Case Report

Posterior Microphthalmos Pigmentary Retinopathy Syndrome with Angle-Closure Glaucoma: A Case Report

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Abstract

Purpose: To describe a particular form of posterior microphthalmos pigmentary retinopathy syndrome (PMPRS) with an atypical clinical presentation of pigment retinal dystrophy and an association to an inconstant complication which is angle-closure glaucoma (ACG).

Methods: A 40-year-old male patient with ACG on maximal topical treatment was referred to our department for uncontrolled intraocular pressure. Best-corrected visual acuity was 2/10 in the right eye and light perception in the left eye. Intraocular pressure was 36 mmHg bilaterally. He had 360° peripheral anterior synechiae on gonioscopy. Fundus examination revealed total cupping with pale retinal lesions in both eyes and a few pigment deposits in the midperiphery of the right eye. Multimodal imaging was done.

Results: Fundus autofluorescence revealed patchy areas of hypoautofluorescence. Optical coherence tomography (OCT) showed bilateral foveoschisis and macular folds. Anterior segment OCT showed a circumferential iridocorneal angle closure. Axial length measured with ultrasound biomicroscopy was 18.4 mm in the right eye and 18.1 in the left eye. Electroretinogram revealed attenuated scotopic responses. The patient was diagnosed with nanophthalmos–retinitis pigmentosa (RP)–foveoschisis syndrome complicated with ACG. A combined surgery with phacoemulsification - anterior vitrectomy - intraocular lens implantation and trabeculectomy was performed in both eyes with a satisfactory outcome.

Conclusions: In its typical forms, PMPR syndrome is an association of nanophthalmos - RP - foveoschisis and optic nerve head (ONH) drusen. Incomplete phenotypes may lack ONH drusen or foveoschisis. Patients with PMPRS have to be screened for iridocorneal angle synechia and ACG.

Keywords: Angle-closure glaucoma, Foveoschisis, Microphthalmos, Nanophthalmos, Posterior microphthalmos pigmentary retinopathy syndrome, Retinal dystrophy, Retinitis pigmentosa

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Introduction

Microphthalmos is a rare ocular defect that manifests with short axial length, shallow anterior chamber, and thickening of choroid and sclera. This entity can be associated with ocular or extraocular anomalies.[1] An uncommon association includes nanophthalmos or posterior microphthalmos, retinal pigmentary dystrophy, foveoschisis, and optic nerve head (ONH) drusen.[2] This association is considered posterior microphthalmos pigmentary retinopathy syndrome (PMPRS). Angle-closure glaucoma (ACG) is a possible complication of this syndrome.[3] In this study, we aim to describe the case of a patient with a particular form of this syndrome and to discuss ACG management in these eyes.

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Case Report

A 40-year-old male with a history of ACG treated with maximal topical treatment and bilateral peripheral laser iridotomy was referred to our department for trabeculectomy because of uncontrolled intraocular pressure. Best-corrected

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visual acuity (BCVA) was 2/10 in the right eye and reduced to light perception in the left eye. Intraocular pressure was 36 mmHg in both eyes. Gonioscopy revealed bilateral 360° peripheral anterior synechiae (PAS). The lenses were clear. Fundus examination revealed total optic disc cupping, retinal atrophy with arterioles attenuation, pale yellow-white lesions of the posterior pole and the peripheral retina in both eyes, and a few pigment deposits in the midperiphery of the right eye [Figures 1a and b]. Fundus autofluorescence (TRC-50DX, TOPCON, Europe medical) showed granular and patchy areas of hypoautofluorescence corresponding to the yellow retinal lesions, with macular sparing [Figures 1c and d]. On optical coherence tomography (OCT) B-scans (DRI-OCT Triton, TOPCON, Tokyo, Japan), there was a macular intraretinal cleavage in both eyes suggestive of macular foveoschisis. Ellipsoid zone and external retinal layers were preserved in the macular region and disappeared beyond the macula. We noted the presence of bilateral macular folds, involving the neurosensory retina and sparing underlying retinal pigment epithelium and choroid [Figure 2]. Visual field examination of the right eye showed a tubular visual field.

