Evaluation of Visual and Astigmatic Outcomes following Femtosecond Laser-Assisted Arcuate Incisions and Implantation of Wavefront-Designed Monofocal IOLs

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DISCLOSURES

INTRODUCTION

- Management of preexisting corneal astigmatism during cataract surgery is vital to achieving excellent visual outcomes and meeting patients' expectations for complete, spectacle-free visual rehabilitation.[1]
- Arcuate keratotomy is an effective and low-cost method of reducing low levels of preexisting astigmatism.
- With the use of femtosecond lasers:
  - the location, depth and extent of the incisions can be more precisely controlled, improving predictability and reproducibility, as well as preventing inadvertent full-thickness perforation.
- The introduction of iris registration technology with femtosecond lasers provides highly precise guidance for the alignment of astigmatic correction.

1. Visco et al. J Cataract Refract Surg 2019.

PURPOSE

- To evaluate the visual and refractive outcomes of femtosecond laser-assisted arcuate incisions (LENSAR) for the correction of low to moderate astigmatism in patients undergoing cataract surgery or refractive lens exchange (RLE) with the implantation of wavefront-designed aspheric intraocular lenses.

METHODS

STUDY DESIGN

Retrospective chart review.

STUDY POPULATION

35 patients (41 eyes) who underwent femtosecond laser-assisted arcuate incisions for correcting pre-existing astigmatism, combined with cataract extraction or Refractive lens exchange.

RECRUITMENT CRITERIA

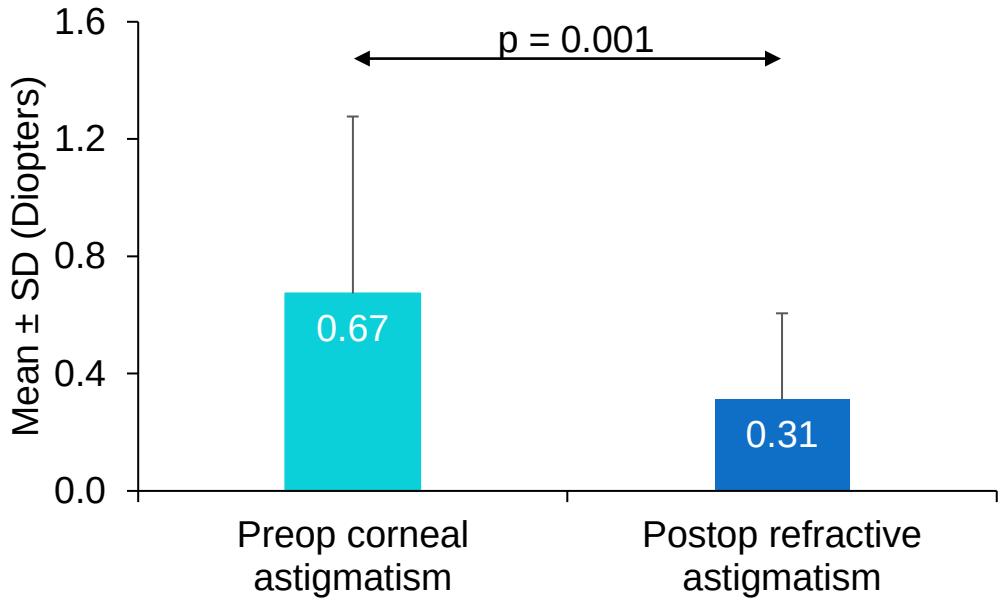
Pre-existing low to moderate regular corneal astigmatism (≥0.25 D to ≤2.00 D); Implantation of an aspheric monofocal IOL (Rayner 200E, Zeiss CT Lucia 611P or B+L enVista MX60E or MX60PL).

