Physician Practices in the Diagnosis of Carpal Tunnel Syndrome at a Medical Center in Southern Taiwan

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Carpal tunnel syndrome (CTS) is the most common neurologic entrapment disorder diagnosed in the upper limb. Nevertheless, there is still debate about the most reliable test that should be performed to diagnose CTS. Much of the argument has been drawn from the opinions of individuals or groups with varying degrees of expertise in the field; little has been based on actual data. The purpose of this study was to investigate the diagnostic patterns of CTS in an academic medical setting in southern Taiwan. The charts of 1,050 patients with a diagnosis of CTS over a 1-year period (2001–2002) were retrospectively reviewed. Data on 622 patients with new-onset CTS were included in the analysis. On the patient's initial visit, physicians made a diagnosis of CTS in 34.9% of cases solely on the basis of the history of symptoms without resort to provocative tests, while 8.7% of cases were diagnosed on the basis of symptom characteristics alone in spite of negative provocative tests. A CTS diagnosis was given according to symptoms and positive provocative tests in 55% of cases. Apart from these, CTS diagnosis remained unchanged in 27.3% of cases without electrodiagnostic signs of CTS during follow-up visits. An average of 1.6 diagnostic maneuvers were conducted for CTS patients, with nerve conduction velocity (NCV) studies (516 cases) being the most frequently performed, followed by Tinel's sign (350 cases) and Phalen's test (102 cases). Our findings imply that physicians are inclined to base their diagnosis on clinical history and physical examination for patients with suspected CTS. Clear guidelines regarding the indications for referral for NCV studies should be established in response to the increased concerns about the cost effectiveness of diagnostic tests.

Key Words: carpal tunnel syndrome, Phalen's test, Tinel's sign, nerve conduction studies

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Of the upper-extremity peripheral entrapment neuropathies, carpal tunnel syndrome (CTS) remains the most commonly seen. CTS is the symptomatic presentation of median nerve compression at the wrist resulting from a variety of causes, such as genetic predisposition, injuries and trauma, and systemic or physiologic disorders, as well as repetitive and forceful motions of the wrist which, in turn, may lead to elevated pressure in the carpal tunnel [1]. The reported prevalence of CTS in the general population varies from 1% in the USA to 2.7% in Sweden [2,3]. This discrepancy may be mainly attributable to the different case definitions used to classify medical diagnoses of CTS in these studies. CTS prevalence rates peak in middle age or later [2,3]. Women have a greater risk of CTS compared to men in various industries or in the general population, with

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two to three times more women than men suffering from CTS [3].

The clinical features of CTS include numbness, pain, tingling or some combination of these symptoms in the area supplied by the terminal cutaneous branches of the median nerve (anterior surface of the first three digits and the radial portion of the ring finger). Patients with CTS may experience diminished dexterity and weakness of the hand [4]; in longstanding cases, even a loss of protective sensation was noted [5]. CTS is usually diagnosed from symptoms, provocative testing, and electrodiagnostic studies, such as nerve conduction velocity (NCV) test and electromyography, individually or in various combinations. Yet, findings in relation to the diagnostic accuracy of clinical tests are controversial. Phalen's wrist flexion test and Tinel's test of nerve percussion are commonly used provocative tests. Their sensitivities range from 48% to 85% (Phalen's test) and from 25% to 67% (Tinel's sign), and specificities from 55% to 89% and from 59% to 94%, respectively [6,7]. Overall, Phalen's wrist flexion test is the most sensitive provocative test for the diagnosis of CTS, while Tinel's sign is the most specific and the least sensitive [7]. Mondelli et al accounted for the disparities in the discriminating values of provocative tests, stating that the positive sensory symptoms, such as pain and paresthesia, provoked from test maneuvers that increase intracarpal pressure probably weaken in advanced stages of CTS due to the progressive axonal loss caused by continuous compression [8]. Consequently, it was suggested that generalizability of research findings in this sphere should take into account the clinical and electrophysiologic severity of CTS.

