

Is it the time to standardize the procedure of ultrasound guided optic nerve sheath diameter measurement?

Sir,

Optic nerve sheath diameter (ONSD) calculated with ultrasound is today one of the established techniques for the assessment of intracranial pressure and detection of intracranial hypertension. It is widely available, cost-efficient, time effective, non-invasive, and does not require additional resources.

Originally described by Hayreh in 1968, ONSD measurement as a measure of intracranial pressure has been useful in many instances in predicting raised intracranial pressure (ICP).^[1]

Although ONSD has been more and more commonly used than ever before, clear cut-offs or upper limits of normal are not established. Normal adults can have ONSD above stated abnormal ranges. Along with this, there have been studies suggesting ONSD as an inferior predictor of raised ICP as compared to other non-invasive methods.^[2] We believe that this is at least partially because the exact method of measurement of ONSD has not yet been standardized, and different methods have been used by various authors in measurement of ONSD.

We would like to point out different methods and various inconsistencies while measuring ONSD by various authors:-

1. Some authors have used measured ONSD by keeping the ultrasound probe parallel to the eyelids, and hence, measure ONSD in transverse plane.^[3] Three such measurements have been averaged to calculate a final value of ONSD. Others have employed a different method. They have taken two measurements: one with probe in transverse plane and second after rotating the ultrasound (USG) probe 90 degrees, so that now the ONSD is measured in vertical plane. These two values have then been averaged to calculate a final ONSD value^[4] Now, it has never been investigated if these two methods result in similar or different ONSD values. In fact, Blehar, *et al.* proved that the coronal and axial diameters of optic nerve sheath vary widely
2. The ONSD in adults is usually measured at 3 mm distal to origin of optic nerve because this is said to be the most distensible part of optic nerve sheath. While measuring ONSD in pediatric patients (and even in infants), the same

landmark has been used blindly, without considering the fact that the total length of optic nerve in pediatric patients is way too smaller than in adults and the most distensible part of optic nerve sheath may be much proximal than in adults

3. The minimum image quality and equipment requirements needed to measure ONSD correctly should be standardized. We believe that a real concern while measuring ONSD, which is many a times not given because importance, is whether the operator has achieved a satisfactory image of eye and optic nerve sheath. We should have some minimum criteria that the ultrasound image must fulfil for being labeled as a satisfactory image. The sonographic quality criteria for optimizing ONSD measurements in critical care settings have been suggested and applying them in future studies may help us in standardizing ONSD calculation^[5]
4. In patients with raised ICP, different brain compartments will have different ICPs; hence, instead of using the mean of ONSD values of the two eyes as the final ONSD value (as has been done by various authors), it will be more meaningful if the ONSD values in both eyes are interpreted differently and serially monitored to gauge the effect of ICP reducing measures.

We believe that if properly calculated, ONSD being a real-time indicator of ICP has the potential to help us estimate exact ICP values, rather than just help us rule out raised ICP.

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Conflicts of interest

There are no conflicts of interest.

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