

12-Month Stability of Femtosecond Laser-Created Arcuate Incisions for the Correction of Astigmatism

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DISCLOSURES

Alcon-A,B

Allergan- B

Atia -A,B

Bausch + Lomb- A,B,C

Bruder Healthcare-A,B

Cassini- A,B,C

Dompé -A, C

ESWIN-A,B

Guardion Health Services-A,B

LENSAR -A,B

Ocuphire B

Rayner-A,B

Sight Sciences -B

Sun Pharmaceuticals-A,B

Tarsus -A

Viatrix-A,B,C

Visiox-A,D

Zeiss-A, B

A=Consultant B=Speakers Bureau C=Research Funding D=Investor

INTRODUCTION

- Two-thirds of eyes presenting for cataract surgery are estimated to have corneal astigmatism between 0.50 D and 1.50 D.¹
- Correcting pre-existing astigmatism at the time of cataract surgery is vital to achieving optimal uncorrected visual outcomes.²
- Traditionally, AKs were created manually; however, these are associated with risk of corneal perforation and induction of irregular astigmatism.³
 - Femtosecond laser-assisted AKs, create incisions of precise position, size, length, and depth,⁴ and yield excellent outcomes.
 - However, regression of effect over time affects the long-term efficacy of Femtosecond laser-assisted AKs.

PURPOSE

- To assess the long-term stability of arcuate incisions created with a beveled cut using a dual-modality femtosecond laser for the correction of astigmatism.

METHODS

Study design

Single site, single surgeon prospective study.

Inclusion criteria

Patients have had an operable cataract and elect to undergo lens extraction with ALLY (LENSAR, Orlando, FL).

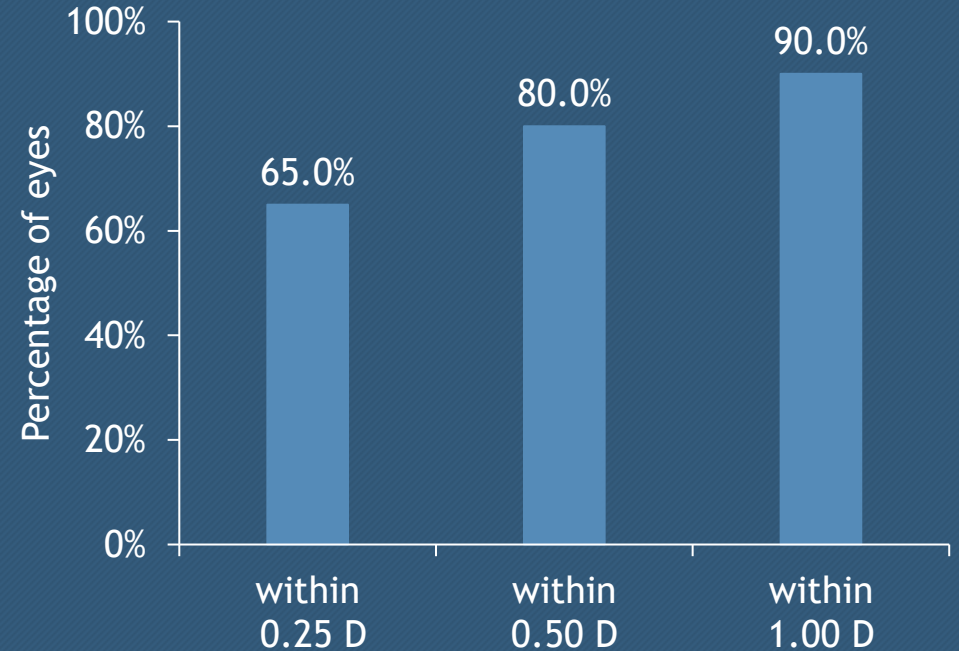
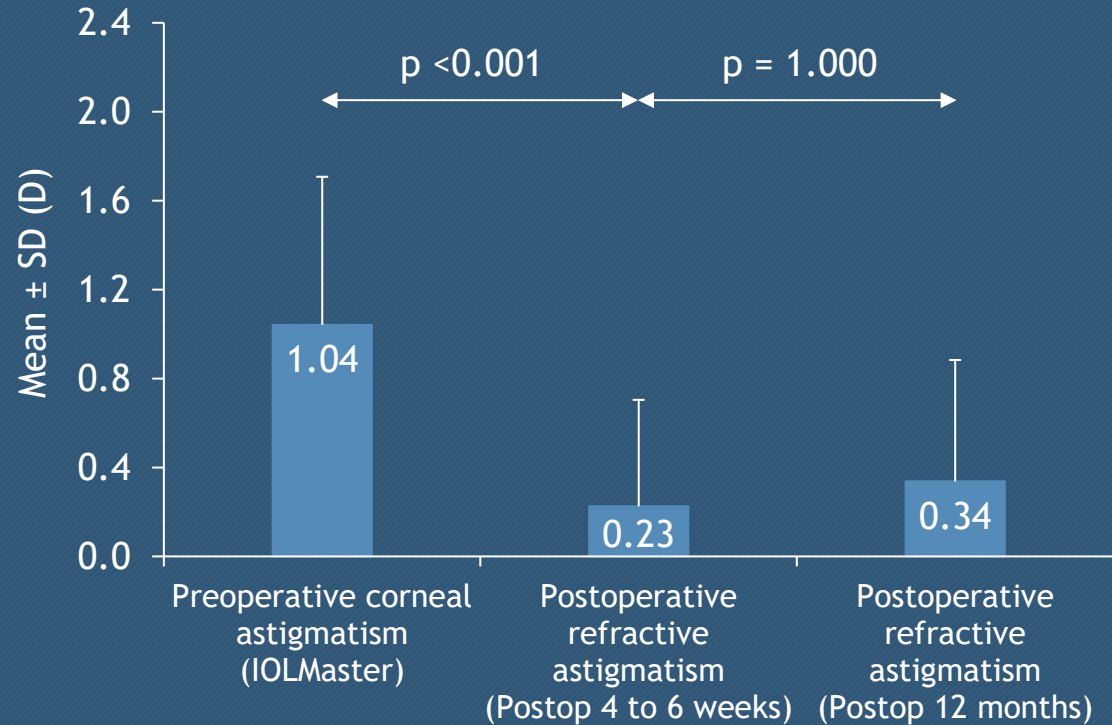
Exclusion criteria

