

## Assessment of Astigmatism and Visual Acuity Following Manual Small Incision Cataract Surgery among Patients in Suez Canal University Hospital

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### ABSTRACT

**Aim:** This study aimed at assessment of the effect of manual small incision cataract surgery approach compared to other approaches of cataract surgery in fields of surgical astigmatism and post operative visual acuity.

**Setting:** The study was conducted at ophthalmology outpatient clinic, inpatient wards and operating theatre at Suez Canal University hospital in Ismailia.

**Design:** A cross sectional study was conducted. Non probability convenience sampling method was conducted.

**Methods:** The study was conducted on 27 eyes of 27 cataract patients through. The data was obtained retrospectively from the records of the patients using a questionnaire.

**Results:** The mean age of the total 27 patients was  $62.75 \pm 10.64$  years. They included 15 female patients (55.6%) and 12 male patients (44.4%). Cortical and nuclear cataracts were the most common types of cataract among the study population (33.3%). 18.5% of the patients had Corticonuclear cataract, while only 14.8% have posterior sub capsular cataract. The preoperative visual acuity was less than 6/60 in 23 patients (85.2%) while it was postoperatively less than 6/60 in 0 patients (0%). The preoperative visual acuity was 6/9-6/6 in 0 patients (0%) while postoperative unaided visual acuity was 6/9-6/6 in 17 patients (63%) and postoperative best corrected visual acuity was 6/9-6/6 in 20 patients (74.1%). ( $P < 0.05$ ). The pre operative corneal astigmatism was  $0.99 \pm 0.76D$  The post operative astigmatism at three months was  $1.12 \pm 0.78D$ . ( $P > 0.05$ ).

**Conclusions & Recommendations:** Manual small incision cataract surgery produces minimal surgical induced astigmatism and gives significant improvement in visual acuity. Manual

small incision cataract surgery is good alternative surgical technique to phacoemulsification for cataract surgery in developing countries due to its low costs and good results.

**Keywords:** Cataract, Extra-capsular cataract extraction, Phacoemulsification, Manual small incision cataract surgery, Visual acuity, surgical induced astigmatism.

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## INTRODUCTION AND RATIONALE

Cataract is opacity of the lens of the eye that causes partial or total blindness. It's the leading cause of blindness in the world. <sup>(1)</sup> Epidemiologic models estimate that Age-related cataracts are responsible for 51% of world blindness, about 20 million people. <sup>(2)</sup> Globally, cataracts cause moderate to severe disability in 53.8 million, 52.2 million of whom are in low and middle income countries. <sup>(3)</sup>

Unfortunately, multiple barriers have adversely affected the availability of cataract surgical services in developing countries. These include a lack of affordable services and poor surgical outcomes. <sup>(4)</sup>

Manual small incision cataract surgery (MSICS) appears to be more effective <sup>(5)</sup> and economical than extracapsular cataract extraction (ECCE) and almost as effective as <sup>(6)</sup> and more economical than phacoemulsification. <sup>(7)</sup> MSICS is also cost effective and prevents the expenses for the purchase and maintenance of the phaco machine. <sup>(8)</sup> MSICS has similar advantages of phaco in the rehabilitation of the cataract blind.

It has been shown that an increase in astigmatism may be common after cataract surgery, a major concern is to know the possible changes in the corneal optics induced by surgery, and these corneal aberrations can be computed from data obtained by corneal topography. <sup>(9-14)</sup>

The main aim of this work was to assess the surgical astigmatism following manual small incision cataract surgery among cataract patients in of ophthalmology department at Suez Canal University hospital and also to detect visual acuity changes by comparing the visual acuity pre and post manual small incision cataract surgery among these patients.

## **SUBJECTS AND METHODS**

### **Study Design:**

A cross sectional study was conducted.

### **Setting of the Study:**

The study was conducted at ophthalmology outpatient clinic, inpatient wards and operating theatre at Suez Canal University hospital in Ismailia.

