Refractive outcomes of toric iol alignment using femtosecond laser image-guided iris registration and comparison with published literature

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Disclosures

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Introduction

LENSAR's femtosecond laser system with Streamline uses IntelliAxis-C for toric IOL alignment creates intrastromal corneal marks on the steep axis 180° apart without any astigmatic effect themselves.

LENSAR's Streamline IntelliAxis-L system creates a pair of capsular marks on the capsular rim during femtosecond laser capsulotomy without impacting its strength or extensibility.

Automated image-guidance technology based on the concept of iris fingerprinting has the potential to remove many sources of error associated with conventional manual marking methods.

~~LENSAR's alignment of toric IOL on the intended axis of implantation is a prerequisite to achieve effective astigmatism correction.~~

~~Effectiveness of manual marking methods using pubble/pendular markers are inherently associated with errors~~

~~For a 10° misalignment, the IOL would lose 33% of its effectiveness and even with accurate corneal marks, parallax error may still result in IOL misalignment of 1-2°.~~

~~Iris-registration with both methods automatically checks and compensates for cyclotorsion.~~

Methods

STUDY DESIGN: Retrospective chart review (IntelliAxis-C, 71 eyes and IntelliAxis-L, 142 eyes).

OUTCOMES CONTINUED: Patients who were unhappy with visual outcome and had residual astigmatism >0.5 and chose to undergo a 2nd surgery were analyzed for the enhancement rate.

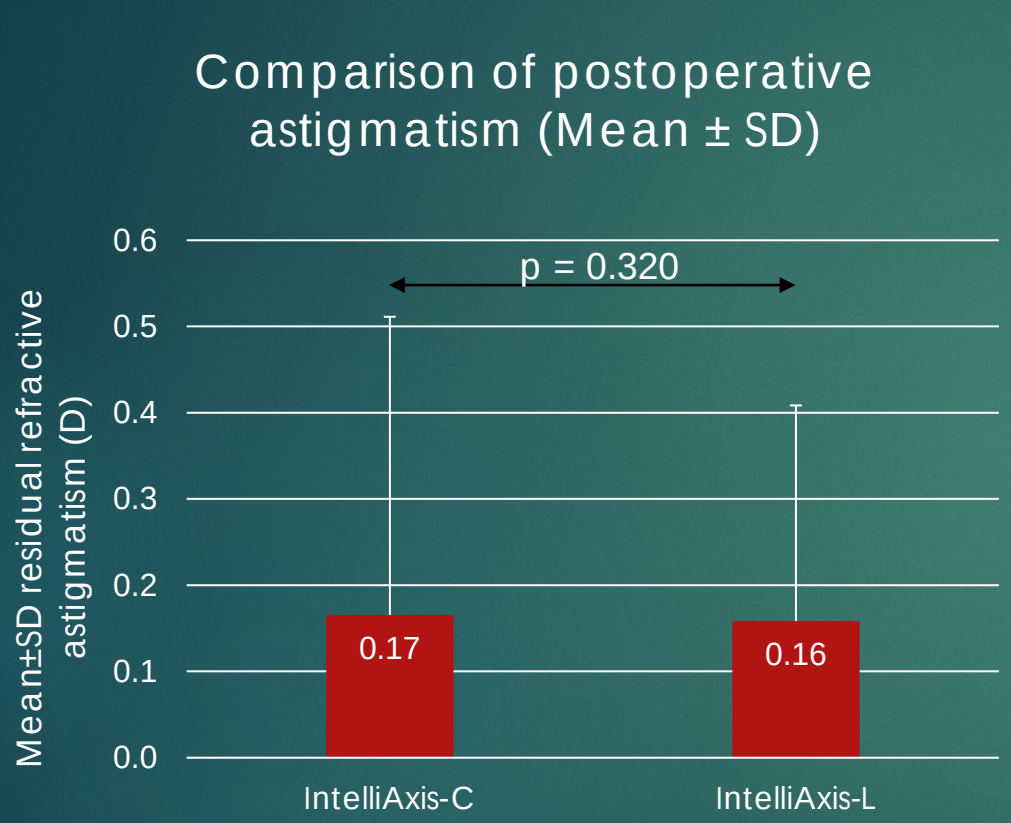
OUTCOMES MEASURED: Residual refractive astigmatism (RRA), enhancement rate and visual acuity.

