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Slit-Lamp Bleb Needling with Mitomycin C for Failed or Failing Trabeculectomy: A Retrospective Study

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Abstract: ***Purpose: To evaluate the safety and efficacy of slit-lamp bleb needling with adjunctive mitomycin C (MMC) for raised intraocular pressure (IOP) following trabeculectomy or combined phacotrabeculectomy. Methods: This retrospective chart review included 262 patients who underwent trabeculectomy or phacotrabeculectomy. Thirty eyes with postoperative IOP above 21 mmHg after the first postoperative month underwent slit-lamp bleb needling with 0.1 mL of 0.04% MMC.A repeat procedure was performed when IOP remained above 21 mmHg. Outcomes and complications were assessed during follow-up of 6 months to 4 years. Results: Of the 30 eyes treated, 22 (73.3%) achieved IOP below 21 mmHg without medication at one year. Six eyes (20.0%) required one or more medications, while two (6.7%) required repeat trabeculectomy with MMC. Transient hyphema occurred in seven eyes and choroidal effusion in three; both complications resolved with medical management. No bleb-related endophthalmitis or loss of vision was reported. Conclusion: Slit-lamp bleb needling with low-dose MMC was associated with useful pressure control and few reported complications in this selected series. It may offer an outpatient option for managing a failing filtration bleb, although prospective comparative studies are needed in routine ophthalmic clinical practice settings.***

Keywords: Bleb needling; Glaucoma; Mitomycin C; Slit-lamp procedure; Trabeculectomy

1. Introduction

Glaucoma management often requires multiple interventions to achieve adequate intraocular pressure (IOP) control. Trabeculectomy remains an established filtering procedure, particularly in Asian populations where angle-closure glaucoma is relatively common. However, postoperative subconjunctival fibrosis, particularly in patients receiving long-term antiglaucoma medications, can result in bleb failure.

Early intervention in a failing filtering bleb can improve surgical outcomes and avoid further invasive procedures. Bleb needling, usually performed in an operating theatre, involves mechanical disruption of subconjunctival fibrosis, often with an adjunctive antimetabolite.

Performing bleb needling at the slit lamp under topical anesthesia offers a convenient outpatient alternative, potentially reducing patient inconvenience, surgical costs and recovery time.

This study evaluates the safety and efficacy of slit-lamp bleb needling combined with low-dose mitomycin C (MMC) in eyes with failing filtration blebs following trabeculectomy or combined phacotrabeculectomy.

2. Materials and Methods

2.1 Study design and patient selection

This retrospective observational study reviewed 306 consecutive eyes that underwent trabeculectomy or combined phacotrabeculectomy with posterior chamber intraocular lens implantation.

After applying the exclusion criteria, 262 records were analyzed. Pediatric patients, secondary glaucoma cases, previously failed trabeculectomies and eyes with previous tube-shunt implantation were excluded.

The study population comprised 140 males and 122 females. The age ranged from 24 to 88 years. There were 151 trabeculectomies and 111 combined phacotrabeculectomies. Follow-up ranged from 6 months to 4 years.

2.2 Surgical technique and postoperative management

Trabeculectomy was performed using a fornix-based conjunctival flap, triangular partial-thickness scleral flap and rectangular internal scleral window with a surgical peripheral iridectomy.

The scleral flap was secured using 10-0 nylon sutures, comprising one fixed apical and two releasable sutures. Conjunctival closure was performed using two wing sutures and one limbal mattress suture. In combined procedures, phacoemulsification and foldable intraocular lens implantation were performed through the same incision.

Patients were examined on postoperative days 1 and 7, and at months 1, 2, 3, 6 and 9, followed by six-monthly examinations. Conjunctival sutures were removed on day 7. Releasable sutures were removed on day 7 when IOP exceeded 21 mmHg or at one month.

Bleb needling was performed when IOP exceeded 21 mmHg at any visit after the first postoperative month.

