

Evaluation of peripapillary detachment in pathologic myopia with en face optical coherence tomography

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Abstract

Background A newly recognized lesion in pathologic myopia is peripapillary detachment of the retinal pigment epithelium (RPE) and retina. Recently introduced en face optical coherence tomography (OCT) provides not only cross-sectional but also coronal scans of the retina, and allows lateral extent visualization and thickness measurement of lesions.

Methods Three patients presenting bilateral peripapillary yellow-orange lobulated area in high myopia have been evaluated with fluorescein angiography (FA), indocyanine green angiography (ICGA), en face OCT (OCT/SLO; Ophthalmic Technologies Inc, Toronto, Canada), and Humphrey visual field analyzer.

Results In all eyes, en face OCT has shown the presence of a peripapillary sub-RPE nonreflective area. The lateral extent of this area was clearly detectable and the measurement of its thickness was obtained. We detected a cleft in the RPE at one edge of the cavitation in two eyes, vascular tractions and vitreoretinal tractions in two eyes, a macular hole with posterior retinal detachment, and small areas of RPE detachment nonconnected with the peripapillary detachment in one eye. In the four eyes presenting a proper central fixation, glaucomatous visual field defects were evident.

Conclusion En face OCT has allowed to evaluate the thickness and the lateral extent of the peripapillary detachment. Therefore, its use could be important in determining the size and grading of these lesions at first visit, and to detect minimal changes of width and thickness during follow-up as an alternative to fluorescein angiography.

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Introduction

A new specific lesion has been recently described in pathologic myopia, consisting of an elevated, well-circumscribed, yellow-orange peripapillary area. Freund *et al*¹ first described it with optical coherence tomography (OCT) as a localised retinal pigment epithelium (RPE) detachment around the optic disc and called it peripapillary detachment of the RPE and retina (PDPM). Toranzo *et al*² have renamed this abnormality 'peripapillary intrachoroidal cavitation'. In accordance with the extent around the optic disc or myopic conus, this peripapillary dome-shaped lesion has been classified as grade 1 (less than a semicircle), grade 2 (more than a semicircle but less than three-fourth of a circle), grade 3 (more than three-fourths).³ It has shown a appreciable prevalence (4.9%) in a series of 632 eyes, but its pathogenesis remains unclear. The recently introduced en face OCT provides not only cross-sectional, but also coronal scans of the retina,^{4,5} and allows to evaluate the lateral extent and the thickness of lesions.

Case reports

Case 1: (Figure 1) was a 65-year-old woman who was first examined for choroidal neovascularization in the right eye. Her best-corrected visual acuity (VA) was 20/40 OD and 20/30 OS.

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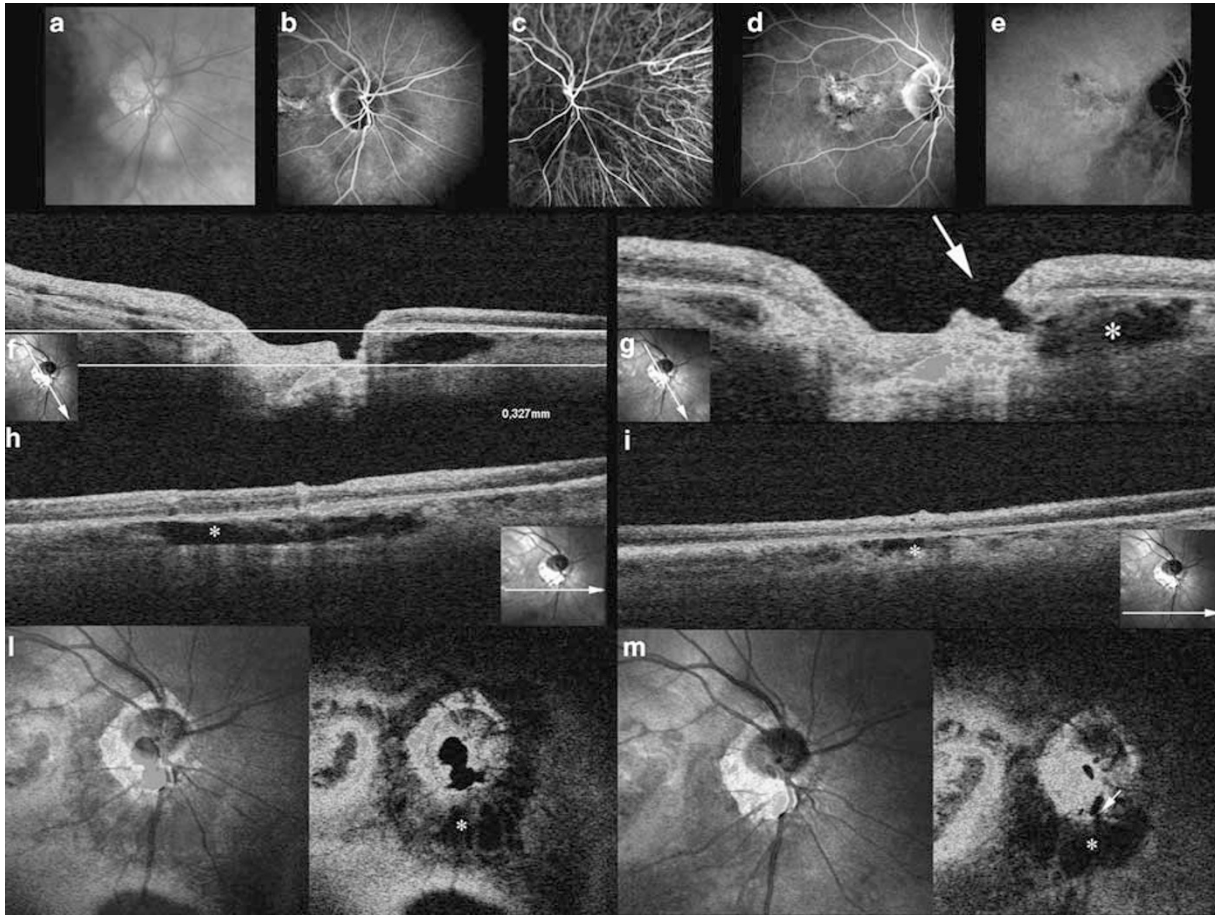


