Sorry to curb the enthusiasm, but how to treat the infected endografts?

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Epidemiology

• Overall Graft infections : 1 to 6 % (except dialysis)
• Aortic graft infection :< 1 %
• Aorto bi-femoral graft infection: 2%
• infra-inguinal bypass > 6%
• Graft for dialysis access : 3 à 35%
• EVAR 0.2 to 5%

Diagnosis and management of prosthetic vascular graft infections L. Legout et al. Med Mal Infect 2012
# Risk Factors for Graft Infection

<table>
<thead>
<tr>
<th>Patient</th>
<th>Operation</th>
<th>After intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Angiography</td>
<td>Inflammatory wound</td>
</tr>
<tr>
<td>Men</td>
<td>Groin incision</td>
<td>Seroma</td>
</tr>
<tr>
<td>Obesity</td>
<td>Long intervention</td>
<td>Haematoma</td>
</tr>
<tr>
<td>Heart failure</td>
<td>Redo Surgery</td>
<td>Pseudo-aneurysm</td>
</tr>
<tr>
<td>Immunodeficiency</td>
<td>Emergency</td>
<td></td>
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<tr>
<td>Diabetes</td>
<td>Bowel suturing</td>
<td></td>
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<tr>
<td>Kidney failure</td>
<td></td>
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<tr>
<td>COPD</td>
<td></td>
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<tr>
<td>Leg ulcer</td>
<td></td>
<td></td>
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<tr>
<td>Prolonged hospital stay</td>
<td></td>
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</tr>
</tbody>
</table>

**Local complications:** graft infection. M.R. Back. Rutherford's vascular surgery (7th ed.)

**Vascular graft infections.** B Hasse et al. European Journal of Medical Sciences 2013

Inflammatory AAA, jejunal adherence to the sac
Symptoms of EVAR infection

- 2004-2014 multicentric, USA
- 206 patients
  - 180 EVAR
  - 26 TEVAR

<table>
<thead>
<tr>
<th>Presenting symptom</th>
<th>No. (%) (N = 206)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>137 (66)</td>
</tr>
<tr>
<td>Back</td>
<td>71 (52)</td>
</tr>
<tr>
<td>Abdominal</td>
<td>47 (34)</td>
</tr>
<tr>
<td>Groin</td>
<td>8 (6)</td>
</tr>
<tr>
<td>Chest</td>
<td>7 (5)</td>
</tr>
<tr>
<td>Flank</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Fever/chills</td>
<td>137 (66)</td>
</tr>
<tr>
<td>Aortic fistula</td>
<td>55 (27)</td>
</tr>
<tr>
<td>Endoleak</td>
<td>50 (24)</td>
</tr>
<tr>
<td>Rupture</td>
<td>23 (11)</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>10 (5)</td>
</tr>
</tbody>
</table>
Imaging a suspicion

CTA with periaortic neck infiltration in contact with duodenum

A PET CTA with uptake in the neck (potential enteric fistula?)
Determine the scenario with PET-CT

- Spondylodiscitis
- Endocarditis
- Stent in femoral position infected

Berard et al. Circulation 2014
Difficulties and Strategy

Duodenal adherence to aortic neck During EVAR explantation

Duodenum direct suture for prosthetic enteric fistulae
Difficulties and Strategy

Gore C3 infrarenal
Clamp planning: suprarenal
Risk for renal arteries: low

Cook suprarenal
Clamp planning: supracoeliac
Risk for renal arteries: high
Difficulties and Strategy

Bridge for aorto-enteric fistula with Gore C3
No difficulties in extraction at day 7
No risk of iliac damage
Tubed pericardium

Gore C3 with right bell bottom
Left iliac calcification
Aorto-bifemoral bypass
Debulking
Omentoplasty
Outcomes


- TEVAR are worse than EVAR
- Polymicrobial and BGN are hard to treat
- Autogenous and antimicrobial grafts do it better
Sonication of stentgrafts explanted

• First described in orthopaedic joint infection
• Ultrasound waves brake the biofilm
• Maximum release of microorganisms in the sonicate fluid

Prosthetic sonication protocol used in the Mayo Clinic Clinical Microbiology Laboratory.

Sonication of explanted stentgrafts

• Sonication was started in our Bordeaux University Hospital, France, in 2011.

• Out of 29 infected graft investigated
  • 10 (34.5 %) were negative in culture without sonication
  • but only one (3.5 %) remained negative in sonicate fluid culture.
Real-Time Microscopic Observation of *Candida* Biofilm Development and Effects Due to Micafungin and Fluconazole

Yukihiro Kaneko, S. Susume Miyazawa, O. Takada, Masatomo Hakariya, S. Satonoi Matsutomi, H. Ohno, Yoshitsugu Miyazaki

May 2013

Anti-fungal at 5th hour

SAEF Bordeaux Protocol: per-operative treatment
Carbapenem + Daptomycin + Candine
Candida Albicans infection

<table>
<thead>
<tr>
<th>Variable</th>
<th>1 hour</th>
<th>4 hours</th>
<th>8 hours</th>
<th>24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGS vs IG</td>
<td>Log₁₀ RF</td>
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<td>Log₁₀ RF</td>
<td>Log₁₀ RF</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>0.40</td>
<td>1.11</td>
<td>3.51</td>
</tr>
<tr>
<td>IGSy vs IG</td>
<td>0.38</td>
<td>1.43</td>
<td>2.94</td>
<td>3.93</td>
</tr>
</tbody>
</table>

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Staphylococcus Aureus meticillin resistant

Viable counts CFU / mL

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<tr>
<th>Variable</th>
<th>1 hour ( \log_{10} \text{RF} )</th>
<th>4 hours ( \log_{10} \text{RF} )</th>
<th>8 hours ( \log_{10} \text{RF} )</th>
<th>24 hours ( \log_{10} \text{RF} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGS vs IG</td>
<td>0.61</td>
<td>1.29</td>
<td>1.26</td>
<td>2.32</td>
</tr>
<tr>
<td>IGSy vs IG</td>
<td>0.66</td>
<td>1.84</td>
<td>1.95</td>
<td>4.08*</td>
</tr>
</tbody>
</table>

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Conclusions

- **Rapid Identification of microorganisms to target drug therapy**
  - Sonication of explanted material

- **Multidisciplinary approach**
  - Close surveillance
  - Adequate Imaging

- **Find Solutions to reduce Reinfections**
  - Biological conduit
  - **Use of Synergy graft when prosthetic**
  - Adapted pre-operative antibiotic
Thank you for your attention

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