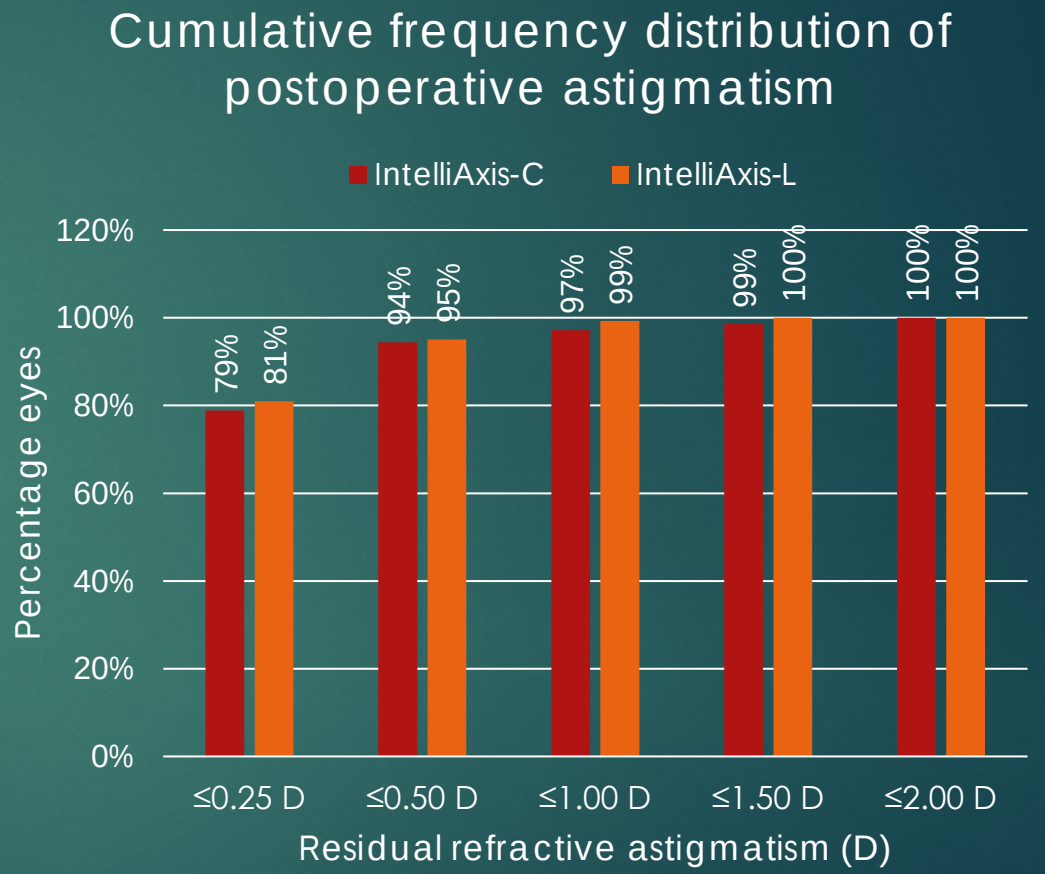
Patients who underwent enhancement procedure for the correction of sphere were not included.

Decision to undergo enhancement surgery was based on:

- Patient's current satisfaction level
- Tolerance to blur due to refractive astigmatic error
- Acceptance of additional surgical risk
- Enthusiasm for the potential benefits of enhancement surgery

