

Internal Revision with Bleb Needling: An Effective, Safe Option for Failing Blebs

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Abstract: *Aim:* To report the outcomes of internal revision with bleb needling in cases of failing blebs with the internal sclerostomy blocked by iris tissue.

Methods: Prospective study of 26 eyes of 26 patients with failing blebs where target IOP was not achieved with 2 anti-glaucoma drugs and sclerostomy was blocked by iris (confirmed on gonioscopy). Patients were divided into 3 groups depending on the time from the first surgery- early (<3 months), intermediate (4-12 months) and late (>1 year). Patients underwent internal revision with bleb needling with either 5-Fluorouracil (5-FU) or Mitomycin C (MMC)

Results: 26 eyes of 26 patients were included in the study. Mean age was 51.35±14.5 years. Time from the filtration surgery was early in 3, intermediate in 5 and late in 18 eyes. Mean IOP reduction at 3 months was 32±18% with maximum reduction in early group (40%). Mean IOP decreased from 24.5±3.4 mmHg to 16.2±4.3 mmHg in 5-FU group (12 patients) and 27.4±9 mmHg to 18.2±6.6 mmHg in MMC group (14 patients). Self-limiting complications were hyphema in 2 patients and subconjunctival haemorrhage in 1 patient.

Conclusion: Internal revision with bleb needling is a safe and effective procedure for reviving failing blebs.

Keywords: Failing bleb, Revision, Blocked internal sclerostomy, Trabeculectomy.

INTRODUCTION

Trabeculectomy is the most commonly performed glaucoma filtration surgery. Subconjunctival fibrosis and scarring at the level of the scleral flap or ostium are the most common causes of failure of filtration surgery [1, 2]. In Tube versus Trabeculectomy study, the cumulative probability of failure after 3 years of follow-up was 28% in the trabeculectomy group [3]. Bleb needling with or without antifibrotic agents has been described as a simple and effective procedure to revive failing trabeculectomy blebs. Bleb needling has been described as Type 1 (subconjunctival), Type 2 (beneath the scleral flap) and Type 3 (through the sclerostomy) [4, 5]. Only few studies have reported on the techniques and outcomes of internal revision of failed trabeculectomy blebs. This study was undertaken with the aim of reporting the outcomes of bleb needling augmented with internal revision in cases of failed trabeculectomy blebs with blocked sclerostomy.

MATERIAL AND METHODS

This prospective study included 26 eyes of 26 patients presenting the glaucoma services of a tertiary care centre with failed/ failing blebs over a period of three years. The study conformed to ethical

declarations of Helsinki was approved by the institutional ethical committee.

The study included patients where target IOP was not met despite use of two anti-glaucoma drugs for the level of optic disc cupping along with evidence of scarring of filter as evident on slit lamp examination along with blockage of internal sclerostomy with iris, as seen on gonioscopy. Patients with multiple trabeculectomies, prior needling, prior combined phacotrabeculectomy, requiring early cataract surgery, and those unwilling/unable for long term follow up, were excluded. All patients underwent complete ophthalmological evaluation including visual acuity, slit lamp biomicroscopic examination, gonioscopy to identify the sclerostomy, dilated fundus evaluation with 90 D lens wherever possible, IOP measurement using applanation tonometry.

Patients were divided into three groups as early, intermediate and late depending upon the onset from initial trabeculectomy. Early group included patients presenting within 3 months, intermediate between 4 and 12 months and late group had blebs older than 1 year.

SURGICAL PROCEDURE

The procedure was performed under sterile aseptic conditions under peribulbar anaesthesia. The surgeon was positioned temporally. A clear corneal paracentesis was made with MVR blade within 3 clock

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hours of the blocked sclerostomy site in the temporal quadrant. Dispersive viscoelastic was injected into the anterior chamber through the paracentesis and a vitreous sweep/ straight rod manipulator was used to release incarcerated iris tissue from internal ostium. The instrument was then swept through the internal sclerostomy opening into the dissected plane beneath the superficial scleral flap to release the subcleral fibrosis. The rod was withdrawn and viscoelastic removal was done and the anterior chamber was reformed with balanced salt solution. The paracentesis site was then hydrated and checked for water tightness.

