

Abnormal Vitreous Structure in Optic Nerve Pit

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Abstract: A 37-year-old man presented with an optic nerve pit and serous macular detachment of the left eye. Scanning laser ophthalmoscopy revealed a cyst-like structure terminating at the pit in the premacular vitreous. During ocular movement, this structure moved vigorously and seemed to exert traction on the pit. We believe that it is part of an anomalous Cloquet's canal, and that traction on the pit may be a significant factor in the development of serous macular detachment in this patient. *Jpn J Ophthalmol* 1997;41:324-327 © 1997 Japanese Ophthalmological Society

Key Words: Cloquet's canal, optic nerve pit, scanning laser ophthalmoscope, serous macular detachment, vitreous.

Introduction

An optic nerve pit is a rare congenital anomaly that occurs in approximately 1 in 10 000 eyes.¹ In early adulthood, half of the patients with this condition develop a serous macular detachment;^{2,3} the mechanism of this development is not yet clear. Although several theories on the origin of subretinal fluid have been proposed, the currently favored understanding is that fluid from the vitreous leaks through the optic pit, filling the subretinal space.¹

The recently developed scanning laser ophthalmoscope (SLO) allows observation of several layers of the retina and the choroid at different depths.⁴⁻⁶ In addition, the real-time continuous imaging of the SLO is useful for observation of the dynamics of the vitreous body.⁷⁻⁹

This article describes one case of optic nerve pit associated with serous macular detachment. A cyst-like structure in the vitreous cavity, presumed to be an anomalous Cloquet's canal, was noted with the SLO. We believe this structure may have been a significant factor in the development of the serous mac-

ular detachment in this patient. This case has been included in previously published reports on SLO images.^{8,9}

Case Report

A 37-year-old man visited our ophthalmology department on February 15, 1996 with blurred vision in the left eye. Initial examination found best-corrected visual acuities of 1.0 OD and 0.2 OS. Biomicroscopic examination was normal; the intraocular pressure was within the normal range bilaterally. In the left eye, indirect ophthalmoscopy revealed a 2.5 disc diameter serous macular detachment surrounded by a 4.5 disc diameter retinoschisis¹⁰ (Figure 1). A macular lamellar hole was also noted, and a gray pit was present in the inferotemporal quadrant of the optic disc (Figure 2). Biomicroscopic vitreous examination found that the posterior cortical vitreous was attached to the retina throughout the posterior pole to the periphery, and an anomalous Cloquet's canal terminated at the pit. There was no traction on the macula noted.

Fluorescein angiography showed only faint hyperfluorescence because of a window defect in the macular lamellar hole. There was no dye leakage into the pit or retinal detachment on either fluorescein or indocyanine-green angiography.

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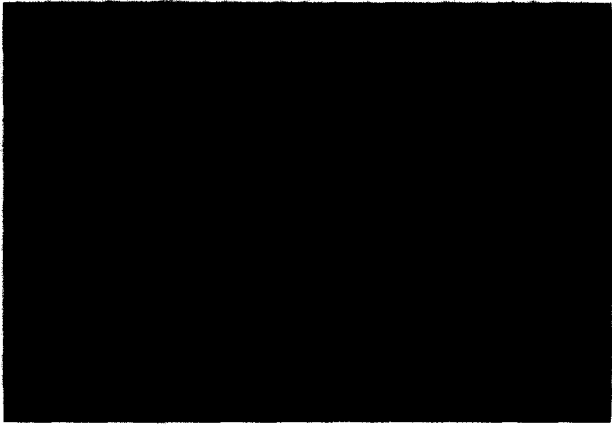


Figure 1. Fundus photograph: left eye. Serous macular detachment and surrounding reflection believed to be retinoschisis are seen.

Monochromatic fundus photography with a red-free filter showed a thin nerve fiber layer between the optic nerve disc and the macula that appeared to be a congenital nerve fiber defect. Using the SLO with an argon-green laser, this thin nerve fiber layer was identified as a band-like hyporeflective zone of nerve fiber (Figure 3).

Scanning laser ophthalmoscope examination with an argon-blue laser, reportedly useful in vitreous observation,⁷⁻⁹ showed a cyst-like structure in the premacular vitreous with a slender connection to the pit (Figure 4). During ocular movement, this structure moved vigorously and seemed to exert traction on the pit.

The diagnosis was optic nerve pit associated with serous macular detachment. Because we believed that the cyst-like structure in the vitreous influenced

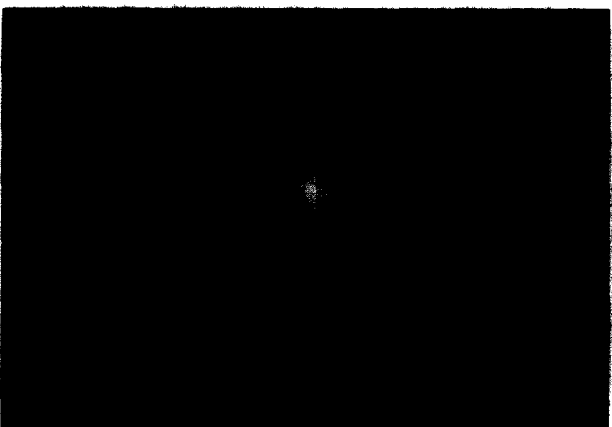


Figure 2. Fundus photograph: left eye. Pit (arrow) can be seen at inferotemporal optic disc.

