Impact of TEVAR on Pulsatile Aortic Strain in Acute TBAD: What is its clinical significance?

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Conflict of interest:
None

Background
* But what is the impact of TEVAR on this pulsatile environment?

Cine-MRI

Distensibility (radial expansion) is 2-20% and is preserved after TEVAR.

But besides distension, the aorta also seems to elongate (longitudinal expansion) during the cardiac cycle.*

116.2 mm → 128.8 mm

* B-lab unpublished data

10.8% elongation

* B-lab unpublished data
Background
- A rigid thoracic stent-graft might influence the pulsatile aortic changes and increase wall stress.
- Increased wall stress might increase the risk of extension (retrograde and antegrade) dissection and SINE (Stentgraft-Induced-New-Entry).
- Dissected aortas might be more of risk compared to other aortic diseases.

Aim
Quantify pulsatile changes in both aortic distension and elongation during the cardiac cycle, before and after TEVAR.

Purpose
To understand the impact of TEVAR on pulsatile aortic changes, potentially clarifying TEVAR-related complications such as retrograde dissection and stent-graft induced new entry tear.

Methods
1. ECG-Gated CTA
2. Sets of dicom files
Methods

1. ECG-Gated CTA

2. Segmentation

Results

• Post-TEVAR aortic Length:
  - Patient 1:
    - Total aortic length decreased after TEVAR from 360.7 mm to 358.3 mm (0.7%, p=.01)
    - Aortic arch length increased from 37.0 mm to 40.4 mm (9.2%, p=.000)
  
• Post-TEVAR elongation changes, patient 1:
Results

- Post-TEVAR elongation changes, patient 2:

Conclusions

- The thoracic aorta showed significant pulsatile aortic changes in both distensibility and elongation, most evident in the Marfan patient
- Distensibility was preserved after TEVAR
- Elongation was not preserved after TEVAR
- TEVAR was associated with increased elongation proximally to the stent-graft
- Is this observation associated with stent-graft related complications, such as dissection extension and SINE?
- Further investigation is warranted to understand if these findings should have implications for patient selection and stent-graft design