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Assessment of Frequency and Severity of Clinical Findings Related to Carpal Tunnel Syndrome in Patients Undergoing Hemodialysis Therapy

Hemodiyaliz Tedavisi Gören Hastalarda Karpal Tünel Sendromu Klinik Bulgularının Sıklık ve Şiddetinin Değerlendirilmesi

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Özet

Amaç: Hemodiyaliz (HD) tedavisi gören hastalarda karpal tünel sendromu (KTS) bulgularının sıklık ve şiddetini değerlendirmek.

Yöntem: Çalışmaya Afyonkarahisar'daki üç merkezde HD tedavisi görmekte olan 95 hasta dahil edildi. Tüm hastalara gece yatarken veya sabah ellerinde ağrı ve/veya uyuşma olup olmadığı soruldu, şikayeti olan hastalara (43 hasta) daha önce normal populasyondaki hastalarda elektrofizyolojik çalışmalardan daha üstün olduğu bildirilmiş puanlı bir anket ve KTS bulgularının taranması amacıyla diğer testlerle kıyaslandığında daha yüksek duyarlılık ve özgünlüğe sahip olan karpal tünel kompresyon testi uygulandı. Ayrıca, HD süresi, arteriovenöz fistül tarafı ve eşlik eden diğer hastalıklar (diabetes mellitus, tendinopati) kaydedildi. Her iki testin cerrahiye karar vermede yol gösterici olup olamayacağı incelendi.

Bulgular: KTS semptomlarının varlığı ve şiddeti ile HD süresi arasında anlamlı bir ilişki tespit edilmedi. Karpal tünel kompresyon testi ile KTS klinik bulgularının ilişkili olduğu görüldü. Anketten elde edilen skorlar ile KTS semptomları arasında anlamlı ilişki bulunurken skorlar ile HD süresi arasında ilişki bulunamadı. Semptomatik hastaların 3/4'ünde 5 ve üzerinde skor değerleri elde edildi. Eşlik eden tendon problemleri, yaş, fistül tarafı, diabetes mellitus ve vücut kitle indeksi ile KTS semptomları arasında bir ilişki tespit edilmedi.

Sonuç: HD tedavisi gören hastalar, normal populasyonla kıyaslandığında KTS gelişmesine ve hatta daha şiddetli seyretmesine daha yatkındırlar. Literatürle uyumlu olarak, HD tedavisi gören hastaların %33,6'sında KTS olduğunu bulduk. Karpal tünel kompresyon testi, HD tedavisi gören hastalarda KTS tanısı koyarken güvenle kullanılabilir. Normal populasyondaki KTS'li hastalardan farklı olarak kullandığımız anketin HD tedavisi gören KTS'li hastalarda cerrahi girişim kararı verirken sinir iletim çalışmalarının yerini tek başına tutamayacağını düşünüyoruz. Tüm hastalar için cerrahi girişim gerekmemekte ancak HD tedavisi gören hastalarda elektrodiagnostik doğrulama ve yakın takip gerekmektedir.

AnahtarKelimeler: Karpal tünel sendromu, hemodiyaliz.

Abstract

Objective: To assess the frequency and severity of clinical findings related to carpal tunnel syndrome (CTS) in patients undergoing hemodialysis (HD) therapy.

Method: The study included 95 patients who undergo HD at three centers in Afyonkarahisar, Turkey. All patients were asked if they had pain and/or numbness while asleep or in the morning. The ones with complaints (43 patients) answered a scored questionnaire which was previously reported to be superior to electrophysiologic studies in the normal population. Carpal tunnel compression test, which has higher sensitivity and specificity values when compared with other tests, was used to scan the patients for having CTS findings. Besides, data on the duration of HD, sides of the arteriovenous fistulas and additional accompanying diseases (diabetes mellitus, tendinopathy) were noted. Whether both of the tests could be used in decision for surgery was investigated.

