

Comparative Study of Outcome of Simple Decompression Versus Anterior Transposition of Ulnar Nerve in the Treatment of Cubital Tunnel Syndrome

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Abstract: Background: Cubital tunnel syndrome (CuTS) is the second most common entrapment neuropathy in the upper limb, after the entrapment of the median nerve in the carpal tunnel. Different techniques of nerve decompression have been described, however, the idyllic surgical treatment and technique for CuTS remain controversial.

Objective: Our aim is to compare the outcome of simple decompression with anterior subcutaneous transposition of ulnar nerve in the treatment of CuTS.

Methods: The study included 20 patients that were surgically treated in the Neurosurgery department at Gamal Abdel Nasser Hospital - General Authority for Health Insurance between August 2014 and February 2015. These patients were randomly distributed into two equal groups, each consisting of 10 cases. In the first group, only simple decompression was performed while in the second group, anterior subcutaneous transposition was supplemented. All cases were followed for at least 6 months.

Results: Seventy percent of the patients were females and the mean age was 45.35 ± 14.62 . The duration of symptoms before surgery varied from 4 months to 2 years. Occupational repetitive elbow flexion and extension was the most common contributing factor. Seven out of ten patients, in the simple decompression group, showed clinical and electrophysiological improvement at 6 months interval. While in the second group, only six patients showed improvement 6 months after surgery. The difference was found to be statistically insignificant. There was no significant effect of the duration of symptoms or co-morbidities on the outcome.

Conclusion: Long term follow up revealed no significant difference between simple decompression and anterior subcutaneous transposition. Simple decompression of the ulnar nerve, in our experience, is an effective and less invasive technique for patients with cubital tunnel syndrome.

Keywords: Cubital tunnel, Ulnar nerve, Simple decompression, Anterior transposition.

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INTRODUCTION

The ulnar nerve can be compressed at several sites along its course in the upper limb, the elbow being the most frequently identified localization site. The resulting neuropathy, known as the cubital tunnel syndrome (CuTS), is the second most frequent upper limb neuropathy after carpal tunnel syndrome [1]. Several predisposing factors can cause CuTS such as repetitive elbow flexion and extension, habitual leaning on the elbow, as a sequel of elbow trauma, osteoarthritis, and chronic valgus stress. Nevertheless, it is idiopathic in 20% of cases [2].

Conservative management in the form of physiotherapy, avoiding flexion of the elbow for long periods, night splints in extension, local steroid injections and analgesics are used as standard treatments in all cases, especially in the mild ones [3]. Surgical decompression is usually carried out in the presence of significant pain or persistent paresthesia in the ulnar nerve territory, or in the presence of weakness and atrophy of intrinsic hand muscles [4].

There is still no universal consent on the best surgical treatment and technique for CuTS. Over the years numerous techniques have been practiced, including simple decompression [5], anterior transposition (subcutaneous, intramuscular, or submuscular) [6, 7], medial epicondylectomy [8, 9] and in situ endoscopic decompression [10, 11].

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The main aim of this study is to compare the outcomes of the most commonly used techniques in the management of CuTS, namely anterior subcutaneous transposition of the ulnar nerve [12] and simple nerve decompression.

MATERIALS AND METHODS

This prospective study was conducted at the Neurosurgery department, Gamal Abdel Nasser Hospital - General Authority for Health Insurance, Alexandria, from August 2014 till February 2015. Twenty patients being surgically treated for CuTS were included in the study. The diagnosis was established on the basis of clinical presentation in aggregation with ulnar nerve conduction velocity (NCV) of less than 50 m/s through the elbow. These patients were randomly distributed into 2 equal groups: group A (10 patients), in which only simple decompression of the ulnar nerve was carried out and group B (10 patients), in which anterior subcutaneous transposition was performed after decompressing the nerve.

The level of ulnar nerve dysfunction was stratified according to Dellon's scale into three grades [7]; grade I (mild): only intermittent paresthesia, grade II (moderate): intermittent paresthesia with or without measurable weakness in pinch or grip strength, and grade III (severe): persistent parenthesis with measurable weakness in pinch or grip strength \pm muscle atrophy. All cases included in this study were either of moderate or severe dysfunction on Dellon's scale.

