



A COMPARATIVE STUDY OF MODIFIED TRABECULECTOMY VS STANDARD TRABECULECTOMY

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ABSTRACT

Purpose. The original trabeculectomy technique of Cairns (1970) was modified to improve success rate. We describe a technique in which the iris of the iridectomy is used to prevent fibrosis of the scleral flap. Results of this technique are compared with standard trabeculectomy. **Material and Methods.** In this prospective study, twenty patients with medically uncontrolled open angle glaucoma underwent modified trabeculectomy and standard trabeculectomy. There were 10 patients in each group. In modified technique instead of performing a usual iridectomy after trabeculectomy, the iris tag was sutured along with scleral flap. Postoperative management was similar to standard trabeculectomy, with suture removal and needling if necessary. All patients had one-year follow-up. **Results.** After regular monitoring of Intraocular pressure (IOP) for one year mean IOP was 14.6 mmHg for patients with modified trabeculectomy and IOP \leq 17 mmHg was reached in 90% of patients without pressure lowering medication. No major complication was seen in any case; like flat anterior chamber, abnormal inflammatory reaction or postoperative raised IOP. There was eccentric pupil in a patient. In standard trabeculectomy patients mean IOP was 16.2 mmHg and only 70% patients had IOP \leq 17 mmHg without antiglaucoma medication. **Conclusion.** This modified trabeculectomy with iris flap technique gives better success rate than doing trabeculectomy alone. This modification prevents trabeculectomy failure by fibrosis. There is a minimal chance of trabeculectomy failure at no additional cost and complication.

KEYWORDS : trabeculectomy, iridotomy, iris flap, iridencleisis

Introduction

The Trabeculectomy technique by Cairns (1970) for open angle glaucoma is effective in reducing intraocular pressure (IOP). (Figure 1). Due to normal tissue response of wound healing, after some time there is failure caused by fibrosis of conjunctiva and sclera at filtration area. So reducing fibrosis is imperative for success of filtration surgery.

Historically Holth's operation/Iridencleisis was a popular operation for primary open-angle glaucoma.¹ It's a free-filtering procedure that creates a full-thickness fistula between the anterior chamber and the sub conjunctival space through an anterior sclerostomy. This involves entrapping a pillar of iris tissue into the sclerostomy to act as a wick to hold the sclerostomy open. Although successful, it was abandoned due to risk of infection and sympathetic ophthalmitis development in an eye with incarcerated uveal tissue.²

We describe a technique combining both procedures. In this *trabeculectomy with iridencleisis technique* the iris from iridectomy is used as a spacer to prevent fibrosis of the scleral flap. (Figure 2) The results are better compared to doing standard trabeculectomy alone.

2. Material and Methods

We operated twenty patients with medically uncontrolled open angle glaucoma. Ten patients underwent trabeculectomy with iridencleisis technique. Rest were operated with standard trabeculectomy with no iris flap. Comparison parameters were post operative IOP and postoperative complications. Patients have had at least one year of follow-up. There were no exclusion criteria for operated patients.

Trabeculectomy technique was similar to original technique, with the only difference that the iris from the iridectomy was not excised fully instead attached from base of iris (similar to a hinged flap of cornea in LASIK procedure). This tag of iris used as spacer underneath the scleral flap.

Both type of trabeculectomy were performed under peribulbar anesthesia. After a fornix based conjunctival flap, a triangular scleral flap of 3 by 3 mm was made. Below this a small triangular piece of scleral flap is prepared up to Descemet's membrane and is removed completely including the trabecular meshwork.

In modification instead of performing a usual iridectomy, an angle based V-shaped iris incision is made. The iris base remains attached while the iris triangle is flipped onto the sclera. The length of the iris flap should be slightly longer than the scleral flap. The *pigmented posterior iris epithelium* is removed by gently touching it with a sponge. The triangular scleral flap is closed with two polyamide 10/0 sutures. The tip of the iris should remain visible after closing the scleral flap

Rest of the steps were same. The conjunctiva closed with 2 limbal sutures side by side with 10/0 polyamide suture. The anterior chamber was maintained during the procedure by injecting air through paracentesis.

