All Persistent Pupillary Membranes need not be treated - A case report

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Abstract

Persistent Pupillary Membrane is a common congenital anomaly which appears as a dense network of tissue across the pupil. It is usually asymptomatic, although blurring of vision can be seen in extensive conditions. This is a hospital based case study of an eleven year old girl with bilateral Persistent Pupillary Membrane since birth. The aim of the study is to establish that the treatment approach varies specific to the individual case and when asymptomatic, it can be safely left untreated as in the present study. Surgical Membranectomy, Pupilloplasty, Argon Laser Photocoagulation are the treatment options that can be considered in case of symptomatic conditions.

Keywords: Persistent Pupillary Membrane, congenital anomaly, Surgical Membranectomy, Pupilloplasty, Argon Laser Photocoagulation.

Introduction

Persistent Pupillary Membrane (PPM) represents a common congenital ocular anomaly seen in 95% of neonates and 20% of adult population [1]. They are the result of incomplete regression of the tunica vasculosalentis, which supplies nutrition to the lens in the early part of gestation and usually involutes by the sixth month of gestation [2]. They appear as dense network of tissue, originating from the collarette and covering the pupil. Fine strands are often avascular while thick strands are usually vascular. Thick membranes are rare and disrupt the visual axis with risk of amblyopia[3]. However, extensive PPMs, occluding the visual axis and resulting in reduced visual acuity, are relatively uncommon. Thus the management of PPMs varies according to the presentation and degree of visual impairment.

Case report

An eleven year old girl presented to Ophthalmology OPD with complaints of headache and blurring of distant vision in both eyes since two months.

On examination after obtaining written informed consent of the parent, uncorrected visual acuity was 6/9 in both eyes. Best corrected visual acuity was 6/6 with - 0.5 sphere. Intraocular pressure was 12 and 14 mm of Mercury by Non-Contact Tonometry.

On slit lamp examination-both eyelids, lashes and conjunctiva were found to be normal, both corneas were clear. Anterior chamber was normal in depth. Both eyes showed a dense network of tissue arising from anterior surface of collarette and covering the pupil [Figure 1 and 2]. On dilatation, the network of

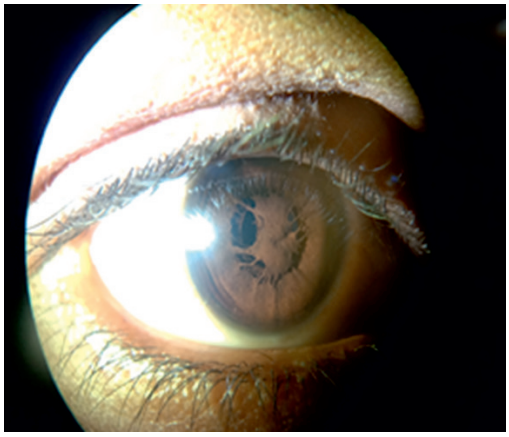

Figure 1: Undilated Right eye

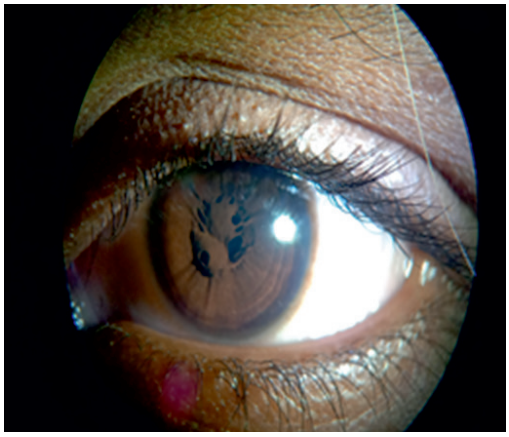

Figure 2: Undilated Left eye

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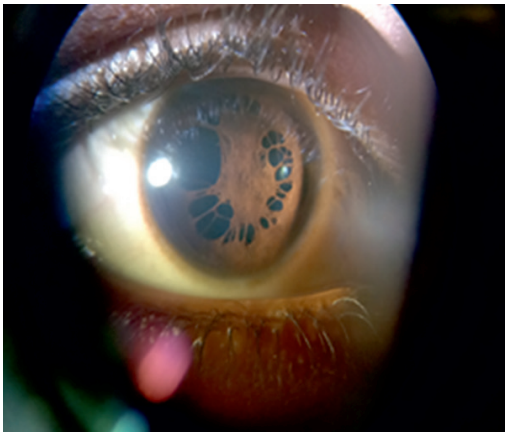

