



Approach to Chronic Pseudophakic Malignant Glaucoma - A Tug of War

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Abstract

Purpose: To report various approaches in the management of chronic pseudophakic malignant glaucoma

Case Presentation: We report two chronic pseudophakic malignant glaucoma cases presented to our hospital several years after uncomplicated cataract surgery. Iridozonulohyaloidovitrektomy and Nd yag hyaloidotomy through patent PI was done in case 1 and 2 respectively, which resulted in a deepening of the anterior chamber, improvement in vision, and good intraocular pressure control on antiglaucoma medications.

Conclusion: Iridozonulohyaloidovitrektomy appears to be an alternative option to pars plana vitrectomy in the treatment of patients with chronic pseudophakic malignant glaucoma. Nevertheless, a simple non-surgical method like Nd yag hyaloidotomy also leads to complete resolution of the disease process.

Highlights

- Myopic shift is an important sign of chronic malignant glaucoma
- Chronic malignant glaucoma treatment is aimed at creating a unicameral chamber
- Complete resolution of the disease process can be achieved by a simple outpatient laser procedure or an IZHV surgery that an anterior segment surgeon can perform.

Keywords: Malignant Glaucoma; Irido-zonulo-hyaloido-vitrektomy; Nd: Yag Hyaloidotomy

Abbreviations

MG: Malignant Glaucoma; IOP: Intraocular Pressure; PCIOL: Posterior Chamber Intraocular Lens; POD: Post Operative Day; PPV: Pars Plana Vitrectomy; IZHV: Iridozonulohyaloidovitrektomy; PI: Peripheral Iridotomy

Introduction

Malignant glaucoma (MG) is a rare but dreaded complication with maximum incidence (approximately 0.6% to 4%) following trabeculectomy in angle-closure disease, but it can also occur following laser, cataract surgery, or following miotic use [1,2]. The term was first coined by Von Graefe in 1869 [3]. It is characterized by aqueous misdirection into the vitreous cavity. The classical presentation includes shallowing of the central and peripheral an-

terior chamber in the presence of a patent iridotomy, aggravation with miotics, and relief with cycloplegic-mydriatic therapy. The condition most often presents with markedly elevated intraocular pressure (IOP) and rarely with IOP in the normal range [4]. The treatment aims at creating a unicameral chamber between the anterior chamber and the vitreous cavity [5].

In this article, we present different modes of presentation and several effective approaches for managing cases of chronic pseudophakic malignant glaucoma.

Case 1

A 71-year-old male presented to our clinic 6 years after uncomplicated cataract surgery with a posterior chamber intraocular

lens (PCIOL) in the bag, with progressive myopia, shallow anterior chamber (AC), and raised IOP of 28mmHg in the left eye. With a chronic pseudophakic MG diagnosis, initial treatment with antiglaucoma medications, cycloplegic, and Nd yag laser iridotomy with hyaloidotomy failed to resolve the condition. He was subjected to trabeculectomy with pars plana vitrectomy (PPV). On the postoperative day (POD) 1, the AC deepened, and IOP was maintained at 12mmHg during the follow-up period of 4 years.

3 years later the same patient presented with progressive myopia, shallow AC, and raised IOP of 26mmHg in the right eye. Due to a failed response to conservative topical medications and laser measures, the right eye was subjected to trabeculectomy with PPV. On POD 1, AC deepened and IOP recorded was 10mmHg. However, on a postoperative visit 2 weeks later, the patient presented with severe headache and eye pain. On examination, the right eye bleb was vascularised with diffuse corneal edema, shallow AC, and IOP being 34 mmHg (Figure 1). Diagnosis of recurrent MG was made. He was started on topical anti-inflammatory agents, cycloplegic, and antiglaucoma medications and was finally subjected to a second surgical measure of iridozonulohyaloidvitrectomy (IZHV) in the right eye. On POD 1, AC was deepened (Figures 2 and 3) with IOP maintained in the low teens without any antiglaucoma medications. which was maintained until the last follow-up visit of more than 1 year. Myopia reverted back to -2.75 dioptre (D) from -5.0 D.

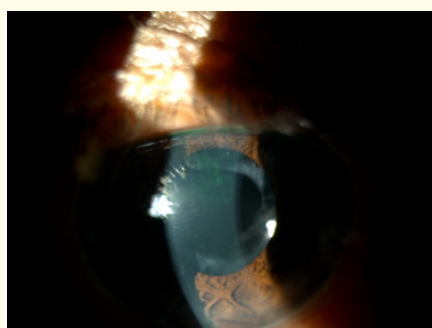


Figure 1: Slit lamp photograph showing shallow central and peripheral AC depth.

