



# Successful needling of previous failed deep-sclerectomy in a child with primary congenital glaucoma

Mohammed Dibaji<sup>a,\*</sup>, Amjad Al Harbi<sup>b</sup>, Rizwan Malik<sup>a</sup>

<sup>a</sup> Glaucoma Division, King Khalid Eye Specialist Hospital, Riyadh, Saudi Arabia

<sup>b</sup> College of Medicine, Qassim University, Qassim, Saudi Arabia

## ARTICLE INFO

### Keywords:

Childhood glaucoma  
Primary congenital glaucoma  
Deep sclerectomy  
Needling  
Revision surgery

## ABSTRACT

**Purpose:** To illustrate the successful of needling with subconjunctival antimetabolite in failed deep-sclerectomy (DS) in congenital glaucoma. To the best of our knowledge, this is the first report of successful needling of DS in a child with congenital glaucoma.

**Observations:** A 14-year-old boy with unilateral congenital glaucoma in the right eye underwent goniotomy followed by DS two-years ago with no improvement. Upon pre-operative examination, visual acuity was (20/200) improved with pinhole (20/70). The intraocular pressure was 28 mmHg. Under slit lamp, there was a scarred bleb, large clear buphthalmic cornea and 0.9 cup-to-disc ratio in the right eye. The patient was scheduled for needling of failed DS with subconjunctival antimetabolite for right eye under general anesthesia. One year post-operatively, the child maintains best corrected visual acuity of 20/70 with and intraocular pressure of 15 mmHg without the need for glaucoma drops.

**Conclusions and importance:** Needling of failed DS may be a viable option in childhood glaucoma for maintaining IOP and preserving the other conjunctival quadrants for future glaucoma surgeries.

## 1. Introduction

Congenital glaucoma is one of major causes of bilateral childhood blindness in the developing countries and in Saudi Arabia.<sup>1,2</sup> The main treatment of congenital glaucoma is surgical and classical primary surgical procedures of choice in childhood glaucoma are goniotomy, trabeculotomy and trabeculectomy. However, these procedures are penetrating, which increases the risk of intraoperative complications such as inflammation, lens injury, iris trauma, hypotony and Choroidal detachment.<sup>3,4</sup> Further these angle-based surgeries are not as effective in CYP1B1-associated primary congenital glaucoma that is commonly seen in the Middle East.<sup>5</sup> Non-penetrating deep-sclerectomy provides a good long-term intraocular pressure reduction with a favorable safety profile.<sup>6</sup> However, the procedure may eventually fail in a small number of eyes.<sup>7</sup> Here, we propose needling of failed DS as a viable surgical option before considering other types of glaucoma surgery. Piercing of trabeculodescemet membrane unintentionally and intentionally at time of DS has been demonstrated in the literature with favorable outcomes,<sup>6,8,9</sup> but in this case, we allowed the tissue healing before full thickness penetration is performed. Some reports have demonstrated the role of transconjunctival needle revision of failed DS in the adult

population<sup>10-12</sup> and to the best of our knowledge, this is the first report of successful needling of DS in a child with congenital glaucoma, with the procedure being described only in adult eyes with open-angle glaucoma.

## 2. Case report

A 14-year-old boy, with primary congenital glaucoma, known to be epileptic controlled on carbamazepine 400 mg orally twice a day. He had been seen in his local hospital since early childhood with a diagnosis of a primary congenital glaucoma and presented with advanced disease at our tertiary center. He had previously undergone failed goniotomy surgery nasally for 4-5 clock hours without involvement of the superior quadrant of the AC angle at age 12 years. Four months later, he underwent DS at 12 o'clock in the right eye. Five months after DS, he was on antiglaucoma drops for the right eye, a combination of dorzolamide 2% and timolol 0.5% (Xolamol, Jamjoom pharmaceuticals company; Jeddah, Saudi Arabia) twice daily, and Apraclonidine Hydrochloride 0.5% (Iopidine 0.5% Ophthalmic Solution, Alcon Laboratories, Inc; Fort Worth, Texas, United States) twice daily and latanoprost 0.005% (Xalatan 0.005% eye drop, Pfizer; Zaventem, Belgium) once daily at bed

\* Corresponding author.