Results: There was no relationship between the presence and severity of CTS symptoms and duration of HD. CTS symptoms and carpal tunnel compression test had a significant relationship. There was a significant correlation between scores obtained from the questionnaire and CTS symptoms but no relationship between scores and duration of HD. Three fourths of symptomatic patients had scores of 5 or more. No association between CTS symptoms and accompanying tendon problems, age, the sides of fistulas, diabetes mellitus or body mass index were detected.

Conclusion: Patients on HD therapy are more prone to have CTS and even in more severe condition than the ones in normal population. We found that 33,6% of patients on HD have CTS and that is consistent with the literature. Carpal tunnel compression test can reliably be used for diagnosing CTS in patients on HD. We believe that, unlike patients with CTS in normal population, the questionnaire cannot be solely used to replace nerve conduction studies to decide surgical intervention in patients with CTS on HD therapy. Not all patients need surgery but electrodiagnostic confirmation and close follow-up are necessary in HD patients.

Keywords: Carpal tunnel syndrome, hemodialysis.

Introduction

Carpal tunnel syndrome (CTS) occurs more commonly in patients undergoing long-term hemodialysis (HD) when compared with normal individuals in the population (1, 2). It is the most common mononeuropathy in patients with end stage renal disease (ESRD) with a frequency of 8% to 31% (1). With the improvements in the techniques of HD, the number of patients suffering from HD related CTS has also increased (3) and the prevalence of CTS correlates with the duration of HD (2, 4).

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Although several factors for nerve compression in patients undergoing long-term HD have been suggested, amyloid deposition is thought to play a dominant role. Other possible causes include: increased extracellular fluid volume, increased synovial volume, edema around the nerve, thickening of the transverse retinacular ligament and an ischaemic or 'steal' effect distal to a dialysis shunt or fistula (2, 5).

The frequency of CTS in long term HD patients has promoted some authors to suggest screening in this population (5). When considering that about 31% of a HD population had findings of CTS (4), it could be thought that a method to scan the HD population would be more practical instead of performing electromyography (EMG) on all patients with complaints that might be related to CTS. With the data supporting that time and resources are wasted as a result of inappropriate referrals (6, 7), if such a method could be instituted, the patients that are candidates for further investigations could readily be determined.

The aim of this study was to investigate the frequency and severity of symptoms related to CTS in patients on long term HD therapy, thus we performed a study substantially based on a questionnaire that was previously described (8) and a provocative test proved to be more sensitive and more specific than the others (9).

Materials and Methods

Patients

The study included 95 patients (52 female and 43 male) who undergo HD at three centers in the province of Afyonkarahisar, Turkey. Mean age of the patients was 51,48 years (22-78 years). Mean duration of HD was 5,2±3,9 years. Demographic data of the patients is available in Table 1.

All patients were asked if they had pain and/or numbness while asleep or in the morning. The ones with complaints were thought to have CTS and were further investigated. The patients answered the scored questionnaire (8) under the supervision of a physician. Data on the duration of HD, site of the A-V fis¬tula in the patients and additional accompanying illnesses (diabetes mellitus, tendinopathy) were also noted.

Table 1. Demographic data of the patients.

Clinical questionnaire for the diagnosis of CTS

In order to assess the patients on HD for having CTS, we used a previously described scored questionnaire (8), that based on the work of Levine (10) and was reported to have a positive predictive value as high as the electrodiagnostic studies (8). According to the questionnaire, a score of 3 or more has been submitted to analysis in comparison with nerve conduction studies and a score of 5 or more is recommended for use of the test as a diagnostic screening tool to replace nerve conduction studies.
Because we only wanted to determine the frequency and severity of symptoms and signs that would highly be related to CTS in patients on HD therapy, we didn't perform any further electrodiagnostic studies.

