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ASTIGMATISM;

MANAGEMENT OF PRE-EXISTING ASTIGMATISM WITH 3.2 MM CLEAR CORNEAL INCISION ON STEEPER AXIS DURING PHACOEMULSIFICATION CATARACT SURGERY.

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ABSTRACT… Objectives: To evaluate the management of pre-existing astigmatism with 3.2 mm corneal incision on steeper axis during phacoemulsification cataract surgery. **Study Design:** Analytical study. **Setting:** Patients undergoing cataract surgery with phacoemulsification in K.D.A Teaching Hospital KMU-IMS Kohat. **Period:** January, 2016 to July, 2016. **Materials and Methods:** 50 patients with age related cataract were selected. Out of them 23 (46%) were male and 27 (54%) were female. All the patients were in age range from 49 to 76 years with mean age of 63.2% years. Proper examination with slit lamp was done. Informed consent was obtained from each patient. Proper proforma was made for documentation. Biometry was done for IOL power. Preoperative keratometry was done with Topcon autoref-keratometer. Patients with traumatic eyes, previously operated eyes, vascularised and opacified cornea were excluded from the study. Pupils of patients were dilated properly with tropicamide eye drop. Phacoemulsification with 3.2 mm clear corneal incision at steeper axis with intraocular lenses implantation was carried out on all patients by single surgeon under topical anesthesia. Postoperative keratometry was done on the same keratometer and observer to avoid bias at the end of two months. **Results:** Preoperative astigmatism was present in range of 0.12 diopter cylinder to 3.71 diopter cylinder with mean 1.56 diopter cylinder. At the end of two months mean astigmatism of 0.98 diopter cylinder with range 0.2 diopter cylinder to 2.0 diopter cylinder was noted postoperatively with mean reduction of 0.58 diopter cylinder. **Conclusion:** Phacoemulsification with 3.2 mm clear corneal incision at steeper axis can correct astigmatism significantly with good emmetropic results.

Key words: Diopter Cylinder (D cyl), With-the-Rule (WTR), Against-the-Rule (ATR), Intraocular Lens (I.O.L).

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INTRODUCTION

According to WHO reports more than 15 million people with nearly annual increment of two million have been suffering from blindness due to cataract.[1] Various methods have been in practice for rehabilitation of vision with cataract extraction and I.O.L implantation. Phacoemulsification is the best method for cataract surgery and patient satisfaction with early visual rehabilitation.[2,3] However sometime it does not meet the demands of patients due to astigmatism induction. With new evolutionary techniques cataract surgery has been re-named as refractive surgery. So the target with phacoemulsification surgery is to achieve uncorrected visual acuity of 6/6 postsurgically. For this purpose all aspects like postoperative spherical ammetropia and astigmatism correction should be considered at the time of surgery.[4] Postoperative astigmatism is being the great obstacle to achieve good uncorrected visual acuity post surgically.[5] Many variables influence the cataract surgery outcome like corneal, scleral incision(location),width and depth of site. Phacoemulsification has overcome these variables effects.[6] Depth of incision has been reported to have no effect on visual rehabilitation while location and site of phacoemulsification incision have a significant role in final visual outcome.[7,8] In phacoemulsification incision location and site should be changed according to steeper meridian to neutralize preoperative astigmatism. Reported datas support that

superior incision induce more astigmatism than temporal incision.[9,10,11] To achieve good post surgical results it has been recommended that in phacoemulsification clear corneal incision should be given at steeper meridian to neutralize or reduce the pre-existing astigmatism.[12]

The objective of this study is to analyse the neutralization and reduction of pre-existing astigmatism during phacoemulsifiacation cataract surgery with clear corneal incision site at the steeper meridian.

MATERIALS AND METHODS

This analytical study was conducted on patients undergoing cataract surgery with phacoemulsification in K.D.A Teaching Hospital KMU-SIMS Kohat from January, 2016 to July, 2016. 50 patients with age related cataract were selected. Out of them 23 (46%) were male and 27 (54%) were female (Table-I). All the patients were in age range from 49 to 76 years with mean age of 63.2% years. Proper examination with slit lamp was done. Informed consent was obtained from each patient. Proper proforma was made for documentation. Biometry was done to calculate I.O.L power and preoperative keratometry was done with Topcon autoref-keratometer. Patients with traumatic eyes, previously operated eyes, vascularised and opacified cornea were excluded from the study. Pupils of patients were dilated properly with tropicamide eye drop. Phacoemulsification with 3.2 mm clear corneal incision at steeper axis with I.O.L implantation was carried out on all patients by a single surgeon under topical anesthesia. Topical antibiotic and steroid combinations were five times a day were advised for three weeks. Postoperative keratometry was done on the same keratometer and observer to avoid bias at the end of two months.