The procedures were performed under general anesthesia. In simple decompression, an incision was made along the course of the ulnar nerve, about 8-10 cm in length, from the tip of the olecranon and midway between the medial epicondyle. This posterior incision was preferred to avoid damage to medial ante brachial cutaneous and medial brachial nerves. The medial inter muscular septum was cut and a localized decompression of the nerve was instituted by incising the osborn ligament and by incising the fascia holding the two heads of the flexor carpi ulnaris in order to open the tunnel between them. Additionally, the cubital tunnel retinaculum was sharply divided in proximal-to-distal direction. [13-17].

However, in anterior transposition, a longer incision was made (12-15 cm). A similar decompression was first carried out but a longer segment of the nerve was dissected (about 8 cm proximal to the medial epicondyle and 6 cm distal to the medial epicondyle). To prevent post-operative kinking about 3 - 4 cm of the medial inter muscular septum, proximal to the medial epicondyle, was excised. Distally, an extra common aponeurosis between the flexor digitorum superficialis and the humeral head of the flexor carpi ulnaris was sought, and if present, was excised to prevent kinking. Motor branches to the flexor carpi ulnaris and flexor digitorum profundus were identified and preserved. A flap of antebrachial fascia, based on the apex of the medial epicon-

dyle, was raised from 1 - 1.5 cm² and was reflected medially. Anterior to this flap a nerve was then transposed, and approximately 1 cm anterior to the medial epicondyle the apex was then sutured to the dermal tissue. To prevent kinking of the nerve at the sling, care must be taken during this step. [18-21].

Initial clinical evaluation was made 2 weeks after surgery, followed by clinical and electrophysiological examination at 3 and 6 months interval. Dellon's scale was used to compare the post-operative results with the pre-operative results.

Analysis of data was carried out using the Statistical Package for the Social Sciences (SPSS) software (Version 16.0; SPSS Inc, Chicago, IL). Marginal Homogeneity test was applied and the significance level was set at 5%.

RESULTS

The study included 20 patients of CuTS that were surgically treated in the Neurosurgery department at Gamal Abdel Nasser Hospital - General Authority for Health Insurance between August 2014 and February 2015. Seventy percent of these cases were females and only 30% were males. The age ranged from 24 to 75 years with a mean age of 45.35 ± 14.62 . The duration of symptoms prior to surgery varied from 4 months to 2 years, 30% of patients had symptoms for more than one year. The most common clinical presentation was tingling and numbness of the medial one and half fingers of hand and 50% of cases had measurable weakness in hand grip at the time of surgery. Clinical picture of our patients are summarized in Table 1.

Table 1. Main complaint distribution.

Main Complaint	No	%
Tingling and Numbness	20	100.0
Pain	13	65.0
Weak hand grip	10	50.0
Cold sensation	6	30.0

Occupational repetitive elbow flexion and extension was the most common contributing factor, it was found in 9 cases (45%). The pre-operative evaluation showed that 12 cases (60%) were of moderate dysfunction according to Dellon's scale and rest of the 8 cases (40%) were of severe dysfunction. Nerve conduction studies showed mild nerve affection (≥ 40 m/sec) in 6 cases (30%), moderate affection (25 - <40m/sec) in 13 cases (65%), and in the remaining case (5%) the conduction was severely affected (10 - <25m/sec).

Nerve conduction studies, performed 3 months after surgery, revealed improvement in 50% of patients in both groups. At 6 months interval, 7 patients (70%) from the first group

showed improvement on nerve conduction studies compared to 6 patients (60%) from group B. These results were not found to have any statistically significant difference.

At 3 months interval, the initial outcome according to Dellon's scale was better in patients of group B (40%) as compared to patients in group A (20%), based on the comparison of their pre-operative scores. However, 70% of patients in group A showed a better score on Dellon's scale at 6 months interval compared to their pre-operative scores, while only 60% of cases in group B showed a similar improvement. This relation was found to have no statistically significant difference between the two modalities. There was no clinical or electrophysiological deterioration in any of our case.

