How to Prevent and Treat Graft Complications During and After Aortic Surgery

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Infection Impact

- Approximately 80 million surgical procedures performed in the USA (60% hospital setting).
- SSI noted in 1.9% of hospital admissions
  - Underestimated due to >50% diagnosed post discharge.
  - Each cost $18,000, increases to $90,000 if implant involved.
  - SSI with deep space infection due to resistant organism approaches cost of infected implant.
- Infection dominates as reason for readmission (~24%)
  - Vascular readmission are the most costly of all studied.

SSI Prevention

CDC recommendations (JAMA Surgery, 2017)

1. Patients should shower with soap night before surgery.
2. Antimicrobials administered before incision.
   - 10-15 minutes for peak concentration.
3. Skin preparation with alcohol based solutions.
   - Fire risk with cautery...chlorhexidine least flammable.
4. Clean/Clean-contaminated cases antibiotics should not be continued after closure.
   - Antibiotics should be re-dosed every 1500 ml of blood loss or q4, depending on nature of surgery.
5. No topical antimicrobials applied to incisions.
6. Glycemic control (BGL< 200mg/dl)
   - Tight glycemic control BGL 80-120 had ↑ mortality
7. Normothermia should be maintained.
   - JHH TAAA: most arrive at ICU >36°C, ↓ re-exploration
8. Increased oxygen (80%) during surgery and after extubation for 6 hours.
   - RCT in colon surgery (80% v 30%), ↓↓ SSI by 39%

SSI Prevention

CDC recommendations

No recommendation:
- Biotic irrigation of cavity
- Antibiotic impregnation of implants
- Antimicrobial wound dressings
  - “Space suits”
Results of “Bundles” to Reduce Infections in

- Fernandez-Prada, Annals Vasc Surg, 2017:

<table>
<thead>
<tr>
<th>AAA &amp; EVAR</th>
<th>Clean surgery in 90%</th>
<th>Complicated surgery in 10%</th>
<th>LE amputations</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSI:</td>
<td>4.9%</td>
<td>0%</td>
<td>33.3%</td>
</tr>
<tr>
<td>SS comp:</td>
<td>13.1%</td>
<td>2.1%</td>
<td>11.9%</td>
</tr>
</tbody>
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Intra-Operative Variables: NSQIP

- **Dominate** as reason for readmissions
- Open wound: OR 1.5
- Operative time: OR 1.2 for each increase in one hour
- Staging procedures
- Better imaging (fusion)
- Resident involvement

Diagnosis of Infected Aortic Graft

- Always in delayed fashion
  - Mean: 22 months post EVAR (VLFDC)
  - 34% infection with initial EVAR (UTI)
- Back pain(66%), fever/chills (66%)
  - Aortic fistula (GIB) 27%
  - Episodic nature may delay dx
- Initial EVAR/TEVAR for rupture
  - Contact with contiguous structure
- Infection without erosion: gram positive
- Infection with erosion: polymicrobial and fungus

Imaging of Infected Graft

- EGD must get very distal
- CT: gas in sac, lack of tissue plane inflammation fluid
- Tagged WBC scan: confirmatory for subtle CT

Patient Preparation for Explant

- Control infection to extent possible
  - IV Abx: targeted or broad spectrum with anti-fungal for erosion
  - Drain sac (if no endoleak)
- **Ensure adequate nutrition (NJ or CPN)**
  - Prealbumin, transferrin
  - Normalize nutrition markers pre-surgery
- Preoperative echocardiography
  - Most pts require supraceliac/SMA clamp (JVS)
- LE vein mapping if NAIS planned
  - 30 for ao-iliac ; 45-60 cm for ao-femoral
- Bilateral ureteral stents (day before)

Key Operative Steps: Preservation of Omentum & Control

- Chronically infected (yrs)
Key Operative Steps: Vascular Grafts

- Rifampin soaked graft as "Go-to".
- 2400 mg in 200cc soak for 60min+
- Size grafts for aorta and iliac diameters, especially for endograft.
- Kinetics: bacteriocidal for 7 days

Perioperative Management of SIRS

- Frequent antibiotic redosing intraoperatively (q1500ml).
- Culture data for guided therapy.
- Remove ureteral stents pre-discharge from ICU to avoid superinfection.
- NAIS: little to no Abx needed on basis of graft
- No consensus on length of therapy or suppression:
  - JHH: IV Abx till CRP and ESR are normalized (3-6 mos)
  - Switch to PO Abx for 3 mos, recheck ESR and CRP
  - CRP and ESR remain normal: stop all Abx, recheck q 3m
  - CRP and ESR re-elevate: Tagged WBC scan to rule out undrained collection/abscess

Preventing Graft Complications

- "An ounce of prevention is worth a pound of cure".
- Surgeons have to manage intraoperative factors to lower infection and readmissions.
- Delay in diagnosis of infected grafts is common as surgery is usually remote.
- Patient preparation is crucial.
  - Sac drainage is option for most infected EVAR
  - Prosthetics = Autogenous Reconstructions Periop.
  - Long term results are superior with antibiotic impregnation of prosthetics
- No consensus on antibiotic therapy to reduce reinfection risk.

Thank You