

Suprachoroidal Hemorrhage after XEN Gel Implant Requiring Surgical Drainage

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ABSTRACT

Aim: To describe a case of a patient on anticoagulation who underwent XEN45 (XEN) gel stent placement and subsequently developed kissing suprachoroidal hemorrhages (SCHs) requiring surgical drainage.

Background: Minimally invasive glaucoma surgery (MIGS) aims to achieve effective control of intraocular pressure (IOP) while minimizing the complications associated with traditional glaucoma surgeries. Rarely, a severe complication of intraocular surgery is SCH, which can result from early postoperative hypotony. The XEN gel stent is a MIGS device that theoretically avoids the risk of hypotony due to its outflow resistance properties. However, cases of SCH associated with XEN gel stents have been reported.

Case description: A monocular 86-year-old Caucasian male with glaucoma and atrial fibrillation on rivaroxaban underwent routine XEN gel stent placement with mitomycin C in his only seeing eye. On postoperative day 3, he presented with severe eye pain and worsening vision. He was found to have a SCH that gradually progressed to kissing suprachoroidals that required surgical drainage. After extensive discussion, the decision was made to hold the patient's rivaroxaban given his monocular status. The patient subsequently had a cerebral vascular accident (CVA) 1 week after drainage, but his symptoms gradually resolved after restarting anticoagulation. Two months after drainage, the patient's SCH had completely resolved, and he had recovered baseline visual acuity with excellent IOP control-off medications.

Conclusion: This case highlights the importance of quick and appropriate management of complications following glaucoma surgery, as well as discussion with patients regarding risks of treatments and return precautions. It also is a reminder that although many new surgical interventions are "minimally invasive," those like the XEN that are more effective at IOP control may have a similar risk profile to more traditional surgeries like trabeculectomy. As such, risk factors like anticoagulation use and older age should be considered in anticipation of surgical intervention.

Clinical significance: The XEN gel stent is a new surgical option for glaucoma patients that asserts a better safety profile than traditional surgeries like trabeculectomy, but our case of kissing SCHs requiring surgical intervention following XEN placement reminds us that even minimally invasive surgeries can have devastating complications.

Keywords: Anticoagulation, Case report, Cerebral vascular accident, Glaucoma, Hypotony, Kissing suprachoroidal hemorrhage, Minimally invasive glaucoma surgery, Postoperative complications, Surgical drainage, XEN45 gel implant.

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BACKGROUND

Glaucoma remains the leading cause of irreversible blindness worldwide.¹ The gold standard surgical treatment for glaucoma is trabeculectomy. However, despite the trabeculectomy's proven IOP-lowering effects, it is also associated with many complications including endophthalmitis, inconsistent filtration rates, and bleb leaks. A potentially severe but rare complication is SCH which results from early hypotony and rupture of posterior ciliary arteries.² SCH often leads to total loss of vision in the affected eye.³ In an effort to minimize such complications, MIGS techniques have been developed, one of which is the XEN (Allergan, CA) gel stent, a device that creates a subconjunctival drainage pathway. There have been case reports, however, of SCH associated with XEN gel stent placement, typically resolving with postoperative observation.⁴⁻⁶ We report here a case of postoperative SCH requiring surgical drainage and complicated by a CVA in a patient on anticoagulation.

CASE DESCRIPTION

The patient is a monocular 86-year-old Caucasian male with history of pseudophakia, primary open-angle glaucoma of the left eye, retinal detachment leading to phthisis and no light perception in the right eye, atrial fibrillation on rivaroxaban, and surgical excision of

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an intracranial hemangioblastoma in 2014 which was complicated by deep vein thrombosis and pulmonary embolism.

Despite maximal tolerated medical management including oral acetazolamide, the patient's IOP remained elevated at 26 mm Hg with progression on visual field. His best corrected visual acuity (BCVA) prior to surgery was 20/30 in the left eye. The decision was made to proceed with XEN gel implant with

mitomycin C to prevent further vision loss in this monocular patient. The patient's anticoagulation was continued, as the risks of holding anticoagulation were felt to be greater than the benefits after discussion with the patient preoperatively.

During surgery, the patient's left eye was prepped and draped in the usual sterile fashion, and a superior conjunctival peritomy was created in preparation for an ab-externo approach. After adequate anesthesia, the subconjunctival area was carefully dissected posteriorly, and topical mitomycin C 0.4 mg/mL sponges were placed for 2 minutes. The XEN needle was entered 2.5 mm posterior to the limbus and advanced to the limbus. Then the XEN gel stent was deployed into the anterior chamber. The stent was noted to be in proper position with good flow, and the conjunctiva was closed with apical wing sutures. At the end of the case, the anterior chamber was deep and there was noted to be no leakage. Subconjunctival antibiotic and steroid were injected, and topical moxifloxacin, atropine, and prednisolone were started.

