Hot off the Press: An Observational Study of 2,248 Patients Presenting with Headache, Suggestive of Subarachnoid Hemorrhage, That Received a Lumbar Puncture Following a Normal Computed Tomography of the Head

Lauren Westafer, et al

Academic Emergency Medicine, 2015

1. Great title

2. Probably one of the most important papers written on the topic. It is a retrospective British study involving six hospitals with a total study population of 2,248 patients. The conclusions of the paper are basically contrary to the ACEP practice standard in that it shows the basic worthlessness of performing LPs after negative CTs.

3. Ninety-two of 2,248 patients had a "positive" LP. However, only nine of the 92 with xanthochromia had a subarachnoid hemorrhage. This resulted in the number needed to identify one aneurysm was 250 LPs! Some of these results are on page 751 i.e. "Among 2,248 patients with an initial high-resolution (16- to 64-slice) cranial CT, 92 patients had a positive LP of whom nine (0.04%) had an aneurysm subsequently identified. A significant proportion of LPs had inconclusive or uninterpretable results, 13 and 16%, respectively. The number of LPs needed to identify one aneurysm was 250 (1/0.004)."

Their take home point is straight forward in that LPs following negative CTs yielded more inconclusive and false positive results than true positive cases of SAH. My conclusion is that one must discuss this with patients so there is shared decision making before a decision to perform a LP is made, if the provider still advises compliance to the 2008 ACEP Clinical Practice Guideline.

Academic Emergency Medicine
Official Journal of the Society for Academic Emergency Medicine

SOCIAL MEDIA

Hot Off the Press: An Observational Study of 2,248 Patients Presenting with Headache, Suggestive of Subarachnoid Hemorrhage, That Received a Lumbar Puncture Following a Normal Computed Tomography of the Head

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Discussing: Sayer D, Bloom B, Fernando K, et al. An observational study of 2,248 patients presenting with headache, suggestive of subarachnoid hemorrhage, that received a lumbar puncture following a normal computed tomography of the head. Acad Emerg Med 2015;22:1267–73.

Associated podcast: http://tinyurl.com/PostCT-LP-SAH2015

BACKGROUND

Headache is a very common emergency department (ED) chief complaint, representing about 2.8% of all visits in the United States.[1] Sudden-onset, severe headache often warrants evaluation for etiologies with unacceptably high morbidity and lethality, including subarachnoid hemorrhage (SAH). Noncontrast head computed tomography (CT) as soon as possible after the onset of headache is the initial SAH diagnostic test of choice, but older studies indicate that up to one in three SAH patients were misdiagnosed during the initial ED encounter with subsequent treatment delays producing less optimal patient outcomes due to failure to perform or appropriately interpret lumbar puncture (LP) results in headache patients with a nondiagnostic CT.[2] Early-generation CT studies reported inadequate sensitivities for the diagnosis of SAH so postimaging LP was the standard workup to adequately exclude SAH.[3] The American College of Emergency Physicians (ACEP) Clinical Policy Statement for the evaluation of adult headache patients currently provide a Level B recommendation supporting LP following nondiagnostic noncontrast head CT to rule out SAH.[4] Recent studies using newer-generation CT scanners demonstrate significantly improved sensitivities for detecting SAH if performed within 6 hours, rendering providers and clinical educators to question the benefit for LP in this population.[5]

ARTICLE SUMMARY

This retrospective study evaluated the diagnostic yield of LP after a nondiagnostic head CT in patients presenting to one of six urban EDs in the United Kingdom. The primary outcome was the rate of diagnosis of SAH by LP after negative head CT. Over the course of 5 years, 2,248 patients were included, of whom 92 patients had a "positive" LP, according to spectrophotometric criteria established by the authors.

QUALITY ASSESSMENT

Several limitations of this study were noted. First, the criteria for a positive LP in this study relied on spectrophotometric cerebrospinal fluid (CSF) analysis, which is not available or routinely performed in 97% of North

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Received November 13, 2015; revision received November 21, 2015; accepted December 31, 2015.
The authors have no relevant financial information or potential conflicts to disclose.
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ISSN 1069-6563
PII ISSN 1069-6563583

doi: 10.1111/acem.12919

American EDs.[5] In fact, spectrophotometric assessment of xanthochromia has specificities as low as 29% and could actually increase further CT angiography and other more invasive downstream testing.[6] Additionally, patients with inconclusive CSF results did not undergo uniform evaluation, since only two of six sites evaluated equivocal LPs and most these equivocal cases were not referred for additional definitive imaging. Using different thresholds to fully evaluate equivocal cases represents differential verification bias (double gold standard bias), which falsely elevates observed estimates of sensitivity and decreases estimates of specificity.[7] In addition, the authors do not report any details about the delay between the onset of the headache and CT imaging or LP, which are both important because CT loses sensitivity after 6 hours and CSF bilirubin requires several hours to manifest following a sentinel bleed.[5,8] Finally, the investigators do not assess for potential temporal bias resulting from improvements in CT imaging quality and interpretation between 2006 and 2011.[9]

