Joint Aspiration

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Disclosures

- None

Objectives

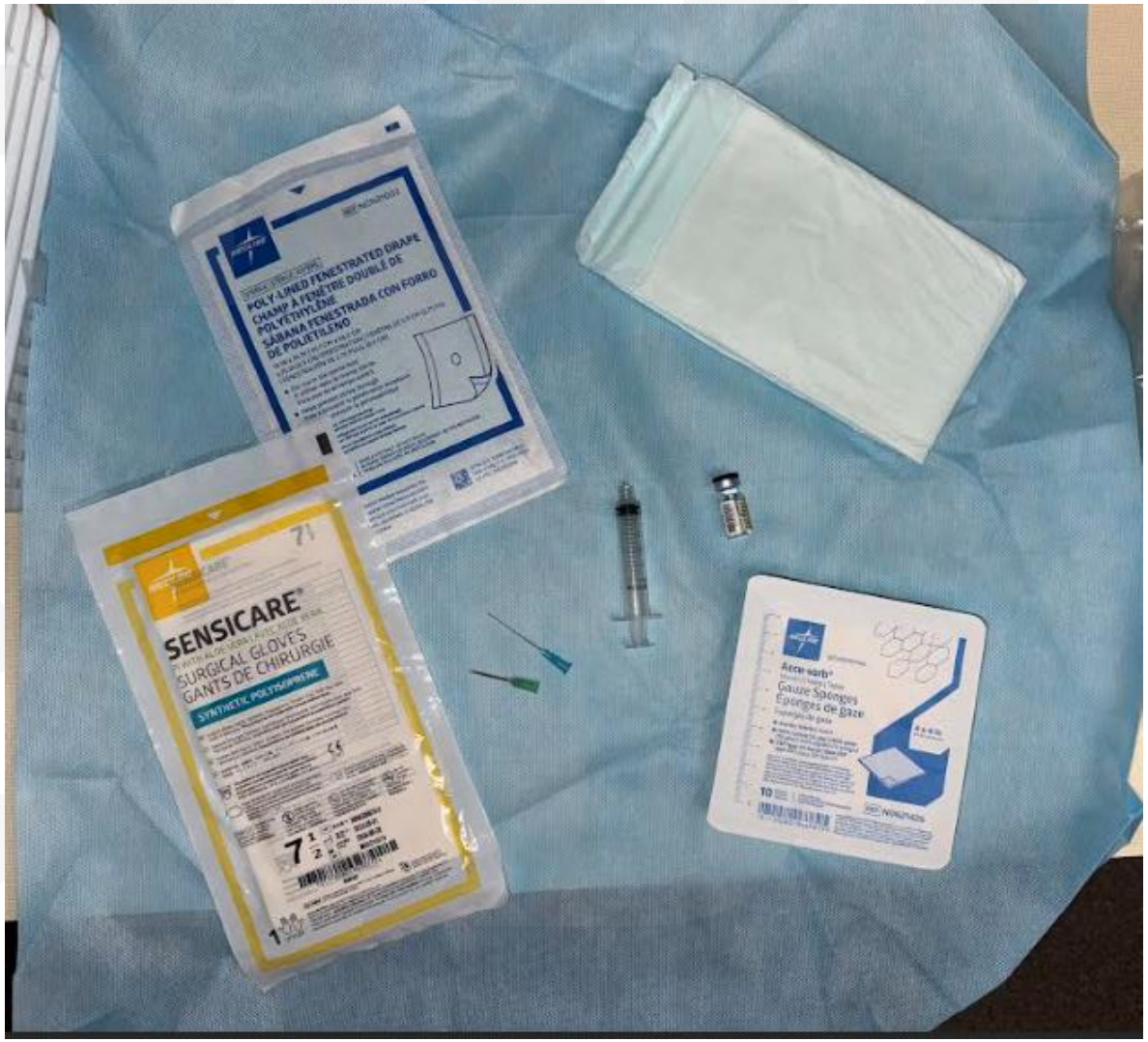
- Discuss techniques to obtain synovial fluid from common joints
- Review septic arthritis

Aspiration techniques

- Knee
- Shoulder (glenohumeral)
- Hip
- Elbow
- Ankle
- Wrist

Aspiration techniques

- Sterile gloves
- Sterile drape
- 18g 1.5 to 3.5 needle
- 25g 1.5 needle
- Syringe (5ml, and 30-60ml)
- Lidocaine 1% with epi
- Chlorhexadine



Lancet. 2015 Nov 21;386(10008):2069-77. doi: 10.1016/S0140-6736(15)00244-5. Epub 2015 Sep 18.

Skin antisepsis with chlorhexidine-alcohol versus povidone iodine-alcohol, with and without skin scrubbing, for prevention of intravascular-catheter-related infection (CLEAN): an open-label, multicentre, randomised, controlled, two-by-two factorial trial.

Mimoz O[1], Lucet JC[2], Kerforne T[3], Pascal J[4], Souweine B[5], Goudet V[6], Mercat A[7], Bouadma L[8], Lasocki S[9], Alfandari S[10], Friggeri A[11], Wallet F[11], Allou N[12], Ruckly S[13], Balayn D[3], Lepape A[11], Timsit JF[8]; CLEAN trial investigators.

⊕ Collaborators (36)

⊕ Author information

Abstract

BACKGROUND: Intravascular-catheter-related infections are frequent life-threatening events in health care, but incidence can be decreased by improvements in the quality of care. Optimisation of skin antisepsis is essential to prevent short-term catheter-related infections. We hypothesised that chlorhexidine-alcohol would be more effective than povidone iodine-alcohol as a skin antiseptic to prevent intravascular-catheter-related infections.

METHODS: In this open-label, randomised controlled trial with a two-by-two factorial design, we enrolled consecutive adults (age ≥18 years) admitted to one of 11 French intensive-care units and requiring at least one of central-venous, haemodialysis, or arterial catheters. Before catheter insertion, we randomly assigned (1:1:1:1) patients via a secure web-based random-number generator (permuted blocks of eight, stratified by centre) to have all intravascular catheters prepared with 2% chlorhexidine-70% isopropyl alcohol (chlorhexidine-alcohol) or 5% povidone iodine-69% ethanol (povidone iodine-alcohol), with or without scrubbing of the skin with detergent before antiseptic application. Physicians and nurses were not masked to group assignment but microbiologists and outcome assessors were. The primary outcome was the incidence of catheter-related infections with chlorhexidine-alcohol versus povidone iodine-alcohol in the intention-to-treat population. This study is registered with ClinicalTrials.gov, number NCT01629550 and is closed to new participants.

FINDINGS: Between Oct 26, 2012, and Feb 12, 2014, 2546 patients were eligible to participate in the study. We randomly assigned 1181 patients (2547 catheters) to chlorhexidine-alcohol (594 patients with scrubbing, 587 without) and 1168 (2612 catheters) to povidone iodine-alcohol (580 patients with scrubbing, 588 without). Chlorhexidine-alcohol was associated with lower incidence of catheter-related infections (0·28 vs 1·77 per 1000 catheter-days with povidone iodine-alcohol; hazard ratio 0·15, 95% CI 0·05-0·41; p=0·0002). Scrubbing was not associated with a significant difference in catheter colonisation (p=0·3877). No systemic adverse events were reported, but severe skin reactions occurred more frequently in those assigned to chlorhexidine-alcohol (27 [3%] patients vs seven [1%] with povidone iodine-alcohol; p=0·0017) and led to chlorhexidine discontinuation in two patients.

INTERPRETATION: For skin antisepsis, chlorhexidine-alcohol provides greater protection against short-term catheter-related infections than does povidone iodine-alcohol and should be included in all bundles for prevention of intravascular catheter-related infections.

