

2016 Current Solutions in Shoulder Elbow Surgery
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How to Prevent Infection in Shoulder Arthroplasty

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Disclosure Richard J. Hawkins, MD

Hawkins Foundation:

Greenville Health System
DJO Surgical
Arthrosurface
Smith & Nephew
Neurotech

Pacira
ArthroCare
Euflexxa
Breg
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 Staphyococcus
 - No significant reduction in *P. acnes*

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

Prep Solutions

TABLE 1 Overall Rates of Positive Cultures for Each Agent and for Each Organism with Respect to Skin Preparation Solution

Organism	Povidone-Iodine	DuraPrep	ChloraPrep	Comparison of Povidone-Iodine and DuraPrep* (p value)	Comparison of Povidone-Iodine and ChloraPrep* (p value)	Comparison of DuraPrep and ChloraPrep* (p value)
Overall	31%	19%	7%	0.05	<0.0001	0.01
Coagulase-negative Staphylococcus	19%	4%	2%	<0.001	<0.001	0.41
Propionibacterium acnes	15%	12%	7%	0.53	0.07	0.23
Corynebacterium	2%	1%	0%	–	–	–
Staphylococcus aureus	2%	0%	1%	–	–	–

- 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

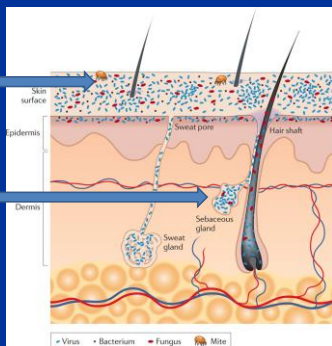
CoNS

- *S. hominis*
- *S. epidermidis*

Nondiphtheroid

- 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. Prophyl 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
 - Kalmeijer 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

Providine – 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

Intra wound 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 prophyl)
- 6.45 % vs 0 % infection (p<.003)
- No adverse events from Vanc



Applied 1 g vancomycin powder before closure

Abundant spine literature

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%

Levy O, et al. Propionibacterium acnes: an underestimated etiology in the pathogenesis of osteoarthritis? JSES, 2013

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 - Proiodine – 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