

# Analysis of Shallow Anterior Chamber Following Trabeculectomy Surgery: A Prospective Study of 32 Eyes

Anjali Khairnar<sup>1</sup>, Anamika Agrawal<sup>2</sup>, Vaishali Jadhav<sup>3</sup>, Eesha Gokhale<sup>4</sup>, Vidhya Khobragade<sup>5</sup>, Anjali D. Nicholson<sup>6</sup>

## ABSTRACT

**Introduction:** IOP is the commonest risk factor that is modified either medically or surgically in the management of Glaucoma. Surgical options have an edge over the medical line of management in lowering IOP more effectively and trabeculectomy is the commonest surgery performed. In our study, we have aimed to study the predisposing factors and aetiology leading to shallow anterior chamber following trabeculectomy surgery; different management modalities; outcomes in terms of IOP control and bleb formation and complications due to persistent shallow anterior chamber.

**Material and Methods:** It is prospective, consecutive case series study. 32 eyes that developed shallow anterior chamber following trabeculectomy surgery combined with cataract surgery and Mitomycin C application wherever indicated were included in the study. Complete success was considered when IOP was controlled without any medications.

**Results:** 30 patients (32 eyes, Average age 55 years, females 33.33%) were included. The mean duration of follow up was 6 months. Bleb leak (31.25 %) was the commonest cause and its incidence was more (82.35 %) when Mitomycin C was used. 31.25 % eyes required surgical intervention and conjunctival suturing (70 %) was commonly performed surgery. 87.5 % achieved IOP control without any medications and in 6.25 % it was not controlled even with maximum medications. Visual acuity remained same in 56.25%, improved in 28.12 % and worsened in 15.62% with corneal decompensation occurring in 2 of these patients.

**Conclusion:** It is crucial to detect the aetiology of persistent shallow ac earlier and to manage it accordingly to avoid further complications.

**Keywords:** trabeculectomy, shallow anterior chamber, Mitomycin C

## INTRODUCTION

Glaucoma is a chronic progressive optic neuropathy caused by a group of ocular conditions which lead to damage of the optic nerve with loss of visual function.<sup>1</sup> Research over the last two decades has identified intraocular pressure (IOP) as the most common risk factor which can be easily modified. The irreversible damage caused by this progressive disorder can only be slowed or halted by appropriate IOP control using medical, laser or surgical modalities. Surgical options have an edge over the medical line of management in lowering IOP more effectively and consistently.<sup>2</sup> In India, the situation is compounded due to lack of awareness, delayed presentation, financial constraints and non compliance in terms of treatment and follow-up. So very frequently, ophthalmologists have to prefer surgical line of management.

A good surgical technique is one which effectively lowers the IOP, preserves the visual function, relieves pain, and is

safe, long lasting and one which can be easily repeated and adjusted. It should be cost effective with minimal side effects and complications. Achieving proper levels of post-operative IOP should be comprehensive goal, and extreme efforts with remarkable skills are required to accomplish this most challenging goal.<sup>3,4</sup> As per the current status of anti glaucoma surgery, the aim is to produce a gap at the sclerocorneal junction so as to communicate the anterior chamber with the subconjunctival space for drainage of aqueous humor out of the anterior chamber.

Trabeculectomy, the most commonly performed anti glaucoma surgery involves the creation of a lamellar scleral flap with excision of short length of the Schlemm's canal, thus producing a filtering channel through the subconjunctival space.<sup>5</sup> Following trabeculectomy surgery; IOP, anterior chamber depth and bleb morphology are important parameters during assessment of the post-operative status of the patient. A shallow or flat anterior chamber may occur in the early, intermediate or late post-operative period<sup>6-8</sup> A persistent shallow or flat anterior chamber can lead to lenticulo corneal touch, corneal oedema, cataract, hypotony and its related complications like maculopathy and choroidal detachmen.<sup>9,10</sup>

Study aimed to find the predisposing factors and aetiology leading to shallow anterior chamber following trabeculectomy surgery; different management modalities; outcomes in terms of IOP control and bleb formation and complications due to persistent shallow anterior chamber.