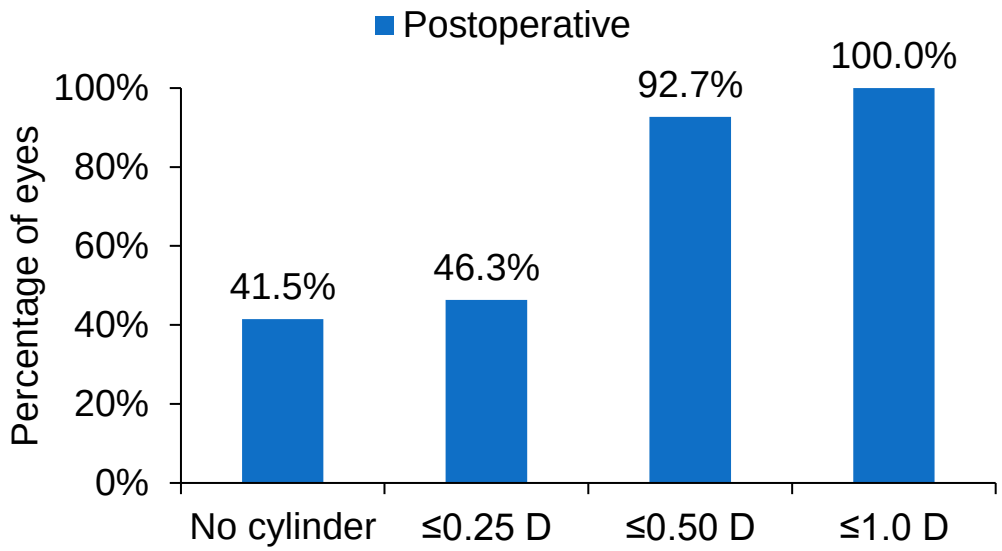
OUTCOME MEASURES

MRSE, residual refractive astigmatism, UDVA, UIVA, UNVA and vector analysis of the effectiveness of astigmatism reduction.

RESULTS

Preop corneal vs postop refractive astigmatism





There was a statistically significant reduction in astigmatism from preop to postop, with 93% of eyes achieving postop refractive cylinder within 0.5 D.