Likewise, a dispute arises over the usefulness of NCV studies for the evaluation of CTS. One line of research indicates that median sensory and motor NCV studies are valid in confirming a clinical diagnosis of CTS, with reported sensitivities of 49% to 84%, and specificities of 95% to 99% [9,10]. DeKrom and colleagues proposed that patients with clinically suspected CTS should be referred directly for neurophysiologic examination in view of the low validity associated with clinical signs and provocative tests [6]. Nonetheless, another line of research cautions the use of electrodiagnostic studies alone because of the high prevalence of abnormal median nerve conduction within the carpal tunnel without corresponding symptoms (i.e. false positives) in healthy worker populations [11]. In addition, false-negative results may occur partly because the condition is intermittent [12] and partly because CTS, particularly in the early stages, selectively affects the small, unmyelinated fibers that are undetectable by NCV studies, which evaluate large-diameter, myelinated sensory and motor nerve fibers [13]. After reviewing a multitude of published reports in connection with the diagnosis of CTS, experts from several medical organizations in fields such as neurology, electrodiagnostic medicine, occupational medicine, and physical medicine and rehabilitation have reached consensus that the combination of electrodiagnostic study findings and symptom characteristics offers the most accurate method to diagnose CTS [14].

These variations in the diagnostic validity of provocative and electrophysiologic tests can complicate diagnostic efforts and should be considered in the diagnostic process for CTS. Research pertinent to the practice patterns of physicians in the diagnosis of patients with symptoms compatible with CTS is scanty, and some of the existing data are inconsistent. One study observed that NCV testing was performed in 282 of 290 cases (97%) with clinical evidence of CTS [15]. Similar findings were obtained in a population-based CTS incidence study, in which 98% of physicians reported using electrophysiologic tests to diagnose CTS [16]. Conversely, underutilization of NCV examination in patients with probable CTS is also reported. For example, Phalen believed that electrodiagnostic procedures are not usually necessary to make the diagnosis of CTS, and that an accurate diagnosis may be established by noting the presence of one or more of three clinical signs: a positive Phalen's test, Tinel's sign, and a sensory deficit in the territory of the median nerve [17]. In a population-based study over a 20-year period, Stevens reflected that approximately 50% of patients in Rochester, Minnesota, USA, who were thought to have CTS were actually referred for electrodiagnostic testing [18]. In a survey of 467 hand surgeons in the American Society for Surgery of the Hand, 37.9% used electrodiagnostic testing "always"; 26.3%, "usually"; 33.2%, "occasionally"; and 1.5%, "never" [19]. Other authors found that even fewer patients diagnosed with CTS and treated using surgery were referred for electrodiagnostic testing [20]. These conflicting diagnostic practices might be partly explained by clinicians' beliefs about the efficacy of the various diagnostic tests. In light of the cost containment and efficiency promoted by the health insurance system, an understanding of the diagnostic tests utilized by practicing physicians contributes significantly to the assessment of the quality and cost of care for CTS. Unfortunately, no direct comparison can be made in this regard because similar studies have not been undertaken in Taiwan.

The purposes of this study were twofold: to examine the current practice patterns of hospital-based physicians in evaluating patients with clinically suggestive CTS, and to

investigate the diagnostic accuracy of provocative tests in comparison with NCV findings.

Materials and Methods

Data were retrospectively collected from a computerized patient database at a large urban medical center affiliated with a university school of medicine in southern Taiwan. Consecutive cases with a diagnosis of CTS (International Classification of Diseases, 9th Revision Clinical Modification, code 354.00) [21] in the hospital discharge register between April 1, 2001, and March 31, 2002, were considered. Patients were included in the analysis if they had new-onset CTS and complete documentation of the patient visit for CTS problems. Exclusion criteria included an underlying disease such as rheumatoid arthritis, diabetes, gout or hypothyroidism, renal dialysis, pregnancy, space-occupying lesions such as a ganglion, previous carpal tunnel release, and previous fracture of the distal radius. The medical charts were reviewed by an experienced occupational therapist together with two trained research assistants. Information pertaining to age, gender, affected hands, diagnosis, diagnosing physician, types of diagnostic tests, and results of diagnostic maneuvers was collected.

