Iris Registration-Guided Femtosecond Laser Capsular Marks To Guide Toric IOL Alignment With Intraoperative Aberrometry

Presented by: P DEE STEPHENSON, MD, FACS

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
Viatris-A,B,C
Visiox-A,D
Zeiss-A, B

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

Introduction

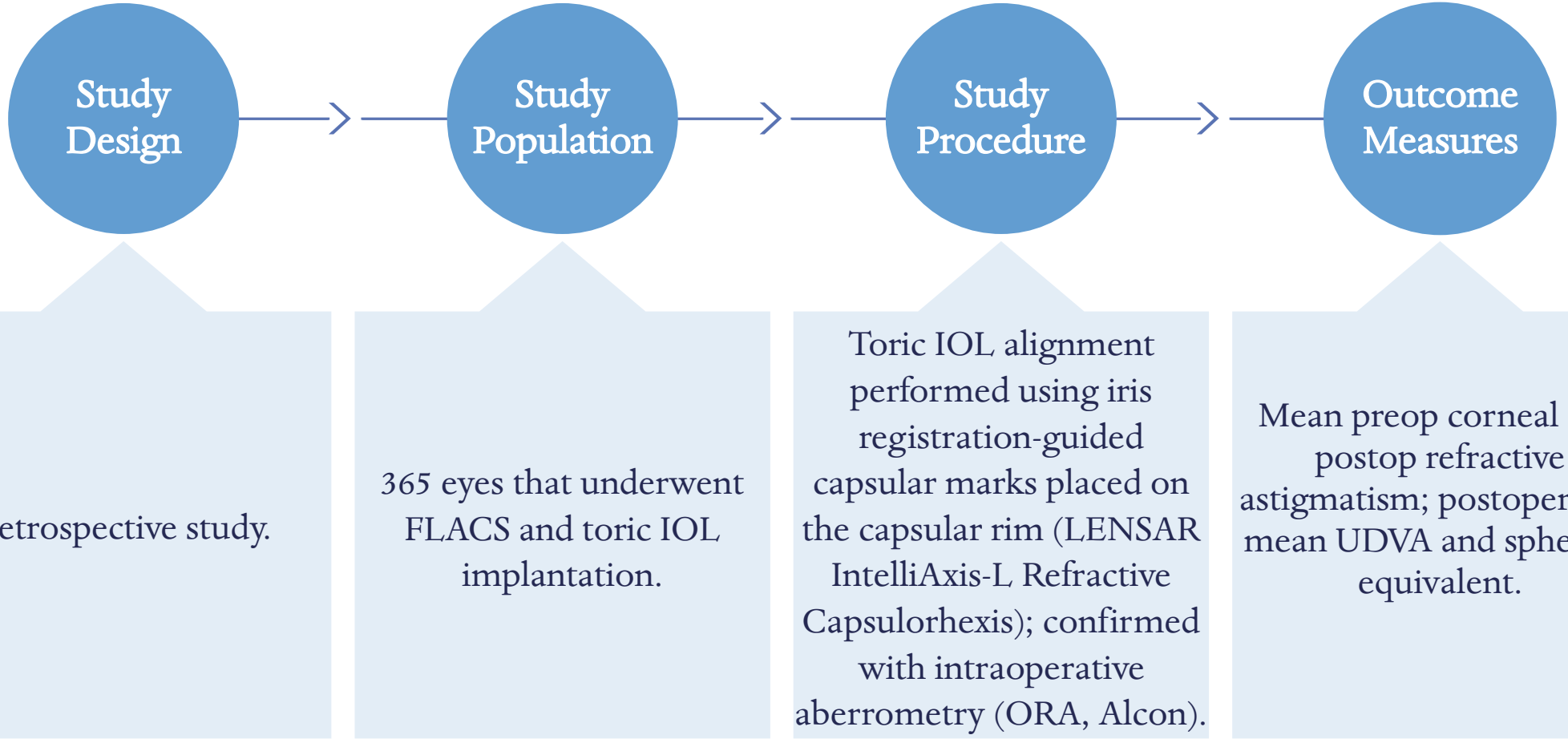
- Ensuring precise alignment of the toric IOL is one of the major challenges faced by ophthalmologists when implanting a toric IOL.
  - Inaccurate alignment of the toric IOL along the intended meridian leads to not achieving the desired astigmatic correction, thus, negatively affecting patient satisfaction.
- From the conventional manual marking methods to automated image-guided systems with digital overlay, the toric IOL alignment strategies have improved a lot over time.[1]
  - Intraoperative aberrometry (IA) can also guide the intraoperative alignment of toric IOL.[2]
- The IntelliAxis (LENSAR) refractive capsulorhexis involves the construction of a pair of capsular marks on the femtosecond laser-assisted capsulotomy.
  - Iris registration compensates for cyclotorsion and aligns the capsular marks on the intended axis.
  - The capsular marks remain visible during the early postoperative period and can, therefore, help recognition of toric IOL rotation and facilitate repositioning, if needed.

