

## A Study on the Impact of Post-Cataract Surgery Induced Astigmatism on the Near Point of Accommodation

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**DOI:** 10.31080/ASOP.2023.06.0624

**Received:** February 08, 2023

**Published:** February 16, 2023

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### Abstract

**Background:** A cataract is an affliction where the eye's lens becomes obscured, impairing vision. The only treatment available to date for restoring vision is cataract surgery.

**Aim:** The study's objective is to determine the impact of post-cataract surgery produced astigmatism with a monofocal intraocular lens implanted on the near point of accommodation.

**Methodology:** From April to May 2022, 66 patients who underwent cataract surgery at Sankara Eye Hospital in Ludhiana, Punjab, and had monofocal IOL implants underwent an experimental study. To measure near point of accommodation, a LogMAR near vision chart calibrated for 40 cm is utilised along with a static retinoscopy to assess the degree of induced astigmatism.

**Results:** After cataract surgery with a monofocal IOL implanted, it was discovered that induced astigmatism had no statistically significant impact on the near point of accommodation ( $P > 0.05$ ). The study's findings suggest that astigmatism that is left uncorrected following cataract surgery plays no significant effect in enhancing near vision and must be entirely corrected in the prescription for improved near vision.

**Keywords:** Age Related Cataract; Post-Cataract Surgery; Pseudophakia Induced Astigmatism; Near Point of Accommodation

### Introduction

The ailment known as a cataract occurs when the eye's lens becomes clouded, impairing vision. The only therapy available for regaining vision as of now is cataract surgery [1]. The Latin word pseudophakia, which means false lens, is used here. The procedure involves implanting an intraocular lens (IOL) to replace a natural lens in the eye. The lens is the transparent portion of the eye that focuses light and images, allowing a person to see [2]. The process

by which the human eye adjusts its focus to perceive objects at various distances from the eye is known as accommodation [3]. The closest point at which the eyes can concentrate is known as the near point of accommodation. The push-up test, which involves gradually pushing a target closer to the patient's eyes until the patient reports the first prolonged blur, is used to determine the near point of accommodation [4]. The unaided near acuity of pseudophakia implanted with monofocal IOLs have

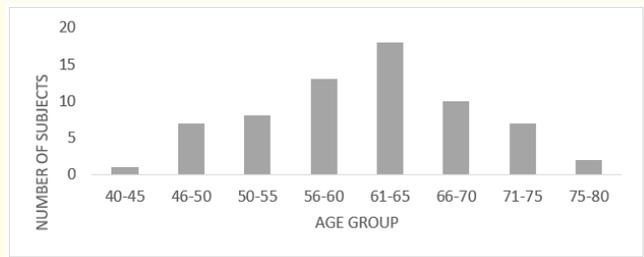
been suggested to be improved by leaving induced astigmatism uncorrected after cataract surgery [5-8]. This approach is less expensive since distance vision may be corrected with commonly accessible spherical refraction lenses, and near vision can be improved with uncorrected astigmatism. The effects of generated astigmatism with a monofocal IOL implanted on the near point of accommodation, if left uncorrected following cataract surgery, have not been assessed in any of the earlier investigations. Therefore, the approach of leaving uncorrected astigmatism for adequate near vision following cataract surgery is ambiguous.

**Material and Methodology**

The experimental study design is carried out between August 2021 and May 2022 at the Sankara Eye Hospital in Ludhiana, Punjab. The study adhered to the tenets of the Declaration of Helsinki, and it commenced after the subjects provided written informed consent duly approved by the local institutional review board. To confirm that inflammation has entirely subsided one month following cataract surgery, we measured the degree of astigmatism using a Heine beta-200 retinoscope [9]. To measure near the point of accommodation using a target that is one size larger than their present near visual acuity, a logMAR near visual acuity chart (40 cm) is employed. Because the study is experimental, convenience sampling was used. All people between the ages of 40 and 80, of both sexes, and pseudophakia patients who had had monofocal IOL implantation and caused astigmatism were included in the study. Anyone younger than 40 years old and with ocular pathology was disqualified [10]. Before including any individuals in the study for evaluation, informed consent was obtained from them. All observations were recorded on a data collecting sheet. After a month had passed since the cataract surgery, static retinoscopy was used to determine the refractive error. When moving the target closer to the patient monocularly, a logMAR near vision chart (40 cm) [11] and ruler are used to measure close to the point of accommodation by noting the distance at which the patient reports first sustained blur. For data analysis, the data is kept in an excel sheet. Microsoft Excel 2019 was used for the descriptive and statistical analysis of the sample. We employed linear regression analysis since the study’s independent variables, the magnitude of generated cylindrical power in diopter spherical (DS) and the independent variable close to the point of accommodation in centimetres, are both continuous variables.

