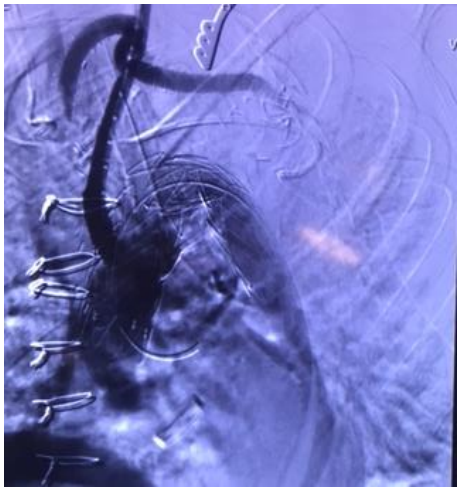
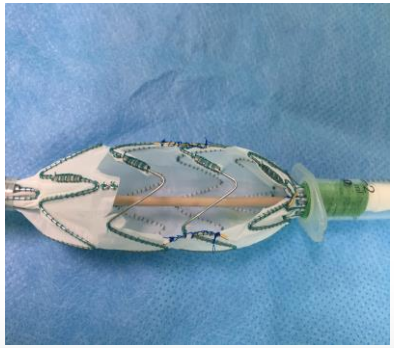
How to achieve a successful proximal sealing in TEVAR?

Pr L Canaud





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Disclosure

I have the following potential conflicts of interest to report:

Consulting: Medtronic

Proximal neck

- **Proximal landing zone:**
  - Lenght (>20 mm)
  - Angulation
  - Morphology of the aortic wall
- **Device conformability / sizing**

Angulation of the neck

- **Angulation >60° : 80% of patients.**

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

- **Use the most conformable graft**

Canaud L et al. J Vasc Surg 2013.Improvement in conformability of the latest generation of thoracic stent grafts

Stent-graft sizing

- **Excessive oversizing**
  - Wrinkling of the prosthesis
  - RTAD

Canaud L et al. Ann Surg 2015. Retrograde aortic dissection after thoracic endovascular aortic repair.

- **Sizing according to the disease**
  - Degenerative aneurysm, traumatic, PAU: 10%
  - Dissection:
    - Acute <5%
    - Chronic 5-10%

Hybrid repair

- **Hybrid repair zone 0 and 1**

  non negligible risk of mortality and stroke

  - ***Mortality: 10%***
  - ***Stroke: 5 %***

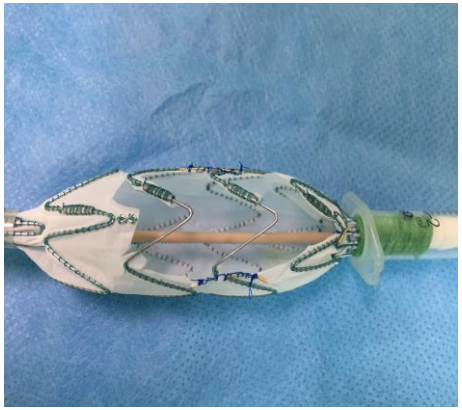
Canaud et al. Endovascular repair of aortic arch lesions in high-risk patients or after previous aortic surgery: midterm results. JTCS. 2010.

Custom-made: total endovascular repair

- **Total endovascular arch repair:**
  - ***Non negligible risk of mortality and stroke***
    - ***Mortality: 13.5 %***
    - ***Failure: 14.6 %***
    - ***Stroke: 15.8%***
  - ***Price***
  - ***Time to manufacture***

Haulon et al. Global experience with an inner branched arch endograft. JTCS. 2014.

Physician modified thoracic stent-grafts for the treatment of aortic arch lesions.