On anterior segment OCT (AS-OCT) (DRI-OCT Triton, TOPCON, Tokyo, Japan), iridocorneal angle was closed despite a penetrating iridotomy, and extensive iridocorneal synechiae were noted [Figure 3]. High-resolution ultrasound biomicroscopy (Aviso, Quantel medical, France) showed a circumferential iridocorneal angle closure, an axial length of 18.4 mm in the right eye and 18.1 in the left eye, an anterior chamber depth of 1.8 mm in the right eye, and 2 mm in the left eye and no signs of plateau iris syndrome or ciliary body anomalies.

Electroretinogram (Metrovision, France) revealed severely attenuated scotopic responses and a mild reduction in photopic responses, suggestive of a rod-cone dystrophy.

The patient was diagnosed with PMPRS. Ophthalmological examination of his unique child did not show any abnormality.

Following intravenous mannitol infusions, our patient underwent combined surgery of the left and then the right eye under general anesthesia. A combined surgery with phacoemulsification - anterior vitrectomy - hydrophobic single-piece intraocular lens (IOL) implantation, trabeculectomy and goniosynechiolysis was performed, all in one session. The required power for IOLs was 35 diopters in the left eye and 34 diopters in the right eye. Postoperative medications included topical nonsteroidal anti-inflammatory drugs, topical steroids, and mydriatics. Intraocular pressure dropped to 18 mmHg in the right eye under brimonidine 0.2% twice a day and 8 mmHg in the left eye with no treatment. Postoperative refraction was -2 diopters in the right eye and -0.5 diopters in the left eye.

BCVA remained stable at 2/10 in the right eye and light perception in the left eye. The patient presented with noninflammatory functional blebs in both eyes. Anterior chamber deepened and the iridocorneal angle was reopened. AS-OCT confirmed deepening of the anterior chamber and showed multilayered functional blebs bilaterally with fluid-filled spaces [Figure 4]. Gene typing was recommended but refused by the patient. The patient consent was obtained for publication.

Discussion

Nanophthalmia and posterior microphthalmia are structural ocular defects defined by an anteroposterior diameter of the ocular globe of less than 20 mm in an adult patient. The distinction between nanophthalmia and posterior microphthalmos is based on the characteristics of the anterior segment of the eye. In posterior microphthalmos, we have normal anterior chamber depth and angle configuration, while in nanophthalmia, we find a small corneal diameter, shallow anterior chamber, a narrow iridocorneal angle, and a thickened sclera.[4]

These two entities can be associated with different developmental ocular abnormalities including chorioretinal or papillomacular retinal folds, macular hole, or pigmentary retinopathy.[2] The association of pigmentary retinal dystrophy to nanophthalmia/posterior microphthalmos was first described in 1958 by Herman *et al*.[5] A few reports of this association have been published since then and depicted cases of foveoschisis and optic disc drusen superimposed to nanophthalmia and pigmentary retinopathy.[6,7] These cases were sporadic, autosomal dominant, or autosomal recessive. In 2006, Ayala-Ramirez *et al*. were the first authors to find a mutation responsible for this syndrome. It is a mutation in the membrane-type frizzled-related protein (MFRP) gene, an essential gene for photoreceptor survival.[8] In 2008, Crespí *et al*. put a name on this association, calling it PMPRS.[9]

The complete phenotype of the PMPRS syndrome includes posterior microphthalmos, pigmentary dystrophy, ONH drusen, and foveoschisis. Incomplete phenotypes, like in our case, may lack ONH drusen or foveoschisis.[10]

In relation to the macular B-scans of our patient, we would rather suppose this was a foveoschisis than a macular edema related to retinitis pigmentosa (RP). The OCT showed hyporeflective spaces in the inner nuclear layer separated by vertical bridges. Our patient is still followed every 3 months with macular OCT to detect any RP associated macular edema. In such case, it would be recommended to use local carbonic anhydrase inhibitors or antivascular endothelial growth factor treatments.[11]

