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Assessment of Choroidal Thickness in Optic Nerve Band Atrophy due to Chiasmal Compression

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Abstract

Choroidal thickness is an essential parameter that has gained significant attention in ophthalmic research as it plays a crucial role in various ocular pathologies. Optic nerve band atrophy resulting from chiasmal compression is a complex and potentially sight-threatening condition. This article aims to review the assessment of choroidal thickness in patients with optic nerve band atrophy due to chiasmal compression, exploring the potential clinical implications and its utility as a diagnostic marker for this condition.

Keywords: Choroidal; Optic nerve; Chiasmal compression

Introduction

Optic nerve band atrophy is characterized by the thinning and pallor of the optic nerve fibers, resulting in a characteristic band-like appearance. One of the underlying causes of optic nerve band atrophy is chiasmal compression, which occurs due to the compression of the optic chiasm by adjacent structures, such as tumors or vascular anomalies [1]. This compression can lead to a range of visual deficits, including visual field defects and reduced visual acuity. Understanding the pathophysiology and identifying potential biomarkers for this condition is essential for early diagnosis and appropriate management.

The choroid plays an important role in the maintenance of ocular function. Several retinal diseases are known to be related to choroidal thickness abnormalities and vice versa. The peripapillary choroid is believed to supply the prelaminar region of the optic nerve head and is possibly associated with peripapillary retinal nerve fiber layer nutrition and optic nerve head damage. New noninvasive imaging techniques, such as enhanced depth imaging and swept-source optical coherence tomography, have done much to improve the assessment of morphological features of the choroid [2].

Chiasmal compressive lesions (CCL) constitute a potentially important model for the evaluation of the effect of inner retinal layer loss on functional parameters and other eye structures. This type of anterior visual pathway damage usually causes temporal hemianopia as a consequence of axonal damage from the crossed RNFL in the chiasm, leading to band atrophy (BA) of the optic nerve head (a peripapillary RNFL thinning and pallor of the optic disc predominantly in temporal and nasal sectors), and loss of retinal ganglion cells and RNFL in the nasal hemiretina. The fact that lesions occur at the chiasm [3], with no indication of primary choroidal abnormality, make it an appropriate model for evaluating the effect of inner retinal neural loss on the choroid. To explore these possibilities, we measured peripapillary and macular choroidal thickness on SS-OCT in patients with CCL and temporal visual field (VF) defects and in healthy controls. The macular RNFL, macular GCL, and macular choroid parameters included global average, quadrant, and hemisector thickness. The corresponding pRNFL and pChoroid parameters were global average and quadrant thickness.

Choroidal thickness and its significance

The choroid is a highly vascular layer located between the retina and the sclera. It plays a crucial role in maintaining the metabolic demands of the retina and providing nutrients and oxygen to the outer retinal layers. Changes in choroidal thickness have been associated with various ocular diseases, including glaucoma, myopia, and age-related macular degeneration. Measuring choroidal thickness provides valuable insights into the vascular and structural changes occurring in the posterior segment of the eye, making it a potential biomarker for optic nerve band atrophy [4].

Methods of assessment

Several imaging techniques can be employed to assess choroidal thickness in patients with optic nerve band atrophy. Optical coherence tomography (OCT) has emerged as the gold standard due to its non-invasive nature and high-resolution imaging capabilities. With the advancement of spectral-domain OCT, enhanced depth imaging (EDI-OCT) allows better visualization and quantification of choroidal thickness. Additionally, OCT angiography can provide information about the choroidal vasculature, which may be altered in cases of chiasmal compression-induced optic nerve band atrophy [5].

Clinical implications

The assessment of choroidal thickness in optic nerve band atrophy due to chiasmal compression holds several clinical implications. Firstly, it can aid in differentiating chiasmal compression-induced band atrophy from other optic neuropathies based on characteristic choroidal thickness patterns. Secondly, longitudinal monitoring of choroidal thickness may serve as a prognostic indicator [6], helping to assess disease progression and treatment efficacy. Moreover, understanding choroidal changes in this condition may contribute to the development of targeted therapeutic approaches to alleviate the effects of chiasmal compression.

Discussion

Optic pathway lesions as a result of chiasmal compression may be

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used as a model to investigate the effect of isolated retinal neural loss on other ocular structures. In eyes with resolved CCL and remaining temporal VF defects, a marked difference was observed between the severely affected nasal hemiretina and the relatively preserved temporal hemiretina. In this model, OCT is a useful noninvasive tool for demonstrating neuronal damage, as shown in the present study [7].

