Section A-Research paper

EVALUATION OF THE VISUAL OUTCOME IN PHACOEMULSIFICATION CATARACT SURGERY AND MANUAL SMALL INCISION CATARACT SURGERY"

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Evaluation of the Visual Outcome in Phacoemulsification Cataract Surgery and Manual Small Incision Cataract Surgery

ABSTRACT

Purpose: To compare and evaluate of visual acuity and surgically induced astigmatism in Phacoemulsification cataract surgery and manual small incision cataract surgery.

Methods: The study group included patients above 50 years undergoing cataract surgery at the hospital either by Phacoemulsification technique or manual small incision cataract surgery. Group 1 included patients who underwent Phacoemulsification with a rigid posterior chamber intra ocular lens implantation with a single temporal suture. Group 2 included patients who underwent suture less manual small incision cataract surgery with a rigid posterior chamber IOL implantation. All patients were followed up post operatively at the end of the first day, 1 week, 4th week and 6th week.

Results: Maximum number of cases in group I i.e. twenty four (80%) and twenty six (86.67%) cases in group II had post-operative best corrected visual acuity 6/9 or better than 6/9. The difference was statistically non-significant between both the groups. At the end of study i.e at 6 weeks, the mean surgically induced astigmatism was 0.966 D in group I patients and 0.82 D in group II patients. The difference in mean surgically induced astigmatism between both the groups was statistically non-significant.

Conclusion: Both Phacoemulsification and manual small incision cataract surgery are equally effective with respect to post-operative astigmatism and best corrected visual acuity if the incision size is same. Although manual small incision cataract surgery induced slightly less post-operative astigmatism

Key Words: MSICS, Phacoemulsification, Visual Acuity, Cataract Surgery, Post Surgery

INTRODUCTION

The principal cause of avoidable blindness in India today is cataract, responsible for 50-90% of all cases depending on the area. It is estimated that there is an annual incidence of 2 million cataract induced blindness in India. National survey conducted on blindness in 2001-2002 shows that prevalence of blindness in general population is 1.1% and in people above the age of 50 years, it is 8.5%. Cataract is responsible for 62.6% of the total blindness. The normal lens is transparent any congenital or acquired opacity in the lens substance or its capsule, irrespective of its effect on vision, is called a cataract. The symptoms of cataract are entirely visual, usually blurring of vision. In the early stages, the vision is correctable with glasses but the power would change rapidly, so one of the earliest symptoms could be a frequent change of glasses. Colored halos may also be seen if the opacities are central. Posterior cortical opacities often cause diminution of central vision apparently out of proportion to the amount of opacity observed. As opacification proceeds, vision steadily diminishes until only perception and projection of light remains. Cataract alone can never lead to inaccurate projection or no light perception. No medical treatment has been shown to be effective in indicating the disappearance of cataract once opacities have developed. Cataract extraction is the most frequently operation in patients over 65 years of age. The ability to eliminate disabling optical effects of the aphakic spectacle without the inconvenience of the contact lens has made the use of an intraocular lens (IOL) implant the standard method of correcting aphakia. Phacoemulsification permits removal of cataract through a 3mm incision, thus eliminating many of the complications of wound healing related to large incision cataract surgery and perhaps shortening the recovery period. The mother of modern phacoemulsification equipment was patented only in 1971. The original machine and to a certain extent modern day versions, consisted of an electromagnetic generator connected to a handle fitted with titanium tip which vibrated longitudinally at ultrasonic frequencies. The action of tip breaks the lens into fragments, which are then aspirated through the central opening of the tip under the aspirating action of a pump fitted to the main piece. It has become the preferred method of cataract extraction in United States, for most types of cataracts. There is less tissue injury, less post-operative pain and inflammation and less surgically induced astigmatism. The small incision means a reduction in the anatomical healing time, reduction in postoperative astigmatism, less post-operative flattening of the anterior chamber, reduction of haemorrhage complications and fewer sutures. In other words, functional recovery is faster.

METHODOLOGY

A descriptive cross- sectional study was conducted at ITM Hospital, Gwalior. A total of 60 patients above 50 years divided in to two groups 30 each were enrolled in this study. The study group included patients above the age of 50 years undergoing cataract surgery at this hospital either by phacoemulsification technique or manual small incision cataract surgery. Only those patients whose functional visual disability could be attributed to cataract were included in the study. There were two groups consisting of 30 patients each. Pre-operative examination: Patients underwent thorough pre-operative examination including: --Visual acuity using Snellen's chart. Slit lamp examination. Measurement of intraocular pressure with applanation tonometry. Fundus examination under mydriasis with a direct ophthalmoscope and indirect ophthalmoscope, wherever possible. Keratometry with Bausch and Lomb Keratometer. Difference in corneal power in steeper and flat meridian was taken as pre-operative astigmatism. The two meridians were taken at 90degrees and 180degrees. Amplitude of astigmatism was recorded. A-scan biometry for determination of the axial length of the eyeball.

Group 1

Included patients who underwent phacoemulsification with a rigid posterior chamber intraocular lens implantation with a single temporal suture

Group 2

Included patients who underwent suture less manual small incision cataract surgery with a rigid posterior chamber intraocular lens implantation

INCLUSION CRITERIA

- Clear cornea with healthy endothelium.
- A well dilatable pupil.
- A normal anterior chamber depth.
- Intact zonular attachment.
- Immature and mature cortical cataract, nuclear sclerosis.

EXCLUSION CRITERIA

- Uncontrolled diabetes mellitus and hypertension.
- History of previous intra ocular surgery.
- Any retinal or optic nerve disease.
- Patients with primary open angle or angle closure glaucoma
- Patients with a pre-existing corneal pathology which can result in corneal astigmatism such as corneal

- Opacities, corneal dystrophies and keratoconus.
- Patients having any pathological process involving limbus or sclera.
- Inability to come for follow-up.

DATA ANALYSIS

In the present study the statistical data analysis was conducted using Microsoft excel and SPSS version 16. Student t-test was used to calculate the p-value. The mean and standard deviation was calculated for age. Data were presented as frequency and percentage for the objectives.

RESULTS

60 cases of cataract, requiring cataract surgery, coming to Kataria Eye & ENT Hospital, Jalandhar, were selected at random for comparison and evaluation of post-operative astigmatism and visual acuity between phacoemulsification and suture less manual small incision cataract surgery with posterior chamber rigid intraocular implantation lens. The cases were divided into two groups of 30 cases each randomly, irrespective of age and sex.

Group I: Comprised of 30 patients who underwent phacoemulsification with posterior chamber rigid intraocular lens implantation with single temporal suture.

Group II: Comprised of 30 patients who underwent suture less manual small incision cataract surgery with posterior chamber rigid intraocular lens implantation.

PRE-OPERATIVE OBSERVATIONS

Table 1

Distributions of cases according to age

AGE GROUPS (IN YEARS)	GROUP 1		GROUP 2	
	NO.	% AGE	NO	%AGE
<50	-	-	-	-
50-59	3	10	4	13.33
62-69	13	43.33	12	40
70-79	12	40.0	12	40
>80	2	6.67	2	6.67
Total	30	100	30	100
Range	55-83		55-81	
Mean+SD	69.63+7.49		69.30+7.33	
'P, Value	0.17		>0.05	
Significance	Non-Significance			

The youngest patient studied in group I was 55 years old and the oldest was 83 years old. The youngest patient studied in group II was 55 years old and the oldest was 81 years old. Age was comparable in both the groups.

