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Aspergillus Infection in Ahmed ClearPath Implant with Tube Exposure

Abstract – We report a case of a 17-year-old girl who underwent glaucoma drainage device (GDD) surgery for refractory glaucoma following vitreoretinal surgery for retinal detachment. The procedure was complicated by tube exposure and fungal infection. Despite attempts at conjunctival re-suturing, severe conjunctival scarring from previous surgeries rendered it impossible, leading to the explantation of the GDD. The patient responded well to topical antibiotics and antifungal medications, with no signs of further infection progression. Prompt management upon detection of GDD surgery complications are important to prevent visually blinding complications such as endophthalmitis.

Keywords – *Glaucoma drainage device, Ahmed ClearPath, refractory glaucoma, tube exposure*

1 INTRODUCTION

Glaucoma drainage device (GDD) surgery has brought a paradigm shift in the management of secondary glaucoma. The indications for GDD surgery include failed trabeculectomy or multiple failed glaucoma surgeries, refractory secondary glaucoma, and patients who have elevated risk of conventional glaucoma filtration surgery failure [1].

Conventional GDD comprises a tube that redirects aqueous humor to an end plate situated in the equatorial region of the eye. These devices come in valved and non-valved implants. Valved implants are equipped with a valve mechanism designed to regulate aqueous outflow, preventing excessive filtration and consequent hypotony by restricting flow when intraocular pressure (IOP) decreases [2].

Similar to other intraocular surgeries, infection represents a potential complication of GDD surgery. Although the reported rate of endophthalmitis associated with GDD is relatively low, approximately 2%, it remains a potentially devastating and vision-threatening complication that can occur at any postoperative stage. Conjunctival erosion and tube exposure are among the common complications following GDD surgery, with eroded conjunctiva potentially facilitating the entry of organisms [3]. Early identification of potential risk factors for infection and prompt management are crucial to prevent the development of endophthalmitis [4].

We present a case involving a young girl who developed refractory glaucoma following scleral buckle and vitrectomy surgery for retinal detachment. The condition was further complicated by tube exposure and fungal infection.

2 CASE REPORT

A 17-year-old girl was diagnosed to have rhegmatogenous retinal detachment (RRD) with giant retinal tear in the right eye for the past 6 years. She underwent right eye encircling scleral buckle and pars plana vitrectomy with silicone oil tamponade. Subsequently she developed right eye refractory glaucoma due to silicone oil emulsification and migration to the anterior chamber. The IOP remained high despite removal of silicone oil and maximum anti-glaucoma medications. She also had left eye RRD managed 8 years ago with scleral buckle, pars plana vitrectomy and silicone oil tamponade done initially, and had oil removal done 3 months after with no secondary high IOP. She was referred to Glaucoma Clinic for further management of right eye refractory glaucoma.

Her best corrected visual acuity (BCVA) was 6/12 in the right eye and 6/9 in the left eye. The right eye examination showed white conjunctiva with clear cornea and deep anterior chamber with patent peripheral iridectomy inferiorly. The IOP was 24 mmHg. Gonioscopy showed presence of peripheral anterior synechiae superiorly and residual silicone oil globules at angle superiorly. Lens was cataractous with posterior subcapsular cataract. Fundus examination revealed pink optic disc with cup disc ratio of 0.9. The retina was flat with 360 degrees scleral buckle indentation at equator and chorioretinal scar superotemporally. The left eye IOP was 14 mmHg, with scleral buckle in situ and retina was flat.

In view of inadequate stabilisation of IOP despite using maximum anti-glaucoma medications, a procedure involving the placement of a combined Ahmed ClearPath 250 implant and phacoemulsification with intraocular lens implantation was scheduled for her right eye. Intraoperatively, there was presence of subconjunctival fibrosis during conjunctival dissection. However, the phacoemulsification procedure was uneventful, and Ahmed ClearPath 250 was implanted 8 mm from limbus superotemporally with 2 mm drainage tube in the anterior chamber. The plate was secured to the sclera using a 9/0 prolene suture and a scleral patch was positioned over the drainage tube. Then, the GDD implant was covered with conjunctiva.

Post-operatively, the IOP was 8 mmHg with the GDD implant in-situ and the GDD implant was well covered by the conjunctiva. The anti-glaucoma medications were off postoperatively. Follow-up at 1-month post-surgery, the IOP was 10 mmHg. However, the GDD implant was partially exposed and was managed with conjunctival re-suturing. She was well with GDD implant in-situ and IOP was controlled until 3 months post-GDD implantation, where she presented with right eye mild pain and discharge for 3 days. It was associated with right eye discomfort after sneezing one day prior to the presentation.