Unlike typical presentations of retinal pigment dystrophy, our patient did not present with manifest pigment deposition or diffuse bone spicule-like lesions. In rare cases, the retinal dystrophy is rather characterized by a few pigment deposits and moderate retinal atrophy. In their description of a similar case, Neri *et al*. illustrated a PMPRS with few bone spicule-like deposits of the retinal midperiphery and yellow-white retinal lesions comparable in their appearance to flecks and suggestive of retinal pigment epithelium atrophy.[10]

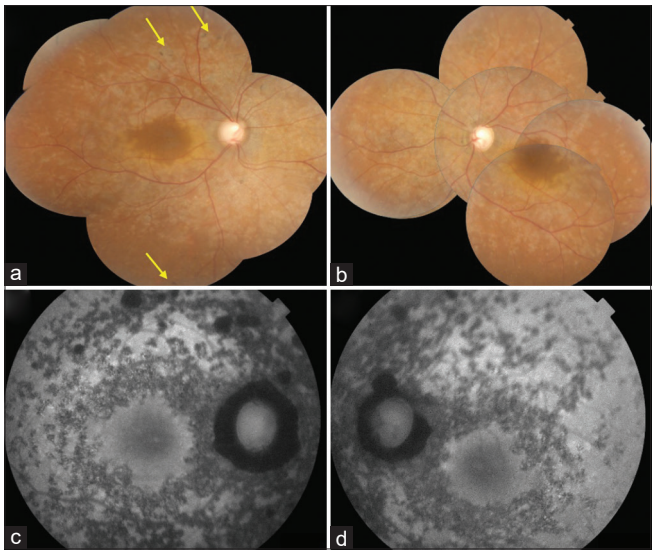

Figure 1: Fundus photographs. (a) Right eye: Total optic disc cupping, retinal atrophy, attenuation of retinal arterioles, yellow-white lesions of the posterior pole, and peripheral retina and few pigment deposits in the midperiphery (yellow arrows). (b) Left eye: Total disc cupping, yellow lesions of the posterior pole and peripheral retina, no pigment. (c and d) Fundus autofluorescence: Patchy areas of decreased autofluorescence with macular sparing

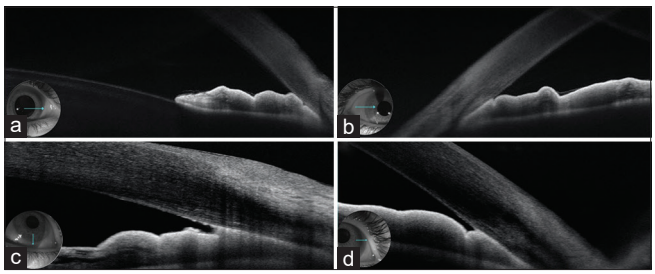

Figure 3: Anterior segment optical coherence tomography showing angle closure nasally and temporally in the right eye (a and b) and inferiorly and temporally in the left eye (c and d) with the presence of anterior synechia

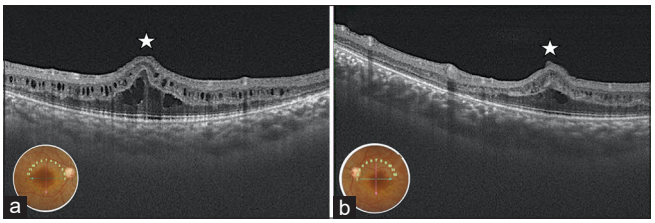

Figure 2: Optical coherence tomography vertical B-scans: (a) In the right eye, we notice the presence of a macular intraretinal cleavage extending superiorly and inferiorly to the fovea, the disappearance of external retinal layers beyond the macular region and a macular fold (white asterisk). (b) In the left eye, there is a macular intraretinal cleavage, a loss of external retinal layers beyond the foveal region, and a macular fold

