



A Tardy Ulnar Palsy with an Anomalous Course of Ulnar Nerve

Harsh R. Shah¹ Amita Hiremath² Parag Munshi³ Mukund R. Thatte²

¹Department of Plastic and Reconstructive Surgery, Bombay Hospital and Institute of Medical Sciences, Mumbai, Maharashtra, India

²Department of Plastic Surgery, Bombay Hospital and Institute of Medical Sciences, Mumbai, Maharashtra, India

³Department of Orthopedics, Bombay Hospital and Institute of Medical Sciences, Mumbai, Maharashtra, India

Address for correspondence Harsh R. Shah, DrNB, Department of Plastic and Reconstructive Surgery, Bombay Hospital and Institute of Medical Sciences, Mumbai 400020, Maharashtra, India (e-mail: shahharsh_89@hotmail.com).

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Abstract

Keywords

- ▶ anomalous nerve course
- ▶ ulnar neuropathy
- ▶ tardy ulnar palsy
- ▶ cubital valgus deformity
- ▶ claw deformity

Variations are inherent feature of the intricate brachial plexus. They can be at the level of origin, the course, or the innervation pattern of each peripheral nerve. Knowledge of the various described variations can be worthwhile during the routine hand surgery procedures. We present a case of an elderly patient with anomalous intramuscular course of the ulnar nerve presenting with ulnar neuropathy at the elbow.

Level of Evidence: IV.

Introduction

Ulnar nerve (UN, C8T1) occasionally receives additional communication from the C7 root.¹ The unique anatomical course of UN in the upper limb is accompanied by approximately five sites of narrowing, predisposing it to compression neuropathy.² A rich literature testifies for various anomalies in branching, course, and of nearby structures that can predispose to compression.³

This article elaborates upon a unique case of tardy ulnar palsy, affected by an anomalous course and previously untreated lateral epicondyle fracture. The point of concern is the secondary maladaptive changes in the course of UN in the arm that could have been one of the contributory factors to compression neuropathy.

Case Report

A 56-year-old, right-handed, man presented with right cubitus valgus deformity (~30 degrees) along with weakness and numbness over the right fourth and fifth digits (since 1 year). The fixed flexion deformity was around 45 degrees (▶ **Figs. 1 and 2**). In the first decade of life, the patient had suffered a malunited fracture of the lateral epicondyle of humerus. The shoulder joint and its muscles were normal, and biceps power was good, while the triceps had a power of 4+ (Medical Research Council [MRC] grading), but it could not overcome the fixed flexion deformity. The ulnar innervated forearm and palm muscles were found to be comparatively weaker, with power of ½ of flexor digitorum profundus slip to little finger and MRC 3 for flexor carpi ulnaris (FCU). There was complete palsy of the

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Fig. 1 Clinical picture of the deformed upper limb showing the cubitus valgus deformity, fixed flexion deformity, and clawing over the ulnar digits.



Fig. 2 X-ray anteroposterior view of the affected elbow showing the maladaptive changes of the medial epicondyle.

intrinsic of right hand and a claw deformity. Sensations were decreased over the little finger. The working diagnosis of high tardy UN palsy was confirmed with electrophysiology studies, which documented the chronic sensory-motor ulnar neuropathy with complete loss of axons in the first dorsal interossei muscle. Written informed consent was obtained and a decompression procedure at the elbow joint with anterior transposition and supplementation with distal nerve transfer was planned.

A standard linear incision was taken posterior to the right medial epicondyle, along the expected normal anatomical course of the UN. The medial epicondyle appeared enlarged and deformed. The relatively superficial location of UN in this region makes it easy to identify. But we could not locate UN either in the cubital region or in mid-arm region at the level of the ligament of Struthers. The incision was then extended

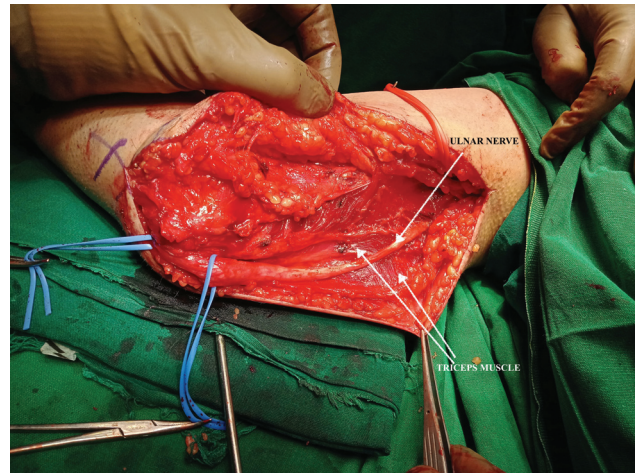


Fig. 3 Ulnar nerve anomalously traversing through the belly of the triceps muscle.

