

Implantation of an Alternative, Novel Glaucoma Drainage Device in the Treatment of Congenital Glaucoma Following Two Failed Filtration Surgeries

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ABSTRACT

Objective: To describe a novel glaucoma drainage device fashioned from a scleral buckle and nasolacrimal silicone tube.

Method: This is a case report and a description of a surgical technique.

Results: A 6-year-old boy with congenital glaucoma who underwent 2 failed filter surgeries had medically uncontrolled intraocular pressures (IOP). Due to limited funds for a second glaucoma drainage device, the author utilized a portion of a scleral buckle and nasolacrimal silicone tube – the same raw materials used in the Schocket implant – to fashion a novel, non-valved glaucoma shunt that was implanted in the patient's eye. Post-operatively, IOP was 8-10mmHg. This was sustained for 12 months without the need for supplemental anti-glaucoma medications. Postoperative complications included tube migration resulting in localized corneal decompensation and cataract formation.

Conclusion: The alternative GDD made from a portion of a scleral buckle and silicone tube may be an effective and economical alternative to the GDDs available in the market.

Keywords: Second glaucoma shunt insertion, failed glaucoma shunt, alternative glaucoma drainage device, congenital glaucoma, Schocket implant

Managing a failed glaucoma drainage device (GDD) is a daunting task even for an experienced glaucoma surgeon. Administration of anti-glaucoma drops is usually the first-line treatment in such cases. However, if medical therapy is inadequate, more invasive procedures such as laser or surgical bleb revision may be required.¹ This is especially challenging in the pediatric population where the patient's cooperation is needed during laser procedures or injection of subconjunctival anti-fibrotics.

Implanting a second GDD is one of the surgical options in managing a failed glaucoma shunt. This can be particularly burdensome to the patient considering that these devices can still fail. The failure rate of implanting a second GDD ranges from 13.6%-60%, depending on the definition of failure in each study.¹⁻⁶ Additionally, some surgeons will opt to use a different shunt for the second implant. However, there is limited published data about the success rates of implanting the same device or using a different one.¹

All GDDs consist of a silicone tube connected to a drainage plate. The tube drains the aqueous from the anterior chamber to the plate which functions to maintain a draining bleb or capsule. Of interest to this case is the Schocket tube implant. It uses an existing scleral buckle or an encircling band from a previous retinal surgery as the draining plate, while a silicone tube is attached from the inner capsule that has formed over the buckle/band extending to the anterior chamber.^{7,8,9} This study used the same raw materials as the Schocket implant to fashion a more affordable alternative GDD for the patient.

CASE REPORT AND SURGICAL TECHNIQUE

This is a case of a 6-year-old boy with congenital glaucoma who underwent trabeculectomy on the right eye. Two months after the first filtering procedure, due to a scarred bleb, a non-valved GDD (Aurolab Aqueous Drainage Implant, Aurolab) was inserted. His intraocular pressure (IOP) was initially controlled at low- to mid-teens.

However, 6 months after the glaucoma shunt insertion, the IOP increased to low 20s mmHg. This was initially controlled with a topical beta-blocker medication. At 7 months post-op, IOP remained elevated despite maximum tolerated medications or after removal of the ripcord suture.

The plan was to implant a second glaucoma shunt at the inferonasal bulbar area. However, due to financial constraints, a cheaper, alternative, novel GDD was fashioned from readily available materials in the hospital pharmacy, namely, a scleral buckle and nasolacrimal stent. The alternative GDD was created from a 1.5 cm portion of a scleral buckle with the edges trimmed to make them round. This served as the silicone plate of the shunt. Two holes located at the middle and near one end of the silicone plate were created. A silicone tube, obtained from a nasolacrimal stent, was passed through the underside portion of the middle hole, and then threaded to the topside of the other hole, to exit in the underside (**Figure 1**). The end of the tube entering the middle hole was made long enough to reach the anterior chamber. Nylon 4-0 was inserted through the silicone tube to function as a ripcord. Vicryl 6-0 was used to ligate the longer end of the tube near the plate, ensuring a watertight seal to prevent aqueous from initially reaching the plate posteriorly.

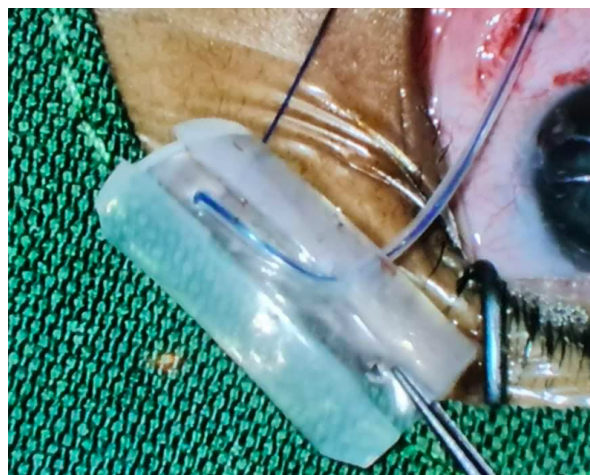


Figure 1. Alternative, novel glaucoma shunt using a scleral buckle and nasolacrimal silicone tube.

