

# Early Drainage of Suprachoroidal Hemorrhage Combined with Surgical Correction of Hypotony after Trabeculectomy

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## ABSTRACT

**Aims and background:** Delayed suprachoroidal hemorrhage (DSCH) is a vision-threatening complication of intraocular surgeries with a higher prevalence in postglaucoma filtering surgeries. Through these case series of trabeculectomy complicated with DSCH, we aim to emphasize that correction of hypotony (inciting factor) is fundamental for complete resolution and prevention of recurrence.

**Case description:** All three glaucoma patients underwent trabeculectomy surgery followed by DSCH on postoperative day 1. Drainage of DSCH using a 23 gauge trocar cannula within 48 hours of onset was performed along with exploration for the cause of hypotony. All three patients had satisfactory visual and anatomical outcomes.

**Conclusion:** Early drainage using 23 gauge trocar cannulas gives good results in DSCH. The cause of hypotony must simultaneously be corrected during the drainage of DSCH. Preventive measures against hypotony should be taken while doing glaucoma filtering surgery.

**Clinical significance:** Surgical exploration for the cause of hypotony must simultaneously be performed during drainage of DSCH. Primary preventive measures against hypotony and bleeding during glaucoma filtering surgeries, like the use of releasable sutures, viscoelastic in the anterior chamber, and discontinuation of anticoagulants, can be done. Early drainage using trocar cannulas gives satisfactory results in DSCH postglaucoma surgeries.

**Keywords:** Case report, Delayed suprachoroidal hemorrhage, Early drainage, Hypotony, Trabeculectomy, Trocar.

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## INTRODUCTION

Suprachoroidal hemorrhage (SCH) is a rare sight-threatening complication of any intraocular surgery. It can occur intraoperatively or in the postoperative period. Delayed SCH (DSCH) has been reported to be higher postglaucoma surgeries (0.15–6.1%) compared to vitreoretinal surgeries (0.17–1.9%), cataract (0.03–0.81%) or penetrating keratoplasty (0.087–1.08%).<sup>1,2</sup> DSCH has been reported to be higher postglaucoma drainage devices [valved (2.8%) and nonvalved (7.1%)] compared to trabeculectomy [(without antimetabolites (1.5%) and with antimetabolites (2.4%)].<sup>3</sup>

Hypotony has been implicated as the main predisposing factor causing DSCH postglaucoma surgery.<sup>4</sup> Hypotony leads to choroidal effusion, which causes subsequent stretching and rupture of short and long posterior ciliary arteries, causing a DSCH.<sup>5</sup>

Management of DSCH is controversial as both conservative [controlling intraocular pressure (IOP) and awaiting spontaneous resolution] and surgical approaches (drainage of DSCH) can be taken for the patients. Surgical drainage is preferred in appositional DSCH, one-eyed patients, patients with retinal detachment or vitreoretinal traction, and if IOP is uncontrolled. The traditional surgical approach is to wait for 7–14 days for lysis of clot and liquefaction of blood, followed by surgical drainage by sclerostomies. Recent reports in literature have reported favorable results with immediate drainage of SCH.<sup>6–9</sup>

It is important to understand that in glaucoma filtering surgery associated with DSCH, the drainage of the hemorrhage alone is not sufficient to manage these cases as there is a high chance of recurrence due to hypotony created by the patent scleral fistula in trabeculectomy and surgical revision of the trabeculectomy is required. We report a series of three cases of

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DSCH posttrabeculectomy surgery that were managed by surgical exploration for the cause and correction of hypotony due to trabeculectomy and drainage of DSCH by using 23 gauge trocar cannula within 48 hours of the onset of the hemorrhage.

