

CASE #5: INFECTION SURROUNDING TOTAL SHOULDER ARTHROPLASTY

MALE W/ TOTAL SHOULDER, PAIN & STIFF AT 3 MONTHS

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SPORTS MEDICINE & SHOULDER



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I (and/or my co-authors) have something to disclose.

Consultant (Wright/Tornier; DJO; Aevumed; Mitek)

Education/Fellowship support (Arthrex; Zimmer; Breg; DePuy-Mitek; Smith&Nephew)

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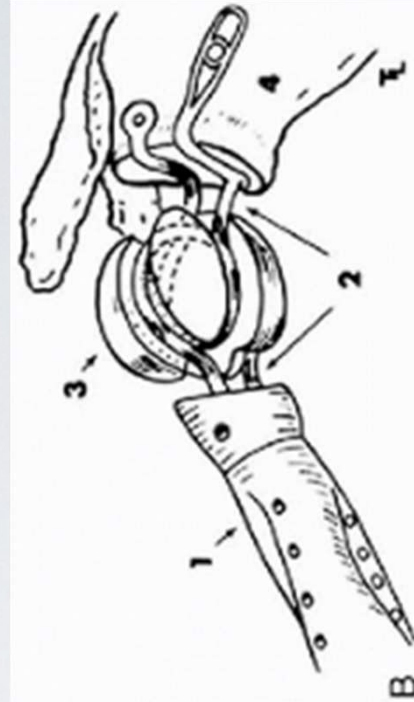
THE PANEL



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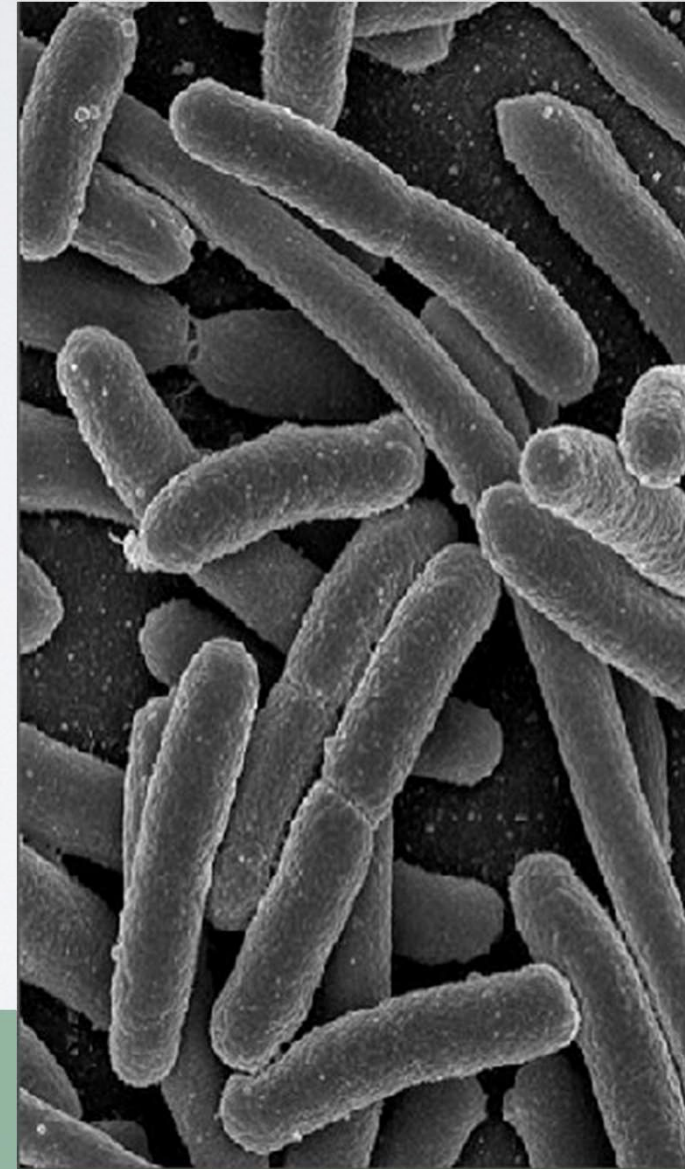
INTRODUCING...THE PROBLEM