Figure of table 1
Age distribution of Patient

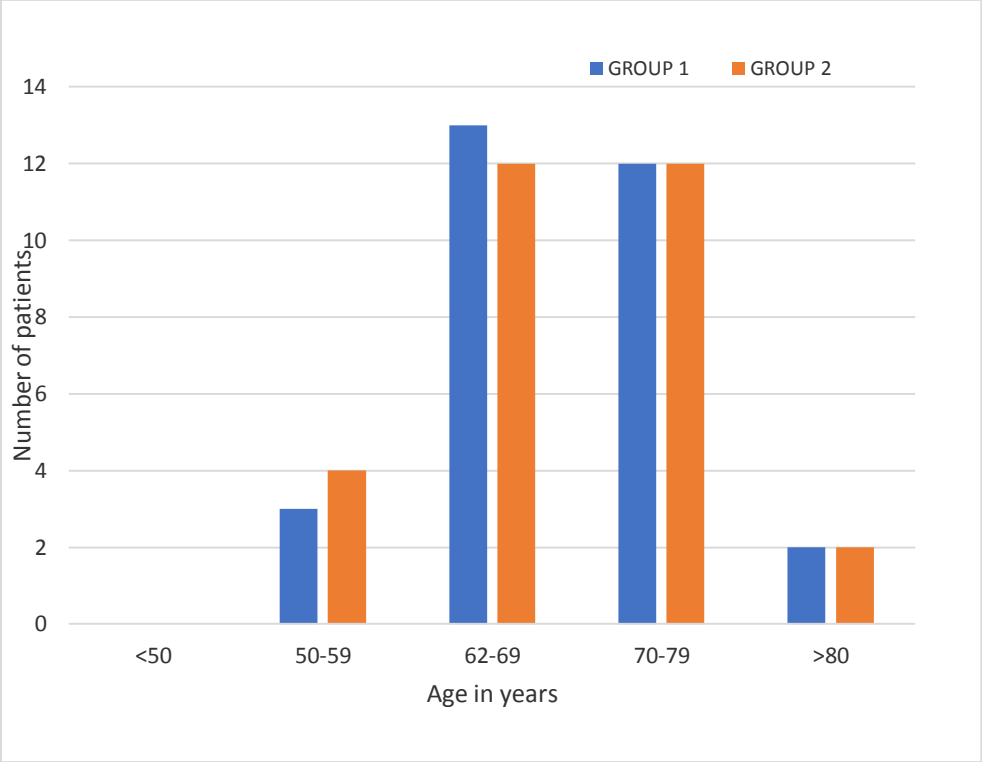


Table 2
Distribution of cases according to age and sex

Figure of table 2
Age and sex distribution of Group 1

Age (in yrs)	**Group 1**		**Group 2**		**Total**		
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Total**
<50	**-**	**-**	**-**	**-**	**-**	**-**	**-**
50-59	**3**	**-**	**4**	**-**	**7**	**-**	**7**
60-69	**5**	**8**	**4**	**8**	**9**	**16**	**25**
70-79	**9**	**3**	**7**	**5**	**16**	**8**	**24**
>80	**1**	**1**	**1**	**1**	**2**	**2**	**4**
Total	**18**	**12**	**16**	**14**	**34**	**26**	**60**
P Value	**>0.05**						
Significanc	**Non-significance**						

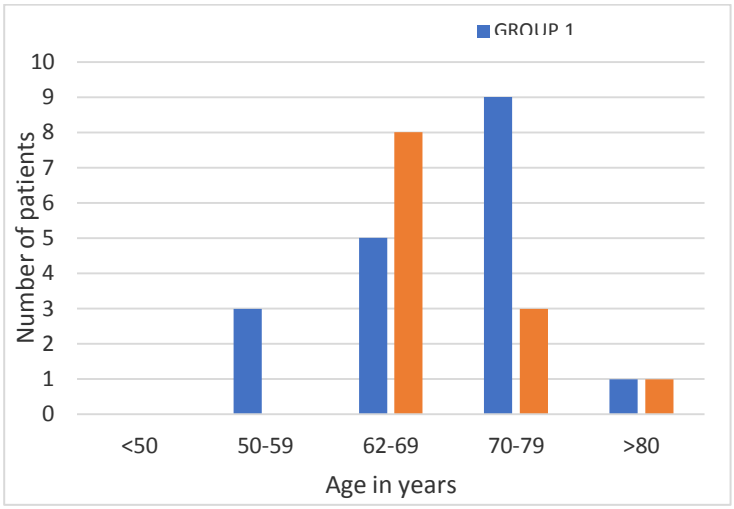
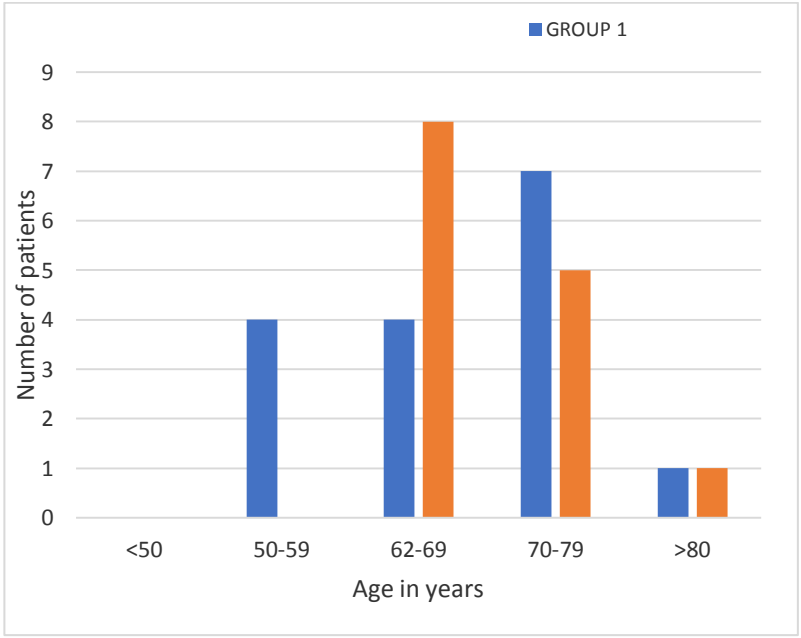


Figure of table 2 (2)
Age distribution of Group 1



In group I, 18 (60%) were male and 12 (40%) were female patients. In group II, 16 (53.33%) were male and 14 (46.67%) were female patients. Gender distribution was comparable in both the groups.

TABLE 3
GROUP WISE DISTRIBUTION AMOUNT OF PRE-OPERATIVE

Amount of Astigmatism (indiopters)	Group I		Group II	
	NO.	%AGE	NO.	%AGE
Nil	7	23.33	6	20
<0.5	-	-	-	-
0.5-1.0	15	50	18	60
1.1-1.5	8	26.67	6	20
1.6-2.0	-	-	-	-
2.1-2.5	-	-	-	-
2.6-3.0	-	-	-	-
>3.1	-	-	-	-
Total	30	100	30	100
Mean ± SD	.0.75± 0.56		0.73 ±0.52	
P Value	0.11> 0. 05			
Significance	Non significance			

Number of cases with pre-operative astigmatism of ID or less than ID was fifteen (50%) in group I and eighteen (60%) in group II.

In group I, the minimum value of pre-operative astigmatism was 0 and the maximum value was 1.5 D. Mean value of pre-operative astigmatism in group I cases was 0.75D.

In group II, the minimum value of pre-operative astigmatism was 0 and the maximum value was 1.5D. Mean value of pre-operative astigmatism in group II cases was0.73D.

