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Recovery features in ulnar neuropathy at the elbow

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Abstract. [Purpose] This study evaluated the effect of age, sex, and entrapment localization on recovery time in patients treated conservatively for ulnar neuropathy at the elbow. [Subjects] Thirty-five patients (16 women and 15 men) who were diagnosed with ulnar neuropathy at the elbow using short segment conduction studies were evaluated retrospectively. [Methods] Definition of recovey was made based on patient satisfaction. The absence of symptoms was considered as the marker of recovery. Patients who recovered within 0–4 weeks were in Group 1, and patients who recovered within 4 weeks to 6 months were in Group 2. The differences between Group 1 and Group 2 in terms of age, sex and entrapment localization were investigated. [Results] Entrapment was most frequent in the retroepicondylar groove (54.3%). No significant difference was found in terms of age and entrapment localizations between Groups 1 and 2. There was a statistically significant difference between the groups for the male sex. [Conclusion] In ulnar neuropathy at the elbow, age and entrapment localization do not affect recovery time. However, male sex appears to be associated with longer recovery time.
Key words: Ulnar neuropathies, elbow, electrodiagnosis

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INTRODUCTION

Ulnar nerve entrapment at the elbow (UNE) is the second most common entrapment neuropathy of the arm[1, 2]. Electrodiagnostic examination is important for confirmation both the diagnosis and localization of the entrapment site. The sensitivity of short segment conduction studies for detecting UNE is similar to routine nerve conduction studies, but with a higher specificity[2, 3]. There is no universally accepted standard treatment protocol based on clinical, neurophysiological, and imaging methods for idiopathic UNE[4].

Surgery is preferred in cases of ineffective long-term conservative treatment and significant loss of muscle strength. Mild-to-moderate entrapments are commonly managed by patient education, including modifications to activities of daily living, and splinting to prevent extreme flexion of the elbow[5]. It is unclear if there is an association between entrapment localization and response to conservative treatment.

This study evaluated the effect of age, sex, and entrapment localization on recovery time in conservatively treated patients with mild-to-moderate UNE.

SUBJECTS AND METHODS

Questionnaires and consent forms were sent to patients diagnosed with UNE by short segment conduction studies (SSCS) within the preceding 6 months. For patients who were not eligible for this method, questionnaires were administered by phone. The research protocol was reviewed and approved by the Clinical Research Ethics Committee and was carried out in accordance with the principles of the Declaration of Helsinki.

SSCS were performed by recording latencies and amplitudes of five selected short segments. For change in latency, the values considered significant were >0.5 ms in the first, fourth and fifth segments, >0.6 ms in the second segment and > 0.7 ms in the third segment[6]. For change in amplitude, a reduction exceeding 20% was interpreted as a focal conduction block, as suggested by the American

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Association of Neuromuscular and Electrodiagnostic Medicine[7]. Entrapments at the distal-to-medial epicondyle were considered humeroulnar arcade (HUA) lesions (cubital tunnel syndrome). Involvement of the immediate proximal-to-medial epicondyle was considered retroepicondylar groove (RTC) entrapment, and involvement of more than 2 cm of the proximal end was considered medial intermuscular septum (MIS) entrapment[8]. Depending on the changes in latency or amplitude, entrapment was classified as HUA if the abnormal conduction was in segments 1 and 2, RTC if in segment 3, and MIS if in segments 4 and 5.

This study included patients with mild-to-moderate UNE based on the McGowan classification[9]. Patients were either educated on modifications to activities of daily living (such as prevention of long-term or repeated elbow flexion, avoidance of elbow flexion while asleep, quitting the habit of resting on the elbow, and ensuring the use of a pad to prevent external compression during resting positions) or were prescribed splints as conservative treatment.

Reasons for exclusion were: atrophy of intrinsic muscles and significant loss of muscle strength by needle electromyography (EMG); cervical radiculopathy and/or brachial plexopathy; electrophysiological findings of polyneuropathy or carpal tunnel syndrome; previous fracture, dislocation or arthritis in the elbow; previous corticosteroid injections; systemic neurological disease; diabetes mellitus (DM); and previous surgery for UNE. Individuals with a job that required long-term or repeated elbow flexion were also excluded.

Fifty-three patients with UNE volunteered for the study. Eleven were excluded for: DM (number [n] = 3), jobs requiring repeated and long-term elbow flexion (n = 5), previous trauma of the elbow (n = 1) and concomitant cervical pathology (n = 2). Six patients who had electrodiagnostic examinations and were previously operated on were not studied. Because of entrapment in both regions in one patient, precluding statistical analysis, 35 patients out of 36 were included in the study. Definition of recovery was made based on patient satisfaction. The absence of symptoms was considered as the marker of recovery. Recovery time, age, and sex were recorded. From treatment initiation, patients who recovered within 0–4 weeks were in Group 1, and patients who recovered within 4 weeks to 6 months were in Group 2.

