Arcuate Incisions Created With A Novel, Dual Pulse Femtosecond Laser System for astigmatism management

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Disclosures

Introduction

- Arcuate incision (AI) is an effective and low-cost method of reducing astigmatism.
- Femtosecond laser-assisted AI helps create incisions at a precise depth, arc length, and location, allowing good predictability of corneal astigmatism correction.
- ALLY femtosecond laser (LENSAR) is a dual-pulse laser with two separate laser profiles - one for corneal incisions (320 fs pulse-width) like AI, clear corneal incisions, and the other (1500 fs pulse-width) for capsulotomy and nuclear fragmentation.
  - The ALLY dual-pulse laser is equipped with 6 fixed Scheimpflug cameras that allow faster imaging and make the femto procedure 2-4 times faster than the previous generation laser.
- The iris registration maneuver allows for precise alignment of AI incisions created with ALLY femtosecond laser on the intended meridian, thereby significantly improving the predictability.

Purpose

- To evaluate the astigmatic outcomes of arcuate incisions created by a dual-pulse femtosecond laser that uses 1500 fs pulse-width to fragment the lens and 320 fs pulse-width to cut the cornea, in patients undergoing cataract surgery or refractive lens exchange (RLE).

Methods

Study Design

Retrospective chart review.

Study Population

57 eyes that underwent cataract extraction or RLE and astigmatism correction with AI using the ALLY system and the Visco AI nomogram.

Inclusion Criteria

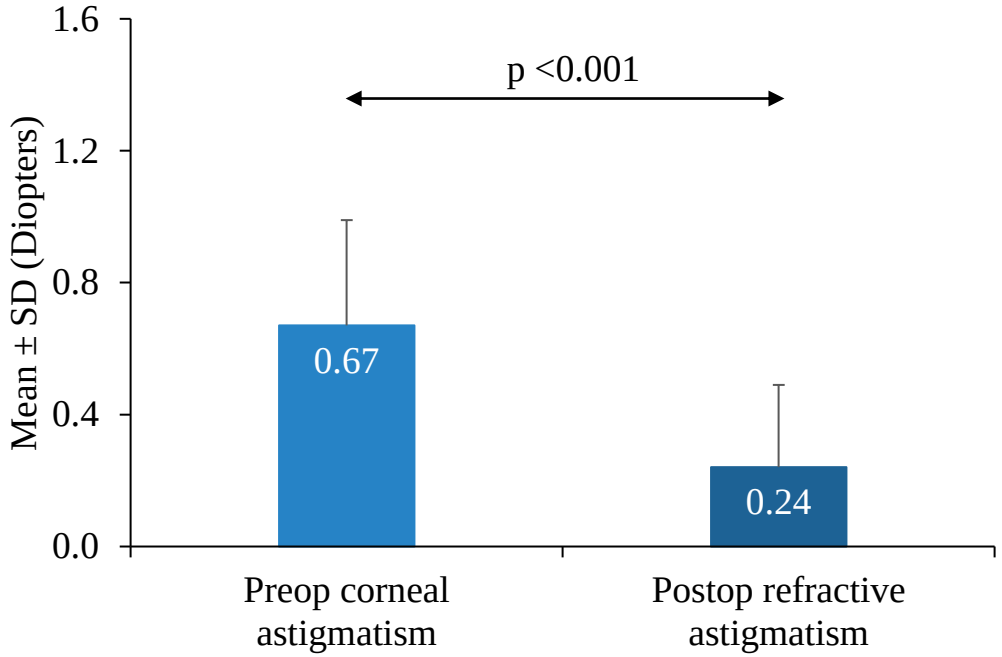
Patients ≥21 years with pre-existing regular corneal astigmatism up to 1.25 D; expected visual acuity of at least 20/25 and clear cornea.