External revision (needling) was subsequently performed using a bent 26-gauge needle attached to a tuberculin syringe filled with 0.1 ml of freshly prepared 5 FU (50 mg/mL) or MMC (0.2 mg/mL). The subconjunctival space was entered 3 mm away from the bleb area. The needle was moved forward with gentle side to side movements disrupting the subconjunctival fibrosis advancing carefully, taking care not to puncture the conjunctiva while ballooning the subconjunctival space at intervals by injecting 5-FU or MMC. The end point was loss of gritty sensations felt during needle movements along with free mobility of needle in the subconjunctival space. The antifibrotic solution was injected along side during needling manoeuvres, and after needle withdrawal, the entry point was sealed with viscoelastic (sodium hyaluronate 1%) to prevent leak of the antifibrotic solution onto ocular surface. Tamponade was done gently with a cotton swab. Subconjunctival antibiotic-steroid injection was the given in the inferior quadrant 180 degrees away from the bleb. The eye was patched for a few hours and thereafter, patients were put on topical antibiotic-steroids combination 4-6 hourly and cycloplegic homatropine twice a day for 2 weeks depending on clinical response of bleb morphology and IOP.

Patient were followed up on day 1, week 1, and every month thereafter for at least 3 months.

Vision, slit lamp examination and IOP were taken on every visit.

Success was defined as IOP control within target and qualified success as those requiring upto 2 anti-glaucoma drugs for IOP control.

RESULTS

Twenty six eyes of 26 patients were included in the study. Mean age was 51.35 years (Range: 24-74

years) with 15 male and 11 female patients. Average time between failed filtering surgery and internal revision was 43.15 months. Bleb age was early in 3 eyes, intermediate in 5 eyes and late in 18 eyes, with the oldest bleb being 15 years old. Pseudophakia was present in 13 patients (50%) and the rest were phakic.

Mean pre-operative IOP was 26.1 ± 7 mmHg. All eyes responded with opened out sclerostomy, confirmed on gonioscopy at 1 month with variable response regarding intraocular pressure control. Figure 1a,b At the end of 3 months follow-up, mean IOP reduction was 8.8 ± 5.7 mmHg. IOP decreased from 24.5 ± 3.4 mmHg to 16.2 ± 4.2 mmHg in 5-FU group (12 eyes) and 27.4 ± 9 mmHg to 18.2 ± 6.6 mmHg in MMC group (14 eyes). Maximum IOP reduction was seen in early group (40%) followed by late group (34%) and intermediate group (21%). Figure 2 & 3 depict two case vignettes of angle closure & Sturge Weber glaucoma, whose failed filters were successfully revived by this procedure. Failure to achieve IOP < 21 mmHg was seen in 4 cases (Bleb age was early in 1, intermediate in 1 and late in 2 cases).



Figure 1a: Pre Intervention: Blocked internal sclerostomy by iris tissue.



Figure 1b: Post procedure: Freed ostium after internal revision.

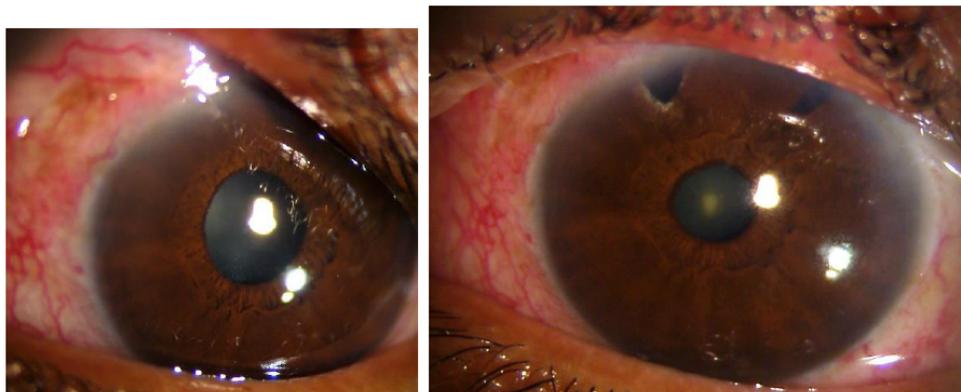


Figure 2a & b: Slit lamp photograph depicting pre and post internal revision in a 56 year old case of angle closure glaucoma.

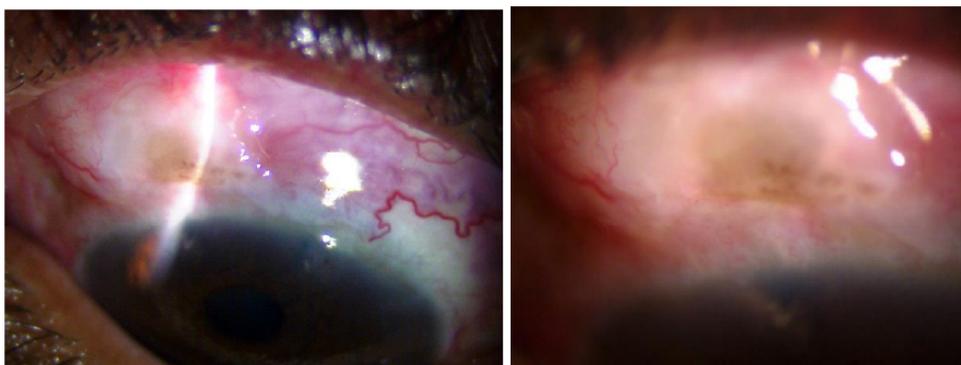


Figure 3a & b: Trabeculectomy bleb pre and post internal revision in a 42 year old female with Sturge Weber glaucoma.

