How to Prevent Infection in Shoulder Arthroplasty

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Disclosure
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Hawkins Foundation:
Greenville Health System
DJO Surgical
Arthrosurface
Smith & Nephew
Neurotech
Pacira
Arthrex
ArthroCare
Euflexxa
Breg
Neurotech
Arthrex

Consulting Agreement:
DJO Surgical
Arthrex
Pacira

Royalties:
Lippincott, Williams & Wilkins
Ossur

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Evidence

- Shoulder studies (randomized)
- Extrapolation from hip and knee studies
- Extrapolation from hip and knee practice

Rates of Infection

- Arthroscopic shoulder surgery
  - 0.006-3.4% (rare)
- Open Rotator cuff repair (RCR)
  - 0.27-1.94% (some)
- Total Shoulder Arthroplasty (TSA)
  - 0-3.9% (1% goal)
- Reverse Shoulder Arthroplasty (RSA)
  - 1.25-12% (Ave 5%)

Most Common Organisms
Post-op (shoulder)

- Propionibacterium acnes
  >50%
- Staphylococcus aureus
- Staphylococcus epidermidis
- Corynebacterium species
Home Skin Preparation

- 100 consecutive patients undergoing shoulder surgery
  - Rx Group – 2% Chlorhexidine Cloth
  - Control – Soap & Water
- Results:
  - 3 fold lower colony count for coagulase-negative Staphylococcus
  - No significant reduction is P. acnes

Murray et al, - Efficacy of preoperative home use of 2% chlorhexidine Gluconate cloth before shoulder surgery, JSES 2011

Prep Solutions

- Significant reduction in the staph and strep flora
- No reduction in P. acnes

Best prep – Chloraprep

Saltzman et al, - Efficacy of Surgical Preparation Solutions in Shoulder Surgery, JBJS 2009

CoNS
- S. hominis
- S. epidermidis

Nondiphtheriod Corynebacteria
- C. minutissimum
- C. tenuis

P. acnes
Use of Plastic Adhesive Ioban Drapes During Surgery for Preventing Surgical Site Infection

- 7 studies (Cochrane database)
  - 5 studies involving 3082 participants compared adhesive drapes to no drapes
  - 2 studies involving 1113 participants compared iodine-impregnated adhesive drapes to no drapes
- wide range of surgical procedure types
- “Intraoperative use of incisional adhesive drapes is unlikely to reduce the surgical site infection rate and may in fact increase it.”

- Axilla Only (Athwal et al JSES, 2007)

Prophylactic Antibiotics

- Routine
  - Ancef (cefazolin)
  - Clindamycin or Vanco

- High Rist MRSA (h/o infxn or nursing home)
  - Vanco

- Duration
  - No further benefit beyond 24 hours

Prokuski. Prophy Abx in Ortho surgery JAAOS 2008
Matar et al. JBJS 2010
Crane et al. Antimicrobial Agents and Chemotherapy 2013

Nasal Flora

- 80% S.A. – Patients own Flora
  - Wetheim et al, Lancet 2004

- Nasal carriage SA - Risk
  - Kalmeyer et al – Inf Control Hospital Epid 2000

- Reduced SA in Nares - infection rate
  - Nalino et al – J. Clinical Microb 2005

- Mupirocin (Bactroban) – Nares pre-op 27% resistance
  - Rotges et al – J. Clinical Microb 2005

Proviodine – Iodine Nasal swabs pre-op
  - 99.5% Reduction SA – 1 hour
Laminar Flow and Space Suits

52,000 primary THR and 37,000 primary TKA
• No reduction in early infection
• In fact, significant increase in early infection

Hooper GJ, et al, Does the use of laminar flow and space suits reduce early deep infection after total hip and knee replacement? The ten-year results of the New Zealand Joint Registry. JBJS (Br) 2011

Knife Change

Should we use a separate knife for the skin? (Yes) Schindler, et al – JBJS (Br) 2006
• Skin blades with bacterial growth: 15.3%
• Control blades with bacterial growth: 6.4%

Irrigating Fluid

95 % reduction in bacterial load with saline alone Van Meurs, et al JBJS 2014

“Antibiotic irrigation should NOT be used” Anglen JAAOS 2001
**Antiseptic Lavage**

Dilute Betadine Wash
(end of case before closure)

$10 for 946 mL

*Brown et al. J Arthroplasty. 2012*

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**Intrawound application of vancomycin powder reduces wound infection after open release of post-traumatic stiff elbows: a retrospective comparative study**

*Hede Yan, et al JSES(2014)*

- Retrospective review of 272 pts
  - 93 control (routine prophylaxis)
  - 179 Vanc powder group (plus routine prophy)
- 6.45 % vs 0 % infection (p<.003)
- No adverse events from Vanc

*Applied 1 g vancomycin powder before closure
Abundant spine literature*

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**Intraoperative intra-articular injection of gentamicin will decrease the risk of infection in total shoulder arthroplasty**

Significant reduction in the infection rate after shoulder arthroplasty (3% vs 0.29%; P < .05)

*J. Lovallo et al, JSES 2014*
Bone Cement Used in Reverse Arthroplasty

Results: 236 antibiotic cement (0% infection)
265 no antibiotics (3% infection)

Mix 1 gm Vanco with Cement (and/or Tobramycin and/or Gentamycin) (Cheaper if you mix yourself)

R. Nowinski et al JSES, 2012

P. Acnes in the Joint at Arthroplasty

- 55 patients
  - 31 primary TSA
  - 24 primary RSA
- Joint swab for culture
- 23 patients positive for P. acnes 42%


The Lesson

*P. acnes* may already be in the joint at the time of Primary Shoulder Arthroplasty

Just like H. Pylori
Summary - Recommendations

• 2% chlorhexidine cloth pre-op
• Chloraprep
• Ioban – “Axilla only”
• Prophylactic – Ancef (Clindamycin or Vanco)
• Nasal Flora - Proviodine – Iodine swabbing pre-op
• Space suits, laminar flow, hoods - NO

Summary - Recommendations

• Knife change after skin
• Irrigation – N/S
• Antibiotic cement
• Betadine wash – before closure
• Intra-art Gentamycin

Thank You