Carpal tunnel syndrome as diagnosed by general practitioners

An observational study

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Abstract

**Background:** The aim of this study was to investigate the results of both clinical testing and standardised nerve conduction studies as performed in patients with CTS complaints, who had been referred to the neurologist by their general practitioners.

**Methods:** Analysis of the data of neurological examination and electrodiagnostic tests as performed on patients with CTS diagnosed on clinical grounds by their general practitioners. A total of two hundred and thirty two patients with CTS complaints were seen by a neurologist and subsequently underwent electrodiagnostic testing.

**Results:** In 187 out of 232 patients (81 %), the diagnosis of CTS that had previously been made by the general practitioner, was clinically confirmed by the neurologist. In 180 out of 232 (78 %) patients, CTS could be confirmed by electrodiagnostic testing. From the 187 cases with clinically confirmed CTS, 180 (96 %) had abnormal nerve conduction tests. Fifty patients (22 %) had normal nerve conduction tests. In 40 (17 %) patients, the neurologist disagreed with the clinical diagnosis of CTS.

**Conclusions:** We showed that general practitioners are very well capable of making a clinical diagnosis of CTS. However, 17 % of the patients might have been incorrectly treated, had they not been seen by a neurologist. To increase consensus between general practitioners’ and neurologists’ diagnoses, predesigned referral forms or flow charts might help in eliminating patients with complaints that cannot be attributed to CTS.
Findings

Background

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy. Reported population
based prevalence is 9.2 % in women and 0.6 % in men [1]. Ferry [2] found a prevalence of 7 to 16
% in the adult community. Epidemiology in general practice studies shows an incidence of 2.8 per
1000 in women and 0.9 per 1000 in men [3]. Carpal tunnel decompression is frequently performed:
almost 3000 cases per year in a population of 5 million people [4]. The signs of CTS with typical
nocturnal paresthesias in the median nerve area usually permit a reasonably sure diagnosis solely
based on clinical signs and symptoms. However, most of the time, electrodiagnostic studies are
performed, in order to confirm the diagnosis as required by most surgeons prior to surgery [5,6]. In
the Netherlands, electrodiagnostic tests are traditionally performed after patients have been referred
to a neurologist. For reasons of practicality and economy, general practitioners may consider to
refer patients, with typical signs and symptoms of CTS directly for electrodiagnostic studies, i.e.
without consulting a neurologist. The aim of the present study was to investigate whether general
practitioners could safely refer directly for electrodiagnostic testing. Patients in whom the
diagnosis of CTS was less likely and rather one of several differential diagnostic possibilities were
excluded. All thus included patients were referred to a neurologist (HB) and were tested with
standardised electrodiagnostic tests.
Methods

Two hundred and thirty two patients with CTS diagnosed on clinical grounds by their general practitioners who were referred in the period June 2007 to January 2009, were included in the study. General practitioners provided us with clinical data by a letter of referral. In every patient, signs and symptoms were evaluated, and a neurological examination was performed. Criteria for the clinical diagnosis of CTS were signs and/or symptoms of a median nerve lesion with or without awakening during the night, and/or positive Flick sign (lessening of symptoms by flapping the hand) and/or increase by driving, riding a bike or telephoning. No signs of other causes were present. The neurologist made a clinical diagnosis first. After this examination, electrodiagnostic testing was performed by an experienced technician in order to see whether the clinical diagnosis of both the general practitioner and the neurologist could be confirmed. The gold standard was the clinical diagnosis.

All patients were tested electrodiagnostically, using standardised techniques [5]. During the test procedure, skin temperature was maintained at at least 31 degrees Celsius. At least three separate tests were performed: firstly distal sensory latency difference in the fourth finger between ulnar and median stimulation at the wrist (difference distal sensory latency DSL $\geq$ 0.4 msec); secondly, between the radial and median nerve in the thumb after stimulation at the wrist (difference DSL $\geq$0.6 msec); and thirdly a comparison of the nerve conduction velocity in median nerve at the wrist with that from proximal and distal located segments (forearm and finger respectively) (difference $\geq$ 10 msec or 15 msec respectively). If no sensory potentials could be obtained, the distal motor latency (DML) of the median nerve (thenar muscles) was determined (DML $\geq$ 4 msec).

