SOUTHWESTERN MEDICAL COLLEGE MCMXLIII
Per Scientiam Servimus
SOUTHWESTERN
MEDICAL FOUNDATION

University Hospital

Parkland Hospital

Contemporary Management of Aortic Graft Infections

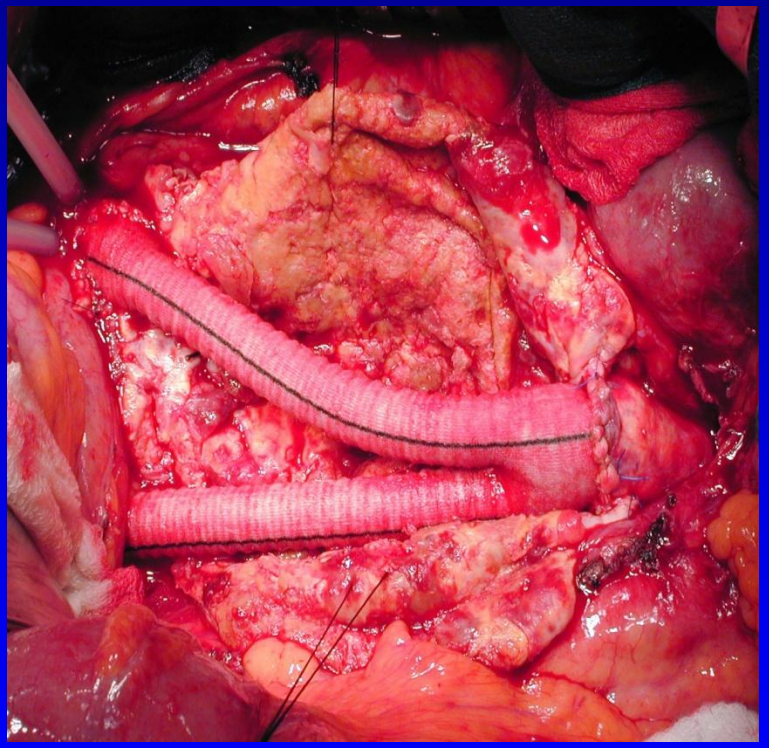
R. James Valentine, MD
Division of Vascular and Endovascular Surgery
UT Southwestern Medical Center
Dallas, Texas

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

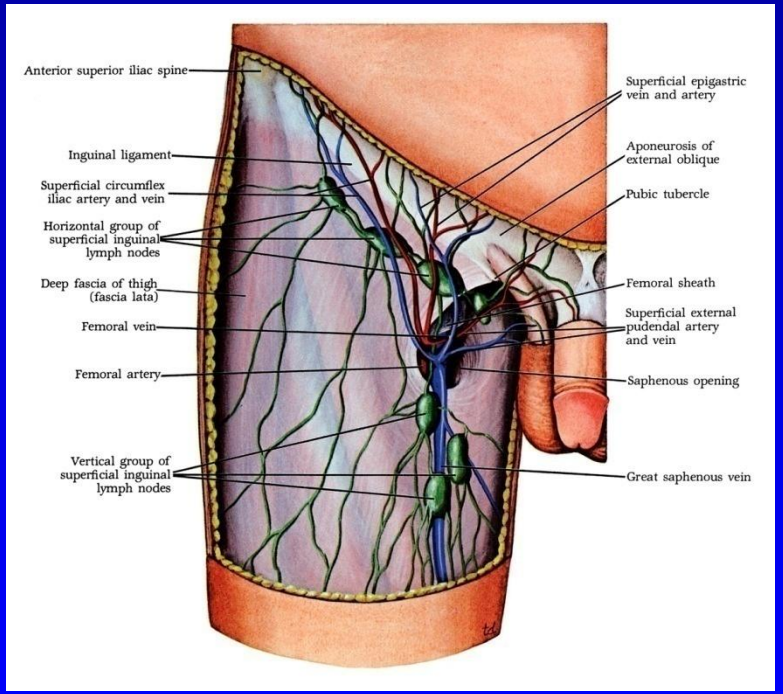
- Affect 2-3% of all prosthetic grafts
- Higher in groin incisions
- Higher in emergency cases

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

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

- 41% had positive arterial cultures
- 70% *S. epidermidis*
  - Half slime producers

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 !

