Physician-Made Fenestrated Endograft Repair For Aortic Arch Lesions: Experience In >115 Cases: Challenges And Technical Tips

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Disclosure

- Medtronic:
  - Consultant
  - Advisory board Aortic
- Patents:
  - Double fenestrated stent-graft

Introduction:

- Homemade proximal scalloped stent graft for TEVAR of zone 2 acute aortic syndrome


- Single fenestrated stent-graft for thoracic endovascular aortic repair of zone 0 aortic lesions.

Total endovascular aortic repair of zone 0 aortic lesions

Custom-made: total endovascular repair

- Total endovascular arch repair:
  - Non negligible risk of mortality and stroke
    - Mortality: 14.5 %
    - Failure: 14.6 %
    - Stroke: 15.8%
  - Price
  - Time to manufacture


Custom-made: total endovascular repair

- Total endovascular arch repair:
  - N: 24.
  - Non negligible risk of mortality and stroke
    - Mortality: 16.7 %
    - Stroke: 25%
    - RTAD: 8.3%
  - Price
  - Time to manufacture

Ferrer et al. Italian Registry of double inner branch stent graft for arch pathology (the TRizemmy Registry. JVS. 2019.
Custom-made: total endovascular repair

- Total endovascular arch repair:
  - 3 high volume centers: 1.5 years
  - N 27
- Risk of mortality and stroke
  - Mortality: 3.4%
  - Stroke: 11.1%
  - Endoleak: 7.4%
  - Reintervention: 7.4%

- Price
- Time to manufacture

Spear et al. Subsequent Results for Arch Aneurysm Repair with Inner Branched Endografts. EJVES. 2016.

How to decrease stroke rate during total endovascular repair of the aortic arch?

Total arch repair

- Technique
  - The proximal large fenestration for the BT and the LCCA of appropriate size (4 mm larger laterally than that of the BT and LCCA orifices)
  - The distal circular fenestration for the LSA: 8 mm

To avoid carotid manipulations

Total arch repair

- Proximal fenestration is automatically directed to the orifices of the BT and LCCA when Lsa fenestration is secured by a covered stent

- To Avoid carotid arteries manipulations
Total arch repair

Out of the 127 fenestrated TEVAR for the aortic arch
- 55 cases: 2017-2019
- Elective: 76.3% (n=42)
- Indications:
  - Degenerative aneurysm (n=25)
  - Dissecting aortic arch aneurysms subsequent to surgical treatment of acute type A dissections (n=11)
  - Chronic complicated type B aortic dissection (n=10)
  - Acute complicated type B aortic dissection (n=6)

Unsuitable

During the time of the study:
- 2 patients had zone 0 hybrid aortic arch repair
  - Dissection of the supra-aortic trunks
  - Anatomy of the arch

Total arch repair

- Stent graft modification: 19 minutes (range 16-20)
- Endovascular exclusion: 100%
- Failed deployment: 3
  - Chimney procedure
  - Two LSA bypass

Total arch repair

- Two patient had a stroke without permanent sequelae: 3.6%
- Overall mortality was 1.8%
- All left supra-aortic trunks were patent
- No type I endoleak was observed.
- One patient with a type II endoleak
- One type III endoleak
- During a mean follow up of 15 ± 2 months, there were no conversions to open surgical repair, aortic rupture, paraplegia, retrograde dissection.
Stroke

Deployment failure

Discussion

Outcomes

- The specific feature of this double fenestrated device is its simple handling during operation:
  - with the proximal fenestrations being directed to the orifices of the BT and LCCA automatically when LSA fenestration is catheterized and secured by covered stent placement

- No carotids manipulations: permanent stroke 1.8%
  - 25 degenerative aneurysms

Long term durability

- Fatigue testing: data will be available at the end of December
- Minimum follow-up of 3 years for large proximal scalloped stent-graft
  - No graft failure
  - No conversion
  - Submitted to Journal of Vascular surgery

Reliability of our data

Chassin-Trubert L, Gandet T Canaud L, JEVT 2019
Minimum follow-up of 3 years for large proximal scalloped stent-graft


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Reviewers’ comments:
Reviewer #1:
1. ***Zero mortality, no endoleaks, 1 stroke with no residual deficits, no loss of target artery patency other than one left subclavian artery that could not be bridged to the thoracic graft... please confirm I have interpreted these results correctly. It seems hard to imagine that the results would be so good.”
Reliability of our data

- 18 cases done in other institutions:
  - Mortality: 0%
  - Stroke: 0%
  - Type I endoleak: 0%

- Other centers:
  - Clinique Pasteur Toulouse: Dr Abouliatim
  - Institut Mutualiste Monsouris: Dr De Blic, Dr Mallios
  - Hospital Nord de Marseille: Dr El-Nafi
  - Clinique les Franciscaines, Nimes: Dr Joyeux
  - Clinique de Metz: Dr Portocarrero
  - CH de Saint Denis de la Reunion: Dr Khantalin
  - CHU de Montpellier: Dr Gillot
  - Centre Cardiothoracique de Monaco: Dr Miahle

Cannulation failure

- Experimental study: Valiant, Cook, Relay

Cannulation failure

- Experimental study: Valiant, Cook, Relay

Cannulation failure

- 28 cases since January 2019 of precannulated LSA fenestration

Cannulation failure

- Development: Off the shelf

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37 out of the 38 patients could have been treated with this off-the-shelf double fenestrated stent-graft

Outcomes

• 1.8% mortality, 0% of type 1 endoleak, 1.8% persistent stroke

• Emergent cases

• The specific feature of this double fenestrated device is its simple handling during operation:
  - with the proximal fenestrations being directed to the orifices of the BT and LCCA automatically when LSA fenestration is catheterized and secured by covered stent placement

• Can be off the shelf