Usefulness of electrodiagnostic techniques in the evaluation of suspected tarsal tunnel syndrome: an evidence-based review
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CRD summary
This review assessed the usefulness of electrodiagnostic techniques in the evaluation of tarsal tunnel syndrome (TTS). Although the small number of poor-quality studies identified provided limited data, the limited literature search employed might have resulted in relevant studies being missed. The authors' conclusion, that nerve conduction studies may be useful in confirming the diagnosis of TTS but that further research is needed, follows from the data presented.

Authors' objectives
To determine the usefulness of electrodiagnostic (EDX) techniques in the evaluation of patients with suspected tarsal tunnel syndrome (TTS).

Searching
MEDLINE was searched from inception to April 2002; the search terms were reported. The bibliographies of retrieved articles were examined for additional studies.

Study selection
Study designs of evaluations included in the review
No inclusion criteria were specified for the study design. The included studies were a mixture of case-control and case series, and included one retrospective study.

Specific interventions included in the review
Studies of EDX techniques, where the procedure was defined or referenced sufficient to permit duplication, the criteria for abnormality were defined and reference ranges reported, and limb temperature was monitored, were eligible for inclusion. The included studies assessed a variety of motor, sensory and mixed nerve conduction (NC) studies.

Reference standard test against which the new test was compared
Studies in which the diagnosis of TTS was based on clinical criteria independent of EDX procedures were eligible for inclusion. The included studies used various combinations of burning or tingling sensation, Tinel's sign, altered planar nerve sensation and weakness of intrinsic foot muscles, as components of the diagnostic clinical examination.

Participants included in the review
Studies of patients with suspected TTS were eligible for inclusion.

Outcomes assessed in the review
No inclusion criteria were specified for the outcome measures.

How were decisions on the relevance of primary studies made?
The included studies were required to meet five out of six stated inclusion criteria. The authors did not state how many reviewers were involved in the study selection process.

Assessment of study quality
The included studies were rated using the diagnostic strength of evidence scheme of the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM). The methodological criteria assessed were: type of study design, number of participants with TTS, demographic data, method of recruitment, clinical criteria for the diagnosis of TTS, assessment time relative to onset of symptoms, and EDX procedures used. A method for assessing validity was reported, but the authors did not describe how the method was applied or the number of reviewers involved.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data
Methods of synthesis
How were the studies combined?
The studies were combined in a narrative.

How were differences between studies investigated?
Differences between the included studies were described and discussed in the text.

Results of the review
A total of four studies were included; the total number of participants was unclear.

The included studies had significant methodological flaws and no consistent reference standard of diagnosis was used. It was therefore impossible to calculate or compare the sensitivity and specificity of individual EDX techniques for the diagnosis of TTS.

Three of the four included studies assessed sensory NC: one found abnormalities in all patients with TTS and the others found abnormalities in 24 out of 25 and 19 out of 21 patients with TTS.

All four studies assessed motor NC; the results were reported for one case series and one case-control study. Three out of 13 patients in the case series had abnormal motor NC, whereas the case-control study showed no differences in NC parameters between the control and non-diagnostic groups.

No study evaluated needle electromyography.

Authors' conclusions
NC studies may be useful for confirming the diagnosis of TTS. However, this was supported by a low level of evidence only, and well-designed studies are needed to fully evaluate the role of EDX techniques in the diagnosis of TTS.

CRD commentary
The review addressed a broad, but clearly stated research question. The inclusion criteria were itemised and were appropriate to the nature of the question and the limited evidence available. The literature search was limited to one bibliographic database and a reference search, and the review may therefore have omitted some relevant data. No attempt to identify unpublished studies or an assessment of publication bias were described. The description of the review process was limited and it was therefore difficult to assess the potential for bias and/or error arising from the review methodology. The details of the included studies were reported fully in text and tables, and an assessment of their methodological quality was described. Weaknesses in the available literature and their consequences for the outcome of the review were discussed in the text. The use of a narrative summary, rather than a formal meta-analysis, was appropriate for the available data. The authors' conclusions follow broadly from the data described.

Implications of the review for practice and research
Practice: The authors presented recommendations based upon this review and a second review that examined plantar NC studies; an electronic evidence table for the second review is available on the AANEM website (accessed 24/07/2014; http://www.aanem.org/Practice/Practice-Guidelines.aspx). The authors stated that, where history, physical examination and testing have ruled out polyneuropathy, radiculopathy and other conditions that may account for the symptoms observed, the following EDX techniques are recommended for confirming TTS:

- tibial motor NC studies, with responses recorded over the abductor hallucis and abductor digitii minimi pedis muscles, demonstrating prolonged distal onset latency (evidence level C, class III);
- medial and lateral plantar mixed NC studies, demonstrating prolonged peak latency or slowed conduction velocity across the tarsal tunnel (evidence level C, class III); and
- medial and lateral plantar sensory NC studies, demonstrating slowed conduction velocities across the tarsal tunnel and/or small amplitude or absent responses (evidence level C, class III).
Research: The authors recommended that future studies evaluating the usefulness of EDX techniques to diagnose TTS meet the methodological criteria outlined in this review. In addition, they stated that such studies should be conducted in a blinded fashion, in a mixed population of patients meeting a case definition of TTS, controls, and patients with similar complaints not meeting the case definition of TTS. The authors further stated that consensus criteria for the diagnosis of TTS are required, that future studies should include an assessment of needle electromyography, and that outcome studies are required to assess the risks, benefits and costs of EDX techniques.

**Bibliographic details**

**PubMedID**
16003732

**DOI**
10.1002/mus.20393

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Action Potentials /physiology; Ankle /physiopathology; Clinical Trials as Topic /standards; Databases, Bibliographic; Electrodiagnosis /methods /standards; Electromyography /methods /standards; Evidence-Based Medicine; Humans; Neural Conduction /physiology; Paresis /diagnosis /etiology /physiopathology; Predictive Value of Tests; Prognosis; Prospective Studies; Reproducibility of Results; Sensation Disorders /diagnosis /etiology /physiopathology; Tibial Nerve /physiopathology

**AccessionNumber**
12005000965

**Date bibliographic record published**
30/09/2006

**Date abstract record published**
30/09/2006

**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.