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Anesthetics

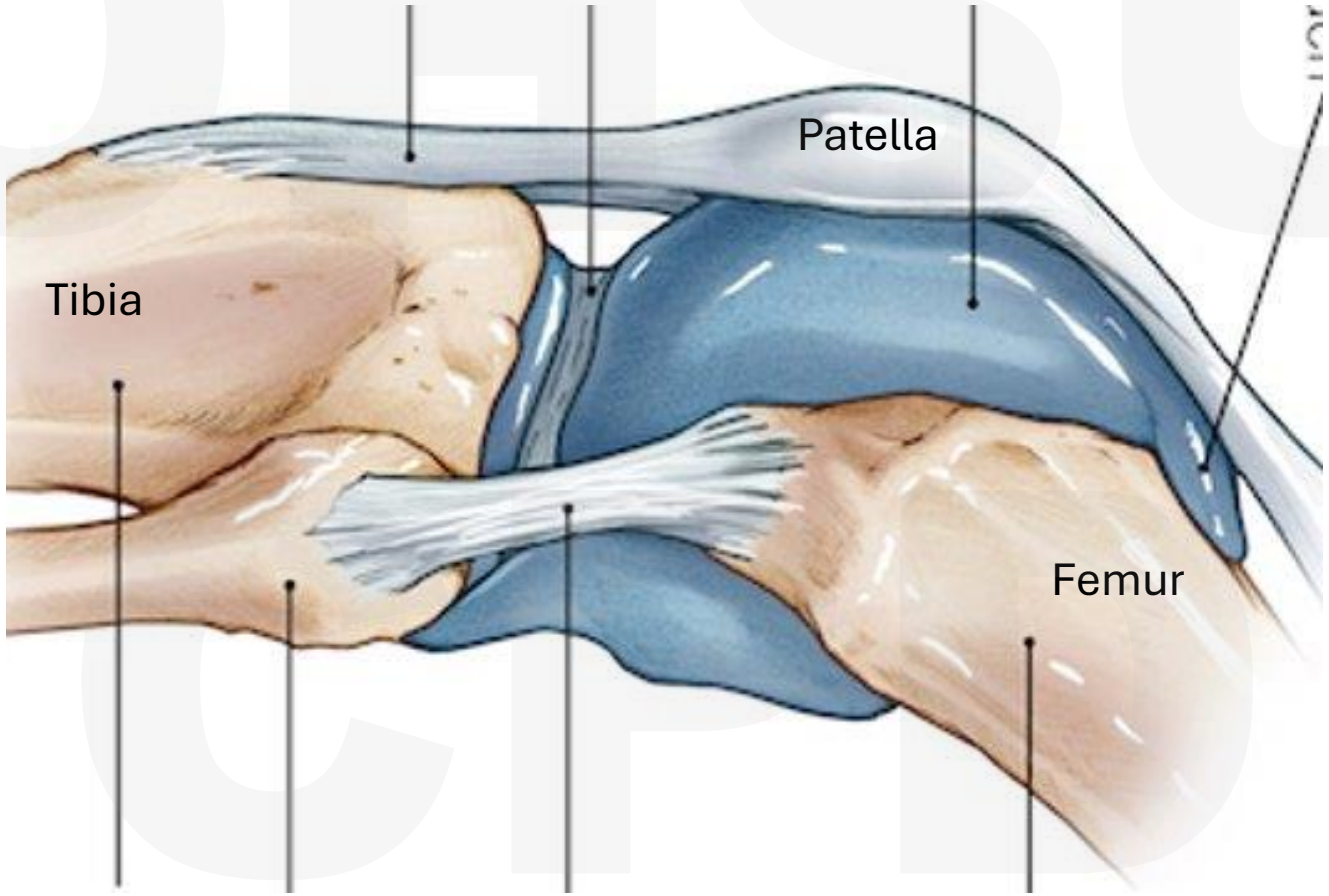
Name	Relative Potency	Onset	Duration(minutes)
Procaine/novocain	1	Moderate	30-60
Lidocaine/xylocaine	2	Rapid	80-120
Bupivacaine/Marcaine	8	Longest	180-360
Ropivicaine/naropin	6	Moderate	140-200

Equipment

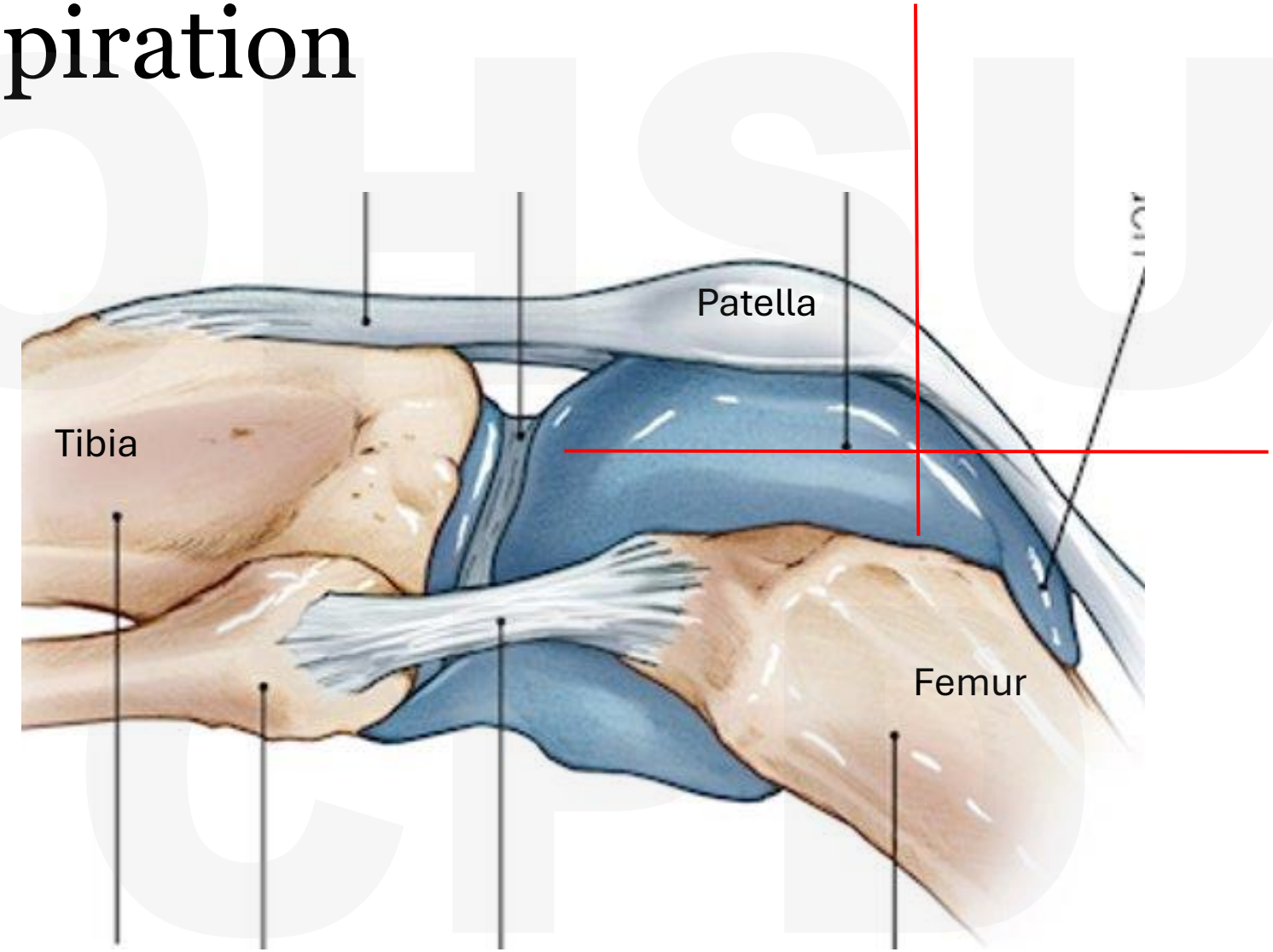
- Needle size
  - 18g standard
  - +/- to use smaller needle to anesthetize track to joint
  - Can aspirate with as small as 30g needle (very slow)

- Syringe size
  - Smaller (5-10ml) more vacuum effect
  - Larger for larger effusion (knee) – up to 60ml syringe