There are two electrodiagnostic laboratories in the hospital, one in the Department of Neurology and the other in the Department of Physical Medicine and Rehabilitation. Physicians from the two departments respond to consultation requests for electrodiagnostic testing throughout the hospital. In patients clinically suspected of having CTS, both laboratories performed electrophysiologic studies in accordance with a uniform operating protocol by means of Dantec Keypoint Version 4 (Dantec Electronics, Tonsbakken, Skovlunde, Denmark) electromyography. NCV evaluation of CTS in this medical center comprised bilateral median and ulnar distal sensory and motor latencies. Factory-set filter combinations were 20 Hz to 2 kHz for surface sensory recordings and 2 Hz to 10 kHz for surface motor recordings. The skin temperature of the palm was maintained above 31°C. In all cases, median thenar and ulnar hypothenar motor latencies were examined by placing the active recording surface electrodes over the midpoint of the abductor pollicis brevis and abductor digiti minimi. The reference electrode was placed over the proximal phalanx of the thumb for the median nerve and over the proximal phalanx of the small finger for the ulnar nerve. Supramaximal distal stimulation was delivered at the wrist over the respective nerve 8 cm proximal to the active surface electrode. Proximal stimulation was applied to the median nerve between the biceps tendon and the medial epicondyle at the elbow, and to the ulnar nerve between the medial epicondyle and the triceps tendon. Median and ulnar sensory nerve studies to the index finger and small finger, respectively, were conducted using standard 14 cm antidromic techniques. The active recording surface electrodes were placed around the proximal interphalangeal (PIP) joints and the reference electrodes were placed around the distal interphalangeal (DIP) joints of the same digits. Wrist stimulation was applied to the median and ulnar nerves at a point 14 cm proximal to the PIP joints of the second and fifth digits, respectively. Supramaximal proximal stimulation was applied to the median nerve between the biceps tendon and the medial epicondyle at the elbow, and to the ulnar nerve between the medial epicondyle and the triceps tendon. The electrodiagnostic criteria for CTS were a median digit II and ulnar digit V sensory latency difference of more than 0.4 ms, a median sensory latency greater than 3.5 ms, a median sensory velocity less than 40 m/s, and a median distal motor latency greater than 4.0 ms.

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows, version 11.0 (SPSS Inc, Chicago, IL, USA). Frequency distribution was used to illustrate the types and numbers of diagnostic tests rendered. Chi-squared analysis was used to determine the association between provocative and NCV test results.

Results

Of 1,050 consecutive patients in the study period, 622 were included in the study population, 159 men (25.6%) and 463 women (74.4%). Women outnumbered men by about 2.91 to 1. Patients were aged between 17 and 88 years, with a mean age of 50.31 ± 11.93 years. Patients were grouped into six categories by age: less than 25, 25–34, 35–44, 45–54, 55–64, and at least 65 years. The prevalence of CTS in these categories was 1.6%, 7.4%, 19.8%, 37.3%, 24.0%, and 10.0%, respectively ($\chi^2 = 315.76$, $p = 0.000$). The greatest frequency was found in the 45–54 years old category, followed by the 55–64 age group. Patients presenting with symptoms in both hands (52.4%) had a higher prevalence of CTS than patients with either right- (26.4%) or left-hand (21.2%) complaints ($\chi^2 = 104.35$, $p = 0.000$).

Among the 622 cases with a diagnosis of CTS, sensory disturbance in the median nerve distribution, such as numbness and paresthesia, nocturnal pain, and muscle atrophy, was reported by 84.1%, 19.5%, and 3.7% of all

patients, respectively. Clinicians recorded one or more diagnostic tests in 96.8% of patients, the most frequent of which were NCV studies (516 cases) and Tinel's sign (350 cases). Phalen's test was infrequently performed (102 cases) (Table 1). Specifically, 45.7% of patients underwent one test, 47.8% underwent two tests, and 6.5% underwent three diagnostic tests. An average of 1.6 diagnostic maneuvers were conducted for patients with CTS symptoms. Similar results were obtained for men and women. Surprisingly, none of the patients had been examined using any sensibility tests.

