Hybrid repair for aortic dissection, indication and state of the art

On behalf of USZ vascular specialists

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Disclosure of Interest

Speaker name: Felice Pecoraro

- I do not have any potential conflict of interest
Hybrid repair (Debranching)
HYBRID VISCERAL PROCEDURE

n=58 (74 years)
30-day mortality 8.6%

Results: Primary technical success of VORTEC was 97% during a mean follow-up of 22.1 months. Subgroups PAAAs and TAAAs was 97.7% and 96.4%, respectively. Occluded Viabahn grafts were reopened by thrombolysis and hemodialysis. Thirty-day mortality rate was 8.6% (3.4% of neurologic deficit occurred in two cases). A paraplegia was observed in three patients presented early (30-day) type I endoleak, three of them treated by coil embolization and radiological surveillance.

Conclusion: VORTEC allows performance of easy, safe technology and may represent a significant technical advancement for addressing questions of reproducibility by other centers and for a minimization of medical complications. (J Vasc Surg 2009;50:1280-4.)

Fig. Primary cumulative patency rate of the Viabahn endoprosthesis in patients with thoracoabdominal and juxtarenal aortic aneurysms over a mean follow up period of 22.1 ± 12.9 months.
HYBRID ARCH PROCEDURE

Novel sutureless telescoping anastomosis revascularization technique of supra-aortic vessels to simplify combined open endovascular procedures in the treatment of aortic arch pathologies

n=20
30-day mortality
7.6%

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Experience with the use of a sutureless telescoping anastomosis, initially described as the TEChnique (TECh) revascularization technique, for debranching of supra-aortic vessels was reported in 2008. 20 patients (15 men) with an aortic arch lesion underwent trans-sternal debranching with sutureless telescoping anastomosis performed with a Viabahn (diameter, 5–8 mm; length, 5–15 cm) or Hemobahn (diameter, 9–13 mm; length, 10–15 cm), followed by endovascular aneurysm repair. Initially, the Viabahn/Hemobahn was sutured to a feeding graft after deployment. Since 2008, the Viabahn/Hemobahn has been deployed within an interposition graft. The underlying aortic pathology was (1) isolated aortic arch aneurysm in 10, (2) chronic dissection or pseudoaneurysm in 6, (3) floating thrombus within the aorta in 4, (4) Stanford B aortic dissection in 3, (5) Crawford II thoracoabdominal aortic aneurysm extending into the left subclavian artery in 2, and interrupted false aneurysm in all patients. Follow-up included computed tomography angiography annually.

Results: Overall, 56 supra-aortic vessels in the 20 patients were reconstructed by the technique including the carotid artery in 18, subclavian artery in 13, and left vertebral artery in 2. The mean ischemia time was 3 minutes (range, 1–9 minutes) for the debranching procedure (n=20). A conventional suture anastomosis. The 30-day mortality rate was 15% (n=3) for all cases and 7.6% (1 of 12) in elective patients. Three patients (15%) had neurologic complications in conventionally-sutured anastomosis territories. No early (<30 days) occlusion occurred. At a mean of 18 months (range, 9–39 months), one patient with Takayasu disease showed aneurysm progression, and the graft was extended to the left subclavian artery. Stenosis in the aortic anastomosis was successfully treated by angioplasty and stent placement through the right brachial artery.

Conclusions: Sutureless telescoping anastomosis with a Viabahn or a Hemobahn is a safe and reliable alternative to sutured anastomosis. It enables safe and fast access for anatomically challenging situations, and requires a very short ischemia time. Questions related to technique reproducibility must be addressed. (J Vasc Surg 2010;51:836–41.)
The “Lantern” Procedure to Simplify Treatment of Retrograde Type A Dissection After Thoracic Endograft Stenting

Chung-Lin Tsai, MD

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

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Objective: Many patients with aortic dissection develop Crawford extent I or II thoracoabdominal aortic aneurysms (TAAA). Because open repair is associated with a high morbidity and mortality, hybrid approaches to TAAA repair are emerging. In this study, we evaluated the midterm outcomes and aortic remodeling of a hybrid technique that combines proximal thoracic endovascular aneurysm repair (TEVAR), followed by staged distal open thoracoabdominal repair for patients with Crawford extent I or II TAAAs secondary to chronic aortic dissection.

Methods: We identified 19 patients with Crawford extent I (n = 1) or extent II (n = 18) TAAAs secondary to chronic aortic dissection who underwent a staged hybrid repair from 2007 to 2014 at our institution. Nine patients had previous open ascending aortic surgery for type I aortic dissection. Stage 1 TEVAR was performed via percutaneous (n = 8), femoral cutdown (n = 8), or iliac exposure (n = 3). The left subclavian artery was covered in nine patients and revascularized in eight patients using carotid-subclavian bypass (n = 7) or laser fenestration (n = 1). Stage 2 open repair was performed a median of 18 weeks later with partial cardiopulmonary bypass via left femoral arterial and venous cannulation for visceral and lower body perfusion. The open thoracoabdominal graft was anastomosed proximally in an end to end fashion with the endograft. We then assessed surgical morbidity and mortality, midterm survival, and freedom from reintervention. Aortic remodeling was measured and change in maximum aortic and false lumen diameter at last follow-up (median, 3 years) from baseline was assessed.