## CASE DESCRIPTION

### Case I

A 27-year-old male with a diagnosis of both eyes primary congenital glaucoma with a history of operated trabeculectomy surgery 20 years back, had best corrected visual acuity (BCVA) right eye (RE) as perception of light (PL) negative and left eye (LE) 6/12. Repeat trabeculectomy with mitomycin C (MMC) done in LE in

view of uncontrolled IOP on maximum medical antiglaucoma medications (AGM) was performed (Table 1). The patient had DSCH on postoperative day 1. In view of appositional DSCH and the patient being one-eyed, he was taken for drainage of DSCH within 24 hours of onset. After drainage, DSCH resolved with better control of IOP (20 mm Hg with 4 AGM), and BCVA improved to 2/60 over 3 days. On the 4th day postdrainage, a recurrence of DSCH occurred, causing a rise in IOP (50 mm Hg) and a drop in BCVA to finger counting close to face (FCCF). The patient was taken to the operation theater for repeat drainage of DSCH the next day, along with exploration to look for the cause of hypotony. We found loose sutures at the scleral flap, causing overfiltration and, hence, hypotony, which was corrected by tight scleral flap suturing. After the second procedure, IOP after 1 week was 22 mm Hg on 4 AGM with BCVA improvement to 5/60 on the Snellen chart. No recurrence was seen in the follow-up visits, and patient's BCVA improved with control of IOP over 6 months (Table 1).

**CASE II**

A 34-year-old female with a diagnosis of both eyes pathological high myopia with aphakia with secondary glaucoma and hypertension. BCVA for RE was 2/60, and LE was PL negative. Trabeculectomy with MMC was performed for RE in view of uncontrolled IOP. On postoperative day 1, DSCH was diagnosed, and the patient was taken for drainage within 48 hours of onset in view of appositional

DSCH and the patient being one-eyed. Learning from case I, at the time of drainage of DSCH, exploration of the trabeculectomy site was done to look for the cause of hypotony. We found multiple cut-throughs of the scleral flap, which were corrected by using a scleral patch graft from the donor eye. BCVA in postoperative period improved to 1/60 with an IOP of 24 mm Hg (on 4 AGM) over 1 week. At 3 months follow-up, IOP stabilized to 14 mm Hg without AGM and BCVA same as preoperative, without recurrence of DSCH (Table 1).