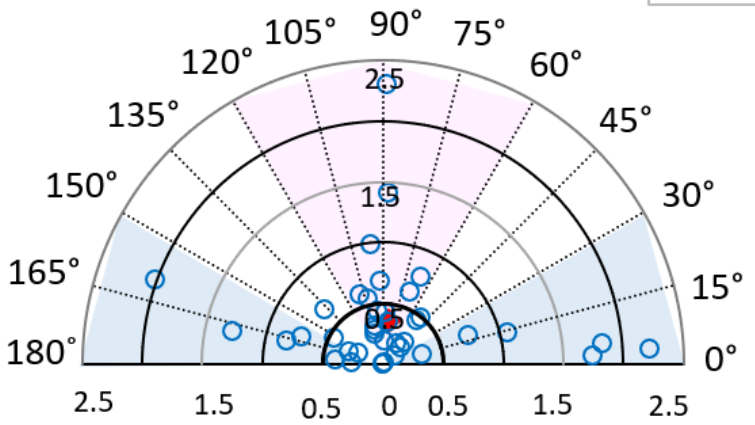
RESULTS

Preoperative corneal astigmatism

+ve cyl

Arith Mean: 0.67 D

Vector Mean:
0.36 D Axis 82.6˚
SD X: 0.72
SD Y: 0.42

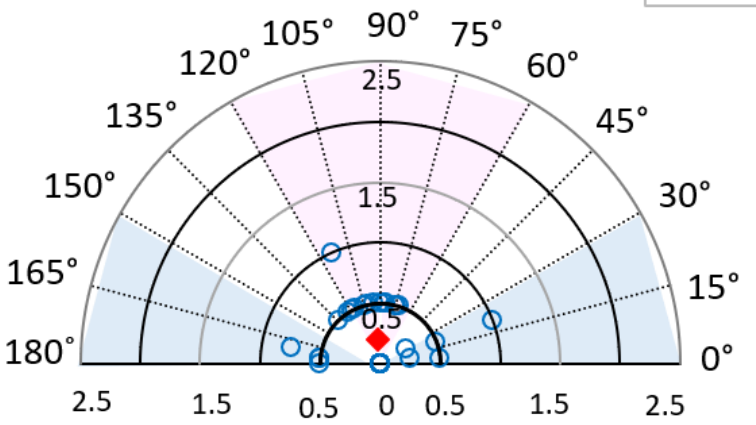


Postoperative refractive astigmatism

+ve cyl

Arith Mean: 0.31 D

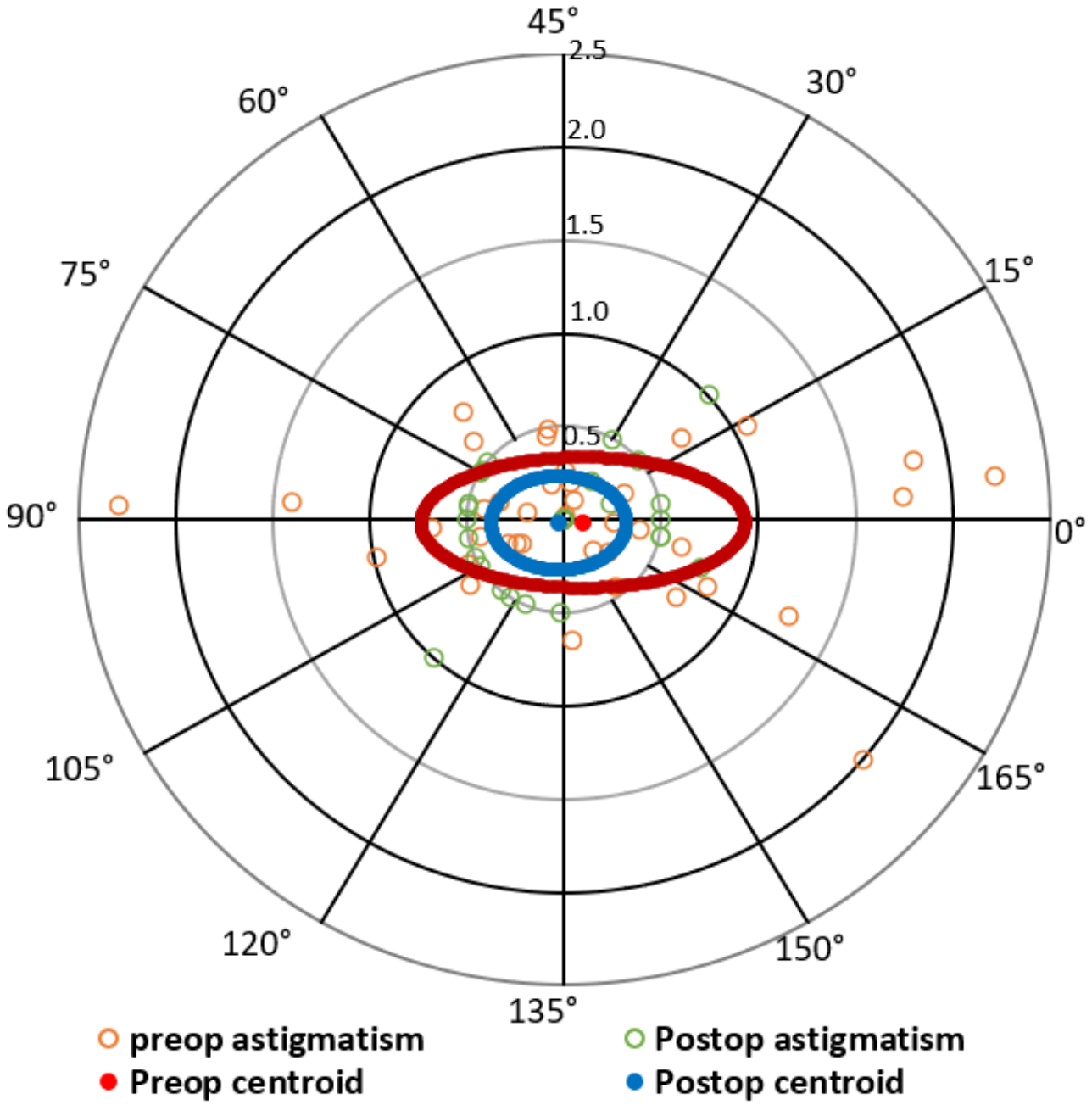
Vector Mean:
0.20 D Axis 94.8˚
SD X: 0.29
SD Y: 0.24



Vectoral mean of astigmatism decreased from 0.36 D preoperatively to 0.20 D postoperatively.