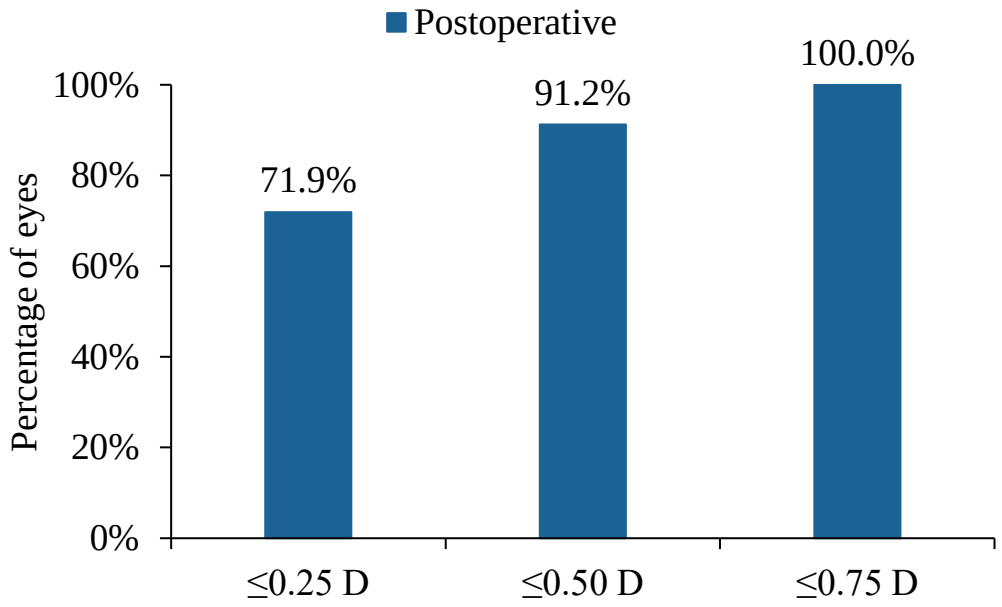
Outcome Measures

Postoperative MRSE, UDVA, and vector analysis.