## MATERIAL AND METHODS

This study was performed in the ophthalmology department of a tertiary care hospital in Mumbai during 2011-2013. The study was approved by the Institutional ethics committee. The study design was prospective. An informed consent was obtained from every study patient.

A sample size of 30 was chosen based upon power of the study, level of significance as also upon the prevailing rates of shallow Anterior chamber in large Randomised control trials. Thus having determined the underlying population event rate, we

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor, <sup>6</sup>Professor and Head, Department of Ophthalmology, T.N.M.C and B.Y.L Nair Charitable Hospital, <sup>3</sup>Glaucoma Consultant, Bombay City Eye Institute, <sup>4</sup>Speciality Medical Officer, B.M.C Eye Hospital, <sup>5</sup>Speciality Medical Officer, Seth G.S Medical College and K.E.M.H

**Corresponding author:** Dr. Eesha Gokhale, Speciality Medical Officer, B.M.C Eye Hospital

**How to cite this article:** Anjali Khairnar, Anamika Agrawal, Vaishali Jadhav, Eesha Gokhale, Vidhya Khobragade, Anjali D. Nicholson. Analysis of shallow anterior chamber following trabeculectomy surgery: a prospective study of 32 eyes. International Journal of Contemporary Medical Research 2016;3(9):2503-2506.

were able to calculate the estimated sample size for the study. Thirty patients diagnosed with either primary open angle or angle closure glaucoma were included in the study. Patients with advanced cataract underwent cataract extraction combined with trabeculectomy surgery. Mitomycin C (MMC) was used as adjunct in patients with advanced glaucomatous damage, or those undergoing combined surgery and one-eyed patient. Patients with aniridia, congenital or secondary glaucoma, and history of previous intraocular surgery were excluded from the study.

### Surgical technique

In all cases, an 8 mm fornix based conjunctival flap was dissected and 10-15 mm side pocketing was done. Wherever indicated 0.2mg/ml of Mitomycin C was applied with polyvinyl sponges under the conjunctival flap for 2 minutes, taking care to avoid contact with the edges of the conjunctival flap or cornea followed by wash with 100 ml of Ringer lactate solution. A 3×3 mm triangular scleral flap was incised and deepened to 1/3<sup>rd</sup> thickness of sclera. The dissection was done beyond bluish grey zone till clear cornea was reached. Paracentesis was done at this stage to avoid any sudden decompression of the eyeball. A block of 1×1mm deep scleral tissue was marked and excised. Peripheral iridectomy was done. Anterior chamber was formed with balanced salt solution. Scleral flap was sutured with 10-0 nylon with one suture at the apex of the triangle and 1 each on either sides of the triangle. IOP titration was done to adjust the tightness of the scleral sutures. Meticulous conjunctival closure was done with 10-0 nylon suture. Interrupted tight sutures were taken each at the two ends of the conjunctival incision. Subconjunctival injection of antibiotic and steroid was given and eye was patched with antibiotic and atropine drop. In combined procedure, cases of phacoemulsification were done through a temporal incision after sclera flap dissection. In cases with extracapsular cataract extraction, after dissecting the scleral flap, the incision was extended temporally through which cataract extraction was done. Postoperative treatment included steroid antibiotics, atropine and lubricating agents. Patients were followed up on day 1, day 3, day 7, then weekly for 1 month and monthly for 6 months. Laser suture lysis was done with Hoskins gonioscopy lens using frequency doubled Nd:YAG laser at 2-4 weeks post operatively in eyes with high IOP and flat bleb. The patients were followed up closely to watch for shallow AC. Depending on the etiology, different modalities were used to manage the shallow AC.

In eyes with shallow AC, low IOP and low bleb, bleb leak was suspected and was confirmed with Seidel's test. In such cases topical steroids were reduced. Pressure patching was done after putting antibiotic and atropine drops with eye pad folded and placed over the closed eyelid. Patient was observed the next day. Eye drops were restarted if the leak subsided. However, if the leak persisted, then patching was done again. A large diameter (17-21mm) bandage contact lens (BCL) was used if the patient was unable or unwilling to follow up daily.