The process of clinical decision making among physicians in their diagnostic formulation was analyzed. No patients underwent NCV studies during their first visit, and NCV consultation did not alter the clinical impression about a patient's diagnosis in 27.3% (141/516) of cases in which NCV tests were negative. Stated another way, physicians determined a CTS diagnosis purely on clinical grounds during the initial visit. In particular, physicians made a diagnosis solely according to the history of symptoms in 34.9% (217/622) of cases without the use of provocative tests, while 8.7% (54/622) of cases were diagnosed on the basis of symptom characteristics alone regardless of negative provocative tests (i.e. negative Tinel's sign, Phalen's test, or both) (Table 2). In the same vein, physicians arrived at a diagnosis based on symptoms in association with positive provocative tests (i.e. positive Tinel's sign, Phalen's test, or both) in 54.8% (341/622) of cases. In 86.7% (351/405) of patients, at least one provocative test was positive. Among these, Tinel's sign was positive in 311 of 350 cases, whereas Phalen's test was positive in 76 of 102 cases.

Neurologists established a diagnosis of CTS in 60.1% of cases, followed by physiatrists (15.9%), neurosurgeons (8.0%), orthopedists (7.4%), internists (4.5%), occupational medicine physicians (1.9%), family medicine physicians (1.1%), anesthesiologists (0.6%), and plastic surgeons (0.3%). The percentage of NCV referrals among all CTS patients seen by each discipline was calculated to determine the referral rate (Figure 1). In the departments of plastic surgery, family medicine, and occupational medicine, all patients were referred for NCV testing, whereas the pain clinic (25%) and orthopedic department (37%) had the lowest proportion of referrals. Figure 2 illustrates the per-

Table 1. Frequency of provocative tests and nerve conduction velocity (NCV) tests performed in patients with suspected carpal tunnel syndrome

Test	Number of patients (n = 602)
Phalen's test	21
Tinel's sign	57
NCV test	197
Phalen's test and Tinel's sign	8
Phalen's test and NCV test	34
Tinel's sign and NCV test	246
Tinel's sign, Phalen's test and NCV test	39

Table 2. Results of provocative tests in patients with suspected carpal tunnel syndrome

Test	Number of patients (n = 405)
Tinel's sign (+)	267
Tinel's sign (–)	36
Phalen's test (+)	38
Phalen's test (–)	17
Tinel's sign (+) and Phalen's test (–)	8
Tinel's sign (–) and Phalen's test (+)	2
Tinel's sign (+) and Phalen's test (+)	36
Tinel's sign (–) and Phalen's test (–)	1

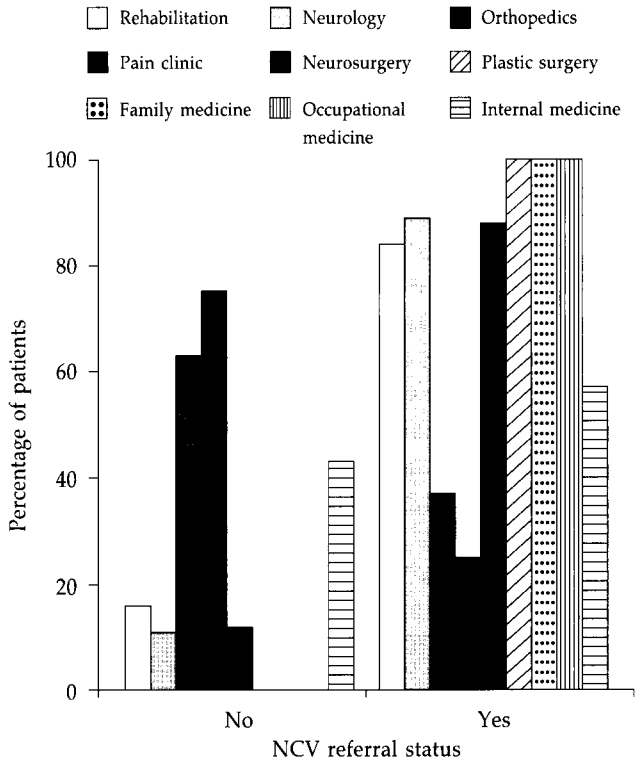


Figure 1. *Distribution of nerve conduction velocity (NCV) referrals among physicians of different specialties.*