- The problem
 - Periprosthetic shoulder infection (PSI) has been with us since the beginning
 - 1894 Jules Pean implanted the first shoulder prosthesis
 - 1896 that same prosthesis became the first explant
 - 123 years later PSI is still an issue
 - Common (0-6%, higher with RSA/revisions)
 - Diagnosis not easy
 - Ideal treatment unclear
 - The good news--active area of research



INTRODUCING...THE STAR OF THE SHOW

- *Cutibacterium acnes* (*C acnes*) formerly known as (*P acnes*)
 - Most common cause of PSI in primary and revision settings
 - Not like pus-forming bacteria
 - Creates diagnostic and management challenges

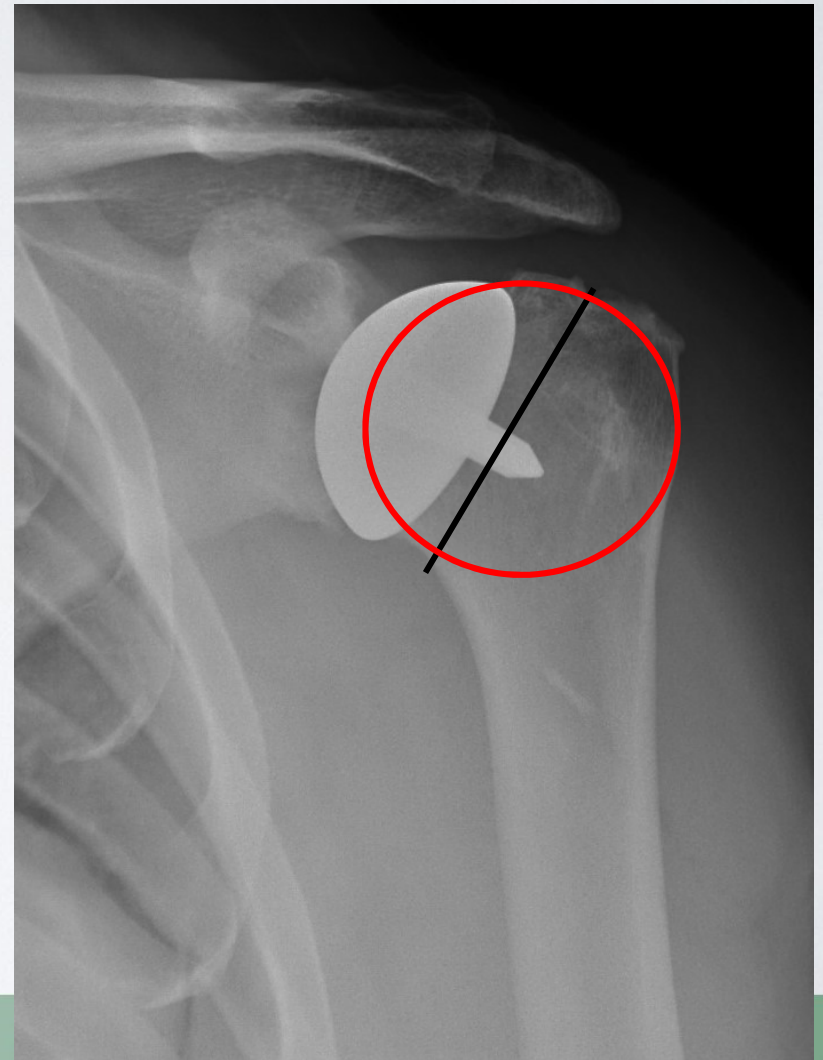


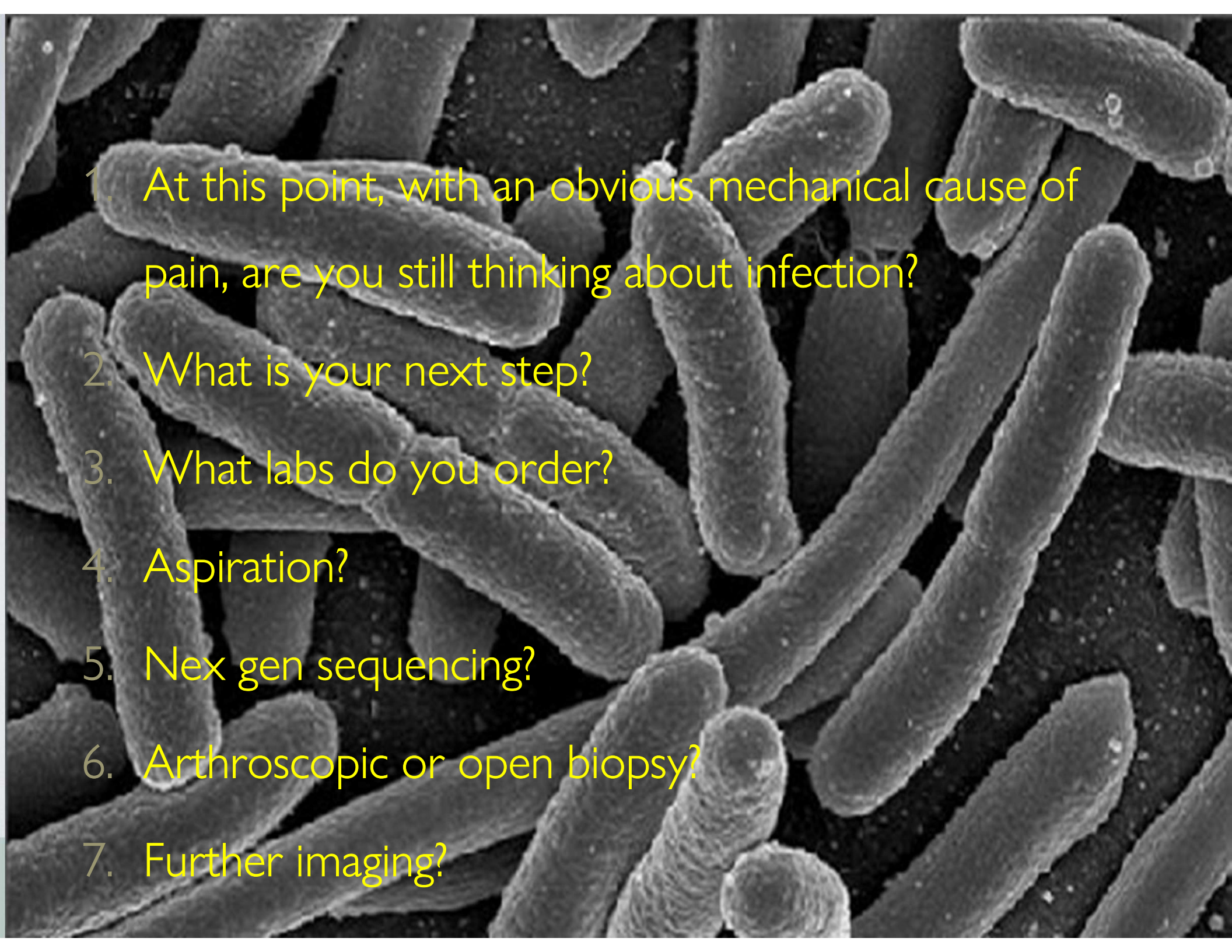
CASE EXAMPLE

- CC: “Pain and stiffness”
- HPI: 51 yr old RHD M bodybuilder s/p L shoulder hemiarthroplasty resurfacing 3 years ago.
 - Did well initially, but increasing pain over last 6 months
 - No injury or event
 - Unable to compete as bodybuilder any longer
- PE: Well-healed deltopectoral incision
 - Passive & active FE 90 degrees, passive ER 10 degrees, active IR lumbar.
 - Cuff strength grossly intact, negative belly press test
 - TTP at glenohumeral joint line, end-range pain
 - NVI

