The clinical diagnosis of compartment syndrome of the lower leg: are clinical findings predictive of the disorder?

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Authors' objectives
To establish the evidence base for using clinical findings to diagnose compartment syndrome of the lower leg.

Searching
MEDLINE was searched for studies published in English from 1966 to 2001 using the term 'compartment syndromes'. The bibliographies of retrieved articles and major orthopaedic texts were also checked.

Study selection
Study designs of evaluations included in the review
Studies with a prospective design were eligible for inclusion. One included study was blinded; the remainder were not. No other details of the designs of the included studies were reported.

Specific interventions included in the review
Studies that reported using clinical findings (pain, paresthesia, pain with passive stretch, and paresis) to diagnose compartment syndrome were eligible for inclusion.

Reference standard test against which the new test was compared
No inclusion criteria for the reference standard were specified. Some of the included studies used tissue pressure measurements as the reference standard for diagnosing compartment syndrome, while others used a combination of tissue pressure measurements and clinical findings.

Participants included in the review
Studies of individuals with traumatic or iatrogenic lower leg injuries were eligible for inclusion. The patients needed to be alert and able to respond in areas of the clinical findings. No further details of the study participants were reported.

Outcomes assessed in the review
Studies that provided the data necessary to calculate the sensitivity and specificity of reported pain, paresthesia, pain with passive stretch, and paresis were eligible for inclusion.

How were decisions on the relevance of primary studies made?
The author did not state how the papers were selected for the review, or how many reviewers performed the selection.

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

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

The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) for each clinical finding (i.e. pain, paresthesia, pain with passive stretch, and paresis) were calculated for each primary study.

Methods of synthesis
How were the studies combined?
The estimates of pooled sensitivity, specificity, PPV and NPV for each clinical finding for diagnosing compartment syndrome were derived by calculating weighted means. The likelihood ratio form of Bayes' theorem was used to assess the discriminatory ability of the clinical findings as tests for compartment syndrome; the prevalence of compartment syndrome was assumed to be 5%.

How were differences between studies investigated?
The author briefly discussed differences between the studies.

Results of the review
Four studies (n=132) were included.

The sensitivity of clinical findings for diagnosing compartment syndrome was low (13 to 19%). The PPVs of clinical findings were 11 to 15%, while the specificity and NPVs were both 97% to 98%.

The probability of compartment syndrome was between 19 and 26% with one clinical finding; 68% with pain and pain with passive stretch; 93% with pain, pain with passive stretch, and paresis; and 98% with all four clinical signs.

Authors' conclusions
There were limited data from which to determine the utility of clinical findings for the diagnosis of compartment syndrome. The findings suggest that the absence of clinical features is more useful for excluding a diagnosis of compartment syndrome than the presence of clinical features is for providing a positive diagnosis. However, the predictive value of clinical findings for the diagnosis of compartment syndrome has yet to be defined.

CRD commentary
The review used explicit inclusion criteria. A limited search for published studies was performed, but there were no attempts to search for unpublished literature or to assess publication bias. The single author did not report how many reviewers performed the study selection or data extraction processes; therefore, it is not possible to comment on whether reviewer error or bias may have influenced the findings. The quality of the studies was not assessed, hence the validity of the findings was unclear. The reference standard used in the diagnosis of compartment syndrome varied among the included studies, which diminishes the review's ability to address its objective. Furthermore, the reference standard in some of the primary studies incorporated the clinical signs which were being tested, thus limiting the validity of the findings.

The limited reporting of study details and the absence of heterogeneity testing make it impossible to judge whether or not it was appropriate to pool the included studies. It appears that the author used the weighted means of accuracy measures from individual studies, rather than calculating pooled estimates from the 2x2 data (a more reliable method). There is a problem with the author's conclusions in that high specificity values would generally indicate the ability of a test to rule in disease (not rule out as stated). However, this should go with high PPV (not high NPV as reported). In addition, there appears to be an error in the results table, with either the sensitivity/specificity or the PPV/NPV entered the wrong way around; it is hard to tell which given that 2x2 data were not reported.

Implications of the review for practice and research
Practice: The author suggested that the absence of clinical features is more useful for excluding a diagnosis of compartment syndrome than the presence of clinical features is for providing a positive diagnosis. However, this is probably not the case.

Research: The author stated that further study is needed to fully define the discriminatory ability of clinical findings for the diagnosis of compartment syndrome.

Bibliographic details

Database of Abstracts of Reviews of Effects (DARE)
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Ulmer T. The clinical diagnosis of compartment syndrome of the lower leg: are clinical findings predictive of the disorder? Journal of Orthopaedic Trauma 2002; 16(8): 572-577

PubMedID
12352566

Indexing Status
Subject indexing assigned by NLM

MeSH
Compartment Syndromes /diagnosis /physiopathology; Humans; Leg /physiopathology; Predictive Value of Tests

AccessionNumber
12002002183

Date bibliographic record published
31/01/2006

Date abstract record published
31/01/2006

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.