Figure 3: modified trabeculectomy steps

- (a) triangular flap
- (b) iris grasped and incised
- (c) iris tag is pulled out
- (d) iris tag sutured with scleral flap
- (e) iris sutured along with scleral flap.
- (f) iris flap extending beyond the scleral flap
- (g) final step; conjunctival suture

Postoperative management was similar to original Trabeculectomy. Patients were followed up at next day, then weekly for 4 weeks and then monthly thereafter. If IOP found high postoperatively manual pressure was applied to the eye to stimulate evacuation of aqueous to the bleb. The one of the scleral suture removed if pressure remained above 18 mmHg after one week in any patients. The conjunctival sutures around bleb were removed after 4 weeks. IOP was recorded every month and for better pressure control antiglaucoma drops requirement is noted. Any other complication and patient comfort is also recorded.

Results

Patient Data

Twenty patients of open angle glaucoma underwent trabeculectomy with iris flap technique or trabeculectomy alone in equal numbers. Two of them had a combined cataract surgery at same sitting. Patient characteristics are shown in **Table 1**. All glaucoma patients had pressure between 23 and 40 mmHg (with a mean IOP of 27 mmHg). They were on maximum antiglaucoma therapy before undergoing surgery.

All patients before surgery were putting one to three eye drops depending on severity of disease. Single or combination of Timolol, Brimonidine Dorzolamide and Latanoprost were being used by glaucoma patient.

Postoperative Complications

Postoperative complications are shown in **Table 2**. One patient had shallow anterior chamber, wound leak on the first day, which treated with bandage contact with lens pressure bandage. One patient had hypotony in first week, which treated with topical atropine and oral steroid therapy. One patient had a hyphaema which resolved spontaneously in a week. Two patients had transient rise of IOP which was treated with 300 cc mannitol 20% for few days. But both the group had similar incidence as shown in **Table 2**.

No abnormal inflammatory reaction is seen in modified technique. After one month no patient had any surgery related complications. In modified technique patients, corectopia is seen with shifting of pupil towards bleb. (Figure 4).

Figure 2: Postoperative view of trabeculectomy with iridencleisis and diffuse bleb Modified Trabeculectomy Outcome

After one year mean pressure was 14 mmHg, patients had IOPs ranging from 12 to 17 mmHg. A pressure of 17 or lower was reached in 92% of patients without any pressure lowering medication after one year. Only in one patient additional antiglaucoma drop was required to control IOP. Visual acuity in all patients remained stable or increased in the combined procedure. In no patient there was reduction of visual acuity. There was no long term complication observed in any of the patient. All of the patients were satisfied with results of surgery.

Standard trabeculectomy outcome

After one year of standard trabeculectomy the mean IOP was 16.2mmHg ranging from 11 to 20 mmHg. Of all the patients 70% could achieve IOP \leq 17 without antiglaucoma medication. Rest 30% patients required additional antiglaucoma drops. In one patient IOP remained high (34 mmHg) even with antiglaucoma drops so he was considered for repeat surgery **Table 3**

Discussion

Most of the studies document follow-up for a one year period. In those reports, it shows that in older patients, glaucoma filtering surgery is successful in about 70-80% of cases, for at least one year. Occasionally, the surgically-created drainage hole begins to close and the pressure rises again. This happens because the body tries to heal the incision in the eye, as if the opening were an injury. This rapid healing occurs most often in younger people, because they have a stronger healing system. Anti-wound healing drugs, such as mitomycin-C and 5-FU, help slow down the healing.

The use of antifibrotic agents to inhibit scarring of trabeculectomy blebs is a well-established clinical practice. Unfortunately, severe complications such as leakage, infection, hypotony, and endophthalmitis with complete loss of vision may occur. So Mitomycin C was never used in any of the patients for fear of complication.

A study by Mutsch YA and Grehn F shows success rate concerning the IOP was 83% in standard trabeculectomy and 74% following trabeculectomy with intraoperative antimetabolites. The postoperative IOP was 14.7 mmHg (+/- 3.4 mmHg) following standard trabeculectomy (preoperative IOP 24.3 +/- 6.7 mmHg) and 15.8 mmHg (+/- 4.9 mmHg) following trabeculectomy with intraoperative antimetabolites (preoperative IOP 27.0 +/- 9.5 mmHg).¹⁰

In the original Holth's iridencleisis the iris prolapsed through the sclerotomy and was grasped with two forceps at the pupil and torn [8]. The two iris pillars were pulled through the sclerotomy giving rise to U shaped pupil [9]. Pressure lowering effect was often very good, with reports of up to 90% of patients with chronic glaucoma

being controlled [10]. In case the iris sphincter was completely sectioned it resulted in a superior coloboma. The major drawback of this techniques was distortion of the pupil with pear shaped corectopia pointing towards the 12 o'clock position, often with an upward displacement of the pupil. [8].