If the bleb leak persisted for more than 4-5 days, conjunctival resuturing was considered.

For patients with shallow AC, low IOP and high bleb, over filtration was the cause. In these patients, a trial of conservative treatment was given. Topical steroids were reduced and aqueous suppressants were added when required. Trial of pressure patch or bandage contact lens was also given. In patients where over

filtration persisted despite the conservative management, extra flap sutures were taken. In patients with shallow AC, high IOP and flat bleb, aqueous misdirection was suspected and the diagnosis was confirmed on UBM. Both eyes of one patient had aqueous misdirection. One eye underwent lensectomy with pars plana vitrectomy. Other eye with advanced glaucomatous damage was treated with topical medications. In the eyes with choroidal effusions i.e., shallow AC, low IOP and low bleb and light brown elevation on the indirect ophthalmoscopy, frequency of topical steroids was increased and oral steroids were added. In one patient with choroidal detachment who presented with lenticulocorneal touch at 2 month follow up, cataract extraction with PCIOL implantation was done on emergency basis.

In patients who underwent surgical intervention for post trabeculectomy shallow anterior chamber, topical steroids, antibiotics and atropine were continued till 4-6 weeks post operatively. In the patients where the IOP was not controlled, antiglaucoma medications were added. Conjunctival sutures were removed at 3-4 weeks post operatively. Post-operative refraction was done after 6 weeks

### STATISTICAL ANALYSIS

Statistical analysis was done using SPSS software. Regression analysis was done to evaluate the influence of individual variable on outcomes. Unpaired t test and chi square test was used as required.

### RESULTS

In our study, postoperative shallow AC occurred more in the older age group. Out of 32 eyes, 11 eyes had primary open angle glaucoma and 21 eyes had primary angle closure glaucoma. Females contributed more to the PACG group, i.e. 17 out of 21 eyes. Of the 32 eyes, 27 eyes were with cataractous lens and 5 eyes were with clear lens. 10 eyes underwent trabeculectomy, 13 eyes underwent trabeculectomy with mitomycin C and 9 eyes underwent cataract extraction with PCIOL implantation with trabeculectomy with MMC (Table-2).

10 eyes (31.25%) had bleb leak, 3 eyes (9.375%) had choroidal detachment (CD), 7 eyes (21.87%) had bleb leak and CD, 3 eyes (9.375%) had over filtration, 2 eyes (6.25%) had aqueous misdirection and 7 eyes (21.87%) had low scleral rigidity as the cause of shallow AC. 17 eyes had bleb leak and MMC was used in 14 (82.35%) of them. Surgical intervention was needed in 10 eyes out of which conjunctival resuturing was done in 7 eyes, scleral flap resuturing was done in 1 eye, cataract extraction with PCIOL implantation was done in 1 eye and lensectomy with pars plana vitrectomy was done in 1 eye (Table-2).

6 months follow up visit revealed corneal decompensation in 2 eyes and cataract progression occurred in 4 eyes. Visual acuity improved in 9 eyes (28.12%), remained same in 18 eyes (56.25%) and worsened in 5 eyes (15.62%) (Figure-1). When IOP below 21 mm Hg was achieved without medications with good bleb, it was considered as complete success; if with medications then as qualified success and if uncontrolled then as failure. Out of the 32 eyes, complete success was achieved in 28 eyes (87.5%), qualified success in 2 eyes (6.25%) and failure in 2 eyes (6.25%) (Table-3).

