The Professional Medical Journal
www.theprofesional.com

ORIGINAL PROF-0-3749

DOI: 10.29309/TPMJ/2019.26.08.3749

COMPARISON OF VISUAL OUTCOMES IN PATIENTS UNDERGOING SMALL INCISION CATARACT SURGERY VERSUS PHACOEMULSIFICATION AT DIVISIONAL HEADQUARTERS HOSPITAL, NEW MIRPUR, AZAD KASHMIR.

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Article received on:
03/04/2019
Accepted for publication:
15/07/2019
Received after proof reading:
31/07/2019

Abstract… Cataract extraction is one of the commonest surgical procedures in Ophthalmology globally. Extracapsular cataract extraction ECCE), through a small incision (SICS), with insertion of an intraocular lens has been the most widely used method from 1990s until recently. Technological advances have led to the increasing use of phacoemulsification (PE) to emulsify and remove the lens. The technique requires a smaller incision, but requires substantial capital investment in theatre equipment. In this study we compared the visual outcomes of patients undergoing both surgical techniques at a public sector hospital in Mirpur. **Study Design:** Single-center retrospective cohort study. **Setting:** Department of Ophthalmology, Divisional Headquarters Hospital, New Mirpur, AJK. **Period:** Cataract surgery cases from January 2018 to February 2019. **Materials and Methods:** 196 patients with age related cataract were included in the SICS group and 115 in the phacoemulsification group. The main comparative outcome was uncorrected visual acuity 4 weeks after surgery. **Results:** In this study, it was found that the primary post-operative visual outcome for small incision cataract surgery and phacoemulsification was comparable in terms of uncorrected visual acuity. No statistically significant difference was found in the proportions of SICS and phacoemulsification groups when compared for UCVA of 6/9 or better, 6/60 or better and 6/60 and worse.

Key words: Blindness, Cataract, Phacoemulsification, SICS, Visual Impairment, Visual outcome.

Article Citation: Hamid KA, Habibullah S. Comparison of visual outcomes in patients undergoing small incision cataract surgery versus phacoemulsification at Divisional Headquarters Hospital, New Mirpur, Azad Kashmir. Professional Med J 2019; 26(8):1365-1369. **DOI:** 10.29309/TPMJ/2019.26.08.3749

INTRODUCTION

Cataract, defined as the opacification of the crystalline lens that causes obstruction to the passage of light into the eye, remains a leading cause of visual impairment and blindness throughout the world. According to the World Health Organization, of the estimated 39 million blind globally in 2010, more than half were suffering from cataracts.[1] In Pakistan, the National Blindness and Visual Impairment Survey reported 1.25 million individuals of all ages to be blind in 2003 and further projecting it, estimated that 2.4 million Pakistanis will be blind in 2020 if the causes of blindness were not addressed.[2] Advancements in the surgical treatment of cataract have led to techniques such as phacoemulsification and manual small incision cataract surgery (SICS).[3] Both these techniques are preferred over the age-old technique of Extracapsular and Intracapsular Cataract Extraction. Both SICS and Phacoemulsification entail small, suture-less incisions and faster visual rehabilitation.[4] However, Phacoemulsification demands far more resources in terms of expensive equipment, disposables, maintenance and continuous electric supply. Furthermore, proper training of surgeons is also mandatory to ensure favorable surgical outcomes. On the other hand, SICS is much less expensive in terms of equipment and human resource.[5] In developing countries like Pakistan, one of the most prevalent barrier to cataract surgery contributing to the burden of preventable blindness is its cost.[6,7] In these circumstances research has recommended such techniques that are less time and resource-intensive and are financially accessible to a majority of the poor population to improve cataract surgery coverage and clear the backlog.[8,9,10]

Studies performed in various parts of the world including meta-analyses and systematic reviews have compared the visual outcomes, intraoperative and postoperative complications rates, time and cost for SICS and phacoemulsification. A vast majority of these studies have concluded that while there is no significant difference in visual outcomes between the two procedures, SICS has been found to result in significantly more postoperative astigmatism due to larger incision size.[11,12,13,14] However, SICS is much less costly in terms of time and financial expense.[15] Both of these factors are important in developing countries where financial resources are limited and the cataract surgery coverage is low.