E-mail address: [dr.m.q.h.d@hotmail.com](mailto:dr.m.q.h.d@hotmail.com) (M. Dibaji).

<https://doi.org/10.1016/j.ajoc.2020.100795>

Received 23 April 2020; Received in revised form 9 June 2020; Accepted 17 June 2020

Available online 24 June 2020

2451-9936/© 2020 The Authors.

Published by Elsevier Inc.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

time. On examination, his visual acuity (VA) in the right eye uncorrected was (20/200) and with pinhole (ph) (20/70); left eye (20/20) uncorrected. The intraocular pressure (IOP) was 28 mmHg in right eye, 15 mmHg left eye by Goldmann applanation tonometry. He was noted to have normal lids both eyes, quiet conjunctiva a scarred bleb right eye at the site of previous DS, large clear buphthalmic cornea, The anterior-chambers (AC) were deep and quiet in both eyes, the pupils round regular reactive with a right relative afferent pupillary defect, normal iris, lens clear both eyes, Fundus examination showed flat retinae with cup-to-disc (C/D) ratios of 0.9 in the right eye and 0.3 in the left eye with average-sized discs for his age, normal macula and blood vessels both eyes, the central corneal thickness right eye was 648  $\mu\text{m}$ , left eye 603  $\mu\text{m}$ . The Goldmann visual field showed inferior scotoma right eye (Fig. 1), with a full visual field in the left eye. The impression at this stage was primary childhood non-acquired glaucoma (congenital glaucoma) with post-failed DS in the right eye on full topical antiglaucoma eye drops and above target eye pressure in the right eye.

As the child was not cooperative for laser goniotomy, the scleral flap was clearly visible during the examination and needling of DS had been reported as a successful procedure in adult open angle glaucoma,<sup>10,11</sup> the patient was scheduled for needling of failed deep-sclerectomy with subconjunctival antimetabolite. The child and parents were counseled about the nature of this procedure, possible risk of hypotony and the possible need for further glaucoma surgery in the case of failure.

Description of procedure: After general anesthesia, the right eye was prepped and draped in the usual sterile ophthalmic manner. A wire lid speculum was applied to open the eye. A 6/0 vicryl corneal traction suture was placed at 12 o'clock, and eye retracted inferiorly. Then posterior conjunctival entry with 27-Gauge needle then dissection of the scarred conjunctiva was made with needling under scleral flap with some provisc injected under the conjunctiva. A puncture into the AC was made with the needle. Mitomycin C 0.25 ml (Mitomycin C 0.2mg/ml,

Intas Pharmaceuticals limited, Ahmedabad, India) injected posterior to conjunctival entry site followed by copious irrigation. There was no leak from entry site at the end of procedure. A small bubble of 15% C3F8 was injected into the AC with a 30-gauge needle to keep it deep and avoid the need for post-operative reformation, as per surgeon preference. Subconjunctival dexamethasone sodium phosphate (2 mg/0.5 ml) (Oradexon ampules, Organon; Oss, Netherlands) and cefazolin sodium (50 mg/0.5 ml) (Cefazolin Vial, Sandoz; Kundl, Austria) were given in the inferior fornix. topical neomycin sulphate, polymyxin B sulphate and dexamethasone (Maxitrol eye ointment, Novartis Pharma AG; Basel, Switzerland) and atropine sulphate 1% (Riatriopine 1% eye ointment, Riyadh Pharma; Riyadh, Saudi Arabia) were applied, an eye pad placed and the patient left the operating room in a good condition.

