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Entrapment of the ulnar nerve in cubital tunnel by free intra-articular body—a case report

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Introduction

Ulnar nerve is often trapped in cubital tunnel at elbow level, this being the second most common place of entrapment of the peripheral nerves in the upper limb.[3] The most commonly associated etiology is the anatomic alteration of the cubital tunnel.[12] There are three mechanisms described: compression, traction, and friction. The symptoms exhibited are hypoesthesia, pain, and weakness, which increase with the bending of the elbow at an angle greater than 90°, and according to nerve involvement we can classify the clinical status using the modified McGowan score.[13] In this article, an unusual extrinsic compression mechanism to cubital tunnel is shown, caused by free intra-articular body, and its surgical management.

Case presentation

A 32-year-old man presented with a history of fracture-dislocation of the left elbow of 2 years' evolution that needed prosthetic management for the broken radial head. Subsequently, he presented with progressive hypesthesia in the territory of the ulnar nerve on bending of the elbow at an angle >90°. The result of the bending of the elbow test with sustained extension of the wrist was positive, causing increased hypesthesia in the territory of the ulnar nerve. No atrophy or motor loss was evidenced, so the patient was classified as stage I according to the modified McGowan score.[13]

The elbow joint range of motion was 10°-120°, associated with the level of pain, and pronation-supination was limited to 10°. Entrapment of the ulnar nerve at the elbow was confirmed by electromyography. On radiologic examination, it was noted that the radial head arthroplasty was in good position, without signs of loosening (Fig. 1, *A*), with osteoarthrosis changes and a free intra-articular body (Fig. 1, *B*).

Surgery of the elbow was performed through a medial approach, focused on the medial epicondyle, with exploration of the cubital tunnel, where signs of thickened ulnar nerve were found (Fig. 2, *A*). Articular capsule distention was also found at the same level (Fig. 2, *B*), and a free body was observed by making an incision (Fig. 3). Subsequently, capsular release and anterior submuscular transposition of the nerve and reinsertion of the medial epicondylar muscles were performed (Fig. 4). After surgery, management was 2 weeks of immobilization, with the splint at 90°, and a rehabilitation program. The patient evolved well; he was evaluated 3 months after surgery, and we found an elbow joint range of motion within the normal range (Fig. 5 and Video S1). The result of the bending of the elbow test with sustained extension of the wrist was negative. The clinical status of the patient was normal according to the modified McGowan score.

Discussion

The ulnar nerve is trapped in 5 anatomic sites: arcade of Struthers, cubital tunnel, medial epicondyle, flexor deep fascia, and Guyon canal[3,12]; the cubital tunnel, at elbow level, is the second most common place of entrapment of the ulnar nerve. This entrapment is caused by primary and secondary anatomic changes affecting the size of the cubital tunnel, as O'Driscoll et al described.[12] The ulnar nerve in the elbow is involved by entrapment in the cubital tunnel associated with friction caused by instability of the nerve in patients with medial epicondylitis, traction in cubitus valgus, and osteoarthritis.[5,6,8]

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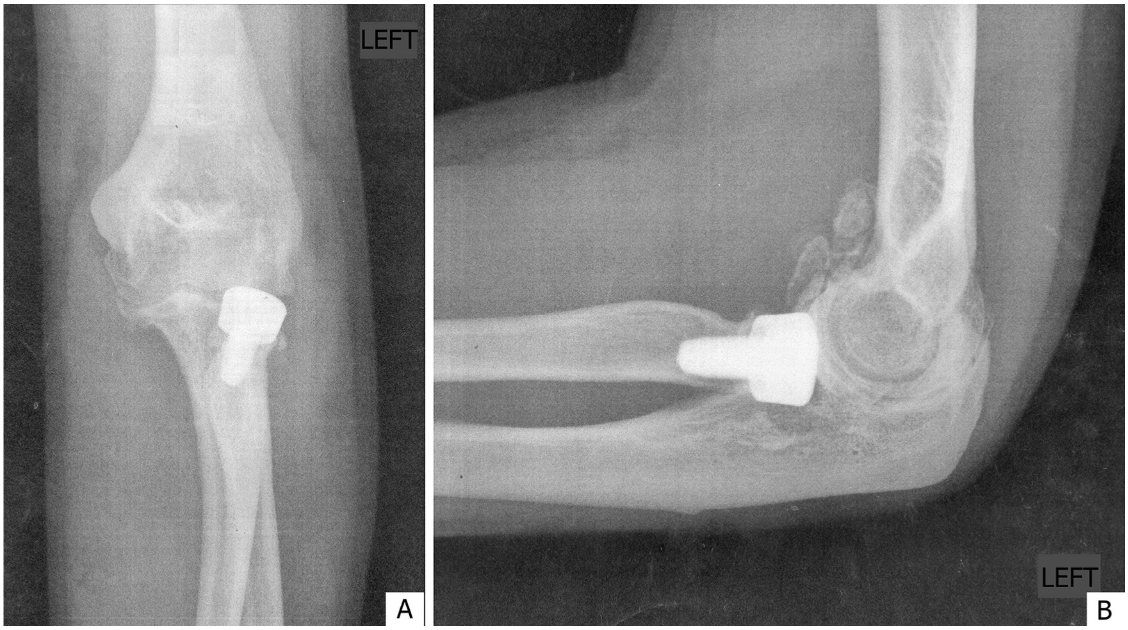

