

Case Reports

Bilateral persistent pupillary membranes associated with cataract

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Summary

Exuberant persistent pupillary membranes (PPM) are rare in adult eyes. We report the case of a 53-year-old man diagnosed with bilateral, profuse, persistent pupillary membranes and unilateral cataract.

Case Report

A 53-year-old man of Chinese descent presented to the ophthalmology clinic of Queen Elizabeth Hospital, Kota Kinabalu, Malaysia, with a complaint of progressive blurring of vision in the right eye of 6 months' duration. The patient claimed that his vision in both eyes was satisfactory prior to this time period. There were no documented systemic illnesses. Family history was unremarkable.

On examination, uncorrected visual acuity was hand movements in the right eye and 6/24 in left eye. Refraction was $-2.25 -1.50 \times 76$ in the right eye, with no improvement in visual acuity, and $+1.75 -2.50 \times 180$ in left eye, giving a best-corrected visual acuity of 6/6. The intraocular pressure was 14mm Hg in the right eye and 16 mm Hg in left eye. On anterior segment examination, both eyes had clear corneas, deep and quiet anterior chambers, and no synechiae. Both eyes showed a dense network of tissue, more gross and exuberant in the right eye, running from the iris surface and spreading over the pupils (Figure 1). The right eye had 3+ and left eye 1+ nuclear sclerotic cataractous changes. There was no view of the fundus in right eye, while the left eye fundus did not reveal any abnormality. B-scan ultrasonography of the right eye revealed a flat retina. A cover-uncover test was normal. In cases such as this one, tests of macular function like entoptic tests, retina acuity meter (RAM) or laser interferometry can be performed to confirm the status of the macula and the visual prognosis. The patient was diagnosed with bilateral persistent

pupillary membranes (PPM) and cataract in the right eye.

Our challenge was to manage both the right eye cataract and the PPM. We could either use laser to cut the PPM prior to undertaking cataract extraction or cut the membranes during surgery. Fearing intraoperative bleeding of the membranes, we decided on the first, two-stage, option. The Nd:YAG laser has been used to cut such membranes¹; however, we decided against using it since treatment is painful and can cause pigment dispersion and bleeding.² We opted instead for photocoagulation by means of Argon laser (Carl Zeiss Meditech AG, Germany, Model 532s). The settings were 600–800 mW, 100 μ m spot size and duration of 200 ms. A total of 60 shots were used to disrupt the PPM (Figure 2). Five days later the patient underwent cataract extraction and intraocular lens (IOL) implantation (Figure 3A). The patient refused phacoemulsification; we performed an extracapsular cataract extraction and IOL implantation under local anesthesia. Intraoperatively, the ring of tissues left from the laser procedure was teased out of the anterior chamber using viscoelastic and Utrata forceps. An extracapsular cataract extraction was then performed. We experienced a small posterior capsular rent superiorly and the IOL was implanted in the ciliary sulcus (Figure 3B). At 6 weeks postoperatively, the patient's refraction was $+1.50 -2.50 \times 15$ and best-corrected visual acuity was 6/7.5.