CASE EXAMPLE

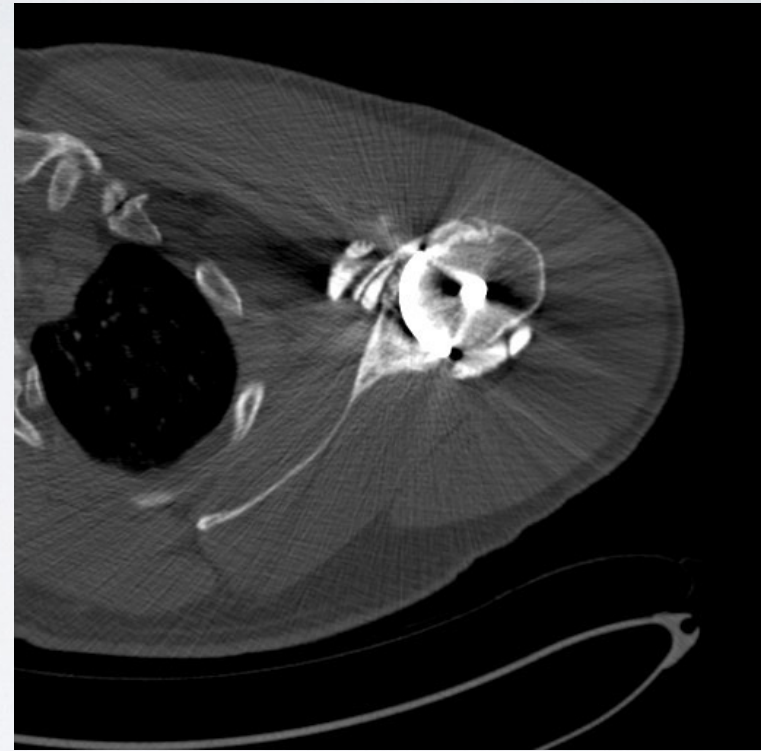
- Plain Radiographs:

