

# Comparison of Astigmatic Changes after Delivery of IOL with Injector in Ac and in Capsular Bag

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## ABSTRACT

**Aim:** To compare surgically induced astigmatism with injector delivery in AC and in Capsular Bag of intraocular lens after phacoemulsification.

**Methods:** It is Quasi experimental study. It was done at Central Park Teaching Hospital, Lahore. 70 consecutive patients were randomly divided in two groups. Both groups were implanted with foldable IOLs with injector. In AC group the lens was delivered in Anterior chamber and in Bag lens was delivered directly in capsular bag by passing the full nozzle through wound in anterior chamber. Pre and postoperative keratometric readings of the patients were taken by Goldman keratometer. Surgically induced astigmatism was calculated by vector method.

**Results:** Mean preoperative astigmatism in AC group was  $0.1618(\pm 0.1834)$  and in Bag group was  $0.1929 \pm 0.2107$ . Post-op first week Ast in AC group was  $0.1929 \pm 0.2193$  and in Bag group was  $0.2500 \pm 0.2268$ . At fourth week Astigmatism in AC group was  $0.1857 \pm 0.2375$  and in Bag group, was  $0.2286 \pm 0.1952$ . At thirteenth week, Astigmatism in AC group was  $0.1714 \pm 0.1795$  and in Bag group was  $0.2429 \pm 0.1766$ .

**Conclusion:** Statistically insignificant difference was found between two groups. However, values were more in Bag than the AC group. Maneuver of delivering the IOL in AC should be considered during Toric and multifocal IOLs implantation.

**Keywords:** IOL, phacoemulsification, intraocular lens

## INTRODUCTION

Cataract is most common cause of treatable blindness all over the world. Cataract extraction is a commonest procedure done in the world<sup>1</sup>. Phacoemulsification is a modern cataract surgery, which serves the purpose of early visual rehabilitation by removing cataract through small incision and induces lowest astigmatism<sup>3,4</sup>. Foldable IOL is an innovation by which we could achieve the dream of early visual rehabilitation<sup>5</sup>.

Foldable IOLs are delivered with injector tip either at wound lip, in the Anterior chamber (AC) or inserted through wound in AC, delivering in capsular bag. In the bag implantation may need holding of eyeball with forceps and full length injector nozzle through wound may stretch the wound and induce astigmatism<sup>6</sup>. Surgically induced Astigmatism (SIA) is based on wound length, width and location<sup>7</sup>.

Present study evaluates the SIA between delivery of IOL from injector tip in the wound lip and in the Anterior chamber.

## MATERIALS AND METHOD

Quasi experimental study conducted at CPTH Lahore from December 2017 to April 2018 on 70 phacoemulsification procedures randomly distributed in two groups. Group one; delivery by injector in the wound lip, group two delivery of IOL by injector in the Bag. All visually significant senile cataract were induced. Any corneal opacity, previous surgeries, trauma and retinal pathologies were excluded from study.

All patients were evaluated for visual acuity, detail SLE examination, 90 D funduscopy and biometry.

Keratometry was done by Goldman keratometer and axial length measured with Ascan quantal. All patients were operated under topical anesthesia with 0.3cc subconjunctival xylocain at 12 o'clock and at 6 o'clock. All patients were monitored by Anesthetist.

Standard steps were observed with main incision of 2.75mm at temporal limbus (post) in right eye and at 12 o'clock in left eye, such that it cut the conjunctiva too incision length kept >1.50mm. CCC circular curvilinear capsulorhexis was done, an enough stab incision was given 90 degree away (approx 70 axis) in right and at 180 axis in left, to pass second instrument, with 11 no blade. After hydrodissection and hydrodelineation horizontal and vertical chop techniques were used to emulsify nucleus. Simcoe's cannula was used to aspirate remaining cortical matter. In Group 1, the opening of injector was placed at the wound lip, foldable lens (Nano fold) pushed in the AC and dialed in the bag with dialer.

In group 2 the injector nozzle pushed through the wound in the AC and foldable lens delivered directly in the Bag. Viscoelastic was aspirated with Simcoe's cannula, wound was hydrated. No suture was applied.

On 1st post op all patients were examined and discharged with combination drops of antibiotic and steroid. They were called for follow up on 1st week, fourth week, then thirteen week. Keratometry readings were taken with top con OM-4 keratometer. Slit lamp examination was done.

Data was entered and analyzed by SPSS-23. Categorical variables like sex and complications were given as frequency and percentage. Numerical variables like age, degree of astigmatism pre and postoperative were given by mean and standard deviation. Keratometric readings were compared by applying student's 't' test with significance P value equal to or less than 0.05.

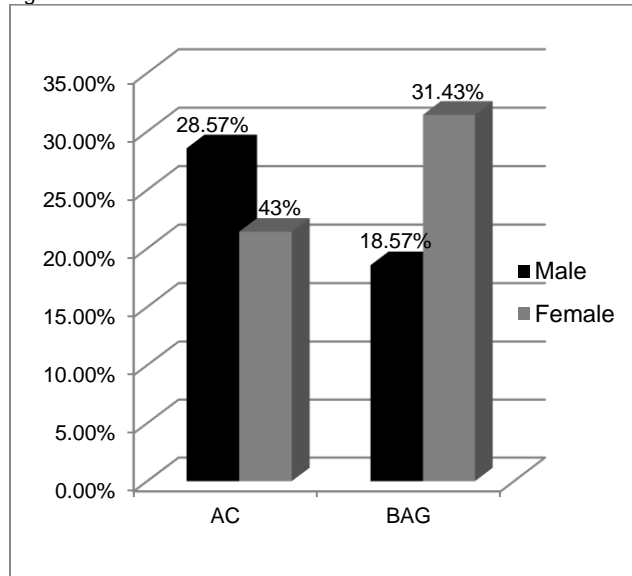
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## RESULTS

There were approximately 29% male patients and 21% female patients, 19% male patients and 31% female patients allocated to AC group and BAG group respectively (Fig.1).

