How to Fix Endoleaks from 2° Intimal Tears at the Celiac Axis and SMA after Remote TEVAR for TBAD

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Disclosure

- I do not have any potential conflict of interest.

Framing the Issue

- Unresolved endoleak from uncovered fenestrations in the paravisceral segment remains the Achilles heel of TEVAR for TBAD leading to continued retrograde pressurization of the false lumen, failure of false lumen thrombosis, and aortic expansion / TAAA.
- Most common cause of secondary interventions is persistent entry-flow and/or sealing of re-entry tears (STABLE study)
- Best scenario is when all 4 visceral vessels arise from the true lumen minimizing distal re-entry sites.

Predictors of Poor Aortic Remodeling with TEVAR

- Complex multiple fenestrations in distal thoracic aorta
- All 4 visceral branches NOT from TL

Predictors of Positive Aortic Remodeling with TEVAR alone in Chronic TAD

- Good proximal LZ
- Ability to cover large entry tear or proximal fenestration by stent graft
- Reasonable size of true lumen; no pseudo-coarctation of distal LZ
- Minimal fenestrations in distal thoracic aorta
- Cover all thoracic fenestrations
- All 4 visceral vessels arise from true lumen
- Avoid new distal stent graft induced new entry tears (SINE) – excessive oversizing
- Remodeling does not appear to be dependent on distal anatomic features of the true and false lumens
- Cover down to celiac
**Delayed SINE: treat with distal endograft implantation**

Shih-Hsin Wang, MD, et al

**Managing Re-Entry Tears with False Lumen Embolization using Occluder Stent Graft Devices**

Jahanzaib Idrees, MD, et al
Journal of Vascular Surgery
Volume 60, Issue 6, Pages 1507-1513 (December 2014)
DOI: 10.1016/j.jvs.2014.08.094

**Coil Embolization of the False Lumen after TEVAR for TBAD**

Enrique María San Norberto, MD, et al
Journal of Vascular Surgery
Volume 54, Issue 1, Pages 201-204 (July 2011)
DOI: 10.1016/j.jvs.2010.11.110

**Use of Visceral Stent Grafts**

Courtesy of J Lombardi, MD

**Chronic Persistent Re-entry Perfusion / Endoleak of the False Lumen Resulting in TAAA**

Role of branch stent grafting to treat progressive visceral segment dilatation resulting from re-entry tears following remote TEVAR for TBAD?

Role of Snorkels, Periscopes, and EVAR / TEVAR?

Role of Staged Open Repair and Hybrid Techniques Following TEVAR for TBAD?

**Staged Hybrid Repair of Extensive Thoracoabdominal Aortic Aneurysms Secondary to Aortic Dissections: Midterm Outcomes**

- 19 patients with Crawford extent I (n = 1) or extent II (n = 18) TAAAs secondary to chronic aortic dissections underwent a staged hybrid repair.
- Following TEVAR: no death, stroke, or paraplegia
- After TEVAR, three patients required repeat intervention for endoleak (type IA, n = 2; type IB, n = 1; type II, n = 1) before open repair.
- Following open repair 1 delayed permanent paralysis
- No deaths, reinterventions, or neurologic events occurred in the remaining 18 patients over a median 85-week follow up
- Staged hybrid repair combining proximal TEVAR with open distal repair for extensive TAAAs secondary to chronic dissection is an effective, durable, and safe alternative to traditional open repair. This mid-term follow up data suggests that staged repair may reduce perioperative morbidity and mortality in patients with extensive TAAAs.
Hybrid procedures for thoracoabdominal aortic aneurysms and chronic aortic dissections – A single center experience in 28 patients

Dittmar Böckler, MD, PhD, Drosos Kotelis, MD, Philipp Geisbüsch, MD, Alexander Hyhlik-Dürr, MD, Klaus Klemm, MD, Hendrik von Tengg-Kobligk, MD, Hans-Ulrich Kauczor, MD, PhD, Jens-Rainer Allenberg, MD, PhD

Journal of Vascular Surgery
Volume 47, Issue 4, Pages 724-732 (April 2008)

Results and Conclusions

- 28 patients underwent abdominal debranching of renals and viscerals followed by simultaneous (Group I: 17) or staged (Group II: 11) TEVAR/EVAR.
- Technical success was 100% in Group I and 64% in Group II.
- 30 day mortality was 14.3% (4/28) for all patients and 15.4% (4/26) for patients with completed hybrid procedures.
- Survival rate in Group I was 80% and in Group II 60%.
- Type I endoleak was 8%; Permanent paraplegia was 8%; Long-term dialysis was 11%; Peripheral graft occlusion was 11%.
- Could not demonstrate a difference in results between emergency Vs elective or between simultaneous Vs staged.

The Visceral Hybrid Repair of Thoraco-abdominal Aortic Aneurysms – A Collaborative Approach

- Collaborative data of 3 major European Vascular Units using the ‘visceral hybrid’ procedure for thoraco-abdominal aortic aneurysms and dissections. Most done as 1 stage; 3/18 ruptured before 2nd stage.
- 107 urgent and elective high-risk patients.
- All stents covered the entire thoracic & abdominal aorta with left subclavian coverage in 19 and revascularization in 12.
- 30-day mortality rate was 16/107 (14.95%).
- 13/107 (12.1%) of the patients suffered spinal cord ischemia which was complete and permanent in 9/12 (8.4%).
- 4 patients (3.7%) required long term dialysis.
- Gut infarction requiring resection occurred in 3 (2.8%).
- Encouraging early results?

Current management and outcome of chronic type B aortic dissection: results with open and endovascular repair since the advent of thoracic endografting

Anderson AN, Keenan JE, Ganapathi AM, Gaca JG, McCann RL, Hughes GC
Ann Cardiothorac Surg. 2014 May; 3(3):264-274

- 70% (>75) were endo-based; 80% were elective
- 3/107: paraplegia; 30 day mortality for endo-based: 0%, 0%, 4%.
- 1- and 5-year survival rates were similar for endovascular-based repairs (86% and 65%, respectively), and open repairs (86% and 56%).
- Median of 34 months, the rate of descending aortic reintervention was 24% (n=18) following endovascular-based repairs and 0% following open repair (P<0.001).
- 44% of descending aortic reinterventions were required to treat stent graft complications.

Conclusions

- Endo-based repair of CTBAD is associated with excellent procedural and survival outcomes, but has a reintervention rate.
- Open repair is associated with higher procedural morbidity but similar overall survival and fewer interventions.
Most appropriate candidates for H-TEVAR and CTBAD are those with large TAAA and challenging anatomy for open repair: prior thoracic aortic procedures, either open / TEVAR / or both.

Patients deemed physiologic “high risk” for open TAAA repair may also be “high risk” for H-TEVAR.

Individualize decision-making; combinations of endo and open options.

Staged procedures whenever possible.

Spinal drains and SSEP monitoring are routine for the endovascular procedure.

Any of the commercially available thoracic / abdominal stent grafts (sometimes in combination) work well.

Late graft related problems and ARD are rare attesting to the durability.