

SOUNDING BOARD: Ultrasound-Guided Elbow Arthrocentesis

BY DANIEL MANTUANI, M.D., AND ARUN NAGDEV, M.D.

Introduction

Emergency physicians must consider septic arthritis when evaluating patients presenting with a painful and swollen elbow. The clinical exam, even in combination with serum laboratory markers, is not adequately sensitive to rule out a septic joint making arthrocentesis with synovial fluid analysis mandatory once the presence of a new effusion has been verified.¹

Overlying tissue edema and obesity often limit the ability of clinicians to assess accurately the presence of an effusion and palpate classic landmarks needed for “blind” joint aspiration.²

Sonography has proven to be superior to both the physical exam and plain film radiography in detecting the presence of joint effusions, while also confirming alternative diagnoses such as cellulitis, abscesses, and soft tissue hematomas.^{3,4}

The absence of effusion in the capsule surrounding the elbow joint on ultrasound (in conjunction with the clinical exam) may prevent an unnecessary invasive joint aspiration.⁴

Along with delineating anatomical landmarks and detecting the presence of joint effusion, point-of-care ultrasound can be used to guide needle as-

piration during arthrocentesis.

Ultrasound guidance has been shown to improve success rates compared to classic landmark techniques, and having a simple protocol can be invaluable for the clinician performing elbow arthrocentesis.⁵

Procedure Elbow Effusion Identification by Bedside Ultrasound

We recommend using the linear transducer (10-5MHz) for both the identification of the effusion and needle guidance for the arthrocentesis (Pic 1A). The elbow can be assessed for the presence of effusion from both the lateral and

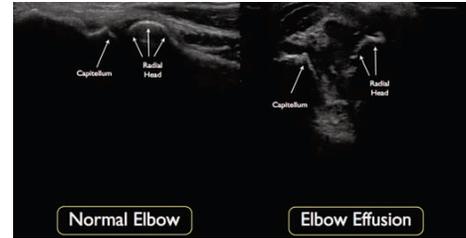
humeral, the radial head, and the olecranon.

The patient should be placed in a sitting upright position with the affected arm abducted, resting to the patient’s side, pronated, and flexed to 90 degrees (Pic 2).

Place the transducer along the proximal forearm in a longitudinal fashion, parallel to the shaft of the radius, and with the probe marker towards the patient’s head.

Slide the probe proximally until the rounded radial head and the lateral epicondyle are visualized (Pic 3).

The capitellum is the articular surface of the distal humerus and articulates with the radial head. Superficial to the radio-capitellar joint space is the common extensor tendon, which can be easily identified and avoided with ultrasound. An effusion of the joint capsule will appear as a hypoechoic/anechoic fluid collection that displaces the fat pad superficially (Pic 4).



Pic. 4: Look for anechoic (black) space between and above the radio-capitellar joint. The displacement of the joint capsule denotes a joint effusion.

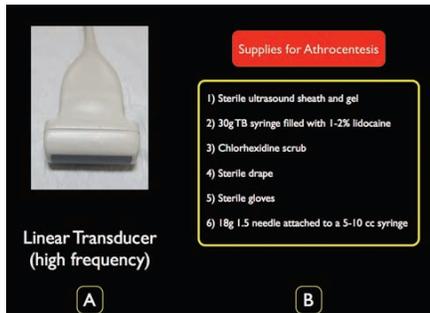
Ultrasound-Guided Elbow Arthrocentesis (Lateral Approach) Materials (Pic 1B)*:

- 1) Sterile ultrasound sheath and gel
- 2) 30g tuberculin syringe filled with 1-2% lidocaine
- 3) Chlorhexidine scrub

- 4) Sterile drape
- 5) Sterile gloves
- 6) 18g 1.5 needle attached to a 5-10 cc syringe



Pic. 5A: Place the ultrasound screen contralateral to the elbow, allowing for direct visualization of both the ultrasound image as well as the location of the joint capsule aspiration. **5B:** Using M-mode can be a simple way to ensure that the center of the probe correlates with the center of the screen.



