DOI: 10.14260/jemds/2014/2759

ORIGINAL ARTICLE

A STUDY OF COMPARISON ASTIGMATISM FOLLOWING MANUAL SMALL INCISION CATARACT SURGERY: SUPERIOR VERSUS TEMPORAL APPROACH

Hemlata Yadav[1], Vaishali Rai[2]

HOW TO CITE THIS ARTICLE:
Hemlata Yadav, Vaishali Rai. "A Study of Comparison Astigmatism Following Manual Small Incision Cataract Surgery: Superior versus Temporal Approach". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 23, June 09; Page: 6430-6434, DOI: 10.14260/jemds/2014/2759

ABSTRACT: INTRODUCTION: Cataract surgery has become one of the most common and successful procedures in ophthalmology. In addition to improving visual acuity (VA), one of the goals of modern cataract surgery is to reduce pre-existing astigmatism (PEA), a factor that may reduce VA and affect the quality of vision. **MATERIAL AND METHODS**: It was a prospective, interventional study conducted at a tertiary care center. The study population consisted of 216 cataract patients admitted in hospital and underwent manual small incision cataract surgery by experts. Patients were examined on post-operative Day 1, 1week, 1.5 months (45 days) and 3 months (90 days). Uncorrected and best corrected visual acuity was recorded. Slit-lamp examination, auto refractometer and keratometry examination were done. **RESULTS:** The mean SIA in group 1 was found to be 1.37 ± 0.65and in group 2 was 0.67± 0.40. T-test was applied to compare the two groups. It was found to be highly significant (P value <0.001). SIA induced by superior incision was 45.28 % more than temporal incision. **CONCLUSION:** SICS with the temporal approach provides a better stabilization of the refraction with a significantly less SIA than superior approach.

KEYWORDS: Astigmatism, Small incision cataract surgery, Temporal section, SIA.

INTRODUCTION: Cataract surgery has become one of the most common and successful procedures in ophthalmology. In addition to improving visual acuity (VA), one of the goals of modern cataract surgery is to reduce pre-existing astigmatism (PEA), a factor that may reduce VA and affect the quality of vision.[1] The main aim of the cataract surgery is to provide a good vision quantitatively as well as qualitatively and an early visual rehabilitation. Astigmatism means "without a point". Miller Stephen J defined astigmatism as a condition of refraction in which a point of light cannot be made to produce a punctate image upon the retina by a correcting spherical lens.[2]

Surgically induced astigmatism (SIA) calculates the magnitude and axis of postoperative induced astigmatism by various methods introduced by Alpins and Goggin,[3] Holladay et al.,[4] and many others. Postoperative astigmatism is affected by various factors such as preoperative astigmatism, location, type, size, closure, and healing of the surgical incision, amount of scleral cauterization performed, type of suturing material used and its placement, position of IOL, postoperative use of steroids. All these have effects on corneal curvature.[5]

With this background we keep the aim of our study to compare between the surgically induced astigmatism (SIA) in manual SICS by superior incision and temporal incision.

MATERIAL AND METHODS:

Study Design: A prospective, interventional hospital based study.

Setting of the Study: The study was conducted at a tertiary care hospital from February 2012 to February 2013.

DOI: 10.14260/jemds/2014/2759

Study Population: The study population consisted of 216 cataract patients admitted in hospital and underwent manual small incision cataract surgery by experts and fulfilled the inclusion.

Inclusion Criteria: Patients aged 45-80 years, controlled for hypertension, diabetes, without cardiovascular disease and who were diagnosed as having visually impairing significant senile cataract.

Exclusion Criteria:

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

PROCEDURE: Eyes having a steeper vertical keratometry reading were assigned to superior SICS group whereas the eyes with a steeper horizontal keratometry reading were assigned to temporal SICS group on the assumption that some flattening of the meridian occurs on which incision is given. Eyes with no astigmatism were randomly assigned to either of the two groups. Each group had 108 eyes. Eyes in Group 1 underwent manual SICS with a superior tunnel and eyes in Group 2 underwent manual SICS with a temporal tunnel.