### **Subjects:**

- **Study Population:**

The study population consisted of all cataract patients in Suez Canal University hospital who had manual small incision cataract surgery and fulfilled the inclusion criteria in the period from 3/2/2013 to 11/8/2013.

- **Inclusion Criteria:**

Patients who were diagnosed as having visually impairing significant senile cataract and agreed to have a surgery of cataract extraction and primary implantation of intraocular lens with the aim of improving visual acuity were included in this trial.

- **Exclusion Criteria:**

1. Patients who was suffering of one of these conditions:
  - a. Corneal conditions affecting corneal topography such as opacities or dystrophy.
  - b. Chronic glaucoma.
  - c. Previous ocular surgery.
2. Patients who refused surgery.
3. Lack of patient's compliance that may affect follow-up & documentation.

## Sampling

- **Frame:** Cataract patients in ophthalmology department at Suez Canal university hospital who fulfilled the inclusion criteria will be enrolled in this study.
- **Method:** Non probability convenience sampling method was conducted.
- **Sample Size:** 27 eyes of 27 patients were included in our study.

## Data Collection Tools

**The data was collected from the patients' records in a retrospective manner. This data included 4 main items:**

I. Identification Data:

- Personal Data including; Patient's name, age and sex.

II. Data related to exclusion criteria such as:

- Chronic glaucoma, previous ocular surgery, corneal conditions affecting corneal topography and surgery refusal.

III. Data obtained pre-operatively such as:

- Affected eye, visual acuity, type of cataract and topography data.

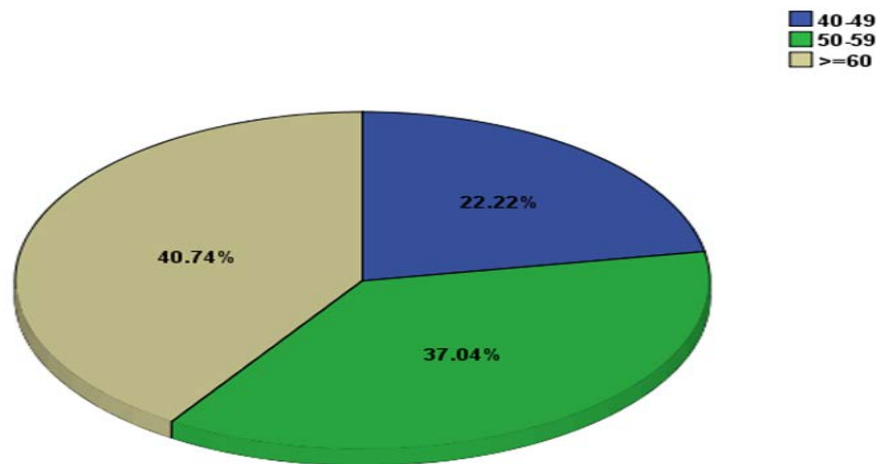
IV. Data obtained post-operatively such as:

- Unaided visual acuity, best corrected visual acuity and topography data.

## RESULTS

The present study was conducted on 27 patients who had manual small incision cataract surgery and fulfilled the inclusion criteria during the period from 3/2/2013 to 11/8/2013 to assess astigmatism and visual acuity pre and post this surgery among the study population. The studied patients were in age group 42 – 71 years. The mean age ( $\bar{x}$ )  $\pm$  standard deviation (SD) was  $62.75 \pm$

10.64 years. It was found that most of the study population was in the age group  $\geq 60$  years old (40.7%).



**Figure (1): Distribution of the study population according to age.**

It can be noticed that both cortical and nuclear cataract were the most common type of cataract among our study population (33.3%). 18.5% of the patients had Corticonuclear cataract, while only 14.8% have posterior sub capsular cataract.

