The Mechanics Of TEVAR Device
Conformability To Aortic And Arch Anatomy:
How Do The Various Devices Compare

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Introduction

- Choice of thoracic stent-graft: critical
  - Different diseases
  - Proximal neck
    - Angulated
    - Short
  - Small thoracic aorta
- Recent evolution of available thoracic stent-grafts

Angulation of the proximal landing zone

Angulation >60°: 80% of patients

Bortone Aet al. Circulation 2002
Endovascular repair of the thoracic aorta

Conformable TAG
Zentih Proform

Available devices
Valiant Captivia Medtronic

- Valiant Captivia
- Relay Bolton

Experimental study

- 10 Fresh non-aneurysmal human aortas
  - Mean age 41.6 years, range 18–57
  - Died a maximum of 4 days previously (mean 2.9 days)
  - The mean diameter 20.5 mm (19–24 mm)
  - Mean delay between aorta harvest and experimental procedures < 30 min

- Fresh aorta: Histological analysis
  - Microscopical analysis: to ensure the presence of a 3-layer wall

Bench test model

- High pulsatile flow
  - 300/150 mm Hg 5 minutes

- Glycerin 30%
- Water 70%
- Dynamic viscosity similar to that of blood

Test

- Measurement of the intraluminal lip length

- Static tests
- Dynamic tests

- As a function of:
  - Oversizing: 5 to 37%
  - Angulation: 70 to 140° (10°)

Results

- C-TAG vs TAG:
  - Proximal Bare stent
    - Since 120° (90°)
    - Up to 2 mm

- Valiant Captivia vs Valiant:
  - Always apposed

- Zénith Proform vs Zénith TX
  - Lack of device wall apposition
    - Since 110° (70°)
    - Up to 4 mm

- Relay NBS Plus vs Relay
  - Proximal Bare stent
    - Since 110° (80°)
    - Up to 4 mm
According to the features of the available stent-grafts:

- Valiant: up to 140°
- C-TAG: up to 120°
- Relay: up to 110°
- Zenith: up to 110°


Clinical impact

- Endovascular repair of acute traumatic transection
  - 2001-2011
  - 48 patients
- 2 groups:
  - First generation of TEVAR until 2007
  - Last Generation of TEVAR

Results

<table>
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<tr>
<th>Lesions</th>
<th>First Generation</th>
<th>Last Generation</th>
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<tr>
<td>False aneurysm</td>
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<td>13</td>
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Statistically comparable

Results

- Decreased stent-graft related morbidity: 18.7% to 6.2%
  - p=0.0003

Conclusion

- Stent-graft conformability is the keystone of long-term outcomes
- Improvement in conformability of the latest generation of thoracic stent grafts
- Improved clinical outcomes