Figure 1 Plain film radiography of the left elbow. (**A**) Anteroposterior view showed radial head arthroplasty in good position. (**B**) Side view showed free intra-articular bodies.

The entrapment of the ulnar nerve, by an external cause, at the cubital tunnel level is due to inflammatory or degenerative processes. Cases like this, in which a free intra-articular body distended the elbow joint capsule, causing compression of the nerve by cubital tunnel narrowing, are uncommon. The origin of the free intra-articular body could be secondary to a type of chondromatosis inflammatory process, as described by Kim et al and Mueller et al,[7,11] or an osteoarthrosis, like the present case, with a clear connection between the fracture of the radial head and the subsequent outbreak of free intra-articular bodies. Within the etiologic diagnosis, it was considered that the entrapment of the ulnar nerve was caused by bone spicules secondary to osteoarthrosis, but it was discarded with radiologic and surgical findings of free intra-articular bodies.

The diagnosis of ulnar nerve entrapment is made by clinical findings and electromyography. Imaging studies also contribute to the diagnosis and the definition of the characteristics of the entrapment of the ulnar nerve. Ultrasound (US) evaluation checks thickening of the nerve, which is characterized by loss of fascicular pattern, increased hypoechogenicity because of perineural edema, and increased cross-sectional diameter of the nerve, with a normal reference[2,4] value up to 10 mm^2. Taking these into account, increased

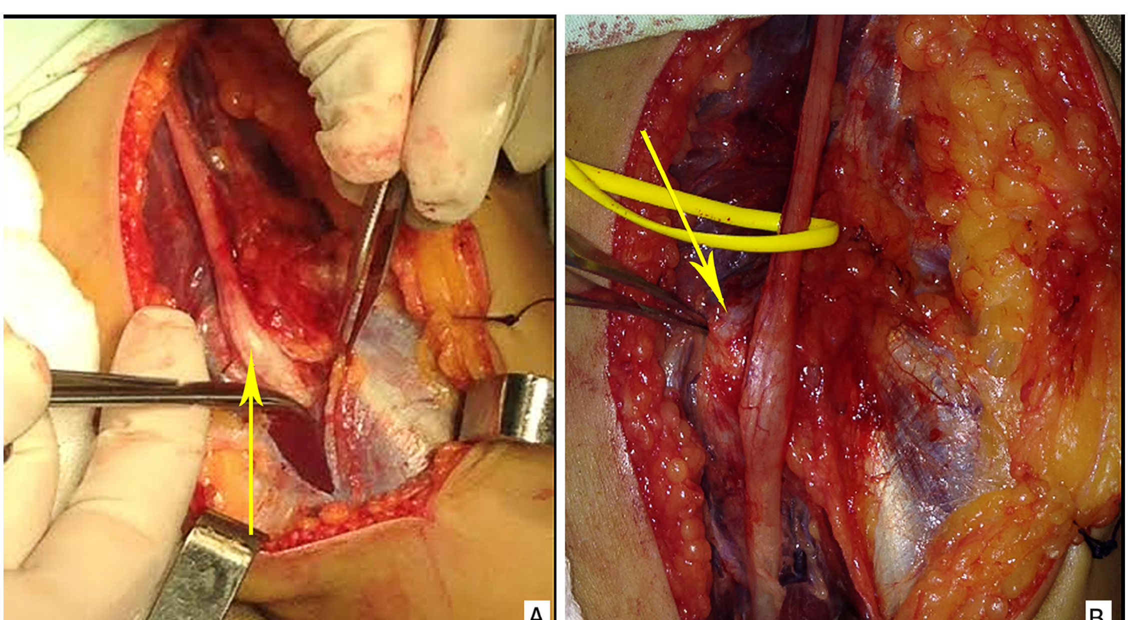

Figure 2 Surgical exploration of the cubital tunnel. (**A**) Thickening of the ulnar nerve at that level (*arrow*). (**B**) Ulnar nerve compression in the cubital tunnel, resulting from articular capsule distention (*arrow*).