First-day post-operatively, the child was comfortable, with VA uncorrected 20/100, IOP 06 mmHg taken by pneumotonometer, diffuse vascular superior low bleb (Fig. 2.A), AC deep, fundus examination showed a 360° shallow peripheral serous choroidal detachment. The patient was discharged with prednisolone acetate 1% eye drop (Econopred Plus 1% eye drops, Alcon Laboratories, Inc; Fort Worth, Texas, United States) every two-hours and Ciprofloxacin (0.3%) eye drop (Ciloxan 0.3% eye drops; Alcon Laboratories, Inc; Fort Worth, Texas, United States) four times daily for two-weeks. Three-weeks post-operative, VA uncorrected was 20/300, IOP was 03 mmHg by Goldmann applanation tonometry (GAT), diffuse formed bleb (Fig. 2.B), AC deep, fundus examination showed flat retina with no choroidal effusion. Two months post-operatively, the findings were: VA uncorrected 20/125 (pinhole 20/80), IOP was 10 mmHg, diffuse formed posterior low bleb (Fig. 2.C) no bleb leak and deep AC. The C/D ratio was noted to regress and was now around 0.5. After one-year post-operatively, the child maintained VA of 20/300 (ph 20/70) IOP 15 mmHg by GAT without any antiglaucoma eye drops, formed bleb, AC deep, flat retina and C/D 0.5. The visual field remained stable.

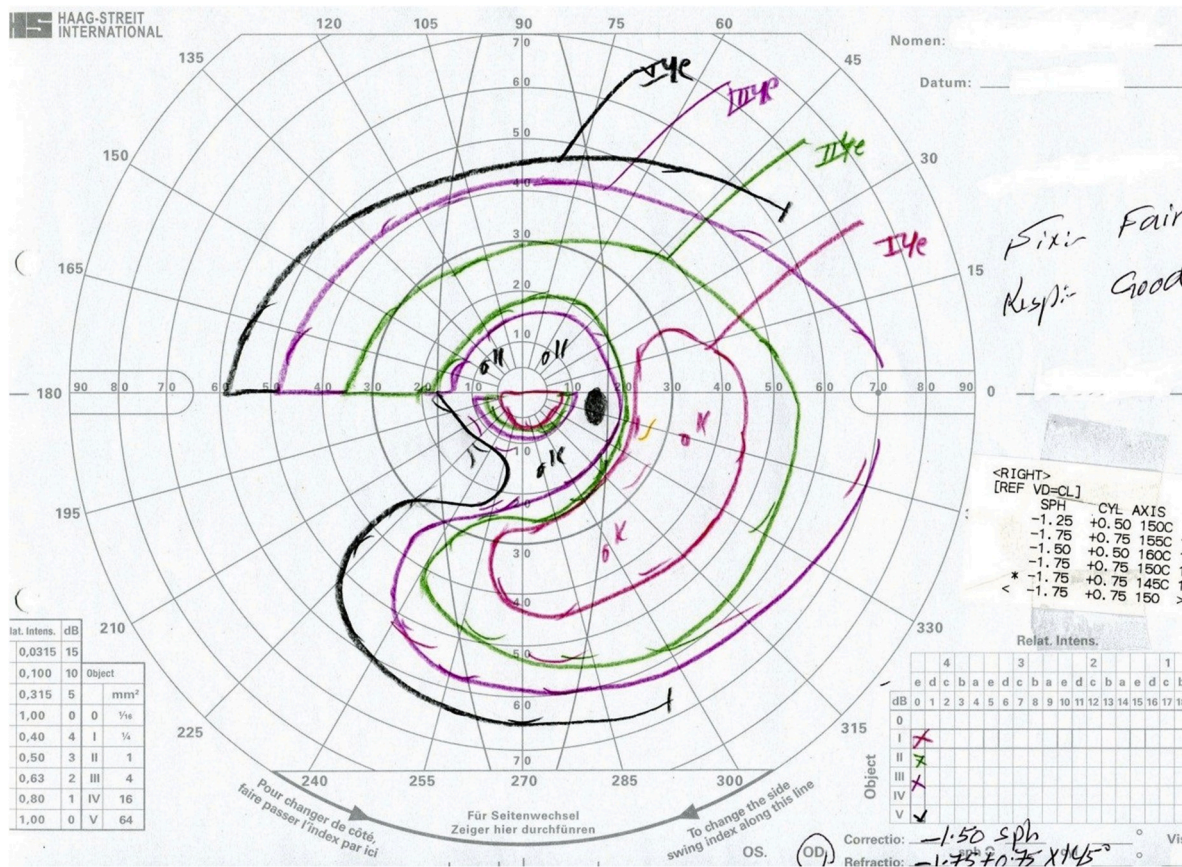
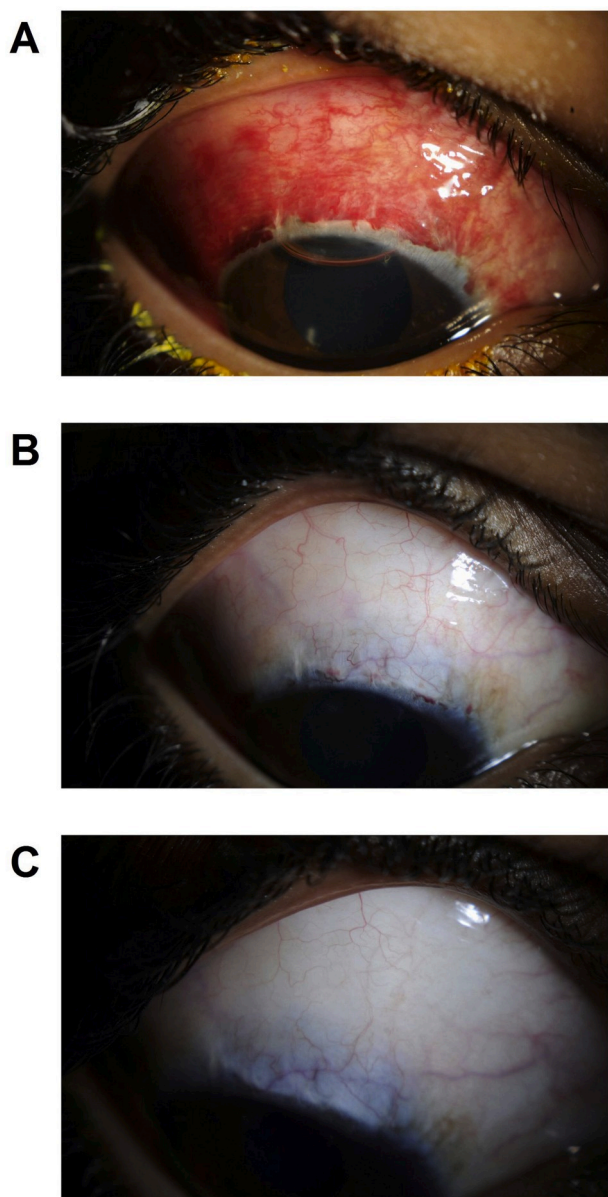


