

COMPARISON OF POST-OPERATIVE ASTIGMATISM FOLLOWING PHACOEMULSIFICATION WITH SUTURED VERSUS UN-SUTURED WOUND CLOSURE

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ABSTRACT

Objectives: To compare corneal astigmatism induced by sutured and sutureless wound closure of the main incision, after phacoemulsification, in patients attending the Eye department, Military Hospital, Rawalpindi.

Design: Quasi experimental study

Place and duration of study: Armed Forces Institute of Ophthalmology, Rawalpindi, from 20th May, 2006 to 19th May, 2007.

Patients and Methods: Sixty patients were included in this study divided in two equal groups. Phacoemulsification with foldable IOL was done in all patients by the same surgeon with same surgical technique. Main incision was closed with a single suture in group A and left sutureless with stromal hydration in group B. Keratometry was performed preoperatively, at day one and 4 weeks post operatively.

Results: Postoperative astigmatism in sutured and sutureless groups at the end of first week was (1.00 D +/- 0.38) and (0.88 D +/- 0.35) respectively. At one month postoperatively astigmatism was (0.76 +/- 0.43) and (0.66 +/- 0.32) respectively in the two groups. There was statistically no significant difference between the postoperative astigmatism at one month between the two groups ($p > 0.05$).

Conclusion: There is statistically no significant difference between post-operative astigmatism after phacoemulsification between a 3.2 mm self-sealing incision whether closed without suture or secured by a single suture.

Keywords: Phacoemulsification, postoperative astigmatism.

INTRODUCTION

Dr. Williams in 1867 was the first surgeon to use sutures to close the wound in cataract surgery¹. Improvements in surgical techniques have led us to phacoemulsification with foldable intraocular lenses (IOL) in which wound can be closed sutureless with stromal hydration. The advantages of phacoemulsification include chamber stability during surgery and early visual rehabilitation. It has become the preferred surgical technique in modern day cataract surgery². One of the major causes of suboptimal uncorrected visual acuity postoperatively is induced corneal astigmatism. It is mainly influenced by preoperative astigmatism as well as by the shape and length of anterior chamber opening, suture technique and wound healing³.

Surgically induced astigmatism is very small after a corneal incision in phacoemulsification without a suture. If the incision is placed on the steepest meridian, the corneal astigmatism can be significantly reduced postoperatively⁴.

In the incision length measuring 3.3mm to 3.5mm, there was no statistically significant difference in surgically induced astigmatism between superotemporal incisions in the right eyes and superonasal incisions in the left eyes 1 year after surgery for a surgeon who sits at the 12 o'clock⁵.

Correction of astigmatism is possible with optical correction, suture manipulation or refractive surgery⁶. Removal of sutures at 12 weeks postoperatively results in comparatively stable refractive status of the eye and thus frequent change of glasses can be avoided⁷.

Charles Kelman in 1967 introduced the extracapsular small incision technique of phacoemulsification⁸. In comparison to sutured

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Received: 24 Jan 2011; Accepted: 04 Feb 2011

manual extra capsular cataract extraction and posterior chamber intraocular lens, sutureless surgery provides faster visual recovery.⁹

To ensure less postoperative astigmatism after phacoemulsification, the size of the incision should be modified as little as possible during the insertion of the intraocular lens.¹⁰ The benefits of sutureless surgery on corneal topography and visual recovery are not degraded by using a suture to prevent wound leakage¹¹.

The purported significance of this study is to find out effect of applying suture to the corneal incision after phacoemulsification. Surgeons should not risk patients by not applying sutures if there is no significant difference between corneal astigmatism of sutured and sutureless incision. This study will help us in refining the operative techniques of phacoemulsification which is nowadays widely practiced and therefore further reduce the incidence of refractive error as a cause of poor visual outcome after cataract surgery.

PATIENT AND METHODS

This Quasi experimental study was carried out from May 2006 to May 2007 in Armed Forces Institute of Ophthalmology Rawalpindi. Approval from hospital ethics committee was obtained. The study included 60 patients divided into two equal groups by non probability convenience sampling. Phacoemulsification with foldable IOL was done by one surgeon using the same technique in all the patients. The only difference was that suture was applied to main corneal incision in group A and sutureless closure with hydro apposition was done in group B. Patients over the age of 45 years with age related cataract were included. Complete ophthalmic examination and systemic examination was carried out. Keratometry was done and patients with preoperative corneal astigmatism were excluded. Patients who developed complications during surgery that can affect corneal curvature like corneal burns, tight or loose sutures and IOL displacement were excluded. Patients were followed up on one week and four weeks post operatively and

keratometry readings recorded. Patients in group A paid an extra visit for removal of stitch at 3 weeks postoperatively.

Data Analysis

Data was analyzed using SPSS version 16. Descriptive statistics were used to measure mean±SD for age. Frequencies and percentages were calculated for gender. Descriptive statistics were used to measure mean± SD for corneal astigmatism preoperatively, 1 week postoperatively and 4 week postoperatively. Independent samples t-test was used to compare the pre and postoperative astigmatism between two groups. Paired sample t-test was used to compare post operative corneal astigmatism at 4 weeks for both groups at a confidence limit of 95%. A p-value of <0.05 was considered significant.

RESULTS

There was no drop out from patients; they were included in study after detailed work up, laboratory investigations and written informed consent was taken.

The mean age ± SD of patients in group A was 64.40 ± 8.881 years while for group B it was 63.00 ± 9.979 years (p -value=0.574).

