

A Needle in a Haystack

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SECTION 2 – ANSWER

Case

A 58-year-old, right-handed, female known for rheumatoid arthritis was seen in the outpatient clinic of our university hospital PM and R department for the left lateral elbow pain evolving over the last year.

She described mechanical pain over her left lateral epicondyle. On observation, there was no swelling, deformities, or scars. Physical examination revealed a positive Mills and Cozen sign. There was no ROM limitation. She had pain on palpation over her left lateral epicondyle.

A diagnostic ultrasound using a high-resolution linear multifrequency (7–18 Hz) probe on a Toshiba Aplio 500 ultrasound machine and a standardized elbow scanning protocol^[1] revealed signs of tendinosis of the common

extensor tendon without radial collateral ligament tears and absence of elbow effusion. While scanning the brachialis muscle in transverse axis at the distal arm level, the image was obtained [Figure 1]. Can you find the needle in the haystack?

INTERPRETATION

On this short-axis view of the distal arm, we can see (centrally in the image) a hyperechoic zone within the brachialis muscle and a posterior reverberation artifact deep to it [Figure 2].

An elbow X-ray in 2017 revealed no significant findings, but a follow-up X-Ray soon after her appointment revealed the image [Figure 3a and b].

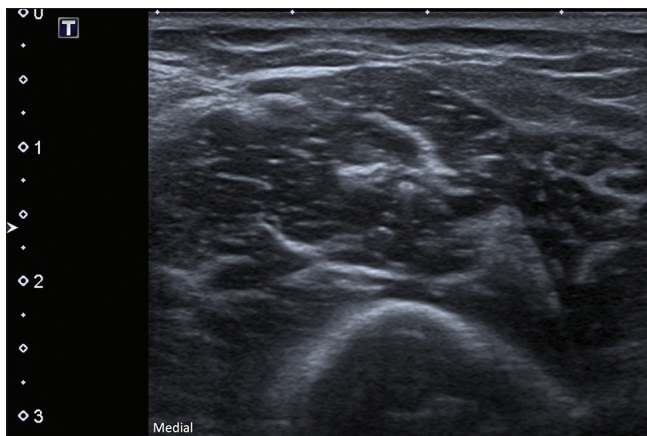


Figure 1: On this transverse view of the ventral arm, approximately 3 cm proximal to the elbow joint, please localize and describe the anomaly

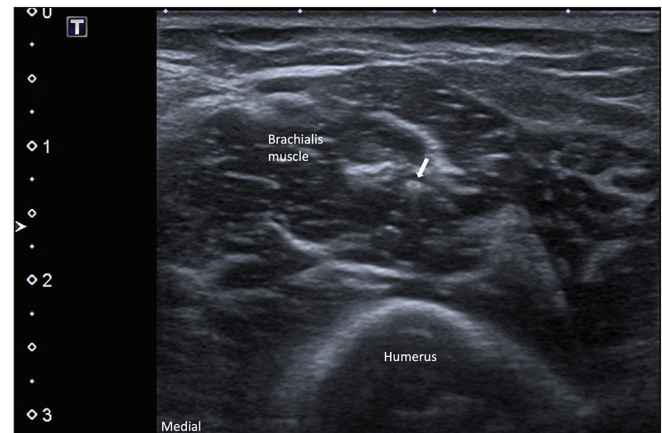


Figure 2: On this short axis, transverse view of the arm, approximately 3 cm proximal to the elbow joint, we demonstrate a central hyperechoic zone within the muscle fibers of the brachialis muscle lying anterior to the humerus (white arrow). There is a posterior reverberation deep to the area of interest

Received: 16-04-2020 Revised: 28-04-2020 Accepted: 07-05-2020 Available Online: 27-06-2020

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Website:
www.jmuonline.org

DOI:
10.4103/JMU.JMU_60_20

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How to cite this article: Mares C, Chang MC, Boudier-Rev  ret M. A needle in a haystack. J Med Ultrasound 2021;29:223-5.



Figure 3: On this X-ray of the left elbow, we clearly demonstrate a 2.5 cm long by 1 mm wide needle superior and medial to the elbow joint, on the anteroposterior (a) and lateral (b) views

A 2.5 cm long by 1 mm wide needle was described proximal to the elbow joint and was not seen on previous X-ray 2 years prior. The patient could not recall any event related to this finding. She frequently goes for blood work related to her rheumatoid arthritis (blood usually drawn around the antecubital fossa), but could not recall any incident related to the broken needle. There was no history of intravenous drug use. We saw the patient in follow-up for further ultrasonographic evaluation to better evaluate the localization of the broken needle [Figure 4a and b and Video 1].