Figure of table 3
Amount of Pre- Operative Astigmatism

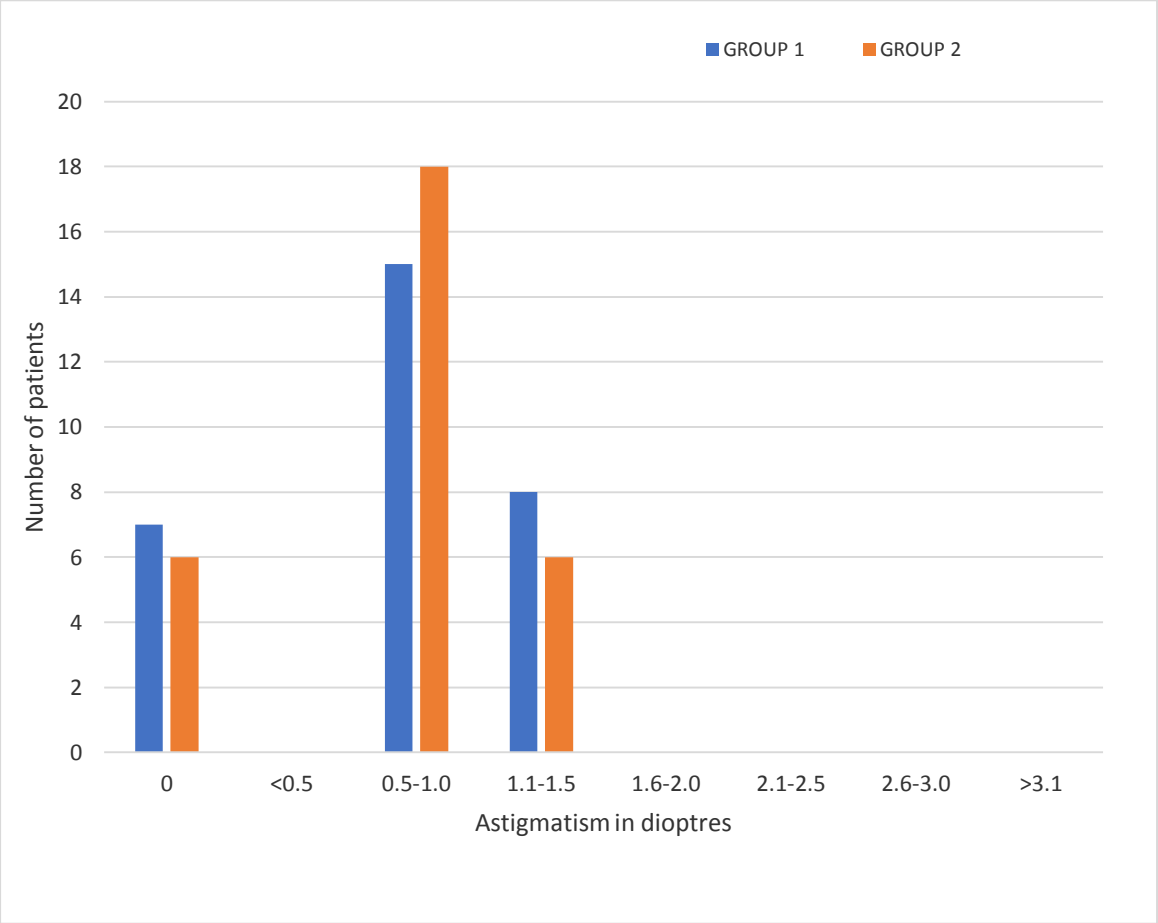


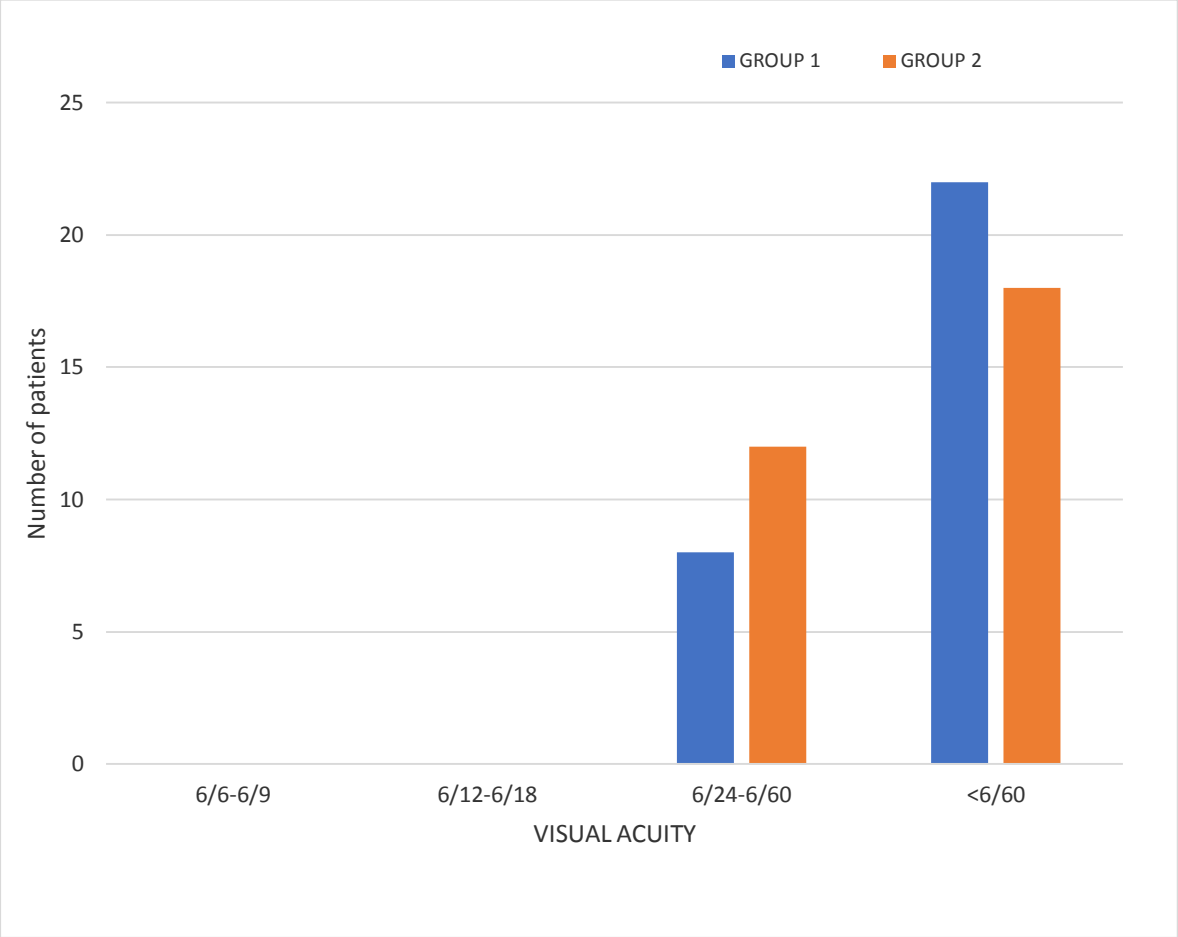
TABLE 4
Pre-Operative Visuai Acuity

Visual Acuity	Group I		Group II	
	NO.	%age	No.	%age
6/6-6/9	-	-	-	-

6/12-6/18	**-**	**-**	**-**	**-**
6/24-6/60	**8**	**26.67**	**12**	**40**
<6/60	**22**	**73.33**	**18**	**60**
TOTAL	**30**	**100**	**30**	**100**

Maximum number of patients had pre-operative visual acuity of less than 6/60. In group I, twenty two cases (73.33%) and in group II, eighteen (60%) cases had visual acuity less than 6/60. None of the cases had visual acuity better than6/24.

