

Ultrasound-Guided Arthrocentesis of the Ankle

Point-of-care ultrasound is a valuable tool to evaluate the presence of joint effusion of the ankle and guide aspiration.

Ankle effusions can be quite debilitating, causing band-like swelling and stiffness to the anterior aspect of ankle at the tibiotalar joint. Significant swelling can impair ankle dorsiflexion and plantar flexion. The differential diagnosis for joint effusions is wide, and includes traumatic effusion; gout; osteoarthritis; rheumatoid arthritis; and septic arthritis, which is one of the most important diagnoses for the emergency physician (EP) to identify and initiate prompt treatment to reduce the risk of serious morbidity and mortality. Differentiating these conditions requires joint aspiration and synovial fluid analysis. While a large effusion will be palpable and likely ballotable, smaller effusions are more challenging clinically. In such cases, point-of-care (POC) ultrasound can be a valuable tool in confirming a joint effusion.¹

Identifying Landmarks and Tibiotalar Joint

To access the tibiotalar joint space, it is important to identify useful landmarks.¹ This is best accomplished by having the patient in the supine position, with the affected knee flexed approximately 90° and plantar surface of the foot lying flat on the bed (**Figure 1**). The palpable landmark is the tibialis anterior tendon lateral to the medial malleolus (**Figure 2**). Immediately lateral and slightly distal to the tibialis anterior is the extensor



Figure 1. Photo demonstrating the proper patient position to access the tibiotalar joint space and identify useful landmarks. Prior to ultrasound imaging, the patient is placed in the supine position with the knee flexed approximately 90°, the ankle dorsiflexed, and the sole of the foot rested on the stretcher.

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Authors' Disclosure Statement: The authors report no actual or potential conflict of interest in relation to this article.

DOI: 10.12788/emed.2017.0042



Figure 2. Photo of an ankle showing the location of extensor hallucis longus (EHL) tendon, tibialis anterior tendon, and medial malleolus. The ideal site for ultrasound probe placement is just medial to the tibialis anterior tendon.

hallucis longus (EHL) tendon, which extends into the proximal foot. When aspirating the ankle joint space, these landmarks will avoid the dorsalis pedis artery lateral to EHL tendon. The location for aspiration of ankle joint will be medial to tibialis anterior tendon.

Performing the Arthrocentesis

The arthrocentesis is performed under sterile conditions using the high-frequency linear probe. A sterile probe cover is highly recommended if the operator will be using ultrasound to guide the procedure in real time. Using the palpable landmarks as a guide, the clinician should align the probe just medial to the tibialis anterior tendon with the probe marker oriented cephalad; scanning should begin superior to the ankle joint. The tibia will appear as a hyperechoic stripe just under a thin soft tissue layer. When the tibia is visible, the cli-

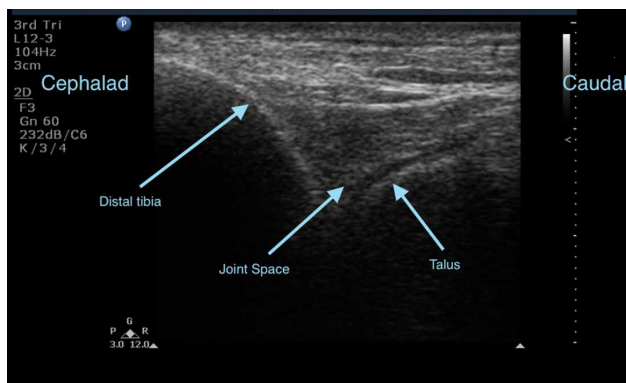


Figure 3. Ultrasound view in the longitudinal plane demonstrating a normal ankle joint space with the distal tibia and talus on either side.

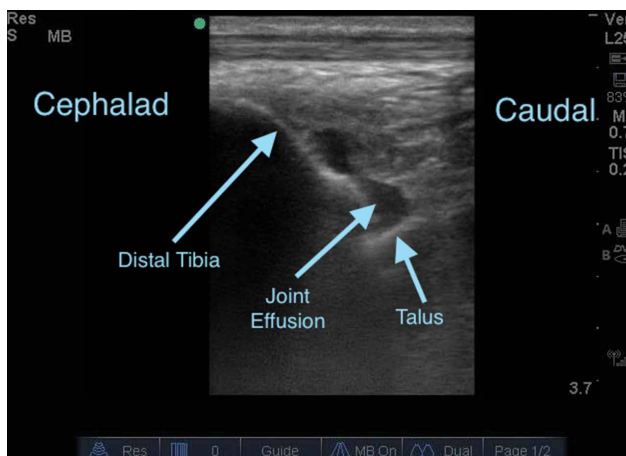


Figure 4. Ultrasound view in the longitudinal plane demonstrating an ankle joint with black (anechoic) fluid collection representing a joint effusion.

nician should then slide the probe distally. The joint space will be demonstrated by visualization of the distal tibia and talus bone (**Figure 3**). Since bone is highly reflective on ultrasound, the cortex will appear as white echogenic line with dark shadow below it. An effusion will appear as an anechoic (black) fluid collection in the space between the tibia and talus (**Figure 4**). If an effusion is present, the clinician should then center the probe over this space and administer local anesthetic medial to the probe (and tibialis anterior), employing an out-of-plane needle approach. Next, one inserts an 18-gauge needle at an angle of 75° to 80° in relation to the probe (**Figure 5**). Using ultrasound to visualize the needle tip entering the effusion, the clinician should aspirate the fluid slowly while advancing the needle into the joint space.



Figure 5. Photo showing the proper longitudinal probe position with the marker pointing toward the patient's head (cephalad), and the out-of-plane needle approach for aspiration of the ankle joint.

Pearls and Pitfalls

Point-of-care ultrasound is not only useful to guide arthrocentesis of joint effusions, but also to confirm the presence of an effusion prior to aspiration. At our institution, we have had many cases in which POC ultrasound demonstrated an absence of effusion, and we were able to avoid an unnecessary joint aspiration. Moreover, when an effusion is present, POC ultrasound-guided aspiration avoids complications. The use of POC ultrasound can also increase the confidence of the provider performing arthrocentesis of joints less commonly aspirated.

Summary

Joint aspiration is an important procedural tool for EPs, especially when used to rule out life-threatening conditions such as septic arthritis.² Deeper joints and small fluid collections, however, can be difficult to access without image guidance. In the ED setting, POC ultrasound provides a widely available, easy-to-use, low-cost tool to increase the likelihood of success while minimizing damage to adjacent structures.

References

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