Furthermore, it can also reveal deeper retinal abnormalities secondary to CCL, such as thickening of the inner nuclear layer, outer plexiform layer, and photoreceptor layer. New technologies such as OCT angiography and SS-OCT have greatly facilitated the assessment of retinal vessel morphology and deeper ocular tissues such as the choroid. Thus, a recent study found that reduced peripapillary and macular vessel densities in eyes with CCL were correlated with retinal neural loss and visual field damage. Therefore, the model may be useful in investigating the effect of retinal neural loss in the choroid [8]. The choroid is essentially a vascular tissue directly related to the retina and the anterior portion of the optic nerve. Researchers evaluating other ocular diseases that typically progress with axonal damage of the retinal ganglion cells have reported choroidal thinning in eyes with RNFL loss. Choroidal thinning might be the result of decreased metabolic activity that is associated with the atrophy of retinal ganglion cells. One study retrospectively evaluated the choroid after traumatic optic neuropathy by comparing the traumatized eye to the unaffected contralateral eye and observing increased choroidal thickness in the former. However, the nature of the lesion and the timing of the OCT scan should be considered when interpreting the data. Since previous studies showed that at least 5 weeks were required to reduce pRNFL and macular thickness after a traumatic indirect optic nerve injury, it is unlikely that the study was able to fully assess the effect of inner retina atrophy on the choroid thickness [9].

Limitations and future directions

While choroidal thickness assessment shows promise as a diagnostic tool for optic nerve band atrophy due to chiasmal compression, there are several limitations to consider. The sample size of studies exploring this specific condition remains relatively small, warranting larger-scale investigations [10]. Additionally, inter-individual variations in choroidal thickness may necessitate the establishment of normative databases for comparison. Future research should also focus on the potential role of choroidal imaging in monitoring disease progression and response to treatment.

Conclusion

Assessment of choroidal thickness in optic nerve band atrophy due to chiasmal compression holds significant potential as a diagnostic marker and prognostic indicator. By providing insights into the vascular and structural changes in the posterior segment of the eye, choroidal thickness evaluation can aid in early detection and management of this sight-threatening condition. As technology continues to advance, further research is warranted to fully understand the clinical implications of choroidal thickness in chiasmal compression-induced optic nerve band atrophy and its potential role in guiding therapeutic interventions.

References

1. Mensher J (1979) Duke-Elder's Practice of Refraction. Arch Ophthalmol 97: 1999–1999.
2. Lai YH, Sheu SJ, Wang HZ (2020) A simple and effective protective shield for the ophthalmoscope to prevent COVID-19. Kaohsiung J Med Sci 36: 570-571.
3. Sheehan M, Goncharov A, Sheehan M, Goncharov A (2011) Unwanted reflections during slit lamp assisted binocular indirect ophthalmoscopy. JMOP 58: 1848–1856.
4. Deshmukh A.V, Badakere A, Sheth J, Bhate M, Kulkarni S, et al.(2020) Pivoting to teleconsultation for paediatric ophthalmology and strabismus: Our experience during COVID-19 times. Indian J Ophthalmol 68: 1387–1391.
5. Sharma M, Jain N, Ranganathan S, Sharma N, Honavar SG, et al. (2020) Tele-ophthalmology: Need of the hour. Indian J Ophthalmol 68: 1328–1338.
6. Pandey N, Srivastava R, Kumar G, Katiyar V, Agrawal S (2020) Teleconsultation at a tertiary care government medical university during COVID-19 Lockdown in India – A pilot study. Indian J Ophthalmol 68: 1381-1383.
7. Shih KC, Chau CYC, Chan JCH, Wong JKW, Lai JSM (2020) Does the COVID-19 Pandemic Spell the End for the Direct Ophthalmoscope? Ophthalmol Ther 9: 689-692.
8. Lai THT, Tang EWH, Chau SKY, Fung KSC, Li KKW (2020) Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. Graefe's Arch Clin Exp Ophthalmol 258: 1049–1055.
9. Johnson AT, Dooly CR, Brown EY (1994) Task performance with visual acuity while wearing a respirator mask. Am Ind Hyg Assoc J 55: 818-822.
10. Yánez Benítez C, Güemes A, Aranda J, Ribeiro M, Ottolino P, et al.(2020) Impact of Personal Protective Equipment on Surgical Performance During the COVID-19 Pandemic. World J Surg 44: 2842–2847.