

Efficacy of Cataract Surgery in Lowering IOP in Small Eyes with Shallow Anterior Chamber

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Abstract

Aim

To evaluate the efficacy of cataract extraction in lowering IOP in patients with small eyes and shallow AC.

Setting

Manjunatha eye hospital, Kundapura, Udupi.

Design

Clinical prospective study

Materials and Methods

A prospective observational study was conducted in 55 eyes of 47 patients attending the outpatient department of Manjunatha Eye hospital, Kundapura, Udupi. The study period was between 01/05/2022 to 30/04/2023. Patients belonging to either sex irrespective of age who had senile cataract of any grade with AC depth – Van Hericks' grade 1-2, with short axial length – $\leq 22\text{mm}$ and/or Intraocular pressure $\geq 18\text{mmHg}$ or a difference of $>5\text{mmHg}$ from fellow eye were included in this study. Traumatic, complicated or secondary cataracts and those who were already on anti-glaucoma medications were excluded. These patients underwent basic eye examinations and systemic evaluation followed by phacoemulsification with foldable IOL implantation under peribulbar block. Postoperatively BCVA, IOP, AC depth were evaluated.

Statistical Analysis

Descriptive statistics

Results

A total of 55 eyes of 47 patients were included in this study. 32 were females and 15 were males. 55 eyes had various grades of cataract. Axial length of 55 eyes were between range of 20.59mm to 22mm. Intraocular pressure were in the range of 18mmHg – 26mmHg. 1 week postoperative follow up showed all the eyes with BCVA of 6/6 with deepening of AC depth grade 3 PACD. AS-OCT done at 1 week post op day showed widening of AC angle. Intraocular pressure postoperatively were in the range of 14mmHg – 18mmHg.

Conclusion

Cataract extraction alone is the most effective way to lower IOP in a cataractous patient with high IOP with short axial length. This avoids the need of combined trabeculectomy with cataract surgery and long term antiglaucoma medications.

Keywords: Cataract Surgery, Small Eye, High IOP

1. Introduction

Cataract surgery is a very common, successful, highly refined surgery with improved visual acuity [1,2]. It is also true that cataract extraction alone lowers IOP two to four mmHg with sustained IOP reduction, especially in those with higher

preoperative IOP [3-5]. Eyes with short axial length $<22\text{mm}$ tend to have higher IOP when cataracts develop. Cataract causes increase in the thickness and density of crystalline lens leading to forward push of iris-lens diaphragm. Cataract surgery to lower IOP may be especially beneficial in developing countries and

where the close follow-up necessitated by traditional glaucoma surgery is difficult. Nonetheless, cataract surgery seems to be emerging as a safe way to lower IOP in patients with mild to moderate glaucoma while avoiding the morbidity of traditional glaucoma surgery [1]. hence we aimed at studying the efficacy of cataract extraction with IOL implantation alone in reducing IOP in patients with short axial length.

2. Objectives of the Study

To evaluate the efficacy of cataract extraction in lowering IOP in patients with small eyes and shallow AC

3. Materials and Methods

A prospective observational study was conducted in 55 eyes of 47 patients attending the outpatient department of Manjunatha Eye hospital, Kundapura, Udupi. The study period was between 01/05/2022 to 30/04/2023. The patients were included in the study by applying the following Inclusion and Exclusion criteria.

3.1 Inclusion Criteria

1. Patients belonging to either sex irrespective of age who had senile cataract of any grade who were attending outpatient department of Manjunatha eye hospital were all included in the study.
2. Patients with AC depth – Van Hericks’ grade 1-2
3. Patients with short axial length – $\leq 22\text{mm}$
4. Intraocular pressure $\geq 18\text{mmHg}$ or a difference of $>5\text{mmHg}$ from fellow eye

3.2 Exclusion Criteria

1. Traumatic cataract
2. Secondary cataracts
3. Complicated cataracts
4. Known case of glaucoma on antiglaucoma medications

3.3 Methodology

Patients fulfilling inclusion criteria were recruited into this study. The aims and objectives of the intended study was properly explained to the subjects and informed consent was taken. Data was collected as per the proforma sheet.

All the patients underwent initial ophthalmological examination

with visual acuity, refraction, anterior segment examination with Anterior chamber depth grading, anterior segment-OCT to measure angle depth, intraocular pressure measured with Goldmans’ applanation tonometer and dilated funduscopy with optic disc evaluation, axial length measurement, keratometry and IOL power calculations.

All the patients underwent following systemic examination and blood investigations prior to the procedure-

- a. Blood pressure test and physician evaluation
- b. Random blood sugars
- c. HIV
- d. HBsAg

All patients were given topical antibiotic moxifloxacin 0.5% drops QID for 3days, timolol 0.5% on drop at night for 3days. All patients underwent phacoemulsification with foldable IOL implantation under peribulbar block. Eye was patched following the procedure for a period of 4hours.

Postoperatively, all were given following medications-

1. Gatifloxacin 0.5% with prednisolone acetate combination eye drops 1drop hourly for 2days and tapered weekly.
2. Sodium chloride 5% ophthalmic solution one drop 2hourly for 1week
3. Carboxymethyl cellulose 1.0% QID for 3weeks

Patients were followed up on post operative day 2, after 1 week and 3weeks. Later on they were followed 2monthly till 1year. Each follow up patients underwent following tests- best corrected visual acuity, anterior segment examination, intraocular pressure measurement. At 1week , anterior segment- OCT was repeated to look for angle widening post cataract extraction.

Data was analyzed using descriptive statistics.

