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CASE IMAGE

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Radial nerve palsy: If in doubt, use ultrasound

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We report a case of post-operative palsy of the radial nerve (RN) diagnosed with ultrasound (US).

A 70-year-old woman presented with wrist drop. She underwent an osteosynthesis of a humerus fracture 5 months previously.

An injury at the level of the spiral groove was suspected due to her inability to extend the wrist with apparent preservation of elbow extension. The patient also mentioned mild dysesthesia of the dorsal radial aspect of her hand.

An electrodiagnostic study revealed signs of motor denervation with axonal damage of the muscles innervated by the RN: mild in the triceps muscle, moderate in the brachioradialis, severe in the extensor carpi radialis, and even worse for the extensor digitorum. Sensory nerve action potential of the RN was also reduced.

A US evaluation was performed. Figures 1 and 2A describes the US findings obtained at the level of the proximal arm.

The report from the previous surgery, as well as the X-rays, were reviewed (Figure 2B). To help stabilize the fracture, the orthopedic surgeon reportedly used a permanent suture.

The lateral head of the triceps showed signs of hypotrophy, as well as the brachioradialis, the supinator, and all of the extensors at the forearm. Muscle atrophy was progressively increasing from proximal to distal.

A revision surgery was planned. Intra-operative findings confirmed the US suspicion of RN compression by a suture (Figure 2C). After suture removal, it was found that some of the fascicles of the nerve were partially torn (Figure 2D). Neurorrhaphy was performed. At 6 months follow-up the patient improved in wrist extension; however, finger extension was still limited, possibly related to the time elapsed from the first to the revision surgery.

The RN is frequently involved in humeral shaft fractures; the injuries are usually at the middle or distal third of the humerus, where the nerve is closely located near the bone. The nerve may be either damaged in the trauma and/or after surgery due to orthopedic hardware or traction. In these injuries patients mainly present with wrist-drop and normal function of the triceps muscle.[1,2]

Although clinically a spiral groove injury was suspected, the electrodiagnostic finding of partial involvement of the triceps led to a closer examination of the RN proximal to the spiral groove, which demonstrated the exact site of damage.

Neuroma represents the proliferative hyperplastic reaction due to nerve damage; neuromas may be divided in terminal (originating at the end of a severed nerve) and spindle (the nerve continuity is maintained).[3]

Due to the peculiar findings of our patient, we concluded that the torn fascicles were likely mainly those that give rise to the posterior interosseous nerve, whereas other fascicles suffered a compressing neuropathy, with some preservation of the sensory function.[4,5]

In conclusion, our case highlights the role of US in the study of nerve injuries, in particular, after surgery, in which US does not suffer from artifacts related to orthopedic hardware. With US we could exactly demonstrate the site of nerve damage, leading to a revision surgery which improved symptoms.

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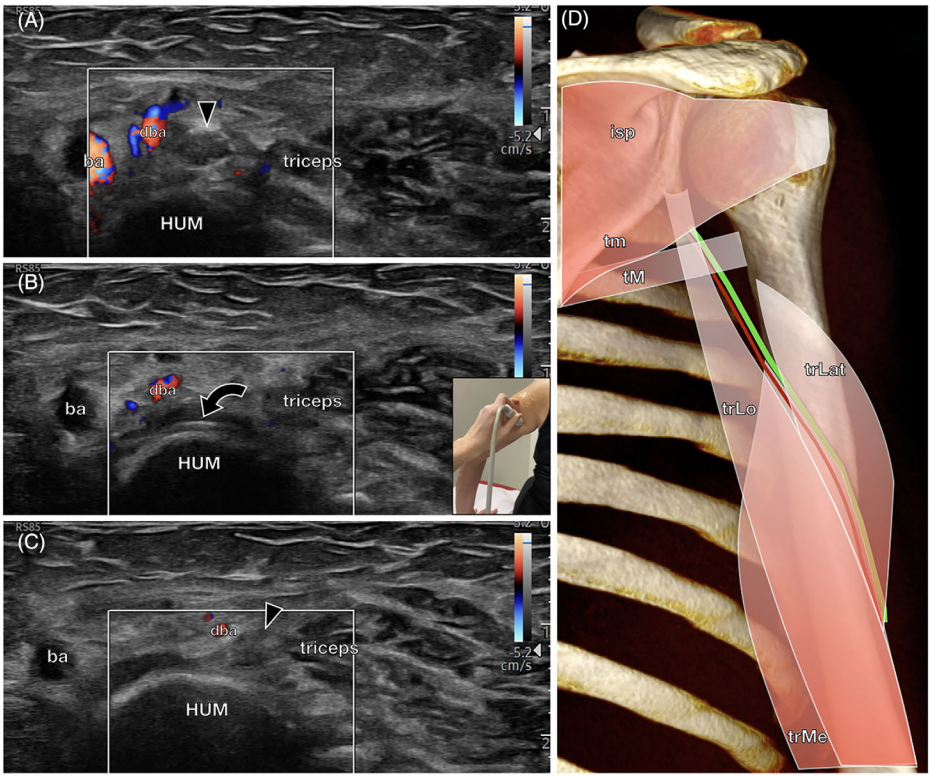


