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CASE REPORT – OPEN ACCESS

Complex Syndrome of Posterior Microphthalmos-Retinitis Pigmentosa-Foveoschisis-Optic Disc Drusen in a 13-year-old Boy

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ABSTRACT

Background: Microphthalmos is an embryonic developmental anomaly that may rarely accompany other congenital ocular disorders.

Case Report: A rare, complex syndrome was observed in a 13-year-old boy with a chief complaint of progressive blurred vision without any known trigger and no familial history of relevant ocular disease. The prominent ophthalmic finding was progressive hyperopia, steep corneas, and a short axial length. Slit-lamp examination revealed optic disc drusen, which were confirmed with echography. The ocular images also indicated the presence of foveoschisis and a macular fold.

Conclusion: Given the multiple structural anomalies and non-consanguineous parents, this appeared to be a very rare ocular syndrome.

Keywords: Amblyopia, microphthalmos, optic disc drusen, retinitis pigmentosa, retinoschisis of fovea

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INTRODUCTION

Microphthalmos is a result of arrested ocular development in the embryonic period. It has been described in 2 forms: simple and mixed ophthalmic complications. The axial length is >2 standard deviations less than the age-adjusted mean of a normal eye. Posterior microphthalmos is a subtype of this disorder with normal anterior segment development. In these cases, unequal development of the sclera and retina leads to a retinal fold, particularly in the macular region, and blurred vision (1). There have been some reports of simple isolated posterior microphthalmos and complicated posterior microphthalmos accompanied by other pathologies, such as optic disc drusen (1–3). The prevalence of optic disc drusen in children has been estimated at 0.4%, but it can be a coexisting finding in 9.2% of patients with retinitis pigmentosa (4). There is some evidence that a combination of posterior microphthalmos and retinitis pigmentosa can be transmitted together as an autosomal recessive trait by a mutation in the membrane frizzled-related protein (MFRP) gene and the crumbs homolog 1 (CRB1) gene (5). Foveoschisis is a rare finding in posterior microphthalmos (2). A combination of all of the aforementioned pathologies bilaterally is a rare ophthalmic syndrome. This report provides the results of a fundoscopic examination and ophthalmic imaging of a case of a complex syndrome of posterior microphthalmos with retinitis pigmentosa, foveoschisis, and optic disc drusen in a 13-year-old boy.

CASE REPORT

A 13-year-old boy with the chief complaint of poor visual acuity had been referred to the ophthalmology clinic of an eye hospital. His past medical history was unremarkable. There was no apparent systemic malformation or finding. Progression through childhood developmental stages and mental status were normal. The ophthalmic history included the use of corrective glasses since the age of 5 years. No one among the parents, siblings, or older generation were affected by any known ocular or systemic diseases, and their ocular examination results were normal. This patient was born to a non-consanguineous couple from cities in 2 different regions.

The prescription of the glasses used was a +6 diopters sphere, but the patient complained of blurred vision. Test results indicated 20/80 vision, a manifest refractive error of +9 diopters sphere and 1.5 diopters cylinder in both eyes, and the cycloplegic refractive error was +11 diopters sphere and 1.5 diopters cylinder. His best-corrected visual acuity (BCVA) was 20/50 in both eyes with +7 diopters sphere. The bilateral corneal diameter was 11.7 mm, both pupil diameters were 3.5 mm, anterior chamber depth in the right eye was 2.9 mm and 3 mm in the left, with a crystalline lens diameter in the normal range (9.3*9.3*4 mm). Ocular alignment with glasses was almost normal. A fundus examination disclosed widely scattered pigmented clumps in the mid-peripheral and peripheral retina. There was no apparent foveal pit or macular reflex with macular folds in the papillomacular bundle area (Fig. 1a, b).