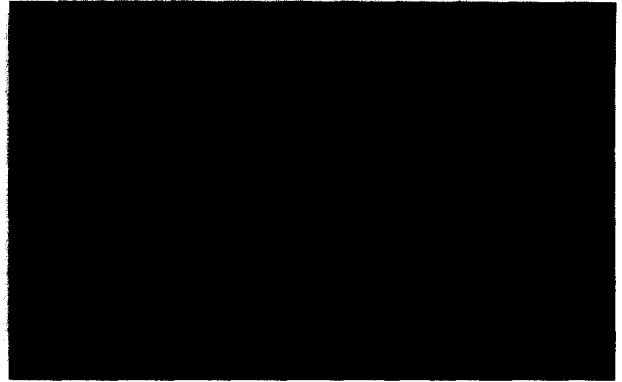


Figure 3. Scanning laser ophthalmoscopy image using argon-green laser. Band-like hyporeflective area (arrows) believed to be nerve fiber defect is clearly observed.

the development of the detachment in this patient, a vitreous procedure was done on March 1, 1996. After a core vitrectomy, a posterior vitreous detachment was created and a fluid-gas (SF_6) exchange was done. The adhesion of the anomalous Cloquet's canal to the edge of the optic nerve pit was easily released, suggesting that it was a weak adhesion. During the procedure, we found no cyst-like structure in the anomalous Cloquet's canal. The retina reattached postoperatively and the macular lamellar hole resolved. Visual acuity in the left eye had improved to 1.0 at 3 weeks postoperatively.

Discussion

The first description of optic nerve pit as a dark gray hole in the optic disc appeared in 1882.¹¹ In 1958, optic nerve pit was reported as frequently associated with central serous chorioretinopathy.¹² Later,

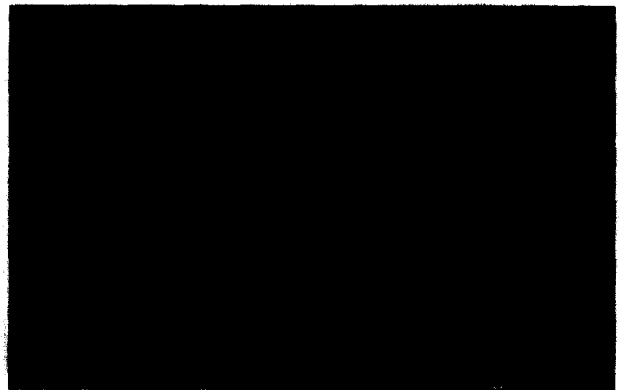


Figure 4. Scanning laser ophthalmoscopy image using argon-blue laser. Cyst-like structure in premacular vitreous (arrows), with a slender connection to pit, moved vigorously during ocular movement.

two-thirds of the optic nerve pit cases were found to be associated with serous macular detachment¹³ and this relationship, which is now widely recognized, was emphasized.

The mechanism responsible for the development of macular detachment in optic pit patients is not clear. The subretinal fluid may originate from disc capillaries, choroidal vessels, cerebrospinal fluid, or the vitreous.^{2,3,14-18} The most widely accepted theory at this time is that the liquified vitreous passes through the optic pit into the subretinal space.¹ In the present case, because there was no dye leakage within the area of the detachment with either fluorescein or indocyanine-green angiography, the subretinal fluid is believed to originate in the vitreous, not in the disc capillaries or the choroidal vessels.

The SLO permitted observation of the cyst in the premacular vitreous linked to the pit by a strand-like connection. We believe this feature has not been reported previously. However, an anomalous Cloquet's canal connected to the optic pit has often been observed by slit-lamp biomicroscopy.¹⁹

Because the optic pit derives from an incomplete closure of the embryonic fissure,^{1,20,21} there also may be a congenital abnormality of the vitreous and the optic disc,¹⁹ leading us to speculate that the cyst seen with the SLO was part of an anomalous Cloquet's canal. Observation of a Cloquet's canal by slit-lamp biomicroscopy is difficult, requiring ocular motion for vitreous gel displacement.^{22,23} A normal eye will have a Cloquet's canal inserted around the optic disc,^{22,23} but our patient had an apparently abnormal canal with a wall of condensed plicated membranes, which were easily identifiable around the optic nerve pit even on biomicroscopic observation without ocular movement.

The premacular cyst was also noted to move in the vitreous during ocular movement and seemed to cause traction on the pit via the connection we describe. Previous reports have noted the anomalous Cloquet's canal moving with ocular movement causing similar traction on the pit.¹⁹ Vitreous traction on the pit has been theorized as the cause of a hole in the optic pit roof, possibly triggering development of serous macular detachment.²⁴ Our observations suggest that traction on the optic pit generated by the movement of the cyst, which may be a part of an anomalous Cloquet's canal, was a factor in the serous macular detachment of the present case.

Retinoschisis is also a significant feature of optic disc pit associated with serous macular detachment. Although Lincoff et al.^{10,25} suggested that retinoschisis was a secondary complication of serous retinal

detachment, we found none of the centripetal vitreous traction believed responsible for inducing serous macular detachment in the retinoschisis area, indicating that it may develop independently.

Visual field defects secondary to this disorder are well recognized.^{1,2,13} Excluding enlarged blind spots due to large optic discs and central scotomas secondary to serous macular detachment and retinoschisis, the most commonly encountered visual field defect is arcuate scotoma.⁴⁻⁶ In the present case, a nerve fiber defect was clearly revealed by a SLO, and perimetry identified an arcuate scotoma corresponding to the nerve fiber defect area.

Because this is a report of a single case, further study is required to substantiate our theory that the serous macular detachment associated with optic disc pit may result from vitreous traction from an anomalous Cloquet's canal.

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