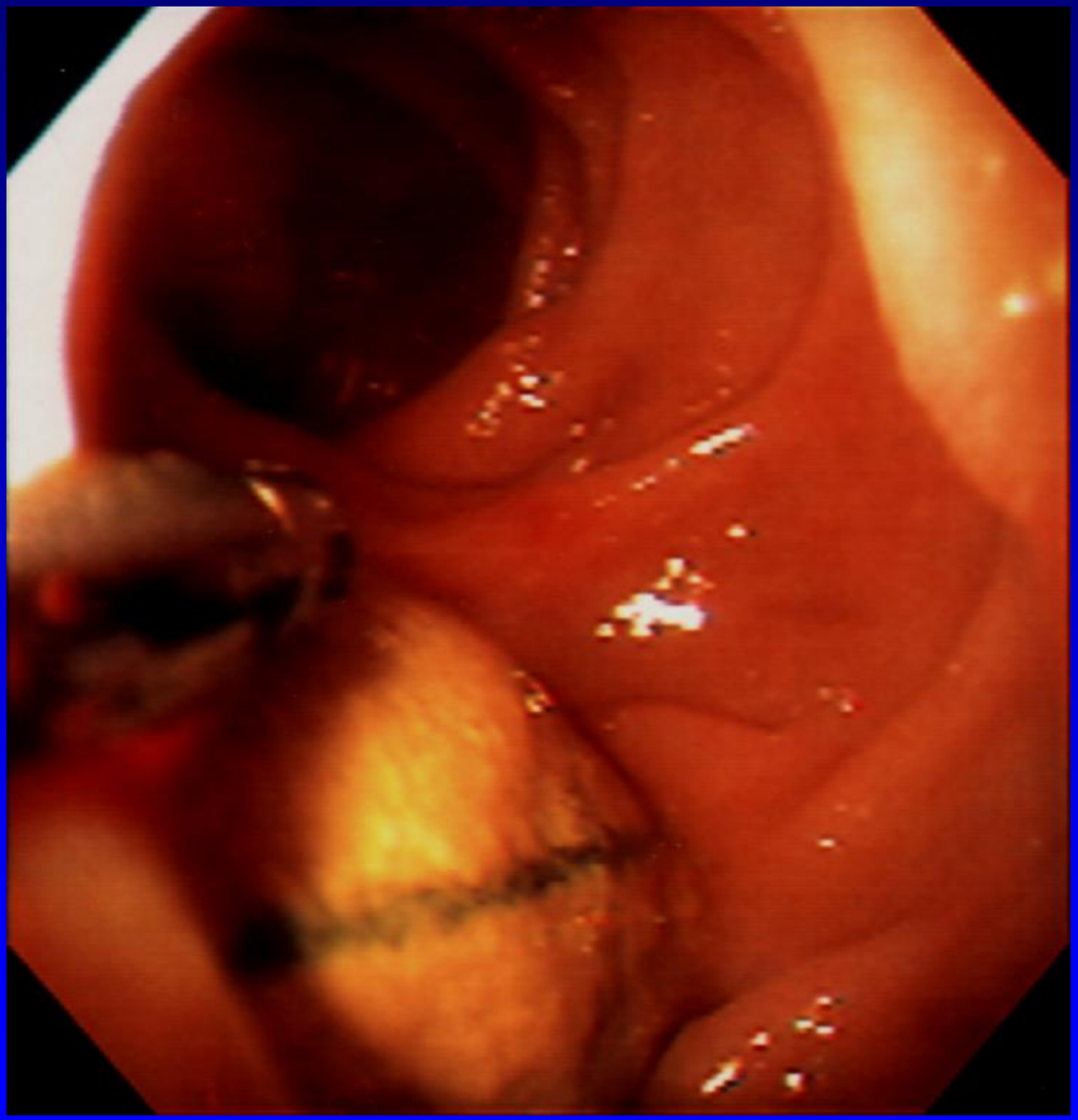
Classification and Presentation

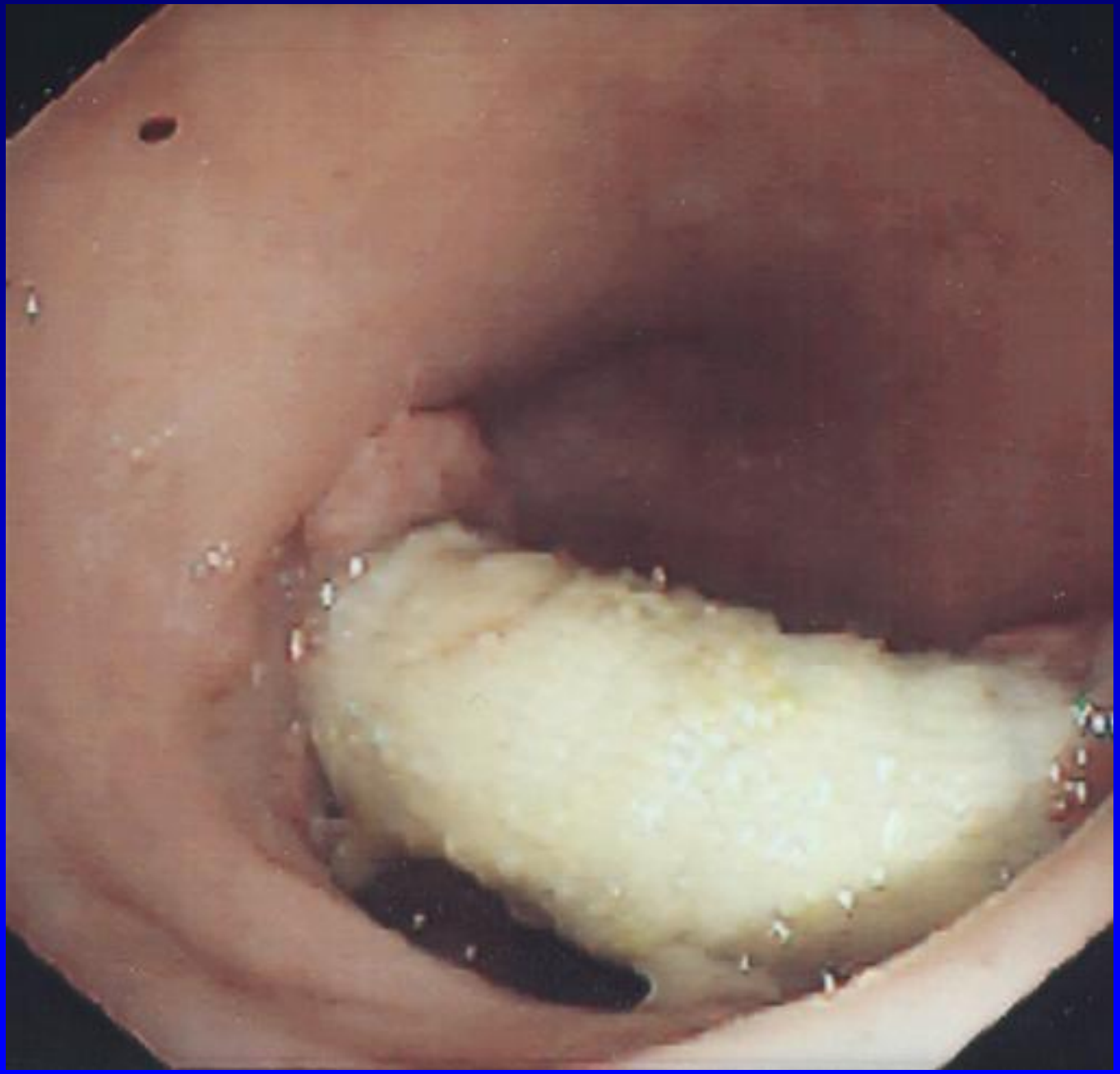
Aortic Graft Infections
Bandyk classification

- 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

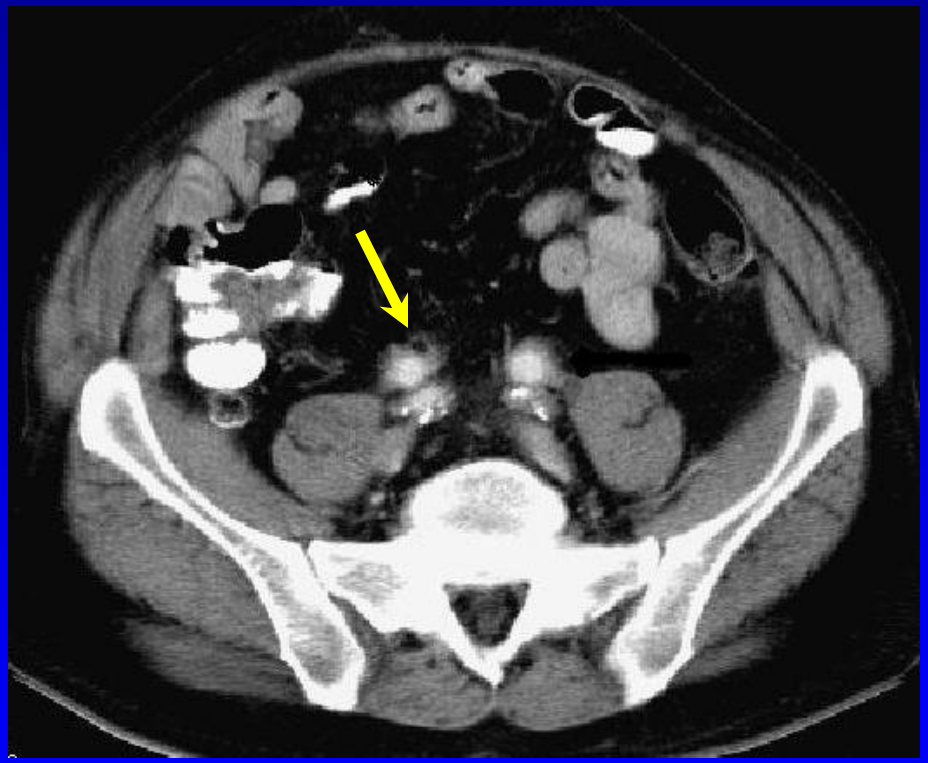
DH





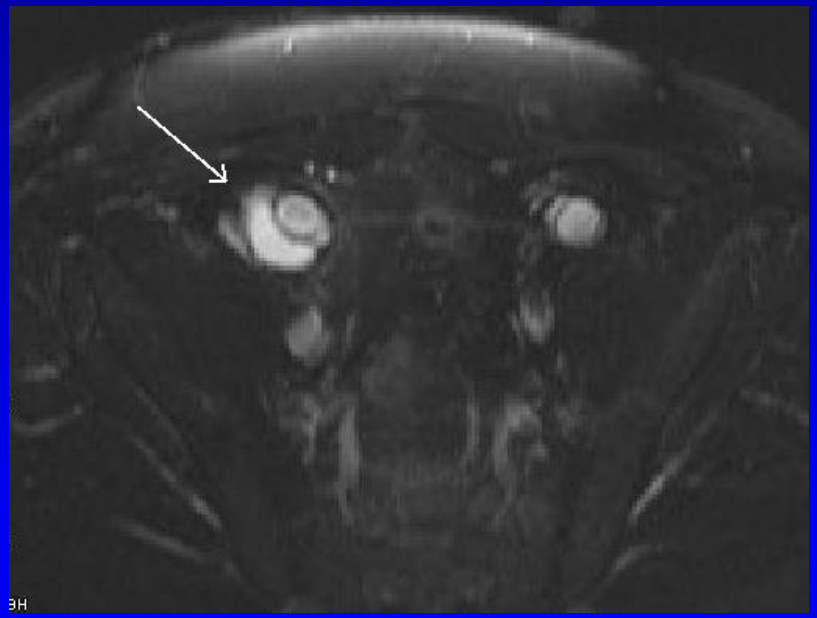
Diagnosis of Graft Infection

CT Scan



- Good for obvious signs:
  - Perigraft fluid/air
  - Pseudoaneurysm
  - Aortic wrap disruption
- For low-grade infections:
  - 100% specificity
  - 55% sensitivity

