Can Bedside Oculomotor (HINTS) Testing Differentiate Central From Peripheral Causes of Vertigo?

Brian Cohn, MD*

*Corresponding Author. E-mail: cohnb@wusm.wustl.edu.

0196-0644/$-see front matter
Copyright © 2014 by the American College of Emergency Physicians.
http://dx.doi.org/10.1016/j.annemergmed.2014.01.010

A **podcast** for this article is available at www.annemergmed.com.

[Ann Emerg Med. 2014;64:265-268.]

Editor's Note: *Emergency physicians must often make decisions about patient management without clear-cut data of sufficient quality to support clinical guidelines or evidence-based reviews. Topics in the Best Available Evidence section must be relevant to emergency physicians, are formally peer reviewed, and must have a sufficient literature base to draw a reasonable conclusion but not such a large literature base that a traditional "evidence-based" review, meta-analysis, or systematic review can be performed.*

INTRODUCTION

Dizziness and vertigo lead to nearly 4 million US emergency department (ED) visits per year.[1] Distinguishing peripheral from central causes of vertigo remains a difficult clinical challenge, and an international survey of emergency physicians rated the need for a clinical decision rule to identify central vertigo as a top priority.[2] Although focal neurologic signs are frequently associated with central causes, they are absent in up to 20% of posterior circulation strokes.[3] Computed tomography (CT), often the initial imaging modality when stroke is suspected, is highly sensitive at detecting intracranial hemorrhage.[4] However, signs of ischemia are often absent early in the course of stroke, particularly in the posterior circulation.[5] Magnetic resonance imaging (MRI) with diffusion-weighted imaging, often considered the criterion standard in stroke diagnosis, is also associated with false-negative results when the posterior circulation is involved.[6] Unfortunately, delays in diagnosis of cerebellar stroke can be disastrous, resulting in an 8-fold increased risk of death.[3]

The ability to accurately differentiate central from peripheral causes of vertigo would be invaluable to emergency physicians, allowing earlier treatment of central causes while reducing unnecessary imaging and admissions in patients with peripheral causes. A bedside oculomotor examination (head impulse test, nystagmus, test of skew [HINTS]) has been proposed as a means of making such differentiation (see video demonstration, available online at http://content.lib.utah.edu/cdm/singleitem/collection/ehsl-dent/id/6).[7] This test involves 3 components: (1) assessment of the horizontal head impulse test: in peripheral vertigo, rapid head rotation during visual fixation results in a corrective saccade (positive test result), which is typically absent in central vertigo; (2) evaluation of the direction of nystagmus: nystagmus is typically unidirectional in peripheral vertigo, whereas the direction may change on eccentric gaze in central causes[8]; and (3) identification of skew deviation: ocular misalignment during alternate eye cover testing (with or without ocular tilt) is frequently observed in patients with posterior fossa abnormalities (ie, brainstem strokes).[9] Although its individual components do not reliably differentiate central and peripheral vertigo,[10,11] this article will evaluate the diagnostic accuracy of the combined 3-step HINTS examination.

SEARCH STRATEGY

An advanced PubMed search was conducted with the terms "(HINTS OR oculomotor OR vestibuloocular) AND (vertigo or dizziness)," limited to humans and the English language, resulting in 142 citations. Original studies that reported sufficient data to construct 2×2 contingency tables were chosen for analysis. The bibliographies of relevant articles were searched for additional references. Three articles that specifically addressed the diagnostic accuracy of the HINTS examination were identified. An additional article was selected that assessed the 3 components of HINTS, as well as vertical smooth pursuit, but allowed calculation of the accuracy of the HINTS examination alone.

ARTICLE SUMMARIES

Kattah et al[12]

This prospective, cross-sectional study was conducted at a single, urban academic center. Patients with acute vertigo, nausea, vomiting, and gait ataxia (with or without nystagmus) were enrolled primarily from the ED. Patients admitted for cerebellar infarction were also enrolled. Eligibility required at least 1 risk factor for stroke (smoking, hypertension, diabetes, hyperlipidemia, atrial fibrillation, eclampsia, hypercoagulable state, recent cervical trauma, or previous stroke or myocardial infarction), and patients with a history of recurrent vertigo were excluded. A neuro-ophthalmologist blinded to neuroimaging results conducted neurologic and vestibular testing on all

subjects, including evaluation of head impulse testing, nystagmus, and skew deviation. The examiners were not blinded to any other clinical information. All patients underwent neuroimaging, consisting primarily of MRI with diffusion-weighted imaging.