**Table (1): Distribution of the study population according to type of cataract**

	Number	Percentage
Posterior Sub Capsular	4	14.8%
Cortical	9	33.3%
Nuclear	9	33.3%
Corticonuclear	5	18.5%
Total	27	100%

The preoperative visual acuity was less than  $6_{60}$  in 23 patients (85.2%) and postoperative visual acuity was less than  $6_{60}$  in 0 patients (0%). It also shows that preoperative visual acuity was  $6_{9-6}$  in 0 patients (0%), postoperative unaided visual acuity was  $6_{9-6}$  in 17 patients (63%) and postoperative best corrected visual acuity was  $6_{9-6}$  in 20 patients (74.1%). There is a statistically significant difference between pre operative visual acuity and post operative best corrected visual acuity ( $P < 0.05$ ).

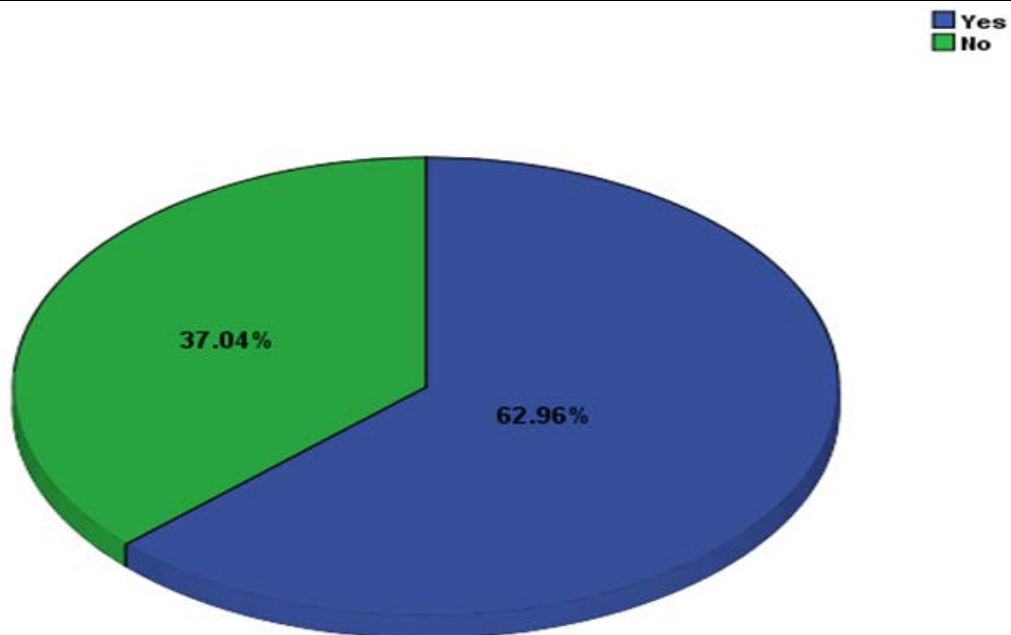
**Table (2): Unaided and best corrected visual acuity pre and post operative among the studied patients using Snellen's notation**

Visual Acuity	Pre operative		3 Months post operative			
	Number	Percentage	UAVA		BCVA	
			Number	Percentage	Number	Percentage
Less than $6/60$	23	85.2%	0	0%	0	0%
$6/60$ - $6/24$	4	14.8%	3	11.1%	2	7.4%
$6/18$ - $6/12$	0	0%	7	25.9%	5	18.5%
$6/9$ - $6/6$	0	0%	17	63%	20	74.1%
<b>Total</b>	27	100%	27	100%	27	100%
<b>p-value</b>			<b>0.001 (Statistically significant difference)</b>			

Mean of pre operative corneal astigmatism was  $0.99 \pm 0.76$  D while it was  $1.12 \pm 0.78$  D post operatively. There is no statistically significant difference between preoperative and post operative corneal astigmatism among the study population ( $P > 0.05$ ).

**Table (3): Corneal astigmatism pre and post operative in study population**

Astigmatism	Preoperative	3 months postoperative	p-value
	$0.99 \pm 0.76$	$1.12 \pm 0.78$	0.213 (No statistically significant difference)



**Figure (2): Distribution of surgically induced astigmatism among study population.**

The causes of uncorrected vision less than  $6/9$  were posterior capsular opacification in one patient (10%), diabetic macular edema in three patients (30%) and against the role astigmatism in six patients (60%). While the causes of correct vision less than  $6/9$  were posterior capsular opacification in one patient (14.3%), diabetic macular edema in three patients (42.9%) and against the role astigmatism in three patients also (42.9%).

