

Case Report

**CORTICOSTEROID-INDUCED GLAUCOMA IN SEVERE VERNAL KERATOCONJUNCTIVITIS :  
TUBE OR TRABECULECTOMY**

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**ABSTRACT**

*Vernal keratoconjunctivitis (VKC) is a severe form of ocular allergy that affects primarily children and young adults living in areas with warm climates. While VKC is self-limiting, chronic forms in Asian eyes may be at higher risk of permanent visual impairment because of complications such as corneal scarring, cataract formation and glaucoma secondary to corticosteroid therapy. The incidence of glaucoma secondary to corticosteroid therapy is 2–7%, most often requiring filtering surgery. We present a case demonstrating the outcome of surgery in a patient; trabeculectomy in one eye versus Tube/shunt in the other.*

**Keywords:** Vernal Keratoconjunctivitis, steroid-induced glaucoma, trabeculectomy, Tube/Shunt.

**CASE REPORT**

A 20 year old gentleman first presented when he was 10 years old with itchiness and epiphora in both eyes for 2 years duration. Examination revealed giant papillary hypertrophy in the palpebral conjunctiva in both eyes. He was diagnosed with severe vernal keratoconjunctivitis and prescribed topical Olopatadine and Betamethasone 0.1% eye drops in tapering dose over 10 months. Betamethasone 0.1% was replaced with topical Fluoromethalone 0.1% a year later, which was then further replaced by topical Cyclosporine 0.5% in 2008 due to increase in intraocular pressure (IOP) in both eyes.

The patient, however, defaulted follow-up between 2010 and 2015 during which he self-administered Fluoromethalone 0.1% eyedrops on a PRN basis (Pro-re nata). He presented again in December 2015 with left blurring of vision of 3 weeks duration. The intraocular pressure was 48 mmHg in the right eye and 54 mmHg in the left eye. Gonioscopy revealed glaucomatous optic disc with cup-disc ratio of 0.9 in both eyes. The Humphrey visual field showed constricted visual fields in both eyes with mean deviation of -23.87 db and -15.16 db in the right and left eye respectively. Optical Coherence Tomography (OCT) revealed right superior and inferior quadrant thinning and left generalised thinning of the retinal nerve fibre layer.

Intraocular pressure in right eye was 36 mmHg with maximum tolerated medical therapy (3 topical anti-glaucoma drugs and oral Acetazolamide 250mg QID). Glaucoma Drainage Device (GDD), a tube shunt Ahmed Valve was implanted in March 2016 to control the IOP.

Trabeculectomy was deemed unsuitable as the eye was too inflamed due to severe vernal conjunctivitis. The postoperative hypertensive phase developed and prolonged requiring anti-glaucoma medication to control the IOP. His final IOP in the right eye was 20mmHg.

The left IOP was also poorly controlled medically with IOP ranging between 50 and 52mmHg. Due to financial constraint, trabeculectomy with intraoperative application of mitomycin C was performed. His IOP maintained at 12mmHg at postoperatively without additional anti-glaucoma medication.

**DISCUSSION**

Vernal keratoconjunctivitis (VKC) is a severe form of ocular allergy that affects primarily children and young adults living in areas with warm climates [1]. However, the pattern and severity of this disease vary widely, depending on racial and environmental differences; most patients with VKC in temperate countries suffer from seasonal exacerbations, but the disease is often chronic and persistent in warm, tropical climates around Asia [2]. Although most cases of VKC are self-limiting, chronic forms in Asian eyes may be at higher risk of permanent visual impairment because of complications such as corneal scarring, cataract formation and glaucoma secondary to corticosteroid therapy [3].

The reported incidence of glaucoma in patients with VKC receiving corticosteroid therapy is 2–7% [4]. ‘Steroid response’ or corticosteroid-induced ocular

hypertension is due to decreased trabecular outflow causing a rise of IOP [5]. Resultant glaucomatous nerve damage may persist even after corticosteroid therapy is discontinued and the IOP normalizes [6]. Lam *et al.* showed peak IOP to be dose dependent and more quickly developed in children below 6 years of age [7]. However, Ang *et al.* (2012) showed that the risk factors for eyes that have severe VKC with steroid response that eventually requires surgery are related to a longer duration of topical corticosteroid use, higher peak IOP and greater increase in IOP from baseline IOP [8].