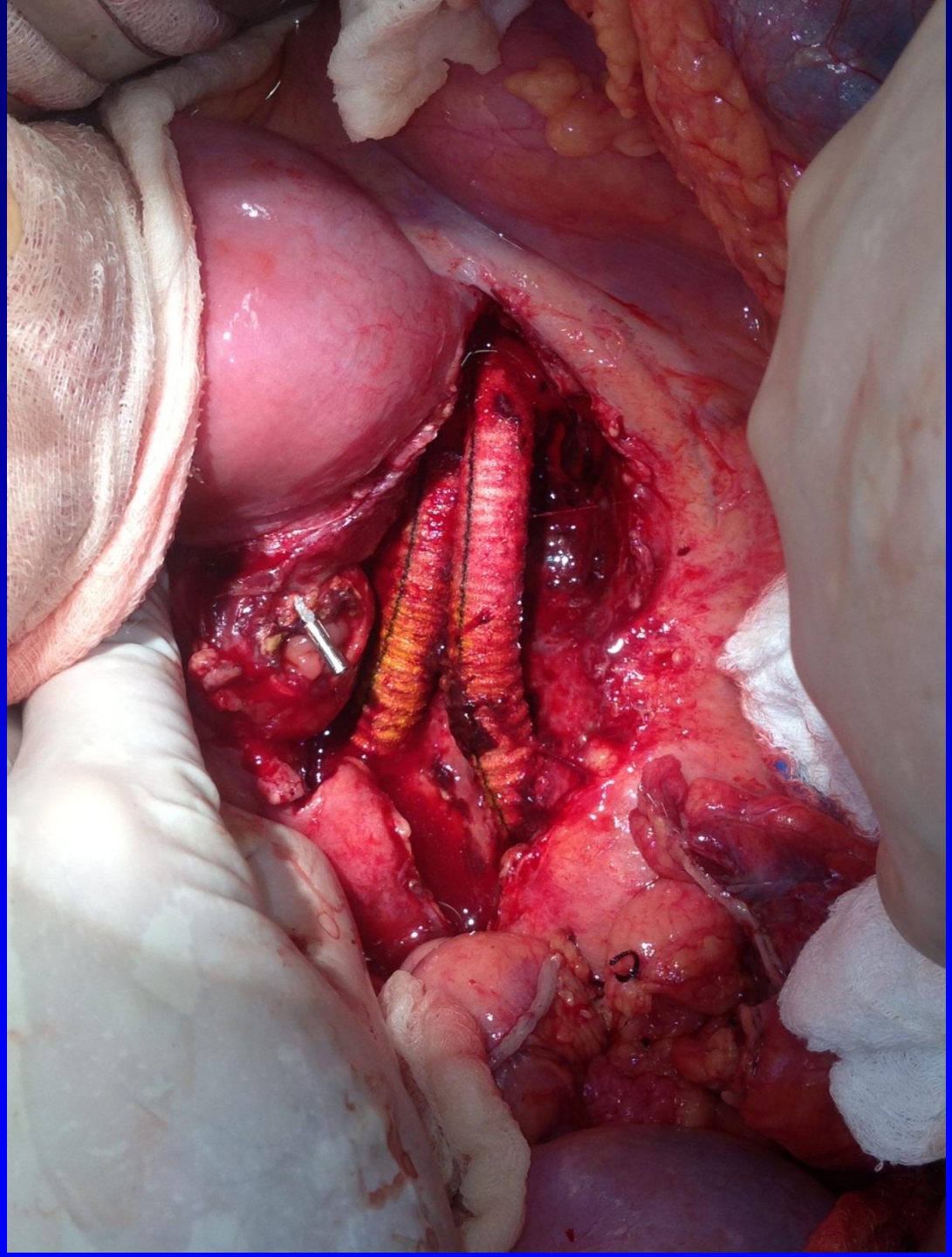
MRI



- 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

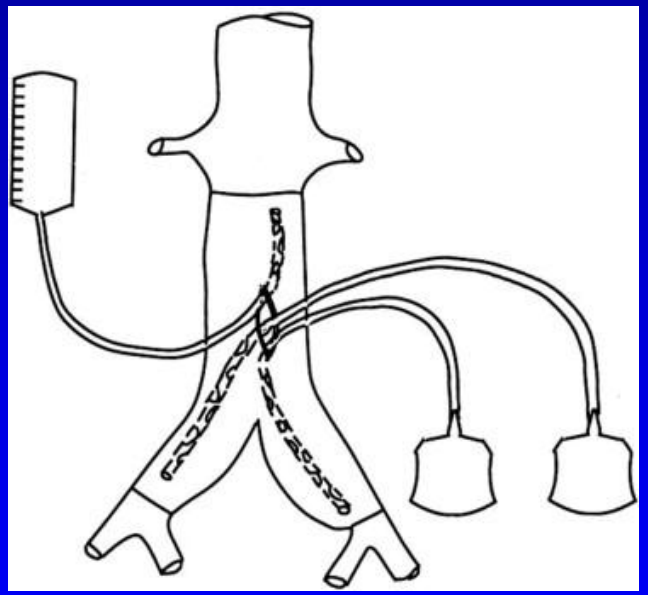
Conservative Management

- Very sick patients / Critical location
- Low-virulence organisms
- Drain infected perigraft space + irrigation
- Life-long antibiotics

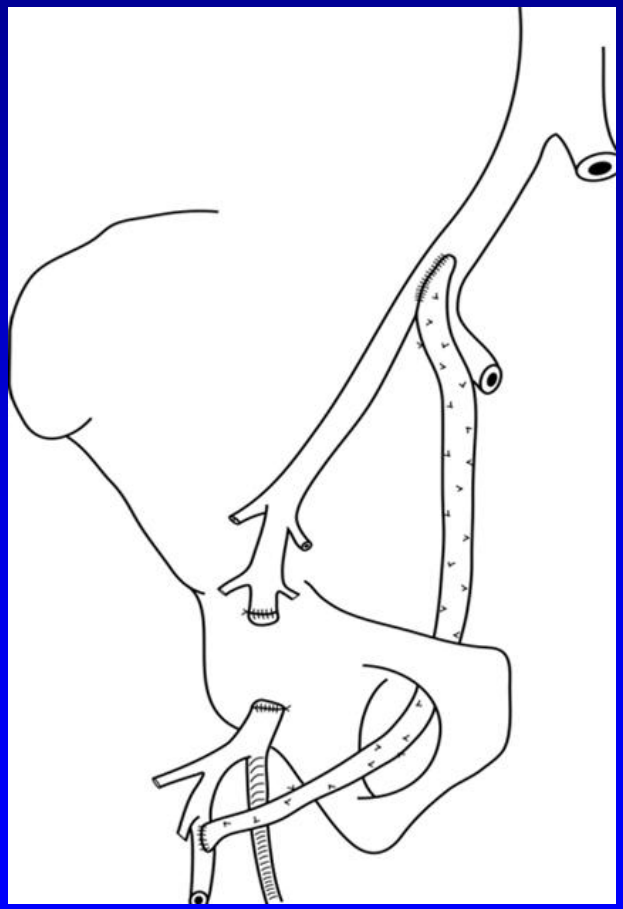
Conservative Management (cont'd)

- 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

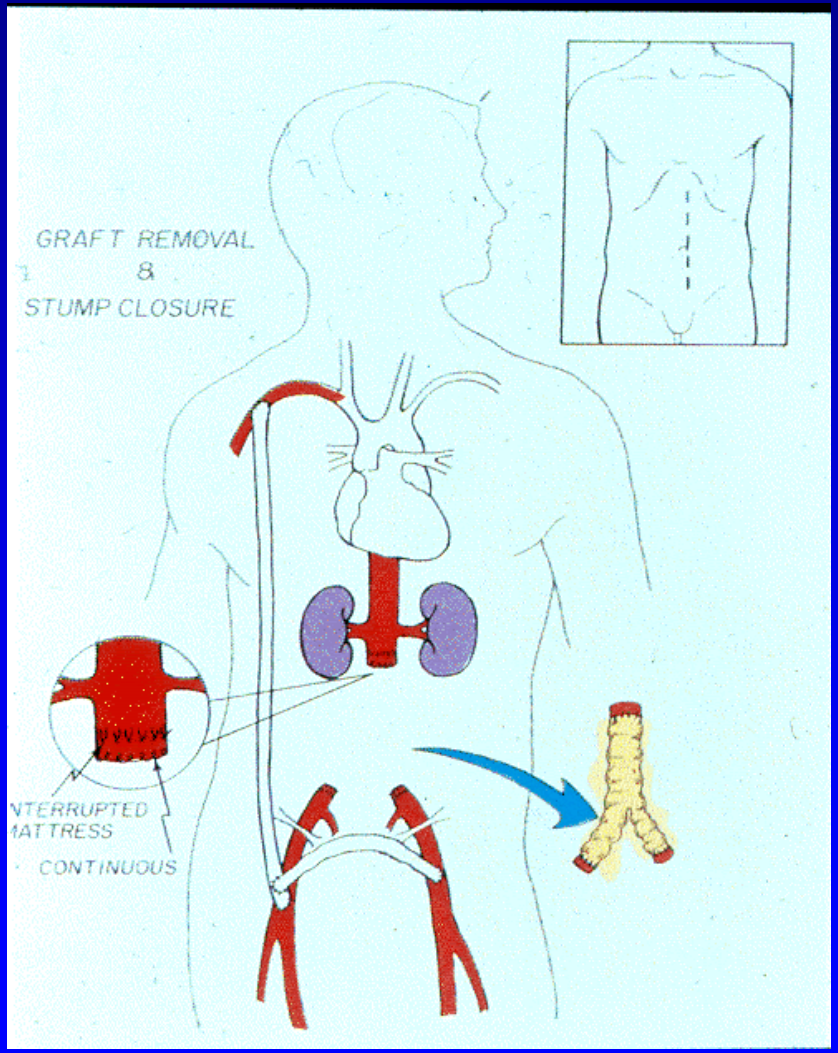
- Prosthetic graft
- Cryopreserved allograft
- Endovascular grafts