Physical examination

There are several provocative tests for CTS and all of those tests have various values for sensitivity and specificity. According to the recently published data, the carpal tunnel compression test has a sensitivity of 86% and a specificity of 95% when the test is performed with wrist flexion (9). None of the other provocative tests could reach the sensitivity and specificity values of carpal tunnel compression test. Thus, we used this test to provoke symptoms of CTS. The test was performed under the supervision of a physician. Presence of a positive compression test is thought to be attributable to a probable CTS more than a polyneuropathy.

Statistical Assessment

Statistical analyses were performed by using Statistical Package for the Social Sciences (SPSS)v.20. Demographic data of the patients were calculated with the programme. Nonparametric data were assessed with Spearman's two-tailed test. The significance level for all tests was determined as $P<0,05$.

	Minimum	Maximum	Mean	Standard Deviation
Age (years)	22	78	51,48	13,46
Height (cm)	145	187	164,94	8,32
Weight (kg)	31	114	63,77	15,51
Body mass index	15,7	42,97	24,5	5,54
Duration of HD (years)	0,02	18	5,2	3,89
Gender (male / female)	43 / 52			
Score obtained from the questionnaire (symptomatic patients)				
3-4			11 (11,5%)	
5 or more			32 (33,6%)	

HD: Hemodialysis

Results

Forty-three of 95 patients (45,2%) reported that they had pain and/or numbness while asleep or in the morning. The questionnaire and carpal tunnel compression test was completed for those patients. Of the patients with complaints, eight reported clinical symptoms on right side, seven reported on left side and 28 (65,1% of CTS group) reported bilateral symptoms.

Scores obtained from the questionnaire did not show statistically significant increase with duration of HD (p>0,05) but showed significant correlation with presence of clinical findings of CTS (p<0,05). Eleven patients (11,5%) got 3-4 points (low probability of CTS) from the questionnaire, while 32 (33,6%) of them had scores of 5 or more (highly probable CTS), which means that most of the symptomatic patients are probably in the advanced phases of the disease.

Twenty-seven patients (28,4%) had type II diabetes mellitus. Mean body mass index of the patients was 24,5 (15,7-43). No correlations between the presence of CTS symptoms and body mass index or diabetes mellitus were detected (p>0,05).

The mean duration of HD was 5,2±3,9 (0,02-18) years. Twenty of the symptomatic patients (46,5% of CTS group) had accompanying tendon problems in the upper and/or lower limbs. No correlations between the duration of HD and presence of CTS clinical symptoms or tendon problems were found (p>0,05). Moreover, presence of accompanying tendon pathologies did not correlate with scores obtained from the questionnaire and positivity of carpal tunnel compression test, however it correlated with symptoms of CTS.

Carpal tunnel compression test was positive in 33 patients (76,7% of CTS group and 34,7% of all patients on HD). The presence of positive carpal tunnel compression test correlated with presence of clinical complaints of CTS (p<0,05). No correlations between age and positivity of carpal tunnel compression test or CTS symptoms were detected (p>0,05).

No significant relationship between the sides of the previous or recent fistulas and clinical symptoms of CTS or carpal tunnel compression test were found (p>0,05). Results and sides of carpal tunnel compression test are listed in Table 2.

Table 2. Data about sides of symptoms and compression tests.

	Symptoms related to CTS	Compression test
Right (+)	8	6
Left (+)	7	8
Bilateral (+)	28	19
Negative	51	60

CTS: Carpal tunnel syndrome

Discussion

As seen in the individuals in normal population, clinical features of CTS include pain, numbness, and tingling in the median nerve distribution to the palm; the pain component is often greatest in the nocturnal hours and usually worsens during dialysis often including both hands.(4, 11)

Frequency of CTS in patients undergoing HD is reported as 8% to 31% (1). In the present study, we found that 43 (45,2%) of the patients on HD therapy had complaints related to CTS. Moreover, 32 patients (33,6%) had scores of 5 or more that reflect highly probable CTS. The ratio we found is consistent with the reported incidence in literature. It is probable that some patients would have some other conditions (neuropathy, tendinopathy, etc.) leading to symptoms similar to the ones in CTS (1, 12).
There are some substantial differences between median nerve compression in the population generally and that on HD. In patients on HD therapy, the incidence increases 10 times more, the nondominant hand is more often symptomatic, male gender is more predominant, complete recovery is less probable, and postoperative recurrence occurs with a higher proportion.(4, 13) CTS is an early manifestation of HD related amyloidosis and in addition to duration of HD therapy, age at initiation of hemodialysis has been identified as a risk factor for CTS.(11) But in our study, we could not find any significant relationship regarding the age of patients.