Pic.1A: A linear high frequency ultrasound probe is needed to image the elbow. **1B:** Gather supplies required for an ultrasound-guided elbow arthrocentesis.

posterior approaches, with the lateral approach preferred for arthrocentesis.

We always recommend first examining the non-affected elbow with ultrasound for clinical comparison of the joint capsule. For the lateral approach to the elbow joint capsule, the goal is to find the soft triangular junction between the lateral epicondyle of the



Pic. 2: Have the patient abduct the shoulder, flex the elbow to 90 degrees and pronate the forearm. Placing a pillow or towel under the forearm will allow for easier visualization of the joint space.



Pic. 3: Slide the linear transducer proximally until the radio-capitellar joint is imaged.

- 4) Sterile drape
- 5) Sterile gloves
- 6) 18g 1.5 needle attached to a 5-10 cc syringe

*Pictures are for educational purposes, and sterile precautions (sterile probe cover, gloves, drapes, etc.) should be used for all joint aspirations.

Arthrocentesis is a sterile procedure, and the patient should be draped and prepped in the standard manner. Place the ultrasound probe in a sterile sheath and position the ultrasound machine opposite the provider so that the screen is in direct line of sight (Pic 5A).

We recommend placing towels or sheets under the elbow to elevate the joint and make the procedure easier to perform. Locate the lateral radio-capitellar joint space and ensure the

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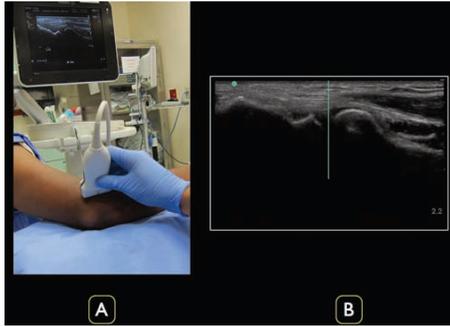
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center of the probe is located at the middle of the effusion.

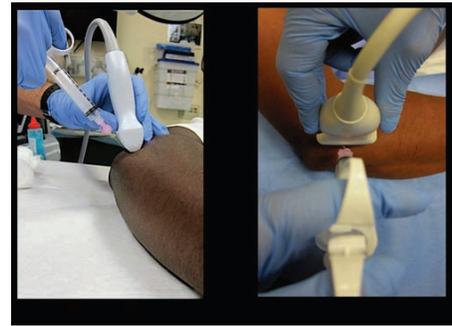
Using the M-mode line is a simple trick that can be used to ensure that the probe image on the screen is in the middle of the probe (Pic 5B). Inject a small amount of local anesthetic for patient comfort just medial (just below) the center of the transducer (Pic 6).

Using a 5-10cc syringe attached to standard 18g needle, enter the skin at the midpoint of the probe at a steep angle (80-90 degrees), out-of-plane to the ultrasound probe (Pic 7).

The clinician performing the arthrocentesis should be aware of the depth of the joint capsule effusion during the procedure, as well as actively aspirating the syringe as the



Pic. 6A and 6B: Place a small amount of local anesthetic just under (anatomically medial to) the probe.



Pic. 7: Using an out-of-plane technique, enter the skin at a steep angle.

PHOTOS COURTESY DR. DANIEL MANTUANI AND DR. ARUN NAGDEV

needle advances.

Ultrasound-guided medial and posterior approaches to the elbow joint capsule are alternative techniques, and

will not be addressed in this tutorial.

Summary

Point-of-care ultrasound can be an ideal tool for assessment for the presence of elbow joint capsule effusion as well as needle guidance for arthrocentesis. A simplified scanning protocol that relies on classic bony landmarks, while looking for underlying anechoic joint capsule effusion can be an ideal tool in the evaluation of the patient with a swollen elbow. A real-time out-of-plane technique for elbow arthrocentesis can be easily incorporated to improve procedural success.

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