Meta-analysis of the sensitivity and specificity of platform posturography

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Authors’ objectives
To compare the sensitivity and specificity of platform posturography with other vestibular tests for patients with peripheral vestibular deficits (PVD), Meniere's disease, benign paroxysmal positional vertigo (BPPV) and central nervous system-vestibular impairment (CNS).

Searching
Index Medicus was searched from 1966 to 1994; Current Contents was also searched. The indexing terms used were listed in the report. Additional references were obtained by examining the citations in the retrieved studies.

Study selection
No inclusion criteria relating to study design were specified. Few details of the included studies were provided. All were observational studies that compared posturography with another objective test of vestibular function.

Specific interventions included in the review
The included studies had to assess the diagnostic performance of platform posturography for identifying balance deficits associated with vestibular impairment. The method of determining an abnormal result had to be reported or referenced. The classification of abnormal or normal posturography test results varied between the studies, but included measurements of body sway angle, and area or length of sway path.

Studies of static and dynamic platform posturography were included in the review. Static platform posturography involves Romberg's or tandem Romberg's test, whilst dynamic platform posturography involves six stance conditions in a sensory organisation test.

Reference standard test against which the new test was compared
The included studies had to compare posturography with another objective test of vestibular function. The reference standard tests used in the included studies were electronystagmography, rotation testing or caloric irrigation.

Participants included in the review
No inclusion criteria relating to study participants were specified. Patients with BPPV (13%), Meniere's disease (19%) and other peripheral vestibular deficits (31%) were included. CNS dysfunction was diagnosed in 3.3% of the cases. The proportion of patients with a normal vestibular examination, based on the criterion standard, was 33.7%. The two studies that classified participants by gender had an average of 47% male participants. The age of the participants, where reported, ranged from 14 to 77 years. Only two studies reported chronicity, and the classification of patients as having acute or chronic disease was not complete for all cases in those reports.

Outcomes assessed in the review
The included studies had to report sufficient data for the derivation of 2x2 contingency tables. The sensitivities, specificities, and positive and negative predictive values were calculated and reported in the review.

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

Assessment of study quality
The author does not state that they assessed validity.
Data extraction
The author does 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?
A chi-squared value was calculated for each study, and then transformed into a standard effect size.

How were differences between studies investigated?
Differences between the studies were investigated by stratified analyses, according to diagnostic category, criterion standard and type of posturography.

Results of the review
Nine studies (1,477 patients) were included.

The sensitivity and specificity of posturography were approximately 50%. The overall effect size was small (0.13) but positive. The diagnostic category had a significant influence on the predictive value of abnormal results: 73% for Meniere's disease and BPPV, compared with 41% for PVD, and 44% for mixed CNS and PVD (F(2,12)=5.26, P=0.02). There was also a significant effect on the magnitude of the effect size: 0.41 for mixed CNS and PVD, compared with 0.22 for Meniere's disease and BPPV, and -0.10 for PVD (F(2,12)=13.95, P=0.001).

Authors' conclusions
Platform posturography provided a measurable supplement to the standard vestibular examination. The enhancement was most notable when the target population included patients with CNS deficits.

CRD commentary
The review addressed a clear research question that was adequately defined by the inclusion criteria. The search strategy was limited, being restricted to two bibliographic databases, although the indexing terms used in the search were reported. This approach to searching is likely to be inadequate, as the indexing of diagnostic studies by major electronic databases is known to be poor. In addition, no attempts to identify unpublished data or assess publication bias were reported. Details of the review methodology were not reported, and the methodological validity of the included studies was not assessed. It is therefore impossible to assess the potential impact of biases, as introduced by defects in the conduct of the review itself or the primary studies, on the outcome of the review.

The reporting of the characteristics of the included studies was extremely sparse. A clear presentation of details relating to the included study populations and the index and reference standard tests would have greatly aided interpretation.

The method used to calculate an effect size was unclear. The calculation of an effect size in terms of increased detection of abnormality in comparison to a reference standard seems inappropriate, as, by implication, abnormal results not detected by a reference standard are false positives. Pooled sensitivity, specificity, and positive and negative predictive values appear to have been calculated. However, the process by which these were determined was not described. Direct pooling of these parameters is rarely appropriate, and never without assessment of between-study heterogeneity and threshold effects; no assessment of heterogeneity was reported in this review.

In the light of the problems highlighted, the reported results and conclusions of this review should be treated with extreme caution.

Implications of the review for practice and research
Practice: The author makes no recommendations for current practice.
Research: The author states that issues related to head position and prospective study designs, and the development of an optimal reference standard for the assessment of posturography, are topics that require additional research.

Bibliographic details

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MeSH
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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.