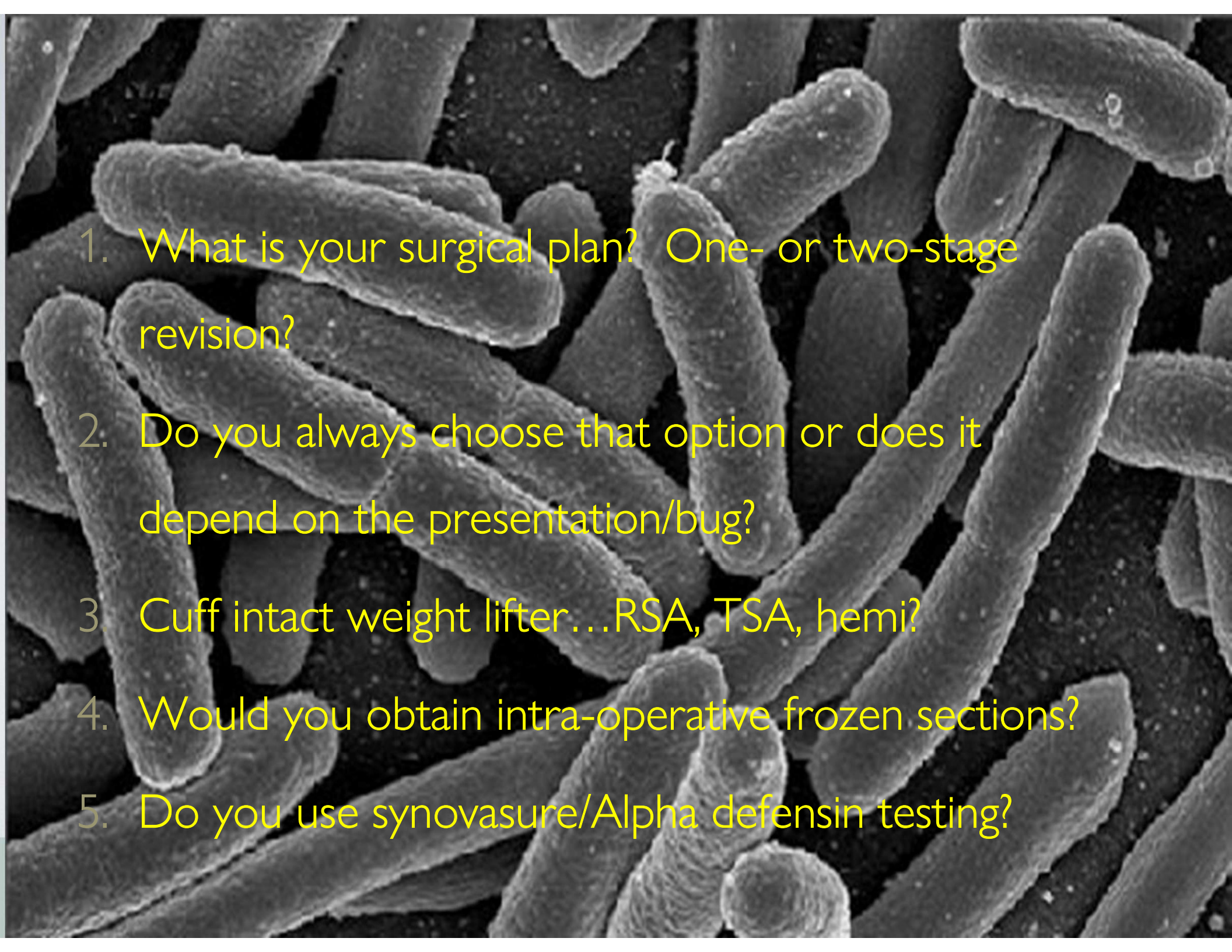


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1. At this point, with an obvious mechanical cause of pain, are you still thinking about infection?
 2. What is your next step?
 3. What labs do you order?
 4. Aspiration?
 5. Nex gen sequencing?
 6. Arthroscopic or open biopsy?
 7. Further imaging?

CASE EXAMPLE

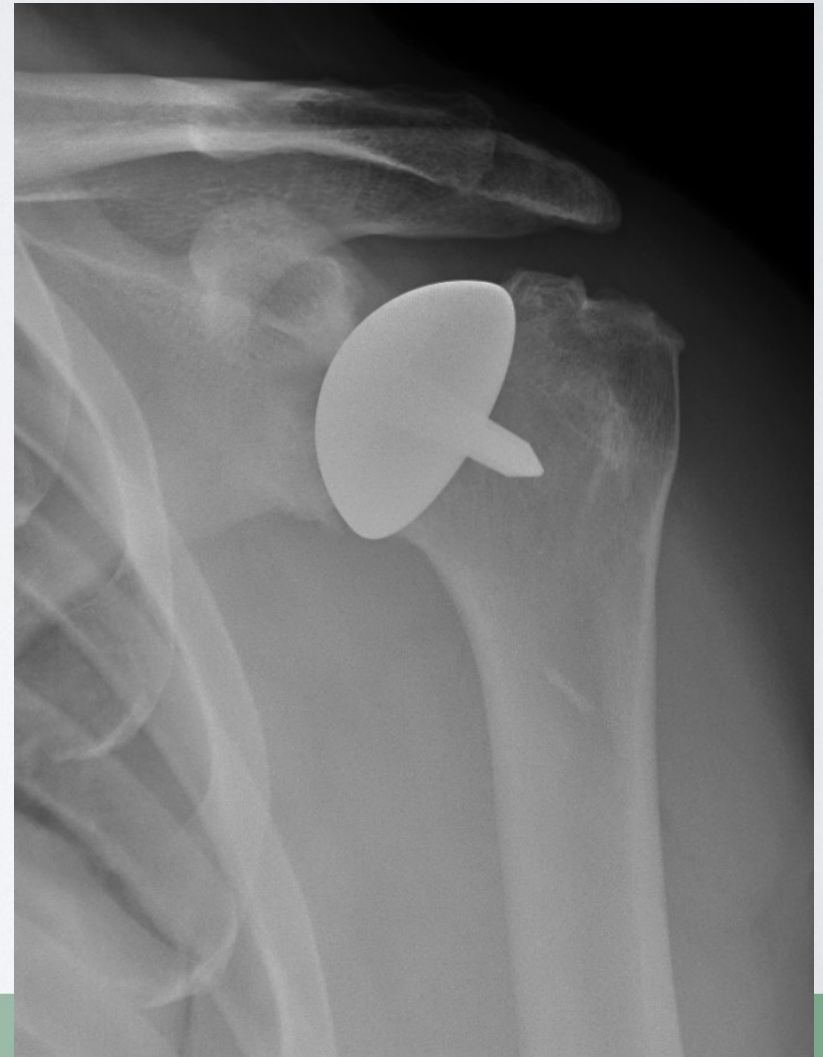
- Pre-operative Testing:
 - CRP & ESR normal
 - Dry aspirate
 - CT arthrogram: no rotator cuff tear, glenoid arthrosis