### DISCUSSION

In our study, the incidence of shallow Anterior Chamber was

maximum in 17 eyes (53.13%) where the baseline IOP was in the range between 31 to 40 mm Hg. According to Suzhen Nie, occurrence of shallow anterior chamber after filtration surgery is related to prolonged ocular hypertension and abrupt drop in IOP during surgery.<sup>11,12</sup> Out of the 32 eyes, 24 eyes (i.e.75%) eyes were myopic, and remaining 8 eyes (25%) were hypermetropic. Low scleral rigidity can be the contributing factor for the occurrence of shallow anterior chamber in myopia. According to Castren J A et al, the scleral rigidity of the myopic eye is lower as compared to hypermetropic or emmetropic eyes.<sup>13</sup> in our study, 8 eyes (25%) had primary open angle glaucoma and 24 eyes (75%) had primary angle closure glaucoma. In primary angle closure glaucoma, anteroposterior lens thickness and age related laxity of the zonules causing forward movement of the lens cause pupillary block. In later stages, the forward movement of the lens iris diaphragm causes angle closure.<sup>14</sup> In our study, all the eyes underwent trabeculectomy with fornix based conjunctival flap. A flat anterior chamber following surgery has been reported to be more common following trabeculectomy with a fornix based flap than a limbus based flap.<sup>15</sup> Out of the 17 eyes in which bleb leak occurred, MMC was used in 13 eyes (82.35%). Thus, the incidence of leak was found to be more when mitomycin C was used.<sup>16-19</sup> this is also observed in the study conducted by Anand N et al which shows that MMC application over the area of scleral flap dissection during glaucoma surgery is associated with a high incidence of bleb leaks.<sup>20</sup> The incidence of bleb leaks probably is higher

in trabeculectomies supplemented with antimetabolites than nonsupplemented surgeries. This can be prevented by taking care to avoid the contact of antimetabolite with the edges of the conjunctival flap, use of polyvinyl sponges for its application, and tight meticulous conjunctival suturing. Also it is better to avoid the use of antimetabolite even if planned when there is slightest doubt about the conjunctival integrity due to surgical trauma.

In our study, shallow anterior chamber occurred in both eyes of one patient due to aqueous misdirection that was confirmed on ultrasound biomicroscopy.<sup>21</sup> This is a condition in which if one eye is affected then there are high chances that the other eye would also get affected.<sup>22-23</sup> This was also seen in a case studied by Stan C where a patient with angle closure glaucoma underwent trabeculectomy in both eyes.<sup>24</sup> In the right eye, six months after surgery, the patient presented with intraocular hypertension, shallow anterior chamber and cataract. The left eye (operated six months after the right eye) showed same signs two weeks after surgery. Diagnosis was malignant glaucoma in both eyes. In our study, 22 eyes (68.75%) were managed conservatively.<sup>25-30</sup> Surgical intervention was required in 10 eyes (31.25% %) and it included conjunctival resuturing in 7 eyes (21.87%), scleral flap resuturing in 1 eye (0.31%) in which over filtration was the etiology, lensectomy with pars plana vitrectomy in 1 eye (0.31%) which had aqueous misdirection and cataract extraction with PCIOL implantation in 1 eye (10%) in which lenticulocorneal touch had occurred due to choroidal detachment. At the end of 6 months, 2 eyes (6.25%) had corneal decompensation and 4 eyes (12.5%) developed cataract.

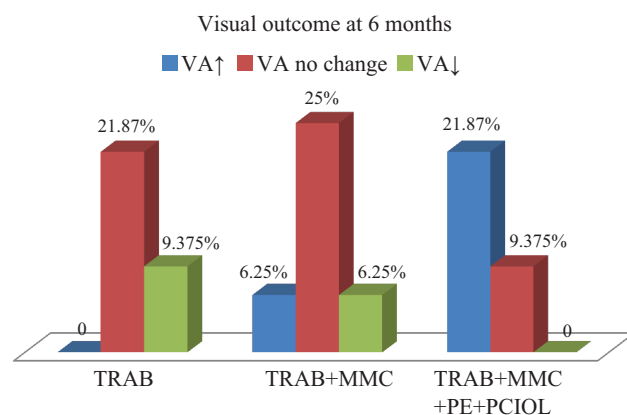
According to the study conducted by Husain R et al,<sup>5</sup> trabeculectomy is associated with progression of lens opacity predominantly in the posterior sub capsular region. Modification of risk factors such as postoperative steroid use may delay progression. Our study also gives similar results. Another study