Knee aspiration



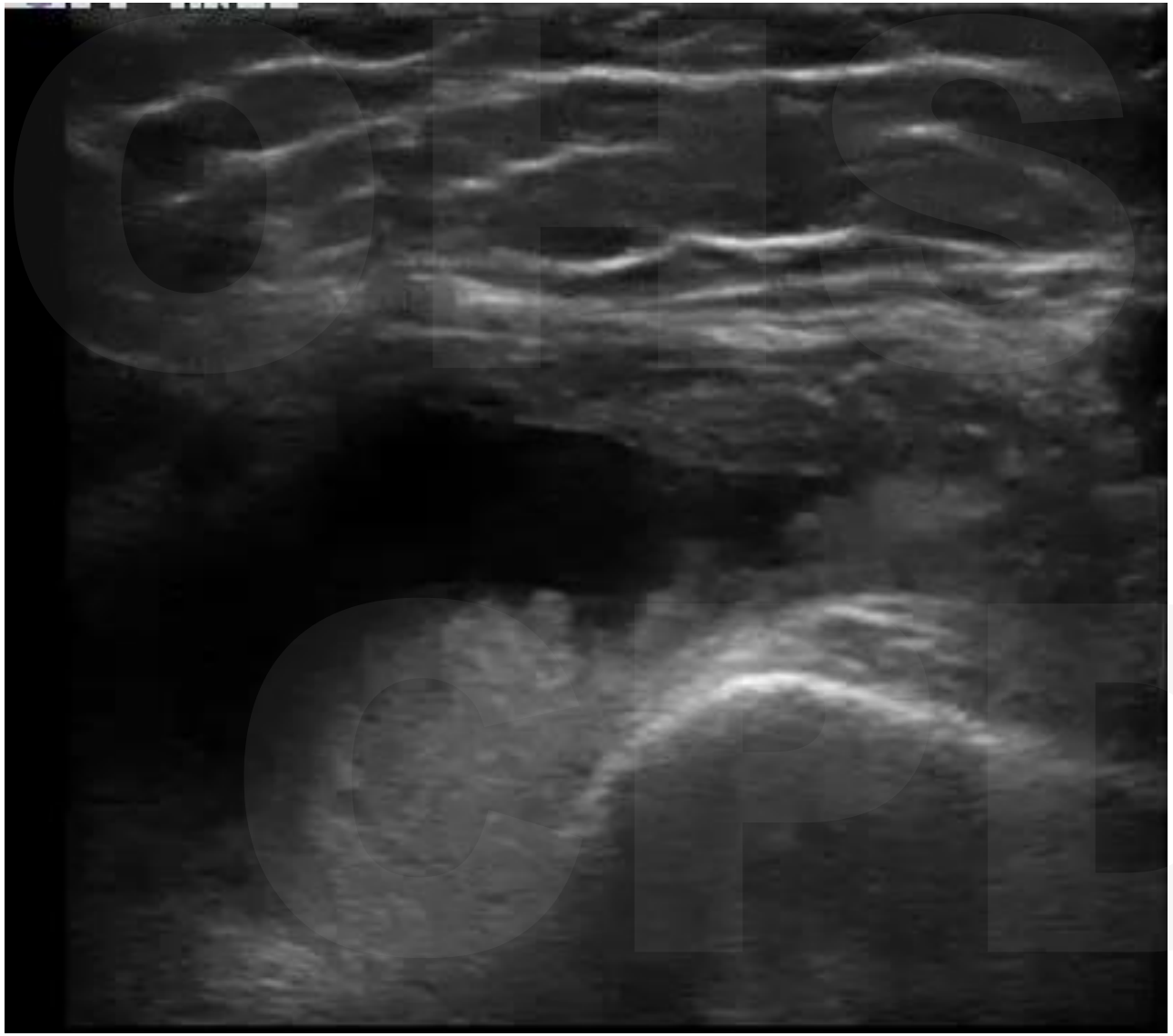
Knee aspiration



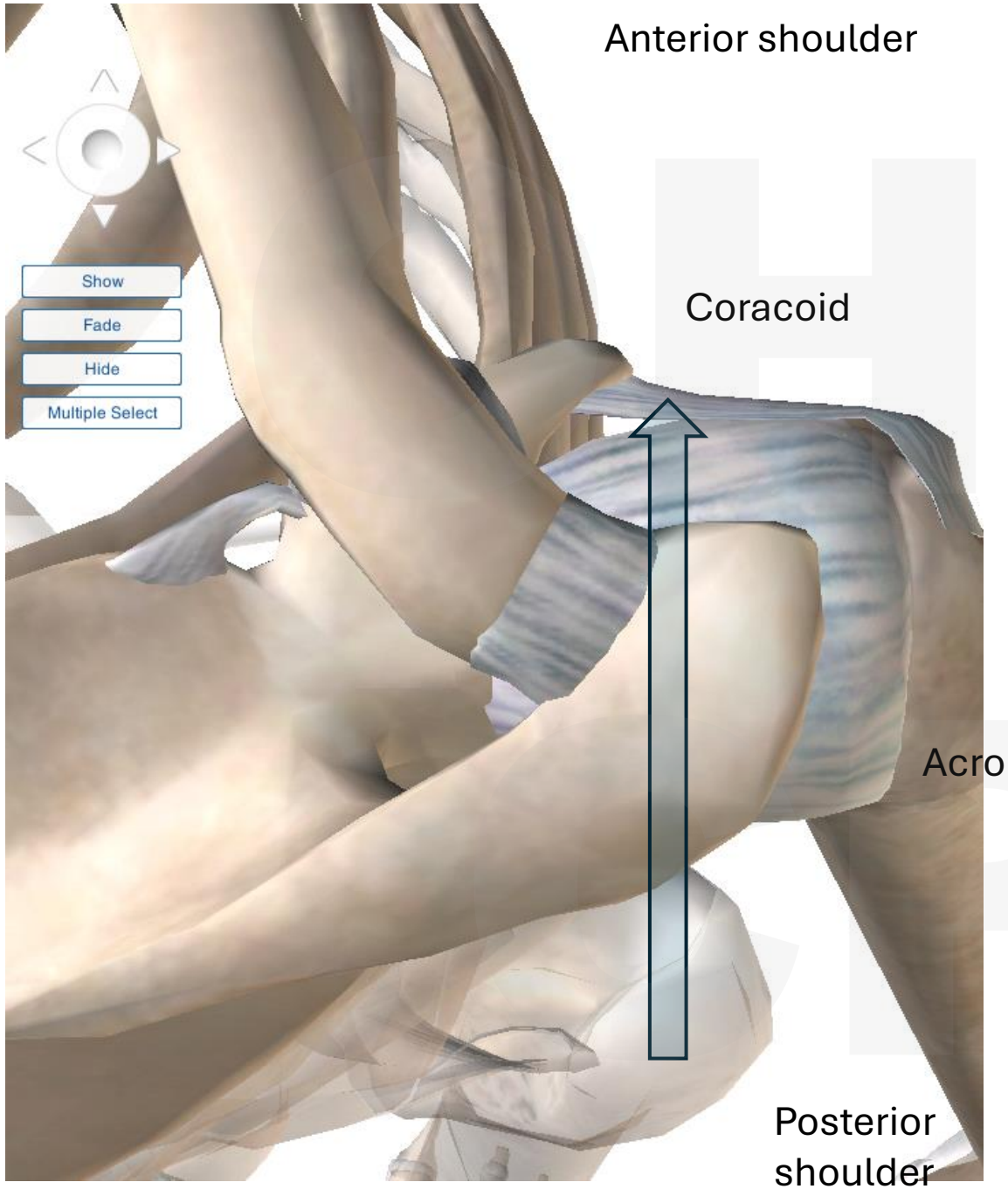
Knee aspiration

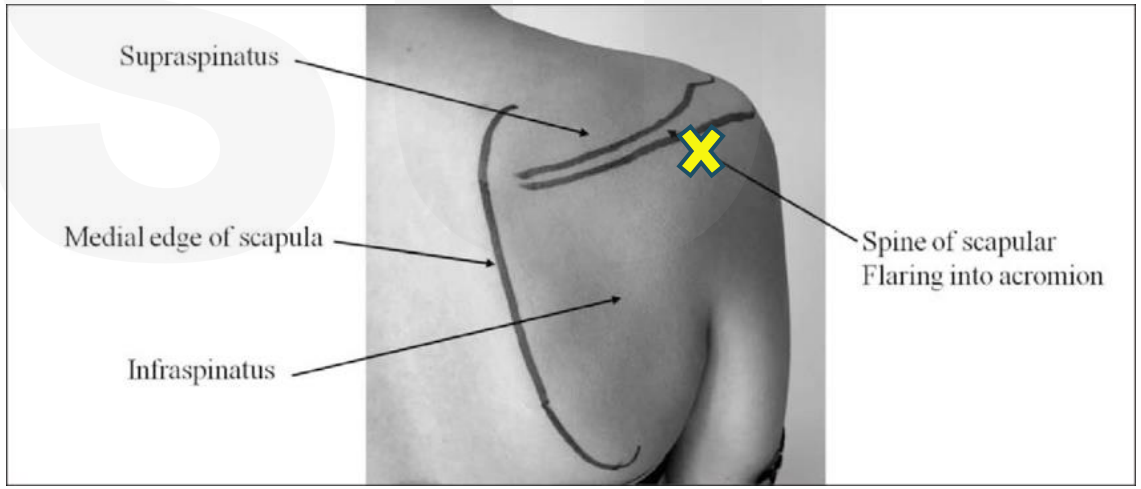
Knee aspiration

Knee Effusion **In Plane** Aspiration



Glenohumeral – posterior shoulder