This study was conducted at the Divisional Headquarters Hospital, New Mirpur AJK. This is a tertiary care hospital catering to the needs of 1.2 million population residing in Mirpur division (Mirpur city, Bhimber and Kotli). The Ophthalmology OPD is attended by an average of 110 patients per day and an average of 600 surgeries are performed per year.

OBJECTIVE

To determine the differences in postoperative uncorrected visual acuity between patients undergoing small incision cataract surgery with posterior chamber intraocular lens insertion and those undergoing phacoemulsification with posterior chamber intraocular lens insertion.

Study Design

Retrospective cohort study.[16]

Study Setting

Department of Ophthalmology, Divisional Headquarters Hospital, New Mirpur, AJK.

Sampling Technique

Non-probability consecutive sampling.

Duration of Study

Cataract surgery cases from January, 2018 to February, 2019.

MATERIALS AND METHODS

This retrospective cohort study included consecutive cataract surgery cases performed at the Divisional Headquarters Hospital, New Mirpur from January 2018 to February 2019. Patients with uncontrolled diabetes, uncontrolled hypertension, posterior polar cataract and traumatic cataract were excluded, as were known cases of severe zonular dehiscence, those undergoing combined procedures and those younger than 18 years of age.

Surgical Technique

Both groups of patients, those undergoing Phacoemulsification as well as manual small incision cataract surgery (SICS) were operated upon by the first author.

In SICS, continuous curvilinear capsulorrhexis with cystome was made, a 5-7 mm frown incision was made at 2 mm from limbus on temporal side of eye. Crescent knife was used for making of scleral tunnel after raising a conjunctival flap, side port made and hydro dissection and hydrodelineation done, the lens nucleus was removed with a irrigating wire vectis through scleral tunnel. Simcoe cannula used to remove the remaining lens (cortical) material, a foldable intraocular lens (IOL) was inserted into the capsular bag, air injected into anterior chamber for self-sealing scleral tunnel. Subconjunctival antibiotic/steroid injection given before applying eye pad.

In phacoemulsification, a self-sealing 3.2 mm clear corneal incision was made on the temporal side of eye. Continnous curvilinear capsulorrhexis with cystome was made, side port made and hydro dissection and hydro delineation done. Prechopper was used to break the nucleus into pieces and then emulsified one by one by using Catarhex easy model of Oertli. Simcoe cannula was used to remove the remaining lens (cortical) material, a foldable intraocular lens (IOL) was inserted into the capsular bag, air injected into anterior chamber for anterior chamber maintenance. Subconjunctival antibiotic/steroid injection given before applying eye pad. In both procedures, the viscoelastic used was viscogel (Methylcellulose).

Outcome Measure

The post-operative uncorrected visual acuity was categorized as 6/12 or better, worse than 6/12 but 6/60 or better, and 6/60 and worse. This outcome measure was chosen as many patients either do not have the means to buy corrective glasses or do not comply with them.

RESULTS

The sample consisted of 311 adult patients out of whom 47% (n=147) were female while 53% (n=164) were male. A hundred and fifteen underwent Phacoemulsification whereas 196 underwent SICS. The postoperative uncorrected visual acuity at 4 weeks after surgery is presented in Table-I.

Type of Surgery	UCVA categories			Total
	6/12 or Better %age (n)	Worse than 6/12 Better than 6/60 %age (n)	6/60 or Worse %age (n)	
SICS	51.02%(100)	43.88%(86)	5.1% (10)	196
PE	45.22%(52)	47.8%(55)	6.99% (8)	115
Total	152	141	18	311

Table-I. Number of patients in the two groups by post-operative UCVA

The z test was applied at an α level of 0.05 to test the statistical significance of the difference between proportions of patients in the three outcome categories by the two types of surgeries. The test revealed no statistically significant differences among patients undergoing the two surgical techniques in all three UCVA categories. While there were 51.02% patients from the SICS group in the 6/9 or better category, 45.22% of patients undergoing phacoemulsification fell in this category. The value of Z_{tab} at 5% level of significance is 1.96 whereas the calculated value of Z (Z_{Cal}) came out to be 0.98. As the calculated value was less than the table value, the null hypothesis was supported which shows that there were, in this instance, no statistically significant difference between the proportions of patients undergoing the two techniques. Similarly there was no statistically significant difference in the percentages of patients in the two groups who had a post-operative UCVA of worse than 6/12 but 6/60 or better. At an α level of 0.05, the Z_{Cal} value for these proportions was 0.69 which is less than the table value of Z, thus upholding the null hypothesis. The calculations for the third group resulted in a Z_{cal} value of 0.63, once again much less than the table value of 1.96, indicating the validity of the null hypothesis.

