An abstract of an article discussing ultrasound-guided arthrocentesis of the elbow, particularly from a posterior approach. The authors describe the anatomy and guidance technique of this approach, highlighting the posterior distal humerus as an excellent acoustic window into the joint space. The technique is also noted to be safe for performance. Ultrasound can assist in the diagnosis of elbow effusion, guide aspiration of the effusion, and decompress painful joints. The article concludes that ultrasound-guided arthrocentesis of the elbow from a posterior approach is a helpful technique to guide the aspiration of the painful swollen elbow.
DISCUSSION

Ultrasound-guided Arthrocentesis of the Elbow

A linear-array high-frequency probe is ideal for imaging the relatively superficial structures of the elbow joint. For this examination, the patient maintains the elbow in 90° of flexion, such as by holding their forearm across their abdomen, and the probe is placed sequentially in long axis and short axis overlying the triceps tendon and distal humerus to characterize the effusion (Figure 1). Flexion of the elbow has been shown to increase the detection of elbow effusions, and small amounts of fluid initially collect deep to the posterior fat pad in the olecranon fossa, where it is easily visualized in this approach (3). In the long-axis view, the bright reflective cortical surface of the posterior aspect of the humerus is demonstrated, and the bowl-like olecranon fossa comes into view distally, which in the normal elbow contains the echogenic fat pad, deep to the triceps tendon. In the short axis view, the mid-humerus has a rounded contour, and as the probe is slid toward the distal humerus, the cortical surface flattens, and then the olecranon fossa again comes into view deep to the triceps tendon (Figure 2). In the presence of a simple elbow effusion, anechoic fluid lines the bottom of the olecranon fossa, elevating the fat pad out of the fossa (Figure 3). In the setting of acute hemarthrosis, the fat pad is similarly elevated, but the fluid lining the olecranon fossa is frequently characterized by homogenous internal echoes rather than simple black fluid (Figure 4).

The short axis view of the distal humerus is ideal for ultrasound guidance of elbow arthrocentesis. In this view, the triceps tendon is visualized, and using sterile technique, the needle can be advanced in-plane from the lateral aspect, directed underneath the tendon toward

Figure 1. Photograph of probe placement along posterior distal humerus in both (A) long and (B) short axis.

Figure 2. Normal ultrasound appearance of posterior distal humerus in both (A) posterior long axis and (B) posterior short axis.
the base of the olecranon fossa (Figure 5). In this plane, no major neurovascular structures are encountered along the path of the needle on its course to the fluid pocket lining the olecranon fossa.

The use of ultrasound to guide needle placement is well described, and ultrasound-guided interventions such as peripheral and central venous access, paracentesis, and thoracentesis are part of emergency ultrasound practice as put forth in American College of Emergency Physicians’ Emergency Ultrasound Guidelines (4). Ultrasound-guided arthrocentesis has been shown to increase the success rate of arthrocentesis compared with traditional landmark techniques (5). Emergency physicians have published their experience with ultrasound guidance of arthrocentesis of hip, knee, and ankle (6–11). Ultrasound increases the ability to detect fluid in the elbow joint compared with clinical evaluation alone (12). In a study of cadaveric elbows, an injection of 5–10 cc in the elbow joint was required for an effusion to be visible on X-ray study, whereas only 1–3 cc was necessary for identification by ultrasound using the dorsal approach described above (3). This dorsal diagnostic approach to the olecranon fossa posteriorly has been reported by emergency physicians as a rapid screening test for pediatric elbow fractures, and both an anterior window of the radiocapitellar joint and the current technique evaluating the olecranon fossa have been described by Valley et al. (13,14). Fessell et al described a dorsal out-of-plane ultrasound-guided elbow arthrocentesis approach that traverses the triceps tendon in the radiology literature (15).

CONCLUSION

This report describes utilizing this large acoustic window to allow for emergency physician-performed
arthrocentesis of the elbow directed by dynamic ultrasound guidance using the in-plane technique.

Ultrasonography is a readily available imaging modality useful for guiding interventional procedures in the musculoskeletal system. Elbow ultrasound offers rapid, inexpensive, real-time examination of the structures of interest with easy comparison to the contralateral side. This posterior approach provides a wide acoustic window for arthrocentesis for both diagnostic and therapeutic purposes, and in the setting of hemarthrosis from radial head fracture presents a path for the needle that is remote from the fractured radial head. This technique should be considered to assist in the diagnosis of elbow effusion as well as to guide the aspiration of the painful swollen elbow.

REFERENCES