In most patients, the average time to steroid response is 6 weeks; although the IOP may still rise after this time period [9]. In patients with severe VKC and steroid response, monitoring of IOP is important throughout the duration of therapy [10]. It is found that both the increase in IOP from baseline and peak IOP were important indicators for increased risk of surgery [8]. The magnitude of IOP rise depends on the potency of topical corticosteroids, with dexamethasone 0.1% the most potent, prednisolone acetate 1.0% followed by fluorometholone 0.1% [11]. On the other hand, Cyclosporine is an immunosuppressive drug that has been shown to reduce corticosteroid dependence in patients with VKC, by blocking Th2 lymphocyte proliferation, histamine release from mast cells and eosinophil infiltration [12]. However, its use did not affect the risk of steroid response and need for surgery [8].

Our patient had a successful trabeculectomy with Mitomycin C (MMC) in the left eye with excellent IOP control. Mitomycin C is an alkylating agent that selectively inhibits DNA synthesis. It has been found to be effective for short-term use if used topically, at low concentrations of 0.01% [13]. By inhibiting both inflammatory cells and fibroblasts, it is effective when steroids or mast-cell stabilizers cannot control symptoms of VKC. Ang *et al.* (2012) showed that MMC 0.02% soaked in surgical sponges applied directly to the bare sclera in the superior fornix during trabeculectomy had a substantial effect on the clinical course of VKC. There was a general improvement of the ocular surface and reduced corneal epitheliopathy post-trabeculectomy with MMC, which led to improvement in BCVA postoperatively [8].

On the other hand, Ahmed Glaucoma Valve implant is often implanted in patients whose glaucoma is inadequately controlled by medical therapy or for whom filtration surgery has been unsuccessful, is contraindicated, or is unlikely to succeed. Multiple studies have shown this device to be safe and effective in lowering IOP [14]. Glaucoma drainage device was offered to the patient initially in view of the possible conjunctival scarring secondary to the underlying severe vernal keratoconjunctivitis.

In cases where the Ahmed Glaucoma Valve has failed, revision is an option. However, our patient had the prolonged hypertensive phase which often occurs after the

implantation of Ahmed glaucoma device. Hypertensive phase is characterized by IOP elevation beyond 21mmHg, occurring anywhere between 1 to 6 weeks postoperatively. It is presumably due to thick-walled bleb over the plate of the implant. Eyes with a hypertensive phase had a higher mean IOP and needed more medications 6 to 12 months after surgery. However, it resolves in minority of eyes [7].

Thieme *et al.* discussed regarding encapsulation of the Ahmed Glaucoma Valve as an early complication in young patients that leads to inhibition of fluid exchange and failure of the procedure. The investigators found that the IOP could be controlled through removal of only the encapsulated blebs in all four of their cases [15]. He also proposed that the valve mechanism was blocked by contracted scar tissue but that the device itself was not affected by the encapsulation. Their conclusion was based on the fact that surgical excision of the capsule immediately led to aqueous flow and a drop in IOP [15].

The Tube Versus Trabeculectomy study showed that Tube shunt surgery was more likely to maintain IOP control and avoid persistent hypotony, reoperation for glaucoma or loss of light perception vision than trabeculectomy with MMC during the first year of follow-up. Both surgical procedures had similar IOP reduction at 1 year, but less supplemental medical therapy was used following trabeculectomy. The incidence of postoperative complications was higher after trabeculectomy with MMC relative to tube shunt surgery, but serious complications associated with vision loss or reoperation developed with similar frequency in both procedures [17]. The reported success rates of Ahmed Glaucoma Valve implants are between 60% and 82% at 2 years [19]. As seen in the Collaborative Initial Glaucoma Treatment Study (CIGTS), trabeculectomy surgery is limited by a suboptimal long-term success rate. The rate of failure has been reported to be as high as 23% to 51% at 5 years and 52% to 59% at around 15 years, even with adjunctive 5-Fluorouracil or mitomycin C [18].

## CONCLUSIONS

In Asian eyes suffering from VKC, the risk of corticosteroid-induced glaucoma may be higher due to chronic use of topical corticosteroids. Patients and their parents should be informed regarding the long term side effect of the corticosteroid eyedrops and abuse of the medication should be avoided. Corticosteroid should be added as pulse therapy only in severe cases and not as prolonged use as in this case. While most of these patients may be controlled with topical medications, it is important to identify clinical characteristics, which increase the risk of progression and surgery. There is limited study found comparing the effectiveness of augmented trabeculectomy versus glaucoma drainage device in young VKC patients with steroid induced glaucoma. However, some studies showed significant improvement in the signs and symptoms of VKC

following trabeculectomy with MMC. This could be related to the after-effects of MMC on the ocular surface and it supports the advantages of MMC use in severe, refractory forms of VKC. Future study is warranted in order to identify factors for unfavorable surgical outcomes of Ahmed glaucoma device in steroid induced glaucoma in VKC patients.

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