All patients were properly examined with visual acuity recording by Snellen's E chart. Slit-lamp bio-microscopy, non-contact tonometry and fundus examination with 90 D or 78 D was done for all patients. Astigmatism was measured by auto refractometer and keratometer. IOL power was calculated with contact A-scan biometry using SRK II formula.

Patients were operated under peribulbar anesthesia with 4 cc of 3:1 mixture of injection Xylocaine 2% and Injection Abocaine (bupivacaine 0.5 %), through button hole dissection at lateral one third of lower conjunctiva. A 6.5 mm scleral tunnel 1.5-2.0 mm posterior to limbus was made. A three-plane incision was created with a 15 degree blade and crescent blade.

The vertical incision was given in frown shape at sclera, posterior to limbus and a crescent blade was used to dissect 1 to 2 mm into clear cornea to form a tunnel. Side port was made and anterior chamber was filled with Viscoelastic solution (Hydroxy Propyl Methyl Cellulose2 %), and capsulorrhexis performed with cystitome made from 26 gauge needle. Entry into the anterior chamber was made with a sharp 3.2mm keratome to create a self-sealing corneal valve.

In the presence of a Viscoelastic solution, a rigid posterior chamber 5.5 mm to 6.5 mms PMMA intraocular lens (as per the size of corneal wound) was implanted in the posterior chamber. Sub-conjunctival injection Gentamicin 20 mg mixed with Dexamethasone 4mg was injected in the lower fornix. The eye was bandaged for 24 hours.

Post-operative oral antibiotic and analgesic were given. Patients were examined on post-operative day 1, 1week, 1.5 months (45 days) and 3 months (90 days). Uncorrected and best corrected visual acuity was recorded. Slit-lamp examination, autorefractometer and keratometry examination were done. All calculations were performed using surgically induced astigmatism (SIA) Calculator version 1.0, a

DOI: 10.14260/jemds/2014/2759

RESULTS: The mean age of the participants was 58 ± 5.38 years in group A and 60.83±7.23 years in group B. There was no significant difference in the incidence of age between group A and group B. Both groups were comparable. There was no significant difference between the groups with respect to the laterality of the eye.

Total of 162 eyes were operated. 81 eyes were in group1 (Superior incision). However in group 2, only 62 eyes out of 81 completed the follow up of 90 days. Distribution of patients according to age is mentioned in the table no.1.

Age (years)	No. of patients	% (n=115)
40-50	41	35.6
51-60	38	33.0
61-70	27	23.4
71-80	09	07.8

Table no.1: Distribution of patients according to age

Out of 81 eyes in group 1, 45 were right eye and 36 were left eye. In group 2, there were 32 right eyes and 30 left eye. Distribution according to the eye operated and mean surgically induced astigmatism (SIA) in each type is described in the table no. 2.

Incision location	Surgically induced astigmatism (SIA)	Number of eyes
Superior	1.37 ± 0.65	81
Temporal	0.67± 0.40	62

Table no. 2: Distribution according to the eye operated and mean surgically induced astigmatism (SIA)

Surgically induced astigmatism in superior tunnel group was statistically not significant between right and left eyes. Same was the scenario with temporal incision group.

The mean SIA in group 1 was found to be 1.37 ± 0.65and in group 2 was 0.67± 0.40. T-test was applied to compare the two groups. It was found to be highly significant (P value < 0.001). SIA induced by superior incision was 45.28 % more than temporal incision.

DISCUSSION: In the present study, the astigmatism induced by a superior (onaxis) incision versus temporal incision in manual SICS in eyes with preoperative "with the rule" corneal astigmatism was compared. It was measured using vector analysis method, which is a simple, powerful, and accurate method. However, it is tedious requiring patience.

