Uncomplicated Type B Aortic Dissection

- Medical therapy is still an effective means of management.
- Early TEVAR treatment may confer long term survival benefit.
- Prospective randomized trials demonstrating the benefits of TEVAR...
In this study the survivors of type B aortic dissection, TEVAR in addition to optimal medical treatment is associated with improved 5 years/aortic specific survival and delayed disease progression. In stable type B dissection TEVAR should be considered to improve late outcome.
Uncomplicated acute dissection can be safely treated with endograft remodeling with thrombosis of the false lumen and reduction of its diameter.
The Challenges?

- Identify high risk groups

- Utilize early physiologic and anatomic markers may allow us to hone in to patients who truly are destined to fail medical therapy.
Heart Rate & BP Control

• SBP < 120 mmHg
• HR < 60 BPM

Improved Outcomes:
• Decreased Growth
• Decreased aortic events

Implications for Pt’s difficult to control.
Entry Tear Anatomy

- Examined
- # of Entry tears
- Location of entry tears
- Significant Aortic growth
- 1 visible entry tear on presentation CTA
- Location of Entry tear yielded no difference in growth
False Lumen Anatomy

Aortic Growth
- Patent False lumen
- Primary entry tear
  \[ \geq 10 \text{ mm} \]

Patients may benefit early TEVAR
BioMarkers

Serologic examination
• D-dimer, FDP, Platelets, Antithrombin III, C-Reactive protein.
• FDP $\geq 20$ ug/ml
  – Associated with Aortic Growth
Other Predictors of Growth

- Initial Trans-aortic Diameter $\geq$ 40mm
- Initial false lumen diameter $\geq$ 22mm
- Primary entry tear location - inner curvature
- Elliptical TL and round FL configuration
# PREDICTORS OF AORTIC GROWTH TYPE B DISSECTION

## Table II. Summary of the predictors of aortic growth in uncomplicated type B aortic dissection

<table>
<thead>
<tr>
<th>Variable</th>
<th>Predictor</th>
<th>Negative predictor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient characteristics</td>
<td>Age &lt;60 years</td>
<td>Increasing age (≥60 years)</td>
</tr>
<tr>
<td></td>
<td>White race</td>
<td>Heart rate &lt;60 beats/min</td>
</tr>
<tr>
<td></td>
<td>Heart rate ≥60 beats/min</td>
<td>Use of calcium channel blockers</td>
</tr>
<tr>
<td>Medical history</td>
<td>Marfan syndrome</td>
<td></td>
</tr>
<tr>
<td>Clinical information</td>
<td>FDP level ≥20 μg/mL on admission</td>
<td>Diameter &lt;40 mm (debated)</td>
</tr>
<tr>
<td>Blood test</td>
<td>Aortic diameter ≥40 mm during acute phase</td>
<td>Closed/thrombosed FL</td>
</tr>
<tr>
<td>Radiologic signs</td>
<td>Patent FL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Partially thrombosed FL (debated)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proximal descending thoracic aorta FL diameter (≥22 mm) on initial imaging</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sac formation in partially thrombosed FL</td>
<td>Intramural hematoma</td>
</tr>
<tr>
<td></td>
<td>One entry tear</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FL/intimal tear located at the inner aortic curvature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>An elliptic configuration of the TL/round configuration FL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Areas with localized dissection/ULP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Degree of fusiform dilatation of the proximal descending aorta (FI ≤0.64)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large entry tear (≥10 mm) located in the proximal part of the dissection</td>
<td>FI &lt;0.64</td>
</tr>
</tbody>
</table>

*FDP, Fibrinogen-fibrin degradation product; FL, fusiform index; TL, true lumen; UL, ulcer-like projection.*
DETECTING PROXIMAL ENTRY

Invasive Contrast-Angiogramm  Non-invasive MR-Angiogramm
PREDICTORS OF AORTIC GROWTH TYPE B DISSECTION
Understanding the Concept of Endovascular Repair in Dissection

- Closure of the proximal entry tear
- Depressurization of the false lumen
- Thrombosis of FL
- Redirection of blood flow towards TL
- Induction of "aortic remodeling" - proximal 95%, distal 45%

Feasibility of EVAR is proven!
Complicated Surgical Treatment

TEVAR is now the gold standard for patients with amenable anatomy.

Multiple options for repair:
- Standard TEVAR
  - Proximal entry tear coverage
- Petticoat Technique
  - Distal Bare stent support

SHOULD WE TREAT ALL TYPES OF B DISSECTION??

HOW??

