Changes in intraocular pressure after phacoemulsification: A pilot study in Uganda

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ABSTRACT

Objective: To determine the changes in intraocular pressure after phacoemulsification surgery among patients with cataracts in Southwestern Uganda.
Methods: This was a retrospective audit of the Intraocular Pressures (IOP) of patients who underwent a routine clear corneal phacoemulsification surgery for cataracts at Dr. Arunga's Eye Hospital between December 2020 and December 2023. The IOPs were measured using i-care rebound tonometer at admission, 2 weeks postoperatively, 6 weeks postoperatively, and at discharge from the clinic. Eyes with glaucoma, complicated cataracts, or post-operative complications were not included. The data was analyzed using STATA 17. The mean difference between the admission and discharge IOPs was tested for significance using the Wilcoxon signed-rank test and a relative difference between the mean IOPs at admission and discharge was calculated.
Results: A total of 78 eyes from 59 patients were included. The majority of patients, 57.7%, were female. The mean age of the patients was 70.0 years. Best corrected visual acuity of 6/12 or better was achieved in 91% eyes at discharge with a median discharge time of 3 months, and IQR of 2-5 months. The mean intraocular pressures were 14.5 mmHg at admission, 13.3 mmHg at two weeks post-operatively, 12.9 mmHg at 6 weeks, and 11.8 mmHg at discharge. The mean reduction in IOP was 1.6 mmHg between admission and at 6 weeks (p=0.001) and 2.7 mmHg between admission and discharge (p=0.001). IOP reduction 3 months post phacoemulsification showed a 17.9% reduction in IOP compared to baseline. The findings of this study are similar to findings in various studies globally that have reported a decrease in IOP post phacoemulsification.
Conclusions: There was a significant reduction in mean intraocular pressure following phacoemulsification. This is the first study assessing changes in intraocular pressure post phacoemulsification in a Ugandan population however the study is limited by a small sample size.

Key words: Intraocular pressure, Phacoemulsification, Cataract, Uganda

INTRODUCTION

A cataract -the clouding of the natural lens in the eye[1]. Cataract is the leading cause of blindness worldwide accounting for 17.1 million blind people[2]. In sub-Saharan Africa, the prevalence varies among countries affecting 3.9–62.5%[3]. In Uganda, cataract is the most common condition among adults aged 60+ years presenting at eye hospitals accounting for over 50%[4]. It is commonly associated with aging though it can be congenital or secondary to trauma. Cataract treatment is surgical with extracapsular cataract surgery (small incision cataract surgery and phacoemulsification) or intracapsular cataract surgery.

Although small incision cataract surgery is the most commonly used surgery around Uganda and many parts of Africa, phacoemulsification is being adapted to different facilities around the country due to its advantages such as being minimally invasive, quick recovery time, reduced risk of complications, minimal discomfort and its high success rate in restoring vision[5].

Intraocular Pressure (IOP) is the fluid pressure of the eye[6]. It can be affected by many factors such as inflammation in the eye, cataracts, surgery, and age. Persistently raised intraocular pressure by any cause can lead to optic nerve damage and hence blindness, a condition commonly known as glaucoma. Studies done in different places have shown a decrease in intraocular pressures post-phacoemulsification[7] and others have proposed this as a reliable option for IOP control among those with high preoperative IOPs[8].

As a relatively newer technology in Uganda, the changes that occur in intraocular pressures after phacoemulsification had not been previously described in a Ugandan population. With other studies reporting a lowering effect of phacoemulsification on IOPs, assessing if the findings are similar would guide in choosing the type of surgery in patients with borderline IOPs as lowering IOPs has been reported to delay or prevent the onset of glaucoma[9]. A pubmed search also indicates no published data about IOP changes post-phacoemulsification in East Africa.

This pilot study therefore was to provide baseline data of changes in intraocular pressures post clear cornea phacoemulsification in a purely Ugandan adult population at Dr. Arunga's Eye Hospital in Mbarara City in Southwestern Uganda and fill the existing knowledge gap in the region.

MATERIALS AND METHODS

This was a retrospective audit of data of patients who underwent clear cornea phacoemulsification at Dr. Arunga's Eye Hospital, a private hospital in Mbarara, City, Uganda that provides services to people from South Western Uganda and other parts of the country.

Data of all patients who underwent a routine phacoemulsification surgery between December 2020 and December 2023 was included with recorded intraocular pressures at the selected visits. Permission was obtained from the hospital administration to conduct this anonymized audit. Glaucomatous eyes, complicated cataracts, and eyes with postoperative complications were excluded. Data from hospital records was extracted. Data extracted included demographics, IOP and VA before the operation, date of admission and discharge, VA at discharge, IOP at 2 weeks, 6 weeks, and at discharge. The main variable for this study was the IOPs at the various visits.

