

Infections in Total Joint Replacement

Prevention and treatment

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Incidence of Infection

- 0.5 - 2% of primary total joints
- 3 - 6% of revision total joints
 - 15% of all revision total joints are done for infection

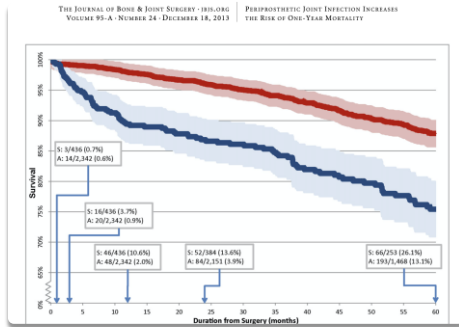
Financial Cost of Treatment

- \$60,000 - \$100,000

Personal Costs of Treatment

- Days/weeks in hospital
- One to many additional surgeries
 - More pain
 - More rehab
 - Less likelihood of having a successful, pain-free total joint

Personal Costs of Treatment



- Higher mortality (Zmistowski, et al, JBJS Am. 2013 Dec 18,95(24):2177-84)
 - 90 day: 3.7% vs. 0.8%
 - 1-year: 10.6% vs. 2%
 - 2-year: 13.6% vs. 4%
 - 5-year: 26% vs 13%

Risk Factors for Infection

- Smoking
- Diabetes
- Obesity
- Malnutrition
- Kidney disease
- Liver disease
- Autoimmune disease (RA, Lupus, Crohn's)
- H/O MRSA infection or colonization
- Lung disease/COPD
- CA
- Poor oral hygiene
- Anemia

Risk Mitigation Requiring Patient Engagement

- Stop smoking
- Lose weight (BMI < 40)
- Hb A1c < 8.0
- Decolonize Staph
- Correct malnutrition (Albumin > 3.5)
- Discontinue biologics (infliximab, etanercept, etc)
- See dentist
- Correct anemia



Surgeon-Directed Risk Mitigation

- Pre-op Staph decolonization
 - CHG bathing and mupirocin
- Perioperative IV antibiotics
 - Ancef better than Clindamycin or Vanco
- Surgeon/team vigilance for breaks in sterile technique
- Double glove
- Change gloves frequently
- Space suite
 - Don't touch face shield
 - Tape gloves to sleeves

Surgeon-Directed Risk Mitigation

- Minimize OR traffic
- UV light
- High air turnover
- Minimize operative time
- Irrigate with dilute Betadine or CHG
- Antibiotic cement
- Topical Vancomycin

Surgeon-Directed Risk Mitigation

- Water-tight wound closure
- Suture closure better than staples (BMJ 2010;340:c1199)
- Mepilex/Aquacel dressing
- Prevena® wound vac (Closed incision negative pressure therapy)
- Extended antibiotics (7+ days)

Infection - Acute versus Chronic

- Acute = 3-6 weeks from surgery
 - CDC definition < 90 days from surgery

Infection Detection

- Sometimes obvious – red, hot and very painful with gross purulence
- Sometimes subtle – mild swelling, mild pain, mild warmth, mild stiffness



Infection Detection

- Joint fluid tests:
 - Cultures
 - Cell count with differential
 - Alpha defensin
 - Leukocyte esterase
- Blood tests:
 - ESR and CRP
 - IL-6
 - D-dimer
 - CBC with differential



Infection Detection

- X-ray changes only if chronic
- Bone Scan abnormal up to 1 year after surgery so not very helpful
 - 99% sensitive but only 35% specific
 - Tagged WBC scan improves specificity
- PET scans 98% sensitive and specific

Infection Definition – 2018 MSIS

- One Major Criteria
 - 2 positive cultures
 - Sinus tract
- Minor Criteria (≥ 6 Points)
 - \uparrow Synovial WBC >3000
 - (+) Alpha defensin
 - \uparrow Synovial PMNs $> 80\%$
 - \uparrow Synovial CRP > 6.9
 - \uparrow Serum CRP
 - \uparrow Serum ESP
 - Purulence
 - 1 (+) culture
 - (+) Histology (> 5 PMNs/HPF)

Treatment Options

I&D with poly
exchange

1-stage
replacement
arthroplasty

2-stage
replacement
arthroplasty

I&D with Poly Exchange = DAIR

- **D**ebridement
- **A**ntibiotics
- **I**mpant
- **R**etention
- Acute infection, usually < 3 weeks after surgery
- Healthy patient (or very unhealthy patient)
- Low-virulence organism
- 6 weeks of IV antibiotics and at least 3 months of oral antibiotics
- 50% - 70% success

1-Stage Replacement Arthroplasty

- For acute or chronic infection
- Used more in Europe than U.S.A
- Healthy patient and low virulence organism
- Success 70% - 90%
- IV antibiotics for 6 weeks and then at least 3 months of oral antibiotics

2-Stage Replacement Arthroplasty

- “Gold Standard”
- Must be medically fit for multiple surgeries
- 6 week of IV antibiotics between removal and reimplantation and then 3 months of oral antibiotics
- Antibiotic-loaded cement spacer in the knee or hip for 6 weeks
- If the joint still looks infected after 6 weeks, then repeat the process.

Articulated Cement Spacers

Advantages

- Deliver high dose of antibiotic into joint
- Reduce dead space
- Provide stability
- Easier to mobilize patient
- Less joint stiffness and contracture of soft tissues for reimplantation



Articulated Cement Spacers

- Local or systemic allergic reactions
- Too much antibiotic for kidneys
 - Vanco and Gent are nephrotoxic
- Cost of pre-made implants versus time to hand-make



Non-traditional Options

- Accelerated 2-stage replacement arthroplasty
 - Remove implant and place a cement spacer
 - Insert a specially designed Wound VAC that can infuse antibiotics into joint
 - Antibiotics infused, allowed to soak, and then sucked out through VAC
 - Return to OR in one week and reimplant
 - 90 % success in small series.

Non-traditional Options

- 1-Stage replacement arthroplasty with intra-articular antibiotic infusion
 - Several papers by Leo Whitesides report 90% success rate

Failure

- Failure of multiple prior reimplantations
- Multi-drug resistant organisms (MRSA, VRE, etc.)
- Poor bone and soft tissue quality
- Elderly nonambulatory patients
- Medically unfit for multiple surgeries

Failure

Knee

- Fusion of knee
- Amputation (AKA)



Failure

Hip

- Resection arthroplasty
- Amputation



The End

Questions?