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Use of the Aurolab Aqueous Drainage Implant as a buckling element in pediatric retinal detachment with a preexisting glaucoma drainage device

Deeksha Katoch *, Sabia Handa, Simar Rajan Singh, Uday Tekchandani, Ramandeep Singh, Surinder Singh Pandav, Sushmita Kaushik

Advanced Eye Centre, Department of Ophthalmology, Post Graduate Institute of Medical Education and Research, Chandigarh, India

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ABSTRACT

Purpose: To describe a novel technique for repair of rhegmatogenous retinal detachment in an eye with a previous non-valved glaucoma drainage device, the Aurolab Aqueous Drainage Implant (AADI).
Observations: A 5-year-old child with bilateral primary congenital glaucoma presented with an inferior retinal detachment (RD) in the left eye. The left eye had a history of multiple surgical interventions including combined trabeculotomy and trabeculectomy done twice, AADI implantation and subsequently phacoaspiration with IOL implantation, 18 months prior to presentation. The left eye retinal detachment was managed by scleral buckling technique using the plate of the AADI as a buckling element without its explantation.
Conclusions: AND IMPORTANCE: Management of retinal detachment in eyes with a pre-existing glaucoma drainage device (GDD) is uniquely challenging. Explantation of the GDD would likely result in intractable glaucoma post-operatively, requiring another surgery. Use of the trimmed plate of the GDD itself as the buckling element helped in settling the RD and preserving intraocular pressure control.

1. Introduction

Management of rhegmatogenous retinal detachment (RRD) in eyes with a pre-existing glaucoma drainage device (GDD) poses a unique surgical challenge. The existing literature on the management of such cases is sparse.[1–4] Pars plana vitrectomy (PPV) with or without encircling band and intraocular tamponade is considered the approach most likely to achieve retinal reattachment in these cases. Primary scleral buckle has been rarely attempted in such cases.[1,2] We describe the successful management of RRD in a child with advanced glaucoma and pre-existing non-valved GDD using a segmental 277 buckle and the trimmed plate of the GDD as the buckling elements.

2. Case presentation

A 5-year-old girl presented with sudden onset loss of vision in the left eye for five days. She was a known case of Primary Congenital glaucoma OU and had previously undergone combined trabeculotomy-with-trabeculectomy (CTT) in both eyes. Postoperatively, the right eye developed an inoperable retinal detachment progressing to pthisis bulbi. A repeat trabeculotomy with trabeculectomy with Mitomycin C in the left eye was done a year later, followed by goniotomy of the untreated angle. Two years prior, placement of a non-valved GDD [Aurolab Aqueous Drainage Implant, (AADI)],[5] identical in design to the Baerveldt Glaucoma Implant in the inferonasal quadrant of the left eye was done, followed by phacoaspiration with intraocular lens implantation 6 months later. She maintained a Cardiff visual acuity of 6/24, and intraocular pressure remained controlled on two topical medications thereafter. Current examination revealed best-corrected visual acuity of hand motions in the left eye. Intraocular pressure was 10 mm Hg on topical Dorzolamide 0.2 % - Timolol 0.5 % combination. Anterior segment examination revealed Haab's striae, AADI drainage tube in the inferonasal anterior chamber, a superior peripheral iridectomy and a posterior chamber intraocular lens (PCIOL) in the capsular bag. Posterior segment revealed a pre-retinal hemorrhage at the macula and a macula off inferior retinal detachment with a break at 6 o' clock. The retinal detachment was confirmed on optical coherence tomography (OCT) (Fig. 1). Considering the child's young age, advanced glaucoma and the inferior rhegmatogenous retinal detachment, a scleral buckling with subretinal fluid drainage as the primary procedure was planned and vitrectomy with silicon oil tamponade was kept as the second option.

* Corresponding author. Advanced Eye Center, Sector 12, Post Graduate Institute of Medical Education and Research, Chandigarh, India.
E-mail address: drdeekshakatoch@yahoo.in (D. Katoch).