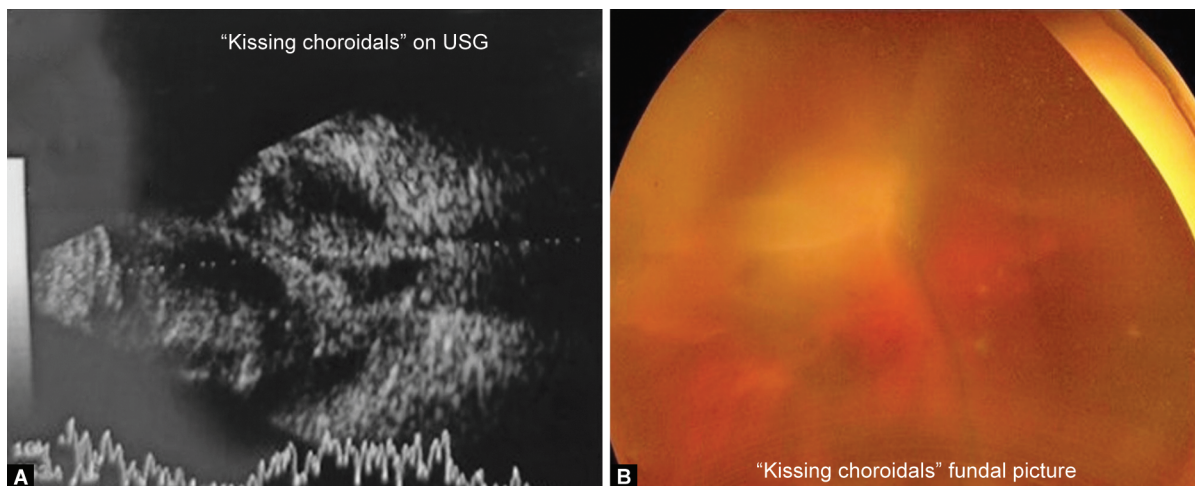
**CASE III**

A 50-year-old, male diagnosed as primary angle closure glaucoma (PACG) with operated trabeculectomy in both eyes with BCVA for RE 6/36 and LE 6/18. The patient underwent LE retractorabeculectomy surgery with MMC in view of uncontrolled IOP. On postoperative day 1, the patient had DSCH (Fig. 1). In view of DSCH being appositional, the patient was taken up for drainage within 48 hours of (Figs 2A and B), along with an exploration of the trabeculectomy site to determine the cause of hypotony (Figs 2C). Loose sutures at the scleral flap were corrected by replacing them with fresh, tighter sutures (Figs 2D). Ultrasound performed after drainage of DSCH showed a decrease in the height of detachment (Fig. 3A). In the postoperative period at first week follow-up, BCVA was 5/60 with an IOP of 20 mm Hg (on 3 AGM). Over 6 months, IOP was documented to be 16 mm Hg on 1 AGM with BCVA of 6/36 and

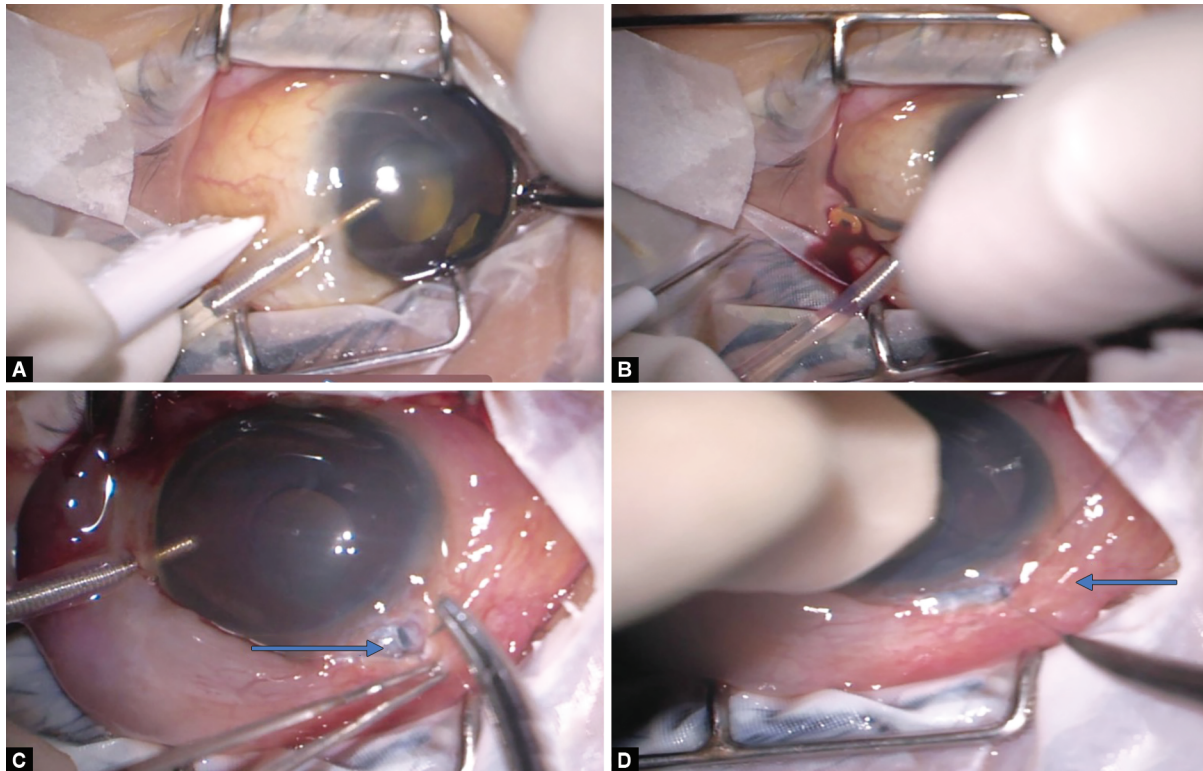
**Table 1:** Pre- and postdrainage visual acuity and IOP of DSCH

