Does this patient have carpal tunnel syndrome?

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Authors' objectives
To review the precision and accuracy of history taking and physical examination in diagnosing carpal tunnel syndrome (CTS) in adults.

Searching
MEDLINE database was searched from January 1966 to February 2000 for publications in the English language, using the terms (exp) 'carpal tunnel syndrome' and (exp) 'diagnosis'. In addition, textword searches were completed for 'Tinel' or 'Tinels', 'Hoffman-Tinels' and 'Phalen' or 'Phalens'. The bibliographies of relevant publications were reviewed.

Study selection
Study designs of evaluations included in the review
No inclusion criteria relating to study design were specified.

Specific interventions included in the review
The included studies were required to clearly describe the physical examination manoeuvres used to test for CTS. The physical examination manoeuvres used in the included studies were motor examination (weak thumb abduction, thenar atrophy), sensory examination (hypoalgesia, diminished two-point discrimination, abnormal vibratory sensation, and abnormal monofilament testing), and other tests (including square wrist sign, closed fist sign, flick sign, Tinel sign, Phalen sign, pressure provocation test and tourniquet test). Definitions were presented of all these abnormal physical findings.

Reference standard test against which the new test was compared
The included studies were required to make an independent comparison of the index test(s) with one or more electrodiagnostic parameters (which had to include at least some measurement of motor or sensory nerve conduction).

Participants included in the review
Studies of patients presenting to a clinician with symptoms suggestive of CTS were included.

Outcomes assessed in the review
The included studies were required to present sufficient data for the construction of 2x2 tables. The outcome measures calculated for the review were the sensitivity, specificity, and likelihood ratios (LRs) of a specified physical examination manoeuvre compared with electrodiagnostic testing.

How were decisions on the relevance of primary studies made?
The two authors independently conducted literature searches and reviewed the identified titles and abstracts.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many of the reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
Summary measures were calculated using the random-effects model of DerSimonian and Laird.

How were differences between studies investigated?
The effectiveness score was used to assess homogeneity.

Results of the review
Twelve articles were included (designs not stated). The number of study participants was not clear.

Few studies addressed the precision of findings for CTS. The following best distinguish patients with electrodiagnostic evidence of CTS.

Hypoalgesia in the median nerve territory (2 studies, 338 hands): the sensitivities were 0.15 and 0.51; the specificities were 0.93 and 0.85; and the pooled LR (positive) was 3.1 (95% confidence interval, CI: 2.0, 5.1).

Classic or probable Katz hand diagrams (1 study, 145 hands): the sensitivity was 0.64, the specificity was 0.73, and the LR (positive) was 2.4 (95% CI: 1.6, 3.5).

Weak thumb abduction strength (2 studies, 343 hands): the sensitivities were 0.63 and 0.66; the specificities were 0.62 and 0.66; the pooled LR (positive) was 1.8 (95% CI: 1.4, 2.3).

The following findings argued against the diagnosis of CTS.

Unlikely Katz diagrams (1 study, 145 hands): the LR was 0.2 (95% CI: 0.0, 0.7).

Normal thumb abduction (2 studies, 343 hands): the LR was 0.5 (95% CI: 0.4, 0.7).

Several traditional findings of CTS have little or no diagnostic value, including nocturnal paraesthesia (3 studies, 314 hands): the pooled LR was 1.2 (95% CI: 1.0, 1.4).

Tinel sign (6 studies, 815 hands): the pooled LR was 1.4 (95% CI: 1.0, 1.9).

Phalen sign (8 studies, 1,075 hands): the pooled LR was 1.3 (95% CI: 1.1, 1.6).

Thenar atrophy (3 studies, 335 hands): the pooled LR was 1.6 (95% CI: 0.9, 2.8).

Two-point vibratory testing (3 studies, 392 hands): the pooled LR 1.3 (95% CI: 0.6, 2.7).

Monofilament testing (1 study, 167 hands): the LR was 1.5 (95% CI: 1.1, 2.0).

Only the results for Tinel sign were heterogeneous. This heterogeneity was not explained by differences in electrodiagnostic parameters, variations in examination technique, differences in prevalence of CTS among studies, differences in the age and gender composition, or apparent work-up bias. Exclusion of two studies accounting for the heterogeneity did not change the summary measure.

Authors’ conclusions
Hand symptom diagrams, hypalgesia, and thumb abduction strength testing are helpful in establishing the diagnosis of CTS. However, the utility of these results is limited by problems inherent in using nerve conduction studies as a criterion standard.

CRD commentary
The aims and the inclusion criteria were stated. The literature search was conducted by two authors independently, but the level of agreement and methods used to resolve conflicts were not described. Statistical heterogeneity was assessed, although the methods used were poorly described, and when found potential sources were discussed. The results were
clearly presented. The authors discussed the following limitations of the review: the validity of using electrodiagnosis as the 'gold' standard and the lack of an ideal criterion standard for diagnosis; and the fact that the analysis was applicable only to patients with symptoms severe enough to be referred, and was not applicable for the diagnosis of patients presenting to a primary care physician.

By limiting the literature search to studies published in the English language, as identified in one database, some relevant studies may have been omitted. No details were given of the methods used to extract the data. Study validity was not assessed. There was a risk of publication bias by not making attempts to locate unpublished work. No comment was made on the degree of blinding of the clinical assessors to electrodiagnostic findings.

LRs are an appropriate summary measure. However, they should only be pooled where no evidence of between-study heterogeneity has been established. In view of the limited assessment of heterogeneity presented, summary receiver operator characteristic curves may have been a more helpful method of pooling the findings in this case.

In view of these limitations, the conclusions of the review should be interpreted with caution.

**Implications of the review for practice and research**

**Practice:** The authors state that hand symptom diagrams, hypoalgesia, and thumb abduction strength testing are helpful in establishing the diagnosis of CTS when electrodiagnosis is used as the standard criterion.

**Research:** The authors state that the potential utility of computed tomography, magnetic resonance imaging and ultrasonography is still to be determined.

**Bibliographic details**

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10865306

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http://jama.ama-assn.org/

**Other publications of related interest**

This additional published commentary may also be of interest. Haines T, Kennedy C. Review: hand symptom diagrams, weak thumb abduction, and hypalgesia are helpful in diagnosing carpal tunnel syndrome. Evid Based Med 2001;6:94.

**Indexing Status**

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**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.