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

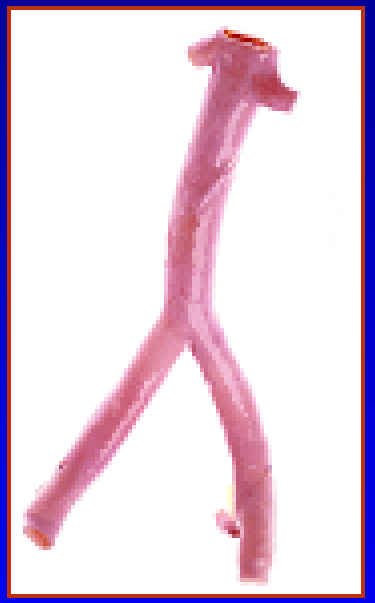
Prosthetic Graft

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??

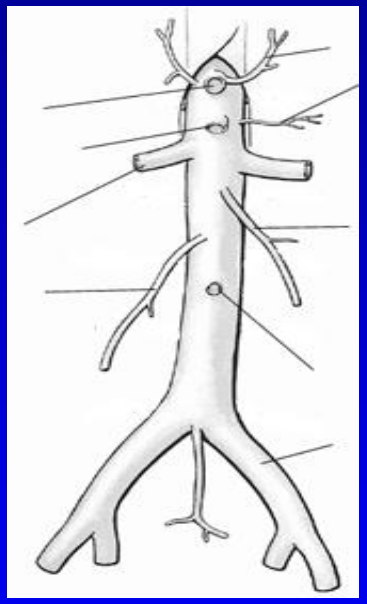
Cropreserved Aortic Graft

- 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

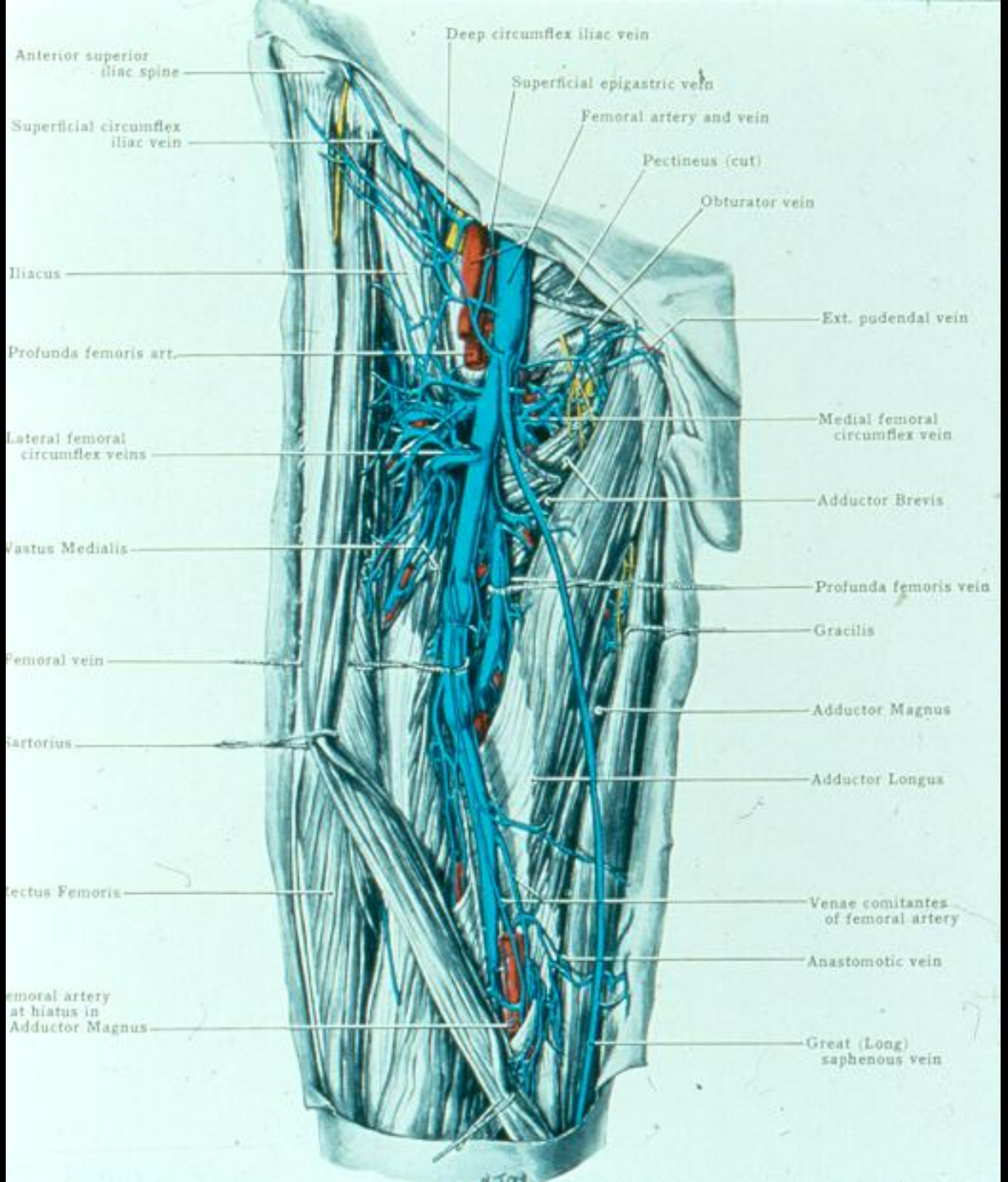
(Clagett Procedure)

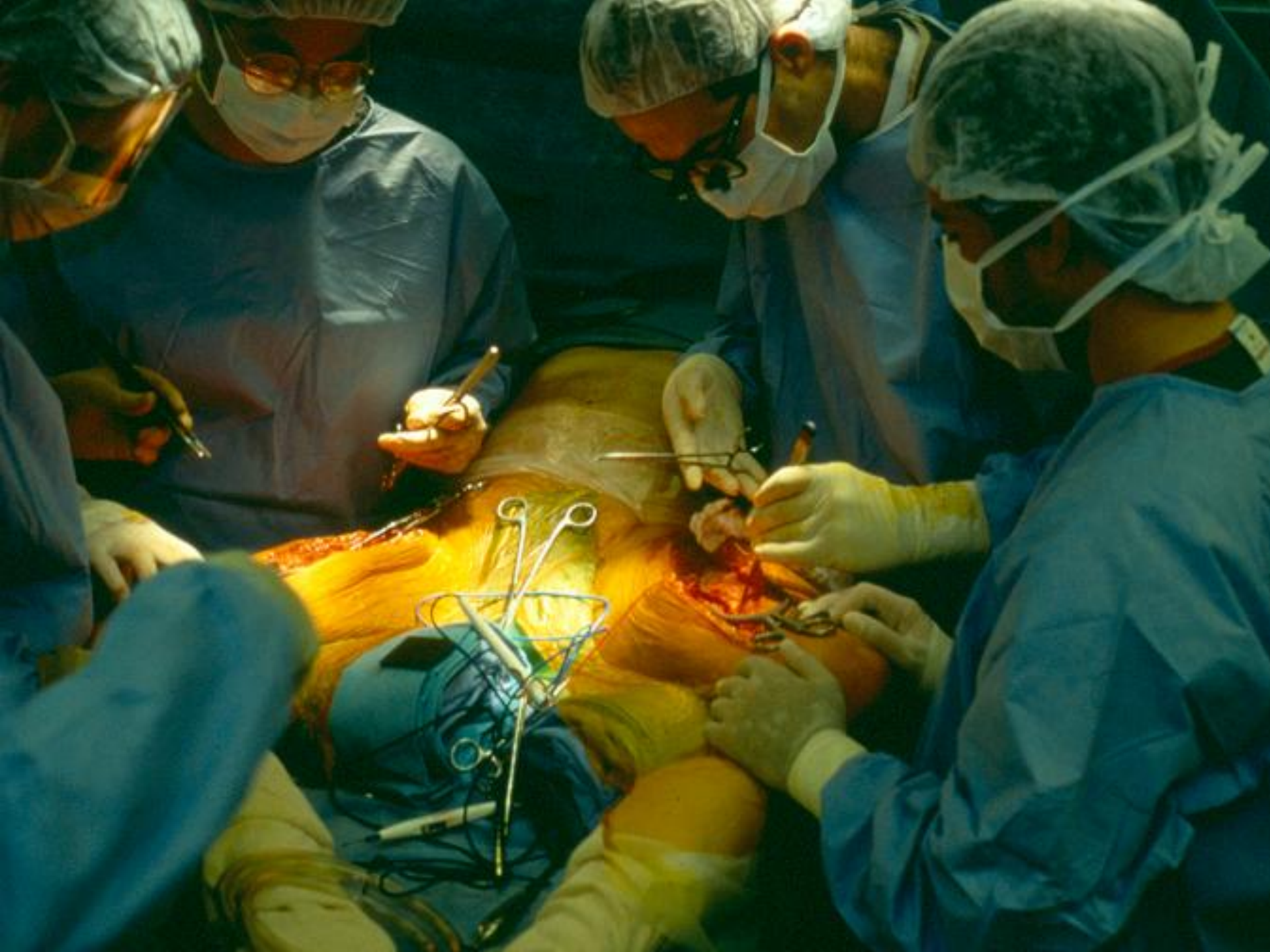
Autogenous tissue reconstruction in the management of infected prosthetic grafts