Case no.	Age/sex	Diagnosis	BCVA before trab	Type of surgery (eye)	IOP (mm Hg) before drainage	BCVA before drainage	IOP (mm Hg) at last follow-up	BCVA at the last follow-up	Follow-up
1	27, male	BE PCG with operated trab	6/12	Retrab + MMC (LE)	40	1/60	18 (on 1 AGM)	6/18	6 months
2	34, female	BE pathological high myopia with aphakia with secondary glaucoma	2/60	Trab + MMC (RE)	38	FCCF	14	2/60	3 months
3	50, male	BE PACG with operated trab	6/18	Retrab + MMC (RE)	52	1/60	16 (on 1 AGM)	6/36	6 months

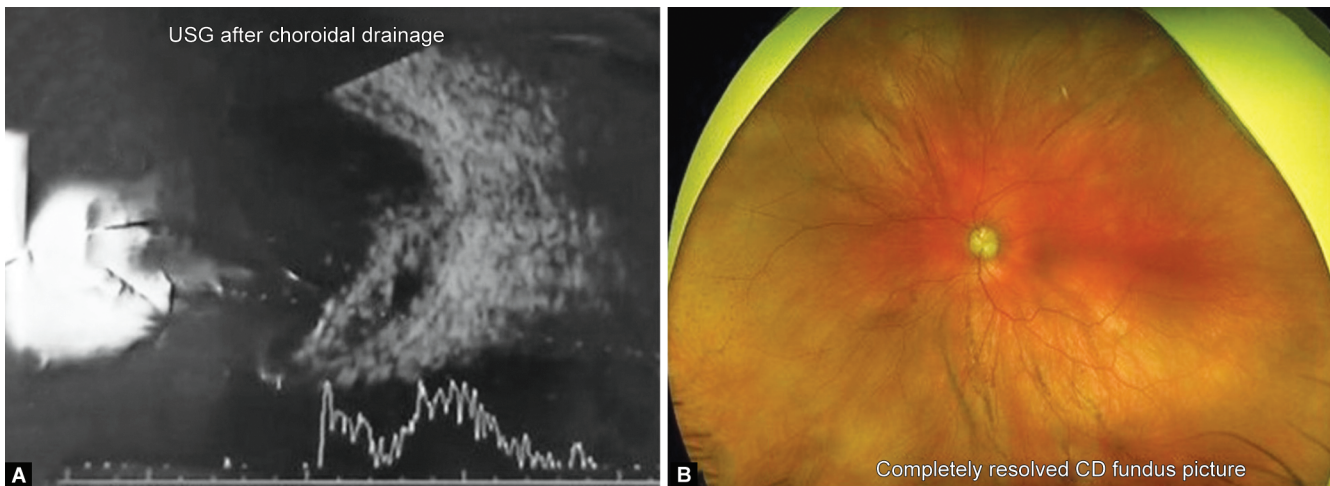
AGM, antiglaucoma medications; BCVA, best corrected visual acuity; BE, both eyes; F, Female; FCCF, finger counting close to face; LE, left eye; M, male; MMC, mitomycin C; IOP, intraocular pressure; PACG, primary angle closure glaucoma; PCG, Primary congenital glaucoma; RE, right eye; Retrab, repeat trabeculectomy; trab, trabeculectomy



**Figs 1A and B:** Preoperative ultrasound (USG) and fundus camera photograph of DSCH; (A) Appositional (kissing) choroidal on USG; (B) Fundus photo of DSCH