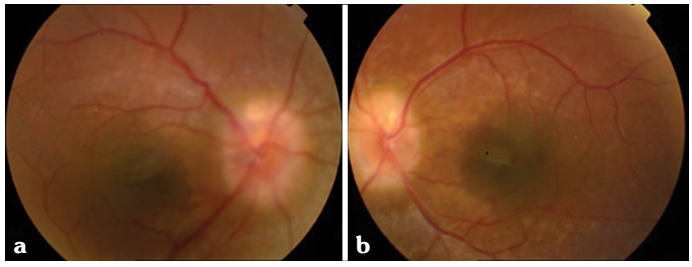

Figure 1. (a) Fundus photography of right eye; (b) Fundus photography of left eye. Both eyes showed crowded optic disk with no physiologic cupping. Disc margins are blurred, but vessels are not obscured. There is no hemorrhage or exudate. Note absent macular reflex with macular fold in both eyes and mid-peripheral dystrophic changes

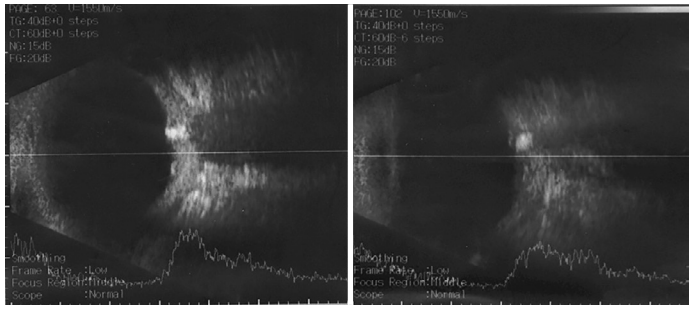

Figure 2. B scan of left (left side of the figure) and right eye (right side of the figure). Scans of both eyes reveal high echo signals in optic discs with posterior shadowing. Axial length is reduced and choroidal thickness is increased

The optic disc margin was blurred, but the retinal vessels were not obscured. There was no hemorrhage. The optic disc was crowded without physiologic cupping.

Keratometry revealed steep corneas measuring 48.84, 50.22*90 diopters and 48.91, 50.37*90 diopters in the right and left eyes, respectively. Goldmann applanation tonometry measurement of intraocular pressure was 19 mmHg. Axial length measurements performed using an IOL master optical biometer (Carl Zeiss AG, Oberkochen, Germany) were 17.12 mm in the right eye and 16.53 mm in the left eye.

There was a hint of papilledema, and we searched for reasons for pseudo-papilledema due to the absence of any relevant clinical symptoms, such as headache or other neurologic symptoms. Careful echography demonstrated a high-density echo in the optic disc with posterior shadowing compatible with optic disc drusen; the axial length was reduced and the choroid diffusely thickened. (Fig. 2). Spectral domain optical coherence tomography (SD-OCT) (Spectralis; Heidelberg Engineering GmbH, Heidelberg, Germany) revealed foveoschisis in the middle and outer retinal layers and macular folds. The macular fold was more prominent in vertical scans, retinal thickness was increased, and a blurred optic disc margin without vessel obscurement was prominent (Fig. 3). Full-field electroretinography (ERG) demonstrated a photopic and scotopic b-wave that was reduced in amplitude and the implicit time of waves was unremarkable.

The blurred vision was managed using a conservative approach of a refinement to the glasses and follow-up. The BCVA was 20/50 with glasses of +7.00 diopters. Four months later, the patient reported no new problem.

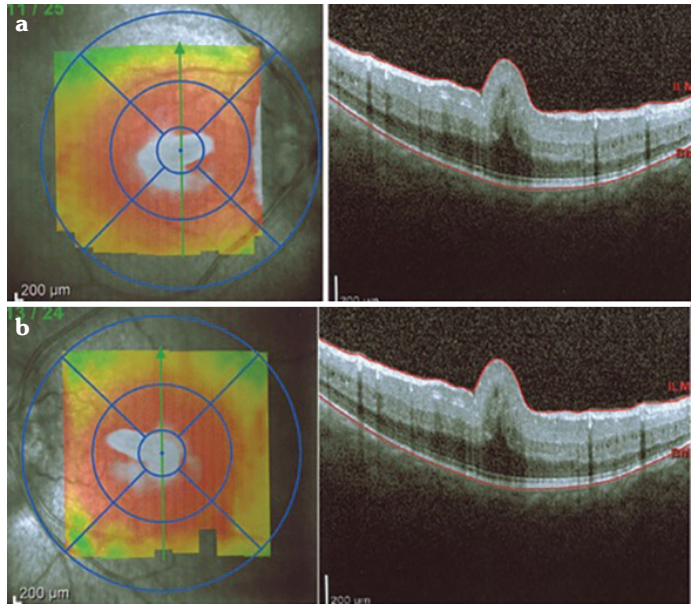

Figure 3. Spectral-domain optical coherence tomography images of (a) the right eye and (b) the left eye. The C scan (right) and B scan (left) illustrate that a foveal pit is absent in both eyes with increased macular thickness due to macular folding that is more prominent in vertical scans. Media is clear, retinoschisis is apparent in the middle and outer retinal layers