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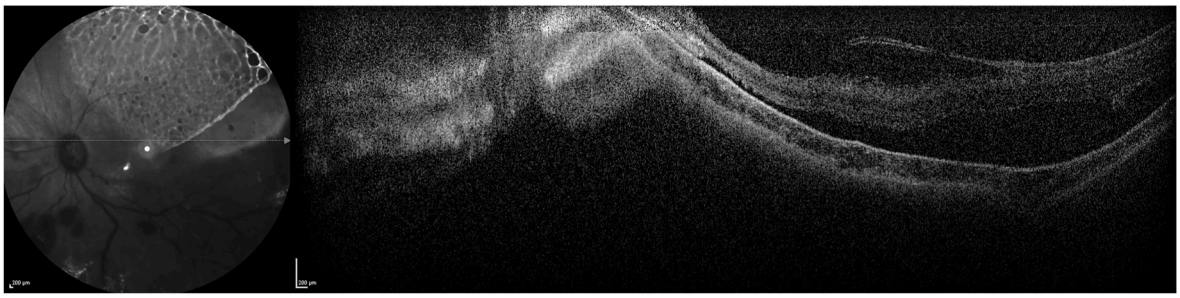

Fig. 1. Preoperative spectral domain OCT of left eye showing inferior retinal detachment involving the macula.

3. Surgical technique step by step

A 360-degree conjunctival peritomy was done. All four recti were bridled. The AADI tube with an intact scleral patch graft covering the proximal portion was visualized in the inferonasal quadrant (Fig. 2a). The tube was ligated tightly using a absorbable 6-0 polyglactin suture to avoid intraoperative hypotony (Fig. 2b). Cryopexy of the inferior retinal break were done. The fibrous capsule over the plate was identified and incised to expose the plate (Fig. 2c). No hypotony occurred during the excision of the capsule. The posterior half of the AADI plate was cut partially to utilize the anterior half as a component of scleral buckle (Fig. 2d). The temporal end of the plate was then exposed after incising the overlying capsule (Fig. 2e). A 240 silicone band was passed in all the quadrants (Fig. 2f). In the inferonasal quadrant, the silicone band was passed over the GDD plate, and two mattress 5-0 dacron sutures were applied using the slit holes of the plate as hinges so that the episcleral plate was incorporated as a component of the scleral buckle (Fig. 2g). A 277 solid silicone explant was placed in the inferotemporal quadrant and secured with mattress sutures (Fig. 2h). External drainage of subretinal fluid was performed. Final tie of mattress sutures, checking of the intraocular pressure and height of the buckle was done and the surgery was completed with closure of the conjunctival peritomy (Video 1). For the initial six weeks intraocular pressures remained high and required maximal antiglaucoma medications. At 6 weeks, the ligature absorbed and the IOP dropped to 0 mmHg. All medications were stopped and a short course of intensive topical steroids and cycloplegics was given. The IOP gradually increased and was controlled at 10 mmHg. At last follow up, 2 years post scleral buckling surgery, child had visual acuity of 6/24 with controlled IOP and an attached retina (Fig. 3a and b).

Supplementary video related to this article can be found at https://doi.org/10.1016/j.ajoc.2023.101962

4. Discussion

Presence of a GDD in an eye with RRD poses unique surgical challenges. The episcleral plate of GDD may be located in an area where scleral buckle has to be placed or cryotherapy has to be performed. To further complicate the situation, the patch graft may interfere with conjunctival dissection and creation of sclerotomy. However removal of the GDD could be perilous in view of the advanced glaucoma and the near certainty of subsequent IOP rise following RD surgery. Most of these eyes would have undergone multiple prior surgeries. Subsequent glaucoma surgery in these sick eyes may have a high risk of failure. Keeping these factors in mind use of the plate of the AADI as the buckling element without explanting it ensures both external tamponade as well as a functioning GDD. The idea of shifting the GDD superiorly to allow placement of the 277 buckle inferiorly was not considered as inferior placement of the AADI tube would become a prerequisite should the child require a vitrectomy with silicon oil tamponade subsequently. The risk of hypotony has to be kept in mind once ligature absorbs, as AADI is a non-valved implant and a close follow-up is warranted at the 4–6 week period to detect it.