On postoperative day 1, IOP in the left eye was 4 mm Hg, BCVA was 20/80, and the anterior chamber remained deep and well-formed. Fundus exam was notable for peripheral choroidal effusions. On postoperative day 2, the patient experienced worsening peripheral shadows over his left temporal field of vision, and dilated fundus exam showed a small superotemporal SCH (Fig. 1). IOP in the left eye at this time was 9 mm Hg, visual acuity was stable, and anterior chamber remained deep. The next morning, he woke up, coughed, and reported sudden-onset 10/10 eye pain and worsening vision. IOP was found to be 41 mm Hg in the left eye, and visual acuity was 20/100. Slit lamp exam showed a markedly shallow anterior chamber with a 1 mm layering hyphema. Fundus

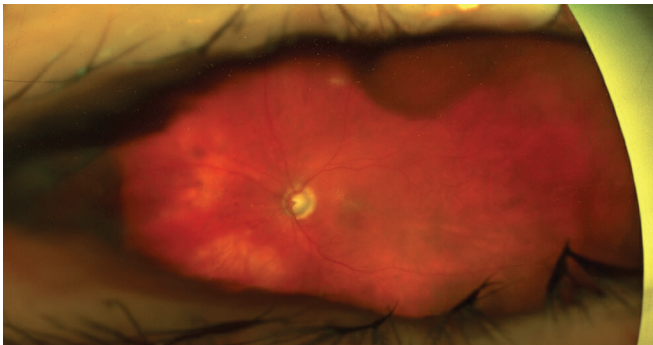


Fig. 1: On postoperative day 2, wide-field fundus photography showed a small superotemporal SCH in the left eye

exam and B-scan showed a small horseshoe tear nasally and worsened temporal and nasal SCH, so the patient was referred to the retina service.

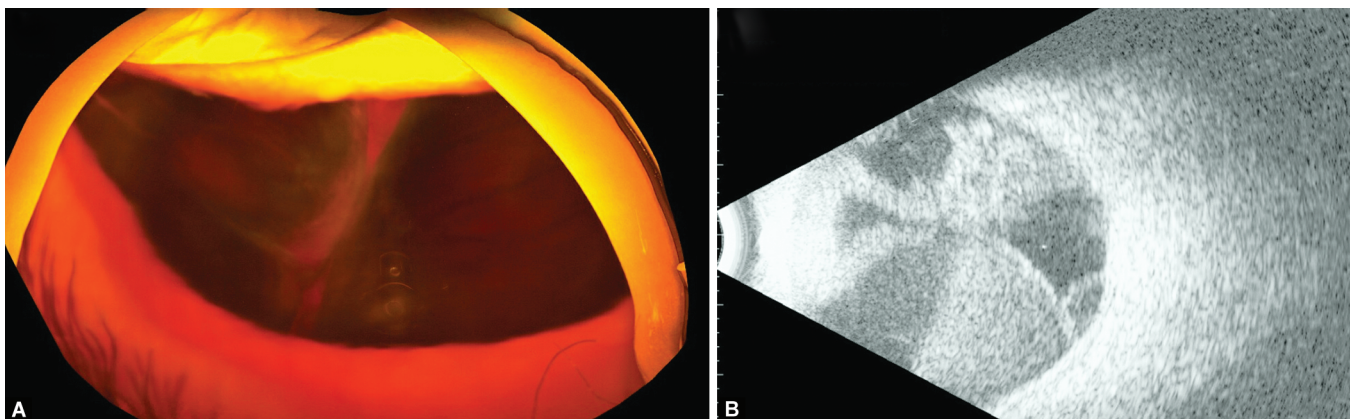
However, despite medical treatment, progression to kissing choroidals had occurred by postoperative week 1 (Fig. 2A). His visual acuity was at the hand motions level and IOP was 5 mm Hg. Laser barricade of the horseshoe tear was attempted but incomplete. B-scan showed liquefaction of the choroidals (Fig. 2B). Given the presence of kissing SCHs and liquefaction on B-scan, surgical intervention was recommended. After discussion with the patient and his cardiologist, the decision was made to hold his anticoagulation preoperatively given his monocular status. The patient underwent successful external drainage through a single sclerotomy in the superotemporal quadrant 8 mm posterior to the limbus. Retinal cryopexy was also performed under direct visualization to treat the retinal tear.

On postoperative day 1, his IOP was 7 mm Hg off IOP-lowering medications in the left eye and visual acuity was counting fingers. After extensive discussion of the risks and benefits with the patient and his family, the decision was made to continue to hold the patient's rivaroxaban until sustained improvement could be demonstrated given his monocular status. However, 1 week after surgical drainage, the patient presented to the emergency department with left-sided weakness and was found to have a transient ischemic attack (TIA). His anticoagulation was restarted, and fortunately his symptoms gradually improved with physical therapy. By 2 months after SCH drainage, the patient's vision had improved to 20/40 with resolution of his SCHs (Fig. 3), IOP was well-controlled at 10 mm Hg off all medications, and there had been no further CVA episodes.

