidence and predictors of in-hospital complications in initially uncomplicated TBAD patients

- **Method:** All initially uncomplicated TBAD patients from IRAD
  - Uncomplicated defined as freedom from periaortic hematoma, shock, hypotension, malperfusion, refractory hypertension/pain, pulse deficits, spinal cord ischemia and in-hospital mortality
Methods (2)

• Divided in 2 groups based on occurrence of complications
  • Incidence of in-hospital complications
  • Univariate and multivariate analyses to identify predictors

• 344 initially uncomplicated patients eligible for study
  • 46 (13.4%) developed complications
  • 298 (86.6%) remained stable
Results (1): Incidence

Incidence of in-hospital complications after acute uncomplicated type B aortic dissection (13.4%)

- Extension of dissection: n=23 (50%)
- Hypotension: n=2 (4%)
- Rupture: n=9 (20%)
- Limb ischemia: n=8 (17%)
- Transient Neurological Deficit: n=3 (7%)
- CVA: n=1 (2%)
Results (2): Multivariate analysis

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
<th>95% C.I. for EXP(B)</th>
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</thead>
<tbody>
<tr>
<td>Step 1a</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>z_BMI</td>
<td>.090</td>
<td>.041</td>
<td>4.839</td>
<td>1</td>
<td>.028</td>
<td>1.094</td>
<td>1.010 - 1.186</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.587</td>
<td>1.320</td>
<td>12.075</td>
<td>1</td>
<td>.001</td>
<td>.010</td>
<td></td>
</tr>
</tbody>
</table>

Universiteit Medisch Centrum Utrecht
Conclusion

• Incidence of in-hospital complications 13.4% in IRAD database

• Most common: Extension of dissection, hypotension and limb ischemia

• Higher BMI predictor of such an evolution
Predictors of Aortic Growth in Uncomplicated Type B Aortic Dissection: Insights from the ADSORB database

A. Kamman\textsuperscript{ab}, J Brunkwall\textsuperscript{c}, EL Verhoeven\textsuperscript{d}, RH Heijmen\textsuperscript{e} and S. Trimarchi\textsuperscript{a}

Submitted to Journal of Vascular Surgery
The ADSORB trial

- Only randomized trial comparing TEVAR (n=30) versus TEVAR+BMT (n=31) for uncomplicated TBAD
  - Results up to 1-year follow-up

- Primary endpoint freedom from:
  - Incomplete or no false lumen thrombosis
  - Aortic dilatation of 5 mm or max diameter descending thoracic aorta 55 mm
  - Aortic rupture

- Initial results published in 2014

Endovascular Repair of Acute Uncomplicated Aortic Type B Dissection Promotes Aortic Remodelling: 1 Year Results of the ADSORB Trial

J. Brunkwall *, P. Kasprzak †, E. Verhoeven *, R. Heijmen ‡, P. Taylor §, the ADSORB Trialists *
Goal: To identify predictors of aortic growth in uncomplicated TBAD

BMT patients with available CT-scan at 1-year identified
- Baseline and 1-year diameter measurements at multiple levels
- False lumen patency in different aortic segments

Two separate analyses
- False lumen growth
- Total aortic diameter increase
## Results (1): Multivariate analysis false lumen growth

### Final model for false lumen growth

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of vessels coming off the false lumen</td>
<td>22.1</td>
<td>(1.01-481.5)</td>
<td>0.049</td>
</tr>
<tr>
<td>Number of patent false lumen thrombosis segments</td>
<td>2.76</td>
<td>(0.93-8.16)</td>
<td>0.066</td>
</tr>
</tbody>
</table>
Results (1): Multivariate analysis total lumen increase

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.902</td>
<td>(0.813-1.00)</td>
<td>0.0502</td>
</tr>
</tbody>
</table>
Conclusion

- Number of vessels originating from the false lumen predictor of false lumen growth

- Higher age negative predictor of aortic growth
• We defined uncomplicated TBAD...

• We determined high-risk features...

• What about patients that need invasive treatment during follow-up?
Contemporary Management Strategies for Chronic Type B Aortic Dissections: A Systematic Review.

Kamman AV, de Beaufort HW, van Bogerijen GH, Nauta FJ, Heijmen RH, Moll FL, van Herwaarden JA, Trimarchi S.
• Open surgery (OSR)?
• TEVAR?
• Branched/fenestrated grafts (B/FEVAR)?

• TEVAR is less invasive....
  • anatomical restraints
  • technically more challenging during chronic phase

• Open surgery is more invasive....
  • no anatomical restraints
  • more durable

GOAL:
To determine ideal strategy for chronic TBAD management
Methods (1)


- Primary endpoints:
  - Early mortality (30-day)
  - One-year survival
  - Five-year survival

- Secondary endpoint:
  - Occurrence of complications (aortic, cardiac, reinterventions)
Methods (2): Search results

- Records through database searches (MEDLINE and EMBASE) n=702
- Articles through other sources (cross-referencing) n=4

Articles after duplicated removed n=583

- Articles screened n=583
- Articles excluded n=404

Full text articles assessed n=75

- Articles excluded (n=40) because:
  - Mixed population n=20
  - No original data n=13
  - Double data n=8
  - New technique n=1

- Articles for quantitative analysis n=35
Results (1): Patient details

- **OSR cohort (n=1081)**
  - Mean age $58.2 \pm 3.8$ years
  - Follow-up 34 months - 102 months

- **TEVAR cohort (n=1397)**
  - Mean age $59.4 \pm 4.2$ years
  - Follow-up 12 - 90 months

- **(B/FEVAR cohort (n=61))**
  - Mean age $65.7 \pm 8.0$ years
  - Follow-up 17 months - 20.4 months
Results (2): Mortality/Survival

• Early mortality:
  • OSR  5.6% to 21.0%
  • TEVAR  0.0% to 13.7%

• One-year survival:
  • OSR  72.0%-92.0%
  • TEVAR  82.9%-100.0%

• Five-year survival:
  • OSR  53.0%-86.7%
  • TEVAR  70.0%-88.9%
Results (3): Reinterventions

- OSR: 5.8% - 29.0%
- TEVAR: 4.3% - 47.4%

Type of reintervention
- OSR: Another open procedure
- TEVAR: Mostly endovascular
Conclusion

- Limited early survival benefit of standard TEVAR over OSR

- Reintervention rate slightly higher after TEVAR

- Optimal therapy remains debatable:
  - Patient specific decision based on anatomy, life expectancy and general patient condition

- Initial experiences with B/FEVAR show feasibility, larger studies needed
Take-home messages/Discussion

• Uncomplicated type B dissection exists

• TEVAR for ALL uncomplicated TBAD will result in unnecessary risks
  • Not all become complicated!

• Ongoing effort for improved risk stratification remains important

• Current predictors and high-risk features based on simple CT/MRI measures
  • Novel predictors and better understanding of underlying disease processes needed
Is there a way to predict the risk in uncomplicated Type B aortic dissections?

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