

## COMPARISON OF LONG TERM INTRAOCULAR PRESSURE CONTROL FOLLOWING SMALL FLAP VS CONVENTIONAL TRABECULECTOMY

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DOI: 10.5455/ijmsph.2014.140420141

Received Date: 23.03.2014

Accepted Date: 14.04.2014

### ABSTRACT

**Background:** Trabeculectomy using a small scleral flap appears to provide medium to long-term IOP control comparable to large flap techniques and may offer potential advantages: reduced surgical tissue trauma, a larger area of undisturbed sclera and conjunctiva should repeat surgery be required, and reduced astigmatism induction.

**Aims & Objective:** To evaluate the long term intraocular pressure (IOP) control of small flap trabeculectomy (microtrabeculectomy) vs conventional trabeculectomy.

**Materials and Methods:** A prospective case control study of small flap trabeculectomy (group I) as against conventional trabeculectomy (group II) was performed on 50 eyes from 50 patients in each group with a minimum follow up of 2 years.

**Results:** All patients had a minimum follow up of 2 years, The mean (SD) intraocular pressures at presentation and preoperatively were 34.3 (5.6) and 23.7 (3.7) mm Hg in group I and 35.2(4.5) and 24.2(2.9) mm Hg in group II. The mean (SD) IOP at 6 months, 1 & 2 years was 12.5 (4.0), 12.9 (4.1), 13.5 (4.5) respectively in group I and 12.0 (4.4), 12.7 mmHg (3.6), 13.0 (3.9) respectively in group II. There was no significant difference in IOP levels at any of the analysis points by one way ANOVA.

**Conclusion:** Small flap trabeculectomy (microtrabeculectomy) is effective at reducing IOP in uncomplicated glaucoma patients with IOP control similar to filtering surgery utilising larger scleral flaps. Well-constructed scleral flaps of both sizes were able to achieve and maintain IOP levels well within the desired range and the small flaps had advantages of avoiding complications associated with larger flaps.

**Key Words:** Intraocular Pressure (IOP), Microtrabeculectomy; Trabeculectomy; Small Flap Trabeculectomy

### Introduction

Trabeculectomy, nowadays involves creation of a partial thickness scleral flap overlying the internal sclerostomy which improves control of aqueous outflow compared with 'full-thickness' procedures such as the Scheie technique. With control over aqueous flow, the risks of hypotony and its sequelae: anterior chamber shallowing, blood aqueous barrier breakdown, choroidal effusions, hypotony maculopathy, cataract, hyphaema, suprachoroidal haemorrhage, and aqueous misdirection can be minimised.<sup>[1,2]</sup> Trabeculectomy has become the gold standard filtering procedure for glaucoma. A number of variations including changing the size, shape, and position of the sclerostomy and trapdoor, limbal, or fornix based conjunctival incisions, and altering the method of performing the sclerostomy by trephination, sclerectomy and the use of a scleral punch have been introduced. In terms of IOP control, none has a significant advantage over any of the others with preoperative risk factors being the most important determinants of surgical success, early postoperative pressure control following small flap trabeculectomy (microtrabeculectomy) has been shown to be comparable with published series for conventional trabeculectomy.

Trabeculectomy using a small scleral flap appears to provide medium to long-term IOP control comparable to large flap techniques<sup>[3-5]</sup> and may offer potential advantages: reduced surgical tissue trauma, a larger area of undisturbed sclera and conjunctiva should repeat surgery be required, and reduced astigmatism induction<sup>[6]</sup>. Potential disadvantages include possible decreased control over aqueous flow and difficulty in controlling subconjunctival bleeding if the conjunctival incision is small.

### Materials and Methods

In our study we used a prospective case control study design to compare the results of small flap trabeculectomy (group I) as against conventional trabeculectomy (group II) on 50 eyes from 50 patients in each group with a minimum follow up of 2 years. Our study was performed in the post graduate department of Ophthalmology from the period between January 2008 – December 2013. Exclusion criteria included eyes with uveitis, rubeotic eyes, and eyes which have had previous intraocular surgery or in which antimetabolite supplementation was to be used, the only demonstrable risk factor for failure in our patients was the prior use of topical anti-glaucoma medications and the two groups

were selected keeping the factor distributed symmetrically. All IOP recordings were made between 09:00 am - 12:00 am and were performed using Goldmann applanation tonometry. "Small flap" trabeculectomy (microtrabeculectomy) is a modification of the "full size" procedure in which a 2 mm by 2 mm scleral trap door is constructed and an anteriorly sited 0.75 mm diameter internal sclerostomy is achieved with a Kelly punch while as in the conventional procedure a 4 mm by 4 mm trap door is created over the sclerostomy.

**Results**

In group I of the 50 eyes that fulfilled the entry criteria, 37 were right eyes and 13 left. 20 of the 50 patients were male. 27 eyes had primary open angle glaucoma (POAG), 20 had glaucoma associated with the pseudoexfoliation syndrome, and 3 had pigmentary glaucoma. The mean age at surgery was 58 years with a range of 50-85 years. Patients had been diagnosed as having glaucoma a mean of 14 months before surgery. There were no intraoperative complications noted. 2 eyes (4%) had postoperative hyphaemas, on the first postoperative day. All of these cleared rapidly without need for any intervention. No eyes have required further surgery to control IOP during the follow up period.