DISCUSSION

Recent advances in the development of MIGS procedures have led to the creation of the XEN gel implant, which theoretically minimizes the risk of severe complications like suprachoroidal bleeding. The device has a 45- μ m-wide inner lumen and a length of 6 mm, which provides an outflow resistance of 6–8 mm Hg predicted by the Hagen–Poiseuille equation, which theoretically avoids hypotony, thus reducing the risk of SCH.⁷

Given that the device has been in clinical use for only 5 years, it is still unclear what its exact risk profile is. The patient we report here unfortunately developed severe SCH after XEN placement, most likely due to hypotony and anticoagulation use. There have been three



Figs 2A and B: At postoperative week 1, the eye rapidly progressed to kissing SCHs as seen on wide-field fundus photography (A) and B-scan ultrasonography, which also shows internal layering of the SCH (B). The patient's retinal tear cannot be clearly seen in the photo

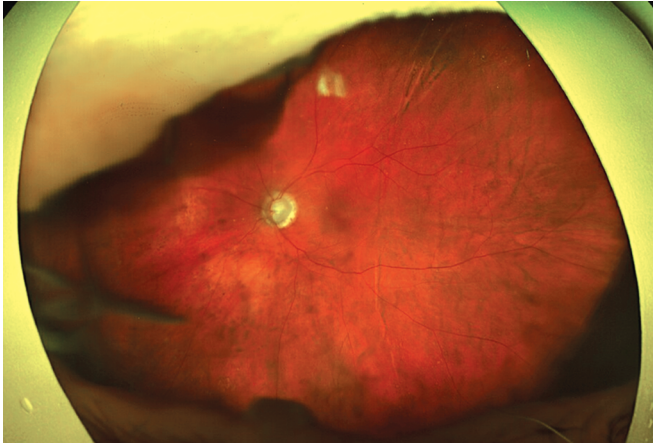


Fig. 3: Two months following surgical drainage of the patient's SCH, wide-field fundus photography showed complete resolution

other cases reported in the literature of SCH occurring in the context of XEN gel stent placement, two of which occurred 2 days after XEN placement and one of which occurred intraoperatively.^{4–6} One of these cases was complicated by retinal detachment requiring surgical intervention, while the others resolved with observation. Our case is thus the fourth reported case of SCH following XEN gel implant and the first requiring reoperation for kissing SCH.

A unique challenge existed with our case, as the patient had a history of atrial fibrillation and was on anticoagulation at the time of SCH. Stopping anticoagulation in patients with atrial fibrillation can increase the risk of stroke and other thromboembolic events. It is estimated that atrial fibrillation presents up to a 12% risk of ischemic stroke and 17% risk of TIA in patients depending on their CHA₂DS₂-VASc score.⁸ This risk is reduced by 80% in patients taking anticoagulation therapy.^{9,10} It is important that patients on anticoagulation be aware of the risks and benefits of continuing anticoagulation prior to surgical intervention, even for minimally invasive glaucoma surgeries, so that an informed and educated decision can be made. In this case, after extensive discussion, the decision was made to temporarily hold anticoagulation to allow the patient's SCH to resolve and to prevent further loss of vision in the patient's only seeing eye. It is known that anticoagulation poses a considerable risk for postoperative suprachoroidal bleeding in glaucoma patients. One study by Law et al. showed an increased risk of hemorrhagic complications during and after glaucoma surgery in patients on anticoagulant or antiplatelet therapy (10.1% in patients on anticoagulation or antiplatelets vs 3.7% in controls).¹¹ Other studies have also found that anticoagulation is a significant risk factor for delayed SCH in glaucoma surgery, with nonvalved tube shunts showing the highest rates of SCH.^{12,13} Furthermore, there have been cases of spontaneous SCH in patients taking anticoagulants.¹⁴ Fortunately, with quick and appropriate diagnosis and management, this patient was able to recover his vision, obtain excellent IOP control-off all medications, and recover from his CVA.

CONCLUSION

This case highlights the importance of quick and appropriate management of complications following glaucoma surgery, as well as discussion with patients regarding risks of treatments and return precautions. It also is a reminder that although many new

surgical interventions are “minimally invasive,” those like the XEN that are more effective at IOP control may have a similar risk profile to more traditional surgeries like trabeculectomy. Thus, risk factors such as anticoagulation use should be considered in anticipation of surgical intervention.

CLINICAL SIGNIFICANCE

The XEN gel stent is a new surgical option for glaucoma patients that claims to have a better safety profile than traditional surgeries such as trabeculectomy, but our case of kissing SCHs requiring surgical intervention following XEN placement is a reminder that even minimally invasive surgeries can have potentially devastating complications.

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