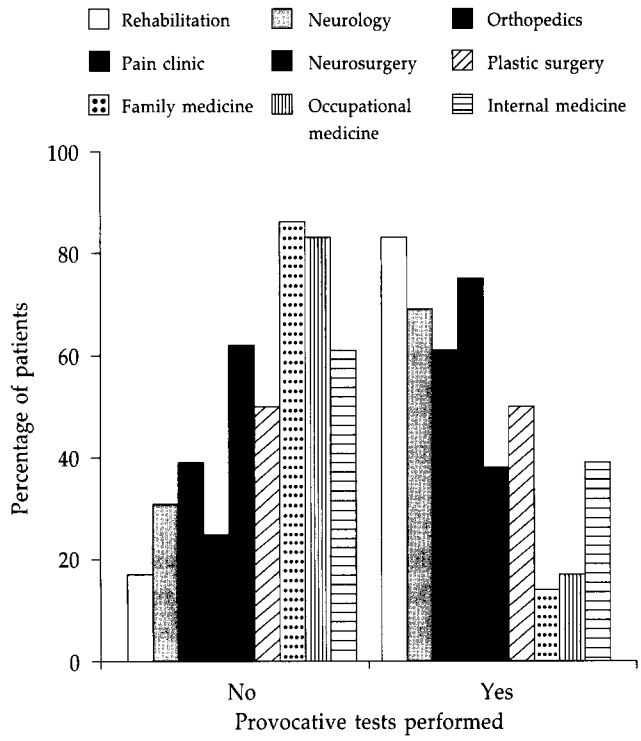


Figure 2. *Frequency distribution of provocative tests performed by physicians from different specialties.*

centage of provocative tests administered by physicians in different specialties. The rehabilitation department performed the highest percentage of provocative tests (83%), followed by the pain clinic (75%), whereas the lowest percentages were found in the departments of family medicine and occupational medicine.

The sensitivity of NCV testing was 74% (145/197) (95% confidence interval, 95% CI, 0.67–0.79), using clinical diagnosis as the criterion (Table 3). Chi-squared analysis revealed significant correlation between electrodiagnostic testing and Tinel's sign ($\chi^2 = 4.62$, $p = 0.03$), whereas no significant association emerged between NCV studies and Phalen's test ($\chi^2 = 1.98$, $p = 0.16$). The sensitivity (proportion of patients with CTS who had positive NCV findings) of Tinel's sign was 91% (95% CI, 0.87–0.94) (Table 4), and that of Phalen's test was 73% (95% CI, 0.60–0.83) (Table 5).

Discussion

CTS is the most frequent compression neuropathy seen by clinicians, affecting the quality of life of its victims and their families; it is often a cause of failure to return to work [22]. As a result, accurate diagnosis could have a tremendous effect on health outcomes for patients and on health care costs. To our knowledge, this is the first study describing how patients with symptoms of CTS are evaluated by practitioners from a broad spectrum of specialties in Taiwan. The age- and sex-specific rates of new-onset CTS observed in this analysis are generally consistent with two population-based prevalence reports from other countries [2], in that females had a higher prevalence of CTS than males, and the middle-aged had a higher prevalence than people of other age groups. Bilateral symptoms have been reported in 59% to 87% of patients [23], and were found in 52% of patients in our study. Among those presenting with unilateral involvement, the right hand was more susceptible to CTS than the left. However, our study was retrospective in nature and no information was obtained concerning handedness.

Most CTS patients (84%) experienced paresthesia and numbness in the digits innervated by the median nerve in this study cohort, and these symptoms seemed to be the main reasons that brought patients to seek medical help. This figure is coincident with earlier data that a sensory disturbance in the distribution of the median nerve distal to the wrist is the most constant clinical finding in CTS patients [17]. A review of the literature indicated that CTS is defined as either symptoms plus physical signs or symptoms plus positive NCV studies [15]. Our findings disclosed that physicians relied solely on the symptom features in making the diagnosis of CTS in 43.6% of cases, while 54.8% of cases were diagnosed based on the presence of symptoms coupled with positive physical examination findings. Electrodiagnostic consultation after history taking and provocative tests seemed to contribute little to clinical decision making, since no statements regarding a change of diagnosis were found on patients' charts in the presence of negative NCV studies. As a matter of fact, physicians did not rule out the CTS diagnosis in 27.3% of cases in which NCV tests were within normal limits.

