290 Surgical Procedures for Ulnar Nerve Entrapment at the Elbow: Physiopathology, Clinical Experience and Results

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Summary

Ulnar nerve entrapment at the elbow is an important and relatively frequent pathological condition that may be related to different causes depending on individual or external factors. The cause of the nerve lesion is also idiopathic in about one-quarter to one-third of cases. This variable aetiopathogenetic presentation has often suggested different diagnostic and clinical approaches and, moreover, various surgical procedures. We present our 8-years surgical experience with 290 cases of ulnar nerve entrapment at the elbow analysing the salient clinical features and the results of the surgical treatment in the light of the relevant literature available on this topic.

Keywords: Ulnar nerve; elbow; entrapment neuropathy, epitrochlear groove; surgical management; electromyography; tardy ulnar palsy.

Introduction

The entrapment of the ulnar nerve at the elbow results from different pathological conditions such as degenerative or inflammatory diseases, congenital defects, iatrogenic or occupational diseases, metabolic or nutritional disorders [8, 11, 12, 16, 18, 37, 43, 46, 47, 54]. The increased vulnerability to compression of the nerve trunk at this level is conditioned by its anatomical relationships [3, 5, 7, 10, 13]: in fact, the nerve is running between the medial belly of the triceps muscle and humerus condyle. The aponeurosis, connecting to the intermuscular septum, and the muscle itself are closely following the nerve as far as it enters the trochlear groove, covered by a sheath of connective tissue extending to the two-folded belly of the flexor carpi ulnaris. Ulnar nerve compression may be related, besides external factors, to anatomical individual variations and it is a common cause of arm and hand pain, paraesthesias and weakness [7, 13, 14, 37]. A correct preoperative evaluation and careful planning of the surgical procedure are essential for a good therapeutic result. Our 8-years experience (1985–1992) with 290 surgically treated instances of ulnar nerve entrapment is reported and results compared with the relevant literature, focusing on the main clinical and therapeutic findings of this pathological condition.

Patients and Methods

236 patients with ulnar nerve entrapment at the elbow (140 males and 96 females) were observed from January 1985 and December 1992. In 54 patients bilateral ulnar nerve involvement was present (290 surgical procedures for ulnar nerve compression). Patients were between 17 and 69 years old with a mean age of 42.5 (median 45.5). History ranged from 1 to 7 years with an average length of 3.5 years. In 33% of cases the presence of local (fractures with deformities or dislocation, cubitus valgus, muscles anomalies, rheumatoid arthritis) or systemic (diabetes, alcohol abuse, polineuropathies) factors were diagnosed.

Subjective symptoms and neurological signs both contributed to the clinical picture. As far as these are concerned, we found paraesthesias in 93%, motor weakness in 66%, pain 44% of cases. Neurological examination revealed a sensory deficit in 80%, a motor deficit in 75%, and muscular loss in 66% of instances. A clinical grading of ulnar loss of function was devised, featuring three classes: 1) patients complaining of subjective disturbances but without neurological signs and showing only mild neurophysiological test (NPT) alterations (17%); 2) patients with neurological signs and showing significative NPT pathological changes (61%); 3) patients with neurological signs and serious NPT alterations (22%). NPT alterations were considered the detection of signs of denervation, alteration of intention patterns and reduction of conduction velocities across elbow to less than 48 m/sec..

The following therapeutic clinically-related criteria were used to select the patient for the proper surgical treatment: a) for the patients with acute neuropathy conservative treatment was advised; b) a decompressive surgical procedure was performed in patients of groups 1 and 2, with an history of less than 12 months, if clinical examina-
tion disclosed an ulnar nerve entrapment syndrome, in spite of a wide trochlear groove; c) in patients bearing anomalies or muscular hypertrophy a deep transposition was the procedure of choice; d) a superficial transposition (subcutaneous) was preferred in the remaining cases. Since acute neuropathy cases were not included in the present report (no surgery), the decompression procedure was performed in 13% of patients, the superficial transposition in 80% and the deep transposition in 7% of instances.

The follow-up of patients, although ranging from 1 to 8 years, was considered at 1 year after surgery, to permit a more homogeneous evaluation of results and to overcome the effects of poor cooperation of patients requested to attend for check-ups over longer periods.

Table 1 summarizes surgical results of the whole series of patients. We registered no major surgical complication and few minor complications such as a hypertrophic scar (5 cases) with a poor cosmetic result and one short lasting superficial infection (successfully treated with systemic antibiotics).

### Results

Between 1985 and 1993 236 patients with ulnar nerve compression at the elbow were operated on at our Institution. Males prevailed in comparison to females (140 vs. 96) and age ranged between 17 and 69 years (mean 42.5; median 45.5). In 54 instances the entrapment syndrome was bilateral and surgical treatment was accomplished in two stages. Preoperative clinical evaluation of patients prompted us to devise a three classes classification according to subjective symptoms, objective signs and EMG findings, as above described. Distribution of patients in the three classes was as follows: 40 patients (17%) in Class I, 144 patients (61%) in Class II and 52 patients (22%) in Class III (Table 1).

The most common subjective symptom was paraesthesia (93%), followed by motor weakness (66%) and pain (40%). At neurological examination sensory deficit resulted in the most frequent finding (80%), while muscular loss and motor deficit were less common (respectively accounting for 66% and 45%). Surgical procedure consisted mainly of superficial (subcutaneous) transposition (195 nerves – 80%), followed by decompression (75 nerves – 13%) and deep (intra-muscular) transposition (20 nerves – 7%). Follow-up ranged from 12 to 96 months, but our evaluation was confined to 1 year after surgery. After this interval 58% of cases showed marked improvement of the neurological status with subjective normalization (excellent); 27% of cases revealed a fair improvement of the neurological symptoms with mild sensory subjective disturbances (good); 15% of cases remained unchanged. We did not register any further deterioration in the surgical cases.

### Discussion

Both systemic and local affection may induce the onset of an ulnar nerve distress at the elbow: congenital anomalies (cubitus valgus, epithrocleoanconeus, thickening either of the triceps, medial belly, or of the aponeurosis of the deep flexor pronator), trauma (elbow luxations, distal humeral lesions), arthritis, tumoural lesions (ganglion cysts, lipomas), iatrogenic injuries (post-anaesthetic, haemorrhagic, due to wrong positioning during operations or in bedridden patients), nutritional or metabolic disorders (diabetes, alcoholic addiction, toxics exposure), occupational diseases (manufacturers, truck drivers, computer or desk employees) and rare illnesses (lepromatosis, biceps rupture) [2, 8, 12, 16, 18, 36, 37, 38, 39, 43, 44, 45, 46, 56, 60]. Individual anatomical variations of the nerve course and situation as well as the peculiar pathologic effect of the different actio-