University Hospital

Parkland Hospital
Contemporary Management of Aortic Graft Infections

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Outline

• Presentation and diagnosis
• Treatment options and outcomes
• Role for endovascular therapy
Aortic Grafts

- Widespread use
  - since 1954
- Excellent durability
- Inert material
  - No rejection
  - Susceptible to infection
Aortic Graft Infections

- Affect 2-3% of all prosthetic grafts
- Higher in groin incisions
- Higher in emergency cases
Infection Sources
INTRAOPERATIVE CONTAMINATION

Patient Factors

- Skin edge
- Redo operations
- Lymphatics
- Groin incision
Efficacy of prophylactic antibiotics in vascular surgery: An arterial wall microbiologic and pharmacokinetic perspective
S. Lalka, J Malone, D Fisher Jr., V. Bernhard, D Sullivan, D Stoeckelmann, R. Bergstrom

• N=29 with groin incisions
• Preoperative antibiotics
• Samples for culture
  – Serum
  – Subcutaneous fat
  – Atheroma
  – Arterial wall

JVS 1989; 10: 501-9
• 41% had positive arterial cultures

• 70% *S. epidermidis*
  – Half slime producers

*Efficacy of prophylactic antibiotics in vascular surgery: An arterial wall microbiologic and pharmacokinetic perspective*

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JVS 1989; 10: 501-9
INTRAOPERATIVE CONTAMINATION

Patient Factors

• Remote infection
  – UTI
  – Pneumonia

• Distal source
INTRAOPERATIVE CONTAMINATION

Patient Factors

• Laminated thrombus
  – 15-20% + cultures
  – 10% s. epidermidis

• Lymphatics
INTRAOPERATIVE CONTAMINATION

Surgeon Factors

- Hole in glove
- Break in sterile technique
- Concomitant procedures
  - Cholecystectomy
  - Appendectomy
INTRAOPERATIVE CONTAMINATION

Surgeon Factors

- N = 40 graft procedures
  (most aortic)
- Preoperative antibiotics
- Randomised to glove change
- Cultured grafts and gloves

Zdanowski et al, Eur J Vasc Endovasc Surg 1999
INTRAOPERATIVE CONTAMINATION
Surgeon Factors

• Culture surgeon gloves & graft material
  – 33% surgeons’ gloves imprints positive for *S. epidermidis*
  – 75% grafts positive for *S. epidermidis*

• Glove change made no difference

• 25% of strains resistant to antibiotic!
Classification and Presentation
Aortic Graft Infections

Bandyk classification

- Early (< 4 months)
  - gram + and gram – organisms
  - entire graft infected
  - More obvious (cellulitis/sepsis)

- Late (> 4 months)
  - usually > 1 year after implant
  - *S. epidermitis*
  - may not involve entire graft
  - More subtle (drainage/PSA)
Presentation
Diagnosis of Graft Infection
CT Scan

• Good for obvious signs:
  – Perigraft fluid/air
  – Pseudoaneurysm
  – Aortic wrap disruption

• For low-grade infections:
  – 100% specificity
  – 55% sensitivity
MRI

- Better to detect small fluid collections
- Can differentiate inflammation vs. hematoma
- T2 weighted images
Diagnosis of AEF

- **EGD?**
  - Not specific
  - Not sensitive

- **CTA**
  - Air around graft
Treatment Options
Conservative Management

- Very sick patients / Critical location
- Low-virulence organisms
- Drain infected perigraft space + irrigation
- Life-long antibiotics
Conservative Management (cont’d)

- 30 – 40 % death at one year due to sepsis

- Contraindications
  - AEF
  - Virulent organisms
  - Anastomotic aneurysms
Partial Excision

- Localized infection
  - Femoral portion

- Low virulence organisms

- In situ vs. extra-anatomic
Total Graft Excision
Revascularization Options

Temporary/unusual
- Prosthetic graft
- Cryopreserved allograft
- Endovascular grafts

