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Case report

Reversal of a glaucomatous optic disc pit

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ABSTRACT

Purpose: To report a patient in whom a glaucomatous optic disc pit (ODP) disappeared spontaneously.
Observations: A 59-year-old Korean woman presented with primary open-angle glaucoma, an ODP, and deep superior cecocentral scotomas. She was treated with topical ocular hypotensive medications and followed. Twenty-eight months later, the superior cecocentral scotomas were not detectable with repeated visual field testing. With repeated optical coherence tomography (OCT), the ODP was narrower and shallower; partially filled with prelaminar tissue, there was an increase in the minimal rim width. At the final examination, the cecocentral scotomas reappeared, although prelaminar tissue continued to fill the ODP.
Conclusions and importance: ODP can disappear spontaneously in glaucomatous eyes under ocular hypotensive treatment. However, this is not always associated with sustained visual field improvement.

1. Introduction

Optic disc pit (ODP) is a rare finding that is sometimes detected during the evaluation of the optic disc by ophthalmoscopy or by optical coherence tomography (OCT). ODP can be congenital, resulting from an imperfect closure of the superior edge of the embryonic fissure.[1] Or, more commonly, it can be acquired as a result of localized glaucomatous damage.[2–4] In glaucomatous eyes, ODP is located mainly at the inferior or superior pole of the optic disc, and typically is accompanied by loss of neuroretinal rim along its outer border.[3] An acquired ODP is also a risk factor for glaucoma progression, and it is spatially correlated with functional deterioration.[5] The topography of an acquired glaucomatous ODP is thought to be permanent, and resolution after ocular hypotensive treatment has not been reported. We report here a glaucoma patient whose ODP disappeared during treatment with topical ocular hypotensive medications.

2. Case report

A 59-year-old Korean woman was referred to evaluate an abnormal optic disc. Her best corrected visual acuity was 20/20 OU, refractive error was +0.5 diopter OU (spherical equivalent), and IOP was 19 mmHg OU (Goldmann applanation tonometry). Central corneal thickness was 595 μm and 597 μm in OD and OS, respectively. Anterior segments bilateral were unremarkable. Dilated funduscopic examination revealed a near-total loss of the inferior neuroretinal rim and corresponding diffuse retinal nerve fiber layer (RNFL) loss in OS. In OD, the neuroretinal rim was normal (Fig. 1). There was decreased RNFL thickness in the temporal-inferior sector and a prelaminar tissue (PLT) defect in OS with OCT that was spatially coincident with neuroretinal rim loss and RNFL thinning. Standard automated perimetry (SAP, Swedish Interactive Threshold Algorithm Standard 24-2 program, Humphrey Visual Field Analyzer 750*i*; Carl Zeiss Meditec Inc., Dublin, CA, USA) of OS showed deep superior cecocentral scotomas and shallow nasal scotomas. These changes were confirmed by a subsequent SAP (Fig. 2A and B). SAP of OD was normal. The patient was diagnosed with primary open-angle glaucoma with an ODP in OS. The patient was treated with topical ocular hypotensive medications including travoprost and timolol/dorzolamide fixed combination. The IOP of OS ranged from 10 to 15 mmHg on subsequent examinations.

Twenty-eight months later, the pre-existing deep superior cecocentral scotomas were not detectable, which was confirmed by subsequent VF testing (Fig. 2C and D). OCT images were obtained using the Spectralis® AutoRescan™ function (Heidelberg Engineering, Heidelberg, Germany) that enables follow-up scans to be placed in precisely the same location as the baseline scan by registering a baseline near-infrared

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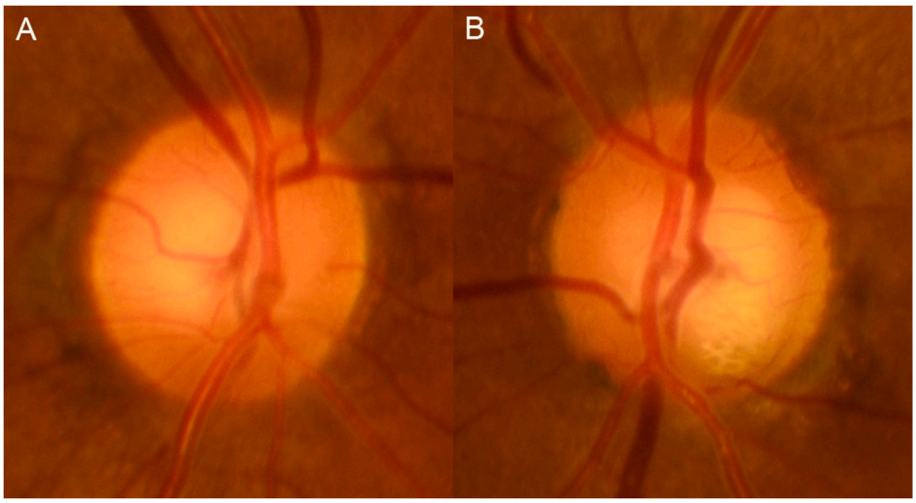