Apart from literature, we could not find any relationship between the presence of symptoms related to CTS and duration of HD. It was reported that the incidence of CTS among patients on HD therapy increases by time and after 20 years, the incidence of CTS in HD population is 100%(11).

According to the questionnaire we used (8), a score of 5 or more is recommended to use the test as a diagnostic screening tool to replace nerve conduction studies in patients with CTS in normal population. In the present study, 11 of the symptomatic patients (11,5%) got 3-4 points from the questionnaire, while 32 (33,6%) of them had scores of 5 or more, which means that most of the symptomatic patients are probably in the advanced phases of the disease. We see that patients on HD therapy had a higher prevalence of scores of 5 or more, that means they already may need surgery, however, we believe that this may lead to an overdiagnosis. Not all patients who get a score of 5 or more may need surgery, and in those patients with functional limitations and night pain electrodiagnostic confirmation may be necessary. We believe that, unlike patients with CTS in normal population, the questionnaire can not be solely used to replace nerve conduction studies to decide surgical intervention in patients with CTS on HD therapy and electrodiagnostic confirmation of the clinical suspicion would be more suitable in HD population.. Some authors recommend close follow-up of patients on HD and frequent nerve conduction studies from the beginning of dialysis to identify CTS earlier and to avoid irreversible nerve damage.(1)

Although thirty patients reported no clinical symptoms of CTS, the results suggest that two third of the patients had a probable impairment in nerve conduction. When considering that most of the symptomatic patients got scores of 5 or more, we may conclude that all patients on HD can have symptoms of CTS in moderate to severe forms and the severity of CTS increases by time. Existing of symptoms in so early period but so advanced forms can be related to increased extracellular fluid volume, increased synovial volume and edema around

the nerve existing even in the predialysis period (2, 5).

We found no association between side of fistula and CTS symptoms. The presence of a fistula cannot be the only reason in bilateral cases (5), other reasons (increased systemic extracellular fluid volume, increased synovial volume, edema around the nerve and thickening of the transverse retinacular ligament) would participate in the condition.(2)

We acknowledge that there are some limitations in our study. The first is that we did not perform electrodiagnostic studies and confirm the diagnosis and severity of CTS as we only wanted to determine the frequency and severity of symptoms and signs that would highly be related to CTS in patients on HD therapy. With use of electrodiagnostic studies, we would distinguish the symptoms that are related to a coexisting neuropathy(4). But we thought that carpal tunnel compression test would not give a positive result in neuropathy, and a positive result would be attributed to CTS, however, in some cases which have tenosynovitis of the flexor muscles of the hand the compression test may give positive results(12). When considering that 20 (21,0%) of symptomatic patients had accompanying tendon problems in the upper and/or lower limbs, it would be probable that some of the patients would have tenosynovitis of the flexor muscles of the hand (12).

In conclusion, it is obvious that patients on HD therapy are more prone to have CTS and even in more severe condition than in normal population. We found that 33,6% of patients on HD have CTS and that is consistent with the literature. Carpal tunnel compression test can reliably be used for diagnosing CTS in patients on HD. We believe that, unlike patients with CTS in normal population, the questionnaire cannot be solely used to replace nerve conduction studies to decide surgical intervention in patients with CTS on HD therapy. Not all patients need surgery but electrodiagnostic confirmation and close follow-up may be necessary in HD patients.

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