Results: There were no deaths, strokes, or chronic renal failure in this cohort. After stage 1 TEVAR, three patients repeat intervention for endoleak (type Ia, n = 1; type Ib, n = 1; type II, n = 1) before open repair. After stage 2 op there was a single delayed permanent paralysis 2 weeks after discharge. At a median 3-year follow-up (range, 1-6.2 years), there were no deaths, neurologic events, endoleaks, or TAAA reinterventions. Complete false lumen tlr occurred in 100% of the patients, with maximum false lumen diameter decreasing from 34.3 ± 15.3 mm to 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, formed 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 aortic remodeling, and freedom from reintervention. (J Vasc Surg 2016;63:62-9.)

Fig 1. Stage 2: Distal open repair. A wedge of the distal thoracic aorta was removed and it is anastomosed to the multibranch graft along with the lower edge of the endograft.
Acute type A (De Bakey 1) AD
Ascending aorta replacement (2007)
7 cm diameter of descending aorta
After arch repair and distal stureless telescoping aortic anastomosis

Surgical graft
After arch repair and distal stentless telescoping aortic anastomosis

Surgical graft

26 months FUP
Management of distal tear
Externa-Interna Bypass VORTEC
Tear exclusion
SG EIA-CIA
Chronic type A (DeBakey I) AD

2000: Composite graft & ½Arch
- CV and RV Malperfusion
  - Stroke, epilepsy
  - Bowel shortening
  - Acute/Chronic renal failure

2009: decline surgery
- Lost to follow-up
• Chronic type A (DeBakey I) AD

• 2000: Composite graft & ½Arch
  – CV and RV Malperfusion
    • Stroke, epilepsy
    • Bowel shortening
    • Acute/Chronic renal failure

• 2012: Symptomatic TAAA
  – Descending max TDM 92mm
OPEN AND ENDOVASCULAR
SA & RV DEBRANCHING

• Chronic type A (DeBakey I) AD
• 2000: Composite graft & ½Arch
  – CV and RV Malperfusion
    • Stroke, epilepsy
    • Bowel shortening
    • Acute/Chronic renal failure

• 2012: «Symptomatic TAAA»
  – Descending max TDM 92mm
OPEN AND ENDOVASCULAR
SA & RV DEBRANCHING

Sympt TAAA
OPEN AND ENDOVASCULAR
SA & RV DEBRANCHING

Asympt TAAA
OPEN AND ENDOVASCULAR
SA & RV DEBRANCHING
OPEN AND ENDOVASCULAR SA & RV DEBRANCHING
OPEN AND ENDOVASCULAR
SA & RV DEBRANCHING
OPEN AND ENDOVASCULAR SA & RV DEBRANCHING
Full midline laparotomy

VORTEC (CT)

GHG (SMA)
OPEN AND ENDOVASCULAR SA & RV DEBRANCHING
TRJ 1943

- Chronic type A (DeBakey I) AD
- 1997: Ascending & hemiarch
- 2005: composite graft & arch replacement
- Symptomatic TAAA
  - Visceral aorta max DM 60mm
• Infrarenal Y graft
• Visceral debranching
  – SMA VORTEC
  – TC conventional
• TAAA EVAR
  – Renal periscopes (3)
• TAAA EVAR
  – Renal periscopes (3)

9 months FUP (Mai 2013)
22 months FUP (jun 2014)
debranching

chimney

periscope
Rationale for ≥2 procedures

• Reduce complexity of
  – Open surgery (HR)
  – (T)EVAR

• Renal protection
  – reduce amount of contrast (EVAR)

• «Reduces risk of paraplegia»
Results

• 36 patients
  – 15 PRAA, 11 TAAA, 4 Descending
  – 6 A&V
  – 5 B-Dissection

• 30d results
  – mortality: 3 deaths (9%)
    • 2x intestinal 1x respiratory and MOF
    • 1x B-dissection
Conclusion

• Hybrid Repair allows treating complex aortic dissection
  – Unfortunately still quite invasive procedure
  – VORTEC and Gore Hybrid Graft facilitate challenging anastomosis

• Combined open/endovascular debranching
  – Promising new option
  – Allows staging complex aortic surgery
  – Allows addressing patients unfit for open surgery or EVAR
  – Reduces invasiveness of open surgery and complexity of EVAR
Limitations

• Diseased arch and branches
THANK YOU FOR YOUR ATTENTION

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