Figure of table 4
Pre- Operative Visual Acuity



POST-OPERATIVE OBSERVATION

Table 5

GROUP wise distribution of post – operative visual acuity with pinhole on day 1

Best Corrected Visual Acuity	Group I		Group II	
	No.	%age	NO.	%age
6/6-6/9	11	36.67	10	33.33
6/12-6/18	13	43.33	14	46.67
6/24-6/60	4	13.33	5	16.67

<6/60	**2**	**6.67**	**1**	**3.33**
Total	**30**	**100**	**30**	**100**

Statistical Analysis

x^2 pvalue Significance

0.80 >0.05 Non-significant

Maximum number of cases in groups I i.e. thirteen (43.33%) and fourteen (16.67%) cases in group II had visual acuity with pin hole 6/12 - 6/18. Eleven cases (36.67%) in group I and ten cases (33.33%) in group II had visual acuity ≥6/9. Six cases (20%) in both the groups have visual acuity worse than6/18.

Figure of table 5

Post-operative visual acuity with pin hole on day 1

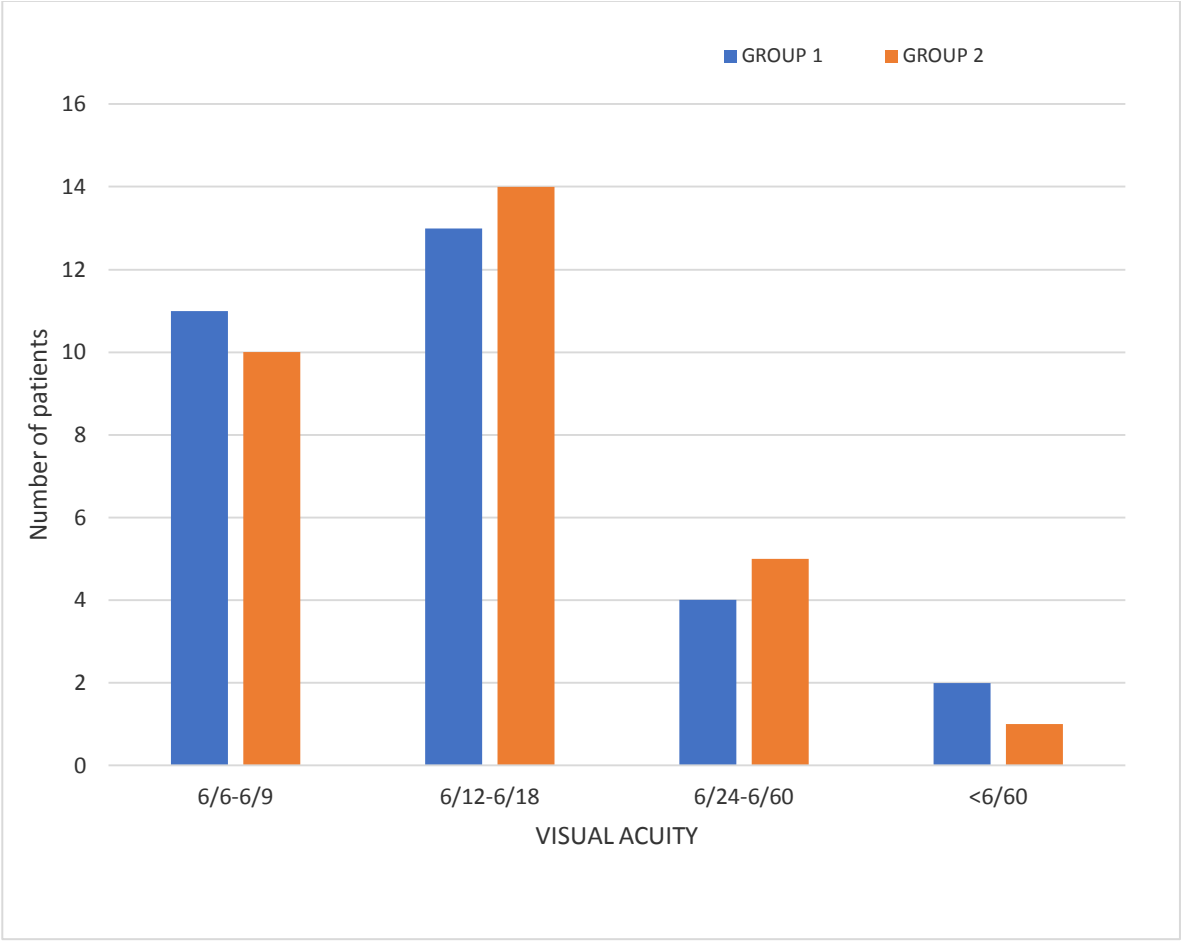


Table 6
Group wise distribution of post – operative best corrected visual acuity after one week

Best Corrected Visual Acuity	Group I		Group II	
	No.	% age	NO.	%age
6/6-6/9	22	73.33	23	76.67
6/12-6/18	8	26.67	7	23.33
6/24-6/60	-	-	-	-
<6/60	-	-	-	--
Total	30	100	30	100
x^2 & p value	0.089>0.05			
Significance	Non-Significance			

Maximum number of cases in group I, i.e. twenty two (73.33%) and twenty three cases (76.67%) in group II had best corrected visual acuity 6/9 or better than 6/9. None of the cases had best corrected visual acuity worse than 6/18.