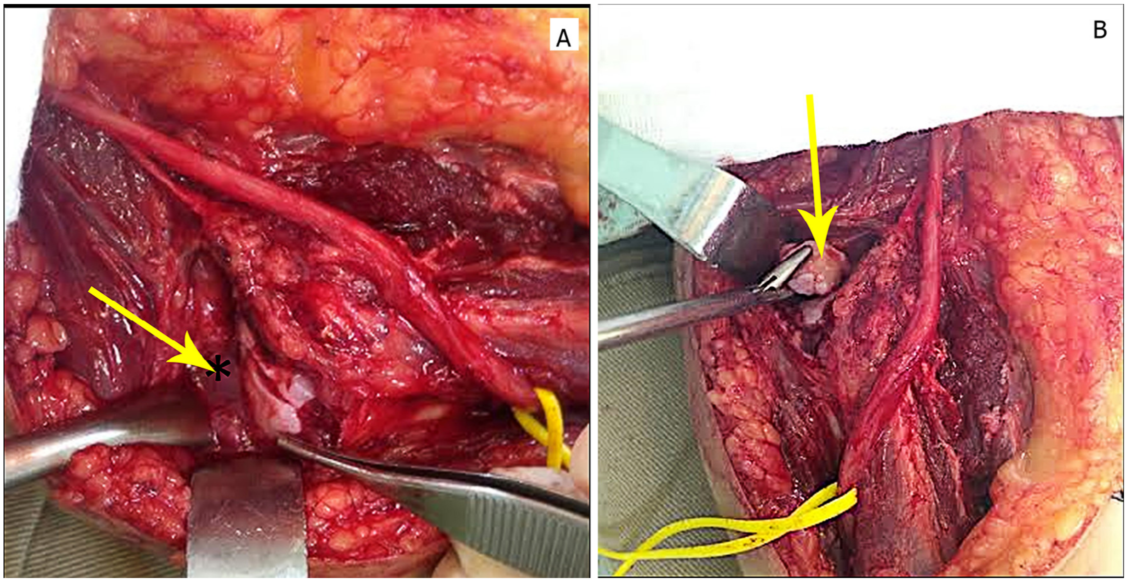

Figure 3 Opening of the joint capsule. (**A**) Exposure of the free body compressing the ulnar nerve (*asterisk and arrow*). (**B**) Intra-articular free body extraction (*arrow*).

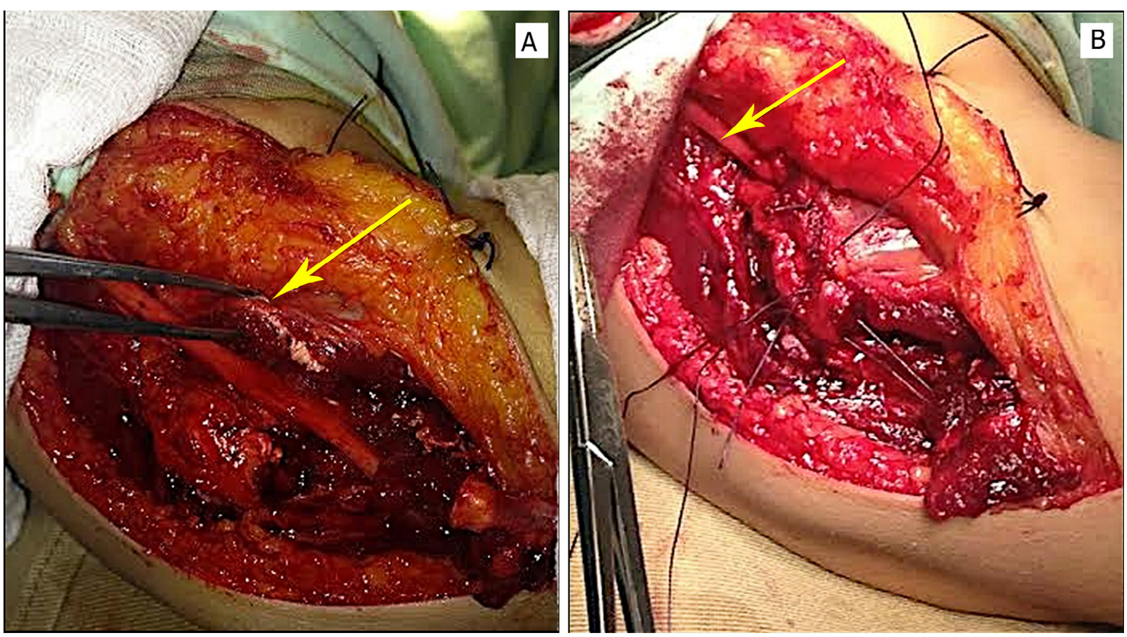

Figure 4 Intraoperative photographs. (**A**) Submuscular transposition of the ulnar nerve (*arrow*). (**B**) Medial epicondylar muscles reinsertion.