Initial scanning of such a finding can prove to be tricky as septations and intramuscular fascia can give similar images to that of the needle. However, due to the posterior reverberation artifact, the needle was distinguished from intramuscular fascia both on short-axis and long-axis views.^[2] The needle was situated in the brachialis muscle, approximately 2 cm proximal to the trochlea and 1.5 cm deep. There was no significant scar tissue around the needle, and it was not adjacent to any major neurovascular structure, specifically the radial and median nerves were not in proximity. No significant Doppler hyperemia was present.

Our hypothesis for the presented case is likely a broken needle during a routine blood test given the location of the needle. Contraction of the brachialis may have contributed to an initial proximal migration of the needle to its current resting position. Interestingly, thorough clinical and sonographic evaluation helped confirm that the needle is not symptomatic at this point in its current location. Her pain is exclusively localized to the lateral epicondyle and there is no pain on palpation (when sonographically guided) in the area of the needle nor with brachialis contraction or stretch. She had received one cortisone injection prior to seeing us for her lateral epicondyle pain, but the needle was not found near that site, so this hypothesis was discarded.

In the short term, we were reassured with the sonographical evaluation as it demonstrated the needle to be far from any important neurovascular structures and there was no pain or signs of infection clinically. Furthermore, this case was seen during the COVID-19 pandemic and it was deemed

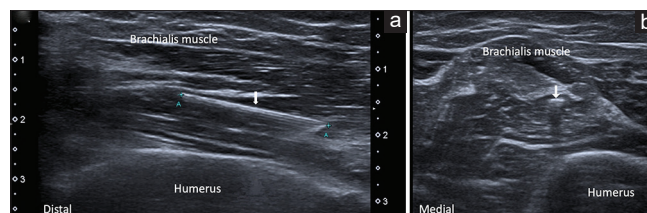


Figure 4: A longitudinal view (a) and transverse view (b) of the aforementioned hyperechoic zone demonstrates the needle (white arrow) embedded within the brachialis muscle, approximately 1.5 cm deep, with a posterior reverberation and acoustic shadow artifact which helps us distinguish it from muscular fascia

appropriate to limit health-care exposure at this time for a future consultation with our surgical colleagues.

DISCUSSION

Our literature review revealed this as a rare complication related to needle interventions. This complication seems to be most often reported in the dentistry literature related to local anesthesia and short and small gauge needles (mostly 30 gauge) which are more fragile to breakage.^[3] The estimated risk of needle breakage in medical dentistry is reported to be 1 in 14 million inferior alveolar nerve blocks.^[3] There is a theoretical risk of infection due to this foreign body or risk of migration and injury to nearby structures (especially neurovascular structures). Needle retrieval is also described in the medical dentistry and maxillofacial surgery literature.^[4] Previously, magnets were once used for retrieval, but this is no longer used and surgical retrieval, when clinically indicated, is the procedure of choice.^[5] We were unable to retrieve any reports of such cases in the interventional musculoskeletal literature.

Malamed *et al.* presented a review of this topic specific to medical dentistry with interesting recommendations at the end of their paper which can likely be generalized to any needle intervention.^[3] Short and smaller gauge needles seem to be more prone to breakage. Needle bending and insertion of needle all the way to the hub should be avoided, especially if already using short and small gauge needles.^[3,6] Studies have shown that needle size does not correlate with pain perception; in fact, a thinner needle increases injection pressure and may cause increased pain.^[7] Children or people with fear and apprehension of the procedure or of needles require more cautious injection, as a sudden, jerk-like reaction could increase the risk of needle breakage.^[8]

Diagnostic ultrasonography is a key tool in musculoskeletal medicine. It has many advantages; however, it is important to remember that as a basic diagnostic workup, a complementary standard radiograph of the desired region should be requested to completely assess the desired region. This case highlights how it could have been easy to initially miss this incidental finding without the standard radiograph. There are well-described artifacts in ultrasonography (posterior reverberation and acoustic shadow) described here, which must

can help the clinician further characterize these conditions. The role of ultrasonography and of the clinician is to be particularly attentive to all images and artifacts (such as reverberation) and rotate the probe 90° for further evaluation when suspicious images are seen.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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