Cranium is a rigid structure that houses brain, cerebrospinal fluid (CSF), and blood. Changes in the quantity of any of these substances can alter the pressure inside the cranium. This pressure is called intracranial pressure (ICP), and when elevated above 20 mmHg, intracranial hypertension (IH). The Monroe-Kellie Doctrine says that elevation in any one component of the cranium will lead to decrease in one or two of the other components.[1] IH decreases the cerebral perfusion pressure (CPP) and is defined by the given formula: CPP = mean arterial pressure − ICP. Therefore, it becomes extremely important to diagnose and treat IH at the earliest to prevent herniation and death.

Etiological classification of IH is given:

• Increase in brain volume: Trauma, ischemic stroke, uremia, and hyponatremia
• Mass effect: Hematoma, tumor, abscess, and intracranial hemorrhage
• Excess CSF production: choroid plexus tumor
• CSF reabsorption defects: Obstructive hydrocephalus, meningitis
• Excess blood volume: Hypercarbia, aneurysms, venous sinus thrombosis, and raised central venous pressure
• Miscellaneous: Benign intracranial hypertension, hypervitaminosis A, and tetracycline use.

The traditional methods of diagnosing IH include history and clinical examination findings such as headache, vomiting, altered mental status, visual disturbance, and sixth nerve palsy. Extremes of IH with pending herniation may present altered mental status, visual disturbance, and sixth nerve palsy. Extremes of IH with pending herniation may present

whether higher ONSD is because of an elevated ICP can be answered by doing a 30° test. ONSD is measured in primary gaze and then 30° from the primary gaze. A decrease in ONSD by over 15% on 30° eccentric gaze is quite specific for IH as the etiology of the elevated ONSD, while a negative test (no change in nerve sheath diameter on eccentric gaze) suggests an alternative etiology for elevated ONSD. Acute and chronic IH may be differentiated with the help of the crescent sign on USG (seen in papilledema), which indicates chronicity.[8]

The current issue of Journal of Emergencies, Trauma and Shock has two articles focused on two different radiological modalities for diagnosing IH, specifically in head trauma patients.[11,12] One of these describes the use of CT in head injury patients that showed that the receiver operating

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On USG, the upper limit of normal for ONSD as measured inner-edge to inner-edge is:

• Up to 4 mm in infants
• Up to 4.5 mm in children
• Up to 5 mm in adults.

Measurements above 5 mm (bilaterally) correspond with elevations in the ICP above 20 mmHg, and further elevation of ICP results in a linear increase in ONSD up to 7.5 mm, at which the diameter plateaus.[10] Whether higher ONSD is because of an elevated ICP can be answered by doing a 30° test. ONSD is measured in primary gaze and then 30° from the primary gaze. A decrease in ONSD by over 15% on 30° eccentric gaze is quite specific for IH as the etiology of the elevated ONSD, while a negative test (no change in nerve sheath diameter on eccentric gaze) suggests an alternative etiology for elevated ONSD. Acute and chronic IH may be differentiated with the help of the crescent sign on USG (seen in papilledema), which indicates chronicity.[8]

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The receiver operating characteristic (ROC) for ONSD at a cutoff value of 5.6 mm detects ICH (measured using invasive ICP monitoring) with sensitivity of 72.2% and specificity of 50%.[11] The other article used USG to measure ONSD in head injury patients, and when compared with CT-based diagnosis of raised ICT using a cutoff value for ONSD of >5.0 mm for raised ICP, they had area under the ROC curve to be 90%.[12] These studies add to the literature on successful use of radiology for diagnosis of IH not only in head trauma, but these modalities are equally good for the various etiologies of IH described above.

To conclude, IH is a life-threatening condition with varied etiologies that must be diagnosed early using any of the easily accessible imaging modalities. USG, in the hands of an expert, is a reliable, quick, noninvasive, radiation-free modality and is now being used commonly by the residents in emergency medicine departments for quick diagnosis of IH. However, if a patient of head trauma is planned to undergo CT scan or MRI, it is advisable to request simultaneous good measurement of ONSD 3 mm behind the globe as an additional quantitative marker of raised ICP. USG has an edge over CT and MRI for being useful in performing repeated measurements of ONSD to document the progression of raised ICP.

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