Available online at www.sciencedirect.com
ScienceDirect
Surgical Neurology 71 (2009) 709 – 712
SURGICAL NEUROLOGY
www.surgicalneurology-online.com

Neuropathy

# Posttraumatic immobilization in flexion of a congenital valgus elbow and cubital tunnel syndrome—case report

Federico Di Rocco, MD, Francesco Doglietto, MD, Tommaso Tufo, MD, Alessandro Ciampini, MD, Liverana Lauretti, MD, Eduardo Fernandez, MD*

*Department of Neurosurgery, Catholic University School of Medicine, Rome 00168, Italy*

Received 14 March 2007; accepted 5 January 2008

**Abstract**

**Background:** Elbow trauma, cubitus valgus deformity, and prolonged flexion of the elbow are recognized risk factors for ulnar nerve entrapment.

**Case Description:** The 3 conditions coincided in the present case. In fact, a 36-year-old woman had a bilateral severe congenital cubitus valgus. A trauma of the right elbow caused luxation and supracondylar humeral fracture for which the joint was fixed in flexion at 90° for 1 month. The patient developed a severe ulnar nerve entrapment syndrome that did not respond to several months of physiotherapy and active mobilization of the elbow. The symptoms recovered after surgical decompression and anterior subcutaneous transposition of the nerve.

**Conclusions:** The present case illustrates how the development of a cubital tunnel syndrome should be considered as the expected outcome of a long immobilization in flexion of an elbow with a severe cubitus valgus. A simple subcutaneous anterior transposition of the ulnar nerve might be recommended before a long immobilization of a cubitus valgus elbow is performed.



*Keywords:* Ulnar entrapment; Supracondylar fracture; Peripheral nerve; Iatrogenic cubital tunnel syndrome; Cubitus valgus

## 1. Introduction

Ulnar neuropathy at the cubital tunnel is the second most common peripheral nerve entrapment syndrome and was described for the first time by Panas [7] in 1898. In the normal elbow, flexion causes an increase in intraneural pressure by 6 times in the ulnar nerve, a shape change from oval to elliptical of the cubital tunnel which narrows by 55%, and a corresponding sliding and stretching of the ulnar nerve [1,2]. Such increase in intraneural and extraneural pressures, during elbow flexion, is usually well tolerated by the ulnar nerve. In elbow deformities, like cubitus valgus, the increase in intraneural and extraneural pressures during elbow flexion is higher, being proportional to the degree of the deformity. Flexion of the elbow is indeed one of the most common etiopathogenetic mechanisms of the cubital tunnel syndrome, either acquired (accidental or occupational trauma) or congenital (like cubitus valgus) [1-3,5,6]. On this basis, what should be the consequences on the ulnar nerve of a prolonged flexion of an elbow with a severe valgus deformity?

We present the case of a young woman affected by a bilateral severe congenital cubitus valgus. After a trauma of the right elbow (luxation and humeral supracondylar fracture), fixation of the joint in flexion at 90° for 30 days was necessary. Whereas immediately after the trauma no neurologic deficit was present, at the end of the period of immobilization a severe ulnar nerve palsy was evident. Would it in this case be easy to predict an entrapment of the ulnar nerve during the 30-day fixation in flexion at 90° of the elbow with such severe valgus deformity? With a positive answer, should a preventive anterior

* Corresponding author. Tel.: +39 06 30154120; fax: +39 06 8072258.
*E-mail address:* e.fernandez@rm.unicatt.it (E. Fernandez).

0090-3019/$ – see front matter © 2009 Elsevier Inc. All rights reserved.
doi:10.1016/j.surneu.2008.01.020


Fig. 1. X-ray of the right valgus elbow. A: Elbow subluxation; B: correction of the subluxation reveals a supracondylar fracture; C: the external apparatus immobilizes the elbow in flexion at 90°.

transposition of the ulnar nerve be performed before the orthopedic treatment?

## 2. Case report

A 36-year-old woman presented to our department affected by a severe right cubital tunnel syndrome. Six months before, she had sustained a fall from a bike resulting in an elbow luxation (Fig. 1A). In the emergency department of another hospital, the elbow luxation was reduced and an underlying humeral supracondylar fracture (Fig. 1B) was noted and treated by immobilizing the elbow in flexion at 90° for 30 days using an external apparatus (Fig. 1C). Four days later, a 1 h/d mobilization of the elbow was initiated. The patient reported that immediately after the trauma she did not notice any motor changes of the hand; however, 1 week later she began to feel a certain weakness in the extension of the IV and V fingers, which remained unnoticed by her doctors. After 30 days of elbow flexion at 90°, the external apparatus was removed; a claw deformity of the right hand and an intrinsic muscle atrophy were evident. The patient followed a program of physiotherapy. An electromyography showed signs of denervation of the ulnar-dependent muscles of the hand. After several months of active mobilization of the elbow and physiotherapy, the claw hand, with a reduced force, was still present. A new electromyography showed fibrillations of the flexor carpi ulnaris, abductor digiti minimi, and first dorsal interosseous muscles, and no action potential could be detected after voluntary contraction.

The patient was admitted to our day surgery and clinical examination showed a bilateral severe cubitus valgus (Fig. 2A) corresponding to a humerus-elbow-wrist angle [5] measured on anteroposterior radiographs of 36° on the right and 30° on the left. A marked atrophy (Fig. 2B) and strength reduction of the intrinsic hand muscles were evident: the first dorsal interosseous, the abductor digiti minimi, and the flexor digitorum profundus of the fourth and fifth digits had a strength of 0/5. Hypesthesia and paresthesias were present into the ulnar side of the hand both ventrally and dorsally; no pain was present. Tinel's sign at the elbow was positive. At surgery, under local anesthesia, severe compression and stretching of the ulnar nerve were demonstrated to occur, as expected, during flexion of the

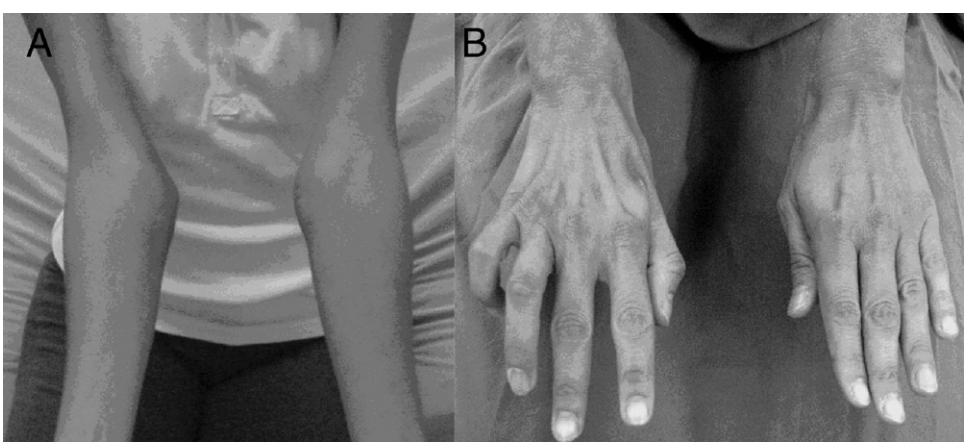


Fig. 2. A: The severe bilateral cubitus valgus; B: the cubital tunnel syndrome features with the right claw hand and muscle atrophy.