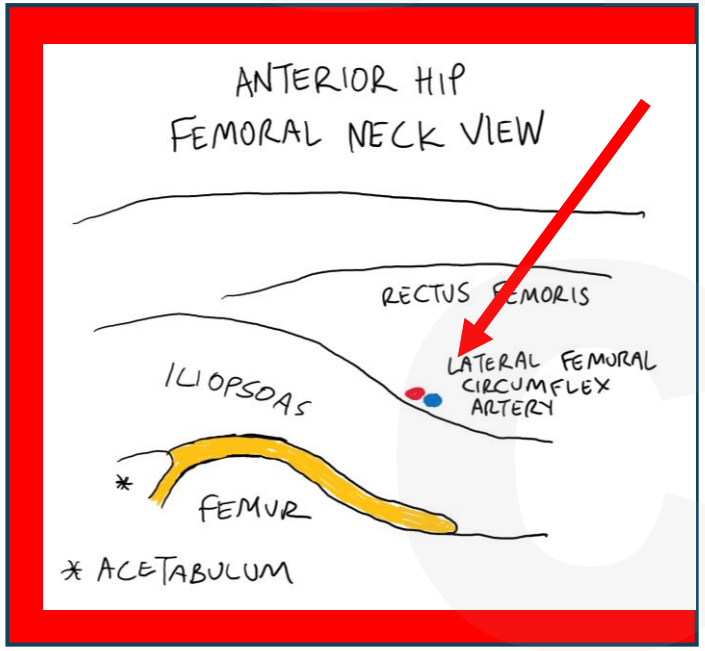


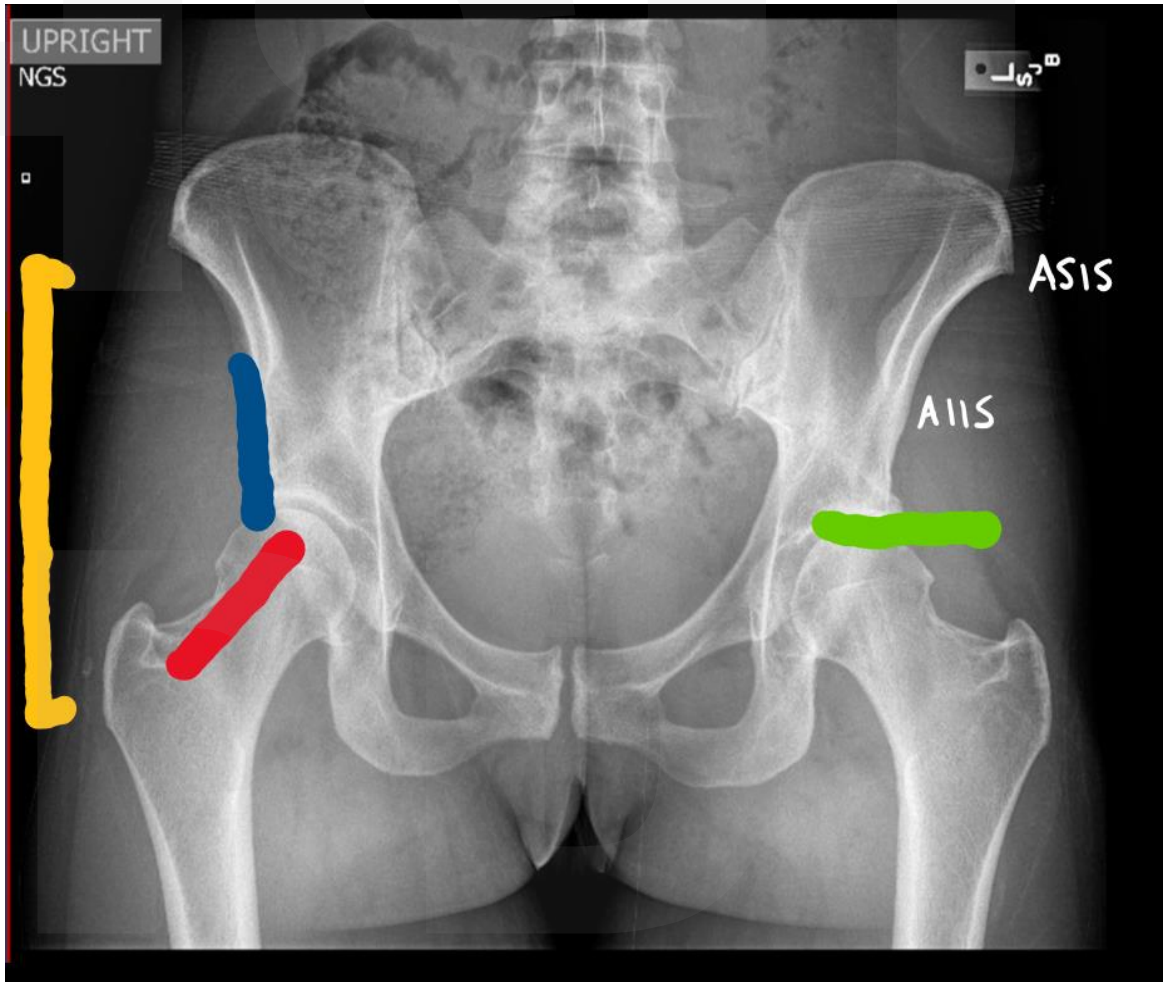


Hip joint aspiration

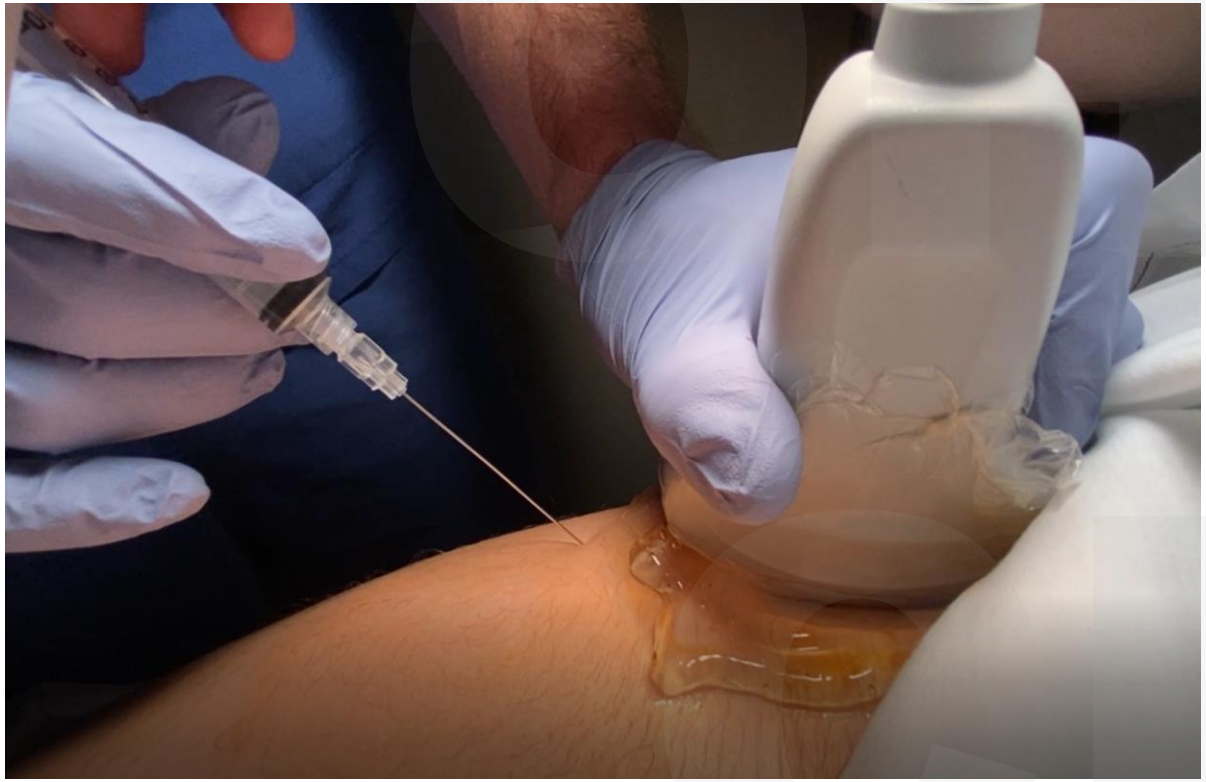
Femoral Neck view

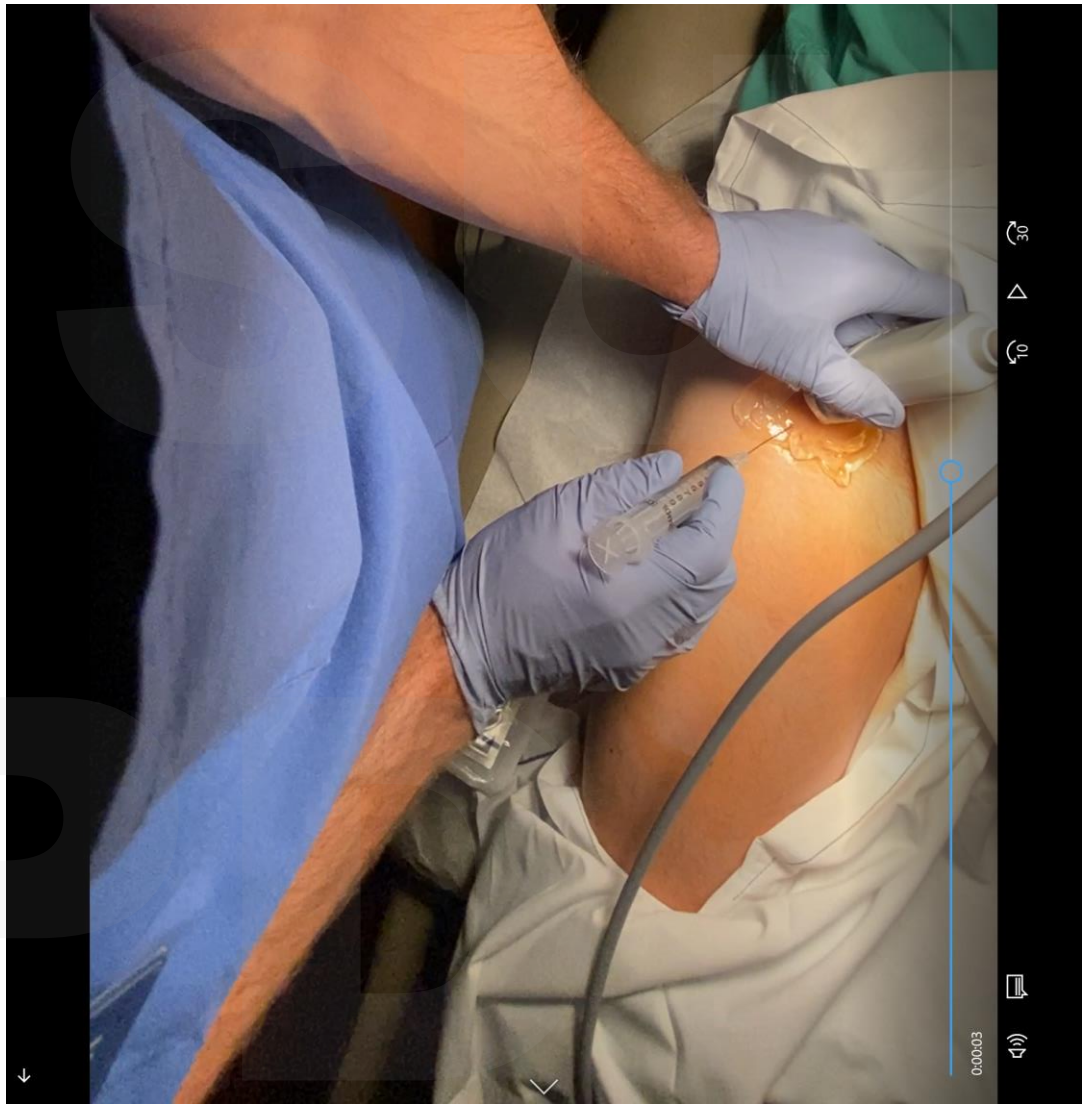
Femoral Neck





Hip joint aspiration