Method: stent-graft modification

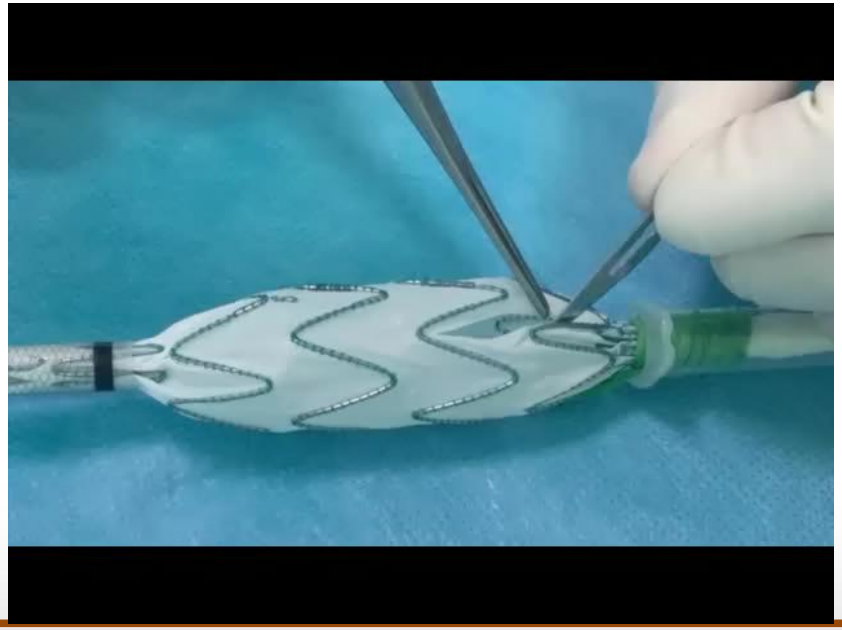
- **Valiant Thoracic stent graft of sufficient length**
  - Proximal and distal landing zones in healthy aorta of at least 15 mm
  - Stent graft oversized by 5% to 15%

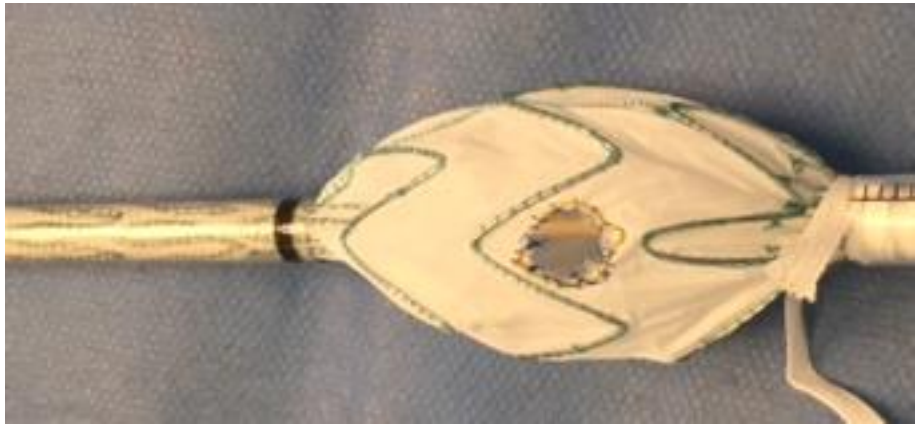
Method: stent-graft modification

- On a back table before the start of anesthesia
- The stent graft was partially unsheathed
- Holding the proximal tip capture using the barrel of a 5-mL syringe

Method: stent-graft modification

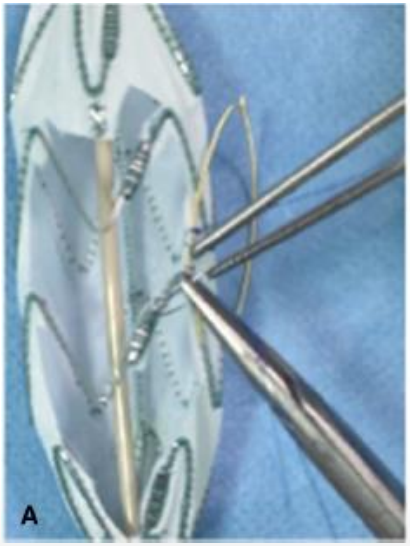
- **Device modifications were tailored to individual patient anatomy**
- **The diameter was that of the target vessel**

