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Original article

Endoscopic ulnar nerve release at the elbow: Indications and outcomes

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ABSTRACT

Background: Ulnar nerve entrapment at the elbow is the second most common nerve entrapment syndrome at the upper limp, after carpal tunnel syndrome. Many surgeons feel that ulnar nerve instability contra-indicates endoscopic nerve release. Published studies, however, found no evidence that pre-operative or intra-operative ulnar nerve instability adversely affected clinical outcomes. The objective of this prospective study was to define the indications and describe the outcomes of endoscopic ulnar nerve release at the elbow.
Hypothesis: Endoscopic ulnar nerve release at the elbow is a valid option even in patients with ulnar nerve instability and regardless of the severity of the compression.
Material and methods: We conducted a prospective single-centre study of patients scheduled for surgery based on clinical and electromyographic manifestations of ulnar nerve entrapment at the elbow. Ulnar nerve instability (incomplete dislocation, i.e., Childress A) before or during surgery was not a contra-indication to the procedure. The patients were re-evaluated 12 months after surgery.
Results: Seventeen patients were included in the statistical analysis. The modified Bishop's score indicated excellent or good outcomes in 15 (88%) patients (excellent in 4 and good in 11) and a fair outcome in 2 patients. Functional outcomes were not associated with the presence of ulnar nerve instability before surgery.
Discussion: We elected to include patients with Childress A ulnar nerve instability. Clinical outcomes in these patients were similar to those in patients without ulnar nerve instability.
Level of evidence: IV, open prospective study of treatment outcomes.

Ulnar nerve entrapment at the elbow is the second most common nerve entrapment syndrome at the upper limb, after carpal tunnel syndrome [1,2]. Numerous treatment methods have been described. Conservative or functional management fails to provide acceptable relief [3], as wearing an extension splint at night is often poorly tolerated by the patients and the absence of an anatomic space capable of retaining a drug preparation severely restricts the usefulness of local injection therapy.

We offer surgical treatment to patients with severe neurological impairments such as the development of motor loss despite conservative treatment for longer than 6 months. However, several different surgical techniques are available. Open or endoscopic in situ nerve release eliminates the compression without altering medial elbow anatomy [3,4]. Anterior transposition of the ulnar nerve modifies medial elbow anatomy but diminishes the traction applied to the nerve during flexion and extension of the elbow. The nerve is moved out of the groove to the front of the medial epicondyle, in the sub-cutaneous, intra-muscular, or sub-muscular plane. Epicondylectomy is another technique for eliminating ulnar nerve compression at the elbow. None of these techniques has been proven superior over the others for the treatment of ulnar nerve entrapment at the elbow [2,5,6].

The objective of this prospective study was to define the indications and describe the outcomes of endoscopic ulnar nerve release at the elbow.

1. Material and methods

1.1. Material

A prospective single-centre study was conducted at our orthopaedic and trauma surgery centre between November 2012 and November 2013. Patients were included if they had ulnar nerve entrapment at the elbow for which surgery was indicated because

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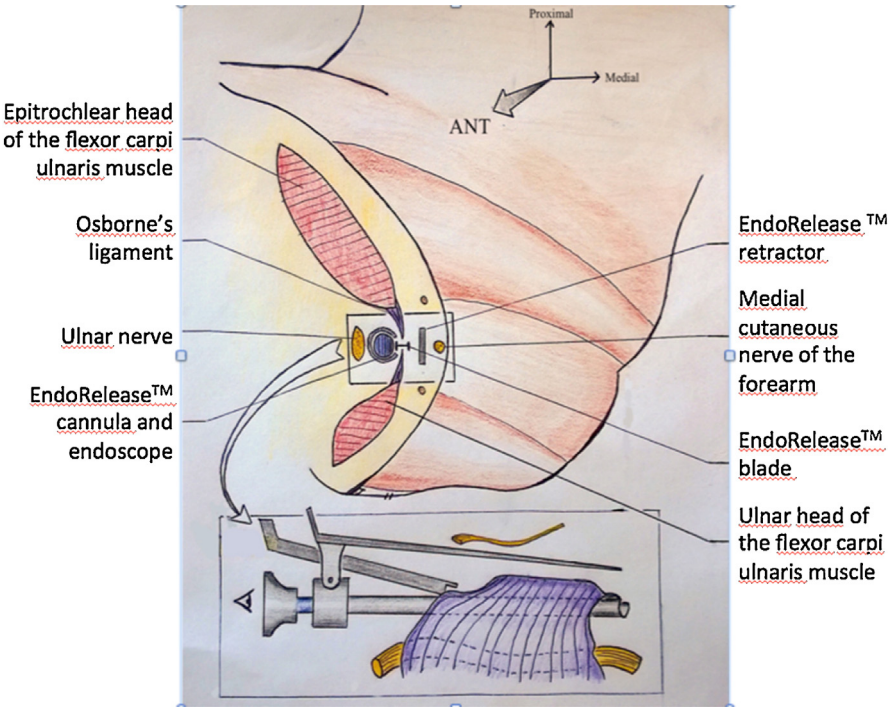

