Endograft Repair of Ascending Aortic Lesions: Lessons learned, where are we now & prospects for an Endograft-Valve combined device

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Conflicts of Interest

- Medtronic
  - Consultant
  - Speaker's bureau
- W. L. Gore
  - Proctor
- Bolton Medical
  - Scientific advisory board
  - Speaker's bureau
- Endologix / Nellix
  - Consultant
  - Proctor

The ascending aorta: Why now?

“The body is a collection of tubes waiting to be stented”
-- Anonymous

- Introduction of transcatheter aortic valve replacement (TAVR)
  - Brought CT surgeons to the table
- Device developments & added experience
  - Increase experience delivering devices to the ascending aorta and aortic arch
  - Imaging advances
  - Hybrid endovascular suites with pump capabilities

Endovascular Treatment of the Ascending Aorta: How it differs from the thoracoabdominal aorta

- The aortic arch needs to be traversed:
  - Helical curvature varies with age and type of aortic lesion
- Area to be covered/excluded is relatively short
  - Coronary arteries and the brachiocephalic trunk (~ 8 cm in length)
- Access to deliver devices do not have to be transfemoral based, shorter distance to target improves control and deployment accuracy
  - Carotid, Axillary, transapical access available
- Deployment of modular branched grafts originate from target vessel not from the endoprosthesis main body
Gore Abdominal Extension Cuffs

- Carotid access possible
- Rapid device release

Coronary stents deployed due to inadvertent coverage of the RCA

PS-IDE Stent-Graft

Modified Valiant Captivia

Treatment of ascending aortic pathologies: Aneurysms, pseudoaneurysms, penetrating ulcers, Type A dissections

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Ascending Endograft

Impingement of the aortic valve upon deployment

Leading edge of Free flow prevents normal aortic valve closure → Acute AI & cardiac pump failure

Ascending Aortic Pseudoaneurysm

Oblique Deployment

Deployment control and avoid retroflex achieved through Supporting wires & V-patch configuration

Stent-graft inside a soft 12 mm nylon sheath

Stent-graft moves towards the inner curve of the aorta & perpendicular to the aortic axis
Levers are used to stabilize and guide proximal edge of the stent-graft to make aortic wall contact.

Tip capture released with levers still holding proximal apices.

Ascending Cases Experience

Oblique deployment avoided
35 cases done OUS

Dual Branch Concept

Thoracic Branch Technology with Relay® NBS Plus

- “Off-the-shelf”
- various proximal diameters,
- standard branch position and endograft lengths
- Large single aperture for ease of cannulation w/1 or 2 internal tunnel(s)
- Single: innominate
- Double: innominate and LCCA
- Intended for Zone 0 deployment combined with extra-anatomic arch branch bypass as required

Deployment Technique

Step 1

Step 2

TUNNEL GRAFT

Deployment Technique

STEP 3

STEP 4

BRANCH GRAFT
Cases with Dual Arch Branches

Case 1: First in Human
Courtesy of Dr. Camparini, Az. Osp. "Brotzu", Cagliari (IT)

Dissection Case
Courtesy of Dr. Kuratani, Osaka University Hospital, Osaka (JP)

46 cases have been done with custom devices

Combined aortic valve & aortic conduit
Designed and tested by Tim Chuter

- Coronary branches stiff and unstable
- Flexible balloon-expanded covered stent could be attached to a current TAVR

Thinking outside the box . . . TEVAS?

Open stent to perfuse arch vessels
L CCA to SCA bypass
Inner endoframe
Polymer filled endobag
Thoracic Endograft

Bolton Medical