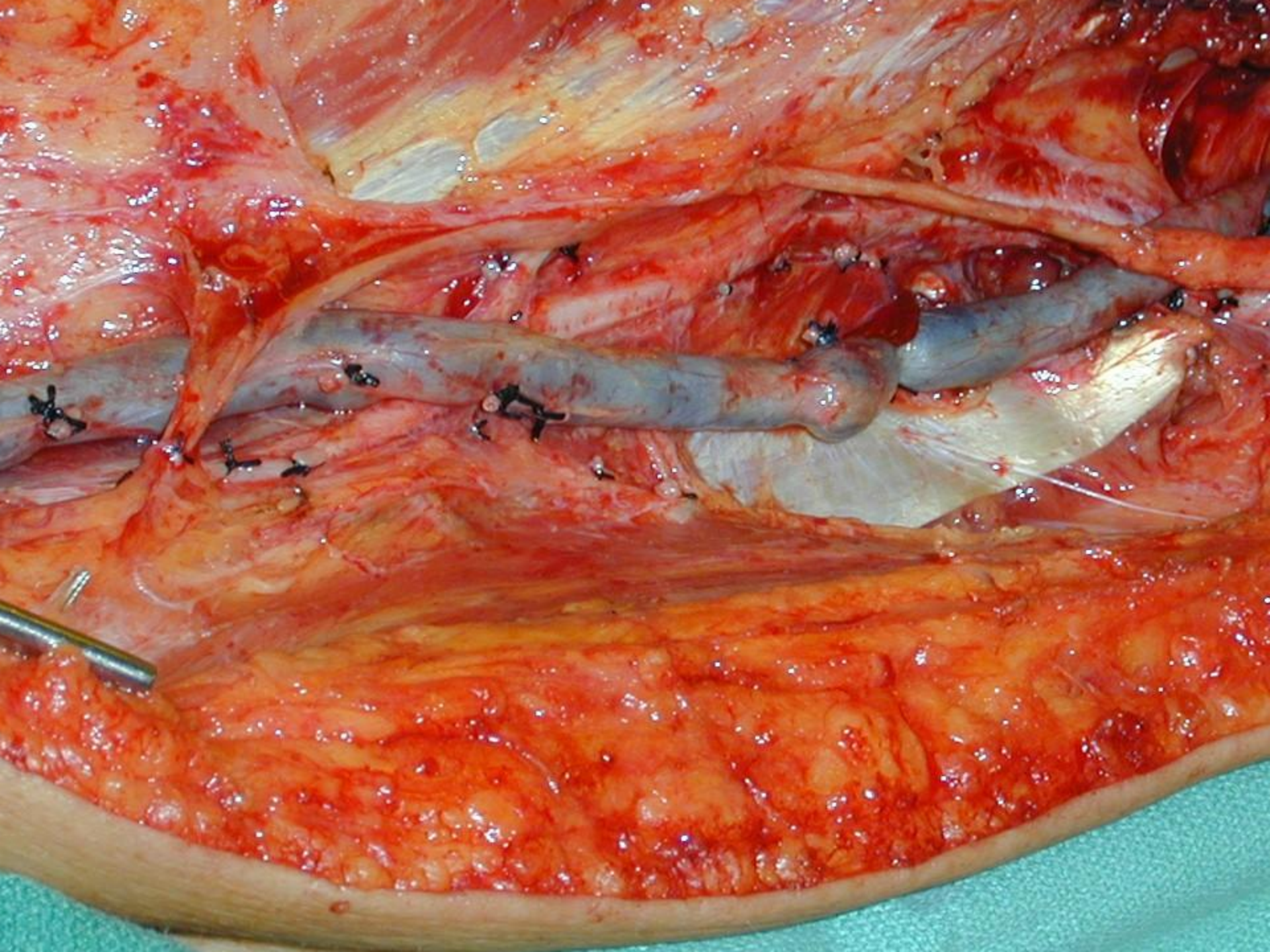
William K. Ehrenfeld, M.D., Bruce G. Wilbur, M.D., Cornelius N. Olcott IV, M.D., *and* **Ronald J. Stoney, M.D.,** *San Francisco, Calif.*

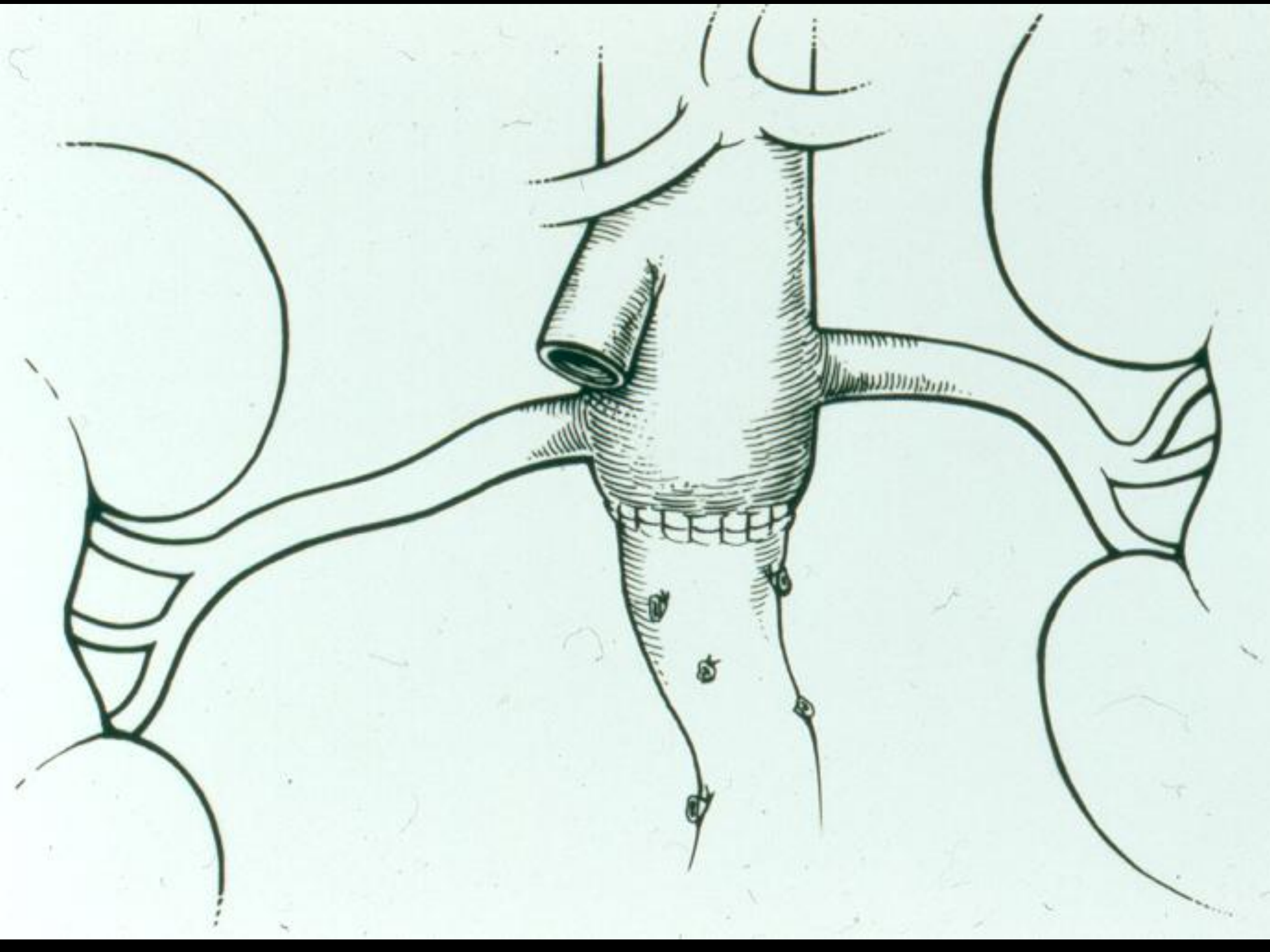
Infection is the most dreaded complication associated with implantation of a prosthetic arterial graft. Although remote bypass followed by complete removal of the infected prosthesis has proven to be a satisfactory method of treatment, in certain instances remote bypass alone is not feasible and other 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)