The SIA was found to be significantly lower in the temporal group compared to that in the superior group. This is in agreement with previous studies.[6-8]

Manual SICS is an alternative for phacoemulsification but the astigmatism is higher due to the larger size of incision. Burgansky et al have shown an increase in astigmatism with an increase in incision size.[9] In their study by vector analysis, the mean induced astigmatism was 0.6 + 0.3 D for 6 mm incision, 0.75 + 0.67 D for a 6.5 mm incision and 1.36 + 0.77 D for a 7 mm incision. Kimura et al have shown by vector analysis that surgically induced astigmatism is less with an oblique incision (1.02 + 0.66 D) than with a superior incision (1.41+0.72 D).[10]

Pre-existing astigmatism can be neutralized by changing site of incision. With the rule astigmatism induced by a temporal incision is advantageous because most elderly cataract patients have preoperative against the rule astigmatism. In study by Gokhale et al (2005), SIA vector in superior group was 1.28D, 0.2D in superotemporal and 0.37D in temporal group. Our study also showed similar results with superior group having SIA vector of1.45D and temporal group with SIA vector of 0.75D.[11]

CONCLUSION: SICS with temporal approach provides better stabilization of refraction with significantly less SIA than superior approach. The pre and postoperative complications are similar in both approaches. The supero- temporal incision has the advantages of both the locations, so it is better than the temporal incision.

REFERENCES:

1. Beltrame G, Salvetat M, Chizzolini M, Driussi G (2001) Corneal topographic changes induced by different oblique cataract incisions. J Cataract Refract Surg 27: 720-727.
2. Miller SJ, Parson's Diseases of Eye. Edinburgh: Butterworth Hienmann International Edition. 18th edition 1990; 63-69.
3. Alpins NA, Goggin M. Practical astigmatism analysis for refractive outcomes in cataract and refractive surgery. Surv Ophthamol 2004; 49: 109-22.
4. Holladay JT, Moran JR, Keririan GM. Analysis of aggregate surgically induced refractive change, prediction error and intraocular astigmatism. J Cataract Refract Surg 2001; 27: 61-78.
5. Spierer A, Bar-Sela SM. Change in Astigmatism after cataract surgery and intraocular lens implantation. Arch ophthalmol 2004; 122: 695-7.
6. Joo CK, Han HK, Kim JH. Computer-assisted videokeratography to measure changes in astigmatism induced by suture less cataract surgery. J Cataract Refract Surg. 1997; 23: 555-561.
7. Mendívil A Comparative study of astigmatism through superior and lateral small incisions. Eur J Ophthalmol 1996; 6: 389-392.
8. Lindstrom R . Cataract surgery and lens implantation. Curr Opin Ophthalmol 1994; 5: 1-4.
9. Burgansky Z, Isakov I, Avizemer H, Bartov E (2002). Minimal astigmatism after sutureless planned extracapsular cataract extraction. J Cataract Refract Surg; 28:499-503.
10. Kimura H, Kuroda S, Mizoguchi N, Terauchi H, Matsumura M, Nagata M. Extra-capsular cataract extraction with a sutureless incision for dense cataracts. J Cataract Refract Surg; 1999; 25: 1275-9.
11. Gokhale NS, Sawhney S. Reduction in the astigmatism in manual small incision cataract surgery through change of incision site. Indian J Ophthalmol 2005; 53 (3): 201-03.

DOI: 10.14260/jemds/2014/2759

ORIGINAL ARTICLE

AUTHORS:

1. Hemlata Yadav
2. Vaishali Rai

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Ophthalmology, Bhopal Memorial Hospital & Research Center, Bhopal.
2. Senior Resident, Department of Ophthalmology, Bhopal Memorial Hospital & Research Center, Bhopal.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Hemlata Yadav
C/o Roshan Chanchlani,
#1/6-Idgah Kothi, Doctors Enclave,
Near Filter Plant, Idgah Hills,
Bhopal-462001, M. P.
Email: roshanchanchlani@gmail.com

Date of Submission: 27/05/2014.
Date of Peer Review: 28/05/2014.
Date of Acceptance: 31/05/2014.
Date of Publishing: 07/06/2014.