Combined Endovascular and Surgical Repair of Thoracoabdominal Aortic Pathology: 

Hybrid TEVAR

William J. Quinones-Baldrich MD
Professor of Surgery
Director UCLA Aortic Center
UCLA Medical Center
Los Angeles, California
Disclosures

• Speaker / consultant
  W.L. Gore
  Endologix
  Medtronic
Repair of type IV thoracoabdominal aneurysm with a combined endovascular and surgical approach
Hybrid Approach to Aortic Pathology

- **Surgical component**
  - Debranching of visceral or extracranial vessels
  - Other

- **Endovascular component**
  - Adequate seal zone either present or created

- **Rationale** – *Decrease magnitude of procedure*
  - No thoracotomy required
  - No high aortic cross-clamping required
  - Ischemia time of each visceral organ limited to time required to do distal anastomosis; simultaneous ischemia to all visceral organs avoided
    - *Can be staged*
“Hybrid” Approach to Thoraco-abdominal Pathology: Results – 17 series with 10 or more patients as of 2011 (most considered unsuitable for open repair)

- Mortality – 0 to 31 %; 14% average
- Morbidity – 30 %
- Paraplegia – 5 %
- Cardiac complications – 5 %
- Renal insufficiency / failure – 12 %

Results have lead some to recommend as preferred approach and others to consider it a poor option

- Poor choice for ruptures or emergency repair
- Interval aneurysm rupture is a risk
Combined endovascular and surgical approach (CESA) to thoracoabdominal aortic pathology: A 10-year experience

William Quinones-Baldrich, MD, Juan Carlos Jimenez, MD, Brian DeRubertis, MD, and Wesley S. Moore, MD, Los Angeles, Calif

1998 - 2014 – 51 high risk patients

40 TAA – 8 II, 23 III, 9 IV

5.8 % mortality - 2 interval aneurysm ruptures

Paraplegia – 2/40 at risk (5 %); II,III 1/31 (3.2%)

2/8 (25%) Single Stage ; 1/32 (3%) Two Stage

2 year cumulative survival – 78%
Staged Approach .... Expanded!
Staged approach: Type III TAA and Arch and DTA
Staged retroperitoneal debranching, endovascular repair of type III TAA; observation of proximal DTA:

Stage 1: Ilio celiac, SMA, L renal bypass

Stage 2: R ilio-renal bypass, conduit, TEVAR
Staged retroperitoneal debranching, endovascular repair of type III TAA; observation of proximal DTA:

Stage 1: Ilio celiac, SMA, L renal bypass

Stage 2: R ilio-renal bypass, conduit, TEVAR
Type A D s/p Arch, Elephant trunk and TEVAR: Reversed Hybrid
Infrarenal Aortic Replacement as Part of Debranching

Pledgeted proximal anastomosis

Graft size to match available endograft
May require distal tapering
Lumbar/Sacral artery revascularization
Lumbar/Sacral artery revascularization
Subcutaneous Conduit: Two stage approach

Conduit passed through retrocolic tunnel

Closure of peritoneum
Combined Endovascular and Surgical Approach to Thoraco-abdominal Pathology: Conduit placement (1rst stage) and thrombectomy (2nd stage)
Chronic Dissection = Thick restrictive septum
False lumen is where aneurysm forms after dissection.
• 51 y/o woman
• Known Type B aortic dissection
• s/p left thoracotomy and descending thoracic aortic repair on L heart bypass
• Radiation therapy L breast for cancer
• Presented with left chest and back pain
• Renovascular HTN
• Pulmonary fibrosis
Hybrid repair for type B dissection with False Lumen Intentional Placement (FLIP)
Type B Dissection with proximal DTA Aneurysm
significant hypertension and LLE claudication
FLIP Intravascular Ultrasound
Type B Dissection with proximal DTA Aneurysm and renal malperfusion and LLE claudication:

Hybrid TEVAR w FLIP
FLIP – From false lumen to true lumen
FLIP – Preservation of intercostal flow
FLIP: Anatomic Requirements

• Proximal landing zone in the true lumen
  - Proximal undissected aorta
  - Proximal surgical or endovascular graft
  - Elephant trunk

• Access from the false lumen to the true lumen
  - Proximal tear

• Distal landing zone
  - Distal false lumen (staged repair)
  - Infra-renal graft with retrograde de-branch
Infrarenal Aortic Repair With or Without False Lumen Intentional Placement (FLIP) of Endografts for Hybrid Management of Complex Aortic Pathology

- Between 2006 and 2016, 27 patients with TAAA underwent open infrarenal aortic replacement combined with endovascular repair in a single or multiple stage procedure.
- 16 patients (59%) also had AD.
- Transient spinal cord ischemia occurred in 3 patients (11%); All 1 stage procedures.
- Peri-operative mortality was 3.7%. One patient died due to interval rupture.
Infrarenal Aortic Replacement and Abdominal Debranching for Aortic Dissection

- 16 patients with type A or B aortic dissection
- 15 chronic; 1 sub-acute
- 8 with Juxta or infrarenal AAA
- 13 with proximal DTA aneurysm
- 5 malperfusion
- 10 done in 2 or more stages
- 5 False lumen Intentional placement of endograft (FLIP)
- 3 have not required proximal repair
  Decompression of false lumen?
False Lumen Intentional Deployment (FLIP) for Endovascular Repair of Aortic Dissection

- Allows full expansion of endograft
- Improves distal perfusion
- May preserve intercostal / lumbar flow
- Excludes weaker false lumen
- IVUS / Trans esophageal echo is critical
- Limited Experience
- F/U to determine if behavior of false lumen is altered (Decompression?)
Repair of type IV thoracoabdominal aneurysm with a combined endovascular and surgical approach

Durable?
Durable?
Combined
Endovascular
and
Surgical
Approach
(CESA or
Hybrid
Approach)

13 yr
follow up
Durable Combined Endovascular and Surgical Approach (CESA or Hybrid Approach)

19 yr follow up
Combined Endovascular and Surgical Repair of Thoracoabdominal Aortic Pathology: **Hybrid TEVAR**

Open surgery and endovascular alternatives are complementary

Patient selection is critical

Hybrid repair of aortic pathology should be in the armamentarium of all caring for patients with aortic pathology
Thank you

aorticcenter.ucla.edu

310-AORTAFIX (310-267-8234)