Original Article

# Effect of Cataract Extraction on Intraocular Pressure in Chronic Angle-Closure Glaucoma

*Dr. Shams Mohammed Noman*[1], *Dr. Umme Salma Akbar*[2]

[1] Senior Consultant, Chittagong Eye Infirmary & Training Complex (CEITC), Chattogram, Bangladesh
[2] Senior Assistant Surgeon, Chittagong Eye Infirmary & Training Complex (CEITC), Chattogram, Bangladesh

## ABSTRACT

**Purpose:** To evaluate the effect of phacoemulsification and posterior chamber intraocular lens (PCIOL) implantation and intraocular pressure (IOP) in eyes with chronic angle-closure glaucoma.

**Methods:** Twenty-two patients with chronic angle-closure glaucoma (CACG) and visually significant cataract were included in our study. All underwent phacoemulsification and PCIOL implantation. Visual Acuity, IOP, Depth of angle and the number of anti glaucoma medications were recorded preoperatively and at one day, one week, one month, two months, and six months postoperatively.

**Results:** The mean age was 71.04 ± 6.55 years and there were 8 males (36.4%) and 14 females (63.6%). The mean IOP was 19.54 ± 1.49 mmHg preoperatively and 16.04 ± 1.49 mmHg six months postoperatively. The mean number of anti glaucoma medications were 2 preoperatively and 0.18±0.50 at final follow-up. The mean preoperative Log MAR visual acuity was 1.00 and 0.3 at final follow-up (P<0.005).

**Conclusion:** When chronic angle-closure glaucoma is associated with visually significant cataract, phacoemulsification and PCIOL implantation alone can significantly reduce intraocular pressure.

***Keywords:*** Chronic Angle-Closure Glaucoma, Phacoemulsification, Intraocular Pressure.

## Introduction

Chronic angle-closure glaucoma may develop either after acute angle closure in which synechial closure persists or when the chamber angle closes gradually and IOP rises slowly as enough angle is compromised. Sufficiently extensive apposition or synechial adhesion of the peripheral iris to the pigmented part of trabecular meshwork results in raised IOP. Surgical management of patients with coexisting visually significant cataract and glaucoma is difficult. We have 3 options to manage this problem: Cataract surgery alone, glaucoma surgery alone followed by later cataract extraction or performing combined surgery[1-5].

Trabeculectomy in CACG is however associated with potential complications such as: shallow anterior chamber, malignant glaucoma, supra choroidal hemorrhage and endophthalmitis[4-5].

Manuscript Received : 07.06.2020
Revision Accepted : 14.07.2020

***Correspondence to:***
Dr. Shams Mohammad Noman
Senior Consultant
Chittagong Eye Infirmary & Training Complex
Chattogram, Bangladesh
E-mail: drshams_noman@yahoo.com

Many studies have shown that cataract extraction and PCIOL insertion decreases IOP in eyes with glaucoma and visually significant cataract. Although the effect depends considerably on the type of glaucoma it can be significant in CACG patients. In these studies, the IOP reduction was attributed to significant widening of the anterior chamber angle. It is known that CACG patients have thicker lenses than normal eyes which is significantly positioned anteriorly. These two mechanisms may completely account for the shallow anterior chamber and indirectly narrow angle in these patients. Therefor it seems reasonable that cataract surgery can improve IOP control in eyes with CACG.

## Methods

We studied 22 eyes of 22 patients with CACG who underwent phacoemulsification and PCIOL

***Table-01: Patient's characteristics***

| | |
|---|---|
| No of subjects | 22 |
| Mean Age | 71.04±6.55 |
| Gender | 8M/14F |
| Follow-up | 6 months |

implantation from 2015 to 2017 at Chittagong eye infirmary and training complex (Table 1).

Inclusion criterion was CACG with visually significant cataract. Exclusion criteria were: IOP>30, Pseudoexfoliation (PEX) glaucoma, any pervious intraocular surgery except peripheral iridectomy, Cup to disc (C/D) ratio >0.7, neovascularization of iris (NVI), and phacodonesis.