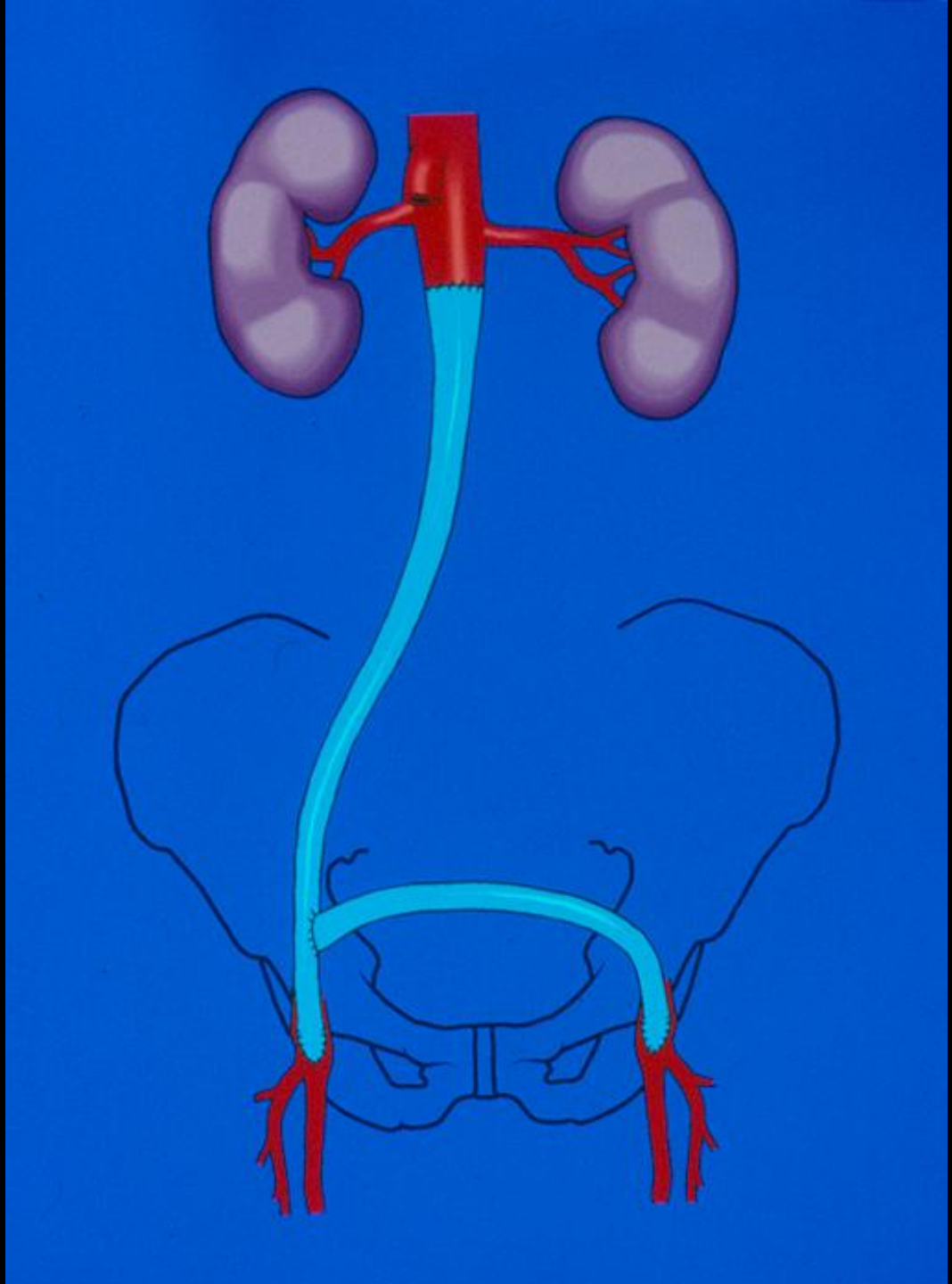
From the Department of Surgery, University of California, San Francisco, Calif.

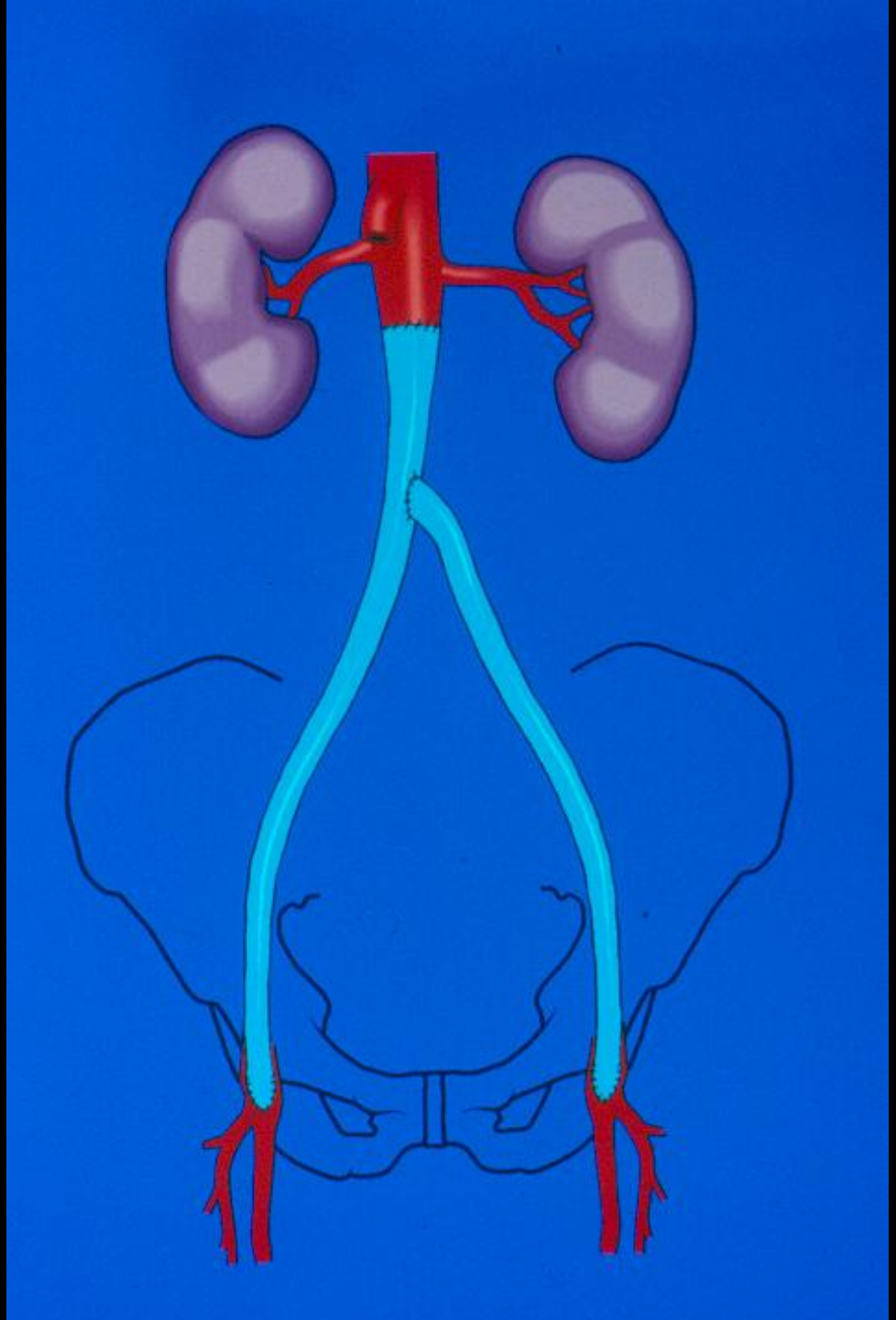

Deep circumflex iliac vein
Anterior superior iliac spine
Superficial epigastric vein
Femoral artery and vein
Superficial circumflex iliac vein
Pectineus (cut)
Obturator vein
Iliacus
Ext. pudendal vein
Profunda femoris art.
Medial femoral circumflex vein
Lateral femoral circumflex veins
Adductor Brevis
Vastus Medialis
Profunda femoris vein
Gracilis
Femoral vein
Adductor Magnus
Sartorius
Adductor Longus
Rectus Femoris
Venae comitantes of femoral artery
Anastomotic vein
Femoral artery at hiatus in Adductor Magnus
Great (Long) saphenous vein



