

THE END OF AN ERA

Smaller incisions in modern cataract surgery reduce the impact of surgically induced astigmatism.

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Patients' expectations of refractive cataract surgery are higher than ever. Those who pay for premium lenses demand less than 0.50 D of astigmatism, and those who choose a toric lens or arcuate incision are likely to expect even less residual cylinder.

Most toric nomograms require a number to be entered for surgically induced astigmatism (SIA), but determining one's personal SIA can be time consuming. Often, trainees and young surgeons will enter an arbitrary number such 0.25 D. In addition, several sources recommend making the incision on the steep axis to alleviate cylinder. The good news is, now that cataract surgery incisions are smaller, cases are shorter, and nomograms are improved, SIA may not affect visual outcomes as much as it used to.

FACTORS IN SIA

SIA has always been an important factor in astigmatism management, because the incision causes flattening. The amount of SIA is related to the type, length, and location of the incision as well as the wound closure technique (Figure). Several studies have shown that SIA decreases as the wound's size decreases (Table).¹⁻⁶ One study showed a reduction in SIA from a 3-mm to a 2.6-mm incision and further reduction when the incision measured 2.2 mm at 90 days.¹

In addition, it matters when SIA is measured, because the wound stabilizes over the weeks following surgery. Diakonis et al showed that, at 1 month, the SIA was 0.09 D for a temporal 2.5-mm manual incision and for laser incisions of the same size.⁵ Our study showed similar SIA results at 1 year with a 2.4-mm temporal incision.⁶

EXCEPTIONS

Outliers always exist, and some corneas may react differently to the creation of a wound. The incision's location can

also make a difference. Wounds that involve the nasal or the superior nasal quadrant can cause higher SIA and more variability than temporal wounds.⁷

Eyes with keratoconus and post-graft eyes often overcorrect when a surgeon creates an astigmatic keratometry incision, so they may also develop unusual astigmatism from cataract incisions.⁸ Furthermore, factors outside of the actual incision's creation, such as manipulation of the wound during surgery, may increase the severity of SIA.

SUMMARY

Most SIA is minimal when the surgeon uses a temporal 2.2- to 2.4-mm cataract incision. Creating the wound in the steep axis will seldom assist in clinically significant flattening, so surgeons should operate where they feel the most comfortable. SIA is minor when compared to other causes



ATA GLANCE

- Now that cataract incisions are smaller, cases are shorter, and nomograms are improved, surgically induced astigmatism (SIA) may not affect outcomes as much as it used to.
- Several studies have shown that SIA decreases as the incision's size decreases and that it can be further minimized by placing wounds temporally.
- To improve outcomes, surgeons should focus less on SIA and more on preoperative testing, the posterior cornea, IOL tilt, and effective lens position.



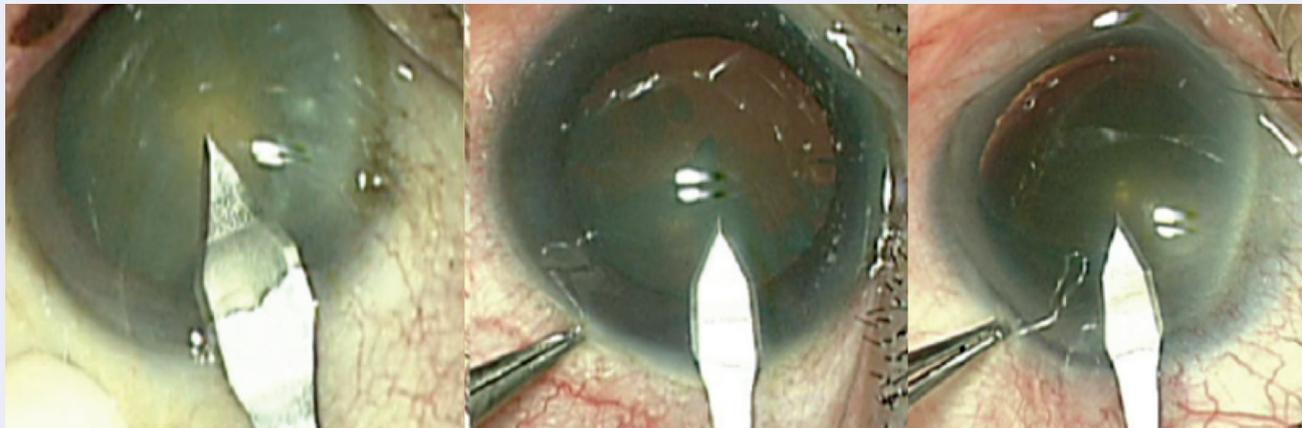


Figure. Comparison of 2.65-, 2.4-, and 2.2-mm cataract incisions.

TABLE. STUDIES COMPARING WOUND SIZE TO SURGICALLY INDUCED ASTIGMATISM

Study	Incision; N	Location	Postoperative Time	Mean SIA ±SD
Wang et al ¹	2.2 mm; N = 43 2.6 mm; N = 42 3.0 mm; N = 44	Temporal/nasal	90 days	0.40 ±0.20 D 0.50 ±0.30 D 0.60 ±0.40 D
Can et al ²	1.2-1.4 mm; N = 45 2.2 mm; N = 45 2.8 mm; N = 45	Not described	90 days	0.13 D 0.24 D 0.46 D
Kim et al ³	1.8 mm; N = 60 2.2 mm; N = 60 2.75 mm; N = 60	Temporal	2 months	0.21 ±0.06 D 0.29 ±0.07 D 0.44 ±0.07 D
Wei et al ⁴	2.5 mm; N = 18	Temporal	12 weeks	0.58 ±0.22 D
Diakonis et al ⁵	Femtosecond laser 2.5 mm; N = 36 manual 2.5 mm; N = 36	Temporal	1 month	0.09 D 0.09 D
Montes de Oca et al ⁶	2.4 mm; N = 42	Temporal	12 months	0.08 D

Abbreviations: SIA, surgically induced astigmatism; SD, standard deviation.

of unanticipated residual astigmatism such as ocular surface issues, variable preoperative testing, posterior corneal astigmatism, IOL tilt, and effective lens position. Rather than specifically study SIA, newer surgeons should focus on these other factors in astigmatism management to improve outcomes. ■

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