Fig. 1. Goldmann visual field of the right eye showing inferior-nasal scotoma.



**Fig. 2.** Clinical photographs of the patient. (A) First day post-operative, showed diffuse vascular superior bleb. (B) Three weeks post-operative, diffuse bleb. (C) Two-months post-operatively showed diffuse low bleb was maintained, with an IOP of 15 mmHg without medication.

### 3. Discussion

In the present case report, we describe a patient with congenital glaucoma who underwent successful transconjunctival needling after failed primary DS and to our knowledge, this is the first reported case of such successful surgery in pediatric glaucoma after failed primary glaucoma surgery. Non-penetrating DS was described by Epstein and Krasnov in the late 1950s and subsequently revised by Fyodorov and Koslov in 1990.<sup>13</sup> In childhood glaucoma, non-penetrating DS provides long-term reduction of intraocular pressure and with a favorable safety profile in Saudi children. Al-Obeidan et al<sup>6</sup> reported efficacy and safety of DS in childhood glaucoma in Saudi Arabia, 143 eyes of 120 patients with congenital glaucoma who underwent DS with a mean follow-up time of 34.5 months, failure occurred in 14% (20 out of 143 eyes). Another study by Denis et al<sup>7</sup> 37 eyes of 22 patients with congenital glaucoma underwent DS with intra-operative 5FU with a mean follow-up time of 38.2 months. Complete success was achieved in 34%