Figure 1 Case 1. At first examination in the right eye (a) fundus image, (b) FA and (c) indocyanine green angiography (ICGA) show the peripapillary lobulated area. After 18 months (d) FA and (e) ICGA show its gravitational enlargement. En face OCT (f–i) longitudinal cross-sectional B-scans and (l, m) overlaid red-free/coronal OCT C-scan (left) and OCT C-scans (right) show a normal and flat RPE and a grade 3 sub-RPE nonreflective area (asterisk). A thinning of retina-RPE layers is present (arrow), although a full-thickness defect is not clearly detectable. The thickness of the lesions is 327 μm .

The refractive error was $-8,50$ D OD and $-4,50$ D OS. At ophthalmoscopic examination, she presented a yellow-orange opaque peripapillary lobulated area in the right eye. At FA, this area showed early hypofluorescence and late staining, without dye pooling. At indocyanine green angiography (ICGA) (HRA2, Heidelberg Engineering, Dossenheim, Germany), it was hypofluorescent throughout the entire sequence. The left eye was normal. At 18 months follow-up, VA was 20/200 OD and 20/30 OS. In the right eye, FA and ICGA showed inferior enlargement of the peripapillary elevated area, which appeared to have also developed in the left eye. En face OCT (Ophthalmic Technologies Inc., Toronto, Canada) B-scans and C-scans showed in the right eye a grade 3 peripapillary sub-RPE nonreflective space, with a maximum depth of 327 μm . The RPE was normal and flat, and a thinning of the retinal layers was detected at the point of transition with the myopic conus, although a clear cleft was nonrecognisable. In the left eye, a similar

grade 2 lesion with a maximum depth of 304 μm was present.

Case 2: (Figure 2) was a 57-year-old woman visited for bilateral high myopia and recent vision loss in both eyes. Best-corrected VA was 20/100 OD and 20/50 OS. Refractive error was -10 D OU. Ophthalmoscopic examination showed a bilateral excavated myopic conus associated with a lobulated yellow–orange peripapillary inferonasal lesion. In both eyes en face OCT showed a peripapillary grade 1 nonreflective area located below a flat RPE, with a thickness of 365 μm OD and 380 μm OS. Partial adherence of the hyaloid to the retina and vascular tractions were present in both eyes. In the left eye a retinal hole in correspondence of an arteriolar traction was associated with posterior retinal detachment and small pigment epithelium detachments, which were not connected with the peripapillary lesion.

Case 3: (Figure 3) was a 69-year-old woman examined for subfoveal choroidal neovascularization in the right