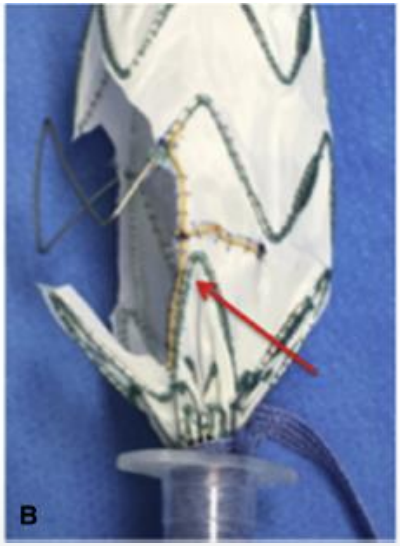


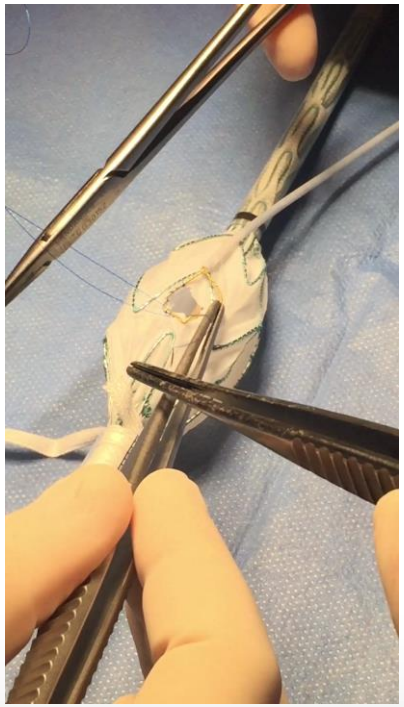


Method: stent-graft modification

- Radiopaque markers were positioned to delineate the distal and lateral edge of the scallop or fenstration
- Loop of a snare secured on the fabric with a continuous locking 5-0 polypropylene suture

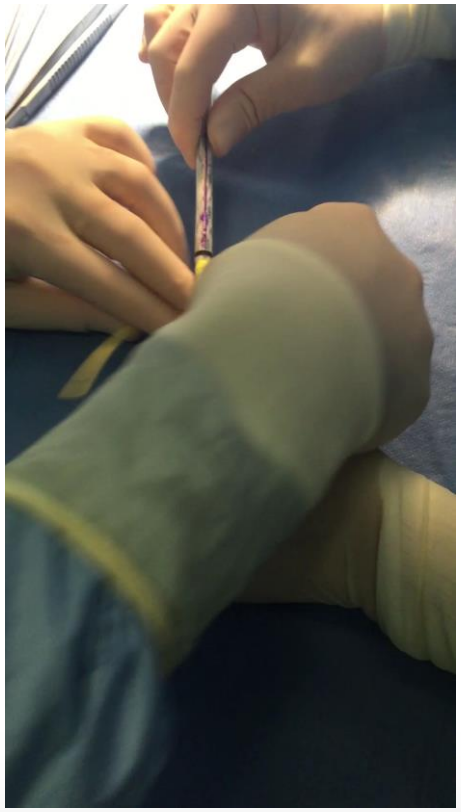






Method: stent-graft modification

- **Reloaded in the existing sheath using a temporary vessel loop tocollapse each stent**