Patients with any other ocular pathology that would be contraindicated under standard of care for cataract surgery.

Outcome measures

Change in keratometric astigmatism and UCVA postoperative 12 months.

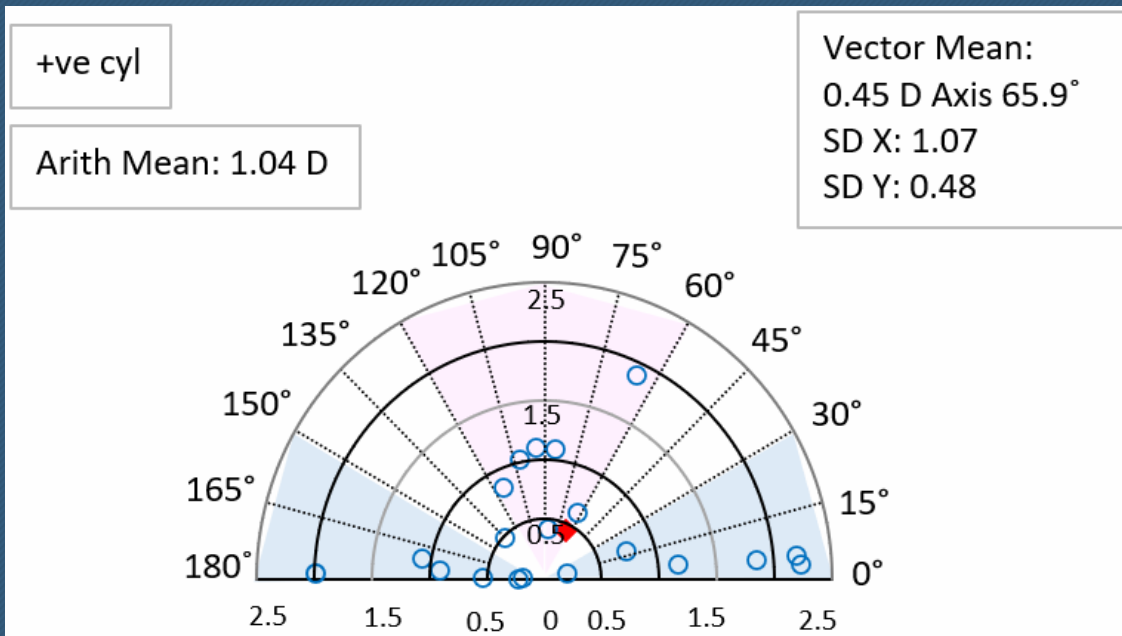
RESULTS: Astigmatism



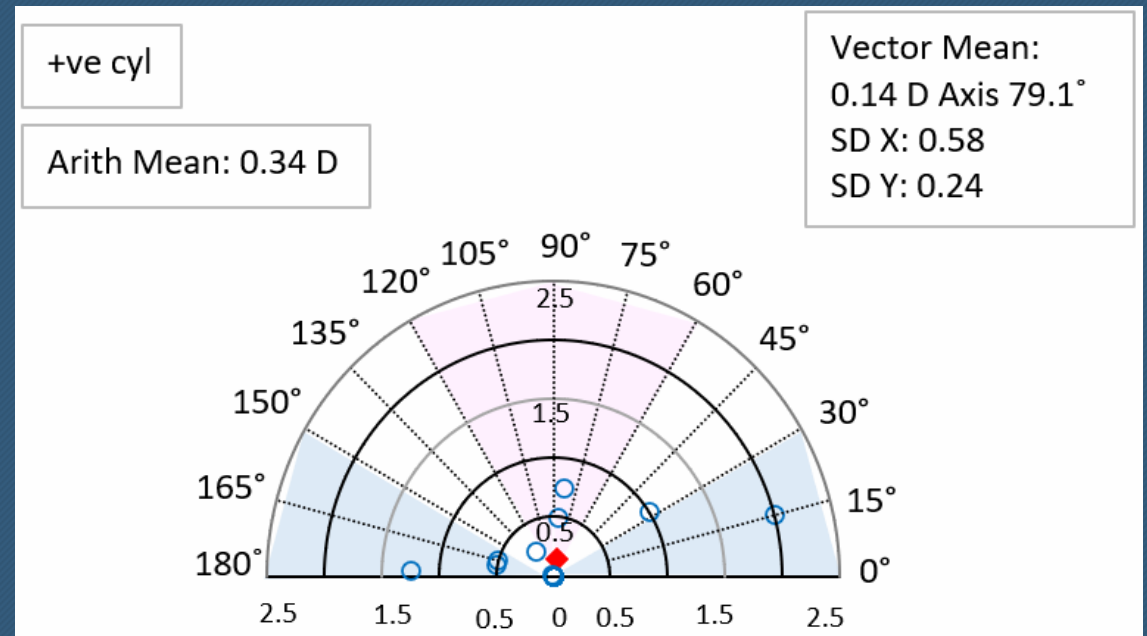
- There was a statistically significant reduction in the mean astigmatism from preop to postop 4 to 6 weeks ($p < 0.001$), which remained stable through postop 12 months ($p = 1.000$).
- At 12 months, postoperative astigmatism within 0.5 D and 1.0 D was achieved in 80% and 90% of eyes, respectively.