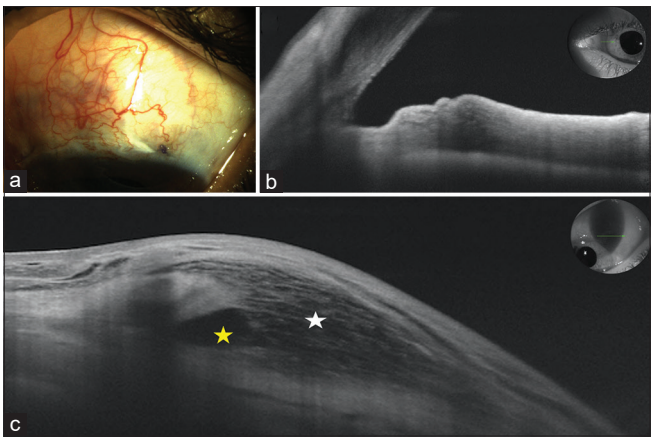

Figure 4: (a) Postoperative anterior segment photography of the left eye showing a mildly vascular, diffuse filtering bleb. (b) Anterior segment optical coherence tomography (AS-OCT) 3-mm horizontal slab of the left eye demonstrating reopening of iridocorneal angle and deepening of the anterior chamber. (c) AS-OCT 6 mm slab of the filtering bleb in the left eye (green arrow represents the scanning line) shows a multilayered bleb (white asterisk) with a mildly hyperreflective wall and a well-defined fluid-filled space (yellow asterisk)

ACG is not a constant finding in PMPRS syndrome.[10] It generally occurs between the fourth and sixth decade because of age-related lens thickening.[3] Mechanism of ACG is posterior pushing, progressive shallowing of anterior chamber, and formation of anterior synechia.[3] Its management can be very challenging. In our patient, combined surgery with trabeculectomy, surgical peripheral iridotomy, goniosynechiolysis, phacoemulsification, anterior vitrectomy and in-the-bag IOL implantation resulted in lowering of intraocular pressure, while preserving visual acuity. No complications occurred at 6-month follow-up. The choice for this combined procedure was motivated first by the very high level of intraocular pressure that probably could not respond enough to phacoemulsification alone and second by the potential high risk of aqueous misdirection in these little eyes when phacoemulsification is performed with no vitrectomy. Through the surgical results of 6 eyes with chronic ACG, including 2 eyes with nanophthalmos, Thompson *et al*. proved the efficacy and safety of prophylactic core vitrectomy by an anterior approach associated with phacoemulsification, with or without trabeculectomy in eyes at high risk for malignant glaucoma.[12]

In patients with less than 180° PAS, treatment follows the guidelines for primary ACG with topical antiglaucomatous drugs and laser peripheral iridotomy (LPI).[13] In cases of extensive PAS with uncontrolled IOP, combined surgery is recommended as it may drive less risk of complications including choroidal hemorrhage, uveal effusion, and malignant glaucoma.[13] The proportion of spontaneous and postoperative complications in these nanophthalmic eyes has not been estimated before, due to the small number of patients in preceding series. A protocol for a systematic review and meta-analysis has been recently published, intending to study the exact prevalence of these complications.[14]

Sclerectomy and sclerostomy could reduce the risk of uveal effusion, and anterior vitrectomy or capsulotomy could

prevent aqueous misdirection and malignant glaucoma.[13] Goniosynechialysis with lens extraction has been described as a good alternative for trabeculectomy, resulting in intraocular pressure lowering and avoiding bleb complications.[13]

The main drawback of this study is the lack of genetic testing for a mutation of the MFRP gene (chromosome 11q23). Clinical and molecular findings have already been published confirming the responsibility of MFRP gene mutation in PMPRS.[8] We need to perform genetic testing in these patients to better elucidate the mechanism of the distinct clinical aspects and for genetic counseling. Unfortunately, it could not be done in our case as it was refused by the patient.

Incomplete and atypical forms of PMPRS have to be known by ophthalmologists not to miss the diagnosis. Patients with PMPRS have to be screened for iridocorneal angle synechia and secondary ACG, although these are not typical findings in these patients. These complications have to be managed with precaution in these nanophthalmic eyes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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