Ultrasound Hip Anatomy – Effusion Measurement

Normal < 0.7cm
Effusion > 0.7cm
OR
Compare to other side

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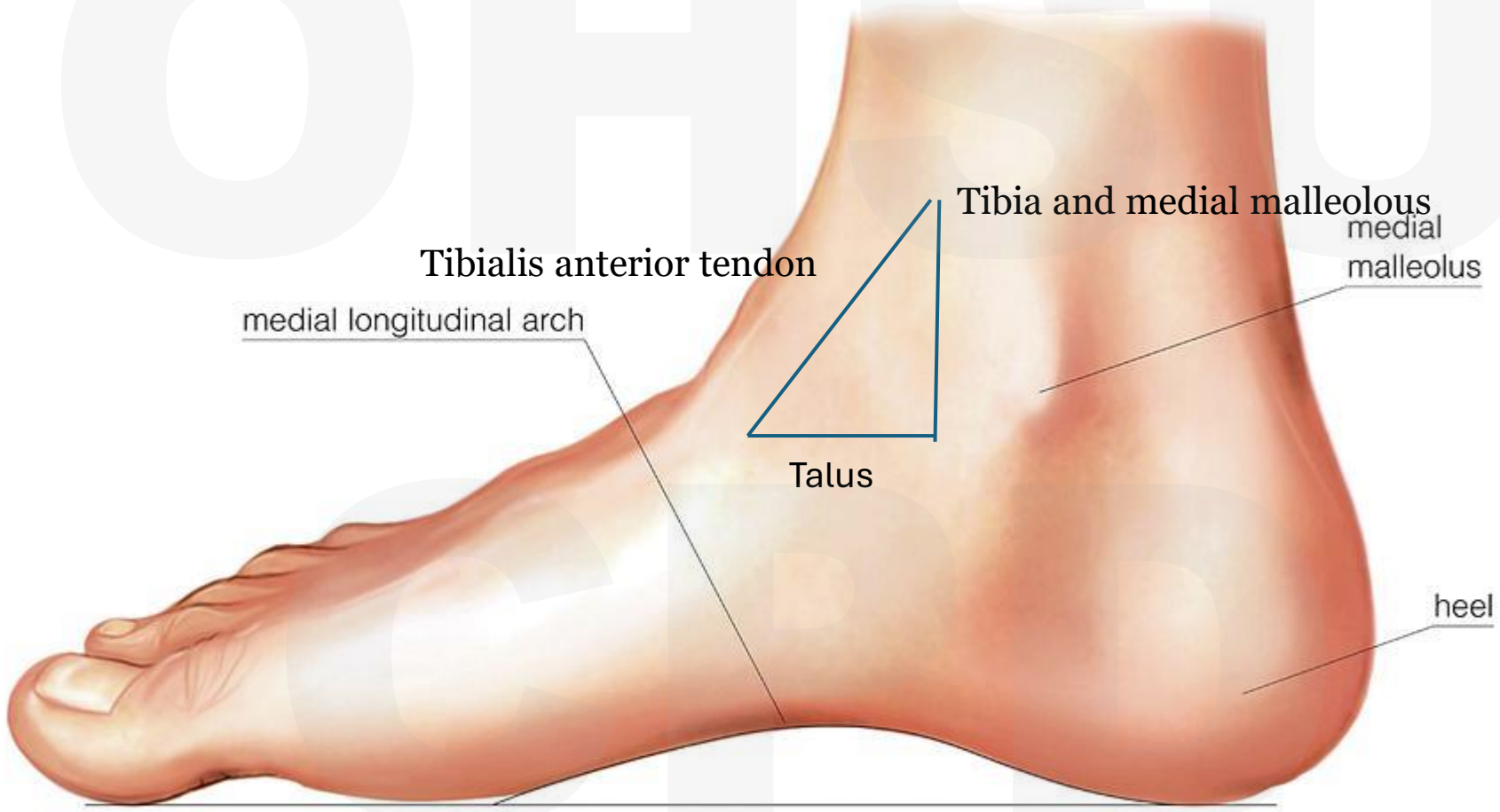
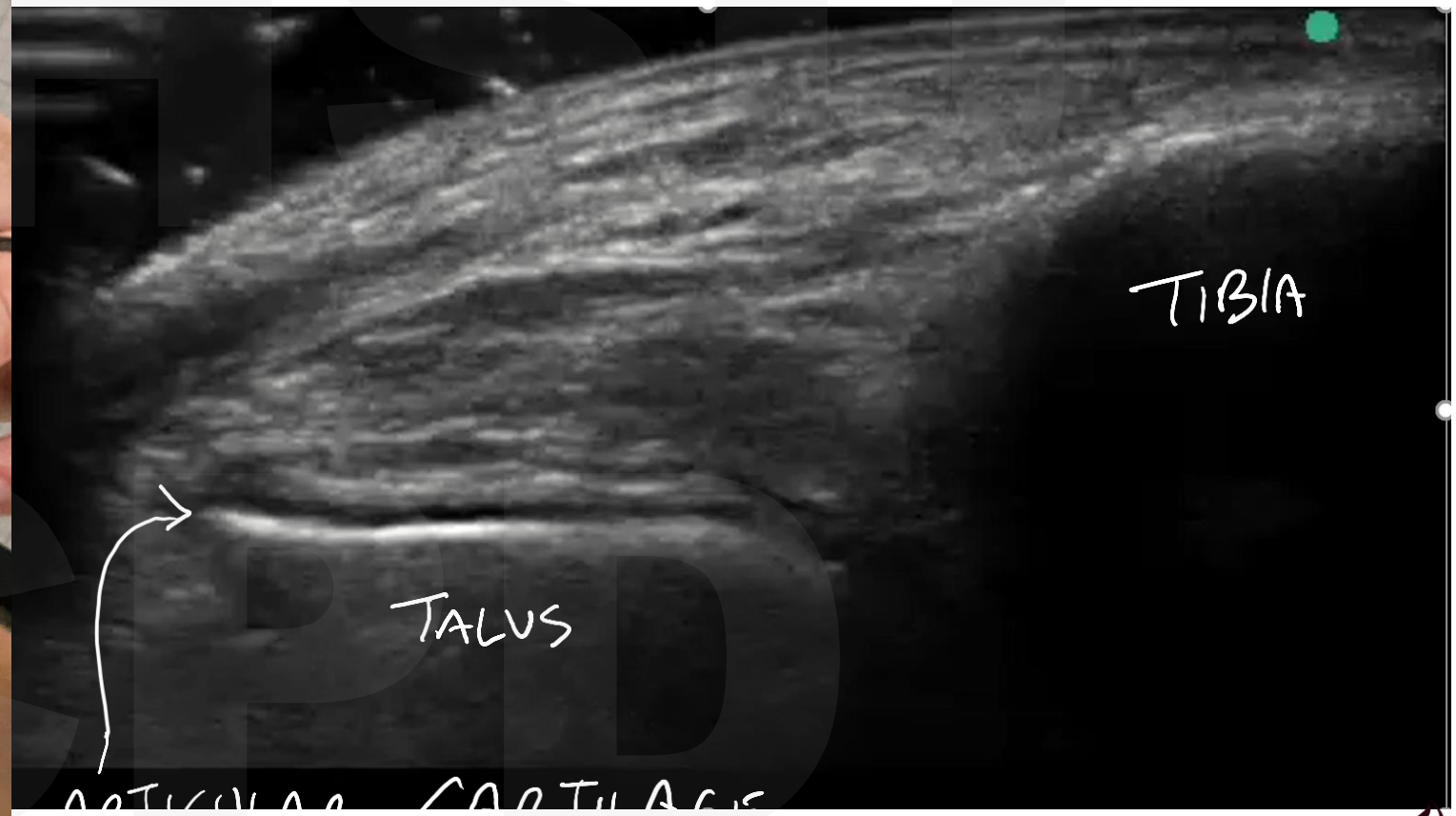
Hip aspiration ultrasound guided

