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Case report

Novel use of fibrin sealant for scleral suture free placement of a glaucoma drainage device in advanced scleral thinning

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ABSTRACT

Purpose: This reports a case using fibrin glue to secure a glaucoma drainage device plate to the sclera where there is a concern with the use of suture.

Observations: A 13-year-old patient with congenital aniridia and associated glaucoma refractory to topical medications underwent implantation of a glaucoma drainage device (GDD) for improved intraocular pressure (IOP) control. The patient had substantial scleral thinning with staphyloma formation, potentially making the use of traditional suturing techniques problematic. Fibrin glue was used to attach the GDD plate, as well the tube and patch graft which has been previously described, without sutures. The patient tolerated the procedure well with a 41% reduction in IOP at six months follow-up with no migration of the GDD from its original position.

Conclusions and importance: The use of fibrin glue in ophthalmology can be expanded to include attachment of the GDD plate to the sclera in patients with suturing contraindications.

1. Introduction

Congenital aniridia is a rare condition associated with a PAX6 gene mutation (11p13) typically affecting both eyes.[1–4] In this condition, development of the cornea, iris, lens, angle, and ciliary body can be delayed or absent.[1] Patients with congenital aniridia are predisposed to glaucoma due to maldevelopment of the iridocorneal angle[1,2,4] and secondary angle closure due mechanical blockage of the trabecular meshwork by an iris stump. Angle surgery, trabeculotomy, and goniotomy, are less likely to be successful due to iris stump apposition.[4] Therefore, surgical implantation of a GDD is a preferred technique with long term success between 66% and 100%.[1] Surgical technique traditionally utilizes sutures to secure the shunt to the sclera.[5] However, this becomes difficult in patients with thin sclera such as this, as the risk of penetrating the globe and subsequent complications is substantially increased.

Fibrin sealants represent a non-invasive option for patients with suturing contraindications. These products contain thrombin and fibrinogen, which function to utilize the final stage in the coagulation cascade to create a stable substrate for surface adhesion.[6–9] Fibrin sealants have previously been shown to be an effective technique in replacing sutures for securing the tube, patch graft, and conjunctival closure when the plate was sutured to the sclera. Herein we report a case using fibrin sealant to adhere a GDD to the sclera including the plate, tube, and graft in a pediatric glaucoma patient with advanced scleral thinning.

2. Case report

A 13 year old with past medical history of congenital aniridia and secondary glaucoma presented with poorly controlled IOP despite the use of conventional IOP lowering medications. Family history was significant only for diabetes type 2 in her mother. Despite medical management including brimonidine tartrate/timolol maleate 0.2%/0.5%, dorzolamide 2%, and travoprost 0.004%, patient's IOPs were 31 mm Hg OD and 40 mm Hg OS with progressive peripheral visual field loss.

The patient was highly myopic with refraction −10.00 OD and −7.50 OS with best-corrected visual acuities of 20/200 OD and 20/40 OS. Anterior segment ocular coherence tomography showed synechial closure of the trabecular meshwork by an iris stump and a staphylomatous thinned sclera (Fig. 1). Slit lamp biomicroscopy revealed aniridia with extensive bilateral thinning of the sclera superiorly and inferiorly more extensive OD than OS (Fig. 2). In the right eye that underwent GDD implantation, all four quadrants of

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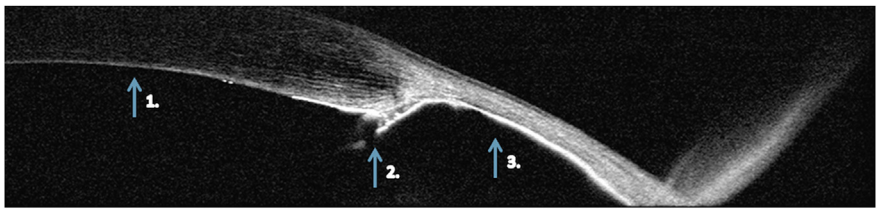

Fig. 1. Anterior Segment Ocular Coherence Tomography (AS-OCT). AS-OCT illustrating normal cornea (arrow #1), Iris stump related synechial closure of trabecular meshwork (arrow #2), Staphylomatous thinned sclera (arrow #3).

the sclera were thinned with the ectasia approaching the limbus supero-temporally where the surgery was to be performed. The optic nerves were small with extensive superior and inferior thinning, OD greater than OS.

