The relationship between electrodiagnostic severity and Washington Neuropathic Pain Scale in patients with carpal tunnel syndrome

Karpal tünel sendromlu hastalarda elektrodiyagnostik tanı ile Washington Nöropatik Ağrı Ölçeği arasındaki ilişki

Çağatay ÖNCEL,[1] L. Sinan BİR,[1] Engin SANAL[2]

Summary

Objectives: We undertook this study to examine the relationships between clinical symptoms as evaluated by Washington Neuropathic Pain Scale (NPS) and electrodiagnostic classification in patients with carpal tunnel syndrome (CTS).

Methods: Eighty patients with unilateral CTS were included in this study. After diagnosis of CTS by electromyography, all patients completed a 10-item questionnaire (NPS).

Results: A statistically significant correlation between total NPS score and severity of CTS was found (p=0.013, r=0.276).

Conclusion: The present study indicates that using NPS might be useful in evaluating the clinical outcome of patients with CTS.

Key words: Carpal tunnel syndrome; neuropathic pain scale.

Özet

Amaç: *Karpal tünel sendromu (KTS) olan hastaların, Washington Nöropatik Ağrı Ölçeği (NAÖ) ile değerlendirdiğimiz klinik semptomları ile elektrodiyagnostik sınıflamaları arasındaki ilişki olup olmadığını saptamayı amaçladık.*

Gereç ve Yöntem: *Tek taraflı KTS'si olan seksen hasta çalışmaya alındı. Elektromiyografik olarak KTS tanısı konduktan sonra, hastalar 10 soru içeren NAÖ'yü yanıtladılar.*

Bulgular: *NAÖ'nün toplam değeriyle KTS'nin şiddeti arasında istatiksel olarak anlamlı bir korelasyon bulundu (p=0.013, r=0.276).*

Sonuç: *Çalışmamızda, NAÖ'nün KTS'li hastaların klinik gidişini değerlendirmede yararlı olduğu sonucuna varıldı.*

Anahtar sözcükler: Karpal tünel sendromu; nöropatik ağrı ölçeği.

Departments of [1]Neurology and [2]Physical Medicine and Rehabilitation, Pamukkale University, Faculty of Medicine, Denizli, Turkey

Pamukkale Üniversitesi Tıp Fakültesi, [1]Nöroloji Anabilim Dalı, [2]Fizik Tedavi ve Rehabilitasyon Anabilim Dalı, Denizli

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Correspondence ***(İletişim):*** Çağatay Öncel, M.D. Hastane Cad., Saraylar Mah., No: 26, Kat: 1, Denizli, Turkey.
Tel: +90 - 258 - 444 07 28 / 2138 **Fax** ***(Faks):*** +90 - 258 - 242 35 12 **e-mail** ***(e-posta):*** cagatay_oncel@yahoo.com

Introduction

Carpal tunnel syndrome (CTS) is an entrapment neuropathy of the median nerve at the wrist. Diagnosis of CTS is based on clinical symptoms, physical signs and nerve conduction abnormalities. The classic symptoms of CTS are numbness and paresthesia in the first three fingers of the hand, which is exacerbated at night. The diagnostic signs include sensory loss along the lateral aspect of the hand, motor weakness and wasting of the abductor pollicis brevis muscle. Additional tests have been described to obtain the correct diagnosis, including Phalen's test and Tinel's sign. Nerve conduction studies and electromyography have also been employed for many years. Although the electrophysiological testing is accepted as a standard for diagnosis of CTS, no tool quantifying the severity of symptoms has been standardized thus far. Assessment of the severity and quality of the symptoms is useful in evaluating the outcome of the treatment.[1-3]

The Washington Neuropathic Pain Scale (NPS) was created in recent years to evaluate neuropathic pain and is composed of 10 units. In this study, we investigated the correlation between the clinical symptom results of patients according to NPS and electrodiagnostic classification.

Materials and Methods

Eighty patients with unilateral CTS were included in this prospective study. The study was approved by the Institutional Review Board at our institution.

An electromyography and nerve conduction velocity system (Medelec Premiere Plus, UK) was used in the present study. The standard motor and sensory nerve conduction study of median and ulnar nerves was performed in both hands in all patients. The temperature was maintained at >32 ºC during the procedure. CTS was defined as present when ulnar nerve studies were normal and median nerve studies met one of the following criteria for abnormality based on normal values obtained and used in our laboratory: Distal peak latency of sensory nerve action potential (DL-S) >3.8 ms, distal onset latency of compound muscle action potential (DL-M) >4.4 ms, and conduction velocity of sensory nerve fibers (CV-S) <50 m/s.

Patients diagnosed with CTS were classified according to the severity of CTS. The American Association of Electrodiagnostic Medicine criteria[4] was used for detection of severity of CTS. The criteria are as follows:

Mild CTS- Prolonged (relative or absolute) sensory or mixed nerve action potential (NAP) distal latency (orthodromic, antidromic or palmar) ± sensory nerve action potential (SNAP) amplitude below the lower limit of normal;

Moderate CTS- Abnormal median sensory latencies as above and (relative or absolute) prolongation of median motor distal motor latency;

Severe CTS- Prolonged median motor and sensory distal motor latencies, with either an absent SNAP or mixed NAP, or low amplitude or absent thenar muscle action potential.