**Figs 2A to D:** Intraoperative photographs of surgical drainage of DSCH using 23 gauge trocars along with exploration of trabeculectomy site. (A) 23 gauge trocars inserted 7 mm from the limbus at the site of maximum elevation predetermined on USG; (B) Gush of brown-colored blood seen after insertion of trocars; (C) Arrow indicates gape of scleral flap at trabeculectomy site due to loose sutures; (D) Arrow indicates scleral flap sutures tightened to correct the gape in scleral flap causing hypotony



**Figs 3A and B:** Postoperative ultrasound (USG) and fundus camera photographs of DSCH. (A) Decrease in height of choroidal detachment on USG immediately postsurgical drainage of DSCH; (B) Fundus photo of resolved DSCH

complete resolution of DSCH (Table 1) (Fig. 3B). No recurrence of DSCH was seen.

The surgical technique for drainage of DSCH for all three patients used 23 gauge trocar cannulas inserted at the highest site of DSCH, as determined by ultrasound. The trocars were inserted at 7 mm from the limbus in the quadrant with a maximum height of elevation at an acute angle of 15–20° and a gush of brown colored blood was seen (Figs 2A and B). A decrease in DSCH was noted on the table. Anterior chamber maintainer was used to maintain the chamber during the procedure (Fig. 2A).

## DISCUSSION

The DSCH is a catastrophic and sight-threatening complication of glaucoma surgeries with a poor prognosis.<sup>10</sup> Systemic risk factors for DSCH include hypertension, advanced age, anticoagulation therapy, diabetes, constipation, and persistent cough. Ocular risk factors are aphakia, high myopia, ocular trauma, hypotony, or prolonged intraocular surgery.<sup>1</sup> Preventive measures for DSCH in glaucoma surgeries in the preoperative period are adequate control of hypertension diabetes, cessation of anticoagulant

drugs like warfarin for 5 days, and cessation of thienopyridines like clopidogrel for at least 1–2 weeks before glaucoma surgery. Treatment of persistent cough and constipation should be done prior to glaucoma surgery. Preoperative intravenous mannitol before surgery lowers IOP, which is protective against DSCH. Intraoperative measures to prevent DSCH are gradual ocular decompression during surgery, avoiding postoperative hypotony by using releasable sutures, leaving sodium hyaluronate 1% in the anterior chamber at the end of glaucoma surgery, and checking for bleb leak on the table before applying the eye pad. In postoperative period, anticoagulants can be restarted after 48 hours but, in cases of hypotony, can be delayed up to 1 week or IOP reaching 10 mm Hg, whichever is earlier.<sup>11</sup> Postoperative treatment to prevent straining due to constipation or vomiting is essential. Delayed removal of releasable sutures must be considered, especially in cases in which the other eye has SCH.

In glaucoma surgeries, hypotony has been implicated as the major predisposing factor for DSCH. The proposed mechanism in literature is that hypotony in the immediate postoperative period after glaucoma surgery leads to engorgement of choriocapillaris followed by serous choroidal effusion. This results in stretching and rupture of short and long posterior ciliary arteries, leading to SCH.<sup>5,12</sup> Hence, avoiding hypotony and correcting the cause of hypotony is a fundamental step for the prevention and early resolution of DSCH postglaucoma surgery. In eyes that are undergoing repeat trabeculectomy due to failure, operating surgeons tend to make a bigger ostium and perform loose suturing to maximize aqueous outflow. This can be counterproductive as these eyes are at a higher risk of hypotony-induced DSCH, and releasable/adjustable sutures must be put in place to ensure that there is no hypotony in the early postoperative period.