DISCUSSION

Posterior microphthalmos is an uncommon ophthalmic malformation. This structural abnormality leads to disparity in scleral growth relative to the retina and the choroid (1). Our clinical examinations of this patient revealed a macular fold. Peripheral retinal hypopigmentation and abnormal ERG findings were compatible with the early stages of retinitis pigmentosa. However, due to the young age of our patient, the characteristic bone spicule clumps were not evident. Fundoscopy and echography confirmed optic disc drusen. There have been some reports of simultaneous retinitis pigmentosa, posterior microphthalmos, foveoschisis, and optic disc drusen in both eyes (2, 6, 7). Recent genetic studies show that the MFRP gene has a crucial role in axial length and photoreceptor development (7). There is some evidence that mutations in MRFP can cause photoreceptor dysfunction and a form of retinitis pigmentosa (8). Mutations of the MRFP gene and, more recently, the CRB1 gene, have been reported in globe-size deformities, such as microphthalmos and nanophthalmos. They may be present in a familial form of this complex syndrome (6, 7). However, the literature reports all describe patients from a consanguineous marriage, whereas our patient was not the child of consanguineous parents, and presented as sporadic form with no other discernible family member involvement.

Paun et al. (6) noted a CRB1 gene mutation in a Turkish family with autosomal recessive inheritance. The presentation was early onset and severe, with retinal atrophy outside of the fovea and hyperpigmentation spots as well as intraretinal macular edema, but drusen were present only in older members of the family (6). Our patient had no hyperpigmentation, but notable drusen were present.

Wasmann et al. (7) described severe compound heterozygous MFRP gene mutations in 2 sisters with nanophthalmos and macular folds, aged 3 and 4 years, the youngest known cases in the literature. Autofluorescence was normal and there was no significant retinal pigment epithelial (RPE) abnormality. Adult patients affected by homozygous or compound heterozygous MFRP mutations generally show signs of retinal dystrophy, with ERG disturbances and RPE abnormalities on autofluorescence imaging. We recommended a genetic evaluation for our patient, but it was declined based on reasons of cultural unacceptability.

Patients with these conditions should be followed carefully for additional sequelae. They are at high risk of glaucoma development at a young age (2, 9). Crespi et al. (2) reported on 3 siblings with a syndrome of posterior microphthalmos, retinitis pigmentosa, foveoschisis, and optic disk drusen who developed angle-closure glaucoma in adolescence. One had blinding malignant glaucoma in his left eye. They all had ocular surgery for increased intraocular pressure. All of the patients were older than 40 years of age at the time of the study. They all had localized foveoschisis, but in the older patients, it was more prominent and macular edema was also present. In our 13-year-old patient, SD-OCT showed very mild cystic areas. It seems that foveoschisis and macular edema are progressive over time. Like patients with retinitis pigmentosa, attention should be paid in follow-up to foveoschisis that might be responsive to dorzolamide eye drops or oral acetazolamide.

CONCLUSION

This case might represent an alternative presentation of previous patients with the combined symptoms described. The high hyperopic refractive amblyopia and other structural anomalies affect treatment and prognosis. Choroidal effusion and intraocular pressure elevation may also degrade the visual prognosis.

Informed Consent: Written, informed consent was obtained from the patient's family for the publication of this case report and the accompanying images.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – MHA; Design – MRN; Supervision – BKG; Resource – MHA; Materials – BKG; Data Collection and/or Processing – MRN; Analysis and/or Interpretation – MRN; Literature Search – BKG; Writing – BKG; Critical Reviews – MHA, MRN, BKG.

Conflict of Interest: The authors have no conflict of interest to declare.

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