Infected Aortic Grafts

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Background

Aortic graft infections are rare 0.2-5%

Graft/arterial interface disruption

Hemorrhage

Sepsis
Risk Factors

Patient factors
Procedural factors
Postoperative factors
Perioperative procedural factors
Microorganisms/Pathogenesis

GP organisms
  Staph aureus/ epidermidis
  Streptococcus viridans

GN organisms
  Ecoli
  Enterococcus

Fungal

Graft contamination vs hematogenous seeding
Presentation

Fever
Abdominal pain
Systemic symptoms
Psoas abscess
Groin abscess
Draining sinus tracts
Graft-enteric erosions – GI bleed
Aneurysm rupture
Aortobronchial fistula
Diagnosis

Establish presence of infection

Establish extent of infection

Mostly inferential

CTA

Delineate anatomy
Perigraft fluid
Abscess
Loss of fat planes
Ectopic gas
Presence of pseudoaneurysm
Diagnosis

MRI

Endoscopy (Extended UGI)

Bronchoscopy

FDG PET/WBC Scan

Positive Blood cultures
Preoperative Workup

Cardiac - echo

Pulmonary

Vein mapping

CRF?
Goals of Surgical Treatment

- Explant infected prosthesis
- Revascularize the aorta and its branches
  - Visceral
  - Renal
  - Pelvic
  - Lower extremities
- Minimize the risk of perioperative complications and late recurrent graft infection
Evolution of Surgical Treatment

Extra-anatomic bypass

*In situ* Prosthetic graft replacement

*In situ* allograft replacement

*In situ* autogenous venous reconstruction (NAIS)
Axillo-bifemoral Bypass

Excision of infected aortic bifurcation graft and axillofemoral bypass: case report.

Abstract

The management of infected abdominal aortic grafts and graft-enteric fistulas.

Abstract

Seven cases of infected aortic grafts or aorto-enteric fistulas following resection of an abdominal aortic aneurysm are reviewed. All cases were treated with axillo-femoral bypass and graft removal. Patients had recurrent fever, chills, and abdominal pain (5 patients), or massive gastrointestinal hemorrhage (2 patients). The two patients with massive gastrointestinal hemorrhage died. Three of the 5 long-term survivors had a recurrence of the retroperitoneal abscess after graft removal; one of these died. One axillo-femoral bypass graft required early thrombectomy. There have been no subsequent problems with any of the grafts in the 2.5 to 4 year followup period. Axillo-femoral bypass immediately before graft removal is the treatment of choice for infected or fistulous aortic grafts. Any delay in graft removal after the onset of symptoms should be avoided.
Axillo-bifemoral Bypass
Axillo-bifemoral Bypass

Staged procedure:
Creation of axillofemoral bypass
Explant aortic graft, with aortic stump closure
1989-1999 (n=36)

5 year primary patency rate 64%

5 year patient survival rate 56%

Recurrent infection rate 3%

Aortic stump blowout 3%

Failed grafts 35%
Axillofemoral bypass

**Advantages:**
- Excessive perigraft purulence
- Debilitated, severely malnourished, immunosuppressed pts

**Disadvantages:**
- 3-20% aortic stump blow out
- 11-20% amputation rate
- Pelvic ischemia
- Prolonged LE ischemia (if not staged)
**In situ Reconstruction: Rifampin soaked Dacron graft**

600 mg Rifampin powder

In 250mls of normal saline

for *at least* 30 minutes
Choice of Incision

Area to be treated and position of new graft

Body habitus

Need for medial visceral rotation

Position of proximal clamp

Relation of old graft to visceral/renal arteries

Prox. aneurysm or debris
Operative Approach

Always get supraceliac control

Isolate renal vein

Identify renal arteries

Suprarenal/ supramesenteric control

Debride to healthy aorta

Debride retroperitoneum
In situ Reconstruction: Rifampin Soaked Dacron Graft

Create new tunnel whenever possible

360 degree Omental wrap

Sartorius flap

Rectus femoris flap

Gerota’s fascia

Clinical research study

Evolution from axillofemoral to *in situ* prosthetic reconstruction for the treatment of aortic graft infections at a single center


Gustavo S. Oderich, MD, Thomas C. Bower, MD, Kenneth J. Cherry Jr, MD, Jean M. Panneton, MD, Timothy M. Sullivan, MD, Audra A. Noel, MD, Michele Carmo, MD, Stephen Cha, MS, Manju Kalra, MBBS, Peter Gloviczki, MD

1981- 2001 (n=117)
Median follow-up 3.4 yrs

<table>
<thead>
<tr>
<th></th>
<th>ISR (n=52)</th>
<th>AXFB (n=49)</th>
<th>p-value</th>
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<tbody>
<tr>
<td>5y primary patency</td>
<td>89%</td>
<td>48%</td>
<td>0.01</td>
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<tr>
<td>5y limb salvage</td>
<td>100%</td>
<td>89%</td>
<td>0.06</td>
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<tr>
<td>Reinfection</td>
<td>11%</td>
<td>17%</td>
<td>0.28</td>
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<tr>
<td>Major complications</td>
<td>30%</td>
<td>60%</td>
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Aorto-Enteric Fistula