- Mal-perfusion
- Rupture
- Early Growth
- Persistent HTN
- Persistent pain
HOW MUCH DO WE KNOW OF THE AORTA TO COVER IN DESSECTION?
THE BAD NEWS
RUPTURE PREVENTION

FATAL RUPTURE

KAT 98: 1/6 PTS
DAKE 99: 2/19 PTS
FATTORI 06: 2/37 PTS
DUEBNER 04: 1/10 PTS

STENT-GRAFTING MAY BE HELPFUL BUT NOT ALWAYS WORKS.
STENT GRAFT – TYPE B DISSECTION

  Stent-graft – acute dissection
  Stent-graft – chronic dissection
STENT GRAFT-TYPE B DISSECTION

...STENT GRAFTS ARE EFFECTIVE FOR: CLOSING ENTRY SITE / PROMOTING THROMBOSIS 86-100% OF PTS

ONE CAN HOPE TO CURE THE PATIENT OF DISSECTION IN SUCH CASES

STUDIES RESULTS:

- Stent-grafting of acute type B dissections may represent a very effective and promising new method by closure of the primary entry tear, thereby minimizing the risk of rupture of the thoracic aorta and optimizing distal perfusion by decompression of the true lumen.

- Early and mid-term results showed that endovascular repair was effective in treatment of acute type B aortic dissection. With the enrichment of doctors’ experience and refinement of the device, better results are expected in the future.

- Aortic dissection with persistent patent false lumen carries a high risk of complications. In addition to Marfan syndrome and aorta diameter, a large entry tear located in the proximal part of the dissection identifies a high-risk subgroup of patients who may benefit from earlier and more aggressive therapy.

SHOULD WE TREAT ALL TYPES OF B DISSECTION??

HOW??
Induced Aortic Remodeling after Stent-graft

- Completely reconstructed acute dissection
- Relief of infra-renal true lumen
Induced Aortic Remodeling after Stent-graft

- Progressive shrinkage of false lumen thrombus mass
Recognizing Asymptomatic Complications in Type B Dissection

- Dissection extends into Distension of the false lumen branch artery compresses true lumen

Imminent malperfusion
Sustained Malperfusion after Thoracic Stentgraft

Dynamic true lumen collapse

Dynamic branch vessel occlusion
Sustained Mal perfusion after Thoracic Stentgraft

Modes of Obstruction

Static

Dynamic

Both
Becoming an Emergency Indication with Late Malperfusion

Dissection related Malperfusion  Revascularisation after Stentgraft
Still a significant growth rate among treated dissections.

Peri-visceral aorta is the most prone to expansion and the most difficult area to treat.

Secondary interventions among treated dissections can be as high as 30% for expansion.
STENT GRAFT TYPE B DISSECTION
RELIEF OF ISCHEMIA

DAKE 99 : 5/11 PTS
CZERMAK 00 : ½ PTS
DUEBNER 04 : 2/10 PTS

REQUIRED TL STENTING/
FENESTRATION /SURGERY FOR
PERSISTENT ISCHEMIA

STENTGRAFTING MAY BE HELPFUL BUT NOT ALWAYS REALIABLE
The PETTICOAT Concept

- Provisional Extension with Customized distal bare metal stent distal to thoracic stentgraft

Dual Component System
STABLE I & II

Zenith® TX2® Endovascular Graft

Zenith® Dissection Endovascular Stent

Preoperative
Device
Postoperative
Petticoat
Pre and Post-op CTA

Petticoat
Pre and Post-op CTA
STENT GRAFT-TYPE B
DISSECTION
WHAT ABOUT PETTICOAT

Nienaber et al: J Endovasc Ther 2006
STENT GRAFT+BMS
TYPE B DISSECTION

- STABLE TRIAL (N=40)
- LOMBARDI ET AL ; J VASC SURG 2012

<table>
<thead>
<tr>
<th>PATIENTS N</th>
<th>MORTALITY (30 D)</th>
<th>RUPTURE</th>
<th>STROKE/PARAPLEGIA</th>
<th>RETROGRADE TYPE A</th>
<th>SECOND INTERV.</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2 (5%)</td>
<td>2(5%)</td>
<td>4(10%)</td>
<td>2(5%)</td>
<td>4(10%)</td>
</tr>
</tbody>
</table>

CONCLUSION:

SIGNIFICANT INCREASE IN TL SIZE & PERCENTAGE OF COMPLETELY THROMBOSED FL.

SIGNIFICANT PERCENTAGE DECREASE OF PATENT FL IN THE ABDOMINAL AORTA
STENT GRAFT+BMS
TYPE B DISSECTION

TO WHICH LEVEL SHOULD WE STENT?

Lombardi et al; J Vasc Surg 2012 (n=40)

39/40 RECEIVED AT LEAST ONE BMS

Melissano et al; J Vasc Surg 2012 (n=25)

AVERAGE STENTGRAFT COVERAGE 186MM/MAIN BMS COVERAGE 149MM
CONCLUSION

TEVAR REMAINS GOLD STANDARD
LONGTERM GROWTH / BRANCH ISCHEMIA STILL AN ISSUE
PETTICOAT TECHNIQUE HAS FAVORABLE EARLY RESULTS AND OFFERS LONG TERM MANAGEMENT OPTIONS