Astigmatism outcomes



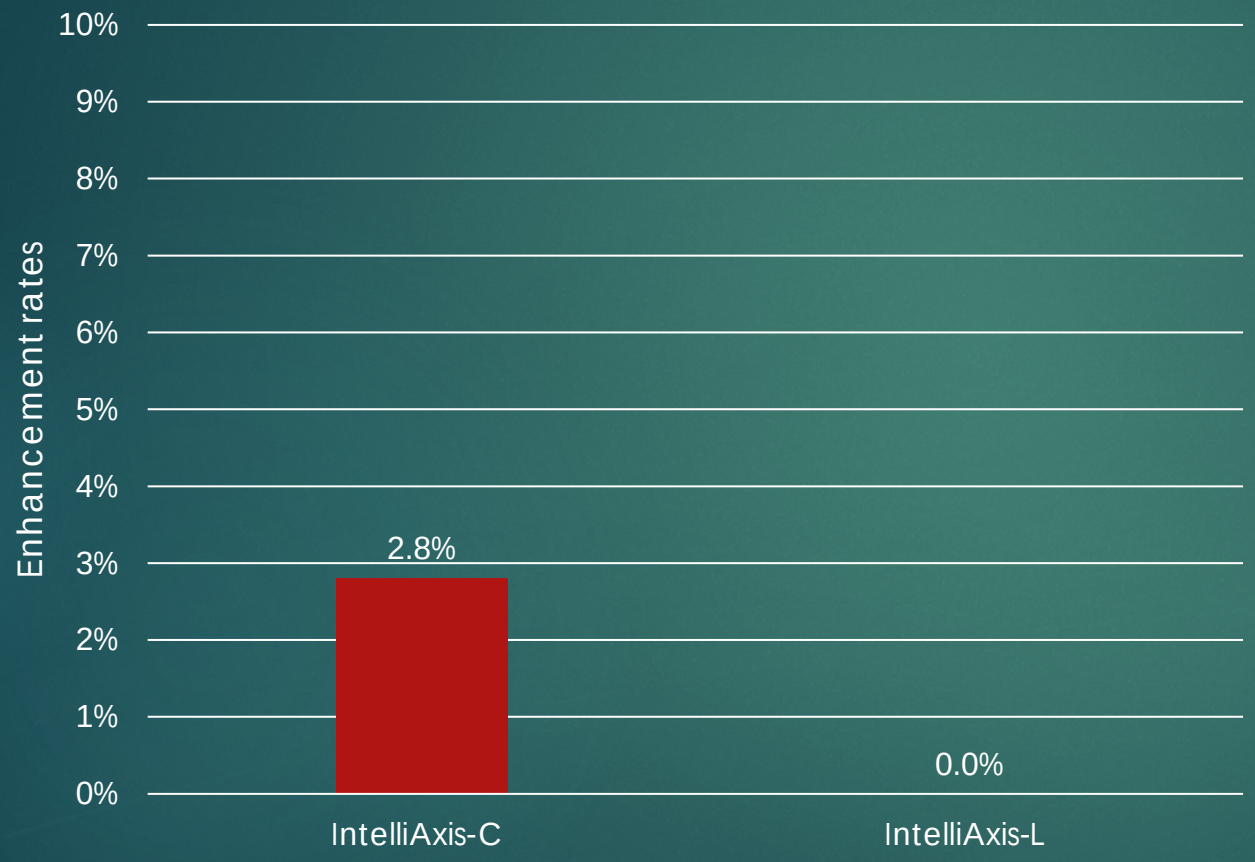


With 95% eyes in the IntelliAxis-L group and 94% eyes in the IntelliAxis-C group achieving an RRA of ≤0.50 D, the mean residual refractive astigmatism was comparable between the two groups (0.16 D vs 0.17 D, p=0.320).

UDVA outcomes

At postoperative 2 weeks, 79% eyes in the IntelliAxis-C group and 96% eyes in the IntelliAxis-L group had UDVA 20/40 or better.