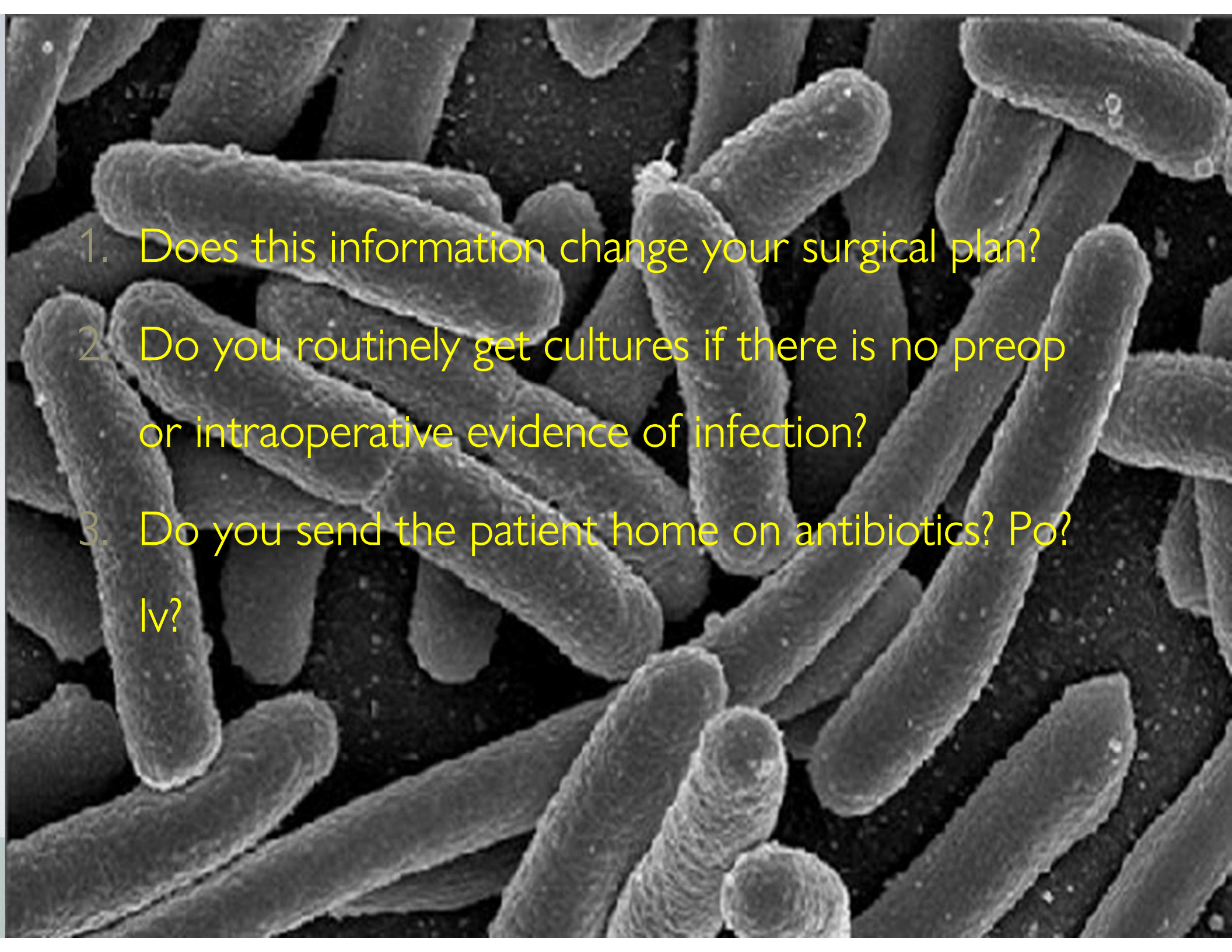


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1. What is your surgical plan? One- or two-stage revision?
 2. Do you always choose that option or does it depend on the presentation/bug?
 3. Cuff intact weight lifter...RSA, TSA, hemi?
 4. Would you obtain intra-operative frozen sections?
 5. Do you use synovasure/Alpha defensin testing?

