Case report

Intraocular and extraocular hemorrhage associated with ligature release of non-valved glaucoma drainage implant

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Abstract

Purpose: To report a rare complication of non-valved glaucoma drainage device surgery.
Observations: An 85-year-old pseudophakic white male presented with painless vision loss and bloody tears. He was 5 weeks removed from uncomplicated non-valved glaucoma drainage device (Baerveldt 101-350, [AMO, Santa Clara, CA]). There was serosanguinous discharge without apparent source and a 25% layering hyphema in the anterior chamber. The tube was unobstructed in the anterior chamber and not abutting the iris. There was no presence of neovascularization or other abnormal vessels in the angle. After clearing of the hyphema, the patient had persistent vitreous hemorrhage necessitating pars plana vitrectomy. No source of hemorrhage was identified.

Conclusions and importance: This is the first report of a rare occurrence of intraocular and extraocular hemorrhage associated following spontaneous release of ligature of a non-valved glaucoma drainage implant. The presumed mechanism was sudden shallowing of the anterior chamber resulting in the tube irritating uveal vasculature. We do not have an explanation for the extraocular blood.

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1. Introduction

Glaucoma is a common, blinding disease with characteristic vision loss and damage of the optic nerve. Intraocular pressure is the only known modifiable risk factor for the disease, and thus treatment centers on pressure reduction. Topical eyedrops, laser treatments and surgery have been employed for this purpose. Glaucoma drainage devices have found an increasing role in the treatment algorithm of glaucoma, and are generally well tolerated. Much like any other intervention, however, surgical complications — both intraoperative and post-operative, are not infrequent and glaucoma specialists must be adept at dealing with these issues. We herein report an undescribed post-operative complication of a non-valved glaucoma drainage device, the Baerveldt drainage implant (AMO, Santa Clara, CA).

2. Case report

An 85-year-old pseudophakic white male presented to the emergency department with painless vision loss and bloody tears in the left eye since awakening from sleep only hours prior to presentation. The patient carried a diagnosis of primary open angle glaucoma, which was end stage in the right eye (oculus dexter, OD), and advanced in the left eye (oculus sinister, OS). He was 5 weeks removed from glaucoma surgery with a Baerveldt 101-350 and scleral patch graft OS. Gonioscopy performed prior to surgery revealed open angles to scleral spur with scattered focal peripheral anterior synechiae (PAS) throughout. There was no evidence of vessels in the angle or associated with PAS. There was no neovascularization of the iris, disc, or retina. The surgery was uncomplicated and comprised of a conjunctival peritomy initiated at 4 mm posterior to the limbus extending superiorly and temporally. The Baerveldt drainage device was implanted with a 6-0 Prolene ripcord and ligated with 7-0 Vicryl. Four venting slits were created in the tube, and the tube was secured to sclera using a 9-0 nylon suture in figure-eight fashion. The scleral patch graft was cut to size and then placed over the tube. The conjunctiva was closed with 8-0 Vicryl suture and the wound found to be fluid-tight at the end of the procedure. His ocular and medical history included remote retinal detachment OD treated with a scleral buckle, uncomplicated...
phacoemulsification and posterior chamber intraocular lens implantation in both eyes (oculus uterque [OU]) 9 years earlier, aortic valve replacement, controlled diabetes mellitus, hypertension, basal cell carcinoma, mild dementia, and chronic kidney disease. Medications included aspirin 81 mg, donepezil, lisinopril, insulin, and metformin. The patient had been seen in glaucoma clinic at 1 day, 1 week, and 1 month postoperatively without evidence of complication. Intraocular pressures in the left eye ranged between 14 and 18 mmHg on dorzolamide-timolol, brimonidine, and bimatoprost. Visual acuities in the operated left eye ranged from 20/50 to 20/100. The patient denied any trauma to his eye. He denied frank eye pain but complained of mild ocular irritation, which had been present since his surgery.

On presentation, visual acuity was light perception OS and intraocular pressure was 13 mmHg. On slit lamp examination there was serosanguinous drainage from the left eye without an apparent source. The main incision was healing well with only dissolving vicryl suture left. The wound was Seidel negative. The site overlying the beveled edge of the ripcord was Seidel negative. There was no evidence of subconjunctival hemorrhage or source of external bleeding. The scleral patch graft was visible in the superotemporal quadrant and was covered with conjunctiva (Fig. 1). There was a 25% layering hyphema and the Baerveldt tube was unobstructed in the anterior chamber, and not abutting the iris (Fig. 2). The hyphema precluded a dilated fundus examination but B-scan ultrasonography revealed diffuse vitreous hemorrhage and an attached retina. After clearing of the hyphema, the patient had persistent vitreous hemorrhage for which a pars plana vitrectomy (PPV) was performed. There was no source of hemorrhage seen intraoperatively. Laboratory evaluation with prottime (PT), international normalized ratio (INR), and complete blood count (CBC) did not reveal a bleeding diathesis or blood dyscrasia. At the last postoperative visit, nearly one year out, the patient’s vision OS was worse, measured at finger-counting at face, although interestingly he feels his vision is stable, and IOP was 14 mmHg. The decrease in vision may be due to advancing glaucomatous disease or dementia, as the retina appears to be within normal limits.