FIGURE 1 (A–C) Axial Color Doppler sonograms from cranial (A) to caudal (C), obtained at the level of the proximal humerus (HUM). In A, the RN (black arrowhead), just distal to the axilla, is quite swollen and hypoechoic. Color Doppler helps in differentiating the brachial artery (ba) as well as the deep brachial artery (dba) from the RN. In B, a bit caudally, the RN cannot be clearly demonstrated, being strictly adjacent to the cortex of the humerus. A white hyperechoic line (curved arrow), parallel and close to the bone, is depicted. In the lower right corner, probe position is indicated. In C, distally, the RN appears again, near the dba and the triceps muscle. D, Schematic drawing showing of the passage of the radial nerve (in green) close to the deep brachial artery (in red), at the level of the posterior proximal arm. Some of the muscles of the posterior aspect of the shoulder and arm are also shown: the infraspinatus (isp); the teres minor (tm); the teres major (tM); the long head (trLo), the lateral head (trLat) and the medial head (trMe) of the triceps

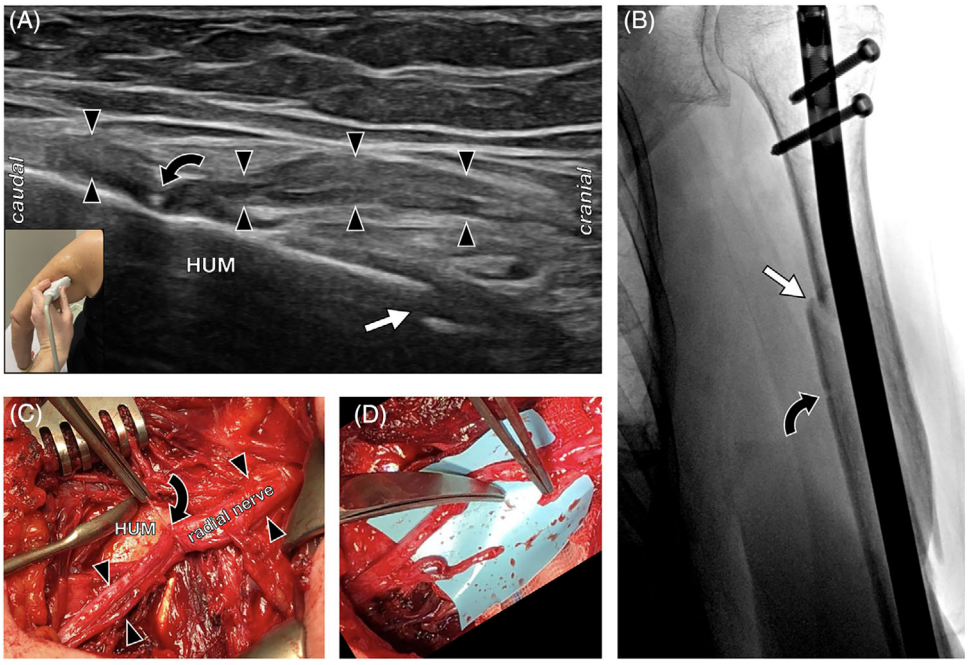


FIGURE 2 (A) Sagittal-oblique sonogram proximal to the spiral groove region demonstrates the RN (black arrowhead), which was abruptly compressed over the humerus (HUM) bone by a hyperechoic dot (curved arrow). Note the fracture site indicated by a white arrow. In the lower left corner, probe position is indicated. (B) Reviewing a previous radiograph performed 1 month before, an irregularity in the medial bony profile (curved arrow), caudal to the fracture site (white arrow), can be demonstrated, related to the suture. Note the close correspondence of the US and radiographic findings. (C) Intra-operative photograph confirmed that the RN was compressed to the bone by a strict permanent suture, which corresponded to the hypereochic structure depicted at US. (D) After removing the suture, it was apparent that some of the fascicles of the RN were torn

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CONFLICT OF INTEREST

The authors have no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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