1. Popp et al., *J Cataract Refract Surg*, 2012; 2. Kaur et al., *Indian J Ophthalmol*, 2017.

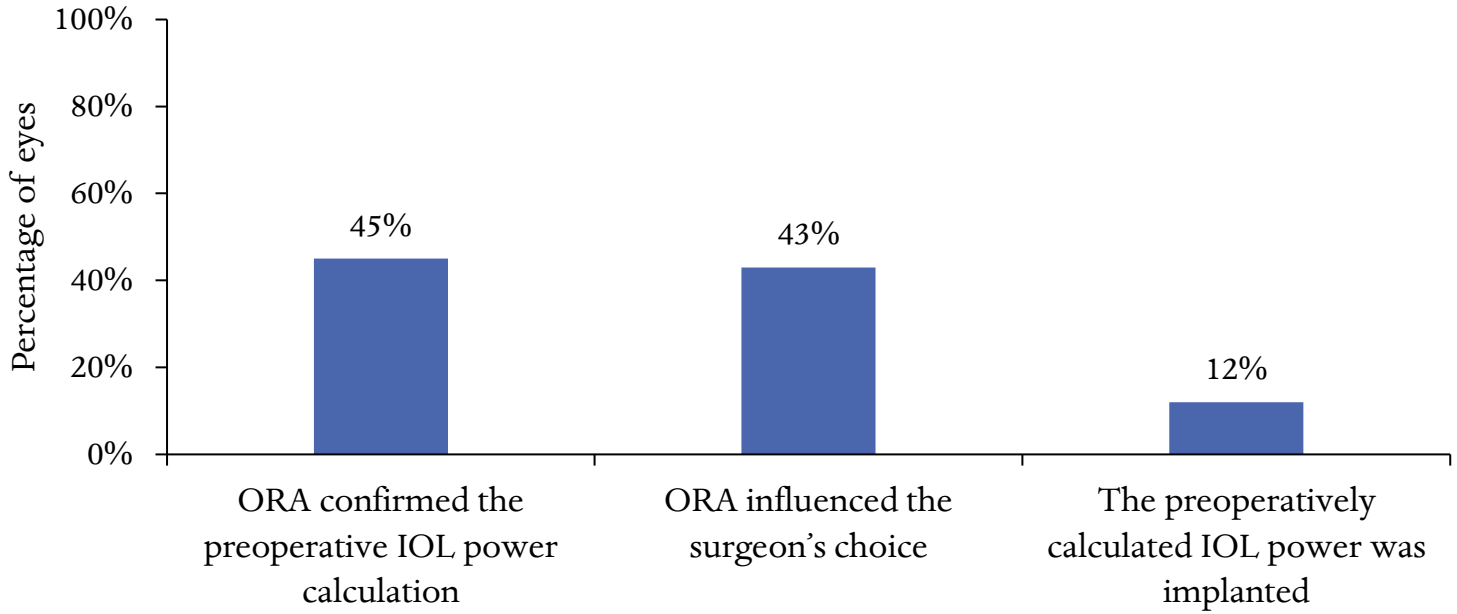
Purpose

To validate toric IOL alignment by iris registration-guided femtosecond laser-assisted capsular marks with intraoperative aberrometry measurements.

Methods


Study Design
Study Population
Study Procedure
Outcome Measures
Retrospective study.
365 eyes that underwent FLACS and toric IOL implantation.
Toric IOL alignment performed using iris registration-guided capsular marks placed on the capsular rim (LENSAR IntelliAxis-L Refractive Capsulorhexis); confirmed with intraoperative aberrometry (ORA, Alcon).
Mean preop corneal and postop refractive astigmatism; postoperative mean UDVA and spherical equivalent.