Fig. 1. Optic disc photographs of OD (A) and OS (B). OD shows the relatively normal neuroretinal rim, while OS shows marked thinning of the inferior neuroretinal rim and an optic disc pit.

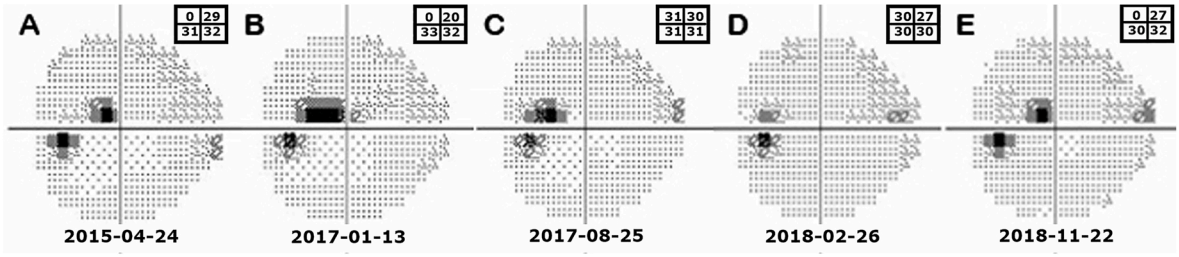

Fig. 2. Serial greyscale plots of standard automated perimetry (SAP, Swedish Interactive Threshold Algorithm Standard 24-2 program, Humphrey Visual Field Analyzer 750*i*; Carl Zeiss Meditec Inc., Dublin, CA, USA) and retinal threshold sensitivities at innermost 4 test points of 24-2 program in box shown at upper right of each test. With repeated visual field testing to confirm each visual field result, the deep superior cecocentral scotomas (A, B) disappeared along with the optic disc pit (ODP) reversal (C, D) but eventually reappeared (E).