Permanent cure
- Extra-anatomic bypass
- Autogenous vein
Total Excision

Extra-Anatomic Bypass
Excision/Ectopic Bypass

*problems*

- Thrombosis of ectopic bypass
  -- Primary patency 43% at 3 years
  -- Limb loss 33% (UCLA series, arch Surg ’91)

- Reinfection of ectopic bypass 15%

- Aortic stump blowout
Replace with Prosthetic Graft

Rifampin-soaked Dacron  Silver-impregnated Dacron
Prosthetic Graft

*limited use!*

- May be appropriate for *limited* infections
  - Aortoenteric fistula
  - 15-20% reinfection rate

- **Rifampin, Silver impregnated grafts**
  - low virulence organisms (10% reinfection)
  - virulent organisms (40% reinfection)

- **Bridge procedure??**
Cropreserved Aortic Graft

- Requires 1-2 days to obtain
  - 30 minute prep time

- ABO compatibility?

- Excellent early results
  - Resistant to most infections
  - Easy handling
Cryopreserved Aortic Graft problems

- Side branch rupture
  - 10-20% acute bleeding

- Worse outcome in AEF

- 10-20% late graft failure
  - AEF
  - Pseudoaneurysms
Replace with Autogenous Vein

Neo-Aortoiliac System (NAIS) Reconstruction

(Clagett Procedure)
Autogenous tissue reconstruction in the management of infected prosthetic grafts


Infection is the most dreaded complication associated with implantation of a prosthetic arterial graft. Although remote bypass followed by complete removal of the infected prosthesis has proven to be a satisfactory method of treatment, in certain instances remote bypass alone is not feasible and other modes of surgical treatment must be employed. This report describes the use of autogenous reconstructions within the infected field, including endarterectomy and replacement of the infected graft with arterial or venous autografts in 24 patients. The key approach in these patients was (1) accurate preoperative assessment of the extent of graft infection, (2) aggressive surgical efforts to remove all infected prosthetic material, and (3) autogenous reconstructions within the infected field to supply critical vascular beds. Three patients died, for a mortality rate of 13%. There were no strokes and only two amputations. Suture lines involving autogenous tissue healed, even when in an infected field. In the aortofemoral group, preservation of aortic continuity is very desirable, when possible. We believe that these techniques provide the maximal potential for salvage of life and limb in the management of this dreaded vascular complication. (Surgery 1979; 85:82-92)

From the Department of Surgery, University of California, San Francisco, Calif.
Primary Patency

Assist Primary/Secondary Patency

81.7%

91%

Patency (%)

Months

Patency (%)
UTSW experience
1990-2011

- 250 operations
- 2325 hours
- 1875 Units transfused
- Results:
  - 90% patency
  - 90% limb salvage
  - 10% mortality
Endovascular Option

...theoretically unappealing!
Infected EVAR

a new problem
Endografts for the Treatment of Aortic Infection

Carlo Setacci, MD, Gianmarco de Donato, MD, and Francesco Setacci, MD

- **Mycotic AAA**: 25% recurrent infection
- **AEF**: 44% recurrence at 13 months
- **ABF**: 10% recurrence at 12 months
Endovascular Utility?

...temporary control of bleeding
Salmonella Aortitis

- Septic
- Acute MI
- Ruptured aneurysm
- Hypotensive
Temporary EVAR Coverage

• Rapid access to aorta

• Potential for balloon occlusion

• EVAR deployed
Temporary EVAR Coverage

- Immediate BP stable
- Allowed 6 weeks
  - IV antibiotics
  - MI recovery
  - Cardiac rehab
- Brought back for definitive Tx
Outcome

- Complete recovery
- Returned to work, normal life
- Graft patent, no re-infection
Summary

• Aortic graft infections
  – Rare
  – Wide range of presentation

• Multiple options for treatment
  – Individualize
  – Few = permanent cure

• Endovascular option = temporary
  – May be life saving!