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A refractory malignant glaucoma posttrabeculectomy in vitrectomized eye: A case report and review of the literature

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Abstract:

The objective of this study is to report a case of refractory malignant glaucoma post trabeculectomy in vitrectomized eye and review of previous literature in PubMed database. A 63-year-old male encountered malignant glaucoma after trabeculectomy in vitrectomized eye. We had tried vitreous tapping with peripheral iridectomy and vitreous tapping with intracameral injection of room air (Chandler procedure). All of previous procedures were in vain. Finally, the yttrium–aluminum–garnet laser membranectomy with zonulectomy was done. The intraocular pressure is within normal range without any topical glaucoma eye drops during 3-year outpatient department regular follow-up. Complete vitrectomy with a patent tunnel from posterior chamber to anterior chamber (iridectomy-zonulectomy) is the effective procedure to manage of malignant-like glaucoma.

Keywords:

Iridectomy-zonulectomy, malignant glaucoma, vitrectomy

Introduction

Malignant glaucoma was first described by von Graefe in 1869 as a rare condition characterized by a shallow or flat central and peripheral anterior chamber, elevated intraocular pressure (IOP), and the presence of a patent iridotomy without suprachoroidal fluid.^[1] It was also named as ciliary block glaucoma, aqueous misdirection syndrome, or cilio-vitreo-lenticular block syndrome.

The pathophysiology of malignant glaucoma is multifactorial and is still not fully understood. Initially, the ciliary body touches the anterior vitreous surface, which causes posterior drainage of aqueous fluid. Subsequent misdirection of aqueous flow posteriorly

causes a pressure gradient between the vitreous cavity and the anterior chamber, which results in anterior herniation of lens-iris diaphragm.^[2,3] Malignant glaucoma is frequently noticed after incisional surgery for primary angle-closure glaucoma. Trabeculectomy is the most commonly mentioned incision surgery to cause malignant glaucoma such as glaucoma tube shunt implantation (Baerveldt implant and Ahmed valve), lens extraction extracapsular cataract extraction (ECCE), laser iridotomy, penetrating keratoplasty, and vitrectomy were all mentioned before.^[4-10]

Several medical, laser based, and surgical treatments for malignant glaucoma have been reported. Treatments such as topical cycloplegic agent to push back the iris-lens diaphragm, aqueous suppressants eye drops and oral carbonic anhydrase inhibitors, and systemic hyperosmotic agents should

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be considered the first-line therapy. These treatments have been reported to relieve 50% of malignant glaucoma condition.^[11,12] Other adjuvant or advanced laser treatment includes neodymium-doped yttrium–aluminum–garnet (YAG) laser capsule hyaloidotomy and transcleral cyclodiode laser. Surgical management may be the last resort, which includes Chandler procedure, vitrectomy, and iridectomy-zonulectomy-hyaloidectomy-vitrectomy.

Because vitrectomy is a surgical treatment of malignant glaucoma, we will present a case of malignant glaucoma posttrabeculectomy in a vitrectomized eye.

Case Report

A 63-year-old male had a medical history of well-controlled diabetic mellitus and hypertension. He had undergone pars plana vitrectomy, endolaser, and gas tamponade in 2010 for left eye rhegmatogenous retinal detachment. He underwent bilateral cataracts surgery sequentially in 2010 and 2011. This time, he was referred to our clinic for refractory IOP control with initial IOP up to 50 mmHg for 1 month. At the first visit, completely closed-angle and shallow anterior chamber depth with 1+ of cell were noticed. Under the impression of secondary angle-closure of uveitic glaucoma hyphema syndrome, we performed a lower laser peripheral iridotomy and kept topical IOP lower agent use.

Three weeks later, poor IOP control was noted even with additional glaucoma eye drops and oral acetazolamide, he underwent trabeculectomy. Two weeks after trabeculectomy, elevated IOP with Grade 2 flat anterior chamber was noticed [Figure 1]. The B-scan rule out suprachoroidal effusion and ultrasound biomicroscopy (UBM) revealed anterior rotation of ciliary body [Figure 2]. Under the impression of malignant glaucoma, 25G vitreous tapping and inferior peripheral iridectomy (surgical enlargement of previous laser iridotomy) were done under emergency. Then, topical 1% atropine every 8 h and topical steroid were given.