All eyes underwent phacoemulsification and PCIOL insertion. Briefly, a 3.2 mm clear corneal incision was made temporally. After viscoelastic injection and capsulorhexis of average 5 mm size, hydro dissection and hydro delineation were performed and then phacoemulsification was done and a single- piece PCIOL was implanted in the bag. All patients were followed for 6 months. Pre- and post-operative best corrected visual acuity, IOP, angle grading (by gonioscopy), and anterior chamber depth with Spaeth method were assessed and medications were recorded. IOP was measured by Goldman tonometer before and after surgery at intervals of 1, 7, 30, 60, and 180 days.

Also C/D ratio was recorded pre- and postoperatively with slit-lamp and +90 D lens. Failure was defined as: IOP ≥ 21 in two visits one week apart or need for more anti glaucoma medication than before surgery. Our study was interventional case series. Statistical analysis was performed with paired t-test. P value less than 0.05 was considered significant.

## Results

There were 8 males (36.4%) and 14 females (63.6%) in our study. The mean age was 71.04 ± 6.55 years. Follow-up period was 6 months. All surgeries were completed with no major complication. 9 patients (40.9%) had hypertension, 6 (27.3%) ischemic heart disease, and 7 (31.8%) diabetes mellitus. All eyes had laser peripheral iridotomy. 5 eyes (22.7%) had glaucomflecken. The mean preoperative medications were 2 drugs and decreased to 0.18 postoperatively (P<0.001). Mean IOP was 19.54 ± 2.9 mmHg before surgery and 16.81 ± 3.2 mmHg (P<0.05), 15.63 ± 2.3 (P<0.05), 16.13 ± 1.6 (P<0.05), 16.68 ± 3.3 (P<0.05) and 16.04 ± 1.04 (P<0.05) at 1, 7, 30, 60 and 180 days respectively after surgery (Table 2).

***Table-02: Mean IOP (mm Hg) and decrease in IOP (mm Hg) over time***

| Examination | Mean IOP (mmHg) | Mean decrease (mmHg) |
|---|---|---|
| Pre-operative | 19.54 ± 2.92 | |
| Post-operative 1D | 16.81 ± 3.21 | 2.72 ± 4.08 |
| 7D | 15.63 ± 2.34 | 3.90 ± 3.68 |
| 30D | 16.13 ± 1.61 | 3.40 ± 3.48 |
| 60D | 16.68 ± 3.32 | 2.86 ± 3.77 |
| 180D | 16.04 ± 1.49 | 3.50 ± 2.77 |

Anterior chamber depth after surgery was wider than before operation (Spaeth classification average one degree). Mean Log MAR visual acuity was 1.00 before cataract extraction and 0.3 at final follow-up. Visual acuity improved in all eyes.

*Figure-01: CACG & Cataract*

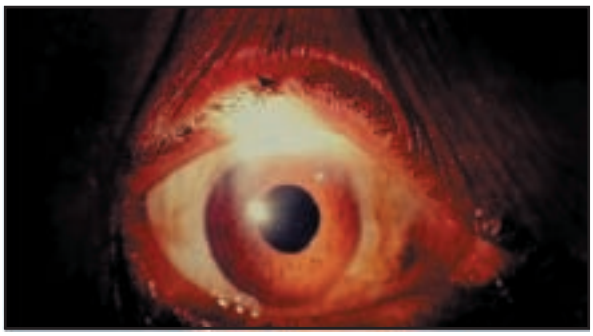

*Figure-02: Post Operative*

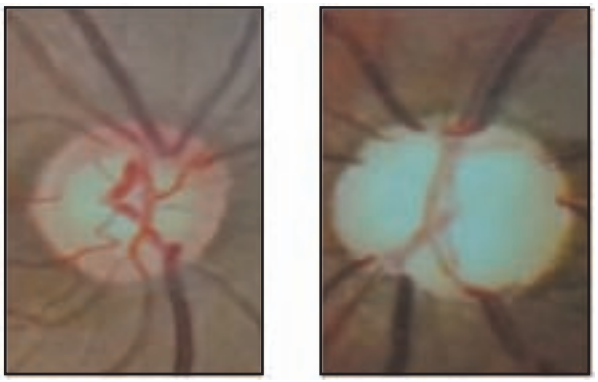

*Figure-03: Glaucomatous Disc*

## Discussion

There are 3 treatment options for patients with CACG and cataract: cataract surgery alone, combined surgery, and glaucoma surgery alone followed by cataract extraction[5-7]. Cataract surgery in these patients poses some unique difficulties.