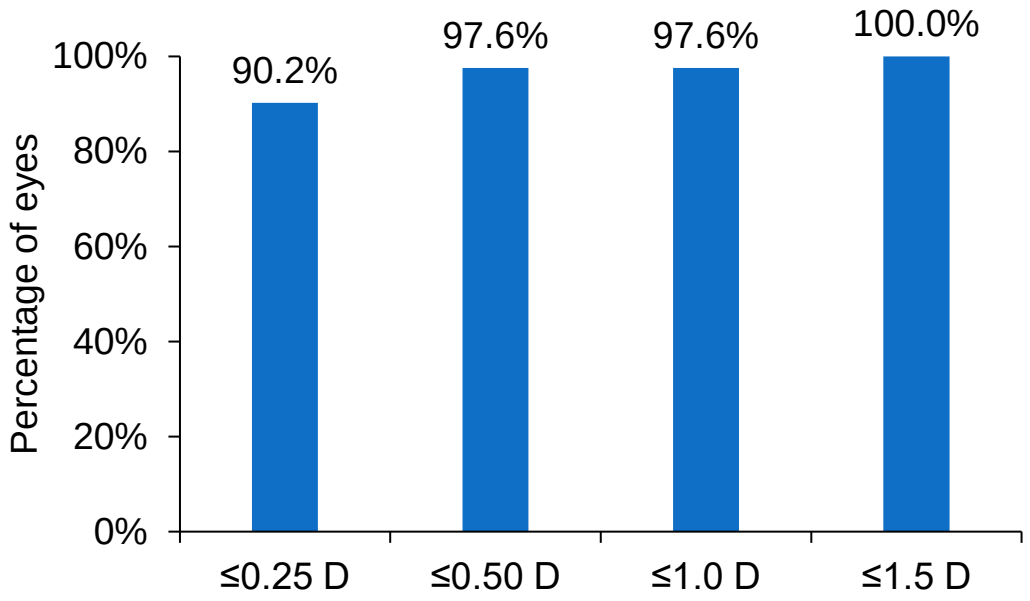
RESULTS

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

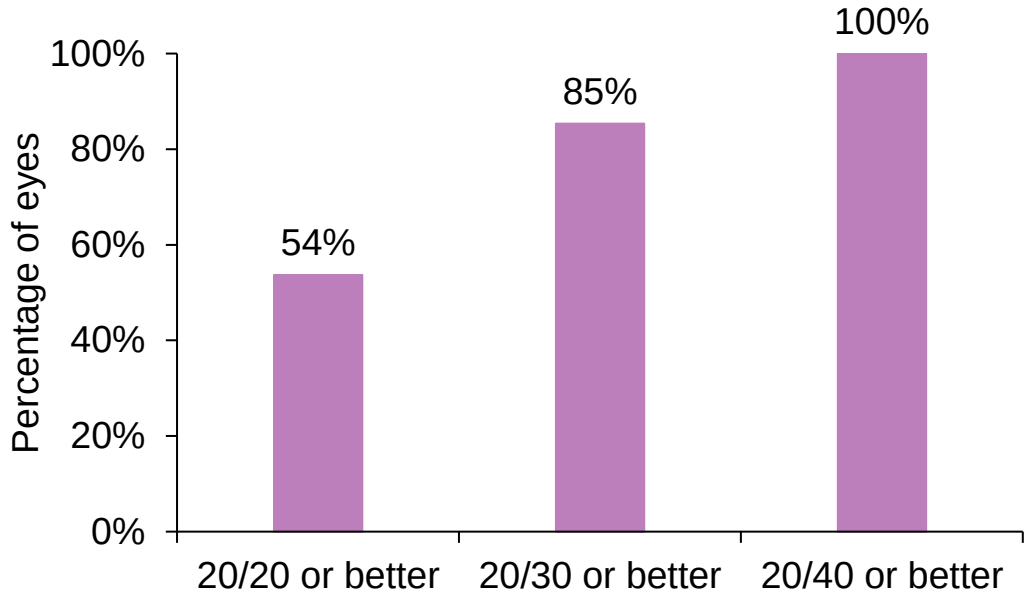


RESULTS

Postoperative MRSE
Mean: -0.09 ± 0.26 D