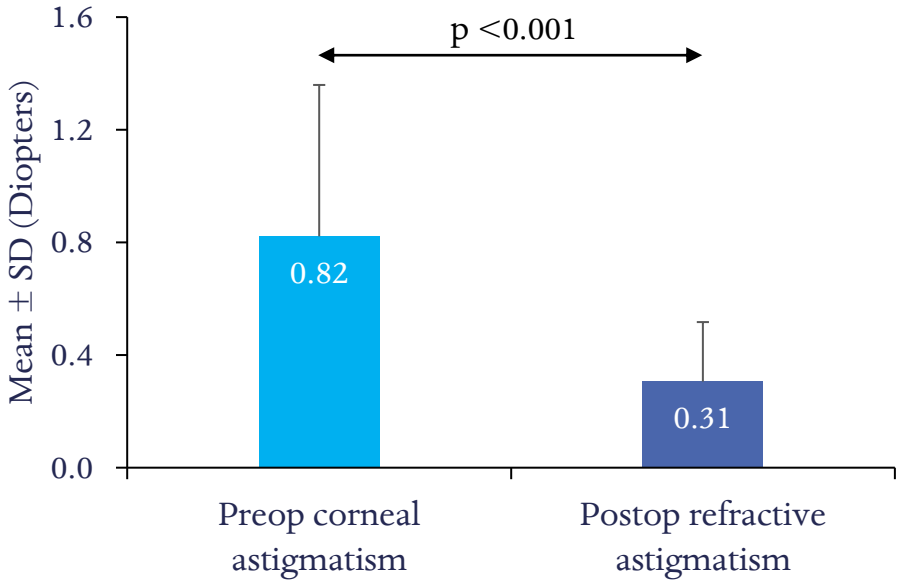
Choice of spherical equivalent IOL power

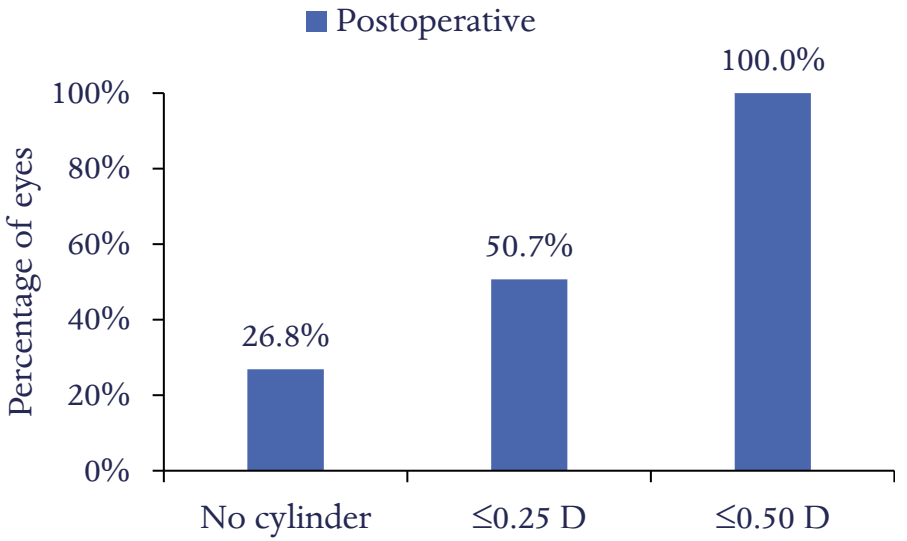


In 88% of the cases, ORA either confirmed (45%) or influenced (43%) the surgeon's preoperatively calculated spherical equivalent IOL power.
In 12% of the cases, the surgeon chose to implant the preoperatively calculated IOL power.

