Use of the branched PETTICOAT technique to treat complex aortic dissections: How to do it and does it promote remodeling in the visceral aortic segment?

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No conflict of interest

A patent true lumen in the distal aorta after aortic root/arch surgery or thoracic SG-placement for AD is not benign!

Patient with 12 cm ruptured false lumen (FL) aneurysm, who died despite successful arch replacement

- Close relation in between patent FL, aortic growth rate and late mortality

So far described methods to treat FL-dilatation

1. Open repair (Cowan, 2003; Rigberg, 2006)
1. Hybrid procedures (Böckler 2008)
1. Endovascular approach with CM fenestrated/branched SG in elective cases (Oikonomou 2014)

Common features:
- 30 day mortality and spinal cord malperfusion over 10%
- All reno-visceral branches have to be bypassed or stented

Remaining FL-perfusion through tears related to reno-visceral branches still causes aneurysmal degeneration of the aorta

Torn out ostium of the celiac trunk
Backflow into thoracic FL
Aneurysmal degeneration of abdominal aorta

Might lead to rupture and death

Proximal descending aortic stentgraft plus distal bare metal stent: The PETTICOAT Concept (Nienaber et al., 2006)
Systematic review of outcomes of combined proximal stent graft with distal bare stent, L. Canaud et al.; Ann Cardiothorac Surg 2014

Dissection stents alone are not capable to induce complete attachment of delaminated abdominal aortic wall, when major reno-visceral branches were torn out, adjunctive procedures are needed

Solution: branched Petticoat = Implantation of balloon expandable covered stents through preexisting entries and struts of dissection stents into FL originating arteries

Re-establishment of blood flow to FL originating target vessels exclusively from TL simultaneously leads to sealing of corresponding tear in the dissection membrane

Intimal fenestrations related to branch vessels = torn out orifices of FL-originating reno-visceral branches were neglected

Distal extended branched Petticoat for the sealing of all relevant entries with off the shelf devices
Deeb Petticoat in a 60y old male patient with 66 mm post dissection TAAA 8 years after incidence of TBAD

- Has the ability to induce total FL thrombosis in the thoracic and abdominal aorta as well as the iliac arteries
- Does promote remodeling of the visceral aortic segment

Deeb Petticoat for the sealing of all relevant entries

- Deeb Petticoat
- SMA
- Petticoat alone

Deeb Petticoat for the sealing of all relevant entries

- Deeb Petticoat
- Renals
- Petticoat alone

Deeb Petticoat for the sealing of all relevant entries

- Deeb Petticoat
- Infrarenal aorta
- Petticoat alone

Deeb Petticoat for the sealing of all relevant entries

- Deeb Petticoat
- Iliac arteries
- Petticoat alone
Deeb Petticoat for the sealing of all relevant entries

21.11.2015 branched PETTICOAT

Iliac bifurcation Petticoat alone

Compareris of status before and after deeb Petticoat in symptomatic 56 y, m, 10 years after initial therapy for type A dissection

after deeb Petticoat Thoracic SG alone

Comparis of status after thoracic SG alone and deeb Petticoat

after deeb Petticoat Thoracic SG alone

SMA

Comparis of status after thoracic SG alone and deeb Petticoat

after deeb Petticoat Thoracic SG alone

Right Renal Artery

Comparis of status after thoracic SG alone and deeb Petticoat

after deeb Petticoat Thoracic SG alone

Infrarenal aorta

Comparis of status after thoracic SG alone and deeb Petticoat

after deeb Petticoat Thoracic SG alone

Iliac arteries
Results and Comparison of deeb Petticoat with alternative methods

- Deeb Petticoat in 19 patients, 13 Type A, 6 Type B
- Redo-setting, 2 m to 14 y after initial treatment
- Exclusively Cook GZSD Dissection stents were used, in combination with Advanta/ICAST, mostly Gore C3 excluder and 9 IBD’s
- 28 aortic branches were supplied with BECS
  - 3 celiac trunks, 2 SMA’s, 21 RA’s, 7 RRA’s and 16 LRA’s
- in 12 cases only 1 FL- originating renal artery had to be stented

Results and Comparison of deeb Petticoat with alternative methods

- In contrast to all other techniques renal function was ameliorated
- No aortic branch vessel obstructions were observed in limited follow-up (1-30m)
- less branch vessel complications can be expected in long term follow-up compared to other methods, as only 1,5 vessels per patient on average were stented

Results and Comparison of deeb Petticoat with alternative methods

- TL originating spinal arteries in the thoracoabdominal junction are preserved
- Deeb Petticoat is perfectly designed for a percutaneous staged approach
- No spinal cord malperfusion observed
- No 30 day- mortality, no aortic related late death
- extremely low complication rate (one asymptomatic loss of hypogastric artery, 2 iliac branch obstructions)

Conclusions

- Thoracoabdominal dissections and TAAA are completely different diseases
- Dissections have something that aneurysms do not have:
  - an often shrunk and perforated but resilient intimal hose
  - This hose can be reinforced and expanded and perforations can be sealed
- The distal extended branched Petticoat technique is perfectly able to do so