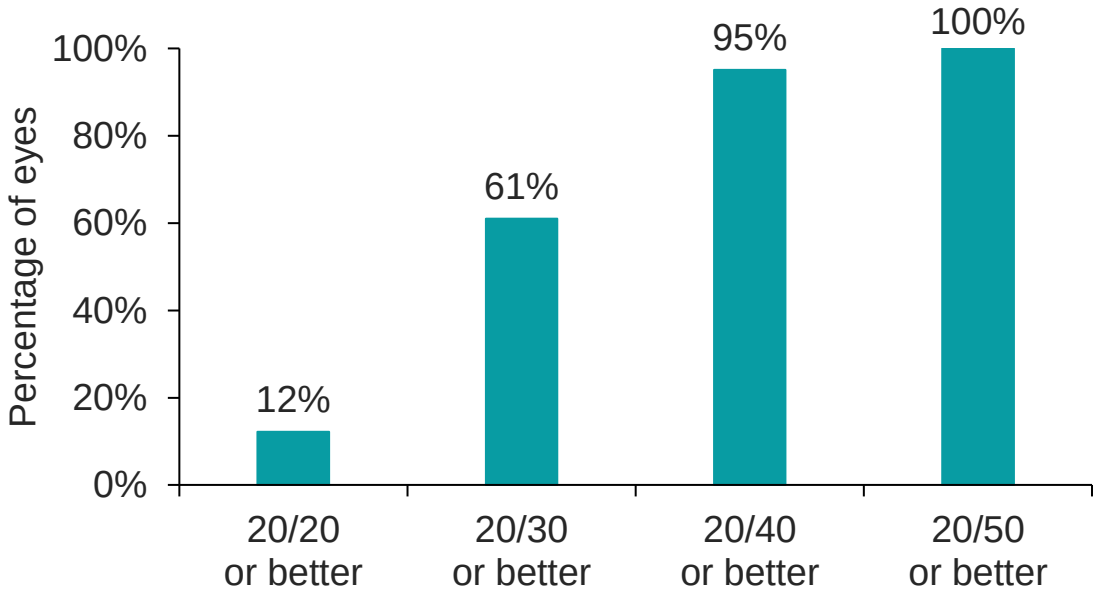
Postoperative UDVA
Mean: 0.08 ± 0.11 logMAR



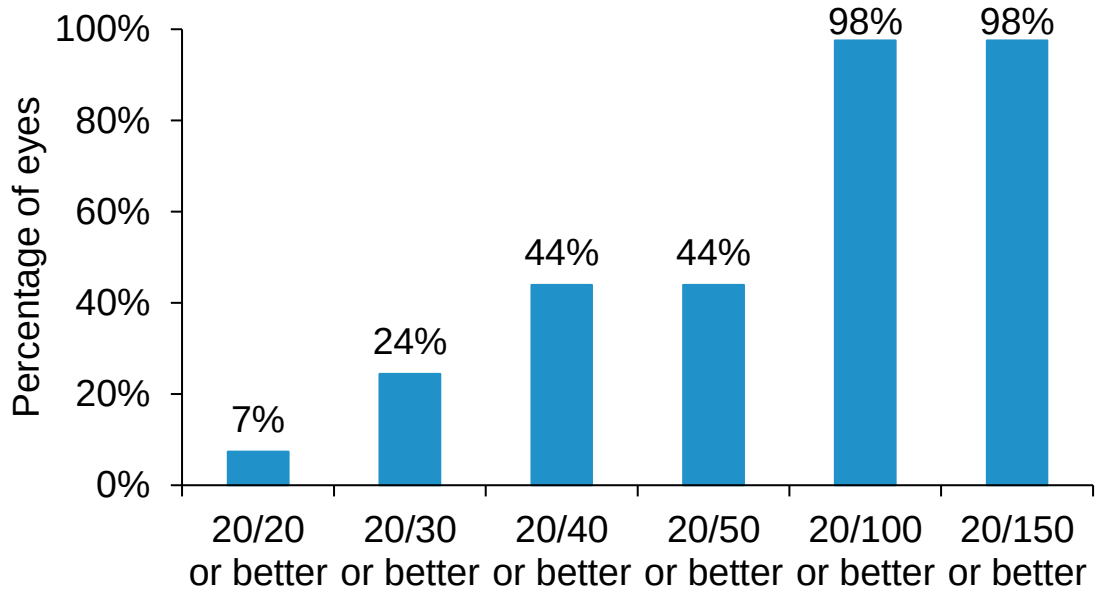
Postoperatively, 98% of eyes had MRSE within 0.5 D & 85% of eyes had UDVA of 20/30 or better.

