Journal Article Review

Relationship between Cognitive Impairment and Retinal Morphological and Visual Functional Abnormalities in Alzheimer Disease

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Summary

Purpose

To determine whether there is a correlation among retinal structures (retinal nerve fiber layer [RNFL], macular thickness, and volume), functional (visual evoked potential [VEP]) measures, and cognitive impairment in Alzheimer disease (AD).

Methods

Twenty-eight eyes of 14 AD patients and 30 eyes of 15 age-matched healthy control subjects underwent comprehensive ophthalmological and neurological examinations. In both cohorts, optical coherence tomography (OCT) was used to acquire RNFL, macular volume, and macular thickness measurements. VEP latency patterns were used to document visual function and Mini-Mental State Examination (MMSE) was used to establish cognitive impairment. Structural, functional, and cognitive impairment differences between AD patients and age-matched healthy control subjects were statistically evaluated. Pearson's correlation test was used to assess structural, functional, and disease severity correlations between AD patients and healthy controls.

Discussion

The study results demonstrated a significant reduction of peripapillary RNFL, macular volume, and macular thickness in patients with AD compared with healthy controls, as well as a strong and significant correlation between total macular volume and MMSE scores in AD subjects. The study results did not show significant differences in VEP latency patterns between AD patients and healthy controls. The results do confirm that AD patients demonstrated a loss of retinal tissue as measured by OCT. In addition, this study revealed that decreased macular volume is significantly correlated to severity of cognitive impairment in AD patients.

Conclusion

- RNFL thickness, macular thickness, and macular volume as measured by OCT are significantly reduced in AD patients compared with healthy controls.
- Standard cognitive assessment tools such as MMSE correlate highly with OCT macular volume measurements in AD patients.
- OCT has a potential role in aiding the evaluation of the disease severity in AD patients.