One week later, recurrent elevated IOP and flat anterior chamber were noticed during regular postoperative follow-up. He underwent an emergent 25G vitreous tapping with intracameral injection of room air (Chandler procedure). After operation, we titrated the 1% atropine to every 6 h. Five days later, the third times elevated IOP up to 40 mmHg was noticed. The slit-lamp examination revealed the flat anterior chamber and fibrin occlusion of the inferior peripheral iridectomy. YAG laser membranectomy was done with power 4.0 mJ, and lens zonular was noticed. Then, we performed zonulectomy with YAG laser power 3.5 mJ, and massive fluid drainage from the

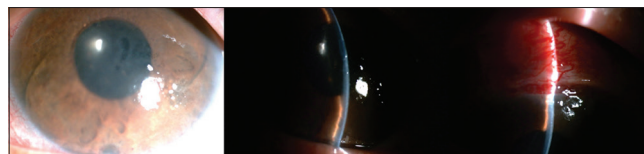


Figure 1: Steamy cornea with Grade 2 flat anterior chamber

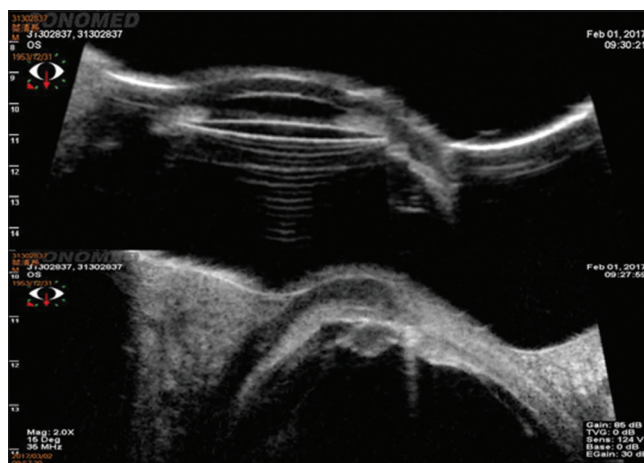


Figure 2: Upper picture revealed flat anterior chamber. Lower picture revealed anterior rotation of the ciliary body

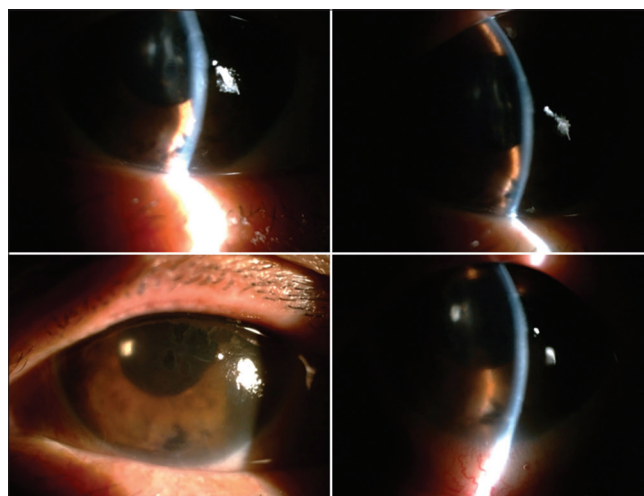


Figure 3: Superior columns revealed flat anterior chamber and fibrin occlusion of inferior peripheral iridectomy. Inferior columns revealed patent peripheral iridectomy and deeper anterior chamber immediately after yttrium–aluminum–garnet laser membranectomy with zonulectomy

vitreous cavity was noted. The anterior chamber became deeper immediately [Figure 3]. There was no recurrent malignant glaucoma episode and IOP within the normal range without any IOP-lowering agent during 3-year outpatient department regular follow-up.