The anterior chamber is characteristically shallow and also the phaco surgeon applies forces through ultrasonic power closer to the corneal endothelium leading to endothelial loss and corneal edema. In view of all these inherent difficulties of performing phaco in these eyes, we had no major complications. In all eyes the anterior chamber depth increased after surgery and there was some angle widening. It has been reported that cataract surgery alone decreases IOP to some extent in glaucoma patients. The degree of IOP reduction differs depending on the type of glaucoma. Ming Zhi et al reported a 9 mm Hg drop in first day postoperative IOP in acute primary angle-closure glaucoma[7-8].

Hayashi et al reported a 5 mm Hg drop in mean IOP one month postoperatively in ACG patients (9-12) and Lai et al showed a 4 mm Hg drop in postoperative IOP in CACG patients. In our study cataract extraction significantly decreased IOP in eyes with chronic angle-closure glaucoma and this decrease continued for up to 6 months. In this study, mean decrease in IOP after cataract surgery was 3.5 ± 2.7 mm Hg which is comparable to previous reports. Also the number of glaucoma medications decreased after cataract extraction.

Hayashi et al showed significant increase in angle width after lens extraction in CACG patients[9] which was comparable with our study. Visual acuity was significantly improved after cataract surgery. No eye developed serious complication or had impaired visual acuity. Our study had some limitations. We did not have ultra sound biomicroscopy to compare preoperative and postoperative ultrasonic findings of the angle. The number of our patients was also limited.

## Conclusion

Phacoemulsification and PCIOL implantation significantly decreases IOP and the number of anti glaucoma medications in CACG patients. Furthermore if cataract extraction fails to control IOP, subsequent filtering surgery can be performed.

***Financial Disclosure: None reported.***
***Support: Dr. Ahmadur Rahman Research Centre***

## *References*

01. Liesengany TJ, Deutsch TA, Corand MG. Basic and clinical sciences course, section 10. 2002-2003; S 103-104.
02. Lai JS, Tham CC, Chan JC. Clinical outcomes of cataract Extraction by phacoemulsification in eyes with primary angle-closure glaucoma (PACG) and coexisting cataract. J Glaucoma 2006; 15 (1): 47-52.
03. Hayashi K, Hayashi H, Nakao F, Hayashi F. Effect of cataract surgery on intraocular pressure control Inglaucoma patients. J Cataract Refract Surg 2001, 27(11); 1779-1786.
04. Zacharia PT, Deppermann SR, Schumas JS. Ocular hypotony after trabeculectomy with mitomycin C. Am J ophthalmol 1993; 116(3): 314-326.
05. Shields MB, Scruggs MW, Shoop GM, Simmons RB. Clinical andhistopathologic observations concerning hypotony after trabeculectomy with adjunctive mitomycin C. Am J Ophthalmol 1993;116(6):673-683.
06. Greenfield DS, Suner IJ, Miller MP, et al. Endophthalmitis after filtering surgery with mitomycin C. Arch Ophthalmol 1996,114(8);943-949.
07. Higginbotham EJ, Stevens RK, Musch DC, et al. Bleb relatedendophthalmitis after trabeculectomy withmitomycin C. Ophthalmology 1990;103(4): 650-656.
08. Obstbaum SA. Glaucoma and intraocular lens implantation. J Cataract Refract Surg. 1986; 12(3): 257- 261.
09. Steuhl KP, Marahrens P, Frohn C, Frohn A. Intraocular pressure after extracapsular cataract extraction with posterior chamber lens implantation. Ophthalmic Surg. 1992; 23(4):233-237.
10. Lowe RF. Causes of shallow anterior chamber in primary angle-closure. Am J Ophthalmol 1969; 67(1): 87-93.
11. Ming Zhi Z, Lim AS, Yin Wong T. A pilot study of lens extraction in the management of acute primary angle-closure glaucoma. Am J Ophthalmol 2003, 133(4); 534-536.
12. Hayashi K, Hayashi H, Nakao F, Hayashi F. Changes in anterior chamber angle width and depth after intraocular lens implantation in eyes with glaucoma. Ophthalmology 2000, 107(4); 698-703.