Figure 3: Dilated Right eye

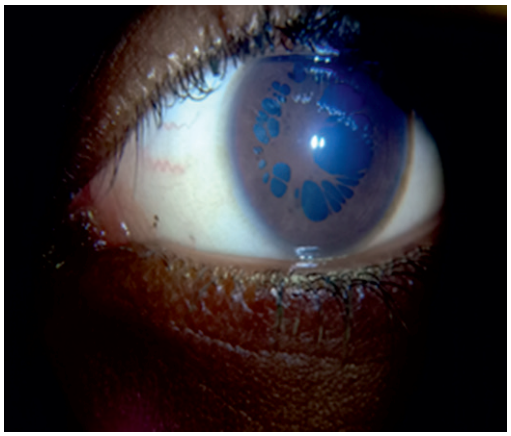

Figure 4: Dilated Left eye

tissue was positioned in the plane of iris [Figure 3 and 4]. Fundus examination revealed normal disc and macula in both eyes.

Ocular examination was otherwise unremarkable. B-Scan and Anterior Segment OCT showed normal results. Since the BCVA was 6/6 in both eyes, no intervention- medical or surgical was considered necessary.

Discussion

During development, iris forms a solid sheet of mesodermal tissue anterior to the lens known as the Pupillary Membrane which is composed of vessels and mesenchymal tissue, meant to provide nutrition for the developing lens. Similarly, in the posterior part of the lens, a network of mesodermal tissue develops from the hyaloid vasculature. These vessels extend anteriorly to anastomose with the network of vessels in the pupillary membrane to form tunica vasculosalentis.

The hyaloid vasculature regresses around fourth month of gestation and the pupillary membrane begins to regress at sixth month of gestation and the process is completed by eighth month. Electron microscopy has shown that cellular mechanisms 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 activities prevents complete regression of the membrane, which appears as persistent pupillary membrane[5]. Similarly, a failure in the regression of the posterior hyaloid system leads to the development of persistent hyperplastic primary vitreous.

The visual acuity in this patient remains good despite this significant anterior segment anomaly obstructing most of the visual axis. This is due to the pinhole effect of multiple apertures within the pupillary membrane. This is otherwise known as the stenopaeic effect. The more peripheral rays of light are blocked by the membrane, giving rise to a clear image[6].

However, extensive PPMs are associated with complications like central visual loss, amblyopia, spontaneous hyphaema, angle dysgenesis and developmental glaucoma. Study done by Mikhail M et al[7] shows a case of firmly adherent plaque on the external surface of the anterior capsule in a young patient with PPM. These can often be confused with anterior polar cataracts pre-operatively. Intraoperative differentiation of the two is critical to avoid unnecessary cataract extraction[7]. PPMs have not been associated with systemic disorders or any congenital cardiac anomaly[8].

The decision to excise them depends on an assessment of their likely effect on visual development. For severe visual impairment, surgical excision of these membranes or lyses becomes necessary.

Study done by Lambert SR et al[9] concludes that to prevent visually significant miosis from developing in these eyes after the excision of these membranes, it is important to excise as much of the membranes as possible. Surgical removal should be considered a safe and effective treatment for patients with visually significant persistent pupillary membranes[10]. Surgical removal carries the risk of general anaesthesia, intraoperative bleeding, intraocular infection and lens damage.

In the case report by Ahmad SS et al[4], it is concluded that Argon Laser Photocoagulation of the membranous tissue caused no bleeding, no pigment disruption and minimal pain and hence considered superior to Nd:YAG laser membranectomy (photodisruption) that could lead to significant hyphaema, cataract formation and pigment dispersion. A report by Mansour AM et al[3] states that combining Argon Laser Photocoagulation with subsequent YAG lysis of thick PPM strands can

lessen the chance of iris bleeding and results in visual gain.

Thus, there are various treatment modalities available and the knowledge regarding these will help in choosing the most suitable modality for patient specific conditions.

Conclusion

Persistent Pupillary Membranes, though asymptomatic in majority of cases, can occasionally lead to significant visual impairment. Surgical Membranectomy, Pupilloplasty, Argon Laser Photocoagulation are the most common modalities to treat the condition with excellent results. Most often, in asymptomatic cases with good visual acuity, no treatment is necessary. So, it is important to understand the varied presentations of the condition and choose the appropriate treatment modality.

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