

Review: The physical examination can exclude the diagnosis of meningitis in low-risk adults

Attia J, Hatala R, Cook DJ, Wong JG. Does this adult patient have acute meningitis? JAMA. 1999 Jul 14;282:175-81.

QUESTION

What is the sensitivity of specific features of the clinical history and physical examination for diagnosing meningitis in immunocompetent adults?

DATA SOURCES

Studies were identified by searching MEDLINE (1966 to July 1997) using terms related to physical examination, meningitis, and diagnostic test properties and scanning bibliographies of relevant articles.

STUDY SELECTION

English and French studies of adults were selected if they assessed the sensitivity of various features of the clinical history or physical examination for the diagnosis of meningitis and if most of the patients had objectively confirmed bacterial or viral meningitis.

DATA EXTRACTION

Data were extracted on the clinical setting, years of data collection, number and characteristics of the patients and patient episodes, how patients were identified, type of meningitis, clinical history (headache, nausea and vomiting, and neck pain), and physical examination (fever,

neck stiffness, altered mental status, focal neurologic findings, rash, Kernig sign, and jolt accentuation of headache).

MAIN RESULTS

10 studies of 824 patients (845 episodes) met the inclusion criteria. 9 of these studies used data from retrospective chart reviews. Age range was 16 to 95 years. Data were combined to calculate pooled sensitivities (Table). Clinical history items had low sensitivities. Physical examination features, especially fever and neck stiffness had higher sensitivities (Table). In 1 study of patients with headache and fever, the jolt accentuation of headache had a sensitivity of 97% and specificity of 60%.

The presence of at least 1 of fever, neck stiffness, and change in mental status had a sensitivity of 99% to 100%; thus, their combined absence virtually ruled out meningitis.

CONCLUSIONS

Among patients at low risk, meningitis can be ruled out by absence of fever, neck stiffness, or altered mental status. All studies, however, are of relatively poor quality.

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For correspondence: Dr. R. Hatala, 4th Floor, McMaster Building, Henderson Hospital, 711 Concession Street, Hamilton, Ontario L8V 1C3, Canada. FAX 905-575-7320. ■

Pooled sensitivities for clinical history and physical examination for the diagnosis of adult meningitis

Clinical history	Number of studies	Number of episodes	Sensitivity (95% CI)
Headache	7	303	50% (32 to 68)
Nausea and vomiting	3	136	30% (22 to 38)
Physical examination			
Fever	10	733	85% (78 to 91)
Neck stiffness	10	733	70% (58 to 82)
Altered mental status	10	811	67% (52 to 82)
Jolt accentuation of headache	1	34	97% (91 to 100)*

*Unpooled data

COMMENTARY

Meningitis is a paradigm for difficult diagnosis because it is a potentially fatal disease with rapid onset and unreliable symptoms and signs. Fear of missing a case of meningococcal sepsis causes physicians to perform numerous lumbar punctures, many of which are negative. Sir William Osler recognized this diagnostic dilemma. In 1892, he cited Stokes' dictum that "there is no single nervous symptom which may not and does not occur independently of any appreciable lesion of the brain, nerves, or spinal cord" (1) to reinforce that many symptoms and signs of meningitis are nonspecific and diagnosis is treacherous.

In an extensive review of the value of symptoms and signs in diagnosing meningitis, Attia and colleagues established that fever, headache, change in mental status, and neck stiffness are important indicators of meningeal infection. Jolt accentuation of headache seems to add to the specificity of the diagnosis, and "level of suspicion" is an important factor in deciding whether to do a lumbar puncture. The evidence provided in the review supports the practice that the physician's index of suspicion should swing the decision toward or away from lumbar puncture when signs and symptoms conflict.

This review pulls together considerable information on the diagnosis of meningitis. However, the paucity of high-quality studies points out the need for more good work. For instance, jolt accentuation of headache needs further validation.

The most important undefined issue for the correct diagnosis of meningitis is that of establishing prior probabilities. Bayes' theorem states that the diagnostic value of any test varies with the frequency of the sought-for condition in the population under study. Once the prior probabilities for diagnosis of meningitis have been properly defined, as has been done for streptococcal pharyngitis, pulmonary embolism, and herpes simplex encephalitis, the value of specific signs and symptoms can be placed in clearer perspective.

*Thomas A. Parrino, MD
West Palm Beach Veterans Affairs Medical Center
West Palm Beach, Florida, USA*

Reference

- Osler W. Principles and Practice of Medicine. New York: D. Appleton; 1892:25.