Published reports on the management of retinal detachment in eyes with a GDD are sparse and advocate Pars Plana Vitrectomy (PPV) with or without placement of an encircling scleral band with reattachment rates of 56–80 %.[1,2] Benz et al. reported the outcomes in 10 such patients. Initial RRD repair consisted of 4 strategies - PPV, fluid–gas exchange, and endolaser in 4 patients; scleral buckling procedure in 2 patients; pneumatic retinopexy with cryotherapy in 1 patient and combined PPV and encircling band in 3 patients. In eight out of ten patients, the fibrous capsule of the GDD was avoided while remaining two patients underwent modification of the GDD at the time of surgery. The first patient underwent removal of the GDD. In the second patient, the plate was dissected out and reflected over the cornea to allow for placement of scleral buckle. The tube was then ligated with a 7-0 Vicryl suture, and the plate was reattached over the band. Kim et al. presented a new surgical technique in which the encircling band was attached to the Baerveldt glaucoma implant to incorporate as a component of the encircling scleral band.[3]

We present here a novel technique of trimming and using the episcleral plate of the AADI itself as a buckle in a child with advanced glaucoma and multiple prior interventions. This technique may also be possible with other GDDs having similar plate designs. This technique provides an alternative to pars plana vitrectomy and silicon oil tamponade as well as avoids explant of the GDD which can be problematic in cases where multiple surgeries have already been done. However, the suitability of this approach in eyes with a pre-existing glaucoma drainage device can be better validated with more number of cases.

Claim of priority

After conducting a literature review on utilizing PubMed and Google Scholar using the key words Aurolab aqueous drainage implant, rhegmatogenous retinal detachment, pediatric we did not find any prior reports of scleral buckling surgery used as a treatment option in an eye with glaucoma drainage device (GDD) in which the episcleral plate of GDD was used as a buckling element.

Patient consent

Consent to publish this case report has been obtained from the patient in writing.