Etiology	No.of eyes (of 22)	% of eyes
Bleb leak	8	36.37
Choroidal detachment (CD)	3	13.64
Bleb leak+CD	1	4.54
Overfiltration	2	9.09
Low scleral rigidity	7	31.82
Aqueous misdirection	1	4.54
Total	22	100

**Table-1:** Etiology of shallow AC in the cases who were managed conservatively

Surgery done	No.of eyes (of 10)	% of eyes
Conjunctival resuturing	7	70
Scleral flap resuturing	1	10
Cataract extraction +PCIOL	1	10
Lensectomy+pars plana vitrectomy	1	10
Total	10	100

**Table-2:** Surgical management of shallow AC.



**Figure-1:** Visual Outcome at 6 months

Etiological factor	Complete success		Qualified success		Failure	
	No.of eyes	% of eyes	No.of eyes	%of eyes	No.of eyes	% of eyes
Leak	10	31.25	0	0	0	0
CD	3	9.375	0	0	0	0
Leak+CD	7	25	0	0	0	0
Overfiltration	3	9.375	0	0	0	0
Aqueous misdirection	0	0	0	0	2	6.25
Low scleral rigidity	5	15.625	2	6.25	0	0
Total	28	87.5	2	6.25	2	6.25

**Table-3:** Etiological factor for post op shallow AC and their impact on success of the surgery.

by the AGIS (Advanced Glaucoma Intervention Study) shows that the nuclear and cortical regions of the lens also get affected after filtration surgery. Globally, the reported incidence of cataract progression after filtering surgery varies greatly, from 2% to 53%. Use of MMC was associated with more chances of progression of cataract in our study.

At the end of 6 months, the visual acuity improved in 9 eyes (28.12%), remained same in 18 eyes (56.25%) and worsened in 5 eyes (15.62%), out of which 3 eyes had undergone trabeculectomy and 2 had undergone trabeculectomy with MMC. Out of the 3 eyes which had undergone trabeculectomy, visual acuity worsened because of aqueous misdirection in one patient (with advanced glaucoma), lenticulocorneal touch with corneal decompensation in one patient and over filtration with subsequent cataract development in one patient. In the 2 eyes where trabeculectomy with MMC was performed, visual acuity was reduced due to cataract progression in one eye and due to decompensated cornea in other eye.

30 eyes (93.75 %) were having diffuse, moderately vascularized and elevated bleb. Bleb failure i.e. flat, vascularized bleb occurred in two eyes with malignant glaucoma.

## CONCLUSION

Shallow anterior chamber occurs commonly following trabeculectomy surgery. Most of them respond to conservative management. However; in cases with persistent shallow anterior chamber, detecting the etiology immediately and prompt management if required surgically should be considered to prevent complications.