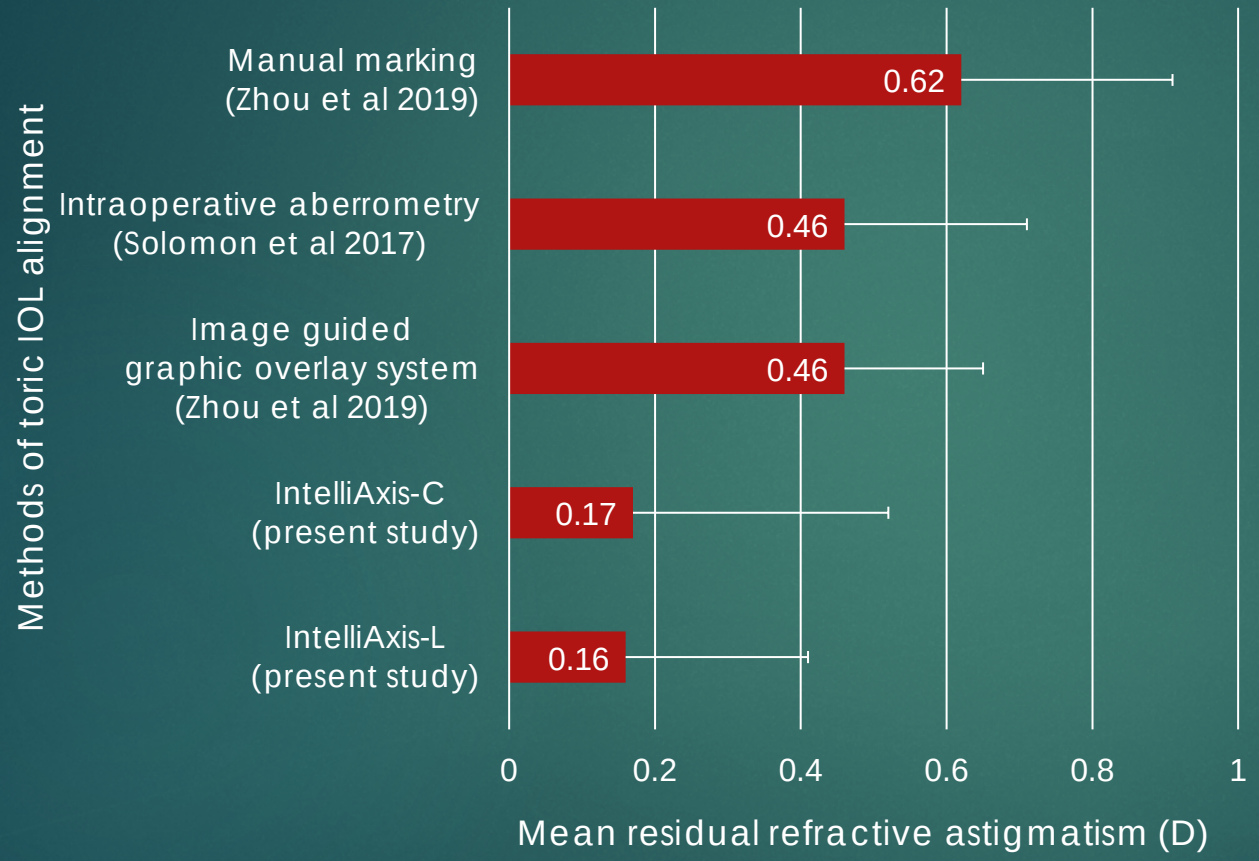
Ehnancement Rate



While the enhancement rate was lower in the IntelliAxis-L group compared with the IntelliAxis-C group, the difference could not reach statistical significance (0.0% vs 2.8%, p >0.05).

