

## Infection after Shoulder Arthroplasty

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## Disclosure

- Biomet-Royalties

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## Introduction

- **Infection**
  - Rare, but devastating complication
  - Reported incidence ranges from 0% to 4%



Coste et al. JBJS-B 2004  
Sperling et al. CORR 2001

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## Diagnostic Studies

- **Diagnosis of Infection**

- Can be challenging, particularly among patients undergoing revision surgery
- Many patients may not present with overt signs of infection such as erythema or sinus tracts

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## Diagnostic Studies

- **Painful hemiarthroplasty**

- 5 prior surgeries elsewhere
- WBC: 10.0
- Sed rate: 4
- CRP: <0.3
- Aspiration: Negative
- Indium Bone Scan: Negative



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## Diagnostic Studies

- **Painful hemiarthroplasty**

- Intra-op path: Negative
- Humeral component well fixed
- Glenoid component placed
- 2/3 cultures positive for Prop. Acnes

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## Diagnostic Studies

- What is the value of pre-op and intra-op studies among patients who underwent revision shoulder arthroplasty and had positive intra-operative cultures?

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## Diagnostic Studies

- **Topolski et al.**
  - Results of 75 shoulders without overt signs of infection that underwent revision shoulder arthroplasty and had positive intra-operative cultures

Topolski et al. JSES 2006

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## Diagnostic Studies

- **Pre-op Studies Negative**
  - WBC: 67 of 72 (93%)
  - PMN distribution: 64 of 70 (91%)
  - Sed rate: 36 of 42 (86%)
  - C-reactive protein: 12 of 16 (75%)

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## Diagnostic Studies

- **Intra-op Studies Negative**
  - Histology: 67 of 73 patients (92%)
- **Most common organism**
  - *Prop. acnes* in 45 of 75 cases

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## Pre-operative Evaluation

- **Decision making**
  - Integrate information from history, examination and diagnostic studies
  - Classify the infection
  - Guide treatment options

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## Classification

- **Type 1:** Positive cultures at revision surgery
- **Type 2:** Acute infection within 30 days of surgery
- **Type 3:** Acute hematogenous infection
- **Type 4:** Chronic infection

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## Treatment

- **Options**

- Antibiotic suppression
- Debridement
- Resection arthroplasty
- Arthrodesis
- Reimplantation: one or two stage

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## Treatment

- **Antibiotic Suppression**

- Well fixed components
- Significant medical co-morbidities that make the risk of surgery unacceptable
- Low virulence organism

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## Treatment

- **Debridement**

- Early post-operative infection (Type 2)
- Acute infection in a well functioning prosthesis (Type 3)

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## Resection Arthroplasty

- **Procedure**

- Resection of components and period of immobilization to allow scarring of the joint



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## Resection Arthroplasty

- **Candidates**

- Significant soft tissue and bone deficiencies
- Medical co-morbidities that would limit the number of surgical procedures undertaken



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## Arthrodesis

- **Candidates**

- Young active patients with significant functional demands
- Patients with rotator cuff and deltoid deficiency

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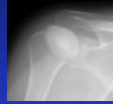
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## Reimplantation

- One or two stages
- Controversial choice
- Contra-indications
  - Resistant infection
  - Loss of deltoid function



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## One Stage Reimplantation

- Extensive debridement with placement of new components secured by antibiotic impregnated cement
- IV antibiotics used are based on the susceptibility of the organism

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## Two Stage Reimplantation

- Most accepted approach for chronic infection
- Component removal
- Placement of antibiotic impregnated cement
- IV antibiotics
- Delayed reimplantation

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## Two Stage Reimplantation

- **Strickland et al.**
  - Nineteen patients
  - Pain 4.2 to 1.8 ( $p=0.0001$ )
  - Elevation 42 to 89 degrees ( $p=0.003$ )
  - Ext. rotation 30 to 43 degrees ( $p=0.155$ )

Strickland et al. AAOS 2008

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## Two Stage Reimplantation



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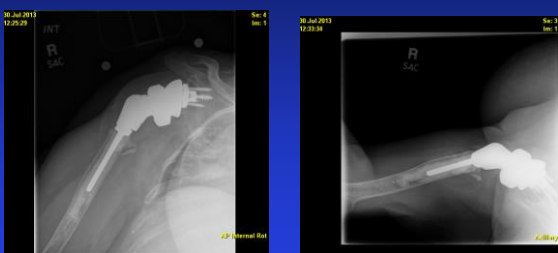
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## Two Stage Reimplantation



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## Spacer

- **Antibiotic spacer**

- Spectrum of sizes available
- Base on size of patient



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## Spacer

- **Current practice**

- Mix cement and antibiotics in Shoulder Spacer Mold
- Facilitates early motion to prevent stiffness and facilitates future reimplanation



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## Example

- 55 year old male with infected arthroplasty



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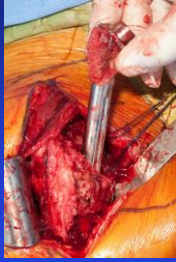
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### Remove Stem



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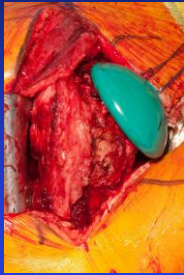
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### Trial Head and Stem



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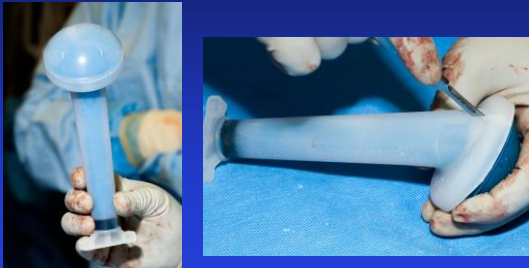
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### Spacer Mold



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## Spacer Mold



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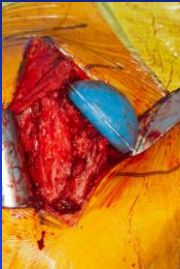
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## Facilitates Motion and Soft Tissue Tension



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## Summary

- Management of the infected arthroplasty
  - Timing of infection
  - Host
  - Organism

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## Summary

- **Type 1: Positive Cultures at Revision**  
–Antibiotic treatment with close observation

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## Summary

- **Type 2: Early Postoperative Infection**  
–Attempt at debridement and prosthesis retention

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## Summary

- **Type 3: Acute Hematogenous Infection**  
–Attempt at debridement with salvage vs. two stage reimplantation

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## Summary

- Type 4: Chronic Infection
  - Two stage reimplantation

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