Herald or massive GI bleeding

Systemic sepsis

Approach depends on hemodynamic stability

Supraceliac control or balloon occlusion

Proximal and distal control before dissection near bowel
Operative mortality (9%)  
stable pt 2.3%  
hemorrhagic shock 40%  
Polymicrobial cultures 85%  

Best reserved for pts with limited contamination

At 5 years:
Primary graft patency 92%  
Patient survival 59%  
Graft reinfection 4%
In Situ Rifampin Soaked Dacron Graft

**Advantages:**

- Expedient
- Avoids stump blowout
- 100% limb salvage
- Excellent primary patency rates

**Disadvantages:**

- Not a viable option for frankly purulent field
- Virulent organisms (MRSA, Rifampin resistant org)
- Need for long-term antibiotics
In situ Neo-Aorto-Iliac System (NAIS)

First described in 1993 for AGI
Autogenous vein grafts
Reversed vs. non-reversed
Evert and ablate FPV valves
Various configurations
Clinical research study

Long-term results of the treatment of aortic graft infection by in situ replacement with femoral popliteal vein grafts


Ahsan T. Ali, MDa, J. Gregory Modrall, MDb, Jennie Hocking, PAb, R. James Valentine, MDb, Horace Spencer, PhDa, John F. Eidt, MDa, G. Patrick Clagett, MDb

1990-2006 (n=187)
30d mortality 10%
5 year primary patency rate 81%
5 year patient survival rate 52%
Reinfection (graft disruption) 5%
Early limb loss 7%
Fasciotomy 25%
In situ Neo-Aorto-Iliac System (NAIS)

Advantages:

- Autogenous tissue (non-thrombogenic, infection resistance)
- Best conduit for infections with virulent organisms/abscess
- Short-term antibiotics

Disadvantages:

- Prolonged operative time
- Major amputations 5-10%
- 20-25% fasciotomy rate
- Chronic leg edema 15-30%
- Not for unstable pts
In situ Arterial Allograft (Cryopreserved)

Early experience*

Mortality 25%
Limb occlusion 9%
Reinfection 9%
Limb amputation rate 11-20%

*Noel et al; Abdominal aortic reconstructions in infected fields...JVS 2001
30d mortality 9%

At 5 years:

- Primary graft patency 97%
- Freedom from limb loss 97%
- Patient survival 51%
- Rupture rate 4%

n=220
**In situ Arterial Allograft (Cryopreserved)**

**Advantages:**
- Non-prosthetic graft
- Decreased risk of reinfection (?)
- Easier to debranch viscerales

**Disadvantages:**
- Expensive
- Availability
- Risk of blowout 3-9%
Infected Aortic Endografts

Same principle as aortic grafts

Patients may be sicker

Endograft explant is an added challenge
Infected Aortic Endografts
Infected Aortic Endografts

Mucosa

Bile stain from aortoenteric fistula
1997-2012 (n=24)

Rifampin soaked Dacron graft (n=15)

Cryopreserved allograft (n=4)

NAIS (n=2)

AXFB (n=3)

30d mortality 4%

Reinfection 4%
Treatment and outcomes of aortic endograft infection

Matthew R. Smeds, MD, a Audra A. Duncan, MD, b Michael P. Harlander-Locke, MPH, c Peter F. Lawrence, MD, d Sean Lyden, MD, e Javariah Fatima, MD, f and Mark K. Eskandari, MD, g on behalf of the Vascular Low-Frequency Disease Consortium, Little Rock, Ark; Rochester, Minn; Bradenton and Gainesville, Fla; Los Angeles, Calif; Cleveland, Ohio; and Chicago, Ill

2004-2014 (n=206)

Rifampin soaked Dacron graft (54%)

Cryopreserved allograft (26%)

NAIS (10%)

AXFB (5%)

30d mortality 11%

Reinfection 9%
## Comparative Results

<table>
<thead>
<tr>
<th></th>
<th>AXFB (%)</th>
<th>Cryopreserved Allograft (%)</th>
<th>Rifampin Soaked Dacron (%)</th>
<th>NAIS (%)</th>
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<tbody>
<tr>
<td>30d mortality</td>
<td>19</td>
<td>13</td>
<td>8</td>
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<tr>
<td>5yr patient survival</td>
<td>56</td>
<td>51</td>
<td>59</td>
<td>52</td>
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<tr>
<td>5yr primary graft patency</td>
<td>64</td>
<td>97</td>
<td>92</td>
<td>81</td>
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<tr>
<td>Reinfecion rate</td>
<td>3-15</td>
<td>4</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Rupture risk</td>
<td>3-20</td>
<td>4</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Freedom from limb loss</td>
<td>81</td>
<td>97</td>
<td>100</td>
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Postoperative care

Hemodynamic support

Be aware of signs of bowel ischemia or persistent sepsis

IV antibiotics for 6-8 weeks

Life long oral antibiotics for prosthetic reconstructions
Summary

Preop:
Key is patient selection, careful operative planning and execution

Operative:
Remove infected graft
Drain abscess
Individualize conduit to patient
Autogenous coverage of the graft

Postop:
Supportive care
Close follow-up
Imaging
Clinical signs/sx