3. Discussion

Hyphema and vitreous hemorrhage are both known early (<3 months) postoperative complications of glaucoma drainage devices. At 3 years of follow-up, these complications were statistically significantly more common in patients with neovascular glaucoma (NVG).2 This suggests that the mechanism of bleeding in the anterior chamber and in the vitreous cavity in these cases is secondary to disruption of abnormal neovascular tissue. Bleeding at time of surgery is not uncommon, especially if intraoperative blood enters the anterior chamber through the sclerotomy, or if the sclerotomy is performed through a highly vascularized area with inadequate cauterization. A far more uncommon cause of hemorrhage after intraocular surgery is Swan Syndrome,3,4 which has been reported after cataract extraction and glaucoma filtration procedures.

Our patient had a history of type 2 diabetes mellitus controlled on oral medications, but he did not have evidence or history of neovascularization of the iris, angle, or retina prior to surgery. He did have cataract surgery 9 years prior to glaucoma shunt implantation, but gonioscopy prior to surgery did not reveal abnormal vessels in the angle associated with PAS or adjacent to the clear corneal incisions. Swan Syndrome is reported to occur a few months to several years after the inciting surgery, and usually in surgeries with larger incisions. This patient was only 5 weeks status post glaucoma surgery, making disrupted neovascularization of the sclerostomy an unlikely source. Disruption of peripheral anterior...

Fig. 1. Oblique view OS. Scleral patch graft with overlying conjunctiva is visible superotemporally. Dried blood is noted on the lid margin.

Fig. 2. Front view OS. Mild serosanguinous drainage with 25% layering hyphema in the AC. Dilated episcleral vessels and rip cord are seen temporally. Dried blood is noted on the lid margin.
synechiae with irregular vasculature is a possible source of bleeding, but seems unlikely in this case. A membrane could form over the tube, and upon ligature release, result in hemorrhage. Our patient did not have evidence of a membrane in any of his postoperative visits, and it was not detected upon clearing of the hyphema and intraoperatively by the retina surgeon.

Surgical modification of Baerveldt implants using a ligation suture of the tube has been successful at decreasing rates of postoperative hypotony. Spontaneous opening of the ligation suture usually occurs between postoperative week 4 and 5. In the absence of neovascularization, trauma, or systemic coagulopathy, the presumed mechanism in this case was ligation suture autolysis leading to enhanced aqueous filtration, which caused a sudden decrease in anterior chamber depth and disruption of uveal vessels. This may have been due to the tube irritating the iris, although no transillumination defects were noted postoperatively. In this proposed mechanism, the vitreous hemorrhage may have been secondary to posterior translocation of blood from the anterior chamber or it may have been a concurrent event related to disrupted posterior uveal vessels.

An alternate explanation is that the intraocular hemorrhage originated from an external source such as a subconjunctival vessel. The ripcord or the patient rubbing his eye may have caused disruption of such a vessel, leading to serosanguinous drainage via a conjunctival defect and to intraocular hemorrhage via sclerotomy or shunt device. However, one might expect at least a small amount of subconjunctival hemorrhage to have been present though none was seen. Furthermore, the conjunctiva was carefully examined and determined to be Seidel negative. There was no way to confirm the source of the external bleeding as no source was identified. If blood tracked along the ripcord as it traversed out of the bleb, a track of subconjunctival hemorrhage would be expected, but was not appreciated here. The authors do not have an explanation for this unusual finding. Other etiologies include irido-tube irritation following ligature release, hemorrhage from abnormal angle vessels with pressure fluctuation (such as the Amsler sign in Fuchs heterochromic iridocyclitis), any cause of vitreous hemorrhage in the setting of a disrupted anterior hyaloid interface, such as peripheral neovascularization in pars planitis, Terson’s syndrome, and a hemorrhagic posterior vitreous detachment.

4. Conclusions

To our knowledge, this is the first case report of intraocular hemorrhage and serosanguinous discharge associated with the spontaneous opening of a non-valved glaucoma drainage implant. Although an exceedingly rare complication, hyphema and vitreous hemorrhage should be considered possible postoperative complications at the time of ligature release in non-valved glaucoma implants.

Patient consent

The patient provided oral consent for publication of personal identifying information including medical record details and photographs, which has been documented in writing on the UNC electronic medical records system.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Conflict of interest

No author from this report has any conflict of interest to report.

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