Case Report

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"Snuff" Phenomenon after Glaucoma Surgery: A Case Report

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ABSTRACT

Purpose: To report a rare case of severe central vision loss ("snuff-out phenomenon") following glaucoma surgery in a 79-year-old male with advanced glaucoma.

Observations: A 79-year-old Black male with advanced primary open-angle glaucoma and a history of poor medication compliance underwent Ahmed Valve FP-7 implantation with ciliary sulcus placement. Postoperative challenges included hyphema, IOP spikes, and eventual severe central vision loss in the operated eye, even after achieving target IOP with medical and surgical management. Contributing factors included advanced glaucomatous damage, corneal scarring, and poor adherence to treatment prior to surgery. No other causes, such as tube obstruction or macular changes, were identified.

Conclusions: Severe central vision loss after glaucoma surgery is rare but can occur, especially in patients with advanced disease. Risk factors such as advanced optic nerve damage, IOP fluctuations, and poor preoperative compliance may increase susceptibility. Early surgical intervention for mild-to-moderate glaucoma could potentially reduce the frequency of advanced disease and its associated complications. Careful perioperative planning and close postoperative follow-up are critical to minimizing this risk.

Keywords: Snuff, Snuff Phenomenon, Loss of Central Vision, Trabeculectomy

Introduction

Glaucoma, a progressive optic neuropathy characterized by elevated intraocular pressure (IOP), stands as a significant threat to visual health, particularly in aging populations and person of African descent, and decreased access to healthcare. The pursuit of effective interventions to manage IOP and prevent optic nerve damage has led to advancements in glaucoma surgeries. Cataract surgery, microinvasive glaucoma surgery, and glaucoma tube shunts are becoming more popular to control elevated intraocular pressure in patients with glaucoma [1]. This case study delves into the complexities surrounding a 79-year-old male patient with advanced glaucoma who underwent glaucoma surgery complicated by central vision loss due to post-operative intraocular pressure spike. Severe loss of central vision (Snuff) has been defined as visual acuity (VA) of 20/200 or less in the affected eye, counting fingers or less if preoperative VA was less than 20/200, or more than a 4-line reduction in Snellen visual acuity [2].

Case Presentation

The patient is a 79-year-old Black male, with a long history of primary open angle glaucoma and rapidly progressive vision loss and poor compliance with topical medications and was referred for further evaluation. He reported poor compliance and had not taken any eye drops in the last five days prior to his initial visit with us. The past medical history was significant for hypertension. The past surgical history was significant for uncomplicated cataract extraction with posterior chamber intraocular lenses bilaterally. The patient had no known drug

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allergies and was taking anti-hypertensive medication. Topical eyedrop medications at the time of consultation were Netarsudil/Latanoprost 0.02-0.005% twice a day in the right eye, and Brinzolamide/Brimonidine tartrate 1-0.2% twice a day in the right eye.

The best corrected visual acuity (BCVA) was recorded as 20/40 in the right eye (OD) and no light perception (NLP) in the left eye (OS). Slit lamp examination revealed a small paracentral central corneal scar measuring 2mm of the right eye and a completely opacified cornea of the left eye. The intraocuar pressure (IOP) measured were 30mmHg in the right eye (OD) and 8mmHg in the left eye (OS). Gonioscopy revealed Schaffer grade III open angle in the right eye with 2+ pigment in the TM, the angle was not able to be seen in the left eye. There was a well-positioned posterior chamber intraocular lens in the right eye. The vitreous was clear in the right eye and optic nerve examination revealed large glaucomatous cupping of the optic disc of (0.95 right eye), evidence of peripapillary retinal degeneration, diffuse loss of nerve fiber layer and artery attenuation right eye. There was no view of the posterior segment in the left eye. The optical coherence topography (OCT) and Humphrey visual field examinations revealed advanced disease but were not reliable. The patient was restarted on Netarsudil/Latanoprost OD one drop at bedtime, Brinzolamide/Brimonidine twice a day right eye, and Acetazolamide 500mg once a day was added [3].

