

From Clinical Examination of the Optic Disc to Clinical Assessment of the Optic Nerve Head: A Paradigm Change.

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Summary

Purpose

To describe the anatomy of the optic nerve head (ONH) detected with spectral-domain optical coherence tomography (SD-OCT) and to propose a paradigm change in ONH clinical assessment.

Methods

SD-OCT imaging of the ONH provides anatomic findings that challenge the basis and accuracy of current clinical evaluation of the neuroretinal rim. The proposed method uses eye-specific anatomical landmarks and geometry of the ONH and the fovea. The proposed 4-point paradigm change suggests: First, Bruch's membrane opening (BMO) as imaged by SD-OCT should define the optic disc margin instead of the clinical examination of the optic disc. Second, the shortest distance – minimal rim width (MRW) – between BMO and inner limiting membrane (ILM) represents the geometrically correct width of the neuroretinal rim. Third, acquisition patterns assessing regional measurements of neuroretinal rim width and the peripapillary and macular RNFL thickness should be adjusted to the individual anatomic position of the fovea relative to the ONH. Finally, SD-OCT imaging of ONH anatomic features enhances the qualitative aspects of the clinical disc examination.

Discussion

The clinically visible disc margin is an unreliable outer border of rim tissue because of clinically and photographically invisible extensions of Bruch's membrane. Changing rim tissue configuration along the optic disc margin requires a 3-dimensional assessment of the neuroretinal tissue entering the optic nerve head. Measuring the shortest distance between the end of Bruch's membrane and the inner limiting membrane (ILM) as detected by SD-OCT assesses the neuroretinal rim tissue width perpendicularly to its orientation. SD-OCT based data acquisition and analysis strategies should account for the large interindividual variability in the angle between the fovea and ONH. This should make the measurements more robust, comparable to normative data and reliable for follow-up.

Conclusions

Recent evidence suggests current clinical evaluation of the optic disc is inaccurate because it lacks a solid anatomic and geometric foundation. Bruch's membrane opening (BMO) as imaged with SD-OCT should be the new definition of the optic disc margin. Evaluating the shortest distance between BMO and ILM (BMO-MRW) enhances the ability to detect glaucoma. By conforming all ONH and RNFL scan patterns to the specific fovea-to-BMO center axis, the interindividual variation of measured parameters will decrease and the comparison to normative data will be clinically more meaningful.

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