EVAR Explantation and Revascularization for Failure and Infection: Technical Tips and Results

I have no relevant financial relationships to disclose at this time

Lessons Learned So Far

- Uncommon, but we are doing more of them
- Device infection and endoleak are primary indications for explantation
- Problems can occur with any device
- Operations are more difficult because of peri aortic inflammation
- Technical considerations important

Management of Type I Endoleak

- Choose the right operation the first time
- Consider branched or fenestrated endograft, or open repair, if anatomy borderline for standard EVAR
- Proximal leaks sometimes can be salvaged with a cuff or stent
  Salvage by open repair does not always require complete graft explantation

Our Approach to Infected EVAR

- CTA critical for operative planning
- Drain abscesses prior to operation
- Visceral and renal bypass, and a remote path for the new graft may be necessary
- Remove the infected graft, debride periaortic tissues and sew to healthy aorta
- In-situ graft covered by omentum
- Organism-specific IV and long-term oral antibiotics

Choice of Incision and Exposure are Everything

Choice of Incision

- Body habitus
- Surface anatomy/costal flare
- Arteries and veins to be isolated
- Position of aortic clamp
- Need for medial visceral rotation
- Self-retaining retractor
Preferred Approach for EVAR Explant

Exposure based on body habitus

Critical maneuver for exposure of upper abdominal aorta

Incision along side of xiphoid process

Transperitoneal Exposure of Suprarenal or Supramesenteric Aorta

• Mobilize left renal vein
• Divide crura of diaphragm
• Phrenic, and rarely a lumbar artery require ligation and division

GENERATION OF REPAIR

EVARS are Failing!

Schanzer et al, Circulation 2011

74 yr old man S/P EVAR 2008 with progressive sac enlargement

Treatment of 56 Type I Endoleaks at Mayo Clinic*

April 2002 – January 2018

<table>
<thead>
<tr>
<th>Type</th>
<th>Ext. limb / coils</th>
<th>Uni-iliac</th>
<th>PTA</th>
<th>Open**</th>
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<tbody>
<tr>
<td>Type 1a</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>45</td>
<td>19</td>
<td>10</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Type 1b</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>10</td>
<td></td>
<td>11</td>
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<tr>
<td>Rupture / Symptomatic</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>18</td>
<td>1</td>
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* Some have more than 1 treatment
** 27 other open explants for type II (23), III (2), IV (2)
Cryopreserved Aortoiliac Graft for Infection

- First choice for conduit
- ABO match not imperative
- Preparation requires approximately 45 minutes
- Buttress branch closures done in the lab
- Keep lumbar arteries anterior
- Grafts may dilate 40% and lengthen 10% under pressure

Total Graft Exploration / Graft-Enteric Fistula

- Avoid bowel
- Bypass renal/visceral arteries if needed
- Clamp aorta and iliac arteries
- Explant infected endograft
- Debride to healthy aorta
- Place new graft and wrap with omentum
- Repair bowel defect

69 year old man with left hydronephrosis, rapidly enlarging saccular aneurysm infrarenal aorta

- Known 3.5 cm infrarenal AAA
- BCG instillation for bladder cancer
- Presents with back and flank pain, and 4.8 cm saccular aneurysm
- Treated with EVAR and left nephrostomy
- No long term antibiotics
- Now has fatigue, weight loss and psoas abscess

Serial CT Angiograms over 6 months

Saccular aneurysm and left psoas soft tissue changes

Operative Treatment and Postop CTA

- Left thoracoabdominal incision, kidney down
- Trifurcated femoral cryopreserved allograft for SMA and renals
- EVAR explant
- Cryopreserved aorto-iliac graft
- Omental wrap

Recent Series of EVAR Infections

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<tbody>
<tr>
<td>No. pts.</td>
<td>21</td>
<td>12</td>
<td>36</td>
<td>180</td>
<td>33</td>
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<tr>
<td>Time to Dx (mos)</td>
<td>11</td>
<td>32</td>
<td>20</td>
<td>22</td>
<td>1</td>
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<tr>
<td>Mortality (%)</td>
<td>4**</td>
<td>17</td>
<td>8</td>
<td>11</td>
<td>39</td>
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<tr>
<td>Any morbidity (%)</td>
<td>71</td>
<td>83</td>
<td>75</td>
<td>35</td>
<td>NR</td>
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<tr>
<td>Re-infection (%)</td>
<td>NR</td>
<td>NR</td>
<td>6</td>
<td>5</td>
<td></td>
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<tr>
<td>Late graft-related (% complications)</td>
<td>5</td>
<td>NR</td>
<td>4</td>
<td>10</td>
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</table>

* Currently over 45 EVAR explants
** A additional late deaths, 1 graft-related
# Low Frequency Disease Consortium
Defining risk and identifying predictors of mortality for open conversion after endovascular aortic aneurysm repair

Subhankar Talai, MD; Anurag W. Bokh, MD; Catherine E. Chang, MD; Dan Niel, MD
Robert S. Prater, MD; David E. Stoney, MD; Scott A. Rattet, MD, PhD, et al.

2002-2014

- VQI review of EVAR explant compared to open AAA repair
- Explant 159 pts; open AAA 3741 pts
- Non-adjusted 30 day mortality higher for explant group, 8% vs. 3%
- MACE similar
- Post-op mortality and morbidity driven by patient covariates and intra-op factors

Summary

Type I Endoleaks

- Best to do the ‘right’ operation the first time
- Plan the initial endovascular or open repair so there is a ‘bail out’ solution
- Most patients referred to us are in need of explantation
- Type of open conversion is based on anatomy and risk

Infected Aortic Endografts

- Incidence seems to be on the rise
- Graft explantation is difficult and often requires in situ techniques
- Bypass of renal and visceral arteries prior to aortic clamping is beneficial in select cases
- Mortality ranges between 10-15% and risk of complications is high