The Initial True Lumen To False Lumen (TL/FL) Ratio On CTs Is A Most Accurate Predictor Of The Need For Interventions With Acute TBADs

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Background
For uncomplicated acute TBAD, many clinical/anatomical variables have been proposed to help decide if a preemptive or prophylactic TEVAR should be performed. Most of these predictive variables are associated with a 75-80% freedom from aortic related event or intervention at 3-5 years follow up.

Study objectives
Characterize the predictive impact of volumetric analysis of the initial diagnostic CT scan on the natural history of acute uncomplicated type B aortic dissection. Evaluate the need for eventual aortic intervention and assess these end points: Growth Rate Survival Free From Aortic Intervention

Study population
164 with Acute Type B AD
36 underwent urgent repair (<14 days)
11 with inadequate imaging for CT analysis
117 available for radiographic analysis
32 underwent eventual repair
85 underwent no intervention

Management Protocol & Intervention
Admission to our VICU
aggressive BP & impulse control with beta blockade pain control

Indications for intervention
Malperfusion
Rupture
Refactory pain
Uncontrolled HTN
Rapid expansion

32 patients underwent successful delayed repair
3 open and 29 TEVAR
Mean time between presentation and intervention: 24 months (range 2-61mo)
TEVAR deployment
Zone 1-2: 8 (28%)
Zone 3: 21

No intraoperative mortality
One 30 day mortality (3%)
**CTA Volumetric Analysis**

CT scan diameter & volume analysis was performed on TeraRecon iNtuition Workstation.

Measurement of aortic volume:
- True lumen volume (TLV)
- Total aortic lumen volume (TAV)
- False lumen volume (FLV) = TAV-TLV

**CTA Volumetric Data & Growth Rate**

<table>
<thead>
<tr>
<th></th>
<th>No Intervention (N=85)</th>
<th>Intervention (N=32)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum diseased aortic diameter (mm+SD)</td>
<td>45.1 (+7.4)</td>
<td>48.4 (+9.4)</td>
<td>0.047</td>
</tr>
<tr>
<td>True lumen volume (mm²+SD)</td>
<td>180 (+51)</td>
<td>167 (+66)</td>
<td>0.386</td>
</tr>
<tr>
<td>False lumen volume (mm²+SD)</td>
<td>139 (+54)</td>
<td>223 (+65)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>TLV/FLV Ratio</td>
<td>1.557 (+0.82)</td>
<td>0.822 (+0.55)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mean growth rate (mm/mo+SD)</td>
<td>0.42 (+1.9)</td>
<td>2.47 (+5.3)</td>
<td>0.003</td>
</tr>
</tbody>
</table>

**Volume Ratio & Growth Rate**

Subgroup analysis – TLV/FLV ratios were split into three groups:

<table>
<thead>
<tr>
<th>TLV/FLV</th>
<th>&lt;0.8</th>
<th>&gt;0.8 and &lt;1.6</th>
<th>&gt;1.6</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Growth Rate (mm/mo)</td>
<td>4.6</td>
<td>2.4</td>
<td>0.8</td>
<td>.025</td>
</tr>
</tbody>
</table>

The higher the false lumen volume compared to true lumen volume, the more rapid aortic expansion was observed.

**Multivariate Analysis – Aortic intervention**

Younger age and increasing false lumen volume were found to be independent predictors of delayed aortic intervention.

**AUROC – Aortic intervention**

TLV / FLV > 1.6 was highly predictive for freedom from intervention. TLV / FLV ratio < 0.8 was highly predictive for need for an eventual intervention with odds ratio of 12.2.

**Freedom from Aortic intervention**

The Survival free from aortic intervention in the sub group with TLV / FLV ratio < 0.8 was only 60%@1year & 42% @ 2 years.
Summary

This volumetric analysis of the index CTA of patients with acute uncomplicated TBAD shows that the TL/FL volume ratio is one of the strongest predictors for the need for aortic intervention. More than half of the patients with a TL/FL ratio <0.8 will require an intervention by 2 years. When anatomically suitable, these patients are considered for TEVAR in the 30-60 day window after index CT.