Figure table 6
Best corrected visual acuity after one week

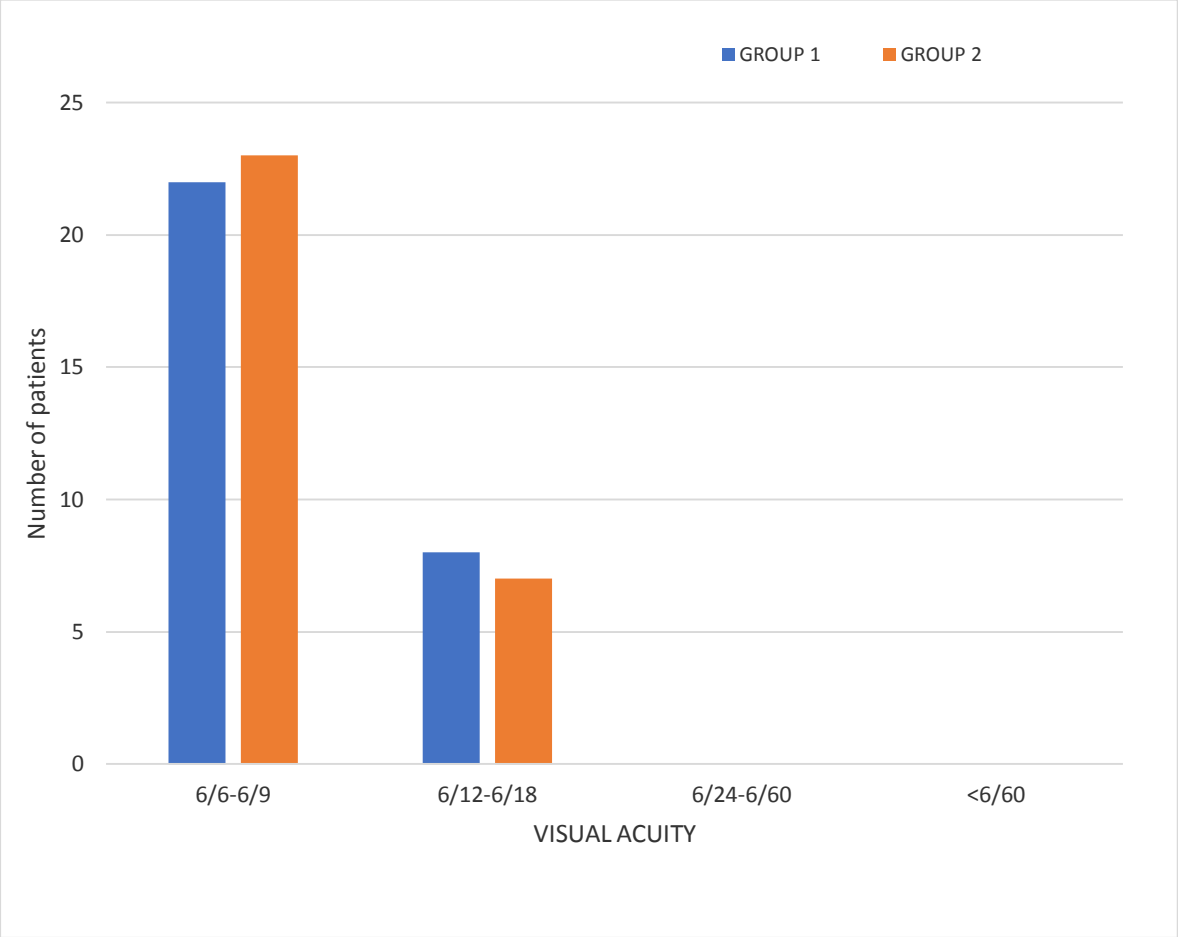

GROUP 1
GROUP 2
25
20
15
10
5
0
Number of patients
6/6-6/9
6/12-6/18
6/24-6/60
<6/60
VISUAL ACUITY

Table 7
Group wise distribution of post – operative best corrected visual acuity after four weeks

Best Corrected Visual Acuity	**Group I**		**Group II**	
	No.	**% Age**	**NO.**	**% Age**
6/6-6/9	**24**	**80**	**25**	**83.33**
6/12-6/18	**6**	**20**	**5**	**16.67**
6/24-6/60	**-**	**-**	**-**	**-**
<6/60	**-**	**-**	**-**	**--**
Total	**30**	**100**	**30**	**100**
x^2 & p value	**0.002>0.05**			
Significance	**Non-Significance**			

Maximum number of cases in group I i.e., twenty-four (80%) and twenty-five (83.33%) in group II had post-operative best corrected visual acuity 6/9 or better than 6/9. None of the cases in group I and II had post-operative best corrected visual acuity worse than 6/18.

Figure of table 7
Best corrected visual acuity after 4 week

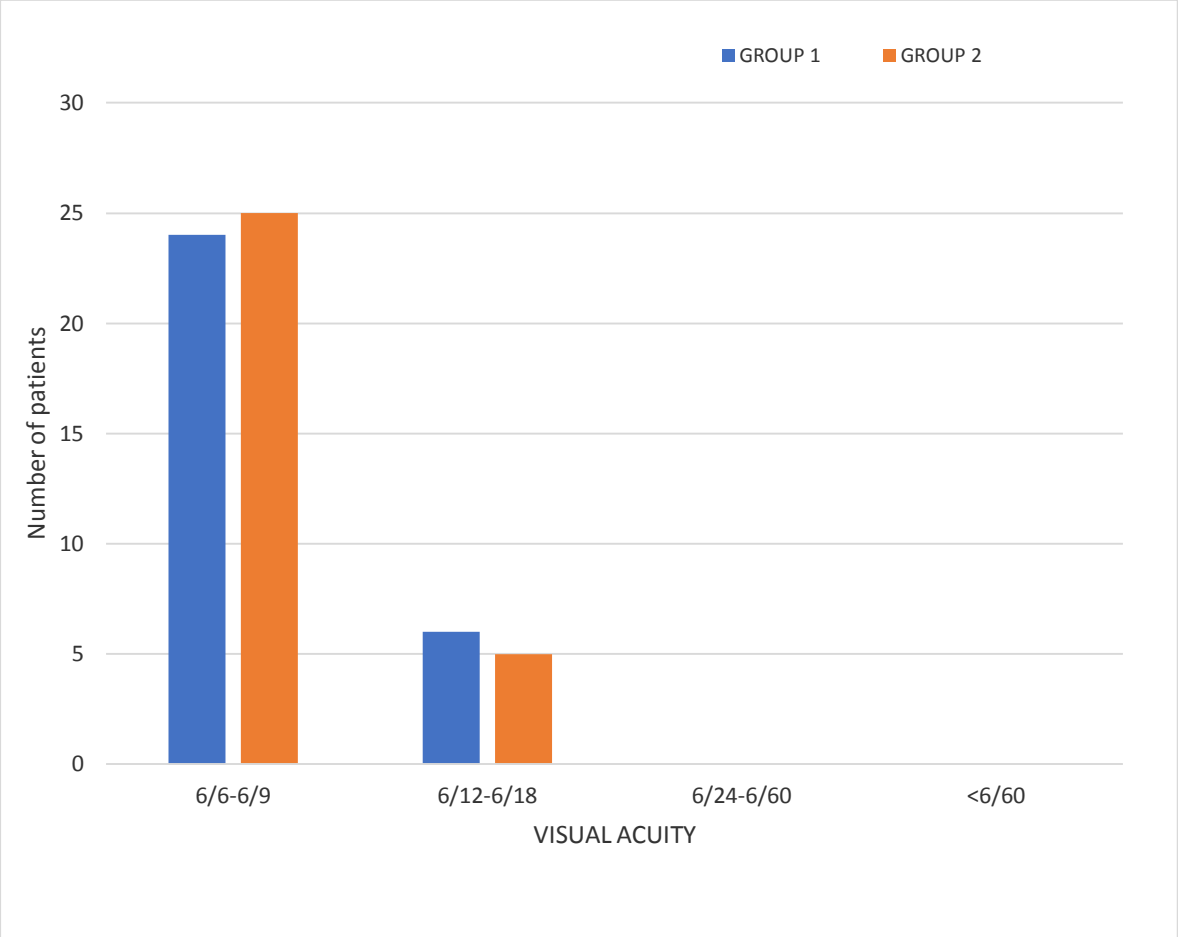


Table 8
Group wise distribution of post – operative best corrected visual acuity after six weeks

Best Corrected Visual Acuity	**Group I**		**Group II**	
	No.	**%Age**	**NO.**	**%Age**
6/6-6/9	**24**	**80**	**26**	**86.67**
6/12-6/18	**6**	**20**	**4**	**13.33**
6/24-6/60	**-**	**-**	**-**	**-**
<6/60	**-**	**-**	**-**	**--**
Total	**30**	**100**	**30**	**100**
x^2 & p value	**0.48>0.05**			
Significance	**Non-Significance**			

Maximum number of cases in group I i.e. twenty four (80%) and twenty

Six (86.67%) cases in group II post-operative best corrected visual acuity 6/9 or better than6/9.

All the thirty cases in group I and II had post-operative best corrected visual acuity after six weeks 6/18 or better than 6/18. None of the cases in group I and II had post-operative best corrected visual acuity worse than 6/18.

