Hybrid Repair of a Complex Thoracoabdominal Aortic Aneurysm

Virendra I. Patel MD MPH
Assistant Professor of Surgery
Massachusetts General Hospital
Division of Vascular and Endovascular Surgery
Disclosure

Speaker name: Virendra Patel

I do not have any potential conflict of interest
Presentation

- 46 year-old female, with history of chronic substance abuse & chronic type B dissection
- Status post repair retrograde type A dissection, with aortic valve resuspension, ascending aortic & hemiarch replacement, innominate & L carotid artery reimplantation
- Presented to ED, with 10/10 abdominal & back pain, uncontrolled hypertension
Relevant History

- 4/07 – Aorto-L CIA bypass & aorto-R EIA bypass, ligation of RIIA for ruptured RCIA aneurysm
- 3/08 – Iliac stent to each bypass grafts
- 2/12 - Repair retrograde type A dissection, with aortic valve resuspension, ascending aortic & hemiarch replacement, innominate & L carotid artery reimplantation
- 3/12 - R axillo-femoro-femoral bypass reconstruction for aortic occlusion
**Other History**

**PMH:**
- HTN
- Hemorrhagic CVA 2/2 cocaine use (2005)
- Sleep apnea

**PSH:**
- Gastric bypass 1/12

**MEDS:**
- Amlodipine
- Labetalol
- Torsemide

**SH:**
- Polysubstance abuse (cocaine/marijuana/EtOH)
- Tobacco (0.5 ppd)

**FH:**
- Neg for dissection, aneurysm
Physical Exam & Labs

Exam:
HR: 64  BP: 176/84

Rad   Fem   Pop   PT
R  2+    -     Dopp  Dopp
L  2+  2+     Dopp  2+

Abdomen: palpable aorta, diffusely tender

Labs:

\[
\begin{align*}
140 & \quad 103 & \quad 10 & \quad 92 \\
3.6 & \quad 26 & \quad 0.9 & \\
10.4 & \quad 269 & \\
5.9 & \quad 35.2 & \\
\end{align*}
\]

INR 1.1
LFTs WNL
Trop < 0.01
Urine tox: +cocaine metabolites
**Initial Management**

- Required 8 anti-hypertensive agents for goal HR 60-80, SBP 90-110

- Cr rise & AKI: contrast induced &/or relative hypotension
  - Renal duplex without dissection extension into renal arteries
Operative Planning

Complex aortic aneurysmal dissection, with previous hemiarch replacement. What are the treatment options?

- Proximal descending aorta not accessible in usual manner

→ Perform traditional extent II repair under circulatory arrest

→ Perform TEVAR with L SCA coverage to treat distal arch pathology

→ TEVAR to serve as elephant trunk for an effective extent III TAAA repair
Operation #1
L carotid-subclavian bypass & subclavian embolization

AMPLATZER plug
Operation #2

- 8d later - complete anterolateral exposure of thoracoabdominal aorta

- Direct aortic puncture (x2) of infra-renal aorta for TEVAR

- IVUS to access dissection true lumen

- Cook Zenith 32-28-160 tapered graft in previously placed arch graft
Operation #2

- Reconstructed L pelvic & LLE circulation without interruption of pelvic perfusion
  - 12 mm Dacron graft to confluence of L EIA & IIA later anastomosed to main body graft

- 10 mm sidearm to 12 mm Dacron graft for atrial-femoral bypass

- Distal aortic, pelvic, & LE perfusion with permissive hypothermia, CSF drainage, & MEP monitoring
Operation #2

- Endo elephant trunk clamped & utilized for proximal anastomosis of effective extent III repair, followed by sequential clamping

- 24 mm Dacron tube graft, 18 x 9 mm bifurcated graft for aorto-celiac bypass 1st to maintain visceral perfusion, followed by aorto-SMA bypass

- Gore hybrid 6-mm vascular grafts utilized for L then R aorto-renal bypasses
Postoperative Course

• Required initial increase in BP to ensure spinal perfusion - ultimately weaned to normal range

• Maintained use of extremities, without paresis or paralysis

• Required supplemental enteral nutrition → regular diet at time of discharge

• Cr at preoperative baseline by time of discharge

• Discharged to rehabilitation facility on POD#25
• Complications associated with open extent II repair
  – Spinal cord ischemia: 7-32%
  – Mortality: 10-42%

• Single-stage vs two-stage extent II TAAA repair??
  – Single-stage repair & permanent spinal cord injury: 15%
Staged Repair

Staged hybrid approach using proximal thoracic endovascular aneurysm repair and distal open repair for the treatment of extensive thoracoabdominal aortic aneurysms.

- 2007 – 2012
- N = 10
- Average age: 48y
- TAAA etiology from chronic dissection: N = 5
- Extent II TAAA: N = 9
- Median interval between TEVAR & open repair: 14wks
- Effective extent III repair after TEVAR with spinal drain
- AKI: 20%, spinal cord ischemia: 0%, mortality: 0%
- Median follow-up: 35 wks.
Staged Repair: updated results

Staged hybrid repair of extensive thoracoabdominal aortic aneurysms secondary to chronic aortic dissection

- 2007 – 2014
- Extent II TAAA from chronic dissection: N = 18
- Median interval between TEVAR & open repair: 18 weeks
- Delayed permanent paralysis 2 weeks after discharge: N = 1
- No other neurologic events, endoleaks, TAAA re-interventions, or deaths
- Complete false lumen thrombosis: 100%
- Total aortic diameter decrease: 60mm to 49mm (P < .01)
- Median follow-up: 3y

13.2 ± 12.0 mm (P < .01) and total aortic diameter decreasing from 60.2 ± 9.0 mm to 49.4 ± 9.6 mm (P < .01).

Conclusions: Staged hybrid TAAA repair, using a combination of proximal TEVAR with open distal repair, can be performed using established endovascular skills and technology coupled with traditional open aortic surgical techniques, with low surgical morbidity and mortality. In the midterm, staged hybrid TAAA repair was associated favorable survival, aortic remodeling, and freedom from reintervention. (J Vasc Surg 2015;□:1-8.)
Case Conclusions

- **Endovascular elephant trunk** for treatment of extent I & II thoracoabdominal aortic aneurysms useful for initial treatment & in redo setting

- Staged approach would appear to be safest

- Open TAAA repair can still be utilized at appropriate centers
Thank You
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