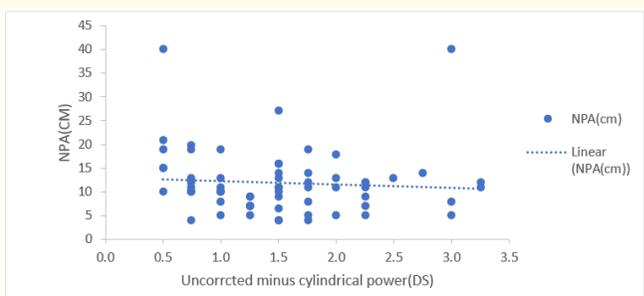
**Result**

The mean age of participants in the study is 61 years with a mean standard deviation of 1 year (Figure 1). A total of 66 patients were selected for the study of which 27 patients were male and 38 patients were female. Of the total patients selected, 39 patients had their right eye (OD) operated and 27 patients had their left eye (OS) operated on.



**Figure 1:** Histogram plotted for different age groups from the sample.

A graph plotted with the minus cylindrical axis on the x-axis and near the point of accommodation in centimetres on the y-axis shows a flat line showing the insignificant impact of induced astigmatism near the point of accommodation (Figure 2).



**Figure 2:** Graph plotted between NPA and Magnitude of Astigmatism.

The resultant p-value was 0.55 when used linear regression statistical test. Since there is no significant relationship between uncorrected astigmatism and near the point of accommodation vision after cataract surgery, we have rejected our alternate hypothesis that there is a significant relationship between induced astigmatism post-cataract surgery and near the point of accommodation.

## Discussion

The outcomes are different from those of research that claims that pseudophakia with uncorrected astigmatism has better near vision [6,9-11]. Earlier research measured near acuity with habitual uncorrected astigmatism, but the current study determined near the point of accommodation with induced astigmatism post-cataract surgery with monofocal IOL implantation, may be the cause of the discrepancy in results [14,15]. According to Maurice H. Luntz., et al. study, "Astigmatism in Cataract Surgery", every eye that underwent cataract surgery experienced some degree of astigmatism. They discovered that neither the suturing method within the parameters of those used in the research nor the material choice has an impact on astigmatism caused by cataract surgery. All study participants experienced some degree of astigmatism following cataract surgery [12]. The most common astigmatism is ATR astigmatism. In a study by Fernando Trindade MD., et al. titled "Benefit of against-the-rule astigmatism to uncorrected near acuity", they evaluated two groups of ten eyes, one with WTR and the other with ATR simple, myopic astigmatism, following uneventful cataract and IOL implantation surgery. They concluded that low, simple, ATR myopic astigmatism is superior to WTR astigmatism in pseudophakia because it offers improved uncorrected near visual acuity. According to a recent study, uncorrected astigmatism does not improve near visual acuity following cataract surgery.

## Conclusion

The current work has addressed the impact of generated astigmatism on the near point of accommodation following the implantation of a monofocal IOL during cataract surgery. The present study concludes that induced astigmatism has no appreciable effects following cataract surgery with a monofocal IOL implanted at a close point of accommodation. Present study findings thus imply that for the greatest near vision feasible, one should completely correct astigmatism in pseudophakia patients with a monofocal IOL.

## Conflict of Interest and Financial Disclosure

The authors have no conflicts of interest to declare. All co-authors have seen and agree with the contents of the manuscript and there is no financial interest to report. We certify that the submission is original work and is not under review at any other publication.

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