Table 3. Sensitivity of nerve conduction velocity (NCV) studies using clinical diagnosis as the criterion standard

	Physician's diagnosis based on clinical grounds (n = 622)	Sensitivity
NCV positive (n = 375)	145	73.6%
NCV negative (n = 141)	52	

Table 4. Tinel's sign and nerve conduction velocity (NCV) studies

	NCV (+) (n = 375)	NCV (–) (n = 141)	Sensitivity
Tinel's sign (+) (n = 311)	188	65	91.3%
Tinel's sign (–) (n = 39)	18	14	

Table 5. Phalen's test and nerve conduction velocity (NCV) studies

	NCV (+) (n = 375)	NCV (–) (n = 141)	Sensitivity
Phalen's test (+) (n = 76)	40	16	72.7%
Phalen's test (–) (n = 26)	15	2	

There is great variability in the adherence of NCV studies to practice standards, especially in the case of diagnosis in subjects with classic or probable symptoms of CTS in conjunction with a negative electrodiagnostic finding. In a prospective study evaluating the value of electrodiagnostic consultation for patients with upper-extremity nerve complaints, 42% of diagnoses were altered after electrodiagnostic testing [15]. In the same work, the complexity of the patient's medical history and the lack of severity or specificity of the patient's complaint related significantly to the final diagnostic certainty. On the contrary, a number of studies support the view that CTS is a clinical diagnosis taking into account the good or excellent results of operative treatment in spite of normal NCV studies [24]. For example, based on a comprehensive review, Jordan et al concluded that electrodiagnostic studies are not useful in confirming the diagnosis in most cases of CTS where the symptoms are well defined, thanks to the low sensitivity of NCV testing, and that electrodiagnostic test results cannot be justified as providing a prognostic indicator of surgical outcome in CTS [25]. Our findings showed that physicians in the busy ambulatory setting tend to diagnose CTS on clinical findings only, since clinical history and provocative tests are more easily performed than electrodiagnostic studies in this type of setting. Generalization of this result awaits further study from a multicenter project on the diagnostic strategies employed by physicians for patients with clinically suspected CTS.

With regard to the clinical disciplines of the diagnosing physicians, neurologists provided the highest diagnostic yield, followed by physiatrists, who together accounted for 76% of all CTS diagnoses. The proportions of doctors diagnosing cases were low among internists, occupational medicine physicians, family medicine physicians, anesthesiologists, and plastic surgeons. This finding is at variance with the limited number of previous reports available. A countywide study in California stated that the greatest number of CTS cases was seen by chiropractors (23%), neurologists (14%), internists (19%), and family medicine physicians (9%) [26]. In surveillance of work-related CTS, Davis et al found that among all physicians, orthopedic specialists together with occupational medicine physicians reported 45% of all CTS cases to the Massachusetts Department of Public Health [27]. Our findings showed that patients with CTS were more likely to opt for care from physicians in the specialty areas of neurology and rehabilitation when suffering from feelings of numbness or tingling in their hands. However, a nationwide investigation on the frequency of patient visits for CTS within each clinical specialty is needed to substantiate this phenomenon.

The NCV test was the most frequently performed (85.7%), followed by Tinel's sign (58.1%) and Phalen's test (16.9%). The departments of plastic surgery, family medicine, and occupational medicine achieved an NCV referral rate of 100%. Different NCV referral rates among physicians were seen in other studies. Lo et al found that 71.8% of NCV referrals were from family medicine physicians, whereas orthopedic and plastic surgeons referred 19.8% of all patients [28]. Mondelli et al documented that most NCV cases were referred by general practitioners (57.8%), followed by rheumatologists (10.1%), orthopedists (9.4%), physiatrists (6.5%), neurosurgeons (6.4%), and other specialists (5.3%); the fewest were referred by neurologists (4.4%) [16]. Generally speaking, decisions to refer for NCV studies after history taking and physical examination may include atypical clinical presentations, consideration of multiple diagnoses, ruling out a diagnosis, or confirming a clinical suspicion [29]. In taking account of the cost efficiency and managed care reinforced by our national health insurance system, it is important to develop clinical guidelines for the use of electrodiagnostic tests in the assessment of CTS in Taiwan.

