ORIGINAL RESEARCH

Characterization of the optic nerve head pit by optical coherence tomography

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Abstract

Aim: To show the characteristics of optic nerve head pit by optical coherence tomography.
Patients and methods: Three eyes of 3 patients with optic nerve head pit were scanned by optical coherence tomography. Fundus fluorescein angiography examination was also performed. The visual acuities were 20/25, 20/25, and 20/15.
Results: Optical coherence tomography showed defects of the optic nerve fiber at the pit area in all 3 eyes. No neurosensory epithelium detachment was found. The first female patient had a window defect in both eyes. One eye of the second female patient had epiretinal membrane and macular edema. Visual field test showed a paracentral scotoma in the first female patient and peripheral constriction in the second female patient. Fundus fluorescein angiography showed late hyperfluorescence at the pit.
Conclusion: Optical coherence tomography may be helpful in the management of optic nerve head pit in searching for neurosensory epithelium detachment and macular edema.

Key words: Optical coherence tomography, Optic nerve disease, Optic nerve head

Introduction

Congenital optic nerve head pits are the smallest nerve head lesions associated with retinal detachment. Petersen was the first to recognize the relationship between an optic nerve head pit and subretinal fluid beneath the macula.[1] Optic nerve head pits are unilateral in approximately 85% of patients and the affected disc is larger than the unaffected nerve head in approximately 80% of patients.[2] Optical coherence tomography (OCT) provides a non-invasive and non-contact imaging technique capable of producing optical cross sectional images of the ocular structures in vivo with a theoretical maximum longitudinal resolution of approximately 10 μm. OCT can help to follow the anatomical structure changes of optic nerve head pits and macular retinoschisis. This report is of 3 eyes with optic nerve head pits scanned by OCT to show the cross sectional features of the pits.

Patients and methods

Three eyes of 3 patients (2 women aged 42 and 52 years and 1 man aged 30 years) were studied. The visual acuities of the affected eyes were 20/25, 20/25, and 20/15, respectively. None of the patients complained of visual impairment or metamorphosia. Fundus fluorescein angiography (FFA; Topcon TRS.50X, Tokyo Japan) and OCT (Zeiss 2000, Humphry, Dublin, USA) were performed for all eyes. Visual field test (Octopus perimeter 101, Interzeag, Northboro, USA) was performed for the 2 female patients. All OCT scans were done by 4 radial long lines through the pit and fovea through dilated pupils.

Results

All 3 eyes had nerve fiber defects at the pit area (**Figure 1**) FFA showed early hypofluorescence and late hyperfluorescence of the pits. Visual field tests showed paracentral scotoma in the first female patient and peripheral constriction in the second (**Figures 2 and 3**). One eye of the second female patient had epiretinal membrane and macular edema (**Figure 4**). Both eyes of the first patient had a window defect at the macular area at the late stage of FFA. No nerve fiber layer detachment or macular holes were found.

