CASE REPORT

Sequential argon-YAG laser membranotomy of extensive persistent pupillary membrane with visual loss

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SUMMARY

A 20-year-old woman, a registered nurse, presented with best-corrected visual acuity of 6/15 (20/50) due to bilateral extensive persistent pupillary membrane. Sequential argon laser photocoagulation of the iris strands at the pupillary membrane iris collarette followed by neodymium:YAG laser lysis resulted in partial clearing of the central visual axis without bleeding. Best-corrected visual acuity improved to 6/9 (20/30) bilaterally without complications noted 1 year after combined laser therapy.

BACKGROUND

Persistent pupillary membranes (PPMs) represent incomplete regression of the tunica vasculosa lentis, which usually involutes by the sixth month of gestation. With incomplete regression, strands of connective tissue may attach to the iris collarette. Fine strands are often avascular while thick strands are usually vascular. The pupillary membrane vessels are derived mainly from the anterior ciliary arteries. Minimal connective tissue remnants are not uncommon but do not affect vision. Thick membranes are rare and disrupt the visual axis with risk of amblyopia. In such rare cases, interventions include surgical excision or laser lysis of the membrane.^{1–6} Photodisruption of these membranes can lead to hyphema with a small risk of cataract formation and pigment dispersion.^{2–5} The risk of bleeding is higher the broader the base of the pillar between the membrane and iris collarette.¹ More recently, Wang *et al*⁶ reported sequential argon laser photocoagulation followed by neodymium:YAG laser to the stalk of the PPM that successfully resulted in liberation of PPM without haemorrhage or other complications. The case described by Wang *et al* had narrow iris strands connecting the membranous roof and the iris collarette. To the best of our knowledge, ours is the second case to describe the use of sequential argon-YAG laser membranotomy. However, in our case, the PPM had a broad thick base and was more extensive.

CASE PRESENTATION

A 20-year-old woman presented for evaluation of her long-standing poor vision, which she had since childhood. On examination, her best-corrected visual acuity was 6/15 (20/50) OU, which did not change after mydriasis. Slit-lamp examination revealed extensive bilateral PPM (figures 1–3).

Figure 1 Persistent pupillary membrane occludes the visual axis in the constricted state in the right eye.

After denying surgical intervention, the patient consented to laser lysis. The fine avascular strands were easily lysed using YAG laser alone (figure 4). However, most of the strands were vascular. A green argon laser (100 micra spot size, 600 mW, 0.1 s) was focused at the junction of the PPM and the iris collarette to cause shrinkage of the embedded vessels. Then, additional YAG laser allowing severing of the strands (single pulse energy of 1–2 mJ) was applied to cut the strands of the PPM from the iris. The procedure was staged into three sessions several days apart, and laser applications halted with the appearance of pigment or flare. A central membrane remained adherent to the anterior capsule after completion of the laser procedures (figures 5 and 6). Mild pigment dispersion was

Figure 2 Persistent pupillary membrane occludes the visual axis in the constricted state in the left eye.

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Figure 3 Dilation of the right pupil stretches the strands.

found in the anterior chamber without associated haemorrhage. Intraocular pressure was normal 1 h after laser treatment. Dexamethasone drops were given four times per day for 2 weeks.

TREATMENT

Surgery for PPM has included internal cutting with intraocular scissors under a viscoelastic shell,³ or by external cutting, by dragging the strands outside the limbal corneal incisions.⁴ Surgical excision is accompanied by a high chance of cataract formation and intraocular bleeding.^{7 8} YAG lysis can result in hyphema, pigment dispersion and anterior uveitis.^{2 5} Combining argon laser coagulation of the collarette vessels with subsequent lysis by YAG laser offers a safer alternative to YAG therapy alone, by photocoagulating the iris vessels.⁶ Our preferred technique is to perform YAG lysis for fine avascular iris strands and argon followed by YAG laser for the thicker vascular strands. Wang *et al*⁶ performed uneventful phacoemulsification 1 day after argon and YAG laser to inferior sector PPM. Our case had extensive pupillary membrane, so treatment was divided into several sessions to prevent attacks of anterior segment inflammation and pigment dispersion.

