When Is a Headache a Migraine or an Indication for Neuroimaging?

Detsky ME, McDonald DR, Baerlocher MO, et al. Does this patient with headache have a migraine or need neuroimaging? JAMA 2006;296:1274–83.

Study Overview

Objective. To determine which elements of the history and physical examination of patients with headache distinguish migraine from other headache types and identify the need for neuroimaging.

Design. Meta-analysis.

Method. Articles that assessed performance characteristics of screening questions in diagnosing migraine and that evaluated the accuracy of the clinical examination in predicting the presence of underlying intracranial pathology via neuroimaging were extracted via MEDLINE search (1966–November 2005) and systematically reviewed. Four studies of screening questions for migraine (n = 1745 patients) and 11 neuroimaging studies (n = 3725 patients) met inclusion criteria. Each article was independently reviewed and abstracted by 2 authors, and a third author resolved disagreements by consensus.

Main outcome measures. Likelihood ratios (LRs) and confidence intervals (CIs) for specific clinical variables.

Main results. In diagnosing migraine, 5 predictors summarized by the mnemonic POUNDing (Pulsating, duration of 4–72 hOurs, Unilateral, Nausea, Disabling) were useful. If 4 of the 5 criteria were met, the LR for definite or possible migraine was 24 (95% CI, 1.5–388); if 3 criteria were met, the LR was 3.5 (95% CI, 1.3–9.2); and if 2 or fewer criteria were met, the LR was 0.41 (95% CI, 0.32–0.52). In deciding if neuroimaging is necessary, the following predictors were useful: cluster-type headache (LR, 10.7 [95% CI, 2.2–52]), abnormal findings on neurologic examination (LR, 5.3 [95% CI, 2.4–12]), undefined headache (ie, not cluster-, migraine-, or tension-type) (LR, 3.8 [95% CI, 2.0–7.1]), headache with aura (LR, 3.2 [95% CI, 1.6–6.6]), headache aggravated by exertion or a Valsalva-like maneuver (LR, 2.3 [95% CI, 1.4–3.8]), and headache with vomiting (LR, 1.8 [95% CI, 1.2–2.6]). No clinical features were found to definitively rule out significant pathologic conditions.

Conclusion. Migraine can be reliably diagnosed with 4 elements in the history and physical examination of patients with headache. Serious pathology cannot be ruled out using only the clinical examination, although several features of headache were found to be associated with a significant intracranial abnormality.

Commentary

In the United States, 6 of 10 women and 7 of 10 men with migraine are undiagnosed [1]. Up to 80% of patients with undiagnosed migraine experience some level of headache-related disability, with one third requiring bedrest [1]. In the United States, annual costs of migraine are estimated at $13 billion to $17 billion [2]. Given that headaches are nearly ubiquitous, early diagnosis of migraine can enable effective prophylaxis, and appropriate use of neuroimaging can detect other pathologies to guide treatment.

Detsky and colleagues reviewed 771 articles spanning nearly 4 decades. Only 4 articles related to diagnosis of migraine met inclusion criteria and had data from which LRs could be calculated. However, because different algorithms were used in each study, data could not be pooled. The authors modified an algorithm from the single best study to produce the POUNDing mnemonic and noted that a prior meta-analysis used different clinical characteristics with lower LRs. For the 11 studies that fulfilled inclusion criteria for the neuroimaging question, data were pooled into 1 of 5 categories to compare similar patients. Several clinical features had significantly higher positive LRs for intracranial pathology, but 4 features were associated with negative LRs, specifically, normal neurologic exam (LR, 0.71 [95% CI, 0.60–0.85]), headache not aggravated by Valsalva (LR, 0.70 [95% CI, 0.56–0.88]), absence of vomiting (LR, 0.47 [95% CI, 0.29–0.76]), and headache of defined type (LR, 0.66 [95% CI, 0.44–0.97]). Unfortunately, no single feature could be reliably used to rule out intracranial pathology.

Detsky et al's study has several limitations. First, while the authors did not combine dissimilar trials, the lack of studies that could be combined makes the mnemonic to diagnose migraine less useful. A prospective validation trial with a larger population is needed to determine if the LR predicted by this mnemonic is accurate. Second, the

neuroimaging studies were done in different settings, and the prevalence of intracranial pathology may have been different. While a random effects model was used to calculate the LRs, it may not be possible to fully adjust for the bias inherent in the improvements made in imaging technology over time. Lastly, as with all meta-analyses, potential missed studies, features not studied, and publication bias must be considered.

Applications for Clinical Practice

The POUNDing mnemonic may be useful in diagnosing migraine, but more studies are needed to validate its accuracy. The likelihood of serious intracranial pathology should be considered before recommending neuroimaging.

—Review by Mark S. Horng, MD

References

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2. Hu XH, Markson LE, Lipton RB, et al. Burden of migraine in the United States: disability and economic costs. Arch Intern Med 1999;159:813–8.

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