After diagnosis of unilateral CTS, patients gave informed consent and immediately completed a 10-item questionnnaire (NPS). The NPS presents 10 domains of pain including two items that assess global pain intensity and pain unpleasantness and eight items that assess the locations of neuropathic pain and specific qualities as: sharp, hot, dull, hot, cold, sensitive, itchy, and deep or surface.[5] Subjects were asked to rate each quality of pain on a scale of 0 to 10, with 0= no pain and 10= the most sensation imaginable. We then investigated whether there was any correlation between classification of CTS and the NPS scale.

SPSS (SPSS for Windows version 13.0) was used for statistical analysis. Pearson's correlation analysis was used to assess the relationships between the NPS score and electrodiagnostic classification. Significance levels were set at $p<0.05$ in all cases.

Results

Eighty patients participated in this study, yielding 80 hands with CTS. There were 17 men and 63 women (1/3.7). The mean age of patients was 46.7±12.6 years (range: 23-80). The mean NPS score was 37.5±12.3 (11-68). Forty-six hands (57.5%) were categorized as mild CTS, 29 (36.3%) as moderate CTS and 5 (6.2%) as severe CTS. Forty-five (56.2%) right and 35 (43.8%) left hands

Table 1. Pearson correlation coefficients for NPS parameters of CTS

NPS parameters	CTS severity p-Value	R
Intensity	0.001	0.359
Sharp	0.179	0.153
Dull	0.145	0.164
Hot	0.005	0.31
Cold	0.236	0.134
Sensitive	0.139	0.168
Itchy	0.203	0.144
Unpleasantness	0.002	0.346
Deep	0.04	0.23
Surface	0.98	0.003
Total score	0.013	0.276

were involved. Right or left hand involvement was not related to the severity of the clinical involvement (p=0.76). Duration of the symptoms was 7.4±4.3 months.

A statistically significant correlation between total NPS score and severity of CTS was found (p=0.013, r=0.276). In addition, there was a statistically significant correlation between the severity of CTS and the four parameters of NPS (intensity, hot, unpleasantness, deep). The correlation coefficients are shown in Table 1.

Discussion

A correlation was found between the total NPS score, the intensity, hot, unpleasantness, and deep pain parameters and severity of electrodiagnostic CTS. This correlation shows that there is a relationship between some clinical symptoms and severity of electrodiagnostic CTS. 91-98% of the clinically diagnosed cases demonstrate abnormality on electrodiagnostic studies.[6] However, the patient sometimes has no symptoms despite the presence of severe electrodiagnostic findings. In exact contradiction, severe symptoms may exist despite very mild electrodiagnostic findings. While some studies have described a relation between clinical symptoms and severity of electrodiagnosed CTS, others did not.[7-9]

There are studies in the literature that have evaluated the relationship between the symptom severity scales and severity of electrodiagnosed CTS.[10,11] You et al.[10] found a correlation between electrodiagnostic findings and symptom severity scale. This scale consisted of questions about pain, weakness, clumsiness, numbness, and tingling. On the other hand, Levine et al.[11] was unable to show any relation between the symptom severity scale and electrodiagnostic findings. However, they did not examine relationships between subgroups of symptoms and electrodiagnostic measures.

However, there has been no study that evaluates this relationship according to NPS, which is practical and easy to apply. The NPS is painless and easy to administer virtually everywhere. The present study indicates application of the NPS scale might be useful in evaluating the clinical outcome of patients with CTS.

References

1. Kamath V, Stothard J. A clinical questionnaire for the diagnosis of carpal tunnel syndrome. J Hand Surg Br 2003;28(5):455-9.
2. Padua L, Padua R, LoMonaco M, Romanini E, Tonali P. Italian multicentre study of carpal tunnel syndrome: study design. Italian CTS Study Group. Ital J Neurol Sci 1998;19(5):285-9.
3. Padua L, LoMonaco M, Gregori B, Valente EM, Padua R, Tonali P. Neurophysiological classification and sensitivity in 500 carpal tunnel syndrome hands. Acta Neurol Scand 1997;96(4):211-7.
4. Stevens JC. AAEM minimonograph: the electrodiagnosis of carpal tunnel syndrome. American Association of Electrodiagnostic Medicine. Muscle Nerve 1997;20(12):1477-86.
5. Galer BS, Jensen MP. Development and preliminary validation of a pain measure specific to neuropathic pain: the Neuropathic Pain Scale. Neurology 1997;48(2):332-8.
6. Oh SJ. Nerve conductions in focal neuropathies. In: Retford DC, editor. Clinical electromyography: Nerve Conduction Studies. 2nd ed. Baltimore: Williams & Wilkins; 1993. p. 496-574.
7. Bland JD. A neurophysiological grading scale for carpal tunnel syndrome. Muscle Nerve 2000;23(8):1280-3.
8. Padua L, Padua R, Lo Monaco M, Aprile I, Tonali P. Multiperspective assessment of carpal tunnel syndrome: a multicenter study. Italian CTS Study Group. Neurology 1999;53(8):1654-9.
9. de Campos CC, Manzano GM, Leopoldino JF, Nóbrega JA, Sañudo A, de Araujo Peres C, et al. The relationship between symptoms and electrophysiological detected compression of the median nerve at the wrist. Acta Neurol Scand 2004;110(6):398-402.
10. You H, Simmons Z, Freivalds A, Kothari MJ, Naidu SH. Relationships between clinical symptom severity scales and nerve conduction measures in carpal tunnel syndrome. Muscle Nerve 1999;22(4):497-501.
11. Levine DW, Simmons BP, Koris MJ, Daltroy LH, Hohl GG, Fossel AH, et al. A self-administered questionnaire for the assessment of severity of symptoms and functional status in carpal tunnel syndrome. J Bone Joint Surg [Am] 1993;75(11):1585-92.