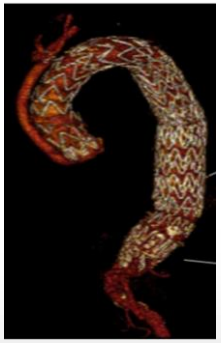
Aortic arch repair

Between November 2013 and June 2016

Aortic arch repair: n=95

Open repair
n=35

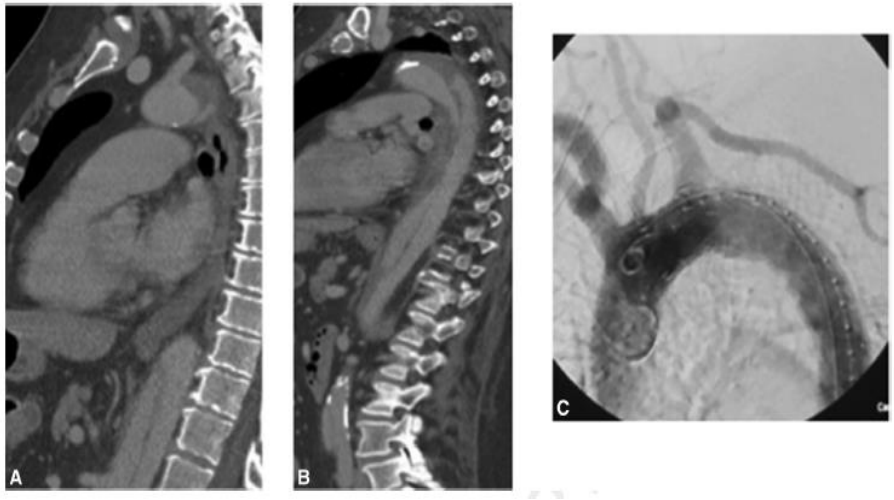
Hybrid repair
n=24



Physician modified
n=36

Physician modified thoracic stent-grafts for the treatment of aortic arch lesions

- 36 patients: 27 men
- Mean age, 74.7±9 years
- Zone:
  - 0 :16 patients
  - 1 : 9 patients
  - 2 : 11 patients



- 30.5 patients were treated emergently

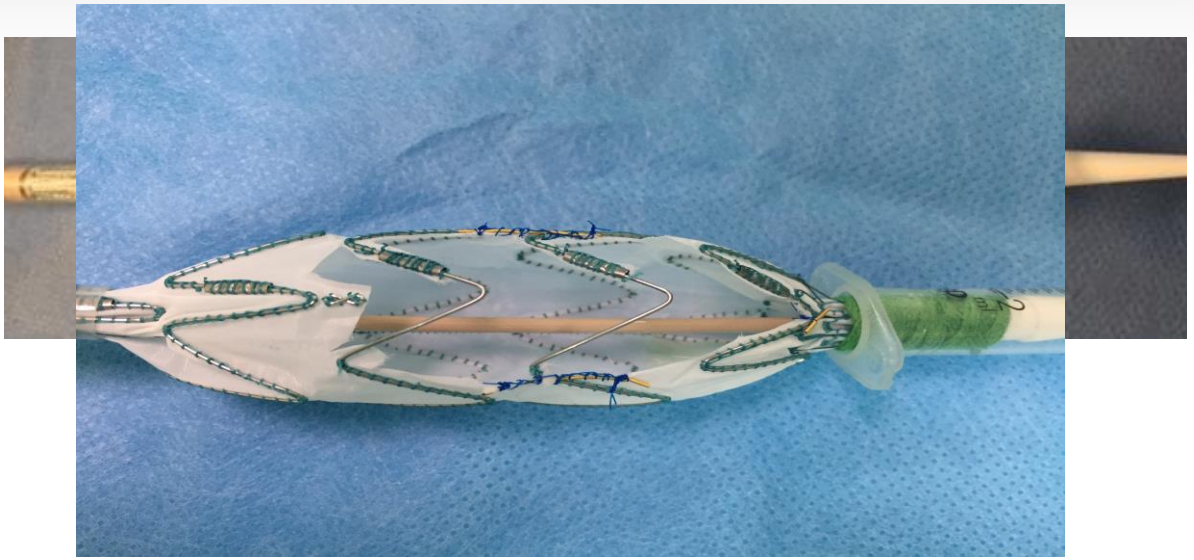
Canaud L et al.Revision JEVT 2017 . Physician modified thoracic stent-grafts for the treatment of aortic arch lesions

Physician modified thoracic stent-grafts for the treatment of aortic arch lesions