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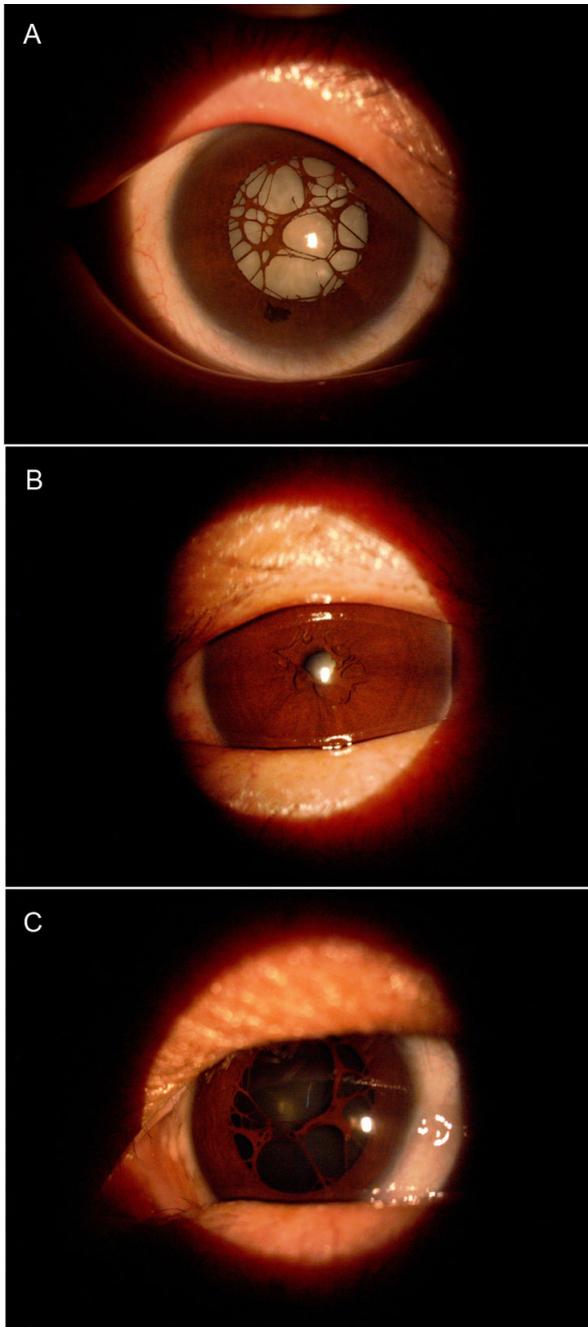


Figure 1. Preoperative photographs. A, Right eye with PPM and cataract. B, Left eye with PPM. C, Left eye following dilatation.

Discussion

During embryological development, the iris initially forms as a solid sheet of mesodermal tissue known as the pupillary membrane. It is composed of vessels and mesenchyme and lies ventral to the lens. On the dorsal

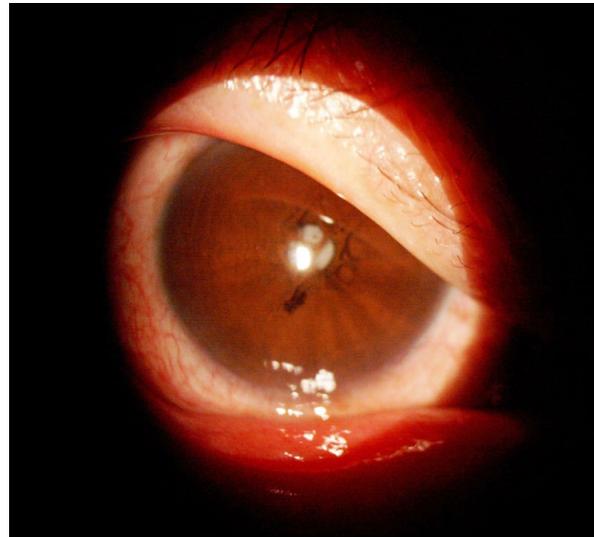


Figure 2. Right eye immediately after laser treatment (the pupil had been constricted with pilocarpine prior to laser).

part of the lens, the hyaloid vessels form a network around the posterior lens capsule. These vessels extend anteriorly to anastomose with the network of vessels in the pupillary membrane. The pupillary membrane vessels are derived mainly from the anterior ciliary arteries. This hyaloid vascular network that forms around the developing lens is known as the tunica vasculosa lentis (TVL).³ The hyaloid vasculature reaches its greatest development at around 10 weeks of gestation. By the end of fourth month, the TVL and hyaloid artery regress. The pupillary membrane itself begins to regress in the sixth month and disappears completely by the eighth month of gestation. Electron microscopy has shown that cellular functions that take part in pupillary membrane atrophy include degeneration of fibroblasts and collagen fibrils, macrophage activity leading to destruction of tight junctions of the endothelial cells and increased phagocytic activity.⁴ A failure of these cellular activities prevents complete regression of the pupillary membrane, which appears as a persistent pupillary membrane. Conversely, a failure in the involution of the posterior hyaloid system leads to the development of a persistent hyperplastic primary vitreous.⁵