Case 2

A 66-year-old woman presented to our clinic with reduced vision in her right eye, a shallow AC, and raised IOP of 32 mmHg. Right eye cataract surgery was done 7 years ago in our clinic and it was uneventful. With a diagnosis of chronic pseudophakic MG, she



Figure 2: Slit lamp photograph showing deep AC after IZHV.

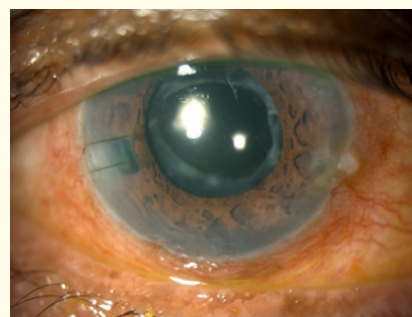


Figure 3: Slit lamp photograph showing surgical iridectomy site of IZHV.

was started on cycloplegics and antiglaucoma medications. Since there was no clinical improvement with medical measures, patient underwent Nd Yag peripheral iridotomy (PI) with an energy of 0.5mJ, and hyaloidotomy posterior to the optic of PCIOL with an energy of 2.3mJ. 2nd PI along with hyaloidotomy through it, was done 1 week later with the same energy characteristics as used initially. Post laser 2 sittings, AC was deep and IOP was 13 mmHg along with the resolution of myopic shift from -3.50D to -1.50D. Until the last follow-up visit of 6 months duration, AC was deep with IOP in low teens maintained with three antiglaucoma medications.

Investigations

Ultrasound B scan was done in all patients to rule out any posterior segment pathology. Ultrasound biomicroscopy showed anterior rotation of the ciliary body suggestive of malignant glaucoma in both patients.

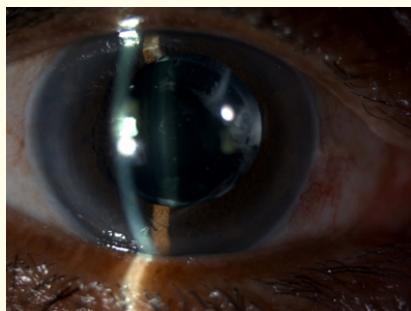


Figure 4: Slit lamp photograph showing deep AC following Nd yag hyaloidotomy.

Discussion

The core pathophysiology of malignant glaucoma is not well understood. However, it is believed to occur at the lens-zonule-iris-ciliary body-hyaloid interface, the complete disruption of which is crucial for the normalization of the anterior segment. MG typically occurs in the acute postoperative period. Reed, *et al.* reported cases of MG occurring several weeks to years after the inciting surgical procedure [6]. Kaleem, *et al.* described the entity of chronic pseudophakia MG as progressive AC shallowing and initially unexplained myopic shift occurring several months after uncomplicated cataract surgery accelerating [7]. Increased myopia has been reported as the first symptom noticed in patients with chronic MG [6]. The myopic shift can be explained by the anterior displacement of the lens - iris diaphragm secondary to increased posterior vitreous pressure.

The initial management of MG mainly is medical as reported by Simmons, *et al.* [8]. The recommended medical therapy includes topical cycloplegics (to promote the posterior displacement of the iris-lens diaphragm), topical aqueous suppressants and oral carbonic anhydrase inhibitors (to decrease the production of aqueous), systemic hyperosmotic agents (to dehydrate the vitreous), and topical steroids (to reduce the inflammation). Luntz and Rosenblatt reported that with medical treatment alone, 50% of eyes achieved resolution in the first 5 days after presentation [9]. The neodymium: yttrium-aluminum-garnet (YAG) laser by disrupting the anterior hyaloid face to create communication from the anterior vitreous to the AC is used in the treatment of pseudophakic and aphakic MG [10]. Surgical management options available in the literature include pars plana vitrectomy with or without lensectomy, vitreous puncture with aspiration, zonulo-hyaloid-vitrectomy for pseudophakic glaucoma, vitrectomy-phacoemulsi-

fication- vitrectomy for the management of phakic MG, and pars plana tube insertion with vitrectomy [11]. Debrouwere, *et al.* reported 100% recurrence with medical treatment, 75% recurrence with laser hyaloidotomy, and no recurrences with complete vitrectomy, hyaloidotomy, and iridectomy [12]. Transscleral cyclophotocoagulation is reserved for the treatment of refractory glaucoma [13].