The details of post-operative outcome are shown in Table 2, 3.

Table 2. The outcome of NCVs improvement in both types of operation 3 and 6 months after surgery.

		NCVs	
		Group A	Group B
		Simple Decompression	Anterior Transposition
		10 cases	10 cases
Improved	3 months	50%	50%
	6 months	70%	60%
Stationary	3 months	50%	50%
	6 months	30%	40%

Table 3. The outcome of Dellon's scale improvement in both types of operation 3 and 6 months after surgery.

		Dellon's scale	
		Group A	Group B
		Simple decompression	Anterior transposition
		10 cases	10 cases
Improved	3 months	20%	40%
	6 months	70%	60%
Stationary	3 months	80%	60%
	6 months	30%	40%

DISCUSSION

Considerable controversy exists in the literature regarding the best surgical strategy for the treatment of CuTS. Comparative studies have established similar results for various modalities and no particular technique has been proven to have better results [14, 22]. Proponents of simple decompression in the absence of an anatomical lesion argue that transposition of ulnar nerve involves an unnecessary risk of nerve injury or devascularization, and extensive dissection. In turn, proponents of anterior transposition argue that dynamic compression of the nerve with elbow flexion can only be properly resolved by this technique [14, 15, 23, 24].

The mean age in our study is 45 years. This is similar to several other reports stating that younger age groups are more commonly affected. This could be attributed to the fact that these age groups are usually more physically active and more prone to trauma [25- 28]. In our study, we found that females were more commonly affected than males (70%), and this predominance can be attributed to the longer duration of elbow flexion during household activities, and their increased propensity to develop rheumatic diseases. This is in agreement with the results given by Thomsen *et al.* [29] and Vanderpool *et al.* [30]. On the other hand, few similar studies have reported a male predominance [31].

The most common contributing factor in our patients was occupational repetitive elbow flexion and extension which was evident in 9 cases (45%). These results coincide with Friedman and Cohran [26] series, which showed that two thirds of their patients gave a history of repeated occupational mechanical trauma, but it does not match with the results of Macnicol *et al.* [18], who found that only 22% of their cases were subjected to repetitive elbow flexion and extension.

In our study, we compared the postoperative nerve conduction studies of both groups, 3 months after surgery, and electrophysiological improvement was found in 50% of patients in both groups. However at 6 months interval, the NCVs improved in 70% of cases in the group A and 60% of cases in group B. This relation was found to have no statistically significant difference between both modalities. This is in accordance with several series which found a significant improvement in the postoperative transelbow NCVs studies compared to the preoperative values; however there was no significant difference between both types of surgery [25, 31]. They concluded that electrophysiological values help predict the functional outcome of surgery.

By comparing the post-operative Dellon's score, computed 3 months after surgery, to the pre-operative score in each case, we found that only 20% of the patients in group A showed improvement as compared to 40% of cases in group B. However, the same comparison, at 6 months interval,

showed that 70% of cases in group A had better scores on Dellon's scale as compared to 60% of cases in group B. These results are in assent with the results obtained by Tackmann *et al.* [32] and El-Deeb *et al.* [28].

Although some reports suggest that anterior subcutaneous transposition has a higher trend towards improvement when compared to simple decompression [14, 15], many other reports including large meta-analysis studies found no statistical difference in the outcome between both modalities. They concluded that simple decompression is a "reasonable alternative" to anterior transposition; having shorter operative time, lower cost and comparable outcome [33-36].

There are some limitations of this study, namely small sample size and utilization of subjective scores rather than objective and standardized measurements that would have imparted more reliability to the study results. We think that larger multicenter studies with standardized post-operative questionnaires are needed to solve this debate.

CONCLUSION

The results of this study demonstrate that anterior subcutaneous transposition of the ulnar nerve and simple decompression are almost equally effective in the treatment of CuTS, with a slightly better long term outcome with simple decompression. Simple decompression of the ulnar nerve in our experience, is an effective and less invasive technique for treating patients with cubital tunnel syndrome.

CONFLICT OF INTEREST

Declared none.

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