cross-sectional diameter of the nerve has been found to be directly proportional to the severity of the symptoms.[14] US evaluates cubital tunnel narrowing, calculating its area and visualizing possible extrinsic compressions, to see nerve mobility in flexion and extension. US is a dynamic examination that allows comparison of the healthy side with the unhealthy side. Magnetic resonance imaging provides information about inflammation of the ulnar nerve, characteristics of the cubital tunnel, and evidence of extrinsic factors of ulnar nerve compression, such as free intra-articular bodies.[2] Compared with US, magnetic resonance imaging is not more cost-effective for the patient. In this case, diagnosis was clinical and electromyographic, using plain film radiography, which proved the presence of free intra-articular bodies in the elbow. During surgery, we ascertained that 1 of those bodies was causing the entrapment.

Decompression of the ulnar nerve at elbow level with primary or secondary entrapment is made by managing the cause, freeing the trapped nerve, and making an anterior submuscular or subcutaneous transposition.[1] In the literature, which of the two procedures is better has been widely discussed,[10,15] and it has been found that subcutaneous transposition has less morbidity than submuscular transposition. However, submuscular transposition is advised for cases of failed subcutaneous transposition. The decision to perform a submuscular transposition was made because of thickening of the nerve and osteoarthrosis changes caused by elbow fracture-dislocation, which could be a risk factor for early recurrence of ulnar nerve entrapment. Furthermore, the literature does not provide conclusive evidence either for or against any technique,[9] so anterior submuscular transposition was performed according to the surgeon's preference.

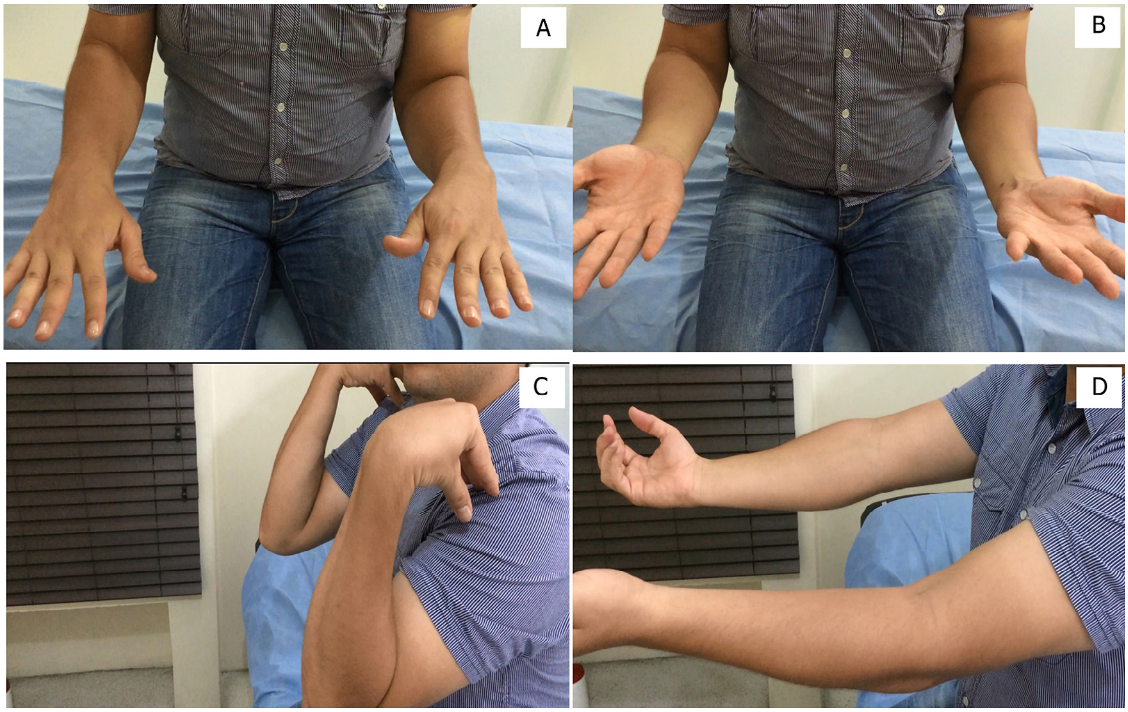

Figure 5 Active elbow range of motion at the final clinical follow-up. (**A**) Active pronation, (**B**) active supination, (**C**) active elbow flexion, (**D**) active elbow extension.

Conclusion

This case represented an unusual mechanism of extrinsic entrapment of the ulnar nerve in the ulnar canal by an intra-articular free body at the elbow. Clinical examination before and after surgery evaluated the clinical improvement of the patient and thus showed satisfactory results. This mechanism must be taken into account in evaluating an entrapment of the ulnar nerve.

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Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jses.2017.04.002

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