**Table (4): Causes of uncorrected vision less than  $6/9$  among the study population**

	Number	Percentage
Posterior capsular opacification	1	10%
Diabetic macular edema	3	30%
Against The Role Astigmatism	6	60%
Total	10	100%

**Table (5): Causes of corrected vision less than  $6/9$  among the studied patients**

	Number	Percentage
Posterior capsular opacification	1	14.3%
Diabetic macular edema	3	42.9%
Against The Role Astigmatism	3	42.9%
Total	7	100%

## DISCUSSION

This study was done on (27) eyes of (27) patients. They were treated with manual small incision cataract surgery. Preoperative astigmatism was examined by corneal topography and visual acuity was also examined using Snellen's notation one day preoperatively. Post operative astigmatism and visual acuity were examined three months postoperatively.

In our study about 40.7% of the study population were above 60 years old and 59.3 % were between 40-60 years old ,Compared to study was made in hospital based eye camps in North Karnataka, In age wise distribution most of them (125 patients [91%]) were above 61 years of age.<sup>(15)</sup>

In a study was made by The National Blindness and Low Vision Survey of Bangladesh about 78.8 % of their study population were about 60 years old and about 17.3 % were between 40-60 years old.<sup>(16)</sup>

The distribution of our study population according to gender showed that females had the largest number of patients in the study population (55.6%). Meanwhile, Males were (44.4%). Also in a study conducted in Kempegowda Institute Of medical sciences in India results were (27 males) and (33 females).<sup>(17)</sup>

In a study was made in hospital based eye camps in North Karnataka, Gender wise distribution of the patients showed 34 (21%) males and 130 (79%) females which agree with our study results of female predominance.<sup>(15)</sup>

The pre operative mean corneal astigmatism ( $0.99 \pm 0.76$ ) D and the post operative mean corneal astigmatism after 3 months was ( $1.12 \pm 0.78$ ) D. There was no significant difference between the astigmatism pre operative and 3 months postoperatively (P-value= 0.213).

Anders N et al<sup>(18)</sup>, Morlet N et al<sup>(19)</sup> in their studies are consistent with our study results as they show that Mean surgically induced astigmatism post small incision manual extra capsular cataract surgery (defined as the change in the corneal curvature determined by the difference between the preoperative and postoperative keratometry measured by simple subtraction) was found to be +1.87D (range + 0.5 to + 3.25D).

Zvia Burgansky et al<sup>(20)</sup> in their study are consistent with our study results as they show that there is minimal surgically induced astigmatism post small incision manual extra capsular cataract surgery.

In our study 88.9% of the study population in our study achieved UAVA at least  $\leq 18$  and 92.6% of the study population achieved BCVA at least  $\leq 18$ .

Guzeh et al<sup>(21)</sup> in their study on 200 eyes undergoing small incision manual extra capsular cataract surgery agree with our study results as they found that about 90% of eyes achieved a final



best corrected visual acuity of at least  $6/12$ . In addition, patients had a faster visual recovery and lower incidence of ocular inflammation particularly fibrinous iritis.

Hepsen et al <sup>(22)</sup> also agree with our study as they achieved a post-operative best spectacle corrected visual acuity of  $6/9$  or better in 83% of eyes undergoing small incision extra capsular cataract surgery.

## CONCLUSION AND RECOMMENDATIONS

In conclusion, manual small incision cataract surgery is an alternative surgical method to Phacoemulsification for cataract surgery in poor countries due to its low costs compared to phacoemulsification. Manual small incision cataract surgery produces minimal surgical induced astigmatism and gives significant improvement in visual acuity.

Evidence-based medicine and clinical practice guidelines standard protocols should be followed and performed as practice patterns in dealing with eye surgical problems.

Further researches for study of the difference between surgical induced astigmatism post manual small incision cataract surgery and the other techniques for cataract surgery.

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