The traditional surgical treatment for chronic MG is complete pars plana vitrectomy [14]. This warrants the dependency on the vitreoretinal surgeon and the complications associated with vitreoretinal surgery. Recurrence is defined as the re-shallowing of the central AC after the initial deepening with IOP \geq 21 mm Hg which occurred in our first case [15]. Dave, *et al.* described 4 cases of recurrent malignant glaucoma following PPV [15]. Massicotte, *et al.* also reported two cases of recurrence after PPV [16]. The primary reason is the inability of this treatment modality to disrupt the cycle of malignant glaucoma because all of the tissues (iris, lens capsule, zonule, and anterior vitreous) had to be removed to create a permanent passage between the anterior chamber and the vitreous cavity. The peripheral vitreous skirt can hardly be removed with the conventional PPV.

Debrouwere, *et al.* emphasized that total vitrectomy was effective in 100% of patients when it is combined with zonulectomy, iridectomy, and capsulectomy [12]. In addition, they reported no recurrence after this procedure. However, there are various disadvantages to this method. It warrants two accesses, which is time-consuming, does not save the conjunctiva, and is prone to potential complications. Zarnovski, *et al.* reported a complete resolution of MG using a novel surgical approach of Iridozonulohyaloidovitreotomy (IZHV) [17]. This technique comprises anterior hyaloidectomy combined with peripheral iridectomy, zonulectomy, and peripheral capsulectomy in patients with malignant glaucoma. The advantage is that it is fast, simple and easy to perform and it can be done by an anterior segment surgeon. In their study, all ten patients with MG had relief of the aqueous misdirection post-operatively with anterior chamber deepening and IOP lowering. Ray, *et al.* reported a successful outcome with IZHV for the treatment of recurrent MG following PPV [18]. In addition, Ray, *et al.* in another study performed intra-operative ostial IZHV with Primary Posterior Capsulectomy for prevention of post-operative MG in combined Phaco-Trabeculectomy in twelve eyes of eleven patients with primary angle closure glaucoma [19].

We performed IZHV for the right eye of case 1 when he presented to our clinic with chronic recurrent pseudophakic malignant glaucoma. Subtenon anaesthesia was given by the surgeon on the operating table. Two side port entries were made 180 degrees apart. 23G vitrectomy cutter passed through the peripheral iridotomy and IZHV was done. AC was formed at the end of the procedure and the side port was sutured. Postoperatively, the patient was advised topical prednisolone acetate 1% eyedrop 8 times a day in weekly tapering doses, and topical antibiotic for 1 week. There were no complications or sequelae related to the procedure like retinal detachment or subluxation of IOL. The patient was noted to have complete resolution of myopia along with deepened AC and IOP maintained without any antiglaucoma medications for the follow-up period of 1 year.

Case 2 patient responded well to a simple outpatient department procedure of Nd yag hyaloidotomy when she presented to our clinic with the diagnosis of chronic pseudophakic malignant glaucoma. 1st sitting of laser hyaloidotomy was done posterior to the optic of IOL. However, the patient presented 1 week later with raised IOP. The reason could be the inability to maintain a common pathway due to the IOL optic causing a mechanical barrier to the creation of a unicameral chamber. Hence, we did the 2nd laser hyaloidotomy through 2nd PI beyond the optic of IOL which resulted in the successful maintenance of IOP in low teens with deepened AC (Figure 4). Risco., *et al.* and Dave., *et al.* described YAG capsulohyaloidotomy in pseudophakia through the optichaptic junction, PI, and beyond the optic of the IOL to create a single chamber [20,21]. Krishnamurthy R., *et al.* described a unique case where MG was successfully treated using laser hyaloidotomy through the optic hole of the polymethyl methacrylate (PMMA) IOL [22].

Conclusion

The management of malignant glaucoma is ever-evolving. It is imperative to note that recurrent chronic malignant glaucoma has occurred despite the patient undergoing core central vitrectomy. The two successfully managed cases in our case report, highlight the significance of an algorithmic approach to the management of MG. To begin with, a simple laser procedure of Nd yag hyaloidotomy should be attempted along with the medical measures. The technique of IZHV through an anterior segment approach is the preferred surgery of choice when conservative measures fail. It has been proven to provide successful outcomes even in chronic recurrent pseudophakic malignant glaucoma cases, hence reducing the burden on vitreoretinal surgery-related complications.

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Sources of Support

Nil.

Conflict of Interest

Nil.

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