Figure table 8
Best corrected visual acuity after 6 weeks

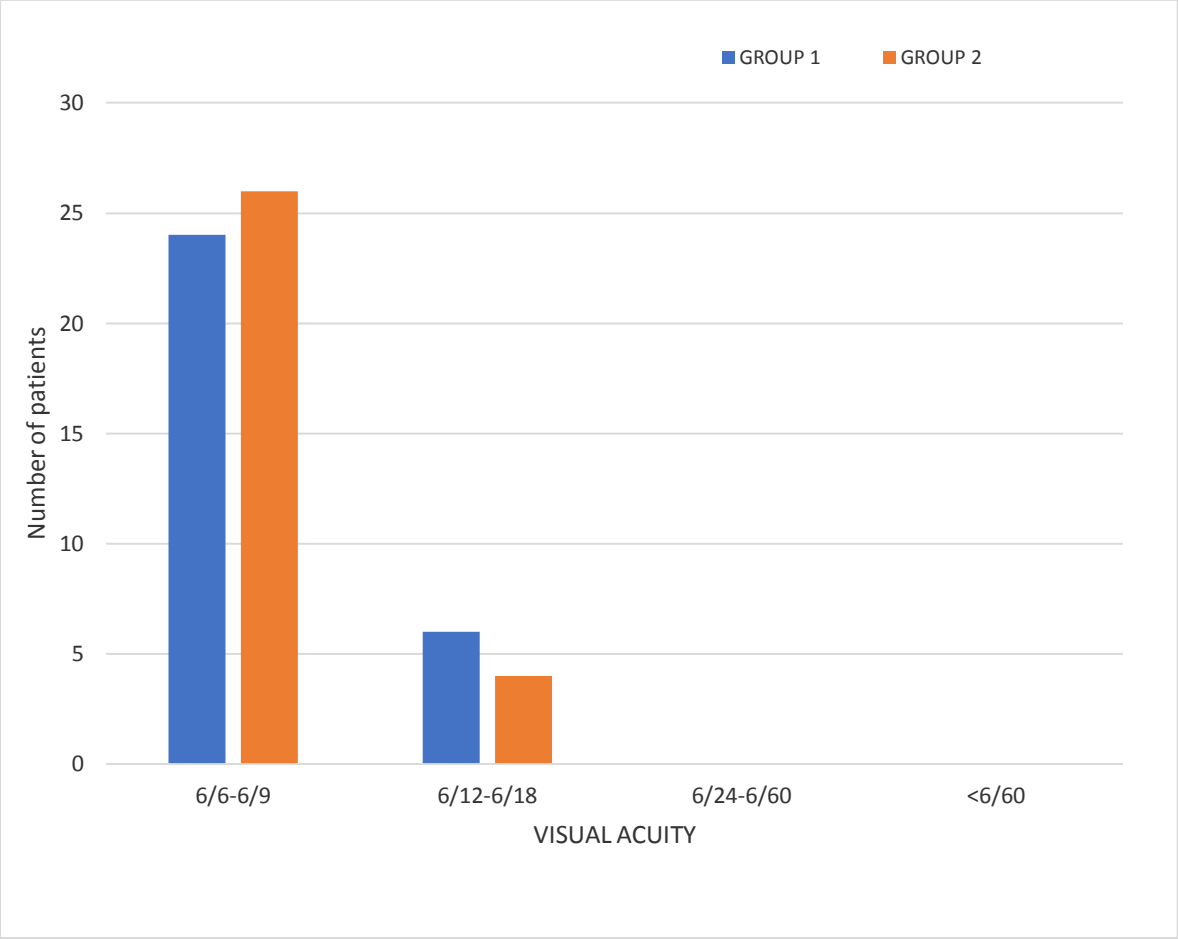


Table 9
Group -Wise distribution of amount of post-operative astigmatism after six weeks

Amount of Astigmatism (in diopters)	Group 1		Group 2	
	No	%Age	No	%Age
0	5	16.67	4	13.33
<0.50	-	-	-	-
0.5-1.0	14	46.67	20	66.67
1.1-1.5	2	6.67	5	16.67
1.6-2.0	3	10	1	3.33

2.1-2.5	**4**	**13.33**	**-**	**-**
2.6-3.0	**-**	**-**	**-**	**-**
>3.1	**2**	**6.67**	**-**	**-**
Total	**30**	**100**	**30**	**100**
Range	**0-4.5**		**0-2.0**	
Mean±S.D.	**1.20±1.13**		**0.88±0.75**	
t & p value	**0.336>0.05**			
Significance	**Non-Signifacance**			

The average amount of post-operative astigmatism after six weeks In group I cases is 1.20 D. The minimum amount of astigmatism was 0 and the maximum amount of astigmatism was 4.5 D. The average amount of post-operative astigmatism after six weeks in group II cases is 0.88 D. The minimum amount of astigmatism was 0 and the maximum amount of astigmatism was 2.0 D.