- Degenerative aneurysm: 18 (58%)
- Proximal type I: 5 (13.9%)
- Complicated acute type B dissection: 4 (11.1%)
- Chronic type B dissection: 4 (8.3%)
- Traumatic transection: 3
- Complicated chronic dissection after acute Type A dissection repair: 1
- Aortoesophageal fistula: 1

Physician modified thoracic stent-grafts for the treatment of aortic arch lesions

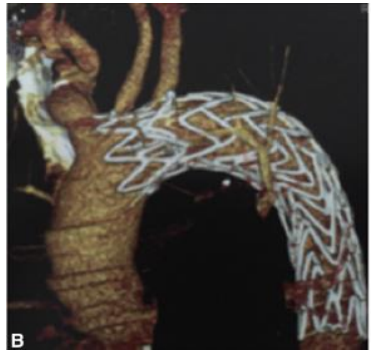
- Zone
  - 0: 16 patients
  - 1: 9 patients
  - 2: 11 patients



- Modification:
  - Single fenestration: 24 (66.6%)
  - Proximal scalloped stent-graft: 12

30 days outcomes

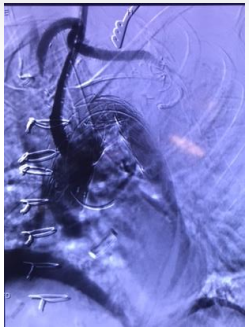
- **Median duration for stent graft modifications: 18 min**
- **Technical success rate of 100%:**
- **No type I endoleak**
- **Stroke without permanent sequelae (2.8%)**



Canaud L et al. JTCVS 2016. Homemade proximal scalloped stent graft for thoracic endovascular aortic repair of zone 2 acute aortic syndrome.

Canaud L et al. Revision JEVT 2017 . Physician modified thoracic stent-grafts for the treatment of aortic arch lesions

30 days outcomes



- **30 day mortality rate: 5.8%**
  - **1st operative day: rupture of the descending thoracic aorta (confirmed by autopsy).**
  - **5th postoperative day from the sequelae of traumatic rupture of the left kidney**

- **Mortality related to aortic repair was 2.8%.**

30 days outcomes

- 1 retroperitoneal hematoma
- 2 dehiscence of their groin wounds
- 1 infection of a carotid-carotid cross over bypass: graft explantation and in situ revascularization using a great saphenous vein

Follow-up

- **Mean follow up of 11.4 (rang, 2- 36 months)**
- **No conversions to open surgical repair**
- **Overall mortality rate: 13.9%**
- **Aortic related mortality: 5.6%**

  rupture of the aortic arch 5 months after the procedure

  due to a secondary proximal type I endoleak

Discussion

Discussion

- **The use of physician modified thoracic stent-grafts for the treatment of aortic arch is feasible and effective option**
- **Rapid, reproducible method**

Canaud et al. Homemade proximal scalloped stent graft for thoracic endovascular aortic repair of zone 2 acute aortic syndrome. JTCS. 2016.

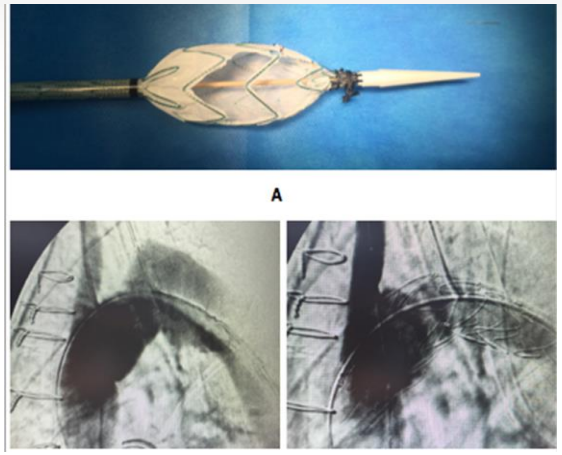
Discussion

- **Surgical strategy**
  - Scallop:

    minimum healthy aortic seal length was at least 15 mm from the expected position of the edge of the scallop, both proximally and laterally
  - Fenestration:

    less than 15 mm laterally of the target vessel, patients were candidates for TEVAR using a fenestrated stent-graft.