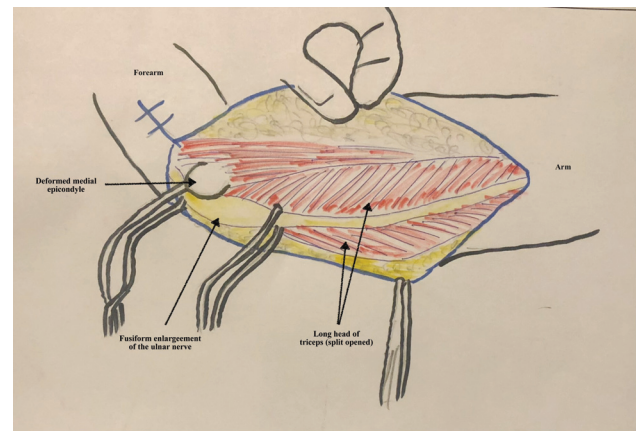


Fig. 4 A diagrammatic illustration of the anatomical finding encountered.

proximally in the arm. The brachial vein and median nerve were identified, but with no sighting of the UN. Subsequently, the inadvertent palpation of the triceps muscle lead us to the identification of the nerve lying intramuscularly, within the belly of the long head of triceps muscle (► **Figs. 3** and **4**). The finding was confirmed by electrical stimulation, when FCU muscle showed contractions. The nerve was dissected free from its bed along its length in arm region. The triceps muscle had to be dissected till its central raphe to expose the nerve completely. There was a fusiform neuroma like enlargement just proximal to the deformed medial epicondyle. Distally, the branch to FCU was found at a proximal level. A tight constricting aponeurotic sheath in the groove between the two FCU heads was released. On dynamic elbow movements, the deformed medial epicondyle was found to be impinging the ulnar nerve. Medial epicondylectomy, preserving the medial collateral ligament, was done by the orthopaedicians team. Anterior transposition was abandoned as there was no obvious compression or stress, over the nerve, on dynamic testing. Additionally, distal nerve transfer of nerve to Pronator Quadratus to the distal motor segment of UN (end to side) was done, in the same sitting,



Fig. 5 A 6-month follow-up picture of the hand, with no evidence of clawing (in inset picture) and good intrinsic functioning.

with a hope to aid recovery of the hand intrinsics. Postoperative recovery was uneventful. At 6 months post-surgery, we noted an onset of recovery in the ulnar innervated intrinsic muscles (► **Fig. 5**).

Discussion

The UN has a unique trajectory throughout the upper limb. Anatomical variations are common and awareness of them can be useful in any surgery. There exist six different characteristic anatomical sites, five in relation to the elbow joint, that can predispose UN to neuropathy.² The UN anomalies near the cubital region have been described in terms of anomalous branching pattern, additional cutaneous branch or additional communication of the UN, and radial nerve or the median nerve.^{4,5}

In our case, the UN was completely encased by the bipennate muscle fibers of long head of triceps and was thus inconspicuous on initial part of dissection. There were no

branches found innervating the triceps from the displaced UN along its intramuscular course. Such a finding has been only once being reported in literature and it was in a cadaver of a 45-year-old individual in 2013. However, the reported anomaly is of a short segment of UN traversing through the medial head of triceps in the mid-arm region.⁶ Knowledge of the UN's anatomical variations is important for the clinicians. The proposed explanation to the anomaly could be the mal-united lateral epicondyle fracture that gradually caused post-eromedial shifting of UN. With growth, the bulkier triceps muscles must have encased the nerve circumferentially. The bulkier triceps muscle along with the disorganized elbow joint probably jointly contributed to ulnar neuropathy in this case.

Conclusion

The uniqueness of the case report is the nature's quest to maintain functionality by modifying the normal route in correspondence with the deformity of adjoining structures, which in this case was the intramuscular course of the UN. Unlike the congenital anomalies, acquired alterations in the course are possible, especially in the growing age.

Conflict of Interest

None declared.

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