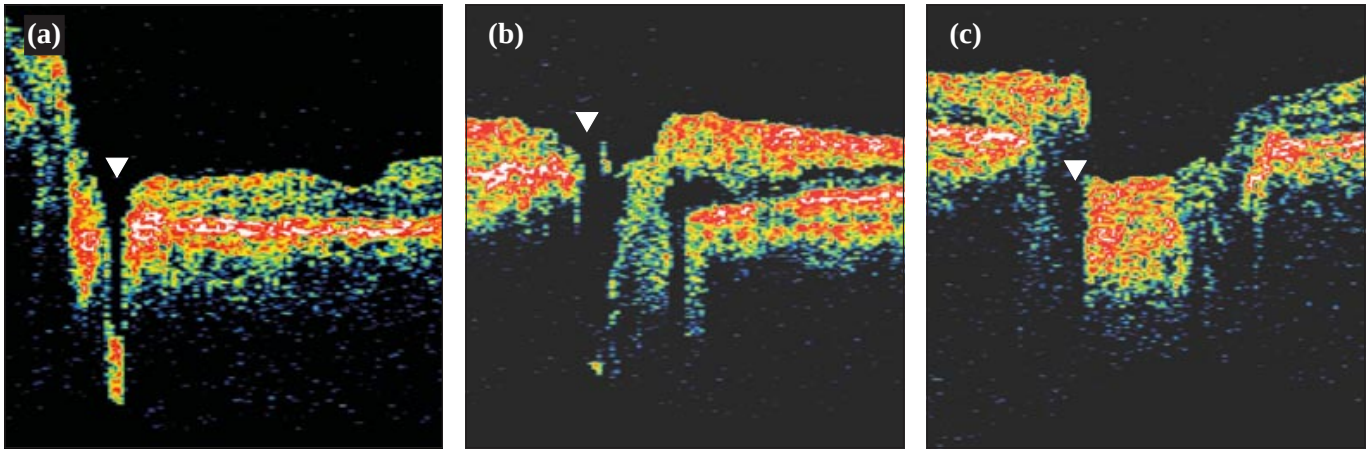

Figure 1. (a, b, and c) Optical coherence tomography images of the optic nerve head pits showing discontinuity of the nerve fiber layer at the pit area.

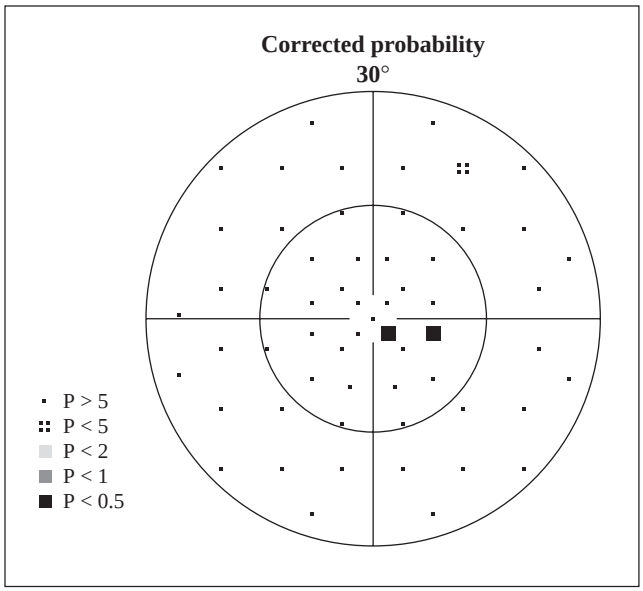

Figure 2. Visual field of the first female patient showing a paracentral scotoma.

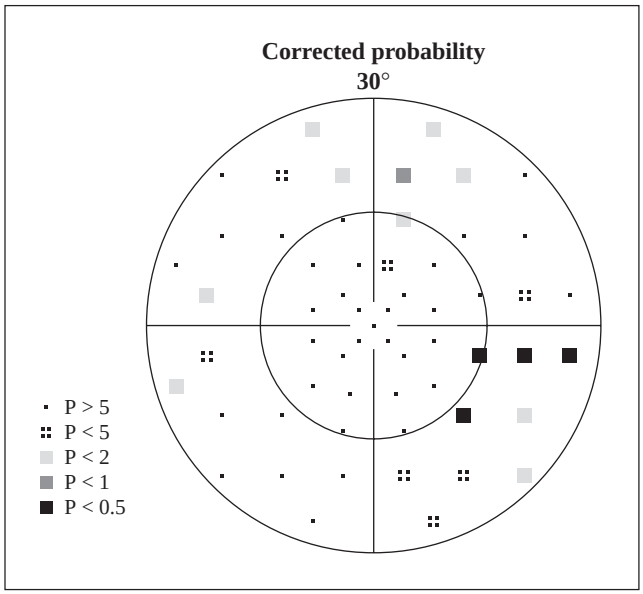

Figure 3. Visual field of the second female patient showing peripheral field constriction.

