Photo Essay

High Myopic Peripapillary Atrophy; Spectral Domain Optical Coherence Tomography Features

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PRESENTATION

Pathologic myopia is defined as myopic refractive error greater than -6.00 diopters (D).[1] Axial myopia progression results in stretching of ocular layers which may be imaged by optical coherence tomography (OCT). These findings consist of dehiscence of retinal layers, retinal cysts, intrachoroidal cavitation, macular holes, posterior retinal detachment and choroidal neovascular membranes.[2] Furthermore, it has been suggested that scleral protrusion temporal to the optic disc in highly myopic eyes could cause excessive tension on the retinal nerve fiber layer which may result in visual field defects.[3]

A 72-year-old woman was referred to the ophthalmology clinic complaining of low vision in her left eye. Past medical history was unremarkable. Best corrected visual acuity of the left eye was 20/400. Anterior segment examination revealed normal intraocular pressure and mild nuclear cataracts in both eyes. Refractive error (spherical equivalent) in both eyes was -10.00D. Fundus examination and fluorescein angiography revealed submacular choroidal neovascular membrane in the left eye with severe bilateral chorioretinal and peripapillary atrophy [Figure 1] which was confirmed by spectral domain OCT (SD-OCT) imaging [Figure 2]. SD-OCT (Topcon 3D OCT-2000, Topcon cooperation, Japan) in the peripapillary region of the right eye [Figure 3] demonstrated atrophy of the choroid and outer retinal layers with scleral protrusion toward the retinal nerve fiber layer. In this region, in addition to the choroid, the retinal pigment epithelium, outer nuclear and outer plexiform layers were interrupted, but the retinal nerve fiber layer, inner nuclear and inner plexiform layers continued up to optic disc margin. The sclera was imaged as a region of hyper-reflectance near the optic nerve with anterior bending toward the nerve fiber layer on SD-OCT [Red asterisk in Figure 3]. Just beneath the scleral hyper-reflectance, another separate hyper-reflectant structure was also evident [Yellow asterisk in Figure 3].

DISCUSSION

The risk of glaucomatous optic nerve damage is higher in highly myopic eyes.[4,5] The exact mechanisms have not been determined yet, but altered anatomic relationships around the optic nerve have been suggested as one possible reason.[6] Peripapillary structural changes in myopic eyes have been reported to be related to progression of visual field defects.[7,8]

Akagi et al[3] have shown that highly myopic eyes with temporal peripapillary scleral bending on OCT have a higher risk of visual field loss. Using swept-source OCT they have shown that the

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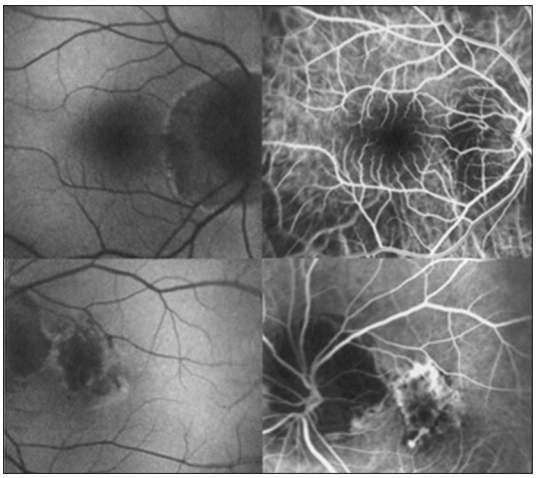

Figure 1. Fundus autofluorescence (left images) and fluorescein angiography (right images) show bilateral peripapillary atrophy evident as a hypofluorescent region around the optic nerve and a hyperfluorescent region in the left macula suggestive of choroidal neovascularization.

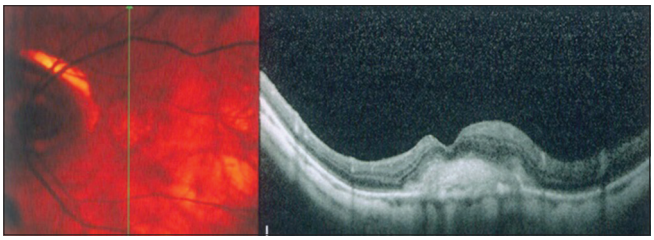

Figure 2. Spectral domain optical coherence tomography image shows submacular choroidal neovascularization in the left eye.

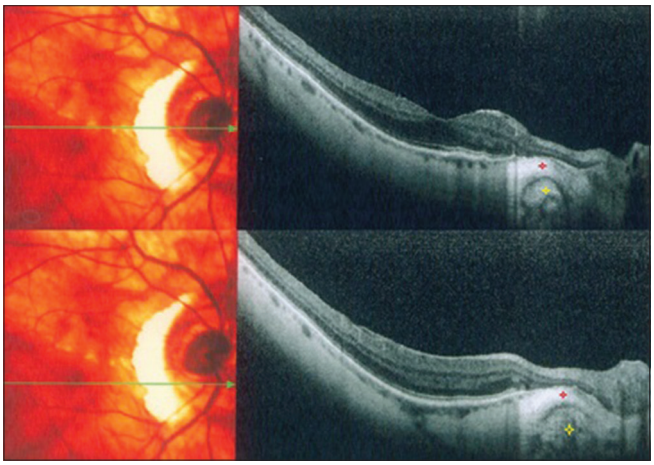

Figure 3. Spectral domain optical coherence tomography in the right eye shows scleral protrusion as a hyper-reflectant hump (red asterisk) which is separated from another underlying hyper-reflectance region of unknown origin (yellow asterisk).

presence of scleral bending is associated with visual field defects and that a sharper edge of protrusion is associated with worse defects and thinner overlying retinal nerve fiber layer. These results suggest that direct mechanical damage to the retinal nerve fibers caused by a sharp angle of scleral bending, at least in part, is responsible for visual field defects observed in highly myopic eyes.

In our patient, temporal peripapillary atrophy was associated with scleral protrusion. The choroid and outer retinal layers were interrupted in this region and the protruded segment of the sclera was in close contact with the retinal nerve fiber layer. In spite of using SD-OCT (not swept-source), another hyper-reflectant region, just beneath and separate from the sclera could be seen. This structure is of undetermined anatomic origin and has also been reported using swept-source OCT imaging in eyes with high myopia.[3]

In summary, SD-OCT can precisely visualize the peripapillary region and be an effective method for assessment of peripapillary structures and reveal their role in visual disturbances in high myopia.

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Nil.

Conflicts of Interest

There are no conflicts of interest.

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