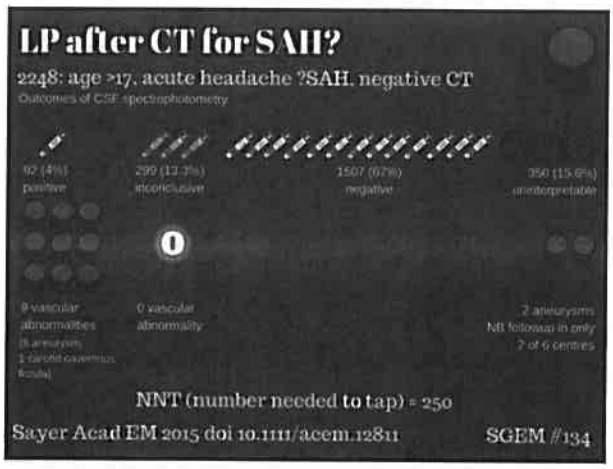
KEY RESULTS

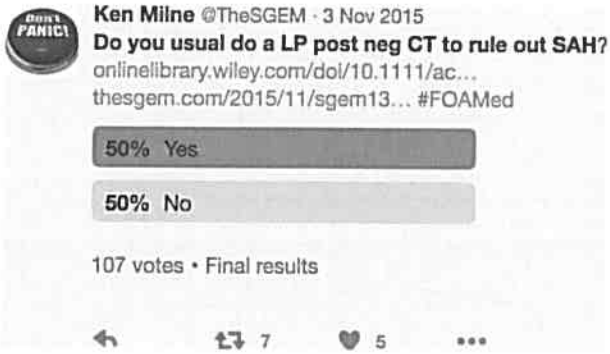
Among 2,248 patients with an initial high-resolution (16- to 64-slice) cranial CT, 92 patients had a positive LP of whom nine (0.04%) had an aneurysm subsequently identified. A significant proportion of LPs had inconclusive or uninterpretable results, 13 and 16%, respectively. The number of LPs needed to identify one aneurysm was 250 (1/0.004).

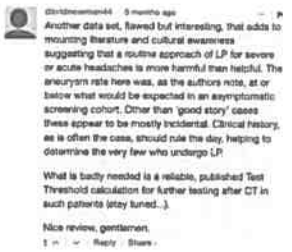
AUTHOR COMMENTS

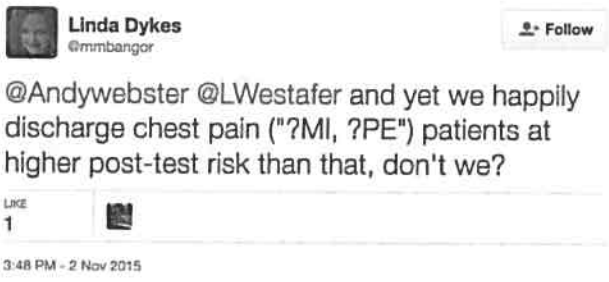
This retrospective study of acute, nontraumatic adult headache patients with suspected SAH contradicts the ACEP Clinical Policy Statement and classical teaching that providers must evaluate CSF for xanthochromia or significant red blood cells following a negative noncontrast cranial CT to rule out SAH in acute headache patients.

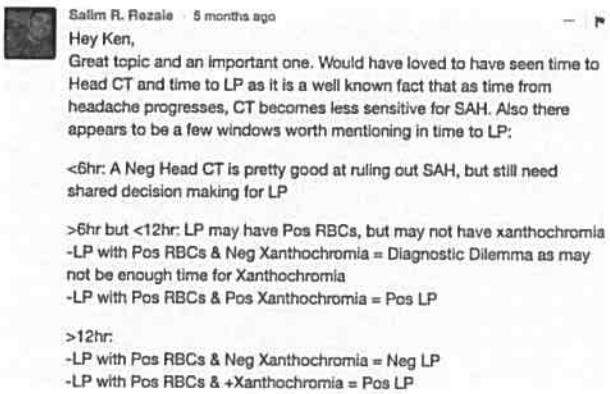
TOP 5 SOCIAL MEDIA COMMENTS











TAKE-TO-WORK POINTS

Routine LP following nondiagnostic cranial CT in patients with acute, nontraumatic headache yields more inconclusive and false-positive results than cases of SAH when evaluating for cerebral aneurysm-related sentinel bleeds. The number needed to LP to find one case of SAH in this scenario is 250, which should motivate shared decision-making with patients and more formal assessments of quantitative test–treatment thresholds in an era of increasingly sensitive CT imaging.

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