Discussion

The pathophysiology of malignant glaucoma is multifactorial but poorly understood. Chandler *et al.* found that the laxity of lens zonules coupled

with pressure from the vitreous leads to forward lens movement. Shaffer and Hoskins suggested that posterior drainage and accumulation of aqueous, which causes secondary iris-lens diaphragm anterior movement.^[13] Some studies revealed fluid accumulation behind vitreous gel and believe that prevented the fluid flow to normal direction,^[14,15] however, which mechanism causes the misdirection of aqueous is still controversial. Chandler found that the laxity of lens zonules coupled with pressure from the vitreous leads to forward lens movement, which may be a predisposing factor to build up the aqueous misdirection cycle.^[16] Some studies propose that anterior rotation and swelling of the ciliary body may also be predisposing factors of cilio-vitreous adhesion, which enhances the aqueous misdirection cycle.^[17,18] The swelling of the ciliary body was also noted in our case by UBM. The first and the second time attacks of elevated IOP may cause by inflammatory swelling of the ciliary body. The third time attack of elevated IOP may cause by the block of the peripheral iridectomy.

Vitrectomy has been considered to be efficacious in the treatment of pseudophakic malignant glaucoma. The destruction of the anterior hyaloid membrane seems to block the aqueous misdirection cycle. However, there had been reported that malignant glaucoma on vitrectomized eye, which named as a malignant glaucoma-like syndrome.^[19] Several surgical method has been reported to treat malignant glaucoma-like syndrome, such as Chandler procedure, complete vitrectomy, and iridectomy-zonulectomy-hyaloidectomy-vitrectomy.

In the experience of our case, complete vitrectomy with a patent tunnel from vitreous cavity to anterior chamber (iridectomy-zonulectomy) is the efficacious procedure to manage malignant-like glaucoma [Figure 4a]. In completely vitrectomized eyes, the posterior drainage aqueous still pushes the IOL and iris diaphragm anteriorly [Figure 4b]. In only tunnel (iridectomy-zonulectomy) without completely vitrectomized eyes, the residual vitreous may block the tunnel with residual posterior aqueous drainage cycle, which may cause recurrent malignant glaucoma-like syndrome [Figure 4c and d]. There were similar finds in DeBrouwere *et al.* study.^[20]

Conclusion

Our case demonstrated a recurrence of malignant glaucoma in vitrectomized eye. In summary of our opinion, complete vitrectomy with a patent tunnel from the posterior chamber to anterior chamber (iridectomy-zonulectomy) is the effective procedure to manage malignant-like glaucoma.

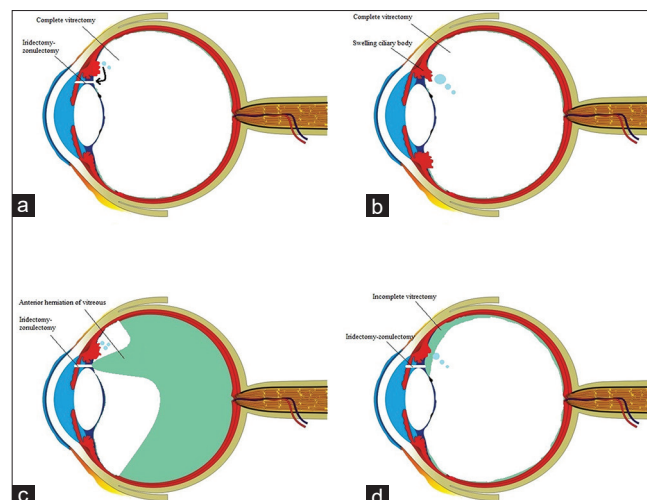


Figure 4: (a) A patent tunnel from posterior chamber to anterior chamber (iridectomy-zonulectomy) with complete vitrectomy. (b) Only complete vitrectomy. (c) Patent iridectomy-zonulectomy with anterior vitrectomy. (d) Patent iridectomy-zonulectomy with incomplete vitrectomy

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 his name and initial will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

The authors declare that there are no conflicts of interests of this paper.

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