**Table-1: Baseline characteristics of the patients included in the analysis**

Characteristics	Group I	Group II
Mean pre-op IOP	23.7	24.2
Mean no of drops pre-op	1.12	1.29
Average postop IOP at last follow up	13.5	13.0
Average IOP at the start of the first glaucoma medication following surgery	23.3	24.1
Average time to the addition of first glaucoma medication following surgery(months)	21.0	22.0
Mean no of drops at last follow up	0.30	0.26

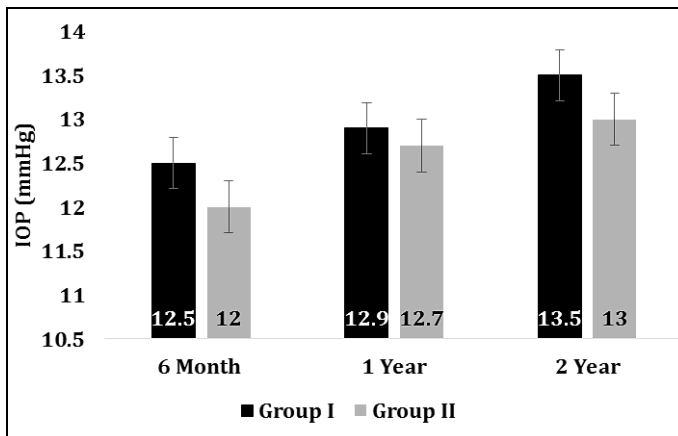
**Table-2: IOPs (mean, SD) in mmHg following microtrabeculectomy and conventional trabeculectomy**

Group	At presentation	Pre-op	1 Month Post-op	6 Month Post-op	1 Year Post-op	2 Year Post-op
I	34.3 (5.6)	23.7 (3.7)	12.1 (2.8)	12.5 (4.0)	12.9 (4.1)	13.5 (4.5)
II	35.2 (4.5)	24.2 (2.9)	11.9 (2.9)	12 (4.4)	12.7 (3.6)	13 (3.9)

In group II of the 50 eyes that fulfilled the entry criteria, 31 were right eyes and 19 left. 29 of the 50 patients were male. 25 eyes had primary open angle glaucoma (POAG), 25 had glaucoma associated with the pseudoexfoliation syndrome. The mean age at surgery was 64 years with a range of 55-85 years. Patients had been diagnosed as having glaucoma a mean of 11 months before surgery. There were no intraoperative complications noted. 5 eyes (10%) had postoperative hyphaemas, on the first postoperative day. All of these cleared rapidly without need for any intervention. 3 eyes (6%) had a shallow AC

postoperatively, of which surgical reformation was needed in 1 eye. No eyes have required further surgery to control IOP during the follow up period.

A one way ANOVA comparing all postoperative IOPs indicates that there is no significant difference between the IOPs at any of the time points from 6 months to 2 years postoperatively ( p >0.05).



**Figure-1: Post-op IOP distribution in two groups**

**Discussion**

Trabeculectomy is currently the most commonly performed operation for the surgical treatment of open angle glaucoma following trabeculectomy outflow of aqueous from the eye beneath a well-constructed scleral flap will depend on a number of factors. The principle resistance to aqueous outflow from the eye via the sclerostomy will be determined by the apposition of the flap to the underlying scleral bed around the sclerostomy and its ability to lift. This will depend upon flap elasticity, which will be influenced by flap thickness, and tension within the flap determined by suture position and tension. Here in our study we try to establish the effect of one such variant that being the scleral flap size. In the initial report of small flap trabeculectomy, Starita et al.<sup>[3]</sup> compared a small 2 by 2mm flap procedure in 17 eyes with a large 4 by 4mm flap procedure in 11 eyes, with similar IOP control at 1 year in the 2 groups. In a retrospective study of 'microtrabeculectomy' Vernon and Spencer used small 2 by 2 mm square flaps on 65 eyes, mean IOP at 13 months was 13.4 mmHg with 88% of eyes controlled at 21 mmHg on no medications<sup>[4]</sup>, results comparable to published studies of conventional large flap techniques with similar follow up<sup>[7,8]</sup>. However, the size of sclerostomy does not appear to increase the likelihood of postoperative flat anterior chamber or choroidal detachment, nor influence long term control of IOP.<sup>[9]</sup> Although in our study the only variable was scleral

flap size there were likely to be small differences in scleral flap thickness, suture positioning, and suture tension within each group, influencing the final IOP. The results of this study indicate that reducing the size of the procedure does not, however, appear to lead to an increased long term failure rate. This can permit the surgeon to take advantage of a procedure which occupies a smaller area on the surface of the eye, a feature is likely to be of particular advantage when performing surgery on eyes that have had previous drainage and/or cataract surgery. A hyphaema rate of 10% is not excessive when compared with previous reports, in which rates vary from 7% to 53%.<sup>[10]</sup> Our results conclude that “small flap” trabeculectomy in a group of uncomplicated eyes controls IOP in the long term as well as previous reports utilising the conventional full sized procedure. However similar results may not be obtainable in higher risk eyes without the use of antimetabolites as the only demonstrable risk factor for failure in our patients was the prior use of topical medications.<sup>[11]</sup>

## Conclusion

Small flap trabeculectomy (microtrabeculectomy) is effective at reducing IOP in uncomplicated glaucoma patients with IOP control similar to filtering surgery utilising larger scleral flaps. Well-constructed scleral flaps of both sizes were able to achieve and maintain IOP

levels well within the desired range and the small flaps had advantages of avoiding complications associated with larger flaps.

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**Cite this article as:** Khan A, Majid O, Wani J, Zahoor S. Comparison of long term intraocular pressure control following small flap vs conventional trabeculectomy. *Int J Med Sci Public Health* 2014;3:797-799.

**Source of Support:** Nil

**Conflict of interest:** None declared