The patient returned 1 week later and the IOP decreased to 15 mmHg in the right eye (OD) and 4 mmHg in the left eye (OS). The patient agreed to Ahmed Valve FP-7 implantation right eye with tube placement into the ciliary sulcus to lower the IOP on less medication to a target of 8-12mmHG and reduce dependency on medications. The patient underwent successful surgery with Ahmed valve FP7 implantation in the usual customary way with traditional priming of the valve and ciliary sulcus implantation. The patient tolerated the procedure well without any complications.

Vision Loss Event

On post-operative day one, the vision in the right eye was decreased to HM due to hyphema presumed to have occurred from insertion of the tube into the ciliary sulcus. Intraocular pressure was measured as 3mmhg in the right eye (OD) and 9mmHg in the left eye (OS). The cornea of the right eye revealed mild folds and a central corneal scar. The patient was asked to discontinue all glaucoma medications in the right eye and use Prednisolone acetate OD QID, Vigamox OD QID, Ketorolac OD QID and sleep in the sitting position with head above the waist.

One week status post Ahmed Valve FP-7 placement, right eye, visual acuity testing improved slightly to count fingers (CF). Slit lamp examination revealed 2+ hyperemia, conjunctival sutures and Ahmed Valve FP-7 with cornea scleral patch superotemporally right eye. The anterior chamber of the right eye was deep with 5% hyphema and 3+ cells. The intraocular pressure was measured as 40mmHg in the right eye and 17mmHg in the left eye. Dilated examination revealed a patent tube without iris or vitreous obstruction. During the visit, paracentesis was performed in the office in the right eye which brought the pressure down to 3mmHg. Thiry minutes later the IOP in the right eye was 16mmHg. IOP in the left eye remained at 17 mmHg. The patient was asked to resume glaucoma medications: latanoprost/netarsudil OD once at bedtime, brinzolamide/brimonidine OD twice a day, and Acetazolamide 500mg po twice a day and decrease Pred forte to twice a day OD. The patient was also instructed to continue on post operative drops: ofloxacin in the right eye four times a day. Posterior examination was stable.

In subsequent weeks the patient reported compliance with the medications. The visual acuity was still CF, the hyphema resolved, the IOP was 9mmHG. The IOP's at 2 months was 17mmHG, 4months 12mmHG and 6 months 20mmHG in the right eye. The vision remained at CF up to month 4 and deteriorated to HM by month 12. There was no other change in the ocular examination.

Discussion

The Snuff Out phenomenon, loss of central vision has been discussed throughout ophthalmology as a possible complication after ophthalmic surgery, especially glaucoma procedures (Figure 1). Our patient had an elevated IOP spike of 40 at the 1 week point after surgery that seemed to have caused the snuff phenomenon of central vision loss. Lowering the IOP, with medications, did not bring his vision back several months after surgery. There was no other etiology that seemed to contribute to this aside from the post op hyphema most likely caused by ciliary sulcus placement of tube, ocular hypertensive phase often associated with Ahmed Valve FP-7 placement and possible poor compliance. In a study evaluating the clinical outcomes of pseudophakic patients with uncontrolled glaucoma, the placement of Ahmed glaucoma valve tube in the ciliary sulcus was deemed "a safe and effective procedure" with hyphema being the most common post operative complication that developed in 23% of patients and resolved within one month of surgery [4]. Additionally, in a case series conducted by the Dongsan Medial Center in Daegu, Korea, Dr. Moon et al, followed the cases of two patients who were diagnosed with neovascular glaucoma and underwent an Ahmed glaucoma valve implantation to the sulcus. In comparison with those patients with implantation of the Ahmed Valve FP-7 to the anterior chamber, these patients have significantly reduced complications and were better able to maintain stable IOPs post operatively [5]. Although there are several factors that may lead to a decline in vision after glaucoma surgery, some cases are unexplained. Dr. Mohammadzadeh et. Al, discuss this phenomenon in two cases where patients underwent uneventful trabeculectomies and later sustained significant loss in vision thereafter. The loss of vision in these patients were accompanied with progressive macular thinning which could be evidence that there is a link between this cell loss and the visual decline [6]. A similar study by Dr. SK Law et. al, posits that in their comparison of glaucoma surgery complications, the unexplained snuff out phenomenon was rare and other more evident causes of vision loss after surgery in patients with advanced glaucoma include higher perioperative intraocular pressures and marked visual field loss [2]. Another study by Dr. BA Francis et al explored the risks factors that make patients more susceptible to transient versus permanent visual loss after trabeculectomy. Some patients that experienced temporary visual loss recovered some vision after 2 years. Risk factors they found in relation to the 2 percent of patients they studied with "snuff out" phenomenon include "preoperative