Among patients in group A, 18 (60%) were male and 12 (40%) were female while in patients in group B, 19 (63.3%) were male and 11 (36.7%) were female. (p -value = 0.711).

The mean ± SD for corneal cylinder for group A were calculated pre operatively (0.216±0.067), 1 week (0.886±0.352) and 4 week postoperatively (0.662±0.324).

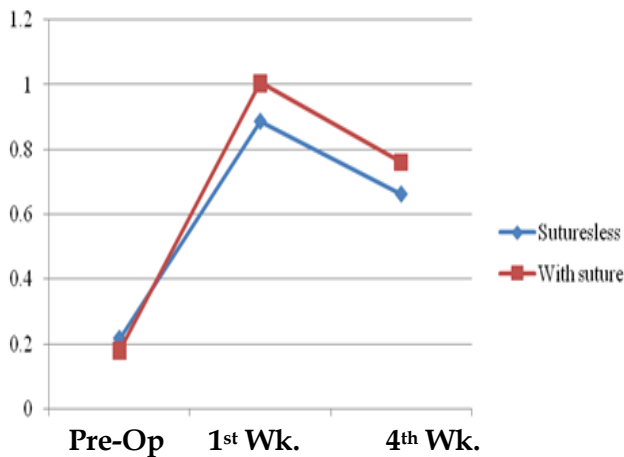
The mean ± SD for corneal cylinder for group B were calculated pre operatively (0.180±0.090) (p -value 0.081), 1 week (1.00±0.381) (p -value 0.213) and 4 week (0.762±0.439) (p -value 0.319) postoperatively.

Paired sample 't' test was used to compare post operative corneal astigmatism at 4th weeks for both groups at a confidence limit of 95%. P-value was statistically insignificant between two groups. It was more than 0.05.

Table: Demographic and clinical characteristics of the patients

		Group A (Sutured) n=30, Mean ± SD	Group B (Sutureless) n= 30, Mean ± SD	P- Value
Age (years)		64.40 ± 8.881	63.00 ± 9.979	0.574
Gender	Male	18 (60%)	12 (40%)	0.711
	Female	19 (63.3%)	11 (36.7%)	
Preop Cyl (Diopters)		0.216±0.067	0.180±0.090	0.081
01 st Wk Post Op. Cyl (Diopters)		0.886±0.352	1.00±0.381	0.213
04 th Wks Post Op. Cyl (Diopters)		0.662±0.324	0.762±0.439	0.319

Graph : Comparison of astigmatism.



DISCUSSION

The hypothesis was that there was no significant difference of astigmatism between sutured and suture less phacoemulsification surgery. The results were in favor of this hypothesis.

Various studies have revealed that age was one of the most important factor responsible for development of cataract. Research and studies carried out in different countries like England, America and Australia revealed that 50% of patients over the age of 60 years had some amount of cataract while those over the age of 80 years had 100% cataract. The numbers of males in our study were 37 (61.7%) and females were 23 (38.3%). Other studies revealed that females were at a slightly higher risk in getting cataract. This was different as compared to our study.¹²

In Spain a study was conducted by Mendivil in which frequency of induced astigmatism following phacoemulsification with a 3.2-mm scleral tunnel incision with

suturing versus without suturing technique was done. One hundred ten eyes of 110 patients were studied. Identical surgical methods were used in every case except for wound closure technique. Data on uncorrected visual acuity and induced astigmatism were analyzed for 6 months after the surgery. Both groups displayed similar uncorrected visual acuity. This study has shown that the differences in surgically induced astigmatism of sutured wounds and unsutured wounds after cataract surgery were not statistically significant when a 3.2-mm self-sealing incision was used. Similarly in our study, astigmatism after sutured and unsutured wound closure was insignificant. The only difference was that in our study the site of the wound was clear corneal instead of sclera tunnel.¹³

He et al conducted a prospective randomized control trial to compare the mean keratometric corneal astigmatism among preop and one-month and three-month postop phacoemulsification with no statistically significant differences corneal incision or a superior scleral tunnel incision. One hundred twenty patients (134 eyes) were randomly assigned to two groups.

Regarding wound site and size different studies have been conducted. One study by Bilińska et al in 2004 showed little difference in surgically induced astigmatism by 3.2 mm each in clear corneal temporal and superotemporal clear corneal incision. But with scleral tunnel incision enlarged to 6 mm and closed with continuous cross-like suture at 12 o'clock showed statistically significant surgically induced astigmatism after 1 day, 1 week and 1 and 3 months.¹⁵

In 2007 Altan-Yaycioglu et al compared the induced astigmatism after phacoemulsification in the right versus the left eye¹⁵. An oblique clear corneal incision in suture less phacoemulsification in a superotemporal location in the right and a superonasal location in the left eye showed surgically induced astigmatism occurred to a greater extent in the left eyes compared with the right, possibly because of structural differences. In our study incision of 3.5 mm was superotemporal in each eye.

In 2006 Giansanti et al found that a 2.75 mm clear corneal incision caused a small change of corneal cylinder regardless of incision site.¹⁶ Our study was revealed that wound closure technique did not play an important role in postoperative astigmatism if the wound size is small and closed with either a single suture or by stromal hydration.

CONCLUSION

The art of making valve like, auto-sealing and water proof incision is of paramount importance in phacoemulsification surgery. Self-sealing capacity of incision should be critically analyzed after completion of phacoemulsification. Unnecessary risk should not be taken whenever in doubt. Wound can be closed with 10-0 nylon suture which can be removed in early postoperative period without causing any significant astigmatism which is comparable to sutureless wound closure.

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