RESULTS

Preoperative W.T.R astigmatism was present in 19(38%) and A.T.R in 31(62%) patients (Table II). Preoperative astigmatism was present in range of 0.12 D Cyl to 3.71 D Cyl with mean 1.56 D Cyl (Table-III).

At the end of two months after surgery, W.T.R astigmatism was noted in 26(52%) and A.T.R in 24(48%) patients (Table-IV) and mean astigmatism of 0.98 D Cyl with range 0.2 to 2.0 D Cyl was recorded (Table-V). So overall mean reduction of 0.58 D Cyl was observed.

Gender	No of Patients	Percentage
Male	23	46 %
Female	27	54 %

Table-I. Gender distribution.

Astigmatism	No of Patients	Percentage
With-the-rule	19	38 %
Against-the-rule	31	62%

Table-II. Type of preoperative of astigmatism.

Astigmatism Range	No of Patients	Mean
0.12-0.9 D Cyl	14(28%)	1.56 D Cyl
1-1.9 D Cyl	23(46%)	
2-2.9 D Cyl	10(20%)	
3> 3 D Cyl	3(6%)	

Table-III. Amount of preoperative astigmatism.

Astigmatism	No of Patients	Percentage
With-the-rule	26	52%
Against-the-rule	24	48%

Table-IV. Type of postoperative of astigmatism at the end of two months.

Astigmatism Range	No of Patients	Mean
0.13-0.9 D Cyl	23 (46%)	0.98 D Cyl
1-1.9 D Cyl	25 (50%)	
2->2 D Cyl	2 (4%)	

Table-V. Amount of Postoperative astigmatism at the end of two months.

DISCUSSION

Astigmatism is the type of refractive error in which parallel rays of incoming light form focal line instead of point focus due to different refractive powers of different refractive meridians. This error was first suggested in 1727 by Sir Issac Newton. Prevalence and importance of this refractive error was explained to ophthalmological world by Donder in 1864.

Different measures are adopted to correct pre-existing astigmatism during refractive cataract surgery measured by keratometry and topography like toric I.O.L, arcuate keratotomy and limbal relaxing incision. But all these measures have

unpredictable results, problems and risk with additional ocular surgery.[13,14,15]

Multiple national and international studies have been carried out on phacoemulsfication incision site to correct pre-existing astigmatism. Changing the incision site is very simple and effective tool to correct pre-existing astigmatism placing incision at the steeper meridian of cornea.[16] With variation incision size and contour, surgeon can achieve desired amount of wound flattening to decrease astigmatism. A golden general rule is to use 3.2 mm phacoemulsification incision size to neutralize astigmatism. According to a study incision size of 2.4 mm does not reduce astigmatism more than 0.5 D Cyl.[17] Our study reveals while using 3.2 mm incision size reduction of mean post operative astigmatism at the end of two months of 0.98 D Cyl from preoperative mean astigmatism of 1.56 D Cyl with mean reduction of 0.58 D Cyl. Malik AM, Haider F, Rauf A have reported overall improvement in preoperative astigmatism is comparable to our study.[18] Khanzada MA, Lodhi AA, Siyal NA et al have reported a reduction of 0.81 D Cyl using incision at steeper meridian.[19] Khan A, Alam M, Afridi MR have reported improvement of postoperative astigmatism in 92.92% patients while in our study improvement of astigmatism was found in all patients. Moreover they have reported mean reduction of astigmatism of 0.54 D Cyl being comparable to our study.[20] Tejedor J, Murube J recommended superior incision for at least 1.5 D Cyl astigmatism at steep axis at 90 degree while temporal incision with astigmatism lesser than 1.5 D Cyl at steep axis at 90 degree.[21] With incision site the astigmatism has been significantly reduced as reported by Rho CR, Joo CK. They have documented a reduction of 0.28 D Cyl, 0.40 D Cyl and 0.46 D Cyl according to change of site at steeper meridian.[22] Amesbuny EC, Miller KM have documented that good postoperative less astigmatic status can be achieved if proper keratometry is done and steeper axis is properly addressed.[23] The postoperative results also depend upon surgeon skill. Surgeon must be able of changing incision to different meridians and comfortably operating at different positions around the patients head. When planning steeper meridian incision surgeon must consider topographic cylinder power, anatomical relationship between physical obstacles and incision site to the surgical approach like nose and brow etc.

Most prevalent and time proved procedure regarding the management of mild to moderate astigmatism during cataract refractive surgery are placement of incision or enlarging it and performing astigmatic keratotomy at steeper axis, making opposite clear corneal incision and implanting toric I.O.L.[24,25,26] According to a study using an on-axis incision is associated with favourable post surgical results for 0.5-1 D Cyl when patient has less preoperative astigmatism, a temporal incision is the best.[27]

CONCLUSION

Phacoemulsification with 3.2 mm clear corneal incision at steeper axis can correct astigmatism significantly with good emmetropic results. Proper selection of patients with accurate keratometry is mandatory.

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