Results

Preop corneal vs postop refractive astigmatism

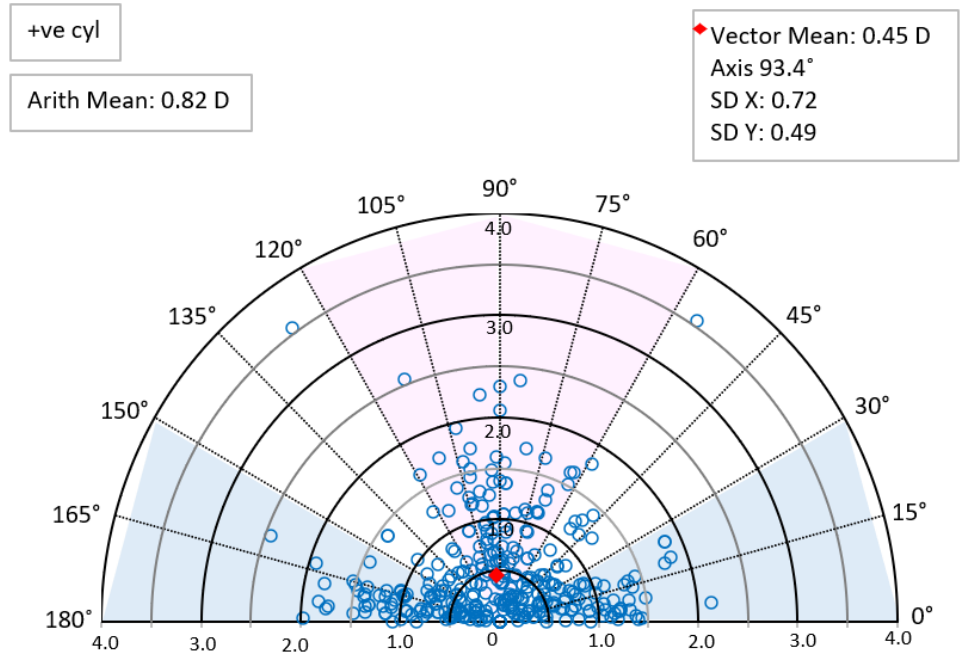




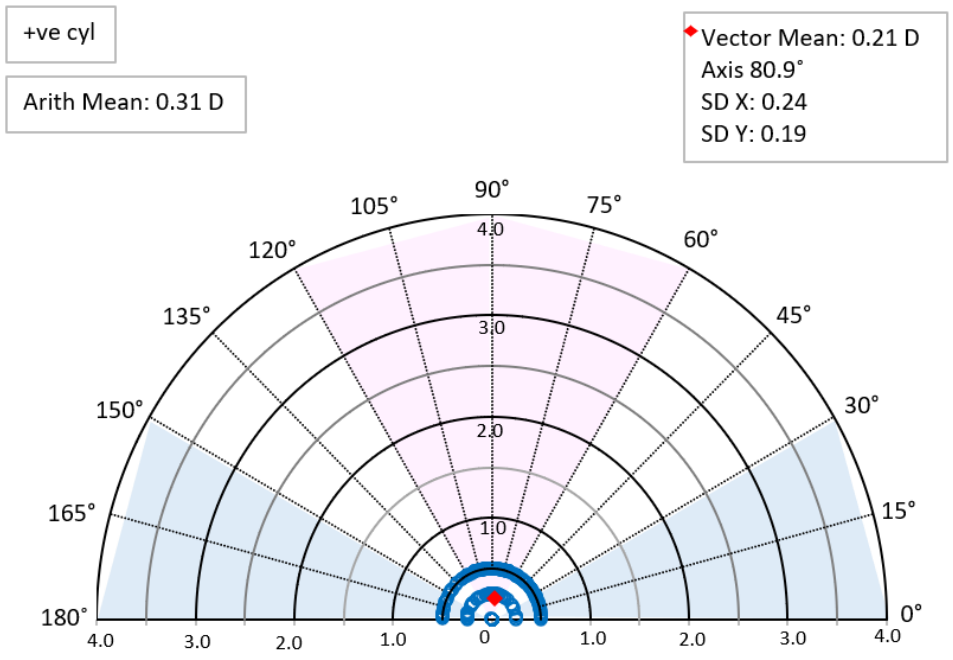
Implantation of toric IOLs led to a statistically significant reduction in astigmatism, with all eyes achieving residual astigmatism within 0.5 D postoperatively.

