Does standard surgical repair of Debakey Type I Dissection alter true lumen geometry downstream?

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Background

Debakey Type 1 Dissections involve the Ascending, Descending and Abdominal Aorta

Collapsed (small) true lumen distally is thought to be a risk factor:

- acutely malperfusion
- long term aneurysm formation
Open distal anastomosis (Hemi-Arch) current gold standard for arch management in acute Debakey Type 1 Dissection
What happens to the TL in the descending aorta after “Hemi-Arch” anastomosis for acute Debakey Type 1 Dissection?

Objective:
Methods

Retrospective review of acute Type A Aortic Dissections at a single tertiary care centre from 2006 -2013

Identified 128 Stanford Type A Dissections
Inclusion Criteria:
  DeBakey Type I Aortic Dissections
  Open surgery with sternotomy, hemiarch replacement under circulatory arrest +/- root replacement

Exclusion Criteria
  Incomplete pre-op and post-op CT imaging
  DeBakey Type 2 Dissection
  IMH
  Hybrid/Total Arch Repairs
Methods

TeraRecon® multiplanar reconstruction software to obtain true short axis view

Preoperative and First postoperative studies

Measurement of cross sectional area of true and false lumen of descending aorta at three levels:
   - Left subclavian artery
   - Pulmonary artery bifurcation
   - Diaphragmatic hiatus
Methods

Manually trace outline of TL & FL

NB:
Most aortic studies are based on max diameter
Not dependable due to irregular shapes of lumen in dissected aorta

Cross sectional area more accurate and reproducible
Multiplanar reconstruction to measure true cross sectional surface area.
Results

128 patients underwent operative repair.

Inclusion criteria met by 45 patients (34 males and 11 females)

Mean age: 56 (range 26-79).

Median interval between scans was 11 days.
## Descending aorta

<table>
<thead>
<tr>
<th>Proximal</th>
<th>Mid</th>
<th>Distal</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>True lumen(cm²)</td>
<td>True:Total ratio</td>
<td>True lumen(cm²)</td>
</tr>
<tr>
<td>Pre-op</td>
<td>3.24 (1.44-4.94)</td>
<td>0.47 (0.07-0.72)</td>
<td>2.31 (0.57-4.41)</td>
</tr>
<tr>
<td>Post-op</td>
<td>3.57 (1.58-5.90)</td>
<td>0.51 (0.07-1.00)</td>
<td>2.54 (0.82-5.52)</td>
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<tr>
<td>Change</td>
<td>15% (-19 – 142)</td>
<td>13% (-38 – 208)</td>
<td>23% (-61 – 300)</td>
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<tr>
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<td>25% (-47 – 146)</td>
<td>9% (-49 – 121)</td>
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</table>
Change in true:total lumen ratio

Decrease

- Combined: 55.6%
- Sub-clavian artery level: 50.0%
- Pulmonary artery level: 53.3%
- Diaphragm level: 64.4%

Increase

- Combined: 44.4%
- Sub-clavian artery level: 50.0%
- Pulmonary artery level: 35.6%
- Diaphragm level: 46.7%
Improvement group: average increase 42% (median 35%, range: 3%- 121%)

Worsening group: average decrease was 18%(median 17%, range 49% - 2%)
Pre-op scan shows false lumen at PA and diaphragm levels.

Post-op scan shows resolution of false lumen and improved diaphragm alignment.
Conclusions

Standard surgical repair in patients with acute De Bakey type I dissection has a variable effect on size of residual true & false lumens in descending thoracic aorta.

TL size increases about half the time

These findings are in keeping with some of limited clinical literature looking at resolution of distal malperfusion post surgery for De Bakey Type I Dissection
Clinical Implication

When distal malperfusion is suspected clinically or radiologically, consideration should be given for more extensive arch and descending aortic intervention.

Further research is required to understand if adjunctive surgical strategies to expand the true lumen distally will mitigate long term complications.
Next Steps

Identify site of primary intimal tear
   - patients with decrease in TL area post op may have had distal tears...

Clinical & Radiologic follow up in group that TL size decreased
   - did they go on to form aneurysms....?
Thank You