Figure of table 9
Amount of post-operative astigmatism after 6 weeks

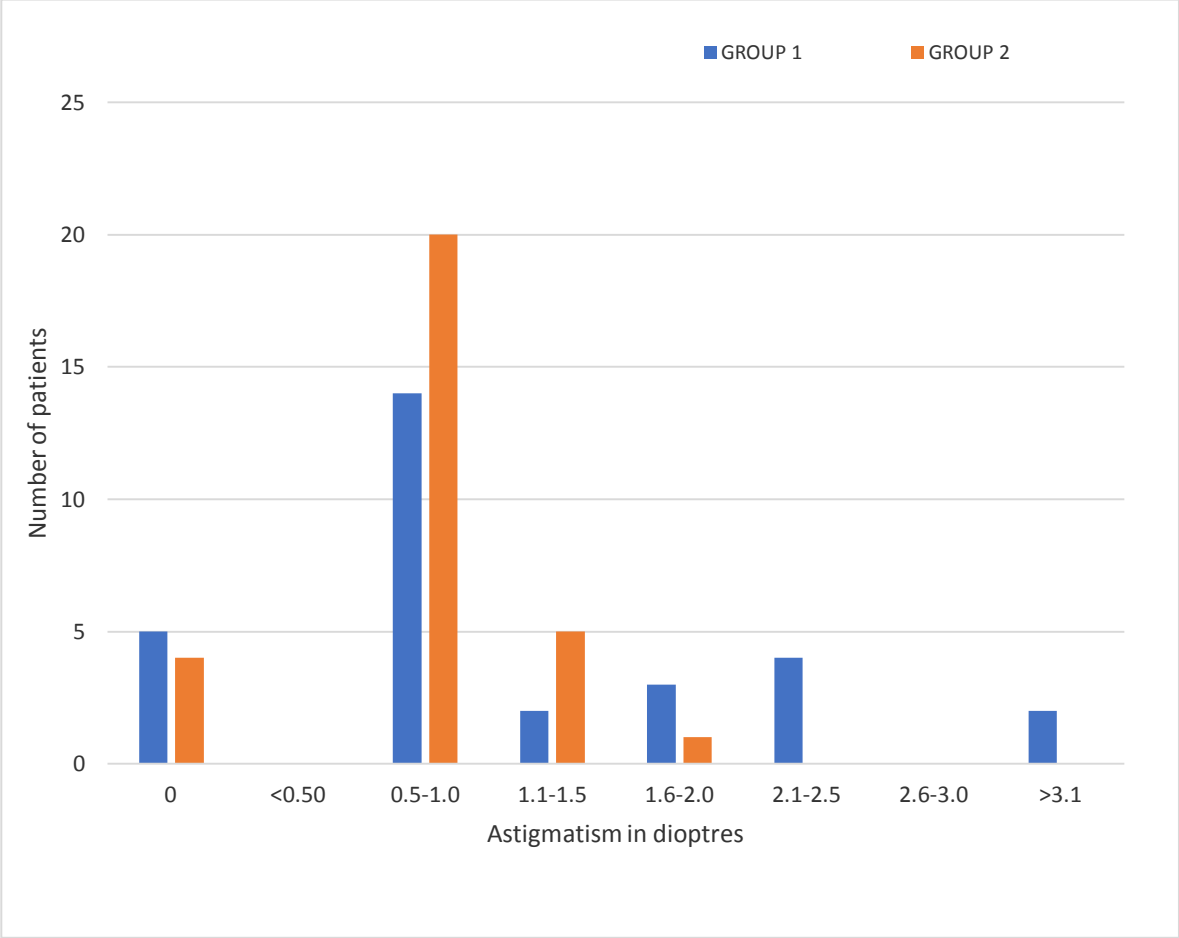


Table 10
Amount of surgically induced astigmatism

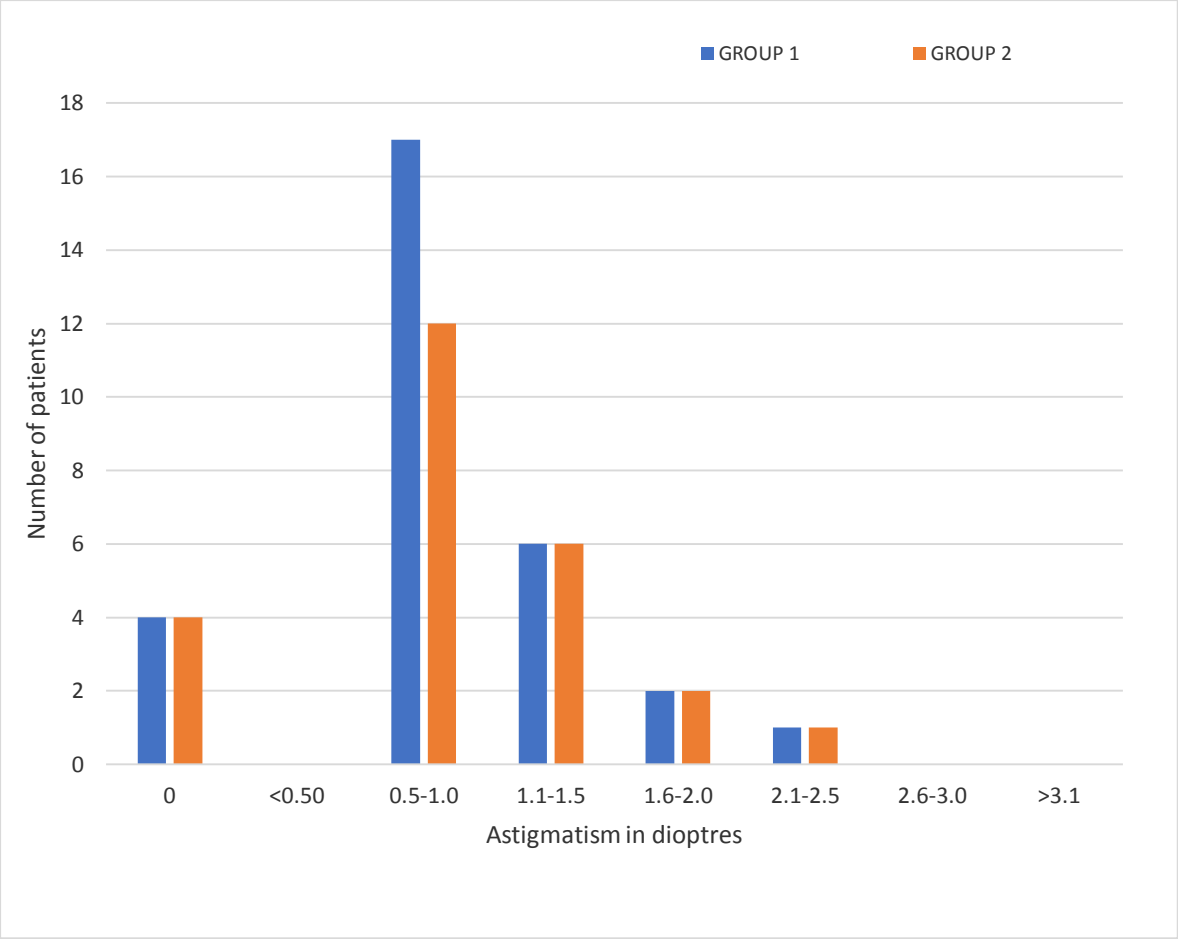
Amount of Astigmatism (in diopters)	Group 1		Group 2	
	No	%Age	No	%Age
0	4	13.33	4	13.33

<0.50	**-**	**-**	**-**	**-**
0.5-1.0	**17**	**56.67**	**12**	**40**
1.1-1.5	**6**	**20**	**6**	**20**
1.6-2.0	**2**	**6.67**	**2**	**6.67**
2.1-2.5	**1**	**3.33**	**1**	**3.3**
2.6-3.0	**-**	**-**	**-**	**-**
>3.1	**-**	**-**	**-**	**-**
Total	**30**	**100**	**30**	**100**
Range	**0-2.5**		**0-2.5**	
Mean±S.D.	**0.966±0.628**		**0.82±0.721**	
t & p value	**0.336>0.05**			
Significance	**Non-Signifacance**			

The mean surgically induced astigmatism was 0.966±0.628D in **group I** patients. The maximum number of cases i.c. 17 (56.67%) in group **I** I had surgically induced astigmatism less than 1 diopter.

The mean surgically induced astigmatism was 0.82+0.721D in **group II** patients. The maximum number of cases i.e. 23 (76.67%) in group I had surgically induced astigmatism less than Idiopter.

Figure of table 10
Amount of surgically induced astigmatism



DISCUSSION

The present prospective study was undertaken on 60 patients with uncomplicated senile cataract and no other systemic or ocular pathology. The study was designed to compare the postoperative astigmatism; best corrected visual acuity and surgically induced astigmatism of the two groups. 30 patients in group I were operated using phacoemulsification and 30 patient in group II were operated using suture less manual small incision cataract surgery, with rigid posterior chamber intraocular lens implantation in both the groups. All the patients were followed up for a period of 6weeks. Majority of patients of the present study who underwent cataract extraction belong to the age group of above 50 years. The mean age was 69.63 years in group I and 69.30 years in group II patients. There was no statistically significant difference in mean age in both groups. Males outnumbered the females in both the groups. There were 18 males (60%) in group I and 16 males (53.33%) in group II. This difference was a co-incidental finding as either of the sex did not have any kind of bearing on the development of cataract.

Pre-operative astigmatism

The mean pre-operative astigmatism was 0.75+0.56 D in group I and 0.73+0.52 D in group II. This difference after statistical analysis was und to be insignificant. The amount of pre-existing astigmatism in maximum number of cases was in the range of 0.5-1.0D in both the groups. This was also seen by Jaffe in 1975.

Pre-operative visual acuity

Maximum number of patients had pre-operative visual acuity of less than 6/60. In group I, twenty-two cases (73.33%) and in group II eighteen (60%) cases had visual acuity less than 6/60. None of the cases had visual acuity better than6/24. The pre-operative parameters age, sex, pre-operative amount of astigmatism and pre-operative visual acuity in both the groups were comparable and their difference was not statistically significant.