Using the physician's clinical diagnosis as the standard criterion, the sensitivity of NCV testing in our study was 74%. This is in line with the findings of Atroshi et al [29] and Finsen and Russwurm [30], who reported sensitivities of 70% and 78%, respectively. On the other hand, sensitivities for Tinel's sign and Phalen's test with NCV studies as the criterion in the present study were 91% and 73%, respec-

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tively. The sensitivities and specificities of NCV testing and provocative tests in symptomatic patients vary widely in the literature. The reasons behind these large variations may include the population investigated, different stages of progression of the syndrome, examination techniques, and differences in case definition [31]. The fact that NCV studies were significantly correlated with Tinel's sign but not with Phalen's test in the present study accorded with the staging of CTS described by Novak et al [32], in that Phalen's test may be more likely to be most sensitive in the early stages of the disease, while Tinel's sign and electrodiagnosis may be the most sensitive in more advanced stages when focal segmental demyelination through wallerian degeneration progresses to regeneration of fibers. In other words, most of the CTS patients in our study may represent more severe cases of the syndrome.

Two major methodologic limitations of this study restrict the generalizability of the results. The first issue is the representativeness of our study sample relative to the total CTS patient population throughout Taiwan during the study period. Second, due to the retrospective nature of data collection, some clinical information was not available for all patients. For instance, detailed description of the clinical history was lacking in many medical records, so a thorough analysis of the clinical symptoms could not be obtained.

In conclusion, no gold standard exists for the diagnosis of CTS [33]. Although NCV studies are by far the most objective assessment of nerve function, physicians from all the specialty fields involved in the care of CTS in a busy medical setting had a tendency to determine a diagnosis of CTS by means of clinical history and physical examination. The role of NCV studies seemed to lie in the differential diagnosis of CTS, facilitating appropriate early treatment, and estimation and evaluation of improvement from surgery or therapy. Further research is warranted to clarify physicians' viewpoints on the applicability of NCV testing to the diagnosis of patients with possible CTS.

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南台灣某醫學中心醫師診斷腕隧道症候群的模式之探討

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腕隧道症候群是上肢最常被診斷的神經壓迫症候群。然而，有關腕隧道症候群的診斷標準仍存有許多爭議。這些紛歧往往源自於個人或一群在腕隧道症候群的診斷與治療具有不同專業程度的專家學者之實驗結果，僅有極少數研究是建立在實際的臨床資料。本文的主要目的即是探討南台灣一家醫學中心的各科醫師診斷腕隧道症候群的模式。在 2001 至 2002 年這一年期間，共有 1,050 位被診斷為腕隧道症候群的病人，其中只有 622 位病人符合收案標準，亦即第一次罹患腕隧道症候群以及病歷中有完整的看診紀錄。研究結果發現，在病人的第一次求診時間，34.9% 的腕隧道症候群診斷只根據病人主訴症狀而定，欠缺相關的 Tinel 或 Phalen 測試；此外，有 8.7% 的診斷也只依據主訴症狀而定，雖然 Tinel 或 Phalen 的測試結果是正常；55% 的病人之診斷則是同時建立於主訴症狀以及 Tinel 或 Phalen 的測試結果。另一方面，27.3% 的腕隧道症候群診斷被沒有因神經電學檢查結果顯示正常而有所變更。腕隧道症候群病人平均接受 1.6 種的診斷檢查，其中以神經電學檢查的總次數最高 (516 次)，其次為 Tinel 測試 (350 次) 和 Phalen 測試 (102 次)。 總結而論，臨床醫師診斷腕隧道症候群主要是以主訴症狀和理學檢查為主。神經電學檢查的使用時機應建立明確之規範，以有效運用醫療資源。

關鍵詞：腕隧道症候群；Phalen 測試；Tinel 測試；神經傳導檢查

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