of eyes and qualified success in 82% of eyes. Feusier et al<sup>8</sup> evaluated the outcome of DS combined with trabeculectomy and MMC for 35 eyes of 28 patients with primary congenital glaucoma, developmental disorders or secondary glaucoma associated with ocular diseases with a mean follow-up time of 3.5 years. Failure occurred in 9 cases out of 35 (25.7%). Treatment options after a failed DS include supplemental medical therapy, laser goniotomy in older children, a second filter (DS or trabeculectomy) or glaucoma drainage device (GDD). Laser goniotomy can be done in older and more co-operative children and this was not possible in this case. A second filtering surgery or glaucoma drainage device are reasonable options but are time-consuming and carry risks of hypotony, failure and corneal decompensation. Needling is a relatively quick and safe procedure. It can be repeated, even multiple times, if there is an initial response.<sup>14,15</sup> Further, it preserves the remaining conjunctival quadrants for future surgery. This is an important consideration in children with congenital glaucoma, who are likely to require multiple surgeries to maintain vision over their lifetime.

Surgical revision of failed DS has previously been reported in adults. Anand et al<sup>11</sup> reported surgical revision of failed filtration surgery with Mitomycin C augmentation for adult glaucoma, fifty-four eyes of 54 consecutive patients with previously failed trabeculectomy or DS who underwent formal surgical revision were included. Of these, needle revision for bleb failure or high IOP was carried out in 23 eyes (42.5%) and further glaucoma surgery in 5 eyes (9.3%) was needed. Elevation of IOP control following non-penetrating DS is likely caused by bleb fibrosis together with collapse of intra-scleral space or lake secondary to fibrosis. Needling of bleb with subconjunctival antimetabolite (mitomycin C or 5 FU) may be needed in order to stop the scarring and preserve the bleb function.<sup>11</sup> In order to prevent hypotony, maintain AC during the early postoperative period, considering the difficulty reforming the AC in children in an office setting if needed, and avoid subsequent surgery, the authors used 15% perfluoropropane (C3F8) gas bubble injection into AC perioperatively.<sup>16–19</sup>

Needling of encysted blebs is a well-established procedure for trabeculectomy and has been performed for decades since the first description by Ferrer in 1941,<sup>20</sup> The needling technique is similar regardless if whether the previous surgery is DS or trabeculectomy.<sup>11</sup> Needling for DS requires sub-scleral flap dissection, with needle puncture into the AC to re-establish flow.

### 4. Conclusion

Needling of failed DS may be a viable option in eyes with childhood glaucoma for maintaining IOP and preserving the other conjunctival quadrants for future glaucoma surgery.

### Patient consent

Consent to publish the case report was not obtained. This report does not contain any personal information that could lead to the identification of the patient.

### Funding

No funding or grant support

### Financial disclosure

The following authors have no financial disclosures: MD, RM, AH.

### Authorship

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

## Declaration of competing interest

None of the authors have any conflicts of interest relevant to this article

## Acknowledgments

None.