RESULTS: Single Angle Polar Plots

Preoperative

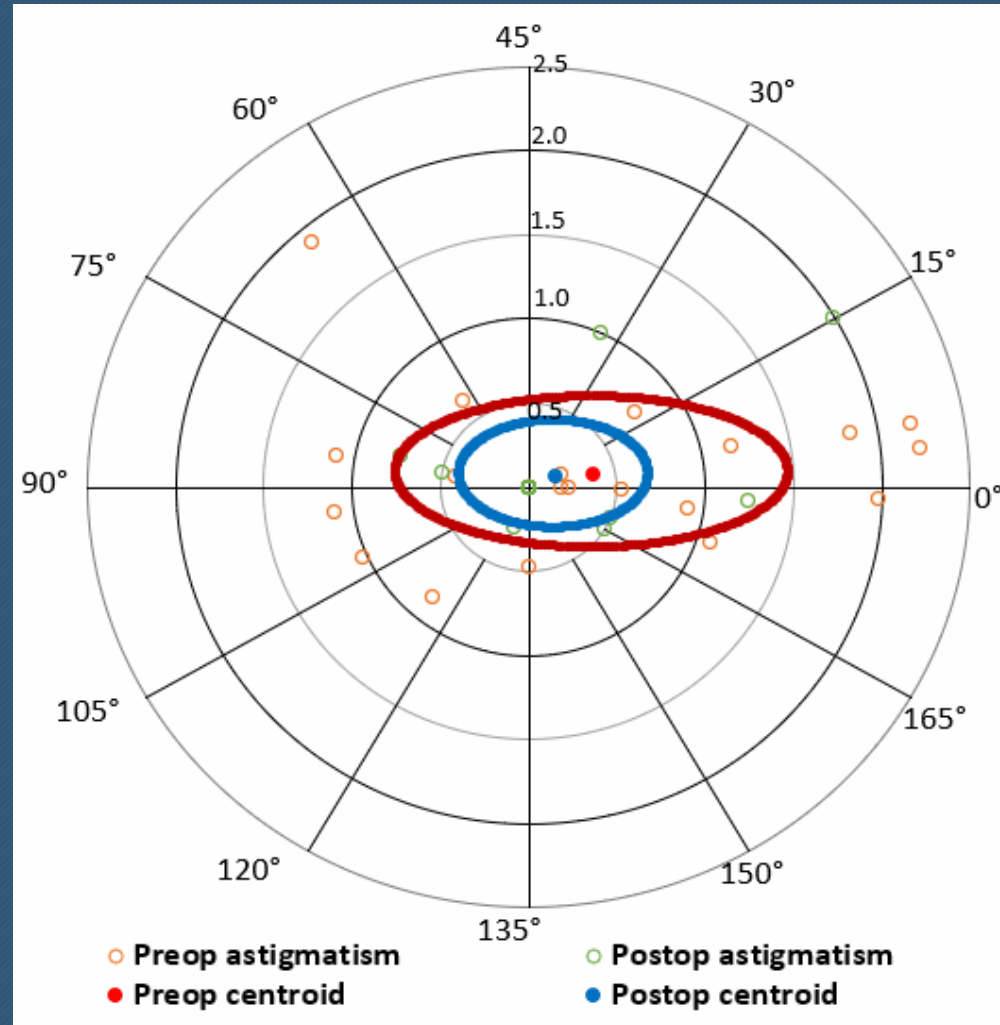


Postoperative



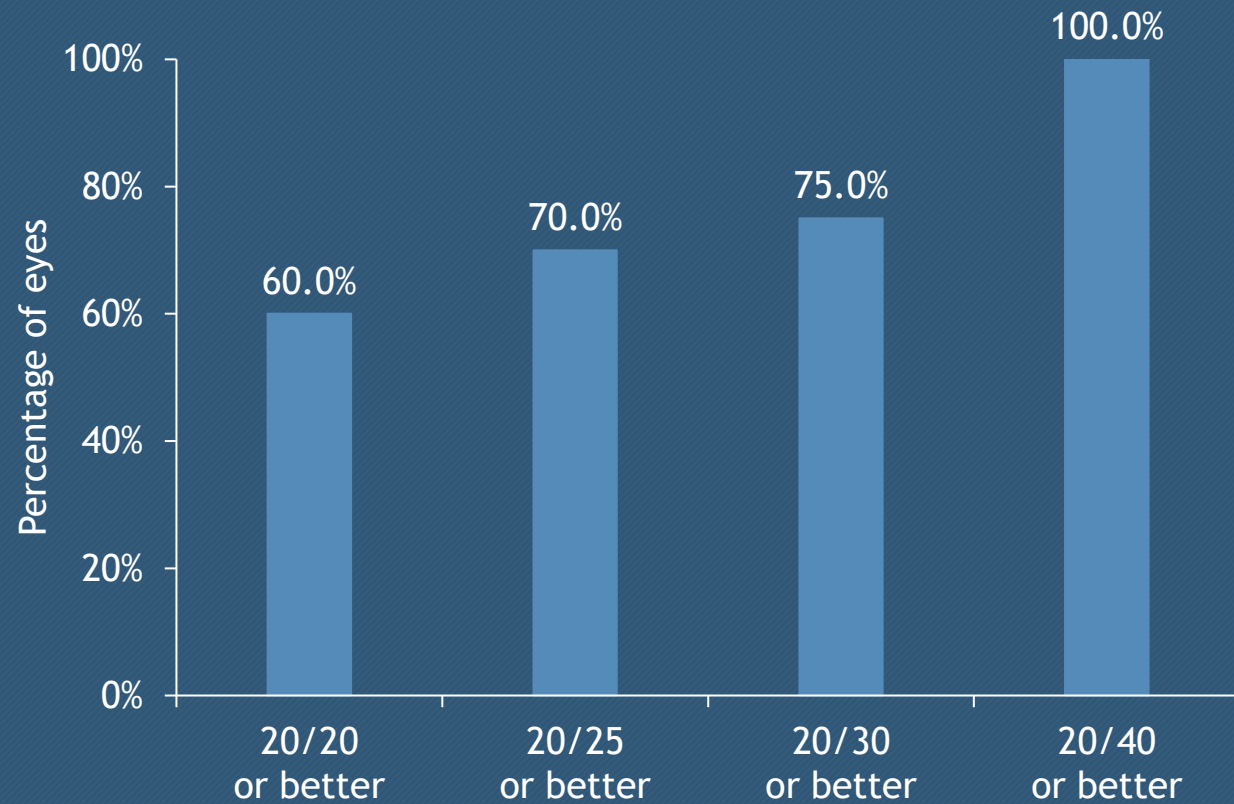
- Vectoral mean of astigmatism decreased from 0.45 D preoperatively to 0.14 D postoperatively.

RESULTS: Double Angle Vector Plot



- The centroid of postop astigmatism was closer to 0.0 D and had a smaller vectoral standard deviation (represented by ellipse).

RESULTS: UDVA



- At 12 months, postoperative UDVA was 0.09 ± 0.14 logMAR (Snellen equivalent 20/24.6), with 75% of eyes achieving UDVA of 20/30 or better, postoperatively.

DISCUSSION

- Femtosecond laser AKs have been reported to produce good outcomes; however, previous studies have demonstrated regression of astigmatic treatment effect in the early postoperative period.^{5,6}
 - This is probably because the epithelial plug that deeply fills the gap is partially replaced by a loosely arranged fibrotic scar, inducing wound contraction over time and reducing the surgical effect of the relaxing incision.⁷
- In contrast, beveled AKs created with the ALLY femtosecond laser allow the anterior cornea to slide forward in relation to the posterior cornea and the realigned stroma heals without wound gaping or formation of an epithelial plug.⁸

5. Chan et al., *Am J Ophthalmol* 2016; 6. Kumar et al., *Ophthalmology* 2010;

7. Javadi et al., *J Ophthalmol Vis Res* 2017; 8. Cleary et al., *Cornea* 2013.

DISCUSSION

- In the absence of an epithelial plug, femtosecond laser AKs oriented perpendicular to the coronal plane would likely be associated with a reduced risk of astigmatism regression.⁹
- The present study's stable astigmatic effect observed at 12 months post-operatively indicates the absence of regression.
- To conclude, femtosecond laser-assisted AK during cataract surgery with ALLY was effective at reducing pre-existing astigmatism, yielding good visual and astigmatic outcomes that were stable over 12 months.

9. Freilinger M. Astigmatism Correction using LENSAR Femtosecond Laser-Assisted 'Shifted' Paired Arcuate Incisions during Cataract Surgery. Presented at the XXXIV ESCRS Congress. Copenhagen, Denmark, September 2016.

THANK YOU