Clinically, PPMs are the most commonly occurring congenital anomaly, seen in up to 95% of normal newborn babies.⁶ These PPMs may not affect vision unless the pupillary opening is less than 1.5 mm in size. A small opening affects visual acuity due to the decreased retinal illumination and diffraction.⁷ In one study of PPMs, 39 cases were followed up. Of these, only 5 were found to

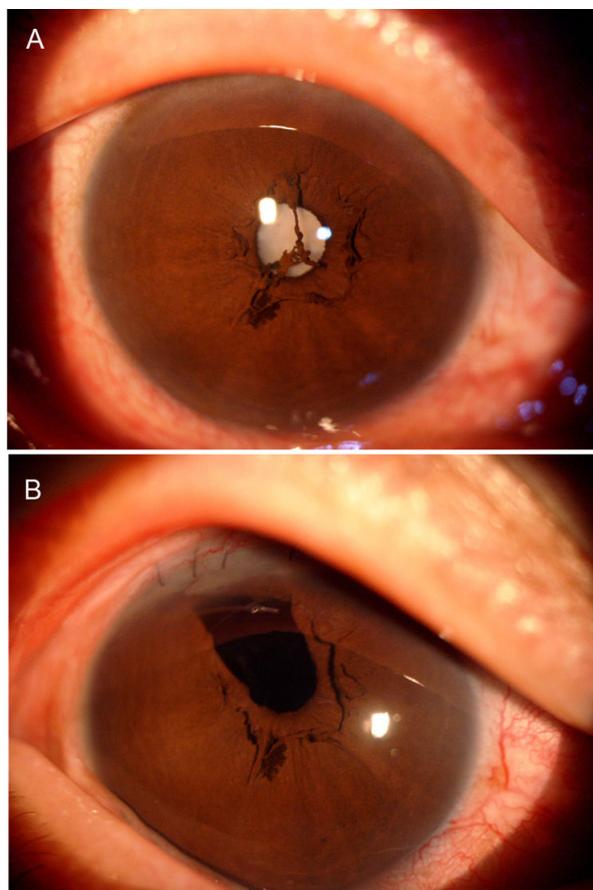


Figure 3. Right eye before (A) and after (B) surgery.

develop poor visual acuity. Four had unilateral deprivation amblyopia, while one case had bilateral anisometric amblyopia. Thus it seems that most cases with PPMs are not significant enough to have visual complaints and so might go undetected.⁸

Management of PPMs depends on the extent of the membrane and consequently the size of the pupillary opening. Small PPMs can be managed conservatively. A regimen of mydriatics, refractive correction, and patching for amblyopia has been employed successfully in some cases.⁷⁻¹³ PPMs have also been disrupted using the Nd:YAG laser. However, a number of reports have shown the presence of blood vessels in these PPMs. Therefore, photodisruption of these membranes can lead to hyphema; the procedure also carries the risk of cataract formation and pigment dispersion.¹⁴⁻¹⁷ Finally, PPMs can be excised surgically. However, surgical management is fraught with risks of anesthesia, intraoperative bleeding, intraocular infection, and cataract formation.¹⁸⁻²²

This case illustrates that adequate pupillary openings in PPMs can lead to normal visual development. There is no evidence of amblyopia in either eye of this patient due to adequate pupillary openings in both eyes. Our choice of Argon laser over the conventionally employed Nd:YAG laser appears to have been appropriate. No bleeding observed during this painless procedure or intraoperatively. Thus we recommend considering the use of Argon laser to treat the PPMs.

Literature Search

The authors performed an English-language search of PubMed, the Virtual Library of the Ministry of Health (Malaysia), and Google Scholar for *persistent pupillary membranes*.

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