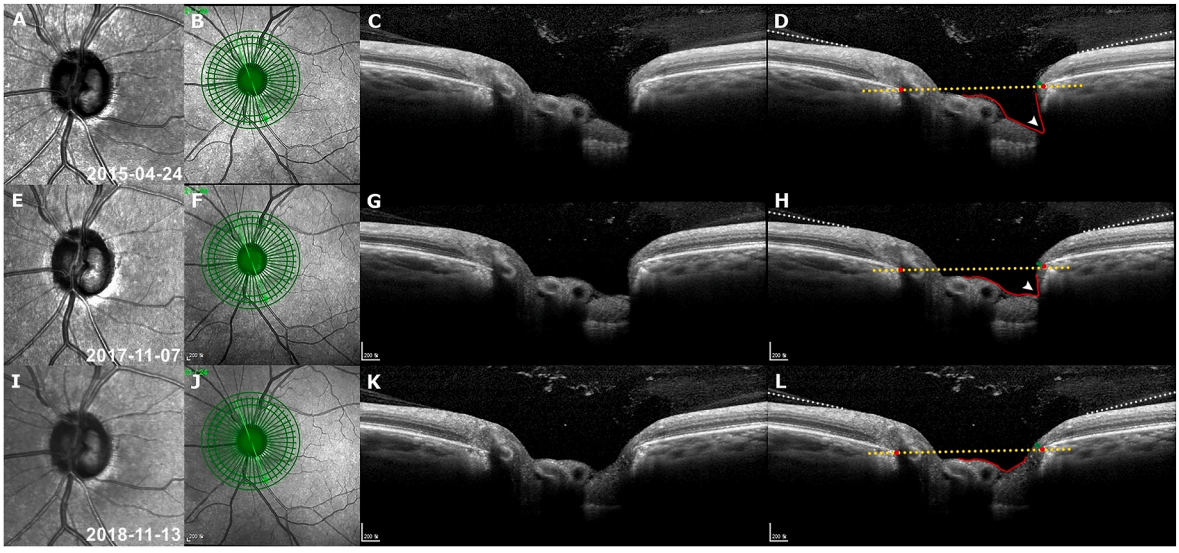

Fig. 3. Spontaneous reversal of optic disc pit (ODP) in serial optical coherence tomography (OCT) scans. Near-infrared fundus images (A, E, I), near-infrared fundus images showing OCT section image positions (B, F, J), OCT scans without labels (C, G, K), and the same images with labels (D, H, L). The images in the first row are baseline OCT examinations, while those in the second and third rows are follow-up examinations performed using the AutoRescan™ function (Heidelberg Engineering, Heidelberg, Germany). The prominent green lines in the near-infrared fundus images indicate the locations of the cross-sectional OCT scans (B, F, J). The contour of the cup surface is indicated by the red lines, the ODP is indicated by the white arrowheads, the Bruch's membrane opening (BMO) is indicated by the red dots, the minimal rim width (MRW) is indicated by the green lines, and the posterior hyaloid membrane is indicated by the white dotted lines (D, H, L). The contour changes along with the prelaminar tissue (PLT) thickening resulted in ODP disappearance and consequent MRW increase in that 54 μm in D, 68 μm in H, and 103 μm in L, respectively. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

fundus image. There no longer was evidence of the ODP in OS, and OD remained within normal limits. At the location of the ODP, there was a change in PLT contour with filling of the previously observed ODP (Fig. 3G and H). Additional filling of the ODP and increased minimal rim width adjacent to it were observed in the final OCT scans (Fig. 3K and L). However, by the time of these OCT scans, the RNFL in the temporal-inferior sector had become thinner (58.26 μm from 64.31 μm at the baseline along a 3.5-mm-diameter circle centred on the optic disc) and deep superior cecocentral scotomas had reappeared (Fig. 2E).

3. Discussion

Whereas changes in depth and thickness of the lamina cribrosa or PLT in eyes with glaucoma or ocular hypertension after IOP lowering with trabeculectomy[6–8] or topical ocular hypotensive medications[9] have been reported, this case is the first to show the reversal of an ODP after medical ocular hypotensive treatment. It may be argued that the ODP on the initial OCT scan was an artifact. However, simultaneously obtained disc stereophotography showed the ODP in the same location, while several adjacent OCT images also showed a slanted anterior surface of the PLT. Moreover, subsequent OCT examinations showed continuous thickening of the PLT, the ODP was not detectable at the last examination. During these changes, the location of the posterior hyaloid membrane separated from the retina was outside the optic disc and did not change significantly (Fig. 3), which implied that vitreopapillary traction, known to cause alteration of the optic disc architecture,[10] was not involved in the reversal of the ODP.

ODP can be congenital or acquired. The shape of ODPs as shown on OCT scans alone is difficult to differentiate as to whether it is congenital or acquired. Congenital ODP, however, predominantly appears along the temporal margin of the optic disc and usually causes ODP maculopathy, whereas acquired ODP of glaucomatous eyes predominantly appears at the superior or inferior pole of the optic disc.[11,12] Further, congenital ODP usually is larger and has deeper excavations than acquired ODP. In light of these points, the ODP in the present case was likely to have resulted from focal glaucomatous damage to the optic disc, in that it was located adjacent to the inferior pole of the optic disc and had shallow excavation.

Approximately 96% of glaucomatous eyes with ODP are known to have dense scotomas near the fixation point.[4] We speculate that the variation and reappearance of cecocentral scotomas in our patient were related to the exceptionally large fluctuation in retinal sensitivity at that test point (from 0 to 31 dB) and ultrastructural changes in the ODP that could not be identified in detail with the current ocular imaging technologies. Given that cecocentral scotomas reappeared and that the sectoral RNFL adjacent to the ODP became thinner, filling of the ODP would have been a result of tissue remodeling through glial cell activation, not regeneration of retinal ganglion cell axons (Fig. 3). Given that the scotomas did reappear, however, one should be cognizant that observed structural improvements of glaucomatous optic nerves, such as reversal of ODP, do not always result in functional improvements.

Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Patient consent

Informed consent was waived by the institutional review board (IRB). IRB File No.: SGPAIK 2019-07-010.

Declaration of competing interest

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