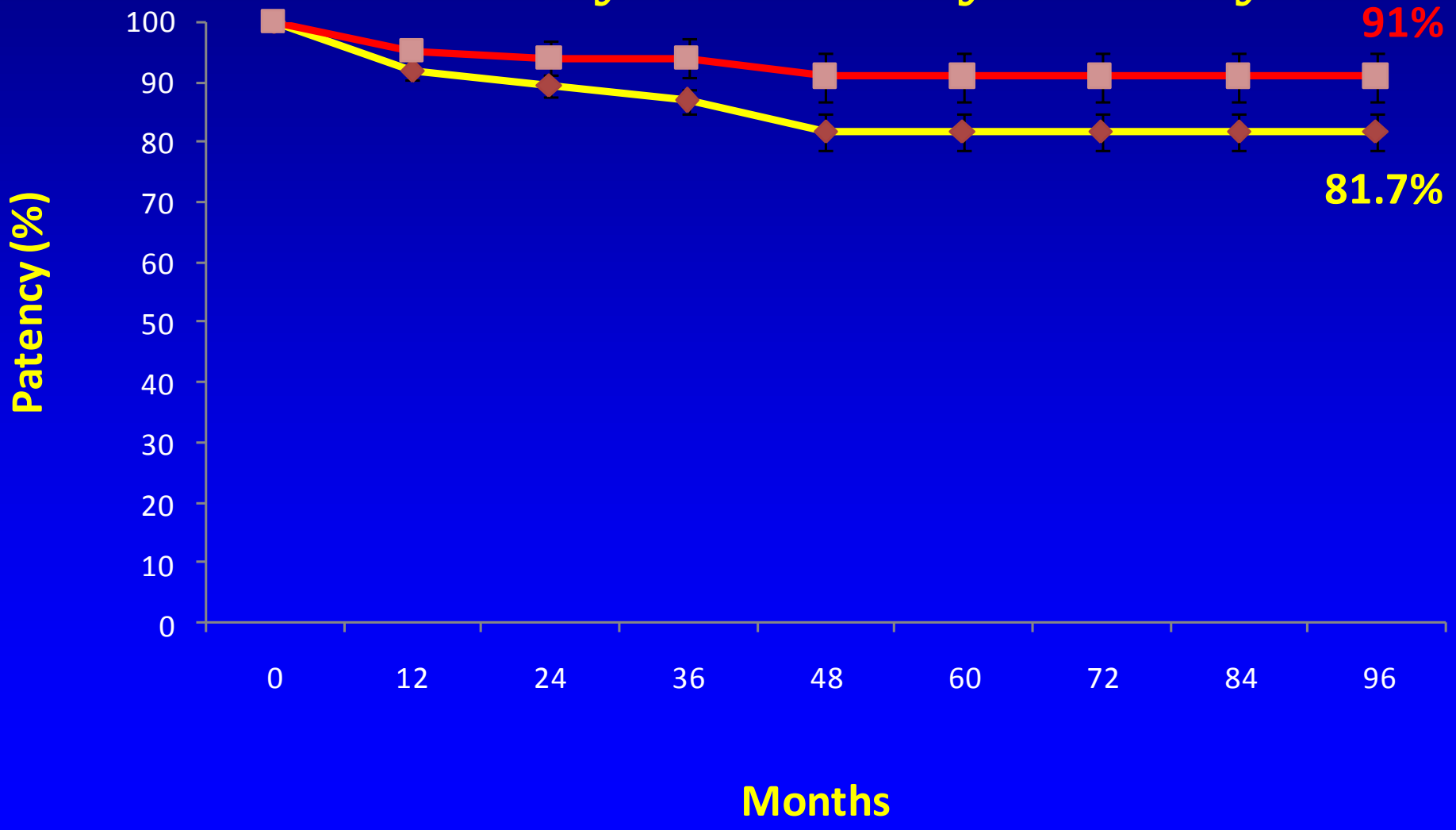




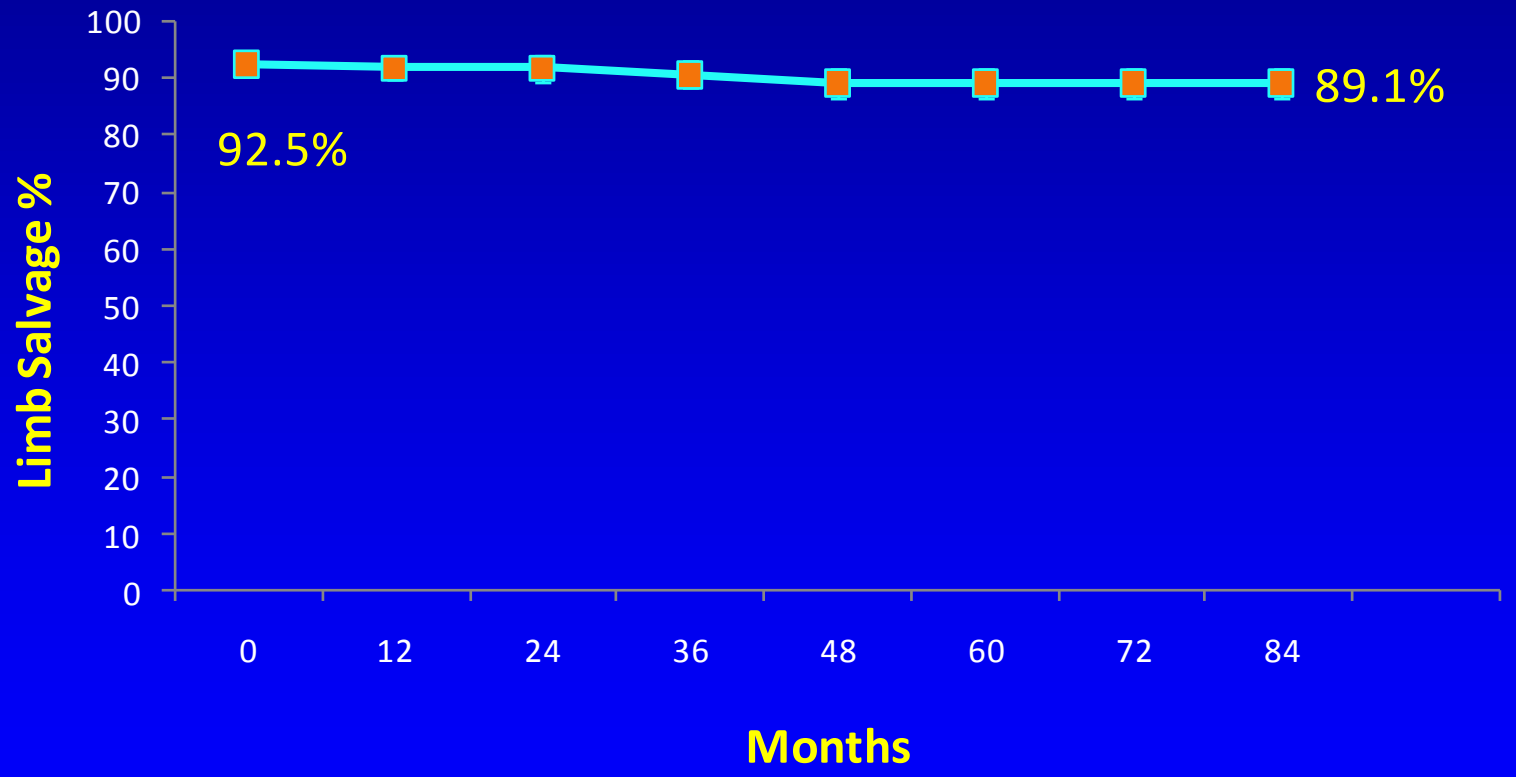




Primary Patency
Assist Primary/Secondary Patency



Limb Salvage



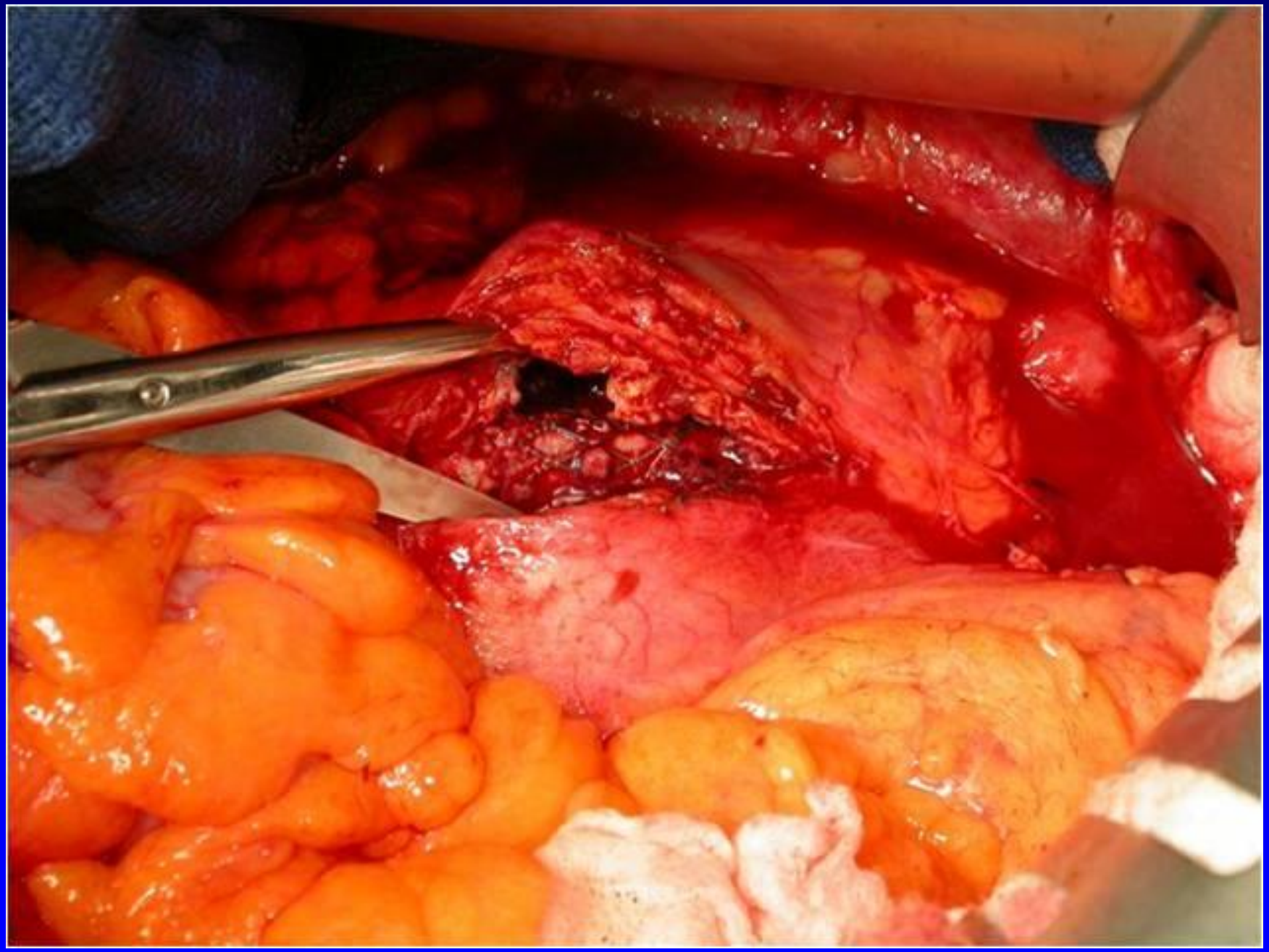
UTSW experience 1990-2011

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

Endovascular Option

…theoretically unappealing!

Infected EVAR
a new problem



