

Is This Patient Having a Stroke?

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RATIONAL CLINICAL EXAMINATION REVIEW SOURCE

This is a rational clinical examination abstract, a regular feature of the *Annals'* Evidence-Based Emergency Medicine (EBEM) series. Each features an abstract of a rational clinical examination review from the *Journal of the American Medical Association* and a commentary by an emergency physician knowledgeable in the subject area.

The source for this rational clinical examination review abstract is: Goldstein LB, Simel DL. The rational clinical examination: is this patient having a stroke? *JAMA*. 2005;293:2391-2402. The *Annals'* EBEM editors assisted in the preparation of the abstract of this rational clinical examination review, as well as selection of the Evidence-Based Medicine Teaching Points.

OBJECTIVE

To update a 1994 systematic review of presenting symptoms and physical examination findings in patients with a suspected stroke or transient ischemic attack.

DATA SOURCES

A search strategy to identify relevant articles published between 1994 and 2005, using MEDLINE, using private collections, and reviewing the references of relevant articles and textbook chapters.

STUDY SELECTION

Any article that provided primary data or summary statistics pertinent to the accuracy or reliability of the history and physical examination in the diagnosis or prediction of the short-term prognosis of patients with a suspected stroke was obtained. Articles also needed to include a final diagnosis based on neuroimaging, as well as relevant laboratory findings.

DATA EXTRACTION AND ANALYSIS

The authors abstracted data to calculate sensitivities, specificities, and likelihood ratios (LRs). Reliability was determined by κ statistics or interclass correlation coefficients.

MAIN RESULTS

The pretest probability of stroke in patients with relevant neurologic findings was 10%, according to findings from the Los Angeles Prehospital Stroke Screen trial, composed of 1,092 out-of-hospital subjects.^{1,2} According to studies using modern neuroimaging, the presence of any of the following physical examination findings, acute facial paresis, arm drift, or abnormal speech, had a positive LR of 5.5 (95% confidence interval [CI] 3.3 to 9.1). The absence of these findings corresponded to a negative LR of 0.39 (95% CI 0.25 to 0.61). To differentiate ischemia from hemorrhagic insults, neuroimaging is required. In terms of prognosis, early mortality (death within the first 3 weeks of experiencing a stroke) increases in patients with any combination (at least 2) of impaired consciousness, hemiplegia, and conjugate gaze palsy, with a positive LR of 1.8 (95% CI 1.2 to 2.8). The negative LR for the absence of these findings was 0.36 (95% CI 0.13 to 1.0). The key symptoms from an algorithm with high interrater agreement for stroke or transient ischemic attack included a sudden change in speech, visual loss, diplopia, numbness or tingling, paralysis or weakness, and nonorthostatic dizziness (not defined) ($\kappa=0.60$; 95% CI 0.52 to 0.68). The reliability of individual neurologic findings can be improved with standardized stroke scoring systems (eg, National Institutes of Health Stroke Scale) and varied from slight to almost perfect. Determination of ischemic stroke vascular distribution from a classification system based on combinations of physical examination findings had a moderate to good interrater reliability ($\kappa=0.54$; 95% CI 0.39 to 0.68) and correctly classified 75% of patients with visible infarcts.

CONCLUSIONS

The history and physical examination are important determinants in the evaluation of patients with suspected stroke. The presence of acute facial paresis, arm drift, or abnormal speech may improve diagnostic accuracy and reliability.

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COMMENTARY: CLINICAL IMPLICATION

In this rational clinical examination series, the authors provide an update on the utility of clinical examination findings in the diagnosis of stroke and transient ischemic attack. Stroke is the third leading cause of death in the United States, and up to 30% of survivors are permanently disabled.¹ Of all the conditions that emergency physicians regularly manage, few have such a devastating effect on both the patient and society. Great advancements have been made in the diagnosis and treatment of stroke and transient ischemic attack during the last decade, many of which focus on emergency care. Also, despite significant technologic advances in neuroimaging, the emergency physician's early and accurate clinical assessment remains integral to successful identification and treatment of patients with either transient ischemic attack or stroke. Despite the high-quality reliability and validity studies of clinical assessments during the past 10 years, methodologically sound research in this area is still needed. The challenges in this work are compounded by differing definitions of transient ischemic attack and stroke and variable reference standards to which clinicians' diagnoses are compared, making interpretation of results difficult. This can be especially vexing in the setting of suspected transient ischemic attack, traditionally defined as an ischemic focal neurologic deficit of less than 24 hours' duration.³ Because most transient ischemic attacks last less than 4 hours, diagnosis in the ED is most often made based on the history rather than physical examination findings.⁴ In one large California-based chart review, it was found that among patients diagnosed with a transient ischemic attack in the ED, 5.5% had a stroke within 2 days and 10.5% had a stroke in 90 days, underscoring the urgent need for accurately diagnosing this condition in the ED setting.⁵

Because of the added difficulty of taking a history or performing an examination on patients who have had a cognitive or speech impairment, the reliability and validity of the clinical assessment of patients with suspected transient ischemic attack or stroke may be challenging. Speech impairment, however, is an objective clinical finding that is of much greater diagnostic value than subjective findings such as sensory deficits. The finding of speech disturbance, arm drift, or facial droop has a positive LR for stroke as a cause of the neurologic deficit of 5.5 (95% CI 3.3 to 9.1), whereas the absence of all 3 has a negative LR of 0.39 (95% CI 0.25 to 0.61).^{6,7} Although clinical assessment does not preclude diagnostic imaging to identify intracranial hemorrhage, this triad of neurologic deficits appears to be the most reliable clinical examination finding for identifying patients with stroke who are candidates for thrombolysis.^{6,7}

TAKE-HOME MESSAGE

Emergency physician assessment of patients with suspected stroke or transient ischemic attack is integral to the early and accurate diagnosis and improved clinical outcomes for these disease entities. The finding of any one or more or the absence

all 3 findings (speech disturbance, arm drift, or facial droop) is easily assessed and reliable for identifying patients with stroke who are candidates for thrombolysis.

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EBEM TEACHING POINT

Measuring interrater reliability. Interrater reliability is the degree to which 2 or more raters or observers arrive at the same results when performing the same evaluation of the same subject. Authors often report this as percentage of agreement.⁸ This may be misleading, however, because it fails to consider agreement by chance alone. Cohen's κ measures the difference between observed agreement and agreement expected by chance between 2 raters.⁹ Fleiss' κ does the same for more than 2 raters.¹⁰ A κ value of 0 can be understood to represent agreement by chance alone, ie, no difference between the observed and expected agreement. A κ value of 1 is interpreted as perfect agreement, and a value of -1 represents perfect disagreement (an indication of systematic error).⁸ In situations in which more than 2 categories exist (eg, triage categories), a weighted κ can be calculated in which partial agreement is recognized by giving greater weighting value to categories that are closer in agreement.¹¹

Despite its common use, the κ statistic has limitations. Perhaps the greatest is its dependence on the prevalence of the item under observation, which results in difficulty comparing values from different studies in which prevalence varies. In addition, the κ value loses accuracy as prevalence becomes extreme such that a high level of agreement for a rarely observed condition will yield a low κ , whereas poor agreement of a very common condition will yield a deceptively high κ .

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