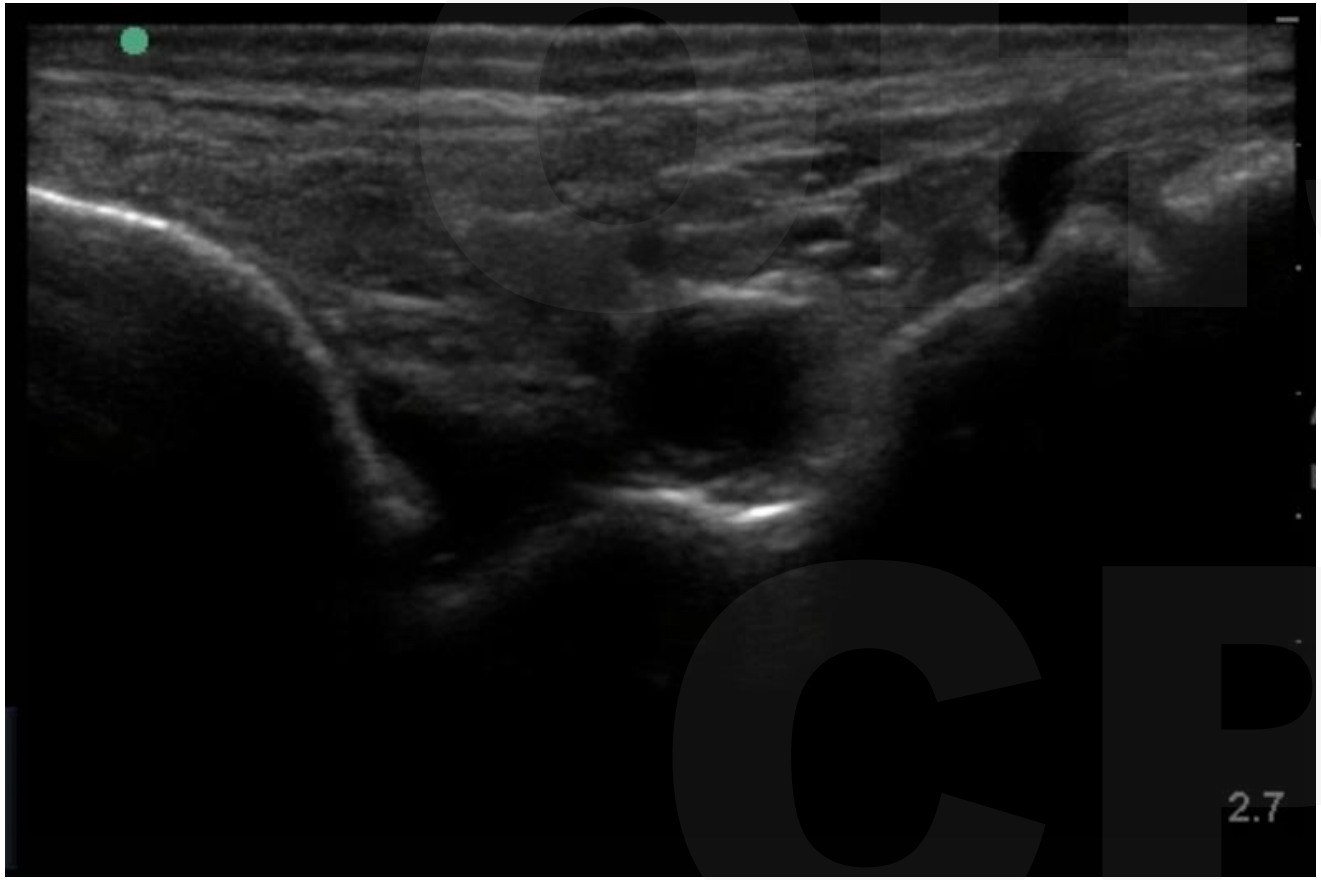
Ankle aspiration



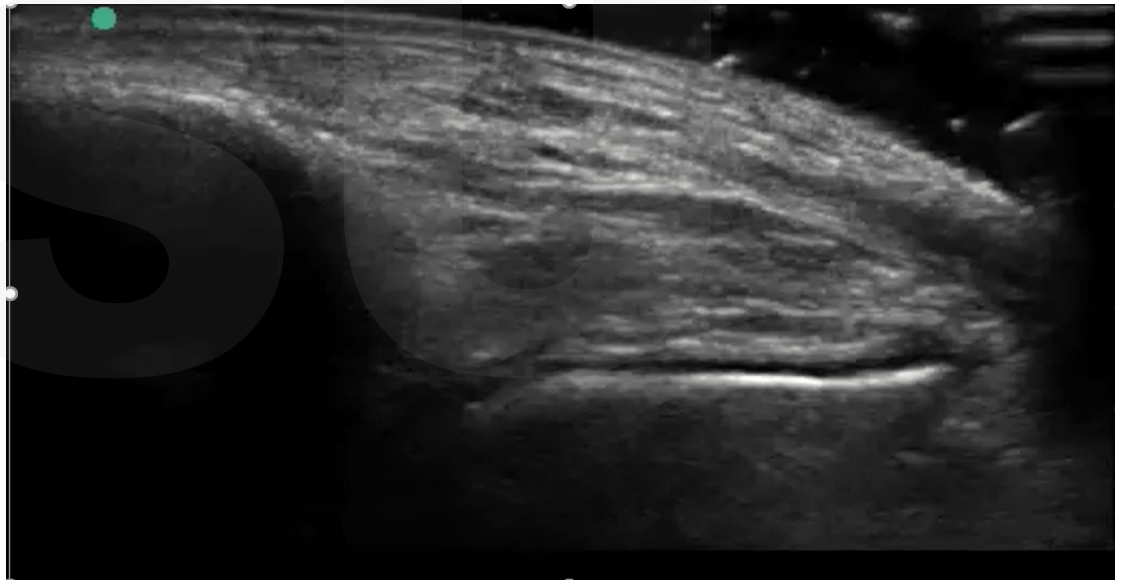
Ankle joint aspiration ultrasound anatomy