Results

Preop corneal vs postop refractive astigmatism

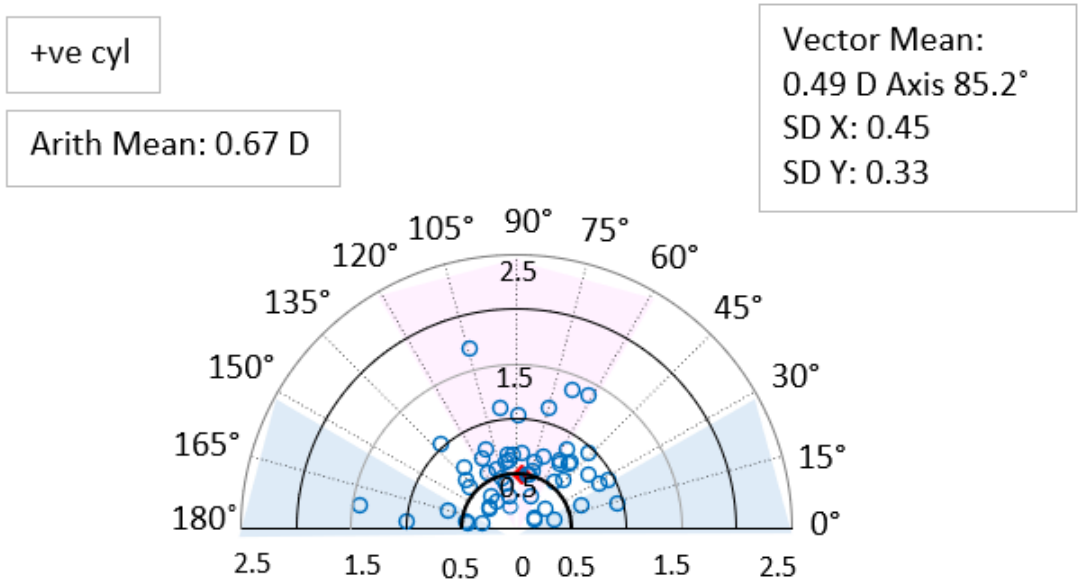




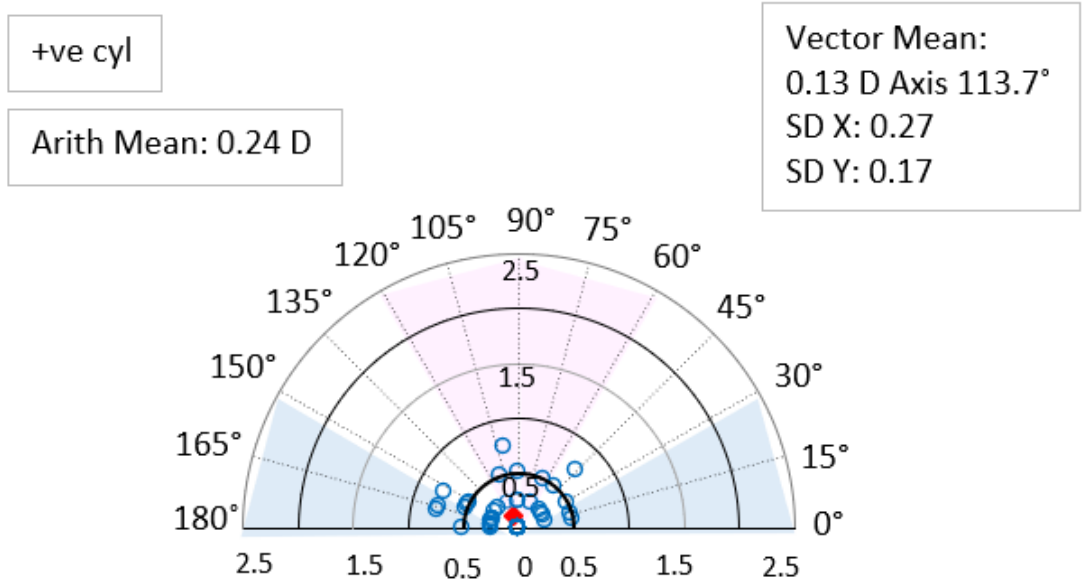
With a statistically significant reduction in mean corneal astigmatism, 91% of eyes achieved a refractive cylinder within 0.50 D postoperatively.