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Authorship

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

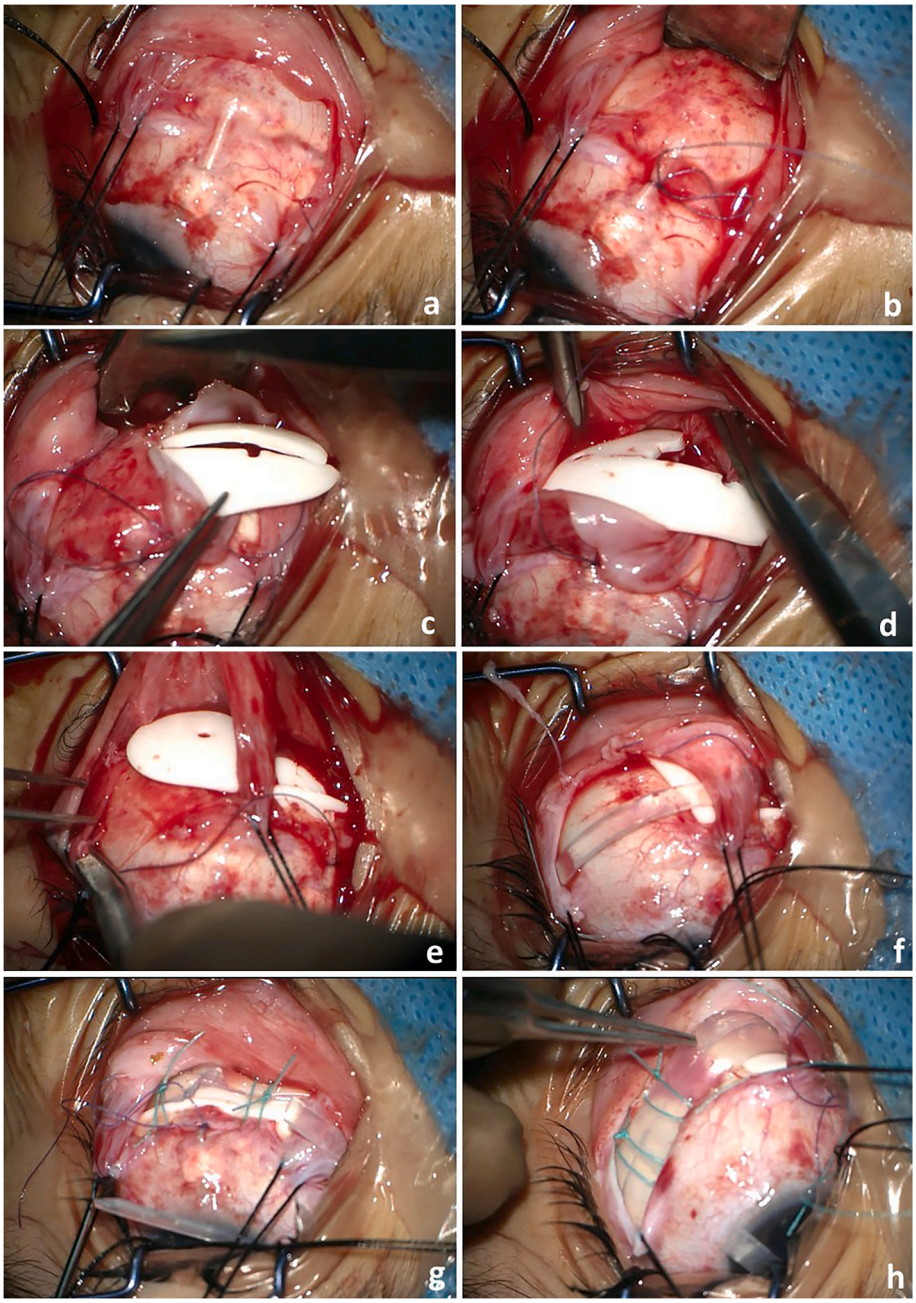

Fig. 2. (a–h): Surgical steps showing the AADI tube with an intact scleral patch graft in the inferonasal quadrant (Fig. 2a). The tube is ligated using a 6-0 vicryl suture (Fig. 2b). The thick fibrous capsule over the plate is incised to expose the plate (Fig. 2c). The posterior half of the AADI plate is cut to utilize the anterior half as a component of scleral buckle (Fig. 2d). The temporal end of the plate is exposed after incising the overlying capsule (Fig. 2e). A 240 silicone band is passed in all the quadrants (Fig. 2f). In the inferonasal quadrant, the silicone band is passed over the incised half of the GDD plate and two mattress 5-0 dacron sutures are applied using the slit holes of the plate as hinges so that the episcleral plate is incorporated as a component of the scleral buckle (Fig. 2g). A 277 solid silicone explant is placed in the inferotemporal quadrant and secured with mattress sutures (Fig. 2h).

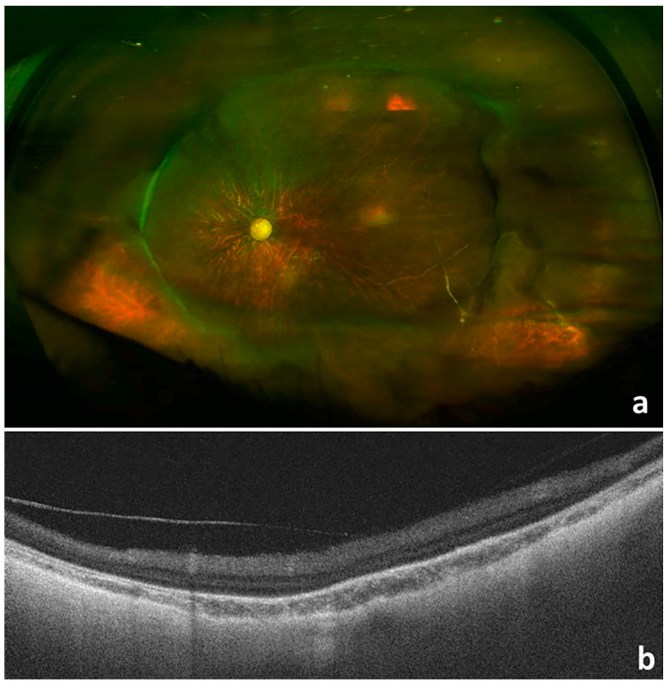

Fig. 3. Postoperative wide field fundus photograph showing an attached retina with good buckle indent (a) and postoperative OCT showing a dry macula (b).

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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"None"

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ajoc.2023.101962.

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