split fixation on visual fields, preoperative number of quadrants with split fixation, and postoperative choroidal effusions with eventual resolution." Our patient had advanced glaucoma with other pre-existing co morbidity of corneal scarring, unreliable OCT and visual field imaging and poor compliance with medication history [7]. Despite uncomplicated intraoperative surgery the small risk of snuff remains real. We share this rare case and issues that can affect snuff. Another potential cause of elevated IOP is sulcus tube malpositioning with iris obstruction. This was not noted in this case however, Dr. Satoko Asaoka et. al, reported in their study that 8% of sulcus placed tube did need repositioning [8].

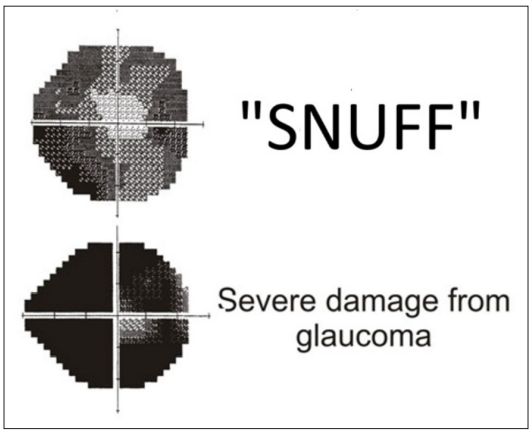

Figure1: Severe damage of glaucoma

In another study, Severe loss of central vision after a trabeculectomy with mitomycin C occurred in 6% of patients who had glaucoma with marked VF loss. These patients had higher preoperative intraocular pressures and higher rates of surgical complications. Unexplained severe loss of central vision (snuff-out) was rare [2]. Glaucoma tube blockage has been reported in about 5% of cases that can account for post-operative pressure elevation. Vitreous obstruction of the tube has been reported as well. The pathophysiology of tube obstruction is related to central and anterior displacement of vitreous that is drawn into and condenses within the proximal lumen of the tube. This can occur from days to years following GDI surgery. Successful management of vitreous-tube obstruction generally requires manual removal of the condensed vitreous plug with end-grasping forceps. This technique achieves reversal of tube blockage and restoration of GDI function. Amputation of the incarcerated vitreous alone with vitrectomy or neodymium: yttrium-aluminum-garnet vitreolysis does not consistently restore GDI function and risks persistent intraluminal tube obstruction.

Early surgical intervention in mild glaucoma patients can play a critical role in preserving vision and preventing progression to more severe stages of the disease. By addressing elevated intraocular pressure (IOP) through procedures such as early cataract extraction and minimally invasive glaucoma surgeries in patients with mild to moderate glaucoma surgeons can often effectively manage IOP levels.10 This proactive approach not only mitigates the risk of optic nerve damage but also halts the potential loss of peripheral and central vision, allowing patients to maintain their quality of life. Moreover, early intervention can reduce the likelihood of progression to advanced glaucoma and the need for more traditional secondary surgeries that can be accompanied by a small risk of "snuff" [9,10].

Conclusion

In conclusion, the snuff phenomenon is rare but real. Patients with advanced uncontrolled glaucoma will have a 100% chance of blindness without glaucoma surgery. However, there is a small but real risk of snuff as we increase the number of glaucoma surgeries globally. Patients with advanced glaucoma do have a small risk of this and careful pre-operative, intraoperative and post-operative care and meticulous follow up are required to minimize this devastating complication. Earlier cataract and microinvasive glaucoma surgery in mild to moderate glaucoma patients may reduce the number of advanced patents and need for secondary surgeries.

Patient consent

Consent to publish the case report was obtained. This report does not contain any personal information that could result in patient identification.

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