EVALUATION OF THE RESULTS OF SURGICAL TREATMENT AND REHABILITATION OF CUBITAL TUNNEL SYNDROME

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Abstract The aim of this study was to evaluate the results of surgical treatment and rehabilitation of cubital tunnel syndrome patients. We treated 21 patients with cubital tunnel syndrome, comprising 12 women and 9 men aged 45 to 58. The syndrome affected 13 left and 8 right upper limbs. According to the modified McGowan classification patients experienced varying levels of change: 17 (81%) patients, grade 3; 3patients (14%), – 2B; 1patient (5%), – 2A. The following patients qualified for surgical treatment: those with pain in the medial side of the elbow joint, those with advanced dysaesthesia and weakness in the motor activity of the hand, and those with changes causing subluxation of the ulnar nerve. All patients were treated surgically through anterior transposition if necessary epineurotomy.The rehabilitation process included exercises involving stretching, relaxing and strengthening of muscle and improvement of the mobility of the elbow. Neuromobilisation and automobilisation exercises were conducted. Patients were taught the correct positioning of the upper limb during work and physical activity. After 12 months, the research results were rated according to the modified criteria of Wilson and Krout. In 16 (76.2%) patients the results were excellent; in 16 (19%) good and in 1 (4.8%) fair.
It was found that the vast majority of patients with advanced changes caused by cubital tunnel syndrome and subluxation of the ulnar nerve can achieve excellent and good results from decompression and transposition of the ulnar nerve and competent rehabilitation treatment.

Key words cubital tunnel syndrome, subcutaneous anterior transposition of the ulnar nerve

Introduction

Cubital tunnel syndrome (Latin: syndroma canalis ulnaris) is one of the most common neuropathies of the upper extremities. The causes of damage to the ulnar nerve are single or repeated injuries, nerve subluxation, compression of ligaments, or degenerative or congenital changes. Nerve compression is promoted by valgity of the elbow, shallowness of the groove, or stretching of the ligaments of the elbow. Cubital tunnel syndrome can occur due to overloading of limbs, destabilisation of the elbow or inflammation of the attachment of muscle to the medial epicondyle. The syndrome frequently occurs in athletes performing throws in disciplines such as: javelin, hammer

throw, baseball, tennis and golf, and among workers packing goods, working as cashiers, or using vibrating tools (Dziak, Tayara,1999; Trehan, Parziale, Akelman, 2012). Conservative treatment rarely brings improvements, most often surgical treatment is necessary. In the development of cubital tunnel syndrome, pain occurs around the medial epicondyle along with dysaesthesia and weakness in the hand's ability to grip. The pains often appear in the form of numbness or tingling but are not very severe. Initially dysaesthesia includes hypersensitivity and, subsequently reduced sensation in fingers IV and V. Functional disorders involving movement include paralysis of the flexor muscles of the elbow and wrist and the flexor digitorum profundus, followed by hyperextension of the metacarpophalangeal (MCP) joint, inability to separate fingers II–V and interosseous muscle atrophy (Deskur, Prowans, 2004; Dziak, Tayara,1999).

Surgical treatment of cubital tunnel syndrome can be performed using the open or endoscopic methods. The treatment involves decompression of the ulnar nerve or anterior transposition with displacement – subcutaneous, intramuscular, or submuscular – of the nerve. When stretching the ulnar nerve in the groove, it is advisable to notch the medial epicondyle. If signs of compression and swelling are found in the rostral part of the ulnar nerve, a epineurotomy is performed. Internal neurolysis is not recommended. In cases of subluxation of the ulnar nerve when bending or straightening the forearm, anterior transposition of the nerve is recommended. At the time of surgery, complications related to damage to nerve or blood vessels may be experienced. Following anterior transposition, compression of the nerve by the arcade of Struthers or fascial band between the heads of the flexor carpi ulnaris may occur (Gokay, Bagatur, 2012; Kamat, Jay, Benoiton, Correia, Woon, 2014; Trehan et al., 2012). The severity of changes in cubital tunnel syndrome can be determined according to the Mc Gowan classification (Gokay, Bagatur, 2012; Rokicki et al., 2013).

Material and methods

In the years 2008–2013, 21 patients with cubital tunnel syndrome, comprising. 12 women, and 9 men aged 45 to 58, were treated. Treatment and testing was carried out at the SP Regional Hospital in Nowogard by the authors. X-ray examinations and EMGs were conducted on patients prior to the clinical trial. Attention was paid to Tinel's sign, Froment's sign, the junction between fingers II and III, elbow flexion, and the abductor muscle of the little finger. The severity of changes in patients with cubital tunnel syndrome prior to surgery, was rated according to the modified Mc Gowan classification (Gokay, Bagatur, 2012; Rokicki et al., 2013) – Table 1.

Table 1. Modified Mc Gowan classification for preoperative grading of ulnar neuropathy at the elbow

Grade	Description
1	Patients with subjective sensory symptoms, but without objective findings
2A	Patients with good intrinsic strength (4/5), without intrinsic atrophy
2B	Patients with fair intrinsic strength (3/5), with intrinsic atrophy
3	Patients with marked intrinsic atrophy and sensory disturbance

Patients with pain in the medial side of the elbow joint, advanced dysaesthesia and weakness in the motility of the hand (Mc Gowan 3) as well as those with changes causing subluxation of the ulnar nerve, such as a valgus deformity of the elbow or shallow groove, qualified for surgical treatment.