The IOP had been measured by icare tonometer as part of routine practice and recorded as mmHg. The icare tonometer takes five IOP readings and gives an average which is recorded as the final IOP reading for that eye.

Data was entered in Excel and analyzed using STATA 17. Data was tested for normality and different findings were analyzed for significance using the Wilcoxon signed-rank test. A relative difference between the mean IOPs at admission and 6 weeks post-operative and discharge was calculated.

RESULTS

A total of 78 eyes from 59 patients were included. The majority of patients, 57.7%, were female. The mean age of the patients was 70.0 years. The majority of patients, 91% had the best corrected visual acuity of 6/12 or better at discharge. Median discharge time was 3 months, IQR was 2-5months.

Table 1: The baseline characteristics of participants (n=78)

Variable	Frequency (n)	(%)
Sex		
Male	33	42.3
Female	45	57.7
Age group (years)		
30-70	34	43.6
Older than 70	44	56.4
Final BCVA		
6/5-6/12	71	91.0
6/18-6/60	7	9.0
<6/60	0	0.0

Figure 1: The number of patients in different categories of visual acuity preoperative and at discharge

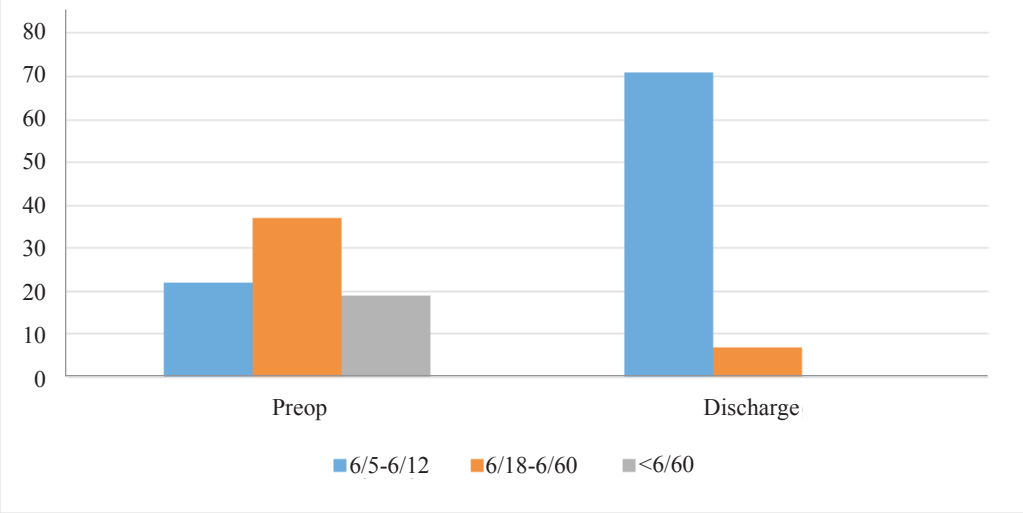
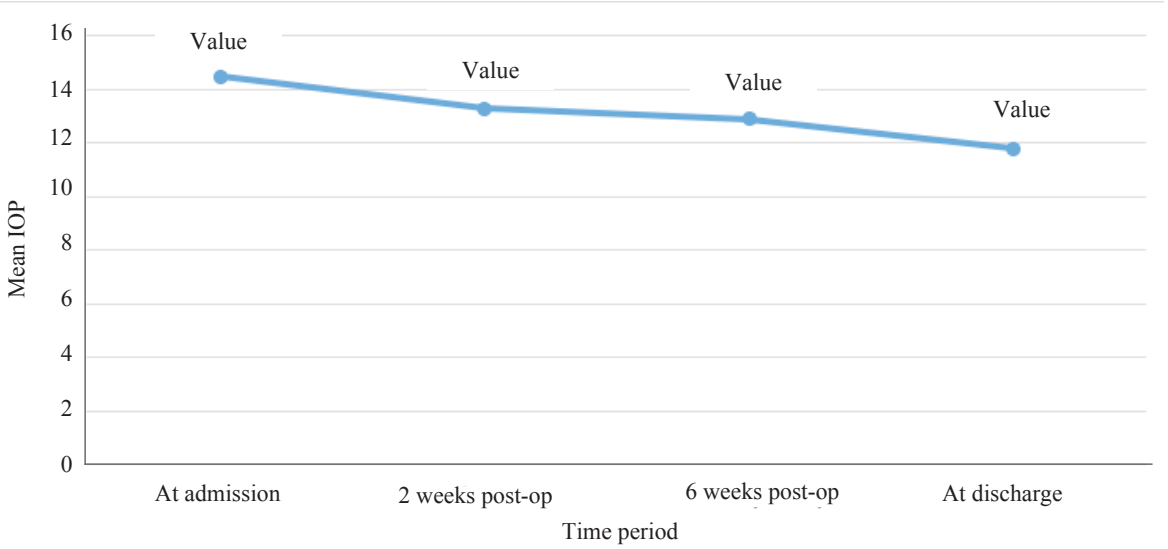


Table 2 shows the summary IOP readings at different time points and serial reductions are graphically illustrated in Figure 2. The mean intraocular pressures were 14.5 mmHg at admission, 13.3 mmHg at two weeks post-operatively, 12.9 mmHg at 6 weeks, and 11.8 mmHg at discharge. The mean reduction in IOP was 1.6 mmHg between admission and at 6 weeks (p=0.001) and 2.7 mmHg between admission and discharge (p=0.001).