2.3 Slit-lamp bleb needling technique

The procedure was performed under topical anesthesia using 0.5% proparacaine eye drops, 2% lignocaine jelly or both. Lignocaine jelly was avoided in patients with a single functioning eye to prevent temporary visual blurring.

A disposable 26-gauge needle mounted on a syringe was introduced subconjunctivally at a site away from the bleb. Under slit-lamp visualization, the needle was advanced towards the scleral flap, entering the anterior chamber through the fibrotic tissue between the scleral flap and scleral bed.

The needle was used to mechanically dissect the fibrotic tissue along the margins of the scleral flap. The procedure was repeated from the opposite side using the surgeon's other hand.

Subsequently, 0.1 mL of 0.04% MMC was injected superior to the bleb using a separate syringe and needle.

Ofloxacin or moxifloxacin eye drops were instilled three times at 10-minute intervals following the procedure, and patients were discharged. Repeat needling with MMC was performed if IOP remained above 21 mmHg after one month.

3. Results

Of the 262 eyes included in the study, 30 (11.45%) developed elevated postoperative IOP and required bleb needling with MMC.

At one-year follow-up following needling:

- **Complete success:** 22 eyes (73.3%) achieved IOP below 21 mmHg without antiglaucoma medication.
- **Qualified success:** Six eyes (20%) required one or more antiglaucoma medications to maintain IOP below 21 mmHg.
- **Failure:** Two eyes (6.7%) failed to achieve adequate IOP control despite maximum medical therapy and required repeat trabeculectomy with MMC. Both subsequently maintained IOP below 21 mmHg during follow-up.

The most common complication was transient hyphema, observed in seven eyes. Three patients developed choroidal effusion. All cases resolved with medical management.

No bleb-related endophthalmitis or loss of vision was reported.

Table: One-year outcomes following slit-lamp bleb needling with mitomycin-C

Outcome 20.0	Number of eyes (n=30)	Percentage (%)
Complete success	22	73.3
Qualified success	6	20
Failure	2	6.7
Total	30	100

4. Discussion

Bleb failure due to subconjunctival fibrosis remains an important cause of inadequate IOP control following trabeculectomy. Needling revision is an established, minimally invasive technique for restoring filtration and can delay or avoid more extensive surgical intervention [3].

Various needling techniques have been described, including mechanical disruption of subconjunctival fibrosis and entry into the anterior chamber to release adhesions around the scleral flap. Both approaches have demonstrated comparable outcomes [5]. In the present study, both techniques were combined to achieve adequate disruption of fibrosis.

MMC is a useful adjunct to bleb needling because it reduces postoperative fibroblast proliferation and recurrent scarring [2,4]. We used a low concentration of 0.04% MMC, with a volume of 0.1 mL, to enhance the success of needling while limiting antimetabolite exposure.

In our study, complete success was achieved in 73.3% of treated eyes at one year, comparable to the cumulative success rate of 76% reported in a similar study [1].

Transient hyphema was the most frequent complication and resolved within one week with topical antibiotic, steroid and cycloplegic treatment. Three patients developed mild choroidal effusion, which resolved within six weeks with systemic steroids and topical cycloplegics and steroids.

Importantly, no bleb-related endophthalmitis or loss of vision occurred. These findings suggest that slit-lamp needling can be performed safely in appropriately selected patients without requiring an operating theatre.

The principal advantages of this technique are its minimally invasive nature, topical anesthesia, immediate discharge and reduced postoperative rehabilitation. These factors may improve patient acceptance and facilitate earlier intervention in failing blebs.

However, this study is limited by its retrospective design, relatively small number of needling cases and absence of a comparison group. Further prospective studies with longer follow-ups are required.

5. Conclusion

Slit-lamp bleb needling with adjunctive low-dose MMC is a useful, minimally invasive outpatient procedure for managing failing filtration blebs following trabeculectomy.

In this study, 73.3% of treated eyes achieved complete success at one year, with a low rate of serious complications. The procedure may help restore filtration, reduce the need for additional surgery and improve the overall success of trabeculectomy.

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