Results

Preoperative corneal astigmatism



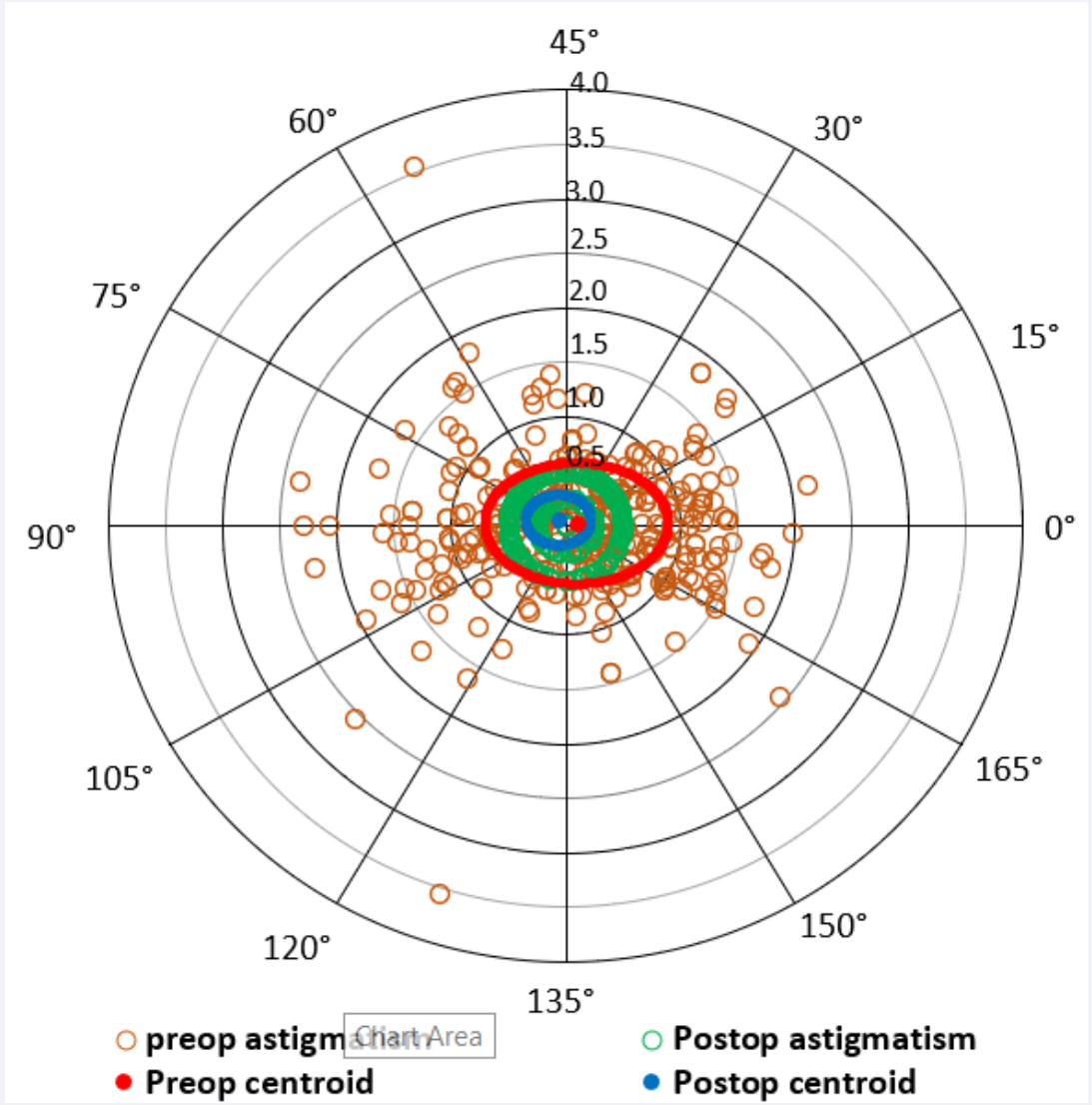
Postoperative refractive astigmatism



Vectoral mean of astigmatism decreased from 0.45 D preoperatively to 0.21 D postoperatively.