The definite diagnosis of the neurologist was based on signs and symptoms, neurological examination, as well as the results of nerve conduction tests, but he made a clinical diagnosis before the conduction tests. The clinical diagnosis of CTS was confirmed when two or more
electrodiagnostic tests were abnormal. When clinical signs were typical of CTS and nerve conduction studies were normal, a definite diagnosis was based on clinical grounds.
Results

In 187 out of 232 patients (81 %), the diagnosis was confirmed by the neurologist based on history and neurologic examination. Electrodiagnostic tests were performed on all patients. Electrodiagnostic testing confirmed CTS in 180 out of 232 (78 %) patients. Seven of 187 (4 %) patients with clinical signs of CTS had negative electrodiagnostic studies. The definitive diagnosis in these patients was CTS. Fifty patients (22 %) had normal nerve conduction tests. In 2 patients, clinical and electrodiagnostic signs of an ulnar neuropathy were found, instead of CTS. In 40 (17 %) patients, the neurologist disagreed with the general practitioner. Two of these 40 patients were diagnosed with ulnar neuropathy. Thirty-three patients had no clear neuropathy. In 5 patients the neurologist was unable to make a clinical diagnosis; in these patients nerve conduction studies turned out to be normal. Hence, they were not treated as CTS.

Results are summarized in table 1.
Discussion

CTS is a frequently occurring and effectively treatable nerve entrapment syndrome. Treatment may consist of splinting, a corticosteroid injection in the carpal tunnel or neurolysis of the median nerve. CTS complaints are very inconvenient for the patient, often disturbing work and sleep. Therefore, a quick and accurate diagnosis is important. The diagnosis of carpal tunnel syndrome is usually based on history, and clinical signs and symptoms. In the Netherlands, patients with CTS complaints turn to their general practitioner, who then refers them to a neurologist for confirmation of the diagnosis. Mostly, electrodiagnostic testing is performed [6], as is preferred by Dutch surgeons [7]. Intervention by a neurologist may obviously cause an undesirable delay. This delay could be eliminated if general practitioners refer CTS patients directly for surgery or for application of conservative treatment. In order to see if it is feasible to pass over the neurologist, we investigated the concordance between the clinical diagnosis of CTS made by the general practitioner and the diagnosis of an experienced neurologist.

It turned out that in only 17 % out of the 232 patients, the neurologist disagreed with the clinical diagnosis of CTS as made by the general practitioner. In our opinion this difference can be explained by the specific expertise of a neurologist, especially by more extensive knowledge of differential diagnosis.

None of the 40 patients in whom the diagnosis of CTS could not be clinically established had abnormal nerve conduction studies. This may suggest that the neurologist was biased by the results of electrodiagnostic testing. However, as stated before, the clinical diagnosis was made prior to electrodiagnostic testing. Nerve conduction studies can be normal in mild CTS, and in some reports, false negative nerve conduction testing up to 34 % is mentioned [5,8]. In our group, 7 of 187 patients with clinical CTS had normal nerve conduction tests. These were diagnosed as having CTS and treated as such.
We did not include any patients that were referred for other reasons than CTS by their GP. Our goal was to test daily clinical practice in the Netherlands and we are aware that referral may be different in other countries.

In a prospective design reasons for referral by the GP could be clarified better. The consensus between general practitioners and neurologists might be further increased by the use of a predesigned referral form or a flow chart. This could reduce the number of false positive CTS diagnoses. Therefore it would be interesting to conduct a prospective study with a predesigned referral form in order to examine whether the consensus rate could be increased.

Electrodiagnostic confirmation will remain desirable; therefore it could be considered to have general practitioners refer patients directly for electrodiagnostic studies prior to treatment, at least surgical treatment.

A flow chart used by general practitioners, leading to electrodiagnostic testing in appropriate cases, prior to conservative or surgical treatment, might shorten the diagnostic process. Further studies are needed to confirm this.
Conclusions

Our results show that for many patients suspected to have CTS, direct referral for nerve conduction studies after clinical evaluation by general practitioners, is a quick and useful way to diagnose CTS. We showed that general practitioners are well capable of diagnosing CTS, following the low percentage of wrong diagnoses in this study (17%).

A flowchart may help to select the appropriate patients for electrodiagnostic studies in order to further reduce this number and to avoid unnecessary examinations.
Competing interests

The authors declare that they have no competing interests
Authors’ contributions

FC participated in design of the study and writing of the manuscript and prepared table 1. FC was responsible for the literature review and extraction of references. HB carried out neurologic examination of patients and participated in writing of the manuscript. JM and WV participated in design of the study, analysis of the data and writing of the manuscript.
Acknowledgements

There are no acknowledgements.
References


### Tables

**Table 1: Agreement between clinical diagnosis GP (general practitioner) and neurologist in combination with nerve conduction studies (NCS)**

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<tr>
<th>Neurologist Clinical diagnosis</th>
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<td></td>
<td>187 (81%)</td>
<td>5 (2%)</td>
<td>40 (17%)</td>
</tr>
<tr>
<td>NCS CTS</td>
<td>180 (78%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
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<tr>
<td>NCS no CTS</td>
<td>7 (3%)</td>
<td>5 (2%)</td>
<td>40 (17%)</td>
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