Results

Preoperative corneal astigmatism



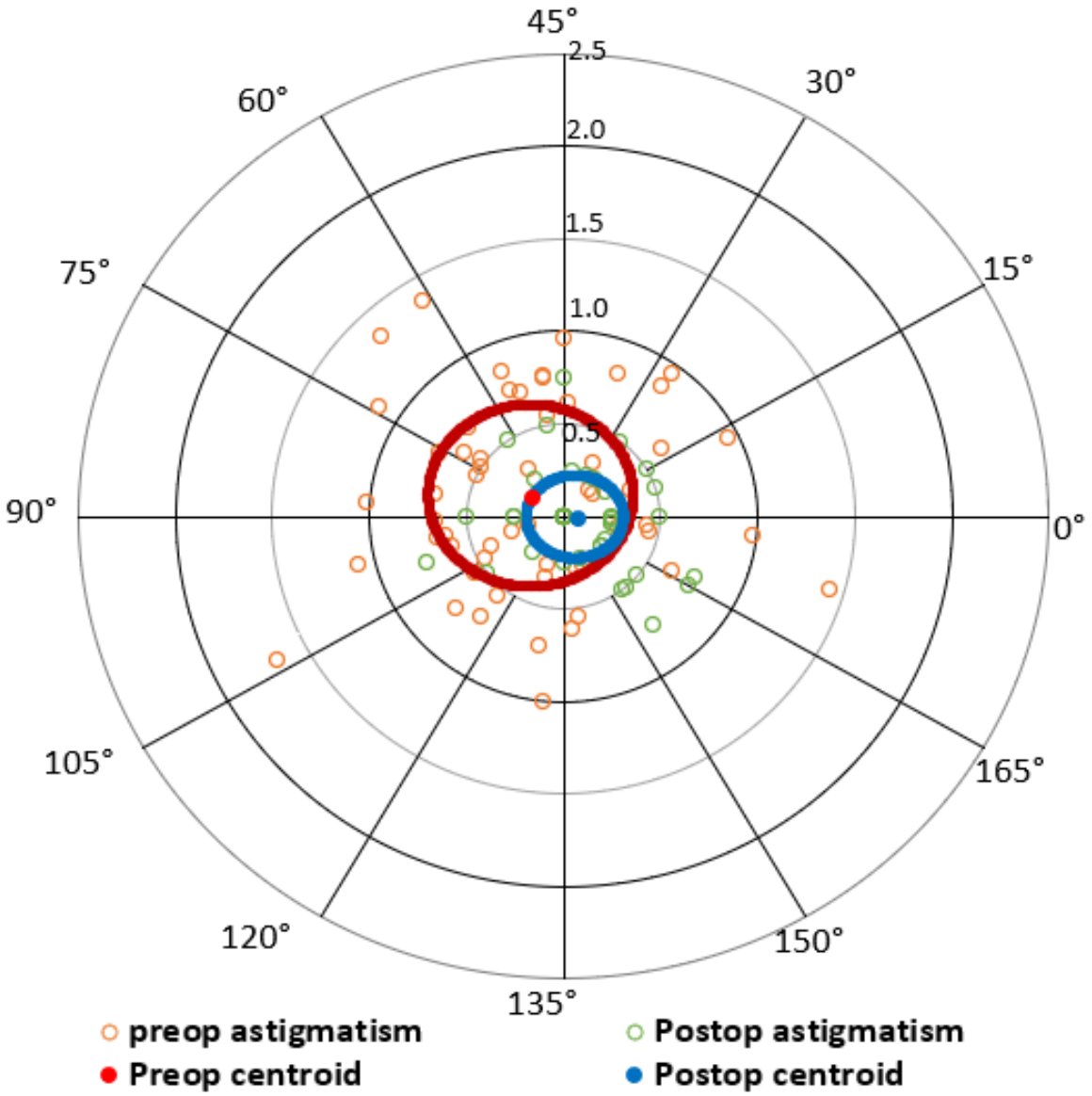
Postoperative refractive astigmatism



Vectoral mean of astigmatism decreased from 0.49 D preoperatively to 0.13 D postoperatively.

Results

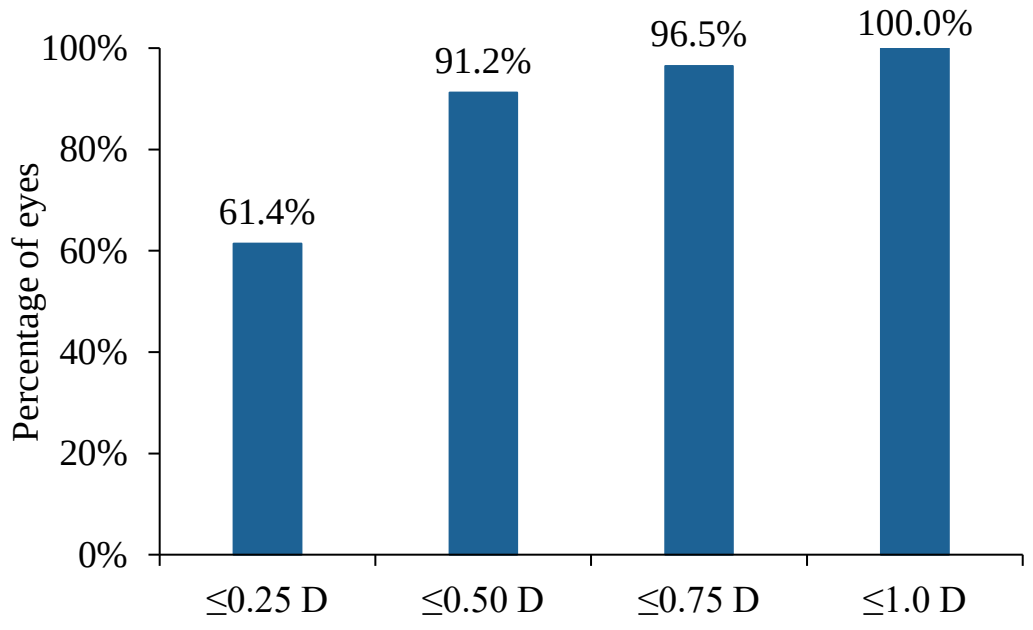
- Centroid of postop astigmatism was closer to 0.0 D and had a smaller vectoral standard deviation (represented by an ellipse).