Ankle joint aspiration ultrasound anatomy

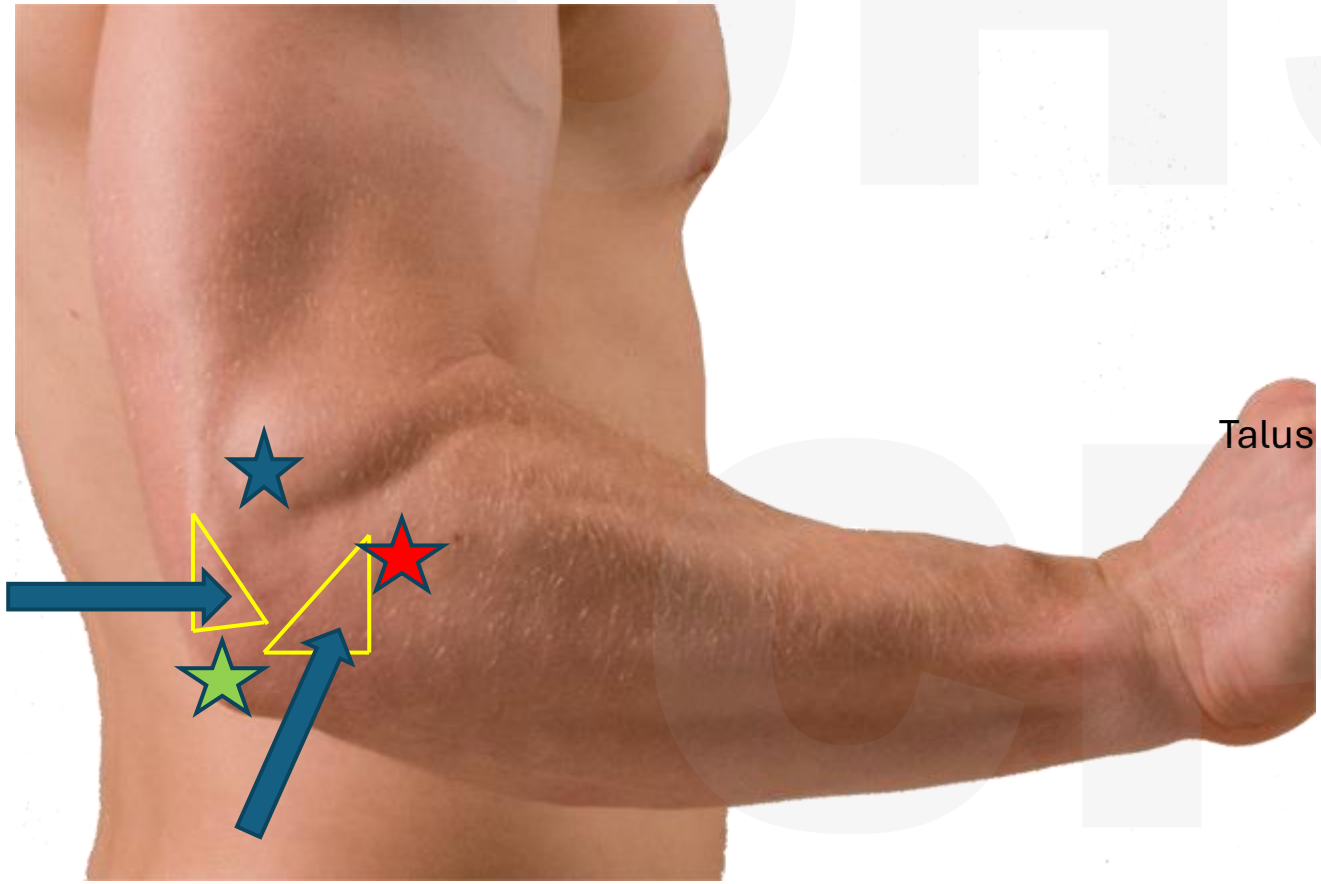


Effusion



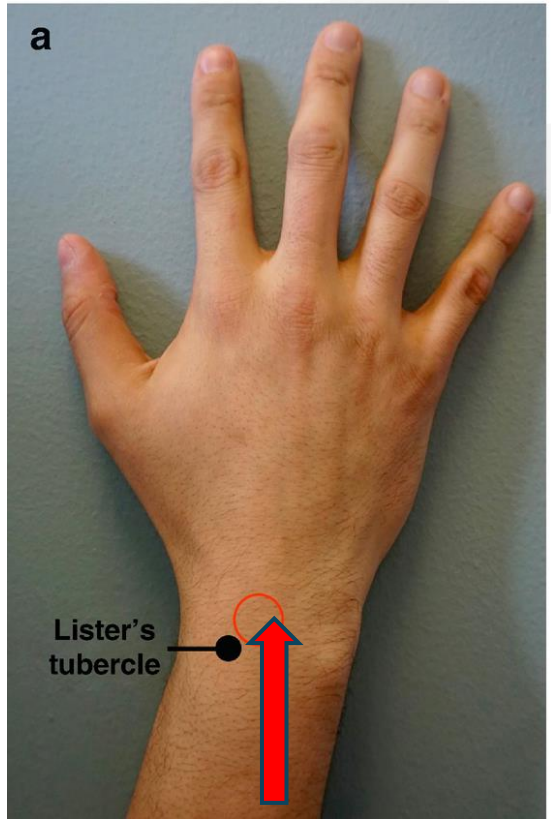
NORMAL

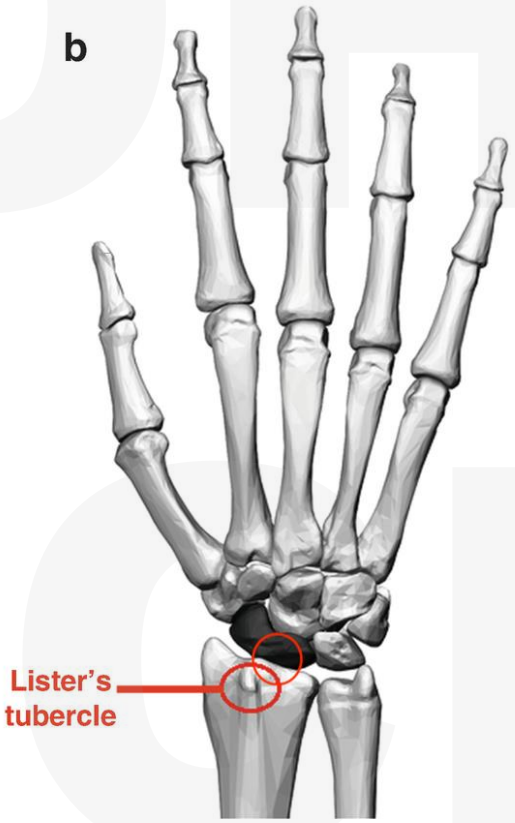
Elbow aspiration



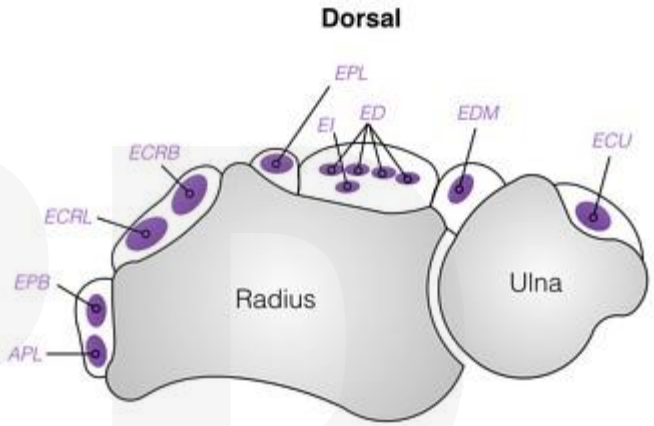
- Lateral epicondyle = blue
- Radial head = red
- Olecranon = green

Wrist aspiration

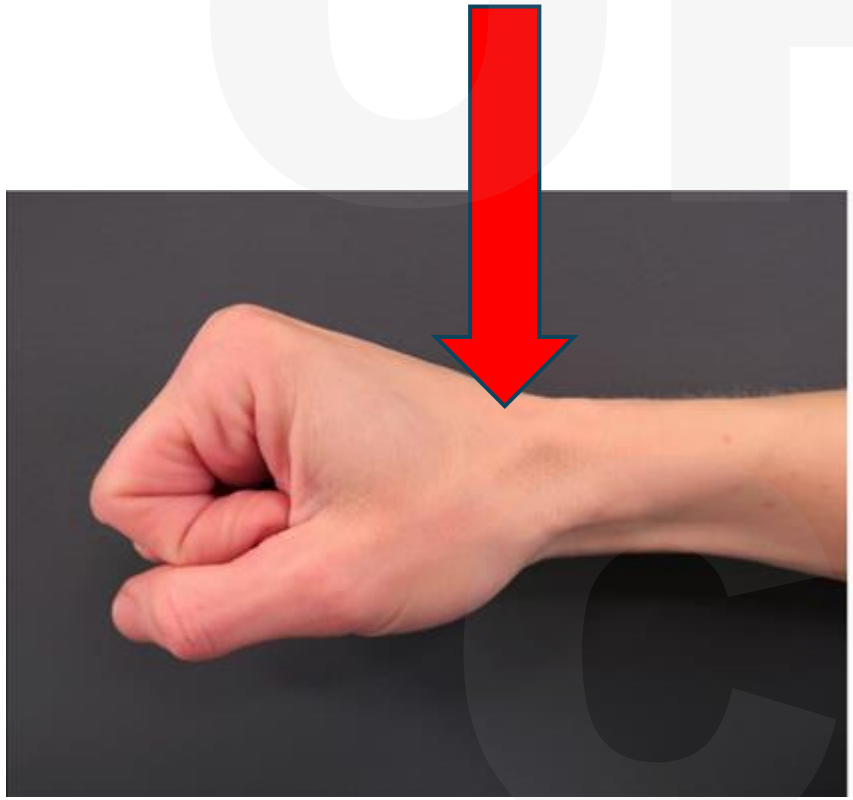




- Landmark is lister's tubercle on the distal radius



Wrist aspiration



Wrist aspiration

Native joint septic arthritis – epidemiology and risk factors

- 2 cases per 100,000 people per year
- Occult bacteremia most common cause
- Complication of joint infections, penetrating wound, or drug use
- Pre-existing joint damage/disease common (OA, RA, gout, lupus, trauma or recent instrumentation)
- Other common risk factors – DM, IVDU, cirrhosis, ESRD, chronic steroids, chronic skin conditions

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Native joint septic arthritis – Presentation

- Fever with warm and painful joint classic description
- Fever (58%)
- Pain may extreme or mild to non-existent (especially in RA and chronic steroids)
- Knee (45%), hip (15%), ankle (9%), elbow (8%) and wrist (6%) most common. Polyarticular in 10-20% of cases
- Osteomyelitis complication in 27-46%

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Native joint septic arthritis – Work up

- Leukocytosis (50-60%)
- CRP and ESR – low sensitivity – but highly useful for negative predictive value
- Procalcitonin – may be more useful than CRP – but still low sensitivity
- Fluid analysis – cell count, differential, crystal, and fluid culture.

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Native joint septic arthritis – etiology

Bacteria	Number (%)
Staphylococci	282 (56)
Methicillin-sensitive *Staphylococcus aureus* (MSSA)	214 (42)
Methicillin-resistant *S aureus* (MRSA)	51 (10)
Coagulase-negative staphylococci	17 (3)
Streptococci	83 (16)
Unspecified streptococcal species	56 (11)
Viridans streptococci	7 (1)
Streptococcus pneumoniae	5 (1)
Other streptococcal species	15 (3)
Gram-negative rods	78 (15)
Pseudomonas aeruginosa	30 (6)
Escherichia coli	14 (3)
Proteus species	5 (1)
Klebsiella species	5 (1)
Others	21 (4)
Others	62 (12)

Approx 20% negative synovial culture

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Native joint septic arthritis – Neisseria gonorrhea

- < 1% cases sepitc arthritis
- Better prognosis
- 75% female
- 72% polyarticular