DISCUSSION

Untreated Cataract is the most common cause of blindness all over the world and in Pakistan as well. In the populous developing countries like Pakistan and India, blindness and visual impairment are also attributable to poverty as well as to limited cataract surgery coverage leading to a backlog of patients. In these circumstances, it is imperative to practice such methods that are affordable to the majority of the poor population and enable fast visual rehabilitation. Small incision Cataract Surgery and phacoemulsification, both with posterior chamber lens insertion are preferred techniques for cataract surgery, however, the former entails significant capital and recurrent expenditures along with the need for training of surgeons while the latter is much less expensive. In this study, it was found that the primary post-operative visual outcomes for small incision cataract surgery and phacoemulsification were comparable in terms of uncorrected visual acuity. No statistically significant difference was found in the proportions of SICS and phacoemulsification groups when compared for UCVA of 6/9 or better, 6/60 or better and 6/60 and worse. This is consistent with the findings of research performed in similar settings in neighboring countries. In India Khanna and colleagues compared the results of SICS and Phacoemulsification carried out by trainees at a tertiary hospital and found no significant difference in postoperative visual acuity between the patients undergoing the two procedures. The most common risk factor for poor outcomes in both groups was the co-occurrence of other ocular pathologies.[17] Multiple meta-analyses have also yielded similar results. Zi et al conducted a systematic review to compare visual outcomes in patients undergoing the two types of surgeries and found no statistically significant differences in UCVA 1 week after

surgery.[18] A systematic review carried out by Jaggernath and colleagues revealed SICS to be as good as phacoemulsification except for the higher incidence of post-operative astigmatism. However, due to its cost-efficiency the authors recommended this technique in resource-poor settings.[14] In a meta-analysis involving 84 studies, Gogate and colleagues found no evidence to suggest a statistically significant difference between visual outcomes including BCVA and UCVA at 6/18 cut-off and 6/60 cut-off among SICS and Phacoemulsification groups.[13]

Nevertheless, some studies have found differences in visual outcomes between patients undergoing the two techniques. Alam and colleagues conducted a single blind randomized control trial on 210 patients with immature cataracts, 50% of which were allocated to each group. The UCVA on first post-op day was reported to be good (6/6 to 6/18) in 80% of phacoemulsification and 93.33% of those in SICS group. On the basis of this finding the authors concluded that SICS was the treatment of choice in immature cataract cases due to its significantly better visual outcome as compared to the expensive and time consuming phacoemulsification.[19] On the other hand, in South Africa Cook et al compared visual outcomes of two groups of 100 patients each undergoing SICS and Phacoemulsification. They reported no difference in the visual acuities between the two groups at the first post-operative day, however, at 8 weeks after surgery, the patients undergoing Phacoemulsification had better corrected ($p=0.03$) as well as uncorrected visual acuity ($p=0.02$). On the basis of this finding, the authors recommended a gradual transition to the latter procedure in the Vision 2020 program in Africa.[20] However, this study supports the findings of the vast majority of research literature which indicates no significant difference in visual outcomes between the two procedures.

CONCLUSION

This study supports the findings of extant research indicating no significant differences in visual outcomes between patients undergoing SICS versus those undergoing phacoemulsification. This makes SICS the technique of choice in resource-poor, backlogged health systems. In this study we compared the visual outcome of both the procedures. Further studies are required to compare other parameters like, patients comfort level, rate of early and late postoperative complications and financial and opportunity costs associated with the two techniques.

Ethical Considerations

As the study was based on clinical records of patients who had undergone surgery during a specific time period, there was no risk involved for the participants.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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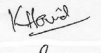
1	Khawaja Abdul Hamid	Sampling, data collection, write-up.	
2	Shaista Habibullah	Introduction, Study design, data analysis, write-up.