Of 121 patients screened, 101 were enrolled. The mean age was 62 years and 65% were men. HINTS examination was performed within 24 hours of symptom onset in the majority of patients (75%). CT alone was performed in 3 patients, all with unequivocal signs of cerebellar stroke; all other patients had MRI performed. Twenty-five subjects received a diagnosis of peripheral vertigo and 76 of a central lesion (69 with ischemic stroke, 4 with hemorrhage, 2 with demyelinating disease, and 1 with anticonvulsant toxicity). All 76 subjects with central pathology had abnormal HINTS testing results, whereas 24 of 25 patients without a central lesion had negative testing results. Diagnostic test characteristics are presented in Table 1. Eight patients with initially normal MRI results underwent repeated imaging 2 to 10 days later because of signs concerning for brainstem pathology, all positive for infarction. The sensitivity of initial MRI for ischemic stroke was 88.4% (95% confidence interval [CI] 78.4% to 94.8%) (calculated online at http://www.medcalc.org/calc/diagnostic_test.php).

In this study of patients with vertigo who were at moderate to high risk of stroke, the authors concluded that the HINTS examination ruled out posterior stroke with a higher sensitivity than MRI with diffusion-weighted imaging in the first 24 to 48 hours of symptom onset. The HINTS examination was performed by specialty trained neuro-ophthalmologists, rather than emergency physicians.

Table 1. Test characteristics of the HINTS examination for the diagnosis of central vertigo.

Test Characteristic	(95% CI)
Sensitivity, %	100 (95.2–100.0)*
Specificity, %	96 (79.6–99.3)*
PPV, %	98.7 (93.0–99.8)*
NPV, %	100.0 (85.6–100.0)*
Positive LR	25 (3.66–170.59)
Negative LR	0 (0–0.11)

PPV, Positive predictive value; *NPV*, negative predictive value; *LR*, likelihood ratio.
*Calculated online at http://www.medcalc.org/calc/diagnostic_test.php.

Chen et al[13]

This prospective study enrolled patients at a single, tertiary care hospital ED during 1 year. Inclusion criteria were vertigo of unclear cause, nausea or vomiting, and at least 1 vascular risk factor (smoking, hypertension, diabetes, dyslipidemia, atrial fibrillation, or recent neck trauma). Patients with brainstem signs were excluded, as were those with resolution of symptoms in the ED allowing safe discharge home. Bedside oculomotor testing was performed on patients after admission to the stroke unit by one of 2 neurologists blinded to MRI results, but not to any other clinical information. Examiners assessed vertical smooth pursuit in addition to the 3 components of the HINTS examination. The examiners underwent formal neuro-otology training, consisting of a 3-hour video-based lecture and 1-hour small-group tutorial. All patients underwent MRI with diffusion-weighted imaging, which was considered the reference standard. No patients required repeated MRI for unexplained findings on serial examination.

Of 36 patients identified, 24 met all inclusion criteria. The mean age was 64 years and 63% were men. Ten patients received a diagnosis of stroke according to MRI results, and all had at least 1 finding on HINTS examination concerning for central vertigo. Two of 14 patients receiving a diagnosis of peripheral vertigo according to normal MRI results had evidence of skew deviation, whereas the remaining 12 had negative HINTS examination results. The diagnostic test characteristics are presented in Table 2.

When the HINTS examination was performed by neurologists after special training, its components had a high sensitivity and negative predictive value for stroke, correctly identifying all 10 cases. This study was limited by its small sample size and the inclusion of a high-risk population of patients admitted to a stroke unit.

Newman-Toker and HINTS Versus ABCD2 Score[14]

This prospective study enrolled ED patients at a single academic center from 1999 to 2012. Patients with persistent vertigo lasting greater than or equal to 1 hour but less than 1 week were screened. Inclusion required the presence of nystagmus, nausea or vomiting, head motion intolerance, gait imbalance, and at least 1 stroke risk factor (smoking, hypertension, diabetes, hyperlipidemia, atrial fibrillation, eclampsia, hypercoagulable state, recent cervical trauma, previous stroke, or myocardial infarction). Exclusion criteria included a history of recurrent vertigo, resolution of symptoms with canalith repositioning, or an inability to participate in the examination because of lethargy. Oculomotor and neurologic testing was performed by one of 2 neuro-ophthalmologists blinded to imaging results. The authors do not mention blinding to other clinical information. New hearing loss was assessed as an indicator of peripheral vertigo and included in a 4-item HINTS "Plus" tool. An ABCD2 score—consisting of age, blood pressure, clinical features, and history of diabetes—was calculated for each subject according to recorded data, or by abstraction from the medical records, with a score greater than or equal to

Table 2. Test characteristics of the HINTS examination for the diagnosis of central vertigo.

Test Characteristic	(95% CI)
Sensitivity, %	100.0 (69.0–100.0)*
Specificity, %	85.7 (57.2–97.8)*
PPV, %	83.3 (51.6–97.4)*
NPV, %	100.0 (73.4–100.0)*
Positive LR	7.0 (1.9–25.3)*
Negative LR	0*

*Calculated online at http://www.medcalc.org/calc/diagnostic_test.php.

Download English Version:

https://daneshyari.com/en/article/3229251

Download Persian Version:

https://daneshyari.com/article/3229251

Daneshyari.com