Of the studied ultrasound noninvasive intracranial pressure monitoring, optic nerve sheath diameter (ONSD), is the best estimator of ICP. The novel combination of optic nerve sheath diameter ultrasonography and venous transcranial Doppler (vTCD) of the straight sinus is a promising and easily available technique for identifying critically ill patients with intracranial hypertension [1].

The optic nerve sheath diameter has been verified by various clinical studies as a non-invasive indicator of intracranial hypertension [2].

Correlations between ICP and Optic nerve sheath diameter (ONSD) using CT and MRI have been observed in adult populations.

Ultrasound methods has been proposed as an alternative safe technique for invasive ICP measuring methods [3].

Admission ONSD in decompressive craniectomy (DC) patients is high but does not predict mortality and unfavorable outcomes [4].

Intracranial pressure (ICP) can be noninvasively estimated from the sonographic measurement of the optic nerve sheath diameter (ONSD) and from the transcranial Doppler analysis of the pulsatility (ICPPI) and the diastolic component (ICPFVd) of the velocity waveform [5].

Where pediatric patients present with an ONSD of over 6.1mm following a TBI, ICP monitoring should be implemented [6].

Padayachy et al present a method for assessment of ONS pulsatile dynamics using transorbital ultrasound imaging. A significant difference was noted between the patient groups, indicating that deformability of the ONS may be relevant as a noninvasive marker of raised ICP [7].

While the ultrasonographic mean binocular ONSD (>4.53 mm) was completely accurate in detecting elevated ICP, color Doppler indices of the ophthalmic arteries were of limited value [8].

Bedside ultrasound may be useful in the diagnosis of midline intracranial shift by measurement of ONSD [9].

In patients with SAH and acute hydrocephalus after aneurysm rupture, the ONSD remains expanded after normalization of ICP. This is most likely due to an impaired retraction capability of the optic nerve sheath. This finding should be considered when using transorbital sonography in the neuromonitoring of aneurysmal SAH [10].

ONSD >5.5 mm yielded a sensitivity of 98.77% (95% CI: 93.3%-100%) and a specificity of 85.19% (95% CI: 66.3%-95.8%).In conclusion, the optimal cut-off point of ONSD for identifying IICP was 5.5 mm. ONSD seen on ocular US can be a feasible method for detection and serial monitoring of ICP in Korean adult patients [11].

Systematic review

The aim of a systematic review and meta-analysis will be to examine the accuracy of ONSD

sonography for increased ICP diagnosis.

Koziarz et al. will include published and unpublished randomised controlled trials, observational studies, and abstracts, with no publication type or language restrictions. Search strategies will be designed to peruse the MEDLINE, Embase, Web of Science, WHO Clinical Trials, ClinicalTrials.gov, CINAHL, and the Cochrane Library databases. We will also implement strategies to search grey literature. Two reviewers will independently complete data abstraction and conduct quality assessment. Included studies will be assessed using the Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) tool. We will construct the hierarchical summary receiver operating characteristic curve for included studies and pool sensitivity and specificity using the bivariate model. We also plan to conduct prespecified subgroup analyses to explore heterogeneity. The overall quality of evidence will be rated using Grading of Recommendations, Assessment, Development and Evaluations (GRADE).

Research ethics board approval is not required for this study as it draws from published data and raises no concerns related to patient privacy. This review will provide a comprehensive assessment of the evidence on ONSD sonography diagnostic accuracy and is directed to a wide audience. Results from the review will be disseminated extensively through conferences and submitted to a peer-reviewed journal for publication [12)].

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