Retrograde Arch Branch TEVAR vs In Situ Fenestration: Advantages and Limitations of Both

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Disclosures
Consultant: Cook Medical, Medtronic Inc, Terumo Aortic, Philips Volcano, WL Gore
Speakers' Bureau: Medtronic Inc., Terumo Aortic, WL Gore
Advisory Board: Medtronic Inc., Melton Medical

Background
Up to 50% of TEVAR will require arch deployment in Zones 0, 1 or 2
- There are currently no FDA approved thoracic branch endografts
- There are 2 ongoing US IDE trials of thoracic branch endograft one of which is a retrograde branch device
- Other methods to revascularize arch branches consist of:
  - Hybrid arch debranching
  - Parallel grafts / chimneys
  - Back table Surgeon Modified Grafts
  - In Situ Fenestration

Retrograde Arch Branch: Device & Technique
Gore Thoracic Branch Endoprostheses: Modular design with 3 components
Careful aortic & branch measurements
Snaring the branch wire & undoing the wire wrap
Rotational alignment & tracking the branch through the portal
Positioning, deploying & balloonizing the branch

Retrograde Arch Branch: Limitations
- Currently not available
- Must fit strict anatomic measurements
- Provides retrograde instead of antegrade flow
- Requires large access vessels
- Complex deployment with many procedural steps
- Deal with many pitfalls: wire wrap, tracking, etc.
- Rotational alignment can be difficult
- Deployment accuracy for axial alignment

Retrograde Arch Branch: Outcomes
TBE Feasibility Clinical Trials Data Overview
Zone 2 Aneurysm (31 patients)
100% Technical success
No Peri-procedural Mortality
1 Stroke (3.2%)
1 Loss of Side Branch Patency (3.2%)
1 Re-intervention (3.2%)
Zone 0/1 Aneurysm (9 patients)
100% Technical success
No Peri-procedural Mortality
1 Neurological Events (33.3%)
1 Loss of Side Branch Patency
No Re-interventions
Retrograde Arch Branch: Advantages

- Extensive benchtop testing done
- Will be commercially available
- Off the shelf device
- Large selection of diameters & lengths
- Designed also for zone 0 deployment
- Can treat larger vessels with 12mm portal
- Based on a proven durable platform

In Situ Fenestration: Technique

Retrograde approach from the brachial artery
Multiple methods: Laser, RF, needle

In Situ Fenestration: Outcomes

Mean Age of 61.3 yrs
N = 60 patients
July 2009 – March 2018
Thoracic aortic pathologies:
Aortic Dissection, IMH, BTAI, Thoracic aneurysms or TAAA (including 16 ruptures [27%])

EVMS Experience

Operative Mortality = 8.3% (5/60)
No type III endoleak
No stent occlusion
3 rupture
2 acute TBAD
cause: heart 2; resp 1; stroke 2
Fenestration related reintervention rate:
5.45% (3/55)
Neurologic Complications:
Stroke : 2 (3.3%)
SCI : 3 (5%)
3 rupture
2 acute TBAD
cause: heart 2; resp 1; stroke 2
No type III endoleak
No stent occlusion
1 early type Ic endoleak requiring coiling
2 late type Ic endoleaks: LSA restenting
Mean Length of Stay = 9.5 days
Mean clinical follow up of 2.5 years (range 0–9 years)

In Situ Fenestration: Limitations

- Limited benchtop testing
- Off label use
- Graft is modified and may affect durability
- Needs larger brachial sheath
- Technique is not standardized
- No long term data on fabric and stent integrity
- Not applicable to larger diameter vessels
- More difficult with acute take off of the vessels
- Outcome limited to few case series

In Situ Fenestration: Advantages

- Available
- Less anatomic restrictions
- Faster & simpler technique
- No need for rotational alignment
- Less arch manipulations
- Lower profile
- Antegrade flow
- Can be used emergently or for bail out
- Longer follow up available
Summary

Both Retrograde arch branch and In Situ Fenestration TEVAR have a high procedural success, low reintervention rates and high branch patency rate.

Both procedures have their advantages and limitations and will be complementary treatment options to revascularize arch branches during TEVAR.