ELSEVIER

Seminars in VASCULAR SURGERY

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

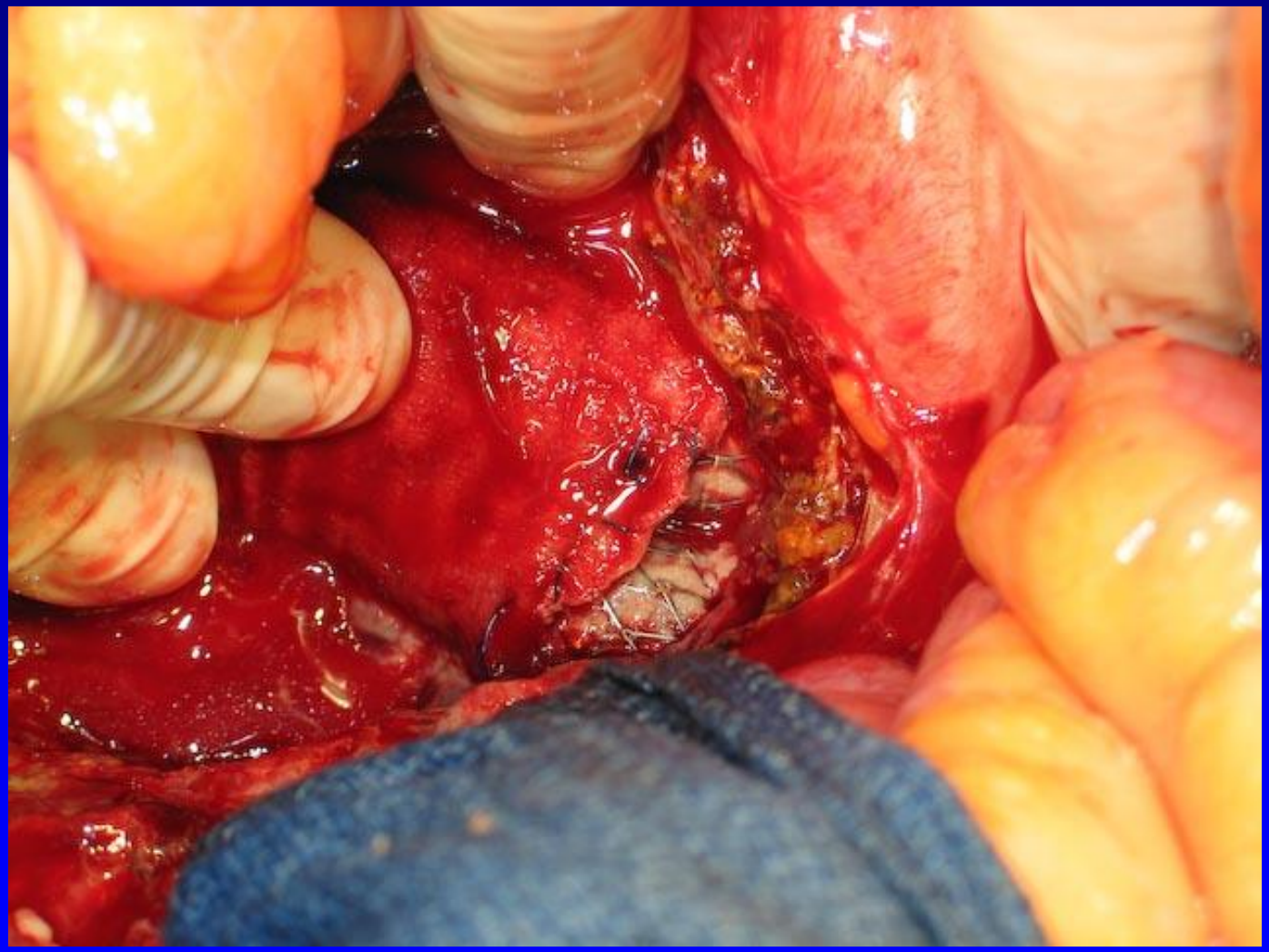
- Rapid access to aorta
- Potential for balloon occlusion
- EVAR deployed

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!

SOUTHWESTERN MEDICAL COLLEGE MCMXLIII
Per Scientiam Servimus
SOUTHWESTERN
MEDICAL FOUNDATION