All patients were treated surgically via anterior transposition of the ulnar nerve. A minimal incision was made between the top of the olecranon and the medial epicondyle. The fascial band i.e. the fibrous arcade of the flexor carpi ulnaris, was cut. The ulnar nerve was released in the channel, between the heads of the flexor wrist. Attention was drawn to the muscular branches of nerves and blood vessels. If there were signs of trouble in the channel of the ulnar nerve and swelling of the proximal part of the nerve, an epineurotomy was performed. It was important to establish sites of compression. On finding advanced changes from cubital tunnel syndrome with subluxation of the nerve, transposition of the ulnar nerve was performed under the freed flap of skin. Attention was paid to suppression of the nerve by the arcade of Struthers or by the band between the heads of the flexor carpi ulnaris. Drainage of the wound was then instituted, with a cocoon-type dressing reinforced with a back slab plaster. On the 4th day following surgery, rehabilitation was carefully implemented. Exercises aimed at relaxing, stretching, strengthening muscles, and improving joint mobility were gradually introduced. Neuromobilisation of the ulnar nerve tract was conducted, as well as automobilisation. Exercises were applied 5 to 10 times a day for 30 to 60 seconds, 1 to 3 minutes apart. Rehabilitation was carried out under the supervision of the authors of the paper (Cemphe, Pieniążek, Pelczer-Pieniążek 2007; Kużdżał, 2009).

The test results of patients at 12 months after surgery were rated according to the modified criteria of Wilson and Krout (Gokay, Bagatur, 2012; Rokicki et al., 2013) – Table 2.

Table 2. Modified Wilson and Krout criteria for postoperative grading of ulnar neuropathy patients

Grade	Description
Excellent	Minimal motor and sensory changes and no tenderness at the incision site
Good	Loss of symptoms but a regional sensitivity continued at intervals
Fair	Improved but persistent sensory or motor changes that are milder than the preoperative status
Poor	No improvement or worsened condition

Results

The study included patients with cubital tunnel syndrome, comprising 12 women (57%) and, 9 (43%) men aged 45 to 58. The syndrome involved 13 (62%) left and 8 (38%) right upper limbs. Prior to surgery in patients with cubital tunnel syndrome varying levels of changes were rated according to Mc Gowan's classification: 17 (81%) patients were assessed at grade 3; 3 patients (14%) – at 2B; and 1patient (5%) – at 2A.

In the postoperative period we evaluated the results of treatment according to the criteria of Wilson and Krout. There were 16 (76.2%) excellent results, 4 (19%) good, and 1 (4.8%) fair (Table 3).

Table 3. Number of people with the appropriate assessment of the results of the treatment of postoperative patients with the cubital tunnel syndrome according to the criteria of Wilson and Krout depending on the severity of lesions according to Mc Gowen preoperatively

Wilson and Krout evaluation	The number of patients with appropriate severity changes cubital tunnel syndrome by Mc Gowan			Total
	2A	2B	3	
Exellend	1	2	13	16
Good		1	3	4
Fair			1	1

Discussion

Most reports state that cubital tunnel syndrome is most common in men and in the dominant upper limb (Anderton, Webb, 2010; Gokay, Bagatur, 2012; Rokicki et al., 2013). In this study the syndrome was present in 57% of women and affected the left side in 62%. Kamat et al. (2014) and Jeon et al. (2010) confirmed that the syndrome was more prevalent in women and Kanat et al. (2014) confirmed that it involved primarily the upper left limb. Perhaps this is the consequence of women, undertaking jobs previously performed by men.

Many authors have stated the variability of results for syndrome patients with cubital tunnel syndrome depending on the severity of lesions, methods of operation and methods of assessment. We present a summary of the results for similarly treated patients with cubital tunnel syndrome. Results of excellent and good were more frequent following decompression and anterior transposition of the ulnar nerve (Table 4).

Table 4. Evaluation of the results of surgical treatment of patients with cubital tunnel syndrome in the published literature

Autors	Number of treated patients	Surgical treatment	Methods of assessment of treatment	Percentages of relevant results in treated patients			
				excellent	good	fair	poor
Rokicki et al. (2013)	19	Decompression of nerve	Wilson and Krout	53	37	5	5
Gokay et al. (2012)	33	Transposition of subcutaneous nerve	Wilson and Krout	73	21	3	3
Han et al. (2014)	20	Transposition of subfascial nerve	Bishop	55	40	1	–
Jeon et al. (2010)	66	Decompression of the nerve	Messininoj	36	45	17	2

Results of treatment may also be good in elderly patients with cubital tunnel syndrome. Sreedharan, Yam, Tay (2010) reported results for 19 patients over 60 years of age following decompression and transposition of the ulnar nerve. Improved sensation was reported in 78.9% and improved muscle strength in 86.7% of patients. Kamat et al. (2014) and Nabhan et al. (2007) achieved comparable results following decompression, neurolysis and anterior transposition of the ulnar nerve.

Conclusions

1. Cubital tunnel syndrome is one of the most common neuropathies of the upper limb. This syndrome is marked by pain in the medial side of the elbow joint, dysaesthesia and weakened motility of the hand.

2. Following the diagnosis of cubital tunnel syndrome, all risk factors must be eliminated immediately and conservative treatment implemented. Lack of improvement is an indication for surgical treatment.

3. Excellent and good results can be achieved in the vast majority of patients with advanced changes from cubital tunnel syndrome and subluxation of the nerve through decompression and transposition of the ulnar nerve and competent rehabilitation.

4. The best surgical results can be achieved with rehabilitation carried out by a specialised therapeutic team.

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