Type B Aortic Dissection

**TEVAR Will Be Required In Most Patients?**

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Type B Aortic Dissections – The Past

• Overall Open Surgical Repair
  • Mortality >30% (IRAD)

• Overall Medical Therapy
  • In Hospital Mortality >10% (IRAD)

• Complicated TBAD: 30%
  • Visceral Malperfusion
  • Aneurysmal degeneration

• Uncomplicated TBAD: >70% of cases
Complicated Type B Aortic Dissections – The Past

- Open surgical repair was primary treatment
  - Significant morbidity & mortality > 40%

- TEVAR evolution
  - Significant reduction in overall morbidity & mortality

- TEVAR is already considered to be the gold standard for complicated TBAD
Uncomplicated Type B Aortic Dissections – The Past

- Optimal Medical Treatment (OMT) was the gold standard
Uncomplicated Type B Aortic Dissections – The Present

- Our definitions of uncomplicated TBAD is evolving, and now includes anatomic variables.
Partial Thrombosis of the False Lumen in Patients with Acute Type B Aortic Dissection

Thomas T. Tsai, M.D., M.Sc., Arturo Evangelista, M.D., Christoph A. Nienaber, M.D., Truls Myrkel, M.D., Gabriel Meinhardt, M.D., Jeanna V. Cooper, M.S., Dean E. Smith, Ph.D., Toru Suzuki, M.D., Rossella Fattori, M.D., Alfredo Llovet, M.D., James Froehlich, M.D., Stuart Hutchison, M.D., Alessandro Distante, M.D., Thoralf Sundt, M.D., Joshua Beckman, M.D., James L. Januzzi, Jr., M.D., Eric M. Isselbacher, M.D., and Kim A. Eagle, M.D., for the International Registry of Acute Aortic Dissection
### Partial False Lumen Thrombosis Associated with Increased Mortality


<table>
<thead>
<tr>
<th>Variable</th>
<th>Hazard Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥70 yr</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>Female sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endovascular treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous aortic aneurysm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atherosclerosis§</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Patent false lumen¶</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Partial thrombosis of the false lumen</td>
<td>2.69 (1.45–4.98)</td>
<td>0.002</td>
</tr>
<tr>
<td>Complete thrombosis of the false lumen</td>
<td>1.02 (0.32–3.22)</td>
<td>0.98</td>
</tr>
</tbody>
</table>
High Risk Uncomplicated TBAD – Lessons Learned

Figure 1. Kaplan–Meier Mortality Curve Stratified According to the Status of the False Lumen.

P values were calculated by the log-rank test. Overall denotes comparison of all three curves.

High Risk Uncomplicated TBAD – Lessons Learned

• False Lumen Entry Tear ≥ 10 mm: Associated with increased mortality
High Risk Uncomplicated TBAD – Lessons Learned

• Initial False Lumen Diameter $\geq 22$ mm: Associated with increased mortality
High Risk Uncomplicated TBAD – Lessons Learned

• Initial Total Aortic Diameter $\geq 40$ mm: Associated with increased mortality
High Risk Uncomplicated TBAD – Lessons Learned

• Proximal Entry Tear Location: Concave entry tear associated with increased complications
High Risk Uncomplicated TBAD – Lessons Learned

• Proximal Entry Tear Location: Concave entry tear associated with increased complications
Uncomplicated TBAD – Natural History

• Most common problem remains late aneurysmal dilatation & rupture; reported >30%.
  • DeBakey et al. Surgery 1982;92:1118-34

• Intervention free survival only 63% at 5 years
  • Afifi et al. Circulation 201;132(8):748-754

• Intervention free survival only 41% at 6 years

• TBAD OMT survival 60-75% at 3-5 years
  • Tsai et al. Circulation 2006;114(21):2226-2231
TEVAR for TBAD – What Are We Trying To Accomplish?

• Cover the entry tears
• Restore flow to the true lumen
• Prevent dissection extension
• Discontinue flow to the false lumen
• Depressurize the false lumen
• Promote false lumen thrombosis
• Promote aortic remodeling
TEVAR for TBAD – Past, Present, and Future

• Initially we thought covering entry tear might be enough.
• Over time we realized dissections are dynamic and best outcomes result from false lumen thrombosis & depressurization, and the resultant aortic remodeling.
• This was not common practice when patients were enrolled in RCTs (INSTEAD, ADSORB, etc.)
• Best TEVAR practice of today was not utilized in managing patients enrolled in RCTs
• … With that said, lets look at the data….
INSTEAD- XL Trial

TEVAR vs OMT at 5 years

- All cause mortality:
  - TEVAR 11.1% vs. OMT 19.3% ($p<0.01$)

- Aortic specific mortality:
  - TEVAR 6.9% vs. OMT 19.3% ($p<0.01$)

- Dissection progression:
  - TEVAR 27.0% vs. OMT 46.1% ($p<0.01$)

- False lumen thrombosis:
  - TEVAR 90.6% vs. OMT 22.0% ($p<0.01$)
Compared TEVAR+OMT with OMT for acute uncomplicated TBAD

- No difference in early mortality (0%)

- TEVAR+OMT patients had better aortic remodeling & lower incidence of incomplete false lumen thrombosis (43%) vs. those with OMT only (97%)
IRAD – Survival After TBAD Based on Treatment

For All Comers

- Technical success of TEVAR for TBAD ranges between 93% - 100%

- Longterm survival best in TEVAR vs. OMT vs. Surgical Repair
There is a paradigm shift in our understanding of all aortic dissections.

Uncomplicated TBAD fall into 2 categories:

- **High risk uncomplicated TBAD**
  - Partial false lumen thrombosis
  - Entry tear ≥ 10 mm
  - False lumen maximum diameter ≥ 22 mm
  - Total aortic maximum diameter ≥ 40 mm
  - Concave shape dissection entry tear

- **Low risk uncomplicated TBAD**
  - The few remaining dissections…

Vast Majority of TBAD
Uncomplicated TBAD – The Future

• Endovascular techniques & technology continue to improve.

• Contrast enhanced MRI is adding to our understanding of flow dynamics in the true and false lumen. This also introduces new high risk predictors in uncomplicated TBAD that were not recognized in the past.

• Catheter based interventions such as septotomy and false lumen embolization are focused on achieving false lumen thrombosis and aortic remodeling, rather than simply covering the dissection entry tear.
Uncomplicated TBAD – The Future

TBAD Survivors: Activity, Mental Health & Sexual Function

- OMT mandates well regulated HTN control which is difficult to achieve (non-compliance & intolerance), and likely the reason for TBAD patient readmissions and increased need for secondary interventions.

- Patient psycho-somatic factors will influence their decision. Depression, inability to engage in regular exercise and daily activities, sexual dysfunction, etc. will play a major role in their decision making, specially as techniques & technology improve.

Uncomplicated TBAD – The Future

• It is likely that the vast majority of uncomplicated dissections will be categorized as HIGH RISK UNCOMPLICATED requiring TEVAR to prevent long-term aortic related morbidity and mortality.

• The question in the near future will not necessarily be if uncomplicated TBAD should have TEVAR, rather WHEN should TBAD undergo TEVAR – in acute vs. subacute vs. chronic settings.
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