Results

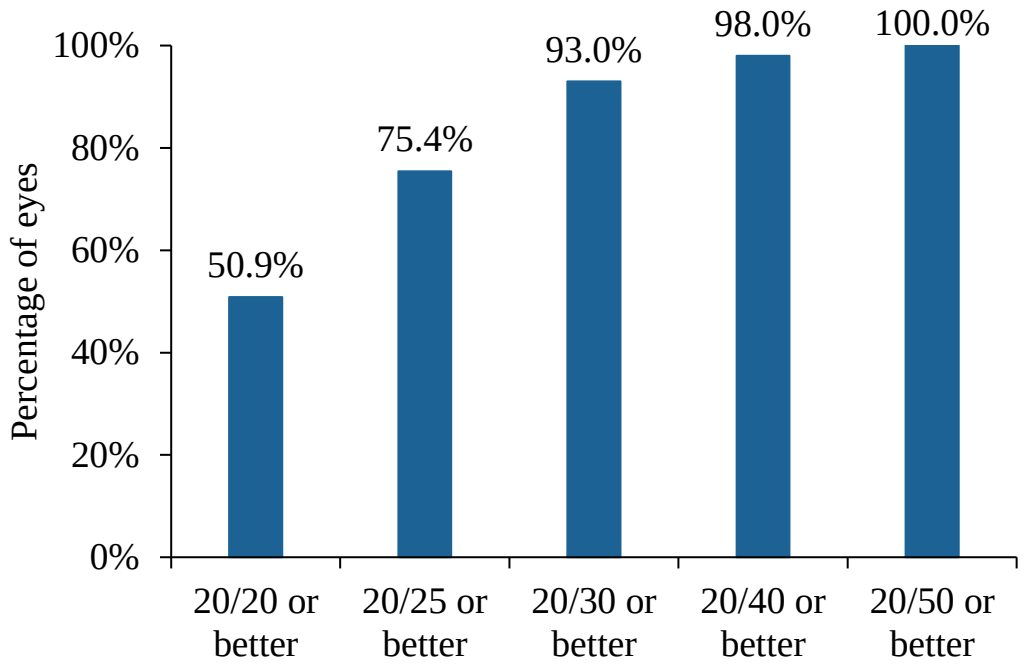
Postoperative MRSE

Mean MRSE: -0.04 ± 0.37 D



Postoperative UDVA

Mean UDVA: 0.07 ± 0.11 logMAR



Postoperatively, 91% of eyes had MRSE within 0.5 D, and 93% of eyes achieved UDVA of 20/30 or better.

Discussion & Conclusion

- Iris registration-guided AIs created using the LENSAR's ALLY femtosecond laser provided good astigmatic outcomes.
  - Approximately 72% of patients achieved postop astigmatism within 0.25 D and 91% within 0.5 D.
- The excellent outcomes achieved in the present study may be attributed to the following factors:
  - The optimized femtosecond AI nomogram.
  - Precise construction of incisions at the appropriate depth and diameter
  - Automatic cyclotorsion correction for the precise placement of AI on the intended meridian
  - Beveled incisions (incisions perpendicular to the coronal plane) that reduce the risk of astigmatism regression.

THANK YOU