The patient was taken to the operating room and under general anesthesia a standard superotemporal GDD implantation fornix-based conjunctival flap was performed. The Ahmed Tube Shunt Model FP-7 (New World Medical Inc., Rancho Cucamonga, CA) valve was primed and the reservoir placed in the superotemporal quadrant 10 mm posterior to the limbus and glued in place with Evicel Fibrin Sealant (Omrix Biopharmaceuticals Ltd., Kiryat Ono, Israel) taking care to apply the components only to the bottom of the reservoir. The tube was again tested with BSS to insure the valve had not become occluded by the glue. The tube was inserted into the anterior chamber through a 23-guage opening as the scleral thickness within 2 mm of the limbus appeared normal, which had been filled with viscoelastic. The tube was in good position and secured to the sclera with fibrin sealant. A split-thickness corneal patch graft measuring approximately 5 × 5mm was then fixated with the fibrin sealant. The conjunctiva was brought over the patch graft and sutured to the limbal cornea with 8–0 polygalactan suture as the cornea was not substantially thinned. At the end of the procedure, a subconjunctival injection of 2mg dexamethasone and 100mg cefuroxime was given. Combined antibiotic/steroid was placed in the interpalpebral fissure and the eye patched and shielded.

On the first postoperative day, visual acuity was 20/400 OD and 20/40 OS. IOPs were 4 mmHg OD and 20 mmHg OS. The anterior chamber was normal depth. The patient was started on moxifloxacin 0.5% and prednisolone acetate 1% four times per day for 1 month and instructed to wear protective eyewear during the day and shield at bedtime. At one week postoperatively, IOP OD showed a 70% decrease from 31 mmHg prior to the operation to 10 mmHg. Visual acuity improved to 20/200 OD. One month postoperatively, the IOP OD had increased to 42 mmHg. The prednisolone acetate was tapered over two weeks and topical ocular hypotensive medications were restarted in the operative eye for presumed hypertensive phase. Acuity was stable from the previous visit. Six months after surgery the tube was well covered and in good position (Fig. 3). The plate was not displaced and the patient had no pain or irritation. Visual acuity remained stable and IOP OD was well controlled with topical medications at 17 mmHg, a 45% reduction from 31 mmHg prior to the operation.

3. Discussion

Medical management of glaucoma in patients with congenital aniridia can be difficult and may require both pharmacological and surgical interventions. Placement of a GDD is often necessary in patients with refractory glaucoma.[10] The use of a GDD, however, may be complicated in a patient with extensive scleral thinning due to the excessively high risk of scleral perforation with traditional suturing techniques. Fibrin glue fixation represents an alternative technique in this unique population.

Fibrin glue was first used in the field of ophthalmology in the 1940s to fixate corneal grafts in rabbits.[6] Advantages to using fibrin glue include decreasing operation time,[11] likelihood of infection, post-op irritation, and inflammation. Today, it is used in conjunctival, pterygium, strabismus, corneal, refractive, lens, vitreo-retinal, lid and adnexal, reconstructive, and glaucoma surgeries.[6] These sealants seem particularly indicated for patients that suturing may put at risk for surgical complications such as globe perforation or infection.

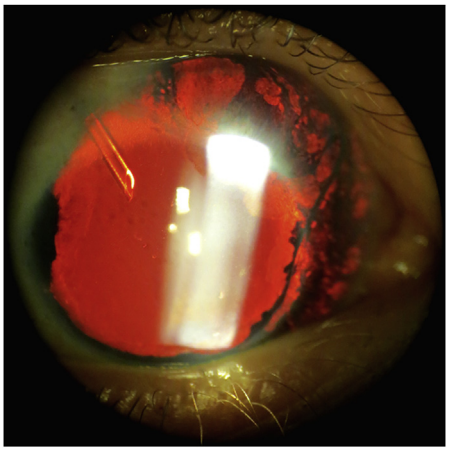

Fig. 2. Slit lamp retro-illumination photo. Right eye illustrating thinned sclera, anterior segment dysgenesis with aniridia and anterior chamber tube placement.

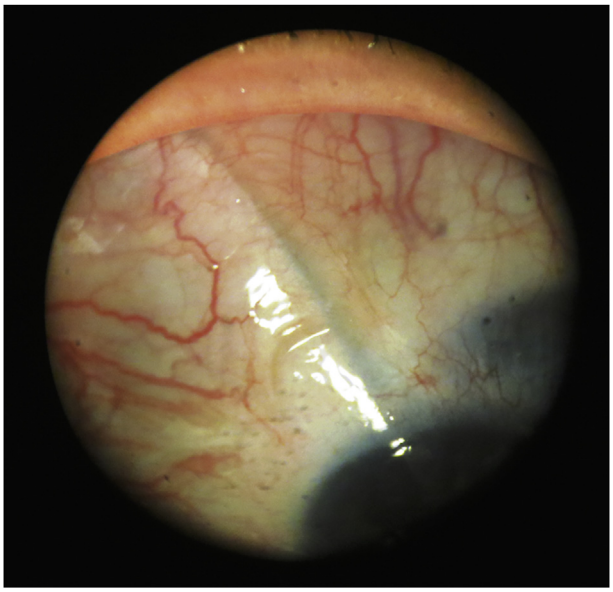

Fig. 3. Six months post-operative. Tube well covered under conjunctivae with no anterior migration of the plate.

