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Original Research Paper

Astigmatic Profile Induced by Superior Vs. Temporal Clear Corneal Incision in Phacoemulsification

Medical Science

KEYWORDS : clear corneal incision, surgically induced astigmatism, keratometry

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ABSTRACT

Aim:*To analyze the postoperative astigmatism after phacoemulsification and intraocular lens implantation through a superior vs. temporal clear corneal incision.*

Methods: *This prospective observational study included 85 patients. A superior clear corneal incision was made in 42 eyes and a temporal incision in 43 eyes, for phacoemulsification using 3 mm incision. The keratometry reading taken in the preoperative assessment by a Bausch and Lomb keratometer was compared to the values on day 1, week 1 and 6 weeks postoperatively to assess the change in astigmatism(if any).*

Results: *Surgically induced astigmatism was <0.5 Diopters in 93.02% cases in the temporal group, whereas in the superior group it was 83.81%.*

Conclusion: *The temporal clear corneal incision group had statistically significant lower induced astigmatism. It gives a substantial improvement in surgical exposure, especially in those with deep set eyes or prominent eyebrows*

INTRODUCTION

As ophthalmic surgeons, we have come to realize that as we journey through this era of constantly evolving technology, any cataract surgery we perform, will be judged according to the refractive outcome. Modern day cataract surgery strives to provide rapid visual rehabilitation, the best possible uncorrected visual acuity, and minimal postoperative astigmatism.

Astigmatism means "without a point." Stephen Miller defined astigmatism as a condition in which a point of light cannot be made to produce a punctate image upon the retina by a correcting spherical lens.[1]

The incisions required for phacoemulsification give rise to scars, thus altering the corneal curvature, leading to corneal flattening along the meridian of the incision and steepening in the meridian 90 degrees away. [2].Therefore placing the incision on the steep meridian of the pre-existing astigmatism can reduce the postoperative astigmatism. Likewise, it is known that the further the incision from the visual axis, the lesser are its chances of affecting the corneal curvature. [3]Temporal clear corneal incisions are associated with minimal bleeding and are useful in cases of against the rule astigmatism, resulting in a more stable refraction. [4]

Materials and methods

This prospective observational study on 85 patients was conducted in the department of Ophthalmology at KMC Hospital, Attavar and Government Hospital, Wenlock over a period of two years from November 2013 to October 2015. 43 cases of temporal and 42 cases of superior clear corneal incision during phacoemulsification for patients undergoing cataract surgery were studied. The astigmatic profile in each of the two groups was compared, using keratometry values, as obtained preoperatively and on day 1, day 14 and one and a half month post-operatively. Clearance from the institutional ethical committee was obtained for the same.

All patients with senile cataract were included in the study and this study excluded those with corneal opacities, glaucoma, traumatic cataract, recurrent uveitis and pterygium.

A detailed clinical evaluation was carried out for each case including the history of presenting complaints and an enquiry into associated co-morbidities like glaucoma, diabetes mellitus and hypertension. Testing for visual acuity with best correction was done with the aid of a Snellen's chart. Ocular examination was conducted using Haag-Streit 900 slit lamp. A dilated fundus examination using slit lamp biomicroscopy with a +78D/ +90D lens and indirect ophthalmoscopy was carried out. Keratometry values in the horizontal and vertical meridian were obtained using a Bausch and Lomb keratometer. The axial length was obtained using a Biomedix A-Scan machine. The Sanders- Retzlaff-Kraff (SRK-II) formula was used to calculate the intaocular lens power.

Prior to the surgery, an informed consent was obtained. All the surgeries were performed under local anaesthesia using a peribulbar block. After thorough cleansing of the lids and the conjunctiva with 5% povidone iodine solution and saline, a superior rectus bridle suture was passed. A clear corneal incision was made, either superiorly or temporally, as per the previously assigned group. Anterior capsulotomy was performed with a bent 26 gauge needle. Hydrodissection andphacoemulsification of the nucleus was done. Cortical matter was aspirated. Posterior chamber foldable intraocular lens implantation was done. Anterior chamber was reformed using balanced salt solution. The section was opposed by hydration of the stroma. No patient required sutures. Patients were discharged on the second postoperative day.

On the immediate postoperative day, keratometry readings were obtained, in the horizontal and vertical meridians. Vision was checked, along with anterior segment evaluation to look for decentration of the intraocular lens. A combination of antibiotics and steroids was started second hourly. These drops were tapered down till one and a half months post surgery. Tropicamide drops were given thrice a day for the first two weeks.

