Is it time to stent the ascending aorta?

Martin Czerny
Content

Basic insights into pathological process

Dissection induced geometry changes

Initial attempts

Dedicated programme

Future developments

Summary
The aorta displays heterogeneity regarding developmental origin \(^2\)

- Neural crest
- Secondary heart field SMCs
- Secondary heart field MMCs

Dijke, Arthur, Nat Rev 2007
CT Angiography

From the first frame, segment aorta lumen

Schwartz, Czerny, Biomed Imag 2012
CT Angiography

From segmentation and deformation fields, extract motion

Schwartz, Czerny, Biomed Imag 2012
Results

Schwartz, Czerny, Biomed Imag 2012
Intraoperative view
Morphological correlate

Sobocinski EJVES 2011
Functional imaging
Functional imaging
Functional imaging
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Summary
Objective

To assess the extent of changes in aortic geometry induced by the dissection process by means of computed tomography angiography (CTA) obtained prior and after acute type A aortic dissection.
Methods
Methods
Results

- Overall 63 patients
- Median age 68 years
- 46% females
- Similar risk profile
- Pre-dissection ascending diameter was <50 mm in all
Results

Pre-Dissection | Post-Dissection | Pre-Dissection | Post-Dissection

48.8mm | 51.4mm

49.6mm | 64.0mm

35.6mm | 38.4mm
Results

**Spontaneous AADA**

**Retrograde AADA**

Mid-Ascending Aortic Diameter (mm)

Pre-Dissection

Post-Dissection

40.1mm

52.9mm

+12.8mm (+32%)

p<0.001
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Summary
Ideal clinical scenario
Alternative approaches- still experimental
Completion CT scan

Zimpfer, Czerny ATS 2006
Content

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  - Dissection induced geometry changes
  - Initial attempts
  - Dedicated programme
- Future developments
- Summary
Content

Basic insights into pathological process

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Morphological correlate

Sobocinski EJVES 2011
Concept Prototype

- Distal extension to cover to the level of the brachiocephalic trunk

Aortic valve  Perfusion  Covered to exclude entry
1. The CT-feasibility study was conducted according to the population of 1196 patients with severe aortic stenosis screened for TAVI (J Card Surg 2014;29:371-376)

2. Novel device prototype was made using Symetis TAVI Valve and Cook thoracic stentgraft and was implanted into transparent 3D printed proximal aorta.
Conclusions

Developing a single-unit endovascular device for simultaneous ascending and aortic valve is a question of time. A novel composite endovascular valved graft will extend the application of transcatheter techniques to patients denied TAVI due to a concomitant ascending aneurysm and those with acute type A dissection with high risk of mortality.
Summary

Thorough understanding of pathophysiology is key

Complexity is amplified as compared to distal aortic segments

A tube alone is not sufficient to treat the majority of patients

Efforts for a valved conduit are ongoing

Combining knowledge and technology will pave the way