On examination of the right eye, the conjunctiva was injected with presence of mucoid discharge. The GDD drainage tube, prolene suture and implant plate were exposed temporally (Figure 1). Cornea was mild hazy with descement striae and shallow anterior chamber. Otherwise, the intraocular lens was stable. Fundus examination showed flat retina with no choroidal detachment. There was no vitritis, retinitis or choroiditis. Conjunctival swab sample was sent for culture and sensitivity. Patient was started on topical ciprofloxacin every 2 hourly.

She was planned for right eye conjunctival re-suturing for the second time. Intraoperatively, the surrounding conjunctiva over the GDD implanted area was found completely keratinised and reinsertion of the plate into the anatomically correct area was impossible. Hence, the decision for GDD explantation was made. Removal of the GDD was performed and the conjunctiva over the GDD explanted area was sutured. The anterior chamber was reformed with viscoelastic. Post operatively, 2 hourly topical ciprofloxacin was continued together with anti-glaucoma medications.

The conjunctival swab culture revealed *Aspergillus versicolor*. Topical fluconazole every 4 hourly was added into her treatment regime. Upon further history, it was revealed that her father works as a farmer and owns a goat pen. She has been assisting her father on the farm.

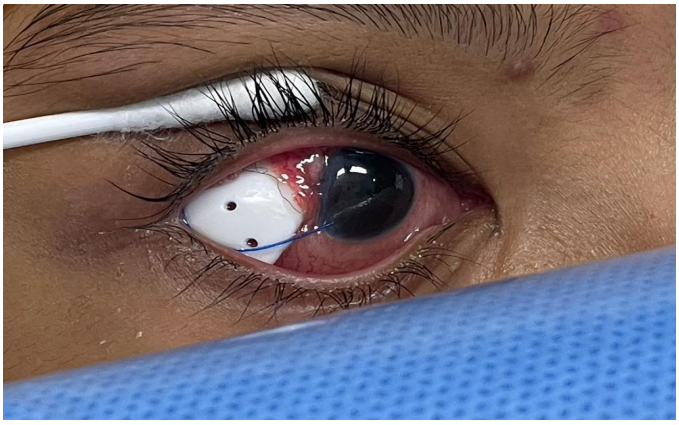

Figure 1. Exposed glaucoma drainage device plate and prolene suture of the right eye at 3 months post glaucoma drainage device surgery

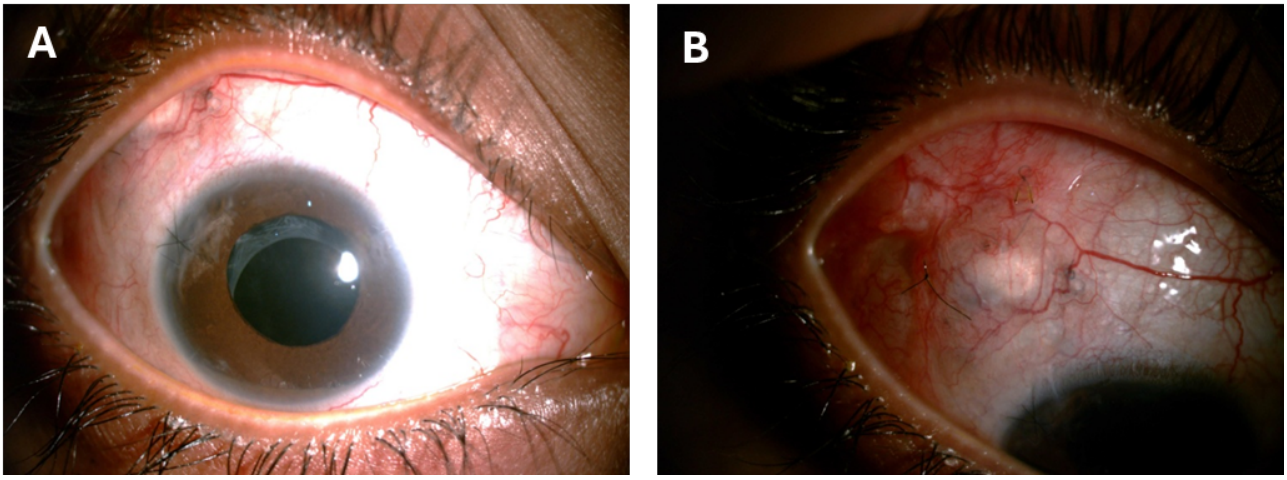

Figure 2. Review at 1-month post glaucoma drainage device explantation of the right eye showed clear cornea (A) and prominent conjunctival vessels at superotemporal glaucoma drainage device explanted area (B)

Review at 1-month post GDD explantation, her right eye BCVA was 6/15, with IOP of 14 mmHg on four topical antiglaucoma medications. The conjunctiva was not injected without any eye discharge. However, there were prominent vessels at GDD explanted area (Figure 2). The cornea was clear, and the anterior chamber was deep without any anterior chamber inflammation. Fundus examination revealed no vitritis with no signs of infection. The topical fluconazole was tapered down slowly over 3 months and topical ciprofloxacin was tapered down over 4 weeks.