Figure 4 Persistent pupillary membrane in the dilated state in the left eye after initial YAG laser lysis of fine avascular strands in the inferior sector (at 7 o'clock).

Figure 5 After sequential argon-YAG laser, the thick strands were cut leaving a central membrane adherent to the lens in the right eye.

OUTCOME AND FOLLOW-UP

At 1-day, 1-week and 1-year follow-up after laser therapy, intraocular pressure was normal with no hyphema or anterior chamber inflammation. Best-corrected visual acuity improved to 6/9 (20/30) in each eye.

DISCUSSION

PPM is accompanied by central visual loss, amblyopia, spontaneous hyphema, angle dysgenesis and developmental glaucoma.^{4 6 9-12} Occasionally, mydriatics can obviate the need for intervention in mild cases.¹¹ For severe visual impairment, surgical excision of these membranes or lysis becomes necessary. The argon laser has been shown to obliterate these vessels and reduce intraocular bleeding.⁶ In our patient, the PPM strands were thick and had embedded vessels. Use of sequential argon-YAG lysis of the PPM strands is safe, avoiding the need for surgical procedures. The technique is simple, non-invasive, effective and safe when divided into sessions to minimise pigment release from the iris or outpouring of inflammatory cells.

Figure 6 The left iris after sequential argon-YAG laser to thick strands.

Learning points

- ▶ Cases of persistent pupillary membrane (PPM) are usually asymptomatic while thick PPMs occlude the central visual loss.
- ▶ Surgical excision of thick PPMs entails a high risk for hyphema and cataract.
- ▶ YAG laser membranotomy can be accompanied by hyphema.
- ▶ Combining argon laser photocoagulation with subsequent YAG lysis of thick PPM strands can lessen the chance of iris bleeding and results in visual gain.
- ▶ Dividing the laser into sessions lessens the degree of pigment dispersion and anterior chamber inflammation.

Contributors AMM conceived the idea, treated the patient and wrote the paper; IH treated patient and wrote the paper. RSA wrote the paper. All the authors contributed equally to writing and approved the final paper.

Competing interests None declared.

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REFERENCES

- 1 Ko J, Jung JW, Kim EK. Two-stage operation for the treatment of cataract associated with persistent pupillary membrane. *J Cataract Refract Surg* 2013;39:1615.
- 2 Kumar H, Sakhuja N, Sachdev MS. Hyperplastic pupillary membrane and laser therapy. *Ophthalmic Surg* 1994;25:189–90.
- 3 Lim KH, Yu YS. Surgical management for persistent pupillary membrane with vitreous scissors. *Korean J Ophthalmol* 1996;10:124–6.
- 4 Tsai YY, Chiang CC, Tsai CH. Surgical technique for removing an extensive persistent pupillary membrane. *J Cataract Refract Surg* 2004;30:1622–5.
- 5 Vega LF, Sabates R. Neodymium:YAG laser treatment of persistent pupillary membrane. *Ophthalmic Surg* 1987;18:452–4.
- 6 Wang JK, Wu CY, Lai PC. Sequential argon-YAG laser membranectomy and phacoemulsification for treatment of persistent pupillary membrane and associated cataract. *J Cataract Refract Surg* 2005;31:1661–3.
- 7 Matsue N, Okabe S, Seki Y. Prenatal fibroplasia from pupillary membrane. *Jap J Clin Ophthalmol* 1973;27–7.
- 8 Cassady JR, Light A. Familial persistent pupillary membranes. *Arch Ophthalmol* 1957;58:438–48.
- 9 Demidenko A, Jakobiec FA, Hanna E, *et al.* Congenital pupillary-iris-lens membrane with goniodysgenesis: a rare cause of glaucoma and vision loss. *Int Ophthalmol Clin* 2009;49:83–8.
- 10 Laidlaw DA, Bloom PA. Spontaneous hyphaema arising from a strand of persistent pupillary membrane. *Eur J Ophthalmol* 1993;3:98–100.
- 11 Miller SD, Judisch GF. Persistent pupillary membrane: successful medical management. *Arch Ophthalmol* 1979;97:1911–13.
- 12 Demeler U. [Iris angiography in the persistent pupillary membrane]. *Ophthalmologica* 1978;177:270–5.

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