An Old Wives' Tale Debunked? Dehydration and Success of Spinal Tap
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These investigators developed an ingenious study to try to answer the question of whether a fluid bolus in young infants might result in higher success rate of lumbar puncture, a premise I've always considered an old wives' tale.


PICO Question: Among dehydrated infants aged 0-3 months, does lumbar subarachnoid space size measured by ultrasonography increase 1 hour after IV fluid administration?

Question type: Descriptive

Study design: Prospective cohort

Traumatic lumbar punctures (LPs), resulting in uninterpretable cell counts and chemistries, are relatively common in febrile infants undergoing evaluation for sepsis. I've often heard the stories that a) traumatic LPs are rare in true bacterial meningitis, because the elevated intracranial pressure associated with meningitis means that the lumbar subarachnoid space is expanded and therefore easier to find with a needle; and b) febrile infants are a little dehydrated, resulting in contracted lumbar subarachnoid spaces, and therefore harder to obtain cerebrospinal fluid (CSF) free of blood contamination. I've always felt that neither of these truisms were biologically plausible, and now 1 study advances the science a bit to put the latter statement closer to the old wives' tale category.

The approach to answering this question I thought was just short of brilliant. Researchers decided to look at infants with suspected pyloric stenosis, a group only slightly older than the under-1-month age population who are dehydrated and conveniently (for this study) tend to have diagnostic sonography performed. If sonography confirmed the diagnosis of pyloric stenosis, the sonographer then went ahead to obtain sonographic measurements of the subarachnoid space at the level of the conus medullaris. The infants then returned to the emergency department for an intravenous normal saline bolus followed by repeat conus medullaris sonography 1 hour after the fluid infusion. Sonogram measurements were read by 2 pediatric radiologists who unfortunately weren't blinded to the sequence of the sonograms; I think the researchers could have overcome this unblinded problem with a little extra computer work to mask the study times, but maybe not.

At any rate, they ended up with 40 evaluable cases, and found that the subarachnoid space measurements really didn't change following fluid bolus. One of the best components of this study, worth reading, is the Discussion section where the authors explore various theories of the dynamics of CSF production and regulation of intracranial pressure; I learned several new things. Of course, these sonographic measurements are only a surrogate for likelihood of traumatic LP in this age group. and the authors note that a randomized controlled trial of febrile infants, with fluid bolus prior to LP, might be the only way to provide better evidence. However, given the multiple factors contributing to traumatic LP, including experience of the practitioner, infant position, type of spinal needle, etc., I'm not sure such as study could lead to any end to the debate.

For the present, I will keep the notion that fluid bolus can increase subarachnoid space volume in my old wives' tale bin. By the way, if you happened to click on my link in the first paragraph for this term, you'll notice I used Wikipedia, a controversial reference for someone espousing Evidence-Based Medicine principles! I'm planning a
5th Tuesday blog next month to expand on the reliability of Wikipedia, so stay tuned for that.

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