3 DISCUSSION

Secondary glaucoma following vitreoretinal surgeries are not uncommon and can develop secondary to few causes such as inflammation post-surgery, steroid, external compression from scleral buckle, or from tamponade agents. Managing refractory glaucoma surgically can pose challenges due to conjunctival scarring, altered conjunctival wound healing, and limited space for implant placement, especially in the presence of a scleral buckle [5].

The GDD offers benefits in contrast to the increased risk of failure associated with traditional glaucoma filtering surgery [6]. Ahmed ClearPath 250 is a valveless GDD, with a curved and flexible plate to conform to the globe shape, and reduced plate height to produce low diffuse blebs to reduce risk of conjunctival erosion [7].

Complications arising from GDD surgery can be categorised into three main groups: valve-related issues, structural complications, and those associated directly with the surgical procedure. Valve-related complications encompass hypotony and IOP fluctuations. Structural complications involve outflow obstruction, conjunctival erosion, implant exposure, tube migration, and diplopia. Surgery-related complications include corneal decompensation, endophthalmitis, vision loss, and surgical failure [1].

In this case report, the glaucoma implant became exposed one month after the surgery. Although it was repaired, the exposure recurred after 3 months, indicating the compromised integrity of the conjunctiva, likely attributable to prior pars plana vitrectomy and buckle surgery.

The incidence of tube erosion has reduced from 30% to 5% with the use of patch to cover tubes in primary surgery, as was done in this case during primary surgery with scleral patch. A few methods have been described for conjunctival erosions closure including direct closure and conjunctival autografts [8]. Repair with conjunctival autograft is not suitable for this patient as anticipated conjunctival scarring and fibrosis of the other eye due to history of vitreoretinal surgery.

Conjunctival erosion and glaucoma tube exposure significantly increase the risk of developing endophthalmitis. This complication may occur due to eye rubbing, poor ocular lubrication, mechanical abrasion of overlying conjunctiva and lid or excessive conjunctival tension covering tube [3]. The eroded conjunctiva can potentially serve as a conduit, allowing infection to enter the eye. Timely conjunctival repair is essential for effectively addressing the exposed tube, ensuring sufficient tissue coverage

without compromising the position or functionality of the implant [9].

Al Torbak reported an average rate of 1.7% of endophthalmitis cases following GDD, with exposed tube due to eroded conjunctiva being one of the major risk factors. Endophthalmitis is commonly caused by various organisms. In pediatric populations, common culprits include *Haemophilus influenzae* and *Streptococcus pneumoniae*. In adults, coagulase-negative and coagulase-positive Staphylococcus species, *Streptococcus pneumoniae*, and *Pseudomonas aeruginosa* are frequently implicated [9].

In this case, the patient exhibited symptoms of a red eye and eye discharge 3 months post GDD surgery. Fortunately, there were no signs suggestive of endophthalmitis. However, a conjunctival swab revealed the presence of *Aspergillus versicolor*. Although fungal infection is not common, the patient's environmental exposure, such as contact with goats, may have predisposed her to this condition. The decision was made to remove the implant because the surrounding conjunctiva had become completely keratinised, preventing full coverage repair. Additionally, the risk of infection progressing to endophthalmitis is high if the implant remained in place. Gedde et al recommended surgical revision in all cases with glaucoma tube exposure due to the increased risk of endophthalmitis [7].

Trans-scleral cytophotocoagulation (TSCPC) performed in limited manner, is sometimes considered the first choice for glaucoma post vitreoretinal surgeries, with success rates reported around 66%-82%. However, the outcome can be unpredictable with risk of hypotony, and loss of vision [5]. If the IOP were to increase again in the patient, TSCPC will be the next step of management for this patient.

4 CONCLUSION

Despite encountering challenges during the postoperative period, the patient managed to regain vision, and their IOP remained within normal range. We recommend thorough postoperative examinations to promptly identify any signs of conjunctival erosion or tube exposure, allowing for timely intervention and management.

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