## References

- Haddad MAO, Sei M, Sampaio MW, Kara-José N. Causes of visual impairment in children: a study of 3,210 cases. *J Pediatr Ophthalmol Strabismus*. 2007. <https://doi.org/10.3928/01913913-20070701-04>.
- Kotb AA, Hammouda EF, Tabbara KF. Childhood blindness at a school for the blind in Riyadh, Saudi Arabia. *Ophthalmic Epidemiol*. 2006. <https://doi.org/10.1080/09286580500477317>.
- Mandal AK, Prasad K, Naduvilath TJ. Surgical results and complications of mitomycin C-augmented trabeculectomy in refractory developmental glaucoma. *Ophthalmic Surg Laser*. 1999. <https://doi.org/10.3928/1542-8877-19990601-11>.
- Al-Hazmi A, Awad A, Zwaan J, Al-Mesfer SA, Al-Jadaan I, Al-Mohammed A. Correlation between surgical success rate and severity of congenital glaucoma. *Br J Ophthalmol*. 2005. <https://doi.org/10.1136/bjo.2004.047761>.
- Al-Shahrani NO, Khan AO. Observations regarding gender and response to initial angle surgery in CYP1B1-related primary congenital glaucoma. *Ophthalmic Genet*. 2017. <https://doi.org/10.1080/13816810.2016.1206574>.
- Al-Obeidan SA, Osman EEDA, Dewedar AS, Kestelyn P, Mousa A. Efficacy and safety of deep sclerectomy in childhood glaucoma in Saudi Arabia. *Acta Ophthalmol*. 2014. <https://doi.org/10.1111/j.1755-3768.2012.02558.x>.
- Denis D, Pommier S, Coste R, Fogliarini C, Benso C, Cornand E. Deep sclerectomy in congenital glaucoma: results of a study lasting more than 3 years. *J Fr Ophthalmol*. 2008. [https://doi.org/10.1016/S0181-5512\(08\)70350-4](https://doi.org/10.1016/S0181-5512(08)70350-4).
- Feusier M, Roy S, Mermoud A. Deep sclerectomy combined with trabeculectomy in pediatric glaucoma. *Ophthalmology*. 2009. <https://doi.org/10.1016/j.ophtha.2008.08.039>.
- Lüke C, Dietlein TS, Jacobi PC, Konen W, Kriegelstein GK. Risk profile of deep sclerectomy for treatment of refractory congenital glaucomas. *Ophthalmology*. 2002. [https://doi.org/10.1016/S0161-6420\(02\)01077-1](https://doi.org/10.1016/S0161-6420(02)01077-1).
- Koukkoulli A, Musa F, Anand N. Long-term outcomes of needle revision of failing deep sclerectomy blebs. *Graefes Arch Clin Exp Ophthalmol*. 2015. <https://doi.org/10.1007/s00417-014-2810-4>.
- Anand N, Arora S. Surgical revision of failed filtration surgery with mitomycin C augmentation. *J Glaucoma*. 2007. <https://doi.org/10.1097/IJG.0b013e31803bbb30>.
- Mendrinós E, Mermoud A, Shaarawy T. Nonpenetrating glaucoma surgery. *Surv Ophthalmol*. 2008. <https://doi.org/10.1016/j.survophthal.2008.08.023>.
- Fyodorov S, Koslov VTN. Nonpenetrating deep sclerectomy in open angle glaucoma. *Ophthalmic Surg*. 1989;3(5):52.
- Tsai ASH, Boey PY, Htoon HM, Wong TT. Bleb needling outcomes for failed trabeculectomy blebs in Asian eyes: a 2-year follow up. *Int J Ophthalmol*. 2015. <https://doi.org/10.3980/j.issn.2222-3959.2015.04.19>.
- El-Raggal T, Elsayed TH. Mitomycin-C needle bleb revision in congenital glaucoma. *Middle East Afr J Ophthalmol*. 2010. <https://doi.org/10.4103/0974-9233.71598>.
- Franks WA, Hitchings RA. Intraocular gas injection in the treatment of cornea-lens touch and choroidal effusion following fistulizing surgery. *Ophthalmic Surg*. 1990. <https://doi.org/10.3928/1542-8877-19901201-06>.
- Franks WA, Hitchings RA. Injection of perfluoropropane gas to prevent hypotony in eyes undergoing tube implant surgery. *Ophthalmology*. 1990. [https://doi.org/10.1016/S0161-6420\(90\)32484-3](https://doi.org/10.1016/S0161-6420(90)32484-3).
- Kurtz S, Leibovitch I. Combined perfluoropropane gas and viscoelastic material injection for anterior chamber reformation following trabeculectomy. *Br J Ophthalmol*. 2002. <https://doi.org/10.1136/bjo.86.11.1225>.
- Gotzaridis SV, Portaliou DM, Mela VA, Xanthopoulou P, Kymionis GD. Anterior chamber sulfur hexafluoride (SF6) injection for the management of postsurgery hypotony in glaucoma patients. *J Glaucoma*. 2018. <https://doi.org/10.1097/IJG.0000000000000958>.
- Ferrer H. Conjunctival dialysis. In the treatment of glaucoma recurrent after sclerectomy. *Am J Ophthalmol*. 1941. [https://doi.org/10.1016/S0002-9394\(41\)93119-7](https://doi.org/10.1016/S0002-9394(41)93119-7).