

Surgically induced Astigmatism in SICS and Phacoemulsification

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1. Introduction

The advent of modern cataract surgery, in which foldable IOL's can be implanted by injectors through small, sutureless incisions, has led to quick visual recovery owing to a reduced risk of SIA and the possibility of correcting pre-existing astigmatism. After surgery, most patients expect to see clearly without any visual aids and surgeons should be able to achieve this goal⁴⁴.

Detection of SIA was the main aim of our study.

Following phacoemulsification, spherical correction is always more successful than the correction of astigmatism, and this has prompted the development of surgical techniques for this purpose.

Current accessible options for reducing astigmatism at the time of surgery include:

- 1) Performing smaller incisions at the temporal meridian
- 2) Clear cornea cataract incision along the steep meridian
- 3) AK
- 4) LRIs or PCRI's
- 5) Full-arc, depth-dependant astigmatic keratotomy (FPAK)
- 6) Toric IOL implantation and OCCIs

Patient counseling is vital to patient satisfaction. The preoperative discussion should include, astigmatism management, toric IOL, multifocal IOL, and the degree of spectacle independence that will realistically result from each.

Videos or computer-based illustrations are helpful and provide a standardized way of explaining the ever-widening menu of options. Although some surgeons may use laser refractive surgery to correct astigmatism after cataract surgery, most patients prefer to have one procedure instead of two. We hold laser refractive surgery in reserve as a means of adjusting the 1% of patients with over or under-corrections following cataract surgery.

The type of IOL to be implanted should be considered when targeting the postoperative astigmatic result.

- 1) For patients who will receive monofocal lenses, residual manifest astigmatism of less than one diopter (D) usually provides excellent uncorrected visual acuity, if the spherical refractive error is close to zero.
- 2) For patients who will receive multifocal IOLs, the goal is less than 0.75 D of residual astigmatism. It is critical to avoid over corrections and large rotations in the axis of residual astigmatism, as they will be poorly tolerated.

Approximately 80 percent of patients have 1.5 D or less pre-existing astigmatism which can be reduced by an incision at the steep axis or with OCCIs.

Risk of developing astigmatism may be more if any of the following are present:

- Keratoconus / Lenticonus
- Corneal Thinning or Scarring
- High Myopia
- High Hypermetropia
- History of eye surgery, such as pterygium .

The location and width of incisions will determine the amount of SIA in cataract patients. Temporal, superotemporal, and Superonasal (between 9 and 12 o'clock, BENT) incisions are less likely to induce postoperative astigmatism than the 12 o'clock incisions.

Similarly, 2.75 mm incisions provoke less SIA than 3.2 mm incisions. The new microincisional cataract surgery techniques requiring incisions as small as 1.5 to 1.7 mm minimize postoperative astigmatism and mean SIA values are around 0.25 D. For watertight wound stability and best refractive results, the incision should not exceed a ratio of 3:2. Thus, the appropriate size in length would be 1.7 for a 2.75 mm width, and 2 mm for a width of 3.2 mm.

The behaviors of the cornea after cataract surgery are predictable and includes changes in the horizontal and vertical meridian as a function of time. In the average eye, these effects stabilize about one month after surgery. Differences in the amount of SIA in the 12 o'clock incisions are attributed to the force of blinking, but it has also been suggested that the biology of the superior and temporal cornea differs.

As the size of incision decreases, the amount of induced astigmatism is also decreasing. MICS with incisions less than 2.2 mm and often less than 1.4 mm significantly lessens the amount of surgically induced astigmatism when compared with non- microincision coaxial phacoemulsification.

Patients with significant pre-existing astigmatism (greater than 0.5 D) will benefit from AK at the time of cataract surgery. Since most elderly patients have ATR astigmatism, temporal incisions work very well for most, but not all, of these cataract patients.

Temporal incisions are also best if the patient has a spherical cornea. The temporal limbus overlies the lateral rectus muscle insertion and is located farther away from the optical

center of the eye than the superior limbus. It will also create less induced corneal astigmatism.

2. Conclusion

200 patients who underwent cataract surgery were operated by a superior incision and their final visual sequel was detected at the end of 6wks. The motive of our study is to:

- Observe the amount of SIA induced by SICS and PHACO.
- Evaluating the final SIA at the end of 6wks and thereby predicting visual outcome of eye.

Our data correlates with data of previous studies. The patients keratometric readings were obtained and data was categorized into age, sex, pre and post- op difference of keratometric readings were taken and analyzed.

Table showing the postoperative astigmatism in phaco and SICS

Post-operative Duration	phaco	SICS
1- Day	0.68	1.28
1 week	0.61	1.03
6 weeks	0.68	1.01

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