Anconeus epitrochlearis involvement in cubital tunnel syndrome: A case report

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Abstract
The anconeus epitrochlearis muscle, typically considered an extension of the triceps brachii and sometimes a variant of the flexor carpi ulnaris due to its course over the ulnar nerve groove and innervation by the ulnar nerve, can play a critical role in the etiology of cubital tunnel syndrome (CuTS). In this case report, we present a patient with CuTS attributed to the presence of the anconeus epitrochlearis muscle. The patient exhibited classic symptoms of CuTS, including pain, numbness, and weakness along the ulnar nerve distribution. Diagnostic imaging and electrodiagnostic studies confirmed ulnar nerve compression at the elbow. During surgical exploration, the anconeus epitrochlearis muscle was identified as the source of compression, and its excision resulted in immediate nerve decompression. Post-operatively, the patient experienced significant symptom relief and functional recovery. This case highlights the need to consider anatomical variations like the anconeus epitrochlearis in the differential diagnosis of ulnar nerve compression syndromes and demonstrates the effectiveness of surgical excision in treating CuTS caused by this muscle.

Keywords: Anconeus epitrochlearis, cubital tunnel, including pain, Nerve entrapment neuropathies

Introduction
Nerve entrapment neuropathies are often a cause of significant functional disabilities. Most of them if diagnosed early can lead to complete recovery. Upper limb entrapment neuropathies are far common than lower limb. Median and ulnar entrapment neuropathies’ accounts for the most numbers. Regarding ulnar nerve most of them occurs at the elbow or below the region. Cubital tunnel syndrome is a prevalent neuropathy involving the compression of the ulnar nerve at the elbow, second only to carpal tunnel syndrome in terms of frequency. Patients typically experience symptoms such as pain, numbness, and tingling in the ring and small fingers, as well as weakness in hand grip and fine motor skills. The causes of cubital tunnel syndrome are diverse, including anatomical anomalies, mechanical stress, and repetitive elbow movements. One rare anatomical anomaly associated with cubital tunnel syndrome is the presence of the anconeus epitrochlearis muscle. Though often asymptomatic, when present, this muscle can compress the ulnar nerve, leading to the development of cubital tunnel syndrome. The anconeus epitrochlearis muscle is frequently regarded as an extension of the triceps brachii; however, some consider it a variant of the flexor carpi ulnaris due to its pathway over the ulnar nerve groove [1] and its innervation by the ulnar nerve [2]. When present, this muscle constitutes the roof of the cubital tunnel [3]. It typically courses obliquely and posteriorly, tightening when the elbow is flexed and relaxing when the elbow is extended [4]. Evolutionarily, the anconeus epitrochlearis was likely a weak elbow extensor but has since evolved to function as Osborne’s ligament of the elbow [2]. This case report presents a rare instance of cubital tunnel syndrome caused by the anconeus epitrochlearis muscle.

Case Report
19-year-old male presented to the outpatient department with a six-month history of progressive tingling and numbness in his right hand, accompanied by deformity and weakness. There was no history of trauma.
On examination, he exhibited an ulnar claw hand deformity with positive froments sign (Figure 1 and 2), intrinsic muscle weakness, decreased sensation over the medial two fingers and hypothenar area, and reduced grip strength as assessed by a hand grip test. Clinical evaluation revealed a positive Tinel sign at the elbow, indicating ulnar nerve irritation. Routine blood investigations were unremarkable.

Nerve conduction studies showed reduced conduction velocity proximal to the elbow for the ulnar nerve, confirming nerve dysfunction. Ultrasound imaging demonstrated peri-neural edema approximately 3.5 cm proximal to the medial epicondyle, and MRI of the elbow revealed edematous changes in the ulnar nerve, with compression noted at the site where it crossed beneath the anconeus epitrochlearis muscle.

Surgical intervention was planned to alleviate the nerve compression. During dissection via a medial approach, the anconeus epitrochlearis muscle was identified, showing clear innervation by the ulnar nerve. The muscle followed its typical course between the olecranon and the medial epicondyle but presented with notable extensions proximal to the medial epicondyle, effectively doubling its length. Anteriorly, the muscle was directly attached to the medial intermuscular septum, while posteriorly, it inserted into the triceps brachii muscle. Surgical release of the muscle and decompression of the ulnar nerve were successfully performed.

Postoperatively, the patient's recovery was uneventful. He was placed on a regimen of regular follow-up and prescribed physiotherapy. Over the course of six months, there was significant improvement noted in grip strength, sensory deficits, and intrinsic muscle weakness. The patient reported functional enhancement, being able to perform routine activities with greater ease and without the previous symptoms of tingling, numbness, or weakness in his hand.

Discussion

The anconeus epitrochlearis muscle, also known as accessory anconeus, was initially described by Austrian anatomist Professor Wenzel Gruber in 1865 [5]. Gruber identified its function as an atavistic muscle variant of the triceps brachii, primarily found in strong males on the right side [6]. This muscle acts as a protective cushion for the ulnar nerve at the entrance of the cubital tunnel, potentially replacing Osborne's ligament and becoming hypertrophied, which can lead to nerve entrapment, especially in individuals engaging in repetitive elbow movements [7]. Symptoms typically manifest over time and include wasting of hand intrinsic muscles, sensory disturbances over the hypothenar area and medial two fingers, though typical clawing is not commonly observed.

Diagnostic approaches include nerve conduction studies, often showing compression-related findings, although a subgroup may present with normal results. Dynamic ultrasound (USG) is highly effective for diagnosis, visualizing the muscle as a hypoechoic lesion surrounding the ulnar nerve. MRI remains crucial for surgical planning, providing detailed anatomical insights across different
planes, assessing muscle size, position, and edema, and clarifying the nerve's relationship with adjacent structures. Surgical intervention becomes necessary for chronic compression with intrinsic muscle weakness, involving myotomy/myectomy with anterior nerve transposition, either endoscopically or via open procedure under regional/general anesthesia. The surgical approach typically includes an incision proximal and distal to the medial epicondyle, with meticulous release and debulking of the anconeus epitrochlearis muscle, often followed by arcuate neurolysis to ensure complete nerve release. Some surgeons opt for subcutaneous anterior nerve transposition/medial epicondylectomy to prevent nerve subluxation. Postoperative rehabilitation spans approximately 6 weeks, facilitating the majority of patients' return to normal occupational activities. This case underscores the importance of recognizing anconeus epitrochlearis entrapment neuropathy as a subset of ulnar nerve compression neuropathies, despite its limited awareness among surgeons. Comprehensive anatomical understanding and precise surgical techniques are critical for achieving favourable outcomes, as demonstrated in this case where the patient experienced significant recovery postoperatively. Fernandez et al. have similarly documented successful surgical outcomes in patients with ulnar nerve entrapment associated with anconeus epitrochlearis [9]. Awareness and proper management protocols are essential for navigating this condition effectively.

Conclusion
The presence of the anconeus epitrochlearis muscle can contribute to CuTS by compressing the ulnar nerve within the cubital tunnel. Early diagnosis and surgical intervention are crucial for relieving symptoms and preventing long-term nerve damage. This case highlights the importance of considering anatomical variations in the differential diagnosis of ulnar nerve compression syndromes and supports the role of surgical excision in managing such cases effectively. Further studies are recommended to explore the prevalence and impact of the anconeus epitrochlearis muscle in CuTS.

Abbreviations
Mri: Magnetic Resonance Imaging
CuTS: Cubital Tunnel Syndrome

References

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