Discussion



- **Special anatomic considerations**
  - Aneurysmal ascending aorta
  - Ascertaining that the fenestration or the scallop is well oriented toward the supra-aortic trunk target vessel is crucial: minor adjustments are possible to rotate the stent graft
  - For zone 1 fenestration, a minimum distance between BT and the LCCA of less than 5 mm precluded this approach

Discussion

- **Graft infection:**

  could be associated with an increased risk of infection

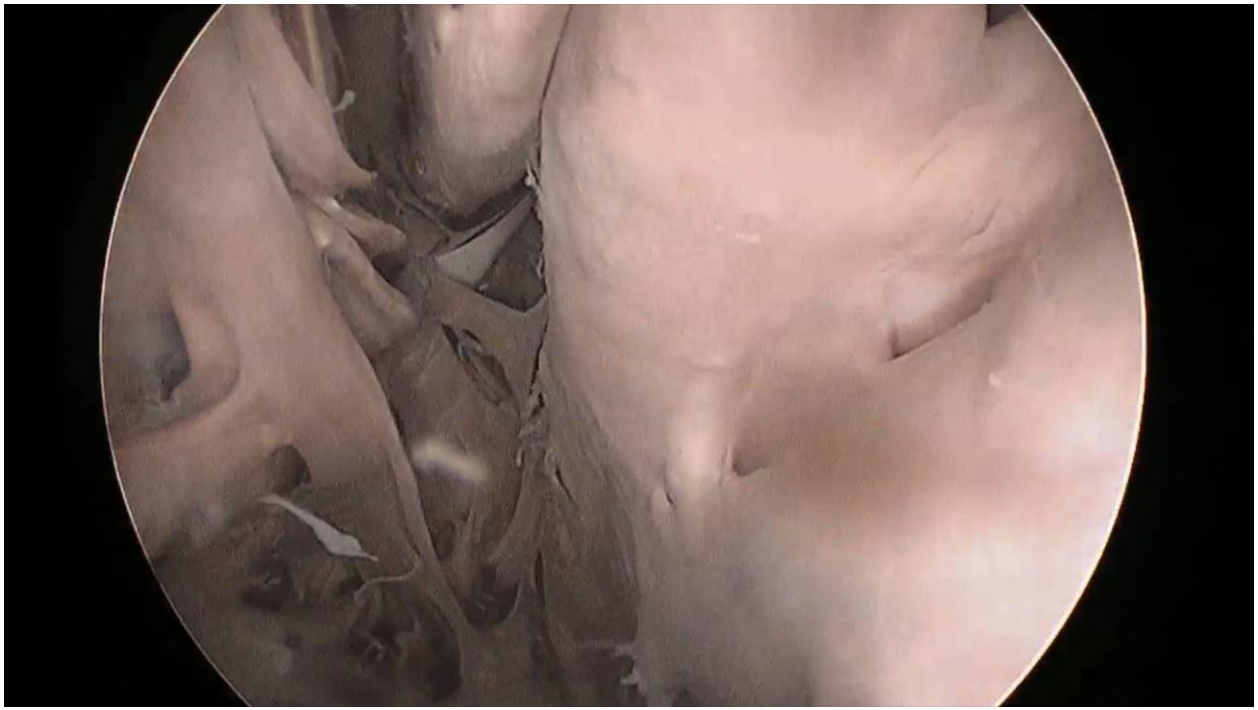
- **Lack of industrial quality control after device modification**