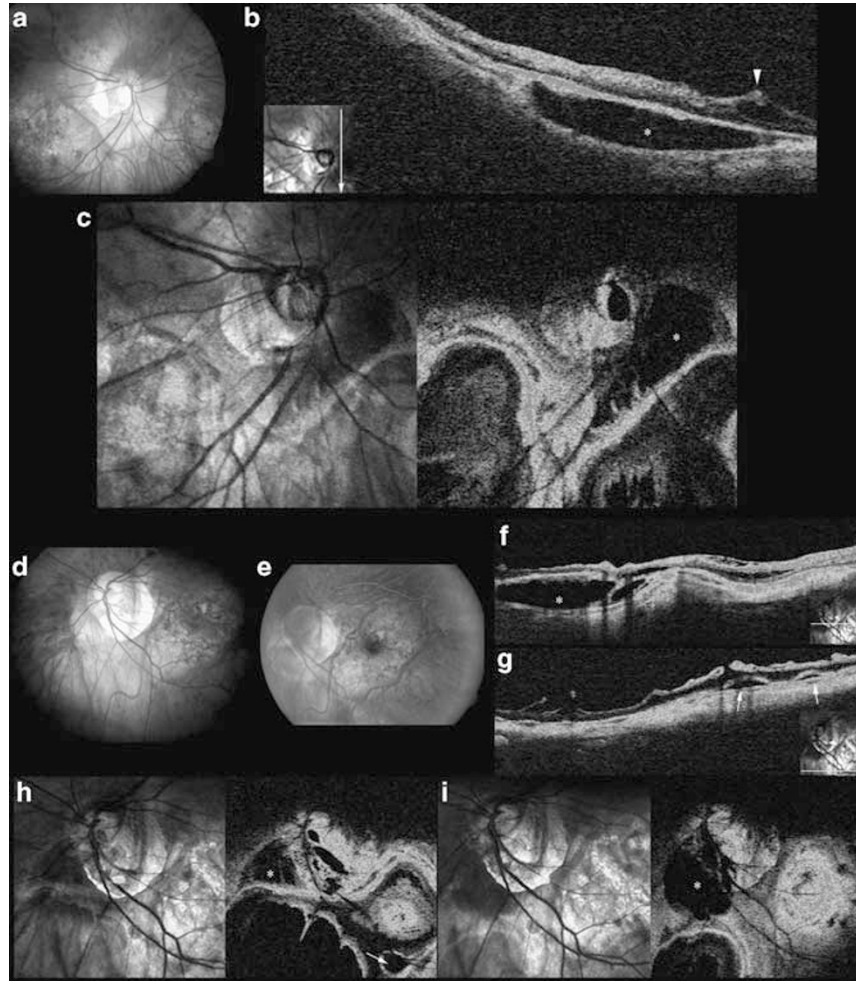


Figure 2 Case 2. (a) Fundus image of the right eye shows a deep excavation of the myopic conus, with tilting of the optic disc. The inferotemporal retinal vein is strongly bent at border of the myopic conus. En face OCT (b) longitudinal B-scan and (c) coronal C-scan show the vascular tractions (arrow) and a grade 1 sub-RPE nonreflective area (asterisk). (d) Fundus image and (e) fluorescein angiography of the left eye. En face OCT (f, g) longitudinal B-scans and (h, i) coronal C-scans show a grade 1 cavitation (asterisk), a retinal hole with posterior retinal detachment and two small pigment epithelium detachments (arrows).

eye. Best-corrected VA was 20/100 OD and 20/30 OS with a spherical equivalent correction of -14 D OD and -11 D OS. Both eyes had a yellow peripapillary elevated lesion, mainly situated inferonasal to the optic disc. En face OCT examination disclosed a grade 2 bilateral peripapillary nonreflective area underneath a non elevated RPE, with a thickness of $380\ \mu\text{m}$ OD and $400\ \mu\text{m}$ OS. In both eyes, a full-thickness defect in the retina-RPE layers along the transition point with the peripapillary atrophy was detectable. Both Cases 2 and 3 presented the same ophthalmoscopic, FA and ICGA features of Case 1. Except the two eyes, with choroidal neovascularization and consequent lack of proper fixation in the other four eyes glaucomatous visual field defects consisting in arcuate scotoma and nasal step were detected with Humphrey visual field analyser. These defects matched the peripapillary abnormality in three eyes.

Comment

In this series, en face OCT has allowed to visualize the lateral extent of the peripapillary sub-RPE nonreflective area and to measure its thickness. The lesions were bilateral in all cases. The origin of this sub-RPE hyporefectivity could be ascribed to the deep excavation of the myopic conus and the consequent impossibility for the retina-RPE to follow this steep fall. They would detach from the choroid and would return to a more normal level, thus creating a space between the retina-RPE and the choroid. The retinal hole, the posterior retinal detachment and the vascular tractions detected in Case 2 are further manifestations of the ocular stretching taking place in highly myopic eyes.⁶ In our study, the retinal layers at the edge of the cavitation were absent at OCT in two eyes (Case 3), and a gravitational