4. Results

A total of 55 eyes of 47 patients were included in this study. 32 were females and 15 were males.

55eyes had various grades of cataract as in table no.1

Grades of cataract	Number of eyes
Nuclear sclerosis grade 3	9
Nuclear sclerosis grade 4	12
Posterior subcapsular cataract	11
Posterior polar cataract	6
Senile mature cataract	17

Table 1: Axial length of 55eyes were between range of 20.59mm to 22mm, with an average of 21.54mm.

Intraocular pressure measured with Goldmans’ applanation tonometer in 55eyes were in the range of 18mmHg – 26mmHg with average of 24mmHg. (Table no.2)

Intraocular pressure(mmHg)	Number of eyes
18-20	17
20-22	10
22-24	15
24-26	13

Table 2: Fundoscopy with optic disc evaluation showed average vertical cup: disc ratio of 0.5.

Follow up

1 week postoperative follow up showed all the eyes with BCVA of 6/6 with deepening of anterior chamber depth grade 3 PACD. (Fig 1)

Post-op 1week

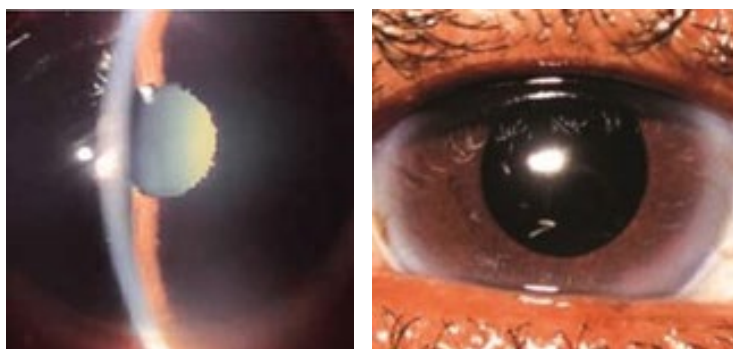


Figure 1: Slit lamp photo Pre-op

AS-OCT done at 1week post op day showed widening of AC angle. (Fig 2)

Postop 1week

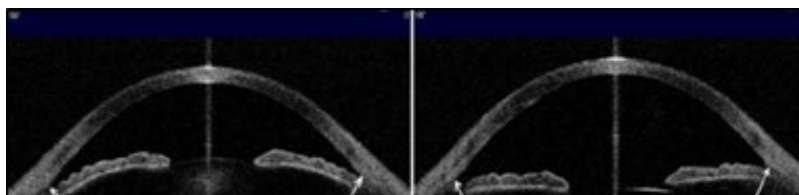


Figure 2: AS-OCT pre-op

Intraocular pressure postoperatively were in the range of 14mmHg –18 mmHg with average of 17mmHg. (table no.3)

Intraocular pressure(mmHg)	Number of eyes
14-16	39
16-18	16

Table 3: We followed up the patients 2monthly for a period of 1 year and IOP pressure remained within same range.

5. Discussion

Cataract extraction can indeed have a positive impact on intraocular pressure (IOP) in patients with high IOP and a shallow anterior chamber due to a cataract in small eyes. The presence of a cataract causes increases IOP due to anterior shift of iris-lens diaphragm leading to secondary angle-closure glaucoma. Cataract surgery with intraocular lens implantation leads to deepening of the anterior chamber and improved aqueous humor outflow. This can result in a reduction in IOP.

There is compelling evidence to make a case for cataract surgery in the reduction of IOP in ocular hypertensive patients.

Mansberger et al. analyzed the observation arm of OHTS, comparing 42 participants (63 eyes) who underwent cataract surgery during the study to a control group of 743 participants (743 eyes) who did not undergo any surgery. A follow-up of 3 years, postoperative IOP was significantly lower than preoperative IOP with a mean decrease of 16.5%. In addition, 39.7% of eyes maintained postoperative IOP reduction $\geq 20\%$ below the preoperative baseline [6]. Huang et al. have also demonstrated a positive relationship between IOP reduction and preoperative lens vault measured by AS-optical coherence tomography (OCT) [7].

In some cases, additional glaucoma treatment may still be necessary, such as topical medications, or even trabeculectomy for adequate management of elevated IOP.

While cataract extraction alone may be effective in some cases of high IOP associated with cataracts in small eyes, it is important to monitor postoperative IOP control and visual acuity. Increased posterior zonular traction due to cataract surgery (whether due to lens removal alone or other technical aspects like small capsulorhexis) has been postulated to improve patency of the trabecular meshwork and result in lower IOP [8-11]. Yang et al. studied a group of 999 patients and performed a battery of diagnostic tests including AS-OCT during the cataract surgery, optical biometry, and ultrasonic biomicroscopy. Measurements like changes in anterior chamber depth, angle opening distance, anterior chamber area, and lens thickness were better predictors of IOP change than was preoperative IOP [12].

Our current study also showed a significant IOP reduction post cataract extraction with AC deepening and widening of AC angle. This avoided the need of anti-glaucoma medications, or glaucoma filtration procedures in all the patients.

6. Conclusion

Cataract itself causes increases in intraocular pressure in small eyes. Hence cataract extraction alone is the most effective way to lower IOP in a cataractous patient with high IOP with short axial length.

Cataract surgery is an incredibly cost-effective intervention for patients with high IOP. It can be performed quickly with relatively lesser infrastructure, with better postoperative recovery and is associated with fewer and less serious complications compared to more traditional glaucoma surgeries such as trabeculectomy and tube shunt surgery. Cataract surgery has been shown to decrease the postoperative dependence on glaucoma medications.

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