CASE EXAMPLE

- Intraoperative Findings:
 - Well healed subscapularis
 - Humeral component well fixed
 - Remnant humeral head osteophytes present
 - Significant central glenoid wear
 - No purulence
 - Frozen sections negative



- 
1. Does this information change your surgical plan?
 2. Do you routinely get cultures if there is no preop or intraoperative evidence of infection?
 3. Do you send the patient home on antibiotics? Po?
Iv?

CASE EXAMPLE

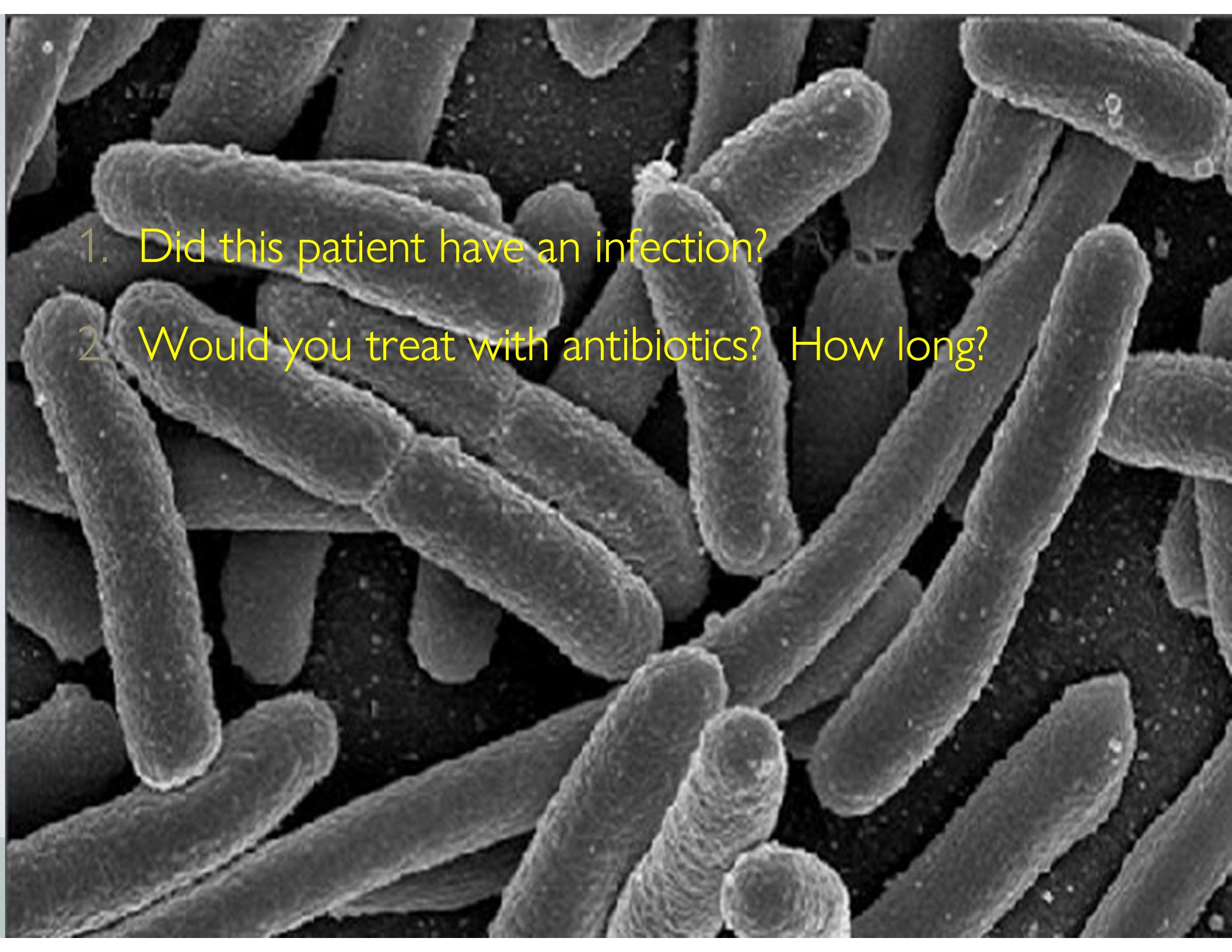
- Intraoperative Findings:
 - Well healed subscapularis
 - Humeral component well fixed
 - Remnant humeral head osteophytes present
 - Significant central glenoid wear
 - No purulence
 - Frozen sections negative
- One-stage revision to anatomic TSA