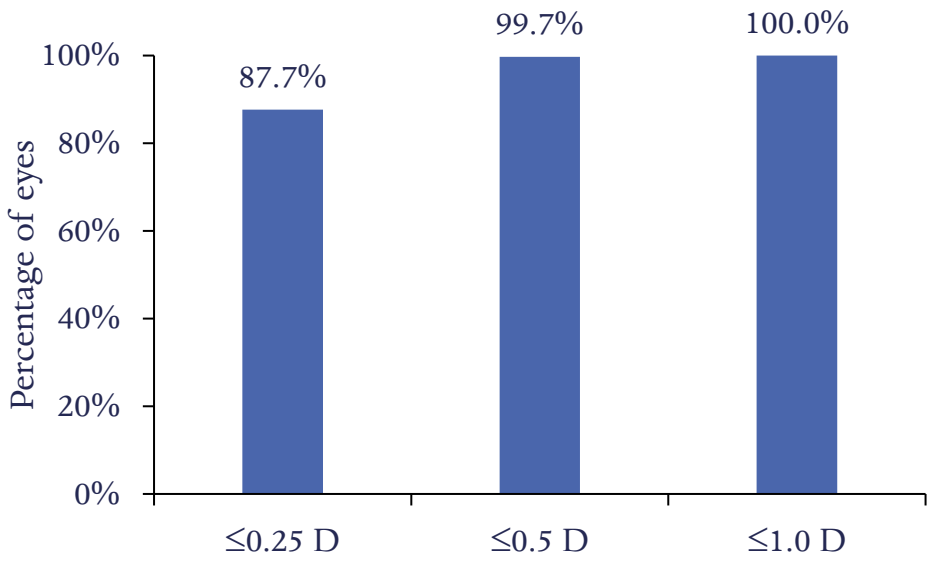
Results:

- Postop astigmatism had a smaller vectoral standard deviation (represented by an ellipse).

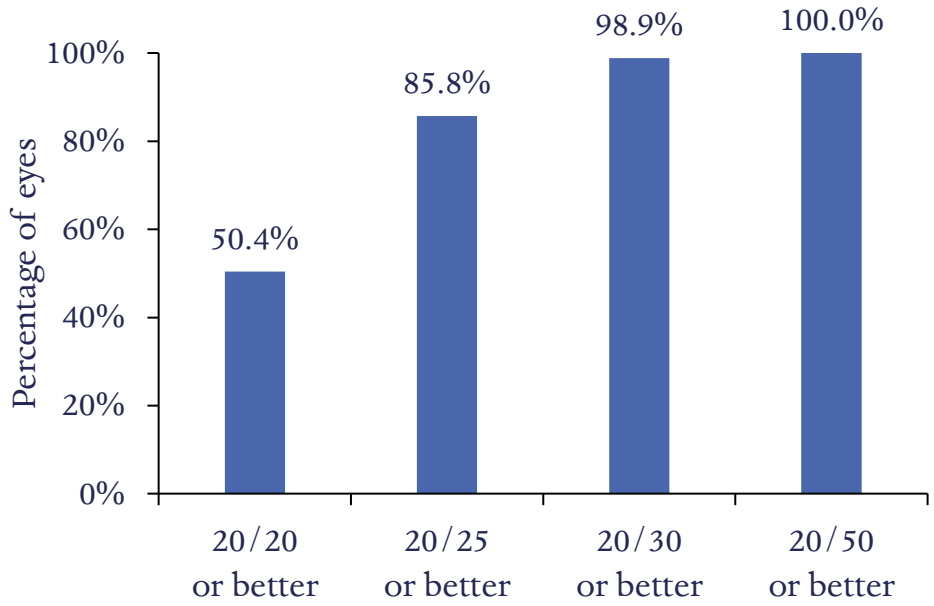


Results

Postoperative MRSE
Mean: -0.03 ± 0.23 D



Postoperative UDVA
Mean: 0.06 ± 0.07 logMAR



There was a significant reduction in postoperative MRSE and 99% of eyes showed UDVA 20/30 or better postoperatively.

Discussion and Conclusion

- The advantages of refractive capsulorhexis (LENSAR IntelliAxis-L) include:
  - A novel visual guide for intraoperative toric IOL alignment as well as postoperative assessment of rotational stability.
  - Parallax error is practically eliminated because the plane of the anterior capsule is essentially the same as the plane of the IOL.
  - The biomechanical strength of capsulotomies with capsular marks is the same as that of the standard femtosecond laser capsulotomies.
- The alignment of toric IOL using IntelliAxis-L guided capsular marks in the present study was in agreement with the pseudophakic intraoperative aberrometry measurement.
- In the present study, all eyes had residual astigmatic error within 0.5 D postoperatively.
  - Besides accurate corneal measurements and IOL power calculations, precise toric IOL alignment on the intended axis using IntelliAxis-L capsular marks contributed to the excellent outcomes.

Thank You