Informed consent describing the procedure was signed by the patient's mother.

The patient underwent implantation with the alternative GDD under general anesthesia. After asepsis and antisepsis procedures were done, a surgical drape was placed and an eyelid retractor was applied. Conjunctival peritomy was performed at the inferonasal quadrant between the medial and the inferior recti muscles of the right eye. Tenon's capsule was dissected away from the sclera and the bleeders were cauterized. The silicone plate was inserted about 8-10 mm away from the limbus and secured with nylon 10-0 (**Figure 2**). The silicone tube was trimmed to a length permitting 2-3 mm insertion into the anterior chamber and the bevel facing upwards. An anterior chamber paracentesis was formed. A partial thickness 4x4 mm limbus-based scleral flap was created at the position of the tube. A gauge 21 needle tract was created under the scleral flap, 2-3 mm posterior to the limbus, then advanced anterior and parallel to the iris plane. The silicone tube was inserted into the needle tract. The scleral flap was sutured over the tube with nylon 10-0. Finally, the Tenon's capsule and conjunctiva were anchored to the limbus with nylon 10-0 to seal the surgical site. Post-operative medications included steroid and antibiotic eye drops.

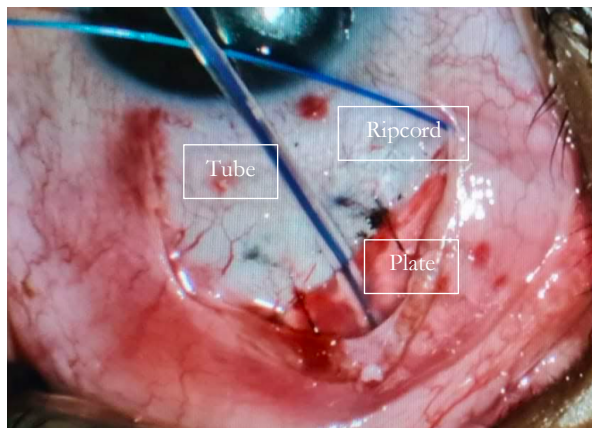


Figure 2. The silicone plate anchored to the sclera..

Postoperatively, IOP was 8-10 mmHg. There were no signs of infection or implant rejection (**Figure 3**). On the third month post-op, the patient developed a posterior subcapsular cataract (**Figure 4**). A minor post-op complication was implant migration anteriorly. The tube touched the corneal endothelium resulting in a localized corneal edema.

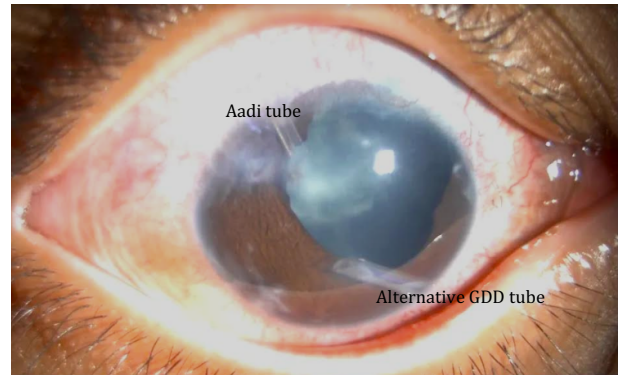


Figure 3. The scleral buckle serving as the plate.



Figure 4. Photo taken at 3 months post-op showing superior and inferior tubes in the anterior chamber with a cataract.

DISCUSSION

The author reported implantation of an alternative glaucoma shunt fashioned out of a scleral belt and nasolacrimal tube in a child with congenital glaucoma who had undergone 2 failed drainage procedures. Post-operatively, IOP was consistently measured to be 8-10 mmHg.

Tube migration is not an uncommon complication following GDD implantation. This is more common in children since their sclerae are still soft and pliable, making their axial lengths variable with IOP fluctuation. The varying globe size results in unpredictable tube positions after the surgery. The patient's tube can easily be trimmed once cataract surgery is performed to address the localized corneal edema. The risk of tube displacement can be lessened by ensuring that the silicone plate is firmly anchored

to the underlying sclera. Another possible solution is to utilize a wider silicone plate that can be tucked under the recti muscles, effectively anchoring the device at the equator of the globe.

This alternative glaucoma shunt may be particularly beneficial in resource-poor countries wherein the cost of even the cheapest GDD may be prohibitive. Long-term follow-up on its efficacy and safety are clearly needed.

This case presentation was able to demonstrate that an alternative GDD made from a scleral buckle and the silicone tube of a nasolacrimal stent may be a viable and cheaper alternative to the GDDs available in the market.

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