Sternberg et al.[12] successfully demonstrated the use of fibrin adhesive to secure a scleral buckle in a patient with a scleral thinning to reduce risk of subsequent globe perforation. Fibrin glue has also demonstrated success in preventing postoperative hypotony after GDD surgery by sutureless closure of a leaking scleral flap.[8] In addition, there have been several GDD studies supporting the use of fibrin glue products for securing the tube,[11,13] scleral patch graft,[7,9,11,13,14] and conjunctivae[11] in both the adult and pediatric[7] populations, but none investigating its use in securing the plate itself.

When considering a patient with extensive scleral thinning, fibrin glue may be highly advantageous to avoid globe perforation. Possible limitations to the use of fibrin glue include potential migration of the GDD reservoir and tube presumably due to inadequate adhesion which could be more likely if the patient had previously been treated with anti-fibrotic agents, hypersensitivity, anaphylaxis, urticaria, edema and pyrexia.[15] Also, since fibrin sealants contain human blood products, there is a theoretical risk of transmitting infectious agents such as viruses and Creutzfeldt-Jakob disease per the manufacturer,[15] but none have been reported. Our patient demonstrated successful adherence of the plate, tube, and patch graft with sutures only used in closure of the conjunctiva. The patient tolerated the product well, did not experience migration of the GDD, and reached the target IOP with adjunctive topical medications.

4. Conclusion

Glaucoma necessitating surgical management utilizing a GDD in the presence of scleral ectasia or other reason to avoid the placement of scleral sutures can be difficult. Fibrin glue has minimal biological reactivity, is well tolerated, and has been described as an adjunct for portions of glaucoma drainage implant surgery. This case represents a technique to secure the glaucoma drainage device plate to the sclera as well as previously described tube and patch graft. The surgery successfully reduced the patient's intraocular pressure to her goal IOP with the aid of topical medications. The use of fibrin-based adhesives is a suitable alternative in patients where the use of sutures is undesirable.

Patient consent

Consent to publish the case report was obtained and is on file.

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Conflict of interest

The following authors have no financial disclosures: JDH, BDM, RLG.

Authorship

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

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References

1. Arroyave CP, Scott IU, Gedde SJ, Parrish RK, Feuer WJ. Use of glaucoma drainage devices in the management of glaucoma associated with aniridia. *Am J Ophthalmol*. 2003;135(2):155–159.
2. Calvão-Pires P, Santos-Silva R, Falcão-Reis F, Rocha-Sousa A. Congenital aniridia: clinic, genetics, therapeutics, and prognosis. *Int Sch Res Not*. 2014;2014:1–10.
3. Ihnatko R, Eden U, Fagerholm P, Lagali N. Congenital aniridia and the ocular surface. *Ocul Surf*. 2016;14(2):196–206.
4. Lee H, Khan R, O'keefe M. Aniridia: current pathology and management. *Acta Ophthalmol*. 2008;86(7):708–715.
5. Almousa R, Lake DB. Intraocular pressure control with Ahmed glaucoma drainage device in patients with cicatricial ocular surface disease-associated or aniridia-related glaucoma. *Int Ophthalmol*. 2014;34(4):753–760.
6. Panda A, Kumar S, Kumar A, Bansal R, Bhartiya S. Fibrin glue in ophthalmology. *Indian J Ophthalmol*. 2009;57(5):371–379.
7. Freeman PD, Kahook MY, Curtis TH. Glaucoma drainage device implantation in children using fibrin glue. *J AAPOS*. 2010;14(2):169–171.
8. Välimäki J. Fibrin glue for preventing immediate postoperative hypotony following glaucoma drainage implant surgery. *Acta Ophthalmol Scand*. 2006;84(3):372–374.
9. Choudhari NS, Neog A, Sharma A, Iyer GK, Srinivasan B. Our experience of fibrin sealant-assisted implantation of Ahmed glaucoma valve. *Indian J Ophthalmol*. 2013;61(1):23–27.
10. Hong C-H, Arosemena A, Zurakowski D, Ayyala RS. Glaucoma drainage devices: a systematic literature review and current controversies. *Surv Ophthalmol*. 2005;50(1):48–60.
11. Kahook MY, Noecker RJ. Fibrin glue-assisted glaucoma drainage device surgery. *Br J Ophthalmol*. 2006;90(12):1486–1489.
12. Sternberg P, Tiedeman J, Prensky J. Sutureless scleral buckle for retinal detachment with thin sclera. *Retina*. 1988;8(4):247–249.
13. Choudhari NS, Neog A, Latka S, Srinivasan B. Fibrin sealant-assisted revision of the exposed Ahmed tube. *Middle East Afr J Ophthalmol*. 2015;22(1):115–116.
14. Zeppa L, Romano M, Capasso L, Tortori A, Majorana M, Costagliola C. Sutureless human sclera donor patch graft for Ahmed glaucoma valve. *Eur J Ophthalmol*. 2010;20(3):456, 451.
15. Evicel. Highlights of prescribing information. Available at http://www.fda.gov/downloads/ApprovedProducts/ucm114073.pdf. Accessed February 5, 2017.