



Unusual Motor Branch Compression of the Ulnar Nerve at the Proximal Forearm

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Introduction

Ulnar neuropathy at the elbow is the second most prevalent peripheral compressive neuropathy, after carpal tunnel syndrome. Various stressors to the ulnar nerve can result in sensory and motor dysfunction, development of pain, numbness and weakness in the patient, and the symptoms will differ according the localization of the entrapment and the structures compromised [1-10]. An ulnar nerve disturbance expressed as a chronic neuropathy must make us consider trauma history (childhood injury) like a possible cause of ulnar neuritis [6].

Case History

A 69 years old male patient attended in the Orthopaedics Department, Hand Unit, with a history of 12 months of gradual decrease of strength in his left hand. The patient refers less force in relation to the fourth and fifth fingers. Also, he presents mild pain in

the inner face of proximal third of the forearm. When asked about the causal mechanism, the patient reports that symptoms apparently began after playing golf. He denies any other trauma previous to the onset of the symptoms. He works as a cook and has no history of chronic diseases, and no alcohol, tobacco or drug abuse. During the pre consulting period, he received an informal massage therapy with deterioration of the symptoms. Initially was evaluated by a general physician and then derived to Orthopaedics Department of our hospital. On general physical examination has no anomalies.

In the left upper limb examination, patient presents normal skin and general appearance with no decrease in muscle mass of forearm and no pain at the time of the consult. Neurological examination reveals decrease in grip strength. Median nerve and radial nerve are normal. Ulnar nerve shows normal sensitivity, but decrease in strength in fourth and fifth fingers in

relation to maintaining the distal interphalangeal joint flexed against resistance (M3 in fourth finger and M2 in fifth finger), presenting a positive ulnar clasp failure or "the nail file sign" (**Figure 1**) and also a positive

Pollock sign [5-7]. Thumb adduction and the rest of intrinsic muscles innervated by ulnar nerve are normal. Right upper limb is normal.



Figure 1: Left hand of the patient presenting a positive ulnar clasp failure or "the nail file sign" [4].

Nerve Conduction Study (NCS) and electromyography (EMG) are requested. NCS for ulnar nerve is completely normal. EMG shows a considerable quantity of denervation potentials consist in fibrillation and slow waves, and a substantial motor unit deficit in voluntary muscle contraction of fourth and fifth fingers FDP. The rest of muscles examined, including intrinsic hand muscles, are normal. Ultrasound of elbow reveals loss of echogenicity and pathological thickening in ulnar nerve with loss of normal fibrillar pattern. Diagnosis: Flexor digitorum profundus (FDP) of fourth and fifth left fingers paralysis

secondary to left ulnar motor neuropathy.

With the mentioned diagnosis patient is operated. Intervention consisted in revision of ulnar nerve and its sites of compression at the elbow and distal to Osborne arcade. During surgery it is identified a mild compression of the ulnar nerve in its all diameter and a severe compression with ischemic changes related to the motor branch that innervate fourth and fifth muscle bellies of FDP (**Figure 2**). No additional sites of compression were found.



Figure 2: Intraoperative photograph shows mild compression of the ulnar nerve in its all diameter and a severe compression with ischemic changes related to the motor branch that innervate fourth and fifth muscle bellies of FDP.

After surgery patient has a postoperative follow up period of 12 months. During this period patient improved range of motion and strength in fourth finger until M4. On the other hand, fifth finger has a poor recovery achieving only until M3.

Discussion

Ulnar nerve disfunction causes significant morbidity in patients affecting their activities of daily life and occupational activities also. Treatment can be either non operative or operative. The latter includes surgical decompression, medial epicondylectomy, and anterior transposition (subcutaneous and submuscular) [9]. All potential points of ulnar nerve compression must be recognized and examined for patients suspected of experiencing ulnar nerve entrapment at the elbow. There are several anatomical areas in which the ulnar nerve is prone to compression, and several of these sites are particularly problematic after certain types of surgical interventions. These areas include Struthers' arcade, intermuscle medial septum, medial epicondyle groove, arcuate ligament, Osborne's arcade and flexor-pronator aponeurosis (Amadio's arcade) [2]. There may be also be considered other causes of compression as angular deformities of distal humerus, osteophytes, anconeus epithroclearis muscle, fascial thickening and

medial triceps head compression [1-13]. The cubital tunnel syndrome may be classified on anetiological basis as a physiological, acute, subacute and chronic. The physiological category makes reference to the diminish volume during elbow flexion produces a "sleep palsy", secondary to the increase of intraneural and extraneural pressure [4]. Acute subacute regarding external compression, and chronic variety caused by occupying lesions, decrease capacity of the tunnel [13]. In patients with cubital tunnel syndrome the pressure measurements adjacent to the compression could be significantly associated with the stage of the ulnar neuropathy, being higher in marked neuropathy than in milder neuropathy [14].

The clinical diagnosis can be difficult and pain may or not may be present. Pain is usually not a predominant feature early in the course of this syndrome. Later, however, this disease entity can seriously interfere with the daily life and work of such patients, who usually present with paresthesia as or weakness of the hand, and atrophy in the ulnar nerve distribution [10]. The ulnar nerve emerges from the medial cord (C8-T1) of the brachial plexus and passes through the axilla into the anterior compartment of the arm, travelling distally next to the intermuscular septum. In the distal arm passes to the posterior compartment (Struthers' arcade)

reaching the posterior part of medial epicondyle passing in its groove at the level of the arquate ligament where the nerve is fixed behind the epicondyle and then crosses beneath Osborne's arcade (formed by the two heads of FCU), reaching the flexor compartment under Amadio arcade [1,12]. The ulnar nerve gives branches to the ulnar and humeral heads of the FCU and the ulnar one-half of the FDP in the cubital tunnel. The FCU is innervated by branches arising from the medial or lateral aspect of the ulnar nerve, the FDP of fourth and fifth fingers are innervated only by deep branches. In most of cases FDP is innervated by a unique branch that supplies fourth and fifth fingers, in the other hand second and third fingers are supplied by anterior interosseus nerve (median nerve). In a half of cases this is the usual anatomical finding. The other half has many anatomical variations [5,11]. These variations of the FDP innervation were described by Sunderland in 1945: is approximately twice as common for the median nerve to encroach on the territory supplied by the ulnar nerve as it is for the latter to extend its influence laterally.

Pollock in 1919 determined a clinical sign to evidence the loss of function of the FDP when a motor ulnar branch is compressed at this level [7]. Kapandji as well described in 1999 the ulnar clasp failor "the nail file sign" through which could be determined the level of the entrapment, being positive when the ulnar clasp fail is present [5]. In this particular case the patient had no other symptoms suggesting ulnar nerve compression, and surgical intervention allowed determine the presence of an isolated entrapment of FDP motor branch without clinical compromising of ulnar nerve function distal to the elbow.

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