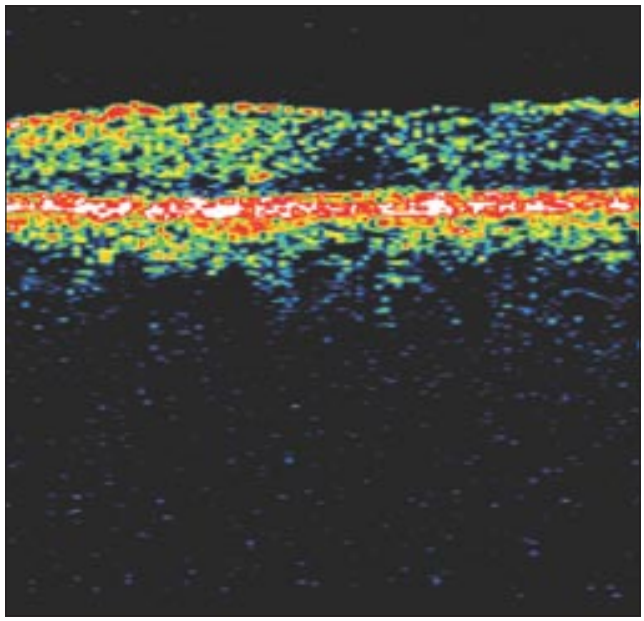

Figure 4. Optical coherence tomography image showing epiretinal membrane and macular edema in the second female patient.

Discussion

In 1960, Kranenburg reviewed the world literature and discovered 123 patients with optic nerve head pit, of which 25% had various types of macular lesions.[3] Kranenburg described 24 additional patients, of which 16 had an abnormal macula.[3] Of the 3 patients described in this report, 1 had epiretinal membrane and macular edema. No obvious serous detachments were found. FFA has demonstrated a variety of findings in patients with congenital optic nerve head pits and localized retinal detachment.[4] The pit typically appears hypofluorescent in the early phase of the angiogram and staining occurs later. FFA showed the same typical features in the 3 patients. Brown et al reported a higher incidence of staining of the pit in eyes with serous detachments than in eyes without subretinal fluid.[2]

In eyes with optic nerve head pits, 55% to 60% have visual field defects, including arcuate scotomas, altitudinal defects,

paracentral scotomas, peripheral constriction, sector defects extending from the nerve head, and nasal or temporal steps.[2] The most common type of visual field defect is an arcuate scotoma, which occurs in approximately 25% of patients.[5] In our study, 1 patient had paracentral scotoma and another had peripheral field constriction.

The natural course of retinal detachment associated with optic nerve head pits is variable.[4] The subretinal fluid may be absorbed spontaneously and then may reaccumulate after a prolonged time. Chronic and intermittent macular detachment may be associated with cystic degeneration, retinoschisis with or without an outer layer macular hole, and retinal pigment epithelial changes that substantially reduce central vision. In 1 study, 11 of 20 eyes (55%) with untreated serous detachments had visual acuity of 20/200 or less after 5 years, and the mean final visual acuity was 20/80.[2] The value of therapy for serous detachments of the macula associated with optic nerve head pits is difficult to assess due to uncertainty regarding the natural course of the condition, the use of different treatment methods, and the unpredictable responses to treatment. Laser photocoagulation along the edge of the pit has been recommended for some years.[6]

In 1988, Lincoff et al described laser treatment in 8 of 15 eyes with optic nerve head pits and macular changes believed to be retinoschisis combined with retinal detachment.[7] In their series, laser therapy alone was used for 5 eyes, including multiple sessions for some eyes. Laser treatment and intravitreal gas injection were used for 1 eye. Laser photocoagulation combined with vitrectomy and intravitreal gas injection was used for 2 eyes. The response to therapy was variable and did not correlate with the clinical appearance of the macula.

Simple laser photocoagulation was not effective for 2 patients. For the other 2 patients treated with laser and intravitreal gas injection, there was no response. The patients treated with combined vitrectomy, gas injection, and laser photocoagulation had successful outcomes. The visual acuity in the 3 eyes with complete absorption of the subretinal fluid ranged from 20/40 to 20/400.

Although in this study there was no neurosensory retinal fiber layer detachment in any of the patients, OCT is helpful for the diagnosis of neurosensory epithelium detachment and macular edema in optic nerve head pits.

References

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