## REFERENCES

- Foster PJ, Buhrmann R, Quigley HA, Johnson GJ. The definition and classification of glaucoma in prevalence surveys. *The British Journal of Ophthalmology*. 2002; 86:238-242.
- The Advanced Glaucoma Intervention Study (AGIS): 7. the relationship between control of intraocular pressure and visual field deterioration. The AGIS Investigators. *Am J Ophthalmol*. 2000;130:429-440.
- South East Asia Glaucoma Interest Group. Asia Pacific Glaucoma Guidelines. 2008;12 Available at:[http://www.seagig.org/toc/APGG2\\_fullversionNMview.pdf](http://www.seagig.org/toc/APGG2_fullversionNMview.pdf).2009.
- Quigley HA, Broman A. The number of persons with glaucoma worldwide in 2010 and 2020. *Br J Ophthalmol*. 2006;90:262-67.
- Edmunds B, Thompson JR, Salmon JF, Wormald RP. The National Survey of Trabeculectomy. II. Variations in operative technique and outcome. *Eye (Lond)*. 2001;15:441-8.
- Liebmann JM, Ritch B: Complications of glaucoma filtering surgery. *Glaucomas*, St Louis: Mosby. 1996:1703-1736.
- Alwitary A, Rotchford A, Patel V, Abedin A, Moodie J, King AJ. Early bleb leak after trabeculectomy and prognosis for bleb failure. *Eye (Lond)*. 2009;23:858-63.
- Jampel HD, et al: Perioperative complications of trabeculectomy in the Collaborative Initial Glaucoma Treatment Study (CIGTS), *Am J Ophthalmol*. 2005; 140:16-18.
- Henderson H W A, Ezra E, Murdoch I E. Early postoperative trabeculectomy leakage: incidence, time course, severity, and impact on surgical outcome. *Br J Ophthalmol*. 2004;88:626-29.
- Stewart WC, Shields MB. Management of anterior chamber depth after trabeculectomy. *Am J Ophthalmol*. 1988;106:41-44.
- Suzhen Nie. Analysis on reasons and treatment approaches for shallow anterior chamber following glaucoma surgery. *Eye Science*. 2011;26:100-102.
- Castren J A, Pohjola S. Myopia and scleral rigidity. *Acta ophthalmologica*. 1962;40:33-36.
- Quigley H, Friedman D, Congdon N. Possible mechanisms of primary angle-closure and malignant glaucoma. *J Glaucoma*. 2003;12:167-180.
- Al-Haddad C, Abdulaal M, Al-Moujahed A, Ervin AM. Fornix-based versus limbal-based conjunctival trabeculectomy flaps for glaucoma. *Cochrane Database Syst Rev*. 2015;11:CD009380.
- Costa VP, Wilson RP, Moster MR et al. Hypotony maculopathy following the use of topical mitomycin C in glaucoma filtration surgery. *Ophthalmic Surg*. 1993; 24:389-394.
- Kee C, Kaufman PL. Profound long-term hypotony without maculopathy after trabeculectomy with antimetabolite. *Acta Ophthalmol (Copenh)*. 1994;72:388-390.
- Bardak Y, Cuypers MH, Tilanus MA, Eggink CA. Ocular hypotony after laser suture lysis following trabeculectomy with mitomycin C. *Int Ophthalmol*. 1997;21:325-330.
- Hong C, Hyung SM, Song KY et al. Effects of topical mitomycin C on glaucoma filtration surgery. *Korean J Ophthalmol*. 1993;7:1-10.
- Anand N. Deep sclerectomy with mitomycin C for glaucoma secondary to uveitis. *Eur J Ophthalmol*. 2011;21:708-14.
- Schroeder W, Fischer K, Erdmann I, Guthoff R. Ultrasound biomicroscopy and therapy of malignant glaucoma. *Klin Monatsbl Augenheilkd*. 1999;215:19-27.
- Chandler PA, Grant WM. Mydriatic-cycloplegic treatment in malignant glaucoma. *Arch Ophthalmol*. 1962;68:353-59.
- Chandler PA, Simmons RJ, Grant WM. Malignant glaucoma. Medical and surgical treatment. *Am J Ophthalmol*. 1968;66:495-502.
- Stan C. [Bilateral malignant glaucoma--case report]. *Oftalmologia*. 2005;49:33-4. Romanian.
- Diane A, Schultz, Schuman, Singh. Managing a shallow anterior chamber after glaucoma filtering surgery. *eyeworld (glaucoma)*; June 2000.
- Blok MD, Kok JH, van Mil C, et al. Use of the Megasoft Bandage Lens for treatment of complications after trabeculectomy. *Am J Ophthalmol*. 1990;110:264.
- Shoham A, Tessler Z, Finkelman Y, et al. Large soft contact lenses in the management of leaking blebs. *CLAO J*. 2000; 26:37.
- Porges Y, Ophir A. Hollow bandage contact lens. *Ophthalmic Surg Lasers*. 2001;32:124.
- Simmons RJ, Kimbrough RL. Shell tamponade in filtering surgery for glaucoma. *Ophthalmic Surg*. 1979;10:17.
- Zalta AH, Wieder RH. Closure of leaking filtering blebs with cyanoacrylate tissue adhesive. *Br J Ophthalmol*. 1991;75:170.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 05-07-2016; **Published online:** 20-08-2016