Comments on "The Value of the Optic Nerve Sheath Diameter (ONSD) in Predicting Postdural Puncture Headache (PDPH): A Prospective Observational Study"

To the Editor:

We read with great enthusiasm the research work by Peng Q et al (1) on predicting the onset of postdural puncture headache (PDPH) in an obstetric cohort noninvasively using ultrasonographic optic nerve sheath diameter (ONSD) measurements. We acknowledge the novelty in the authors' proposition of a 'drop' in ONSD measurements in PDPH (ONSD < 0.4 cm at 24 hours after spinal anesthesia; AUC = 0.9787 and $P < 0.0001$), nevertheless certain caveats in this research require attention.

To begin with, the cerebrospinal fluid flow dynamics in an altered physiologic milieu like pregnancy needs a meticulous reflection. Even though there is a decrease in cerebrospinal fluid (CSF) volume in pregnancy due to pressure of gravid uterus, the related literature does not suggest a rise in intracranial pressure (ICP) anytime peripartum, except during uterine contractions in labor (2). Given ONSD presents a noninvasive corroborative of intracranial CSF pressure (3), an increased ONSD has been shown to be predictive of raised ICP across settings of ischemic stroke, traumatic brain injury, hyponatremia, and hepatic encephalopathy (4-7). Berty Gutiérrez and Carrera González additionally reaffirm the utility of this technique in diagnosis of intracranial hypertension in a preeclampsia cohort, albeit paucity of literature in this patient subset (8). Our research (9) found that a raised ONSD reduces on CSF pressure, reducing therapies in lines with existent literature. Though CSF hypotension is etiologic in PDPH, the clinical relevance of such a decrease to be 'visible' on a previously normal ONSD, as in pregnant population, is difficult to completely discern in a small cohort of 24 cases with PDPH in the Peng et al study.

Wang LJ et al (10) compared ONSD and ICP variations specifically with regard to intracranial hypotension, in a cohort of 136 patients with neurologic disease who underwent diagnostic lumbar puncture (LP). The authors found a strong correlation (r = 0.952; 95% confidence interval = 0.924–0.969; $P < 0.001$) between ONSD and ICP, with an ONSD cut-off point of 3.15 mm (98.3% sensitivity and 91.7% specificity) for identifying decreased opening CSF pressure on LP. However, extrapolation of these findings to the Peng Q et al's (1) postulation is far from straightforward given that the patients in Wang LJ et al (10) study were ailing from neurologic disease with nearly 40% of cases (54 out of 136 cases) having raised ICP (> 200 mm H_2O).

Moreover, altered CSF pH (11) due to physiologic hyperventilation of pregnancy is a variable that can confound the ONSD measurements. Apart from that; cerebral venodilation, as a confounder to ONSD measurements, is etiopathogenic to PDPH (12) and needs to be borne in mind while assessing suitability of variations in ultrasonographic ONSD to predict PDPH onset. Methodological discrepancies of using B-scan ultrasound for ocular ultrasound (13) instead of A-scan, like 'Bloom' artefacts, also limits the accuracy of Peng Q et al findings as the measured difference in ONSD between parturients with PDPH and without PDPH is submillimetric (0.36 ± 0.02 cm versus 0.44 ± 0.03 cm, respectively). Further, given the fact that compared to basal measurements (T0), ONSD reduced in both PDPH and non PDPH group at all time frames of assessment (T1, T2, T24, T48, and T72) a possibility of atypical headache in certain cases following dural puncture cannot be excluded in the index cohort (14,15). The drastic fall in ONSD at T1 (10 minutes after injection of spinal anesthetic drug) among both the groups, remains inexplicable to the readers.

To conclude, while the demonstration of intracranial hypotension using ONSD assumes much relevance in a context of previously raised ICP, a fall in ONSD from a preexistent normal value in pregnancy mandates further research consideration. We additionally opine that the Peng et al findings be carefully interpreted in light of the confounders mentioned here.

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