The other reason why iridencleisis may have fell out of choice was possible risk of sympathetic uveitis. In the first half of the 20th century, at least 652 cases of sympathetic ophthalmia were reported, following trauma, cataract surgery, and many other intraocular surgeries [7]. Sourdille, however, did never encounter sympathetic ophthalmitis in his series of 236 iridencleisis procedures and stated that iridencleisis is no more dangerous than other fistulising operations [9]. In later reports presenting modified iridencleisis procedures, the issue of sympathetic ophthalmitis is not mentioned.

Considering the fact that we used postoperative steroid the risk of sympathetic ophthalmitis is extremely rare. We did not see this in any case. The posterior layer of the iris epithelium is removed by a swab wick to remove the pigmented layer. It reduces spread of these pigmented cells below the conjunctiva due to the aqueous flow. This creates a visible pigmentation which mimic as a subconjunctival nevus or melanoma. This is a common effect of this technique, but bleb remains hidden by upper lid.

It is known from older reports of the iridencleisis procedure that iris tissue can provide a long lasting fistulisation through the sclera [6, 7]. After performing trabeculectomy and iridectomy, the small strand of iris tissue with its furrows and crypts is discharged. Instead of using resorbable or nonresorbable foreign material as spacer underneath the scleral flap, the iris is an excellent alternative. Fibrosis at the level of the scleral flap is not possible if the iris is interposed. Since the tip of the iris reaches further than the scleral flap, the aqueous is drained through the sclera up to the subtenon and subconjunctival space. At the tenon or conjunctival level fibrosis is possible as in all other filtering procedures. Postoperative management of conjunctival fibrosis remains necessary. Our technique may have the advantage of decreasing scleral flap fibrosis.

The initial results of this trabeculectomy combining with iridencleisis technique are very encouraging with almost no failure case. This technique is slightly different from the old iridencleisis technique. In most cases the pupil was oval and but centered, with normal pupil reflex. When looking with the slit lamp an iridectomy is visible, with small red reflex coming through tissue gap. With a zeiss 4 mirror gonioscopy the iris base can be seen turned into the trabeculectomy window.

A similar small series by Veva De Groot et al showed success ratio of 90% after one year and IOP \leq 16 mmHg two years. In the 70% IOP was \leq 14 mmHg after two years. They used Mitomycin C in 30% of the patients. But we didn't use it in any of our case. They also didn't find any abnormal inflammation or other problems compared to standard trabeculectomy.

Our modified trabeculectomy had IOP between 12 to 17 mmHg one year follow up and mean IOP was 14.6 mmHg. Out of ten patients under study, nine patients didn't require any antiglaucoma drops. Only one patient required additional anti glaucoma eye drop for full IOP control. So this technique has success rate of 90% in achieving IOP control without any medication. **Table 3**

In standard trabeculectomy 70% could achieve IOP \leq 17 without antiglaucoma medication. Rest 30% patients required additional antiglaucoma drops. The mean IOP was 16.2mmHg ranging from 11 to 20mmHg.

Conclusion

Trabeculectomy combined with iris flap has higher success rate than doing standard trabeculectomy alone. This study shows good IOP control in one year follow up. This technique has no additional

complication when compared to doing trabeculectomy alone. None of the case with modified trabeculectomy showed failure within one year.

Table 1: patient profile.

Patient characteristics	Total patient 20
Male/female ratio	1/1
Mean Age	65 years (range 60 to 78)
IOP before surgery on maximum therapy	34mmHg (range 23 to 40)
Number of topical IOP lowering eyedrops	2 (range 1 to 4)
Previous LTP (laser trabeculectomy)	nil
Previous failed trabeculectomy	2/20
Previous corneal transplant	nil
Pseudoexfoliation glaucoma	4/20
Neovascular glaucoma	1/20

Table 2: Postoperative complications.

Postoperative complications	Modified trabeculectomy in 10 case	Standard trabeculectomy in 10 case
Raised IOP in first week	1	2
corectopia	3	none
Shallow anterior chamber	2	1
Hyphema during first week	1	1
Hypotony	none	1

Table 3 Postoperative IOP control in two techniques

Postoperative IOP control	Modified trabeculectomy	Standard trabeculectomy
Mean IOP	14.6mmHg	16.2mmHg
Postoperative IOP range	12 to 17	11 to 20
Antiglaucoma drug free IOP control	90%	70%
Patient requiring antiglaucoma drugs	10%	30%

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