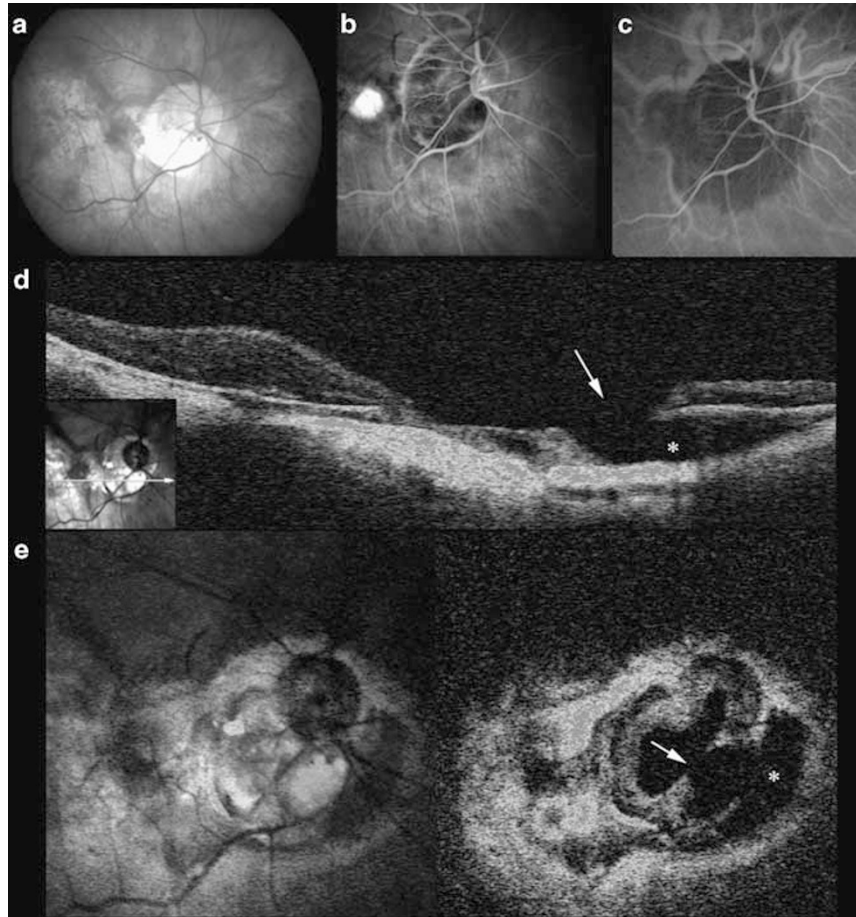


Figure 3 Case 3. In the right eye (a) fundus image shows tilting of the myopic disc implant, with excavation of the myopic conus. (b) FA and (c) ICGA show subfoveal neovascularization, peripapillary atrophy and a peripapillary hypofluorescent area. En face OCT (d) longitudinal B-scans show a nonreflective sub-RPE area (asterisk). (e) Coronal OCT C-scans allow to define its lateral extent. A full-thickness defect in the retina-RPE layers is detectable at both cross-sectional and coronal scans (arrow).

enlargement of the intrachoroidal widening was detected at 18 months follow-up in one eye (Case 1). Thus, we could speculate that the passage of vitreous underneath the pigment epithelium could represent a further aetiologic factor, as also suggested by other authors.³ A glaucomatous visual field defect has been reported in 71% of cases³ and, in our series, it has shown a similarly high prevalence. A damage to the retinal nerve fibre layer crossing the edge of the excavated myopic conus could explain these defects. In this study, en face OCT has allowed to measure the thickness of the sub-RPE lesions and to visualize their extent on the posterior pole by overlaying coronal C-scans on the red-free point to point correspondent images of the fundus. Therefore, en face OCT could be used to determine the size and grading of these lesions at first visit and could represent an alternative to fluorescein angiography to detect minimal changes of width and thickness during follow-up.

References

- 1 Freund KB, Ciardella AP, Yannuzzi LA, Pece A, Goldbaum M, Kokame GT *et al*. Peripapillary detachment in pathologic myopia. *Arch Ophthalmol* 2003; **121**(2): 197–204.
- 2 Toranzo J, Cohen SY, Erginay A, Gaudric A. Peripapillary intrachoroidal cavitation in myopia. *Am J Ophthalmol* 2005; **140**(4): 731–732.
- 3 Shimada N, Ohno-Matsui K, Yoshida T, Yasuzumi K, Kojima A, Kobayashi K *et al*. Characteristics of peripapillary detachment in pathologic myopia. *Arch Ophthalmol* 2006; **124**(1): 46–52.
- 4 van Velthoven ME, Verbraak FD, Yannuzzi LA, Rosen RB, Podoleanu AG, de Smet MD. Imaging the retina by en face optical coherence tomography. *Retina* 2006; **26**(2): 129–136.
- 5 Forte R, Pascotto F, Soreca E, Cusati G, de Crecchio G. Posterior retinal detachment without macular hole in high myopia: visualization with en face optical coherence tomography. *Eye* 2006 [E-pub ahead of print].
- 6 Ikuno Y, Gomi F, Tano Y. Potent retinal arteriolar traction as a possible cause of myopic foveoschisis. *Am J Ophthalmol* 2005; **139**(3): 462–467.