CASE EXAMPLE

- Postoperative Course:
 - 1/5 cultures positive for *Staph epi*,
POD#2 (broth only)
 - 4/5 cultures positive for *P. acnes*,
POD#6





1. Did this patient have an infection?
2. Would you treat with antibiotics? How long?

INTERNATIONAL CONSENSUS DEFINITION FOR SHOULDER PJI

- **Definite PJI:** The presence of one or more of the following criteria is diagnostic of definite shoulder PJI:
 - Sinus tract communicating with prosthesis is present.
 - Gross intra-articular purulence is present.
 - Two positive cultures with phenotypically-identical virulent organism present.
- **Scoring System:** If criteria for Definite PJI are not met, a summative scoring system is used to classify likelihood of PJI:
 - Score ≥ 6 with an identified organism = **probable PJI**
 - Score ≥ 6 *without* an identified organism = **possible PJI**
 - Score < 6 with:
 - Single positive culture of a virulent organism = **possible PJI**
 - Two positive cultures of a low-virulence organism = **possible PJI**
 - Negative cultures or single positive culture of a low-virulence organism = **unlikely PJI**



INTERNATIONAL CONSENSUS DEFINITION FOR SHOULDER PJI

Minor Criteria	Weight
Unexpected wound drainage	4
Single positive intra-operative tissue culture (virulent organism)	3
Single positive intra-operative tissue culture (low-virulence organism)	1
Second positive intra-operative tissue culture (identical low-virulence organism)	3
Humeral loosening	3
Positive frozen section (≥ 5 PMNs in at least 5 high-power fields)*	3
Positive pre-operative aspirate culture (low or high virulence organism)	3
Elevated synovial neutrophil percentage ($\geq 80\%$)*	2
Elevated synovial WBC ($\geq 3,000$ cells/microliter)*	2
Elevated serum ESR (≥ 30 mm/hr)*	2
Elevated serum CRP (≥ 10 mg/L)*	2
Elevated synovial alpha-defensin	2
Cloudy intra-operative fluid	2

INTERNATIONAL CONSENSUS DEFINITION FOR SHOULDER PJI

Minor Criteria	Weight
Unexpected wound drainage	
Single positive intra-operative tissue culture (virulent organism)	
Single positive intra-operative tissue culture (low-virulence organism)	1
Second positive intra-operative tissue culture (virulent organism)	3
Human	
Positive frozen section	
Positive frozen section (two fields)*	
Two positive cultures of a low-virulence organism =	
<u>Possible PJI</u>	
Two positive cultures of a high virulence	
Elevated neutrophil percentage ($\geq 80\%$)*	
Elevated synovial WBC ($\geq 3,000$ cells/microliter)*	
Elevated serum ESR (≥ 30 mm/hr)*	
Elevated serum CRP (≥ 10 mg/L)*	
Elevated synovial alpha-defensin	
Cloudy intra-operative fluid	

Score <6 with:
Possible PJI

CASE EXAMPLE

- Postoperative Course:
 - 6 weeks IV antibiotics, followed by 3 months oral antibiotics



CASE EXAMPLE

- Six month follow-up:
 - Well-healed incision
 - FE 150-160 degrees, ER 50 degrees, IR lower to mid thoracic
 - 5/5 rotator cuff strength
 - Negative belly press
 - NVI



INTERNATIONAL CONSENSUS MEETING



THANK YOU!

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