In cases I and III, loose scleral flap sutures and, in case II, disintegrated scleral flap were the cause of hypotony, ultimately leading to DSCH. In our cases, this vicious cycle of hypotony causing DSCH was broken by the surgical repair of scleral flaps to correct hypotony at the time of drainage of DSCH. Previous case reports and studies on DSCH postglaucoma surgeries have discussed early surgical intervention vs delayed, but none have explored the trabeculectomy site to look for the cause of hypotony (inciting factor) in an immediate postoperative period which we aim to emphasize.<sup>4,8</sup>

In our cases, we preferred early drainage (within 48 hours of onset) due to the DSCH being appositional and for early visual rehabilitation of one-eyed patients. DSCH causes very high IOP, causing damage to the optic nerve, which is already compromised due to glaucoma. Early lowering of IOP will protect the optic nerve from further damage. Delayed drainage of DSCH can have deleterious effects like increased inflammation predisposing the eye to intraocular adhesions, necessitating the need for complicated vitreoretinal surgery and damage to photoreceptors evident from pigmentary changes seen on fundus imaging (Fig. 3B). These ultimately will lead to poor visual outcomes.<sup>10,13</sup> Weinberg and Rosenberg reported retinol–retinal adhesions as early as 3 days in eyes with DSCH.<sup>14</sup> Pakravan et al. and Jin et al. found that early surgical drainage of DSCH results in good anatomical and visual outcomes.<sup>8,15</sup> Hence, we planned for early drainage (within 48 hours of onset) of DSCH.

In our cases, we found that early surgical intervention leads to drainage of a significant amount of hemorrhage. Our findings support the recent hypothesis by Abrams et al. that in postglaucoma surgeries, serous choroidal detachment prior to DSCH delays

clotting, which makes early drainage of DSCH easier.<sup>9</sup> Pakravan et al. also found liquefied blood on immediate intervention (within 36 hours of onset) in DSCH cases postglaucoma surgeries.<sup>8</sup>

All three cases were drained using 23 gauge trocars without pars plana vitrectomy instead of traditional sclerostomy. We observed adequate drainage of DSCH using a 23-gauge trocar cannula. Studies in literature have described this surgical technique of using trocars as an alternative to sclerostomy with good results.<sup>6,7</sup> Rezende et al. compared the use of 20 gauge vs 25 gauge transconjunctival trocar to drain choroidal detachments and found 20 gauge trocar to better drain hemorrhagic choroidal detachment as the passage of blood and small clots is easier.<sup>7</sup> The disadvantage is that suturing the port site requires 20 gauge cannulas. Other studies demonstrated effective drainage of DSCH using 23 gauge cannulas without the requirement of sutures at the port site.<sup>6,16</sup> Some studies have combined trocar drainage of DSCH along with pars plana vitrectomy surgery.<sup>6,16</sup> The disadvantages of combining the two are excessive conjunctival scarring and manipulation, which is deleterious and can cause failure of glaucoma surgeries. Moreover, results with transconjunctival trocars for drainage of DSCH have been satisfactory, as in our cases and those of Rezende et al.<sup>7</sup> Compared to traditional sclerotomy for drainage of DSCH, trocars have the advantage of ensuring sclerotomies of known and reliable diameter with consistent patency during the procedure. Additionally, there is minimal damage to the conjunctiva, which is helpful for subsequent glaucoma surgery.

Case-control studies in the future are ideally required to assess the outcomes of early vs delayed drainage of DSCH; however, such a study design is difficult as DSCH is a rare complication.

## CONCLUSION

The DSCH is a visually threatening complication of glaucoma filtering surgery. This case series highlights that early drainage (within 48 hours of onset) using a 23 gauge trocar with simultaneous repair/resuturing of the trabeculectomy site to treat the cause for hypotony results in satisfactory visual and anatomical outcomes.

Primary prevention with the use of releasable/adjustable sutures and viscoelastic in the anterior chamber can prevent early hypotony and reduce the risk of SCH.

## Clinical Significance

Surgical exploration for the cause of hypotony must simultaneously be performed during the drainage of DSCH. Primary preventive measures against hypotony and bleeding during glaucoma filtering surgeries, like the use of releasable sutures, viscoelastic in the anterior chamber, and discontinuation of anticoagulants, can be done. Early drainage using trocar cannulas gives satisfactory results in DSCH postglaucoma surgeries.

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