Post-operative astigmatism

In group I the average amount of post-operative astigmatism after six weeks was 1.20D. In group II, After six weeks, the average amount of post-operative astigmatism was 0.88D. The mean astigmatism in group II cases (0.88D) was less than the mean astigmatism in group I cases (1.20 D). But the difference between these two groups was statistically insignificant ("t" value is 0.336 &'p' value is >0.05). It was originally believed that wound compression in superior incisions led to a reduction in vertical circumference of the globe and thus steepening of the vertical meridian. It is well proven that tight sutures cause wound compression, which in turn steepening in the meridian of the suture. It can be observed with a slit lamp, however, that a tight suture will cause the peripheral cornea under that suture to be quite flat. Goerge et al (2005) compared the surgically induced astigmatism following conventional extracapsular cataract extraction, manual small incision cataract surgery and phacoemulsification. Mean surgically induced astigmatism was 1.77 D (1.61 D) for the extracapsular cataract extraction group, 1.17 D (0.95 D) for the small incision cataract surgery group and 0.77 D (0.65 D) for the phacoemulsification group. It was concluded that Phacoemulsification induced less astigmatism than small incision cataract surgery and extracapsular cataract extraction in this study but the magnitude of the difference between small incision cataract surgery and Phacoemulsification was small, Malik and Goel (2002) compared the post-operative astigmatism in 100 subjects between small incision cataract surgery (group 1) and Phacoemulsification (group 2) for 2 months post operatively. Higher values were obtained in group 1 at 1 week and 4 weeks, but by 2 months there was no significant difference in astigmatism between Small incision cataract surgery and phacoemulsification. In our study, we compared visual outcome manual small incision cataract surgery with superior 6mm corneo-scleral incision with rigid posterior chamber

intraocular lens implantation to the temporal Phacoemulsification through 6mm clear corneal incision with a rigid posterior chamber intraocular lens implantation with single temporal suture. It was concluded that suture less manual small incision cataract surgery induced slightly less astigmatism than Phacoemulsification. But this difference was statistically non significant. Slight less astigmatism observed in manual small incision cataract surgery can be attributed to incision location i.e. 2 mm away from limbus and incision shape i.e. frown shaped incision used as compared to clear comeal incision parallel to limbus in Phacoemulsification.

Post-operative best corrected visual acuity

In group I, eleven cases (36.67%) had post-operative best corrected visual acuity 6/9 or better than 6/9 on day one. After one week, twenty-two cases (73.33%) had post-operative best corrected visual acuity 6/9 or better than 6/9. After four weeks, twenty-four cases (80%) had post- operative best corrected visual acuity 6/9 or better than 6/9. After six weeks, twenty-four cases (80%) had post-operative best corrected visual acuity 6/9 or better than6/9. In group II, ten cases (33.33%) had post-operative best corrected visual acuity 6/9 or better than 6/9 on day one. After one week, twenty-three cases (76.67%) had post-operative best corrected visual acuity 6/9 or better than 6/9. After four weeks, twenty-five cases (83.33%) had post-operative best corrected visual acuity 6/9 or better than 6/9.After six weeks, twenty-six cases (86.67%) had post-operative best corrected visual acuity 6/9 or better than6/9. In the present study, the difference of best corrected visual between suture less manual small incision cataract surgery acuity and phacoemulsification techniques was non-significant. Maximum number of cases in both the groups had best corrected visual acuity 6/9 or better than 6/9. None of the cases in group I and group II had post- operative best corrected visual acuity worse than6/18. Zhang JY et al did a study to compare outcomes of Phacoemulsification with manual small-incision cataract surgery for age- related cataract. It was found that there were no significant differences between the techniques regarding the best corrected visual acuity 6/9 or better and less than 6/18. Martha et al (1993) showed no significant difference among the manual small incision cataract surgery and phacoemulsification groups in terms of proportion of eyes achieving visual acuity more than 20/40 after 3 months postoperatively. Gogate et al (2005) concluded that both the phacoemulsification and the small incision techniques are safe and effective for visual rehabilitation of cataract patients.

Surgically induced astigmatism

In group I, the mean surgically induced astigmatism was 0.966D. In group II the mean surgically induced astigmatism was 0.82D. Maximum number of cases i.e. 21 (70%) in group

I had surgically induced astigmatism less than 1.0 D. Maximum number of cases i.e. 21 (70%) in group II had surgically induced astigmatism less than1.0D. The difference in mean surgically induced astigmatism between the two groups was statistically non significant.

Uusitalo and Tarkkanen (1998) evaluated manual small incision cataract surgery by phacoemulsification and found that mean preoperative cylinder on keratometry readings is 1.3D (+1.5 standard deviation) and postoperative 1.53D (+1.65 standard deviation). Mean surgically induced astigmatism was 0.2+0.7D, and the shift was within or equal to 1.0 D in 91.2% of cases.

LIMITATION OF THE STUDY

The limitations of evaluating the visual outcome in Phacoemulsification and manual small incision cataract surgery include: Selection bias due to non-random assignment of surgical techniques. Lack of standardized protocols for evaluating visual outcomes. Variability in the duration of follow-up, which may not capture long term complications or changes in visual acuity. Limited assessment of patient reported outcomes beyond visual acuity. Addressing these limitations would involve adopting standardized protocols, incorporating longer follow-up periods, including patient-reported outcome measures, controlling for confounding factors and conducting multi-center studies with diverse patient population.

CONCLUSION

Both Phacoemulsification and manual small incision cataract surgery are equally effective with respect to post-operative astigmatism and best corrected visual acuity if the incision size is same. Although manual small incision cataract surgery induced slightly less post- operative astigmatism because the incision was more posterior (2 mm outside the limbus, sclero-corneal tunnel) and was frown shaped as compared to phacoemulsification in which the incision was clear- corneal (2 mm inside the limbus) and was parallel to the limbus. But the difference was statistically insignificant.

SUMMARY

60 cases of senile cataract without any other associated ocular pathology operated in ITM Hospital, Gwalior were included in the present study. In this study amount of post-operative astigmatism, best corrected visual acuity and surgically induced astigmatism after suture less manual small incision cataract surgery was compared with that induced by phacoemulsification with posterior chamber intra ocular lens implantation. 60 cases of senile cataract without any associated ocular pathology were divided into two groups comprising of 30 patients each.

Group I: Comprised of 30 patients who underwent Phacoemulsification with rigid posterior chamber intraocular lens implantation.

Group II: Comprised of 30 patients who underwent manual small incision cataract surgery with rigid posterior chamber intraocular lens implantation.

Best corrected visual acuity was recorded pre-operatively and post-operatively on day one, after one week, four weeks and six weeks. Amount of astigmatism was recorded preoperatively and postoperatively at sixth week. Following conclusions have been drawn from the present study: The average amount of pre-operative astigmatism in group I was 0.75 D and in group II was 0.73 D. The difference was statistically insignificant. In group I cases, the average amount of post-operative astigmatism was 1.20 D after 6 weeks. In group II cases, the average amount of postoperative astigmatism was 0.88 D after 6 weeks. Thus manual small incision cataract surgery induces post-operative astigmatism as compared less phacoemulsification and this difference is statistically insignificant. Maximum number of cases in group I i.e. twenty four (80%) and twenty six (86.67%) cases in group II had post-operative best corrected visual acuity 6/9 or better than 6/9. The difference was statistically non-significant between both the groups. None of the cases in group I and II had post-operative best corrected visual acuity worse than 6/18. Post-operative best corrected visual acuity was similar in both suture less manual small incision cataract surgery phacoemulsification techniques and the difference was statistically non-significant. At the end of study i.e. at 6 weeks, the mean surgically induced astigmatism was 0.966 D in group I patients and 0.82 D in group II patients. The difference in mean surgically induced astigmatism between both the groups was statistically non- significant.

ACHKNOWLDGEMENT

We would like to thank all the participants in this study and who supports this study in all manner.

DECLARATIONS

Funding: Self financed and no financial aid applied or received.

Conflict of interest: There are no conflicts of interest.

Ethical approval: Ethical approval was done by the ethical committee of ITM University, Gwalior,Madhya pradesh, India

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