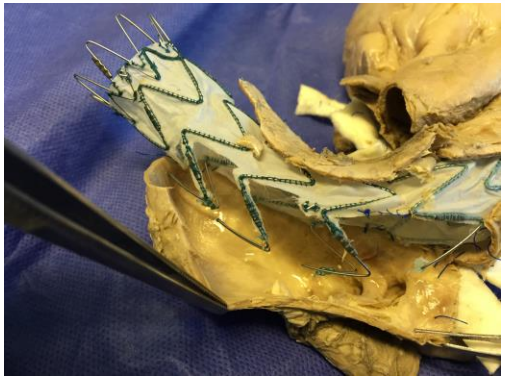
Discussion

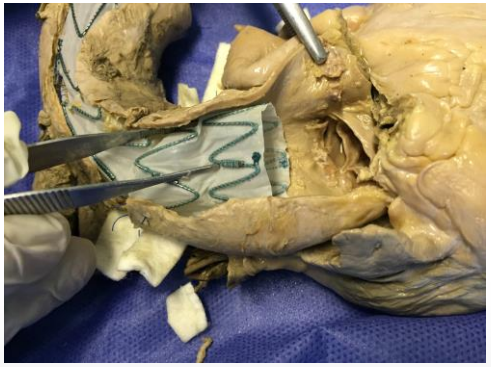
- **In the long term, strict surveillance of these stent grafts and modifications will be necessary to monitor and ensure durability of repair because of the potential for stent collapse or stent breakage**

Perspective

Perspective: Type A dissection

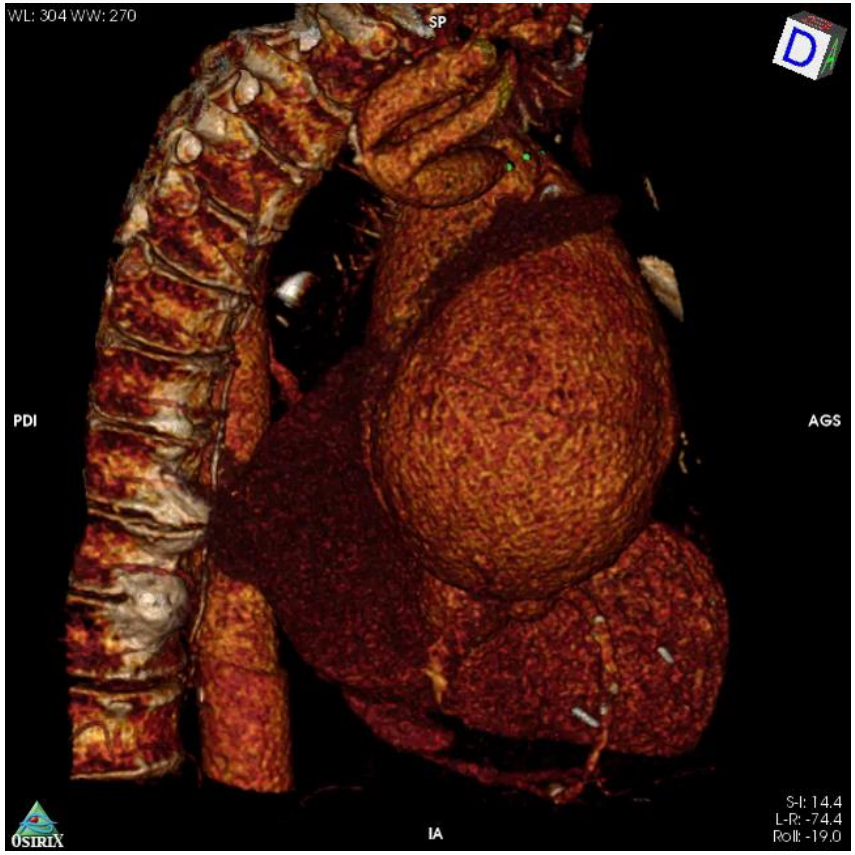






Gandet T, Canaud L. Revision Ann Thorac Surg 2017 . Experimental evaluation of endovascular repair of ascending aortic dissection

Perspective



Perspective

Conclusion

Conclusion

- **Conformable graft**
- **Sizing according to the disease**
- **Proximal neck > 2 cm**
  - Hybrid repair
  - Custom made stent-graft
  - Home made stent-graft