Periodic examinations were conducted on day 1, day 14 and 6 weeks postoperatively. On each visit, keratometry readings and slit lamp examination was done. For simplification of analysis, oblique astigmatism was not studied. Astigmatic changes were studied only in the vertical and horizontal axis (90 and 180 degrees). In case oblique readings were obtained, they were regarded as being with or against the rule, depending on their values (within 30 degrees) proximity with the corresponding vertical or horizontal axis. Analysis of astigmatism was obtained by sub-

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traction method.

The course of postoperative astigmatic changes were determined by keratometry readings obtained using a Bausch and Lomb keratometer. Analysis was done using Students unpaired t – test on SPSS ver. 17.0 software. (P value < 0.05 was considered statistically significant

RESULTS:

The total number of cases studied was 85.

A Superior Clear Corneal Incision was put in 42(49.41%) cases and a Temporal Clear Corneal Incision in 43(50.59%) cases. Total number of males who underwent surgery was 48(56.47%), and the number of females was 37(43.53%).In the Superior Clear Corneal Incision group, there were 23 males (54.76%) and 19 females (45.24%). In the Temporal Clear Corneal incision group, there were 25 males (58.14%) and 18 females (41.86%). Majority of the patients were in the age group of 60-70 years (45.88%). The age range was 42-72 years. The mean age of patients undergoing phacoemulsification surgery in the superior clear corneal incision group was 59.89 years and that in the temporal group was 58.91 years.

Discussion:

A comparative clinical analysis revealed that out of the 85 cases studied, with 42 cases in the superior group and 43 in the temporal, majority of patients were in the age bracket of 60-69 years. The number of males undergoing surgery was higher in both these groups, the Male: Female ratio being 1.21:1 and 1.38:1 in the superior and temporal groups respectively.

At the end of 6 weeks postoperatively, we found that the astigmatism induced by the superior incision was 0.54+_0.24D and that induced by the temporal incision was 0.36+- 0.24D. The difference in the magnitude of the induced astigmatism between the two incisions was statistically significant. This is in accordance to the previous studies by Marek R, Sujithra H, A.Jacob, Simsek et al, Roman SJ et al, Gokhale Nikhil S, Joel C Axt, Cilino S et alwhich established the supremacy of temporal clear corneal incisions over superior ones. 56789postoperative astigmatism, and uncorrected visual acuity (UCVA101112

A.Jacob conducted a study on 50 eyes and stated that around 76% of the eyes had SIA of below 0.5D with 40% showing nil astigmatic changes and 36% showing only a 0.25D change with a temporal clear corneal incision.7

The present study shows that the mean astigmatism in the superior clear corneal incision group preoperatively was 0.2381D which increased at the first follow up to 0.5298D and further increased in the second follow up to 0.8155D. This implies that there has been an increase in the gross astigmatism in the first and second follow up period. This however decreased in the final follow up to 0.7381D. However, the gross astigmatism in the temporal clear corneal astigmatism group showed a constant decline from the preoperative value of 0.3023D to the first follow up where it was 0.1105D and subsequently reduced to 0.0116D at the last follow up period at 6 weeks. It was observed that the change in astigmatism on subsequent follow ups in the temporal group was negligible and hence implied early stabilization. This study is similar to that conducted by Gokhale et al, where they concluded that a temporal incision led to early stabilization of astigmatism and early visual rehabilitation.10

The surgically induced astigmatism was less than 0.50 D in 93.02% and 83.81% in the temporal and superior groups respectively. Surgically induced astigmatism in the range of 0.50-1.0 D was found in 6.98% and 16.67% in the temporal and superior groups. In the superior group, there was a trend in the rise of the horizontal keratometry values on subsequent follow ups, implying an induced against the rule astigmatism. In the temporal group, the keratometry readings in the vertical meridian showed an increase, suggestive of an induced with the rule astigmatism.

Thus, in our study, with a temporal clear corneal incision, the preoperative against the rule astigmatism was reduced significantly and by placing a superior clear corneal incision, preoperative with the rule astigmatism was reduced. 13

This is in accordance to the fact that by placing the incision on the steepest meridian, there occurs a decrease in the refractive power in that meridian and an increased refractive power in the meridian perpendicular to it.

A superior incision is easier to learn and chances of infection are less. A temporal incision offers the advantage of being made easily in deep sockets and small eyes.

The study however, had a small follow up period and the sample size was too small to convincingly state that the results were statistically significant.

A longer study with a larger sample size can be done to confirm the findings.

CONCLUSION:

Decay of astigmatism from second to third follow-up in both superior and temporal clear corneal incision was negligible, implying early wound stabilization and therefore enabling early spectacle correction by third week.

Surgically induced astigmatism of <0.50D was 93.02% in the temporal group and 83.81% in the superior group. The temporal clear corneal incision group had statistically significant lower induced astigmatism. It gives a substantial improvement in surgical exposure, especially in those with deep set eyes or prominent eyebrows.

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