Statistical Package for the Social Sciences (SPSS 15.0 for Windows) was used. Two-tailed t-test and χ^2 were used for normal distribution of independent numeric variables and independent categorical variables, respectively. Monte Carlo Simulation was used if distribution was not normal in multiple-group comparison. A p value < 0.05 was statistically significant.

RESULTS

The study included 35 patients with a mean age of 43.14 ± 10.13 yr, including 16 women (mean age: 46.06 ± 10.11 yr) and 19 men (mean age: 40.68 ± 9.74 yr). Entrapment localizations were RTC in 54.3%, HUA in 22.9%, and MIS in 22.9% (Table 1).

The ratio of Group 1 patients to total was 68%. There was no statistically significant differences in terms of age and entrapment localizations between Groups 1 and 2 (p = 0.366 and p = 0.127, respectively). There was a statistically significant difference in terms of gender between recovery groups (p = 0.027). The ratio of male patients was higher in Group 2 (Table 2).

DISCUSSION

In patients who received conservative treatment, age and entrapment localization did not change the recovery time. However, there were more male patients in the group of extended recovery time. With the conservative treatment,

Table 1. Demographics and localization features of the study population

		Women N = 16	Men N = 19	Total N = 35
Age (Mean ± SD)		46 ± 10.1	40.6 ± 9.7	43.1 ± 10.1
Localization				
[n (%)]	RTC	9 (56.2)	10 (52.7)	19 (54.3)
	HUA	4 (25)	4 (21)	8 (22.9)
	MIS	3 (18.9)	5 (26.3)	8 (22.9)

HUA: Humeroulnar arcade (cubital tunnel syndrome); RTC: Retro-epicondylar groove; MIS: Medial intermuscular septum

Table 2. Recovery features in terms of age, sex, and localization of entrapment

		Group 1 N = 24	Group 2 N = 11
Age (years) (Min–Max)		44.2 ± 10.5 (23–64)	40.8 ± 9.2 (29–57)
Sex [n (%)]	Kadın	14 (58.3)	2 (18.2)
	Erkek	10 (41.7)	9 (81.8)*
Localization			
[n (%)]	RTC	11 (45.8)	8 (72.7)
	HUA	8 (33.3)	0 (0.0)
	MIS	5 (20.8)	3 (27.3)

HUA: Humeroulnar arcade (cubital tunnel); RTC: Retroepicondylar groove; MIS: Medial intermuscular septum
*p < 0.05

symptoms disappeared in as little as 4 weeks in 68% of patients.

UNE can be assessed in three McGowan classification grades, based on physical examination. This study included patients with sensory complaints, such as paresthesia and hypoesthesia, and/or mild subjective muscle weakness (McGowan classification Grades 1 and 2). SSCS notably determine the localization of UNE and planning for potential surgery. The efficacy of patient education in the treatment of upper extremity problems, including UNE, carpal tunnel syndrome, and tendinitis is well known[5, 10–12]. We believe that this is the first study of an association between localization and recovery in patients receiving conservative treatment. Surgery may vary with the entrapment localization, but conservative treatment does not[13]. Activity modification through patient education removes the increased mechanical stress on the ulnar nerve[5]. Splinting, which prevents elbow flexion and allows extension, resolves paresthesias and improves electrodiagnostic tests[14, 15]. A previous study suggested that splinting is not additive to patient education about activities of daily living[16]. This study did not group patients who had splinting in addition to patient education; conservative treatment was discussed as a whole. Recovery features did not differ in either RTC entrapment, thought to arise from external compression and friction mechanisms, or HUA and MIS entrapments, thought to frequently arise from increased traction pathological mechanisms. Conservative treatment approaches aim to prevent external compression, traction, and increased friction on the ulnar nerve.

UNE at the elbow is more common in men than in women because the coronoid tubercle is 1.5 times larger and the subcutaneous adipose tissue is less in men[17, 18]. The longer recovery time in men who received conservative treatment may have resulted from these anatomical differences.

With age, the incidence of ulnar neuropathy at both the elbow and wrist increases[19]. In this study, age did not affect the recovery time in patients undergoing conservative treatment. This may mean that entrapment neuropathies recover through the removal of mechanical stress rather than as a factor of age.

Dellon et al. found that surgical treatment rates within 3 years in patients with mild and moderate UNE after diagnosis were 21% and 33%, respectively[20]. In this study, only 11% were operated on within two years, and symptoms in 68% disappeared in a short time, e.g. 4 weeks.