Self-limiting complications included hyphema in two patients and subconjunctival haemorrhage 1 patient.

DISCUSSION

Trabeculectomy bleb failure is quite common despite the use of antimetabolites during surgery. Success rates of bleb needling with adjunctive antimetabolites have been reported from 60-72% over 1 to 2 year follow-up [6-8]. However, only few studies have reported on the techniques and outcomes of internal revision of failed trabeculectomy blebs.

Blockage of sclerostomy by iris, lens, vitreous or ciliary body can lead to trabeculectomy failure [9]. Hence, it is imperative to perform gonioscopy in all cases of trabeculectomy failure to rule out blockage of inner sclerostomy by iris tissue, ciliary tissue or vitreous. This study demonstrates the outcomes of a combined procedure of internal revision with bleb needling in cases of failed trabeculectomy blebs accompanied by blocked inner sclerostomy.

Pasternack *et al* described a surgical technique to revise a failed filtering bleb using 5-FU with combined

ab-externo and ab-interno approach in which they used a cyclodialysis spatula to enlarge the communication between the anterior chamber and subconjunctival space [10]. A successful outcome defined as a 20% reduction from baseline IOP and a maximum IOP of 18 mmHg was achieved in 52% of their patients. Delayed suprachoroidal hemorrhage was seen in 2 eyes and kissing choroidals in 1 eye. Other complications included flat anterior chamber, epithelial corneal defect and blebitis.

Grover and Fellman described the outcomes of ab-interno bleb revision using a novel biplanar sclerostomy spatula in 21 patients [11]. Mitomycin C was injected at least 1 week prior to the bleb revision. They observed decrease in mean IOP from 21.9 mmHg pre-operatively to 12.1 mmHg at 12 months. Failure to achieve IOP control was seen in 5 patients.

In a study on 56 patients of a 5-FU augmented internal revision, Elhofi *et al* observed success in 71.4% at 6 months (complete success in 24 patients and qualified success in 16 patients). The most common complication was hyphema [12].

In this study, a vitreous sweep/ straight rod manipulator was used to sweep iris away from the inner sclerostomy ostium and for release of fibrosis beneath the superficial scleral flap followed by bleb needling with 5-FU or MMC, which has not been previously described. Successful IOP control was achieved at 3 months in 22 out of 26 eyes (84.6%). The better response achieved in early bleb failure was probably due to nascent fibrosis with immature fibroblasts. Duration of bleb has been cited as a factor affecting success of needle revision with blebs older than 1 year or younger than 1 month, both having poorer responses [8, 13].

Complications observed were hyphema in 2 patients and subconjunctival haemorrhage in one patient which were managed conservatively. No serious adverse events like blebitis, suprachoroidal hemorrhage or hypotonic maculopathy were noted.

Failure to achieve IOP control was seen in 4 eyes, 3 of which had pre-operative IOP>30 mmHg. Studies have reported various risk factors for failure of bleb needling including pre-needling IOP>30 mmHg(13), IOP >10 mmHg immediately after needling [14-16], fornix- based trabeculectomy [17], number of pre – needling antiglaucoma medications , young age and lack of MMC use during the index filtration surgery [14, 18]. The probable lack of response in our 4 cases could be intense , irreversible scarring , which was reflected in the high IOP present prior to needling procedure. Age of bleb, needling done post combined phacotrabeculectomy, requirement of phacoemulsification have been previously reported as risk factors of needling failure [8].

Comparative studies have reported better success rates with needle revision with MMC compared to needle revision with 5-FU for failed trabeculectomy blebs [7, 16, 19]. In this study, similar IOP control was seen in 5-FU group (33%) and MMC (31%) at 3-month follow-up. Longer follow-up is required to comment on the long-term success of the procedure.

CONCLUSIONS

For patients with failed trabeculectomy with blockage of inner sclerostomy, combined procedure of ab-interno revision and bleb needling is a safe and effective method to revive these blebs. Early intervention done at bleb walling off and / or intraocular pressure rise results in better response.

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