Table 2: The mean intraocular pressures and medians at admission, 2 weeks, and 6 weeks and at discharge

	Median	IQR	Range	Mean	SD
At admission	13	11-17	8-29	14.5	4.5
2 weeks post-op	13	10-15	7-25	13.3	4.3
6 weeks post-op	13	10-15.75	6-22	12.9	3.4
At discharge	11	10-14	5-23	11.8	3.2

Figure 2: The mean reductions in Intraocular pressures at the subsequent visits



This is a figure plot showing the reduction trend in mean IOP at subsequent visits after phacoemulsification surgery. The relative differences in mean IOP at subsequent visits postoperative compared to admission IOP were 8.3% at 2 weeks postoperative, 11.1% at 6 weeks post-operative and 17.9% at discharge.

DISCUSSION

In this pilot study, we aimed to describe the trends in IOP changes after phacoemulsification among a purely Ugandan population. Our study found a significant decrease in the mean IOPs post phacoemulsification at 6 weeks and at discharge from the hospital.

Although our study only included patients with a normal pre-operative IOP, other studies have presented evidence that the post-operative IOP reduction is more in people with a higher baseline such as glaucoma patients[8]. One study from Iran evaluated IOP changes in different baseline IOP categories post-phacoemulsification. They included 129 eyes that were grouped into three according to preoperative IOPs with Group 1-IOP<15, Group 2-IOP = 16-20 and Group 3-IOP =21-30. The IOPs at 1 and 6 weeks post-operative were analyzed compared to admission IOPs. The study noted a significant mean and percentage decrease in IOPs at week 6 postoperative as G1-(1.8±1.7 mmHg), 13.5%±12.7, G2-(4.3±2.9 mmHg), 24.5%±11.7 and G3-(9.3±4.1 mmHg), 38.3%±16.2, respectively for the different groups[10]. Similar findings have been reported in other studies between a lower baseline IOP (normal) group and a higher baseline IOP (pseudoexfoliation) group. In a comparison study from Iran, the mean reduction in the pseudoexfoliation group was higher at 4.5 mmHg compared to 2.7 mmHg in the normal eyes group, P<0.0[11].

A similar study in Cairo evaluated the changes in IOP and anterior chamber depth after phacoemulsification of non-glaucomatous eyes. This study looked at 100 eyes that underwent routine surgery for which they noted a significant reduction in IOPs at 1 week, 1 month, and 3 months postoperatively which can be explained by the increase in anterior chamber depth following surgery that was found in this study[12].

Our study reported IOP at discharge which ranged from 2-5 months. Longer cohorts have shown that IOP reduction is steeper in the first weeks and then gently rises to a sub-pre-operative peak by one year. One such fairly large cohort in Korea investigated the long-term effect of phacoemulsification on IOPs among healthy individuals (648 eyes) and those with glaucoma (106 eyes). In this study, the relative reduction was higher at one month with a 13% relative difference compared to 8% at one year. Even then, the IOP in both normal and glaucoma groups remained lower than the pre-operative readings. This

almost permanent reduction in IOP has supported the notion that phacoemulsification might be a reliable option for IOP control among patients with high pre-operative IOP[8].

Strengths

This was the first study of IOP changes post-phacoemulsification in a Ugandan population. The findings thereof were similar to what has been reported in literature and provide an important baseline for our population.

Weaknesses

This was a small hospital audit that included only normal routine patients. Although the practice of phacoemulsification is growing in Uganda, the bulk of cataract care is Small Incision Cataract Surgery (SICS). This study did not explore the IOP changes among patients who underwent SICS.

CONCLUSION

Our pilot study showed an important reduction in IOP after phacoemulsification in a Ugandan population. This finding suggests an additional benefit of phacoemulsification in the surgical management of cataract. Additional information on IOP changes after phacoemulsification cataract surgery in patients with glaucoma might be of clinical importance in our setting where this procedure is becoming more common.

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Availability of data and material: The anonymized data sets used and analyzed for this study are available from the corresponding author on request.

Conflict of interest: None to declare.

Authors' contributions: ZT, OM, RK, NVA, and SA-made the study design, ZT, SA- collected data, and ZT, OM, and SA-analyzed the data, all authors reviewed and approved the final manuscript.

Declaration: The research was presented at the 11th COECSA congress however it has not been submitted to any other journal

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