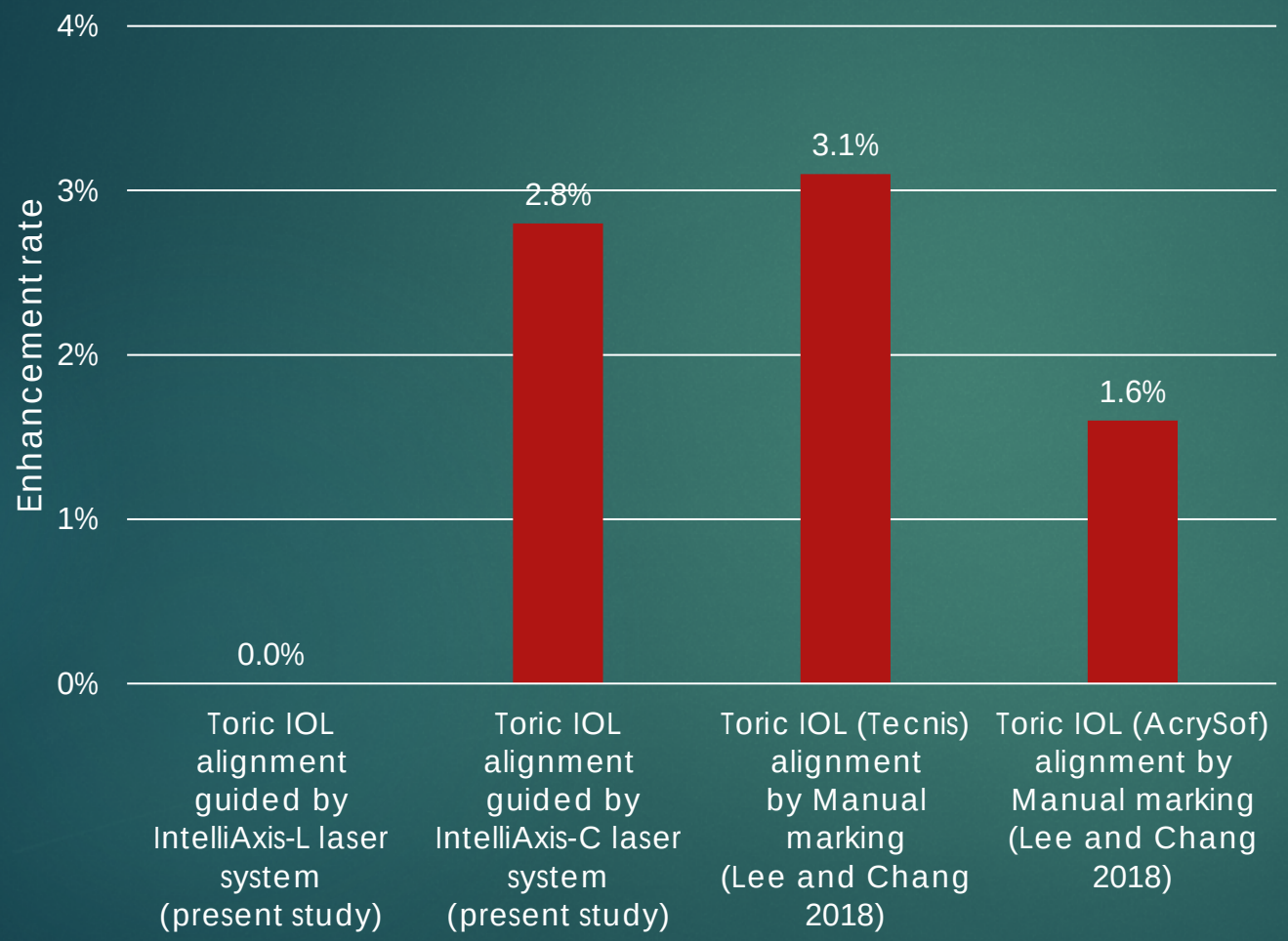
*one eye that underwent enhancement due to residual sphere (no residual cylinder) was excluded.

RRA Comparison in Literature



The results obtained in the present study with IntelliAxis-C/L compare favorably with the results of recent meta-analysis, revealing lower values of RRA with IntelliAxis-C/L compared with image guided systems, intraoperative aberrometry or manual corneal marking methods.

RRA Comparison in Literature



Toric IOL alignment guided by image-based systems results in lower enhancement rates compared with toric IOLs aligned using manual corneal based marking.

Conclusion

- In the present study, IOL registration guided femtosecond laser assisted marks provided precise guidance to accurately align toric IOLs on the intended axis of implantation.
- Ninety-four and Ninety-five percent of eyes demonstrated residual refractive astigmatism (RRA) ≤ 0.50 D for corneal and capsular marks respectively at 2 weeks postoperatively.

Postoperative residual astigmatism was lower for the IntelliAxis-C/L compared with image guided graphic overlay systems, intraoperative aberrometry and manual corneal marking methods.

Enhancement rates were less with the IntelliAxis L than with manual marking based Toric IOL alignment

When considering both RRA and enhancement rate, Intelliaxis L may deliver a higher number of happy postoperative patients when compared to other Toric IOL marking methods