Fig.1



There were 35 patients in each group who operated. Mean age of AC group was 58.46 and mean age of BAG group was 57.37. The patients of AC group were bigger by age comparatively to BAG group but the more age variation was seen in BAG group comparatively to AC group (Table 1).

There were 33 male patients and 37 female patients in both group as whole. Mean age of male group was 58.61 and mean age of Female group was 57.30. Male patients were bigger by age comparatively to female patients but the more age variation was seen in male patients comparatively to female patients (Table 2).

The characteristics existed in the column "parameter" were taken as dependent variable along the independent variable "sex". Insignificant P-value (0.05) between the male and female demonstrated that the level of "pre op AST" was almost equally effect both sexes but mean of "Pre Op AST" in male group was 0.13 and mean of "Pre Op AST" in female group was 0.22 which bigger than male group. P-values at first week, fourth week and thirteen week were seen insignificant which indicated the stability of Ast over the thirteen weeks. The mean value of male group at first week was 0.25 but this mean value reduced at fourth week and remain same at thirteen week. The mean value of female group was 0.20 at first week and this mean value increased at fourth week and remain constant at thirteen week (Table 3).

In the above table, the characteristics existed in the column "parameter" were taken as dependent variable along the independent variable "group". Insignificant P-value (0.60) between the AC group and BAG group demonstrated that the patients at level of "pre Op AST" was allocated randomly to both intervention group but the mean of "Pre Op AST" in AC group was 0.16 and mean of "Pre

Op AST" in BAG group was 0.19 which bigger than male group. P-values at first week, fourth week and thirteen week were seen insignificant which indicated that both maneuvers doesn't change the dimensions of wound. The mean value of AC group at first week was 0.19 and the mean value at fourth week was 0.18 and the mean value of AC group at thirteen week was 0.14. This trend showed the reduction in mean value of AC group when time passes more the mean value reduces more. The mean value of BAG group at first week was 0.25 and the mean value at fourth week was 0.23 and the mean value of BAG group at thirteen week was 0.24. These values are higher than AC group but remain stable (Table 4).

Table 1:

	Sex	N	Mean	Std. Deviation
Age	AC	35	58.46	10.918
	BAG	35	57.37	12.737

Table 2:

	Sex	N	Mean	Std. Deviation
Age	Male	33	58.61	13.472
	Female	37	57.30	10.209

Table 3

Para-meters	Group	N	Mean	Std. Deviation	P-Value (Mann-Whitney U test)
Preop AST	Male	33	.1288	.17811	0.050
	Female	36	.2222	.20509	
First Week	Male	33	.2500	.24206	0.336
	Female	37	.1959	.20527	
Fourth Week	Male	33	.1894	.19794	0.636
	Female	37	.2230	.23410	
Thirteen Week	Male	33	.1894	.18782	0.400
	Female	37	.2230	.17464	

Table 4:

Para-meters	Group	N	Mean	Std. Deviation	P-Value (Mann-Whitney U test)
	AC	34	.1618	.18343	0.601
	BAG	35	.1929	.21079	
First Week	AC	35	.1929	.21934	0.238
	BAG	35	.2500	.22687	
Fourth Week	AC	35	.1857	.23750	0.225
	BAG	35	.2286	.19527	
Thirteen Week	AC	35	.1714	.17958	0.089
	BAG	35	.2429	.17663	

## DISCUSSION

Corneal incision at temporal approach give significant less Astigmatism then superior approach<sup>1,3</sup>. In WTA the steeper meridian is 90deg, incision at, brings decreasing astigmatism. Astigmatism depends upon incision length width and location. Less than 3.00mm may consider clinically neutral. Wound stability is high with larger length incision but higher astigmatism reported post op<sup>1</sup>.

In our study, the method of lens delivery may impact the outcome even it is clinically insignificant but it's higher value in the capsular Bag should consider.

Both methods are safe but in AC group i found two cases of IOL delivery in the wound and injector recoiled out. This lead to retrieval of lens by increasing wound length and delivery by forceps. Both cases were excluded from study.

By Jaime Tejedor study trial<sup>4</sup>; 2.8mm clear corneal incision induce higher value on superior meridian then temporal. This value should be consider with precise knowledge of steep axis, while planning Toric IOL correction<sup>4</sup>. In this study the results are clinically insignificant but the higher value (0.25D) in the BAG delivery maneuver, of IOL, should consider.

De Vries NE and et al in this article most common dissatisfaction after multiple iol implantation is post op residual astigmatism. Little astigmatism may affect the optical outcome. In present study, Consider the method of delivery may induce insignificant change but vision in diffractive Multifocal may be affected by such small change.

## CONCLUSION

Astigmatic changes are insignificant with both way of IOL delivery but higher values in Bag group, may consider for Toric and Multifocal IOL implantation.

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