- Hemorrhagic pustules
- Urinary symptoms in only 32%
- Gonococci found in synovial fluid in less than 50% cases

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Joint Aspiration

Table 3. Examination Of Synovial Fluid.

	Normal	Noninflammatory	Inflammatory	Septic
Clarity	Transparent	Transparent	Cloudy	Cloudy
Color	Clear	Yellow	Yellow	Yellow
WBC/mL	<200	<200-2000	200-50,000	>50,000
PMNs (%)	<25%	<25%	>50%	>50%
Culture	Negative	Negative	Negative	>50% positive
Crystals	None	None	Multiple or none	None
Associated conditions	—	Osteoarthritis, trauma	Gout, pseudogout, spondyloarthropathies, rheumatoid arthritis, Lyme disease, systemic lupus erythematosus	Nongonococcal or gonococcal septic arthritis

Used with permission from: Tintinalli JE, Kelen GD, Stapczynski JS, eds. *Acute Disorders of the Joints and Bursae.* 5th ed. Table 278-1.

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Treatment approach

- Consider empiric antibiotics only if fluid has been obtained
- Standard thresh-hold for cell count is 50K WBC
- Common to have either
  - Septic arthritis and < 50K WBC
  - OR
  - No Septic arthritis and > 50K WBC

Treatment approach

Empiric antibiotic therapy for suspected septic arthritis of native joints

Gram-positive cocci on Gram stain of synovial fluid
- High-prevalence area for methicillin-resistant *Staphylococcus aureus* (MRSA)
  - Vancomycin 1 g intravenous (IV) every 12 hours
- Low-prevalence area for MRSA
  - Cefazolin 2 g IV every 8 hours

Gram-negative cocci on Gram stain of synovial fluid, or clinical syndrome suggestive of disseminated gonococcal infection
- Ceftriaxone 1 g IV every 24 hours PLUS
- Azithromycin 1 g orally (single dose)

Gram-negative rods on Gram stain of synovial fluid
- Cefepime 2 g IV every 8 hours or piperacillin-tazobactam 4.5 g IV every 6 hours

No organisms seen on Gram stain
- Vancomycin 1 g IV every 12 hours (cefazolin may be used in areas of low MRSA prevalence)
- In the elderly, immunocompromised, critically ill, or intravenous drug users, add an antipseudomonal beta-lactam, such as cefepime or piperacillin-tazobactam

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Treatment approach

- Arthroscopic debridement typically recommended in most cases of septic arthritis – but few studies have compared treatment with antibiotics and aspiration vs arthroscopic wash out

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Questions?
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