RESULTS

Postoperative UIVA
Mean: 0.20 ± 0.11 logMAR



Postoperative UNVA
Mean: 0.39 ± 0.25 logMAR



UIVA and UNVA of 20/40 or better were achieved in 95% and 44% of eyes, respectively.

RESULTS

		Preoperative astigmatism (D)	Postoperative astigmatism (D)		Postoperative MRSE (D)	
	N	Mean ± SD	Mean ± SD	Within 0.5 D (%)	Mean ± SD	Within 0.5 D (%)
Overall	41	0.67 ± 0.60	0.31 ± 0.29	**92.7%**	-0.90 ± 0.26	**97.6%**
Rayner 200E	9	0.61 ± 0.72	0.42 ± 0.31	**88.9%**	-0.15 ± 0.28	**100.0%**
enVista MX60E or MX60PL	24	0.65 ± 0.46	0.29 ± 0.30	**91.7%**	-0.09 ± 0.28	**95.8%**
Zeiss CT Lucia 611P	8	0.82 ± 0.88	0.25 ± 0.27	**100.0%**	0.00 ± 0.13	**100.0%**

RESULTS

		Postoperative UDVA (logMAR)		Postoperative UIVA (logMAR)		Postoperative UNVA (logMAR)	
	N	Mean ± SD	20/30 or better (%)	Mean ± SD	20/40 or better (%)	Mean ± SD	20/40 or better (%)
Overall	41	0.08 ± 0.11	**85%**	0.20 ± 0.11	**95%**	0.39 ± 0.25	**44%**
Rayner 200E	9	0.15 ± 0.13	**67%**	0.16 ± 0.14	**100%**	0.26 ± 0.28	**56%**
enVista MX60E or MX60PL	24	0.06 ± 0.10	**92%**	0.20 ± 0.11	**96%**	0.39 ± 0.24	**50%**
Zeiss CT Lucia 611P	8	0.07 ± 0.13	**88%**	0.21 ± 0.09	**88%**	0.51 ± 0.20	**13%**

DISCUSSION

- Wavefront-designed IOLs that either increase spherical aberrations or maintain most of the corneal spherical aberrations, provide an improved range of vision.
- Patients with no astigmatism are generally considered ideal candidates for implantation of wavefront-designed monofocal IOLs, leading to excellent visual acuity and contrast sensitivity.[1]
- The present study intended to evaluate the optical performance of wavefront-designed monofocal IOLs when implanted in conjunction with arcuate keratotomy for the correction of pre-existing astigmatism.
- LENSAR laser-assisted arcuate keratotomy with the implantation of wavefront-designed monofocal IOLs resulted in excellent distance vision outcomes and functional intermediate vision.

Hilson T. Which lens is right for you?. Available at: https://www.visualsurgery.com/eye-conditions/cataract/which-lens-is-right-for-you/.

CONCLUSION

- Femtosecond laser-assisted arcuate incisions were effective in correcting low to moderate astigmatism, yielding excellent visual and refractive outcomes with different wavefront-designed aspheric IOLs.

THANK YOU