Fig. 1. Endoscopic release of the ulnar nerve using the EndoRelease™ system (Integra).

of clinical symptoms with electromyography findings confirming the nerve compression. Non-inclusion criteria were a history of elbow trauma with bone abnormalities (e.g., malunion or non-union), morbid obesity, recurrent ulnar nerve compression, and complete ulnar nerve dislocation anterior to the medial epicondyle (Childress B) [7]. Pre-operative or intra-operative ulnar nerve instability (Childress A) was not a contra-indication to surgery [7]. All procedures were done by the same surgeon. The outcomes were evaluated routinely 12 months after surgery.

We used the EndoRelease™ system (Integra, Plainsboro, NJ, USA). The patient was in the supine position with a tourniquet at the root of the upper limb. Anaesthesia was general or regional. Care was taken to achieve complete limb exsanguination in order to facilitate the endoscopic procedure and to ensure good visibility of the ulnar nerve. The upper limb was placed on an arm rest with the elbow elevated to enhance access to the cubital tunnel. An incision about 2 cm in length was made over the posterior and superior part of the medial epicondyle. Dissection scissors were then used to create a surgical space between the deep fascia and the subcutaneous tissue, in the distal-to-proximal direction, in order to protect the sensory nerves, notably the medial cutaneous nerve of the forearm. The cubital tunnel was then opened to allow access to the ulnar nerve. The spatula provided in the toolkit was used to release the ulnar nerve from any adhesions, in the distal-to-proximal direction. The cannula and its obturator were inserted distally. The obturator was removed to allow insertion of the endoscope. The entire length of the ulnar nerve under the cannula was visualised. The blade was introduced into the cannula and used to divide the medial ulnar collateral ligament, Osborne's ligament, and the common flexor sheath. Proximally, the same method was used to divide Struthers' ligament. The blade was positioned opposite the ulnar nerve, and the structures causing compression were divided centrally (Fig. 1) [8].

1.2. Methods

Pre-operatively, we recorded the time since symptom onset. The severity of the neurological impairment was assessed using the classification developed by MacGowan and modified by Goldberg [9] and the clinical status using the scores developed by Bimmler [10] and Yasutake [11].

All patients were re-evaluated in person 12 months after surgery. During the visit, we determined the grade in MacGowan's classification, the Bimmler score, and the Yasutake score. We used the modified Bishop score to categorise outcomes as excellent, good, fair, or poor [12]. At each follow-up visit, we looked for complications of nerve release surgery including complex regional pain syndrome type 1, infection, incomplete ulnar nerve dislocation, and sensory impairment in the territory of the medial cutaneous nerve of the forearm.

1.3. Statistical analysis

Quantitative data were described as mean ± SD, range, and median and qualitative data as number and percentage. For between-group comparisons of qualitative variables, we chose either the chi-square test or Fisher's exact test, depending on theoretical sample size and number of categories for the variable being tested. Non-parametric tests were applied to assess the distribution of quantitative variables, i.e., the Mann-Whitney test for unpaired series, the Wilcoxon test for paired series, or the Kruskal-Wallis test for comparing the distributions of quantitative variables and of a qualitative variable having more than two categories. For all analyses, *P* values lower than 0.05 were considered significant. The tests were run on Statview 5.0 and SAS 9.1.3 software (SAS Institute, Cary, NC, USA).

2. Results

During the study period from November 2012 to November 2013, 20 patients underwent surgical ulnar nerve release at the elbow. Among them, 3 were excluded intra-operatively, 2 because of a fullness behind the olecranon that precluded insertion of the EndoRelease™ system and 1 because of anterior luxation of the ulnar nerve at the anterior part of the medial epicondyle after