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Cross-sectional area of the optic canal as a factor associated with papilledema in idiopathic intracranial hypertension: a case-control study

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Introduction

In idiopathic intracranial hypertension (IIH), papilledema results from the transmission of elevated intracranial pressure to the optic nerve, in the absence of structural lesions that could otherwise explain this finding. Previous studies suggest that narrower optic canals may limit this pressure transmission. Bidot et al. demonstrated that, in patients with IIH and unilateral papilledema, the unaffected side had a narrower optic canal, whereas larger canals were associated with higher Frisén papilledema grades and worse visual function.

Objective

To assess whether optic canal area is associated with the diagnosis of IIH and the presence of papilledema.

Methods

This retrospective case-control study included patients with definite or probable IIH according to Friedman criteria and age- and sex-matched migraine controls. Only individuals with cranial computed tomography (CT) scans with adequate bone-window images for optic canal measurement were included. The cross-sectional area (CSA) of the optic canal was measured by an investigator blinded to diagnostic group, using the standardized technique described by Bidot et al., adapted for CT imaging. Optic canal CSA was dichotomized according to the sample median and classified as narrow when <50 mm^2 and large when ≥50 mm^2. Statistical significance was set at $p<0.05$.

Results

Initially, 25 individuals with definite or probable IIH and 21 controls were identified. In the IIH group, nine patients were excluded due to the absence of adequate bone-window CT images and six due to incomplete data. In the control group, five individuals were excluded due to the absence of bone-window CT images. The final sample included 10 cases and 11 controls, all female, with no difference in age between groups ($p>0.99$). Among patients with IIH, seven had papilledema, including two with unilateral papilledema, whereas three had no papilledema. There was no significant difference in optic canal CSA between the IIH and control groups. However, optic canals classified as large were associated with a higher frequency of papilledema. Individuals with large optic canals had a 4.5-fold higher odds of papilledema compared with those with narrow canals (OR=4.50; 95% CI: 1.01–20.11; $p=0.040$).

Conclusion

Optic canal CSA did not differ significantly between patients with IIH and migraine controls. However, larger optic canals were associated with higher odds of papilledema, suggesting that optic canal anatomy may influence the transmission of intracranial pressure to the optic nerve and act as an additional factor in the clinical expression of IIH. These findings should be interpreted as exploratory due to the small sample size and require confirmation in larger studies.

Keywords:
Idiopathic intracranial hypertension
Papilledema
Optic canal
Computed tomography
Optic nerve

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