In conclusion, male sex appears to be associated with longer recovery time in mild-to-moderate UNE, and is a potential factor in treatment planning. There are several limitations in this study. Patients with prognostic factors, such as previous fractures, dislocation, or arthritis, possibly resulting in ulnar nerve entrapment, were excluded from the study. However, this was a retrospective-study, and-the presence of recurrent subluxation of the ulnar nerve and cubitus valgus-unidentified prior to the study, might affect recovery. To the best of our knowledge this study is the first to investigate the factors associated with recovery time in patients with UNE. Prospective studies with a larger population are needed to support our results.

REFERENCES

1) Merlevede K, Theys P, van Hees J: Diagnosis of ulnar neuropathy: a new approach. Muscle Nerve, 2000, 23: 478–481. [Medline] [CrossRef]
2) Visser LH, Beekman R, Franssen H: Short-segment nerve conduction studies in ulnar neuropathy at the elbow. Muscle Nerve, 2005, 31: 331–338. [Medline] [CrossRef]
3) Mesci E, Gunduz OH, Yagci İ, et al.: Sensitivites of various elektrophysiological methods in diagnosis of ulnar neuropathy at the elbow. Neurosurg Q, 2010, 20: 60–64. [CrossRef]
4) Caliandro P, La Torre G, Padua R, et al.: Treatment for ulnar neuropathy at the elbow. Cochrane Database Syst Rev, 2012, 7: CD006839. [Medline]
5) Assmus H, Antoniadis G, Bischoff C, et al.: Cubital tunnel syndrome—a review and management guidelines. Cent Eur Neurosurg, 2011, 72: 90–98. [Medline] [CrossRef]
6) Korkmaz M, On AY, Caliş FA: Reference data for ulnar nerve short segment conduction studies at the elbow. Muscle Nerve, 2011, 44: 783–788. [Medline] [CrossRef]
7) : Practice parameter for electrodiagnostic studies in ulnar neuropathy at the elbow: summary statement. American Association of Electrodiagnostic Medicine, American Academy of Neurology, American Academy of Physical Medicine and Rehabilitation. Muscle Nerve, 1999, 22: 408–411. [Medline] [CrossRef]
8) Yildirim P, Misirlioglu TO, Yildirim A, et al.: Short segment conduction study and localization features in ulnar neuropathy at the elbow. a retrospective study of 57 patients. Turk J Phys Med Rehab, 2015, doi: 10.5152/tftrd.2014.66674.
9) McGowan AJ: The results of transposition of the ulnar nerve for traumatic ulnar neuritis. J Bone Joint Surg Br, 1950, 32-B: 293–301. [Medline]
10) Taspınar O, Kepekci M, Ozaras N, et al.: Upper extremity problems in doner kebab masters. J Phys Ther Sci, 2014, 26: 1433–1436. [Medline] [CrossRef]
11) Lee YS, Yang HS, Jeong CJ, et al.: Changes in the thickness of median nerves due to excessive use of smartphones. J Phys Ther Sci, 2012, 24: 1259–1262. [CrossRef]
12) Nakamichi K, Tachibana S, Ida M, et al.: Patient education for the treatment of ulnar neuropathy at the elbow. Arch Phys Med Rehabil, 2009, 90: 1839–1845. [Medline] [CrossRef]
13) Mandelli C, Baiguini M: Ulnar nerve entrapment neuropathy at the elbow: decisional algorithm and surgical considerations. Neurocirugia (Astur), 2009, 20: 31–38. [Medline] [CrossRef]
14) Seror P: Treatment of ulnar nerve palsy at the elbow with a night splint. J Bone Joint Surg Br, 1993, 75: 322–327. [Medline]
15) Sailer SM: The role of splinting and rehabilitation in the treatment of carpal and cubital tunnel syndromes. Hand Clin, 1996, 12: 223–241. [Medline]
16) Svernlöv B, Larsson M, Rehn K, et al.: Conservative treatment of the cubital tunnel syndrome. J Hand Surg Eur Vol, 2009, 34: 201–207. [Medline] [CrossRef]
17) Richardson JK, Green DF, Jamieson SC, et al.: Gender, body mass and age as risk factors for ulnar mononeuropathy at the elbow. Muscle Nerve, 2001, 24: 551–554. [Medline] [CrossRef]
18) Contreras MG, Warner MA, Charboneau WJ, et al.: Anatomy of the ulnar nerve at the elbow: potential relationship of acute ulnar neuropathy to gender differences. Clin Anat, 1998, 11: 372–378. [Medline] [CrossRef]
19) Özçete ZA, On AY: Ulnar Sinir Tuzak Nöropatileri. Turk Fiz Tip Rehab Derg, 2010, 56: 190–195.
20) Dellon AL, Hament W, Gittelshon A: Nonoperative management of cubital tunnel syndrome: an 8-year prospective study. Neurology, 1993, 43: 1673–1677. [Medline] [CrossRef]