



# Elliptical iFS Flaps Cause No Astigmatism

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## Introduction

The IntraLase 150 kHz iFS™ femtosecond laser creates flaps in less than 11–18 seconds and is capable of creating inverted side cuts (Fig.1) and elliptical flaps with a horizontal axis up to 12% longer than the vertical axis. The purpose of this study was to measure whether elliptical flaps induce astigmatic aberrations.

## Methods

This study was performed at the Codet Vision Clinic in Tijuana, Mexico. Permission was obtained from the Ethics Committee. Thirty-seven eyes were studied. Sixteen round and twenty-one elliptical flaps were cut using the IntraLase 150 kHz iFS system, lifted, and then replaced without excimer ablation. (Excimer ablations were performed after the 10-week study period.) Aberrations were measured with the Tracey wavefront aberrometer before flap creation and 10 weeks after flap creation, and the difference in aberrations was calculated.

## Results

The only wavefront change with statistical significance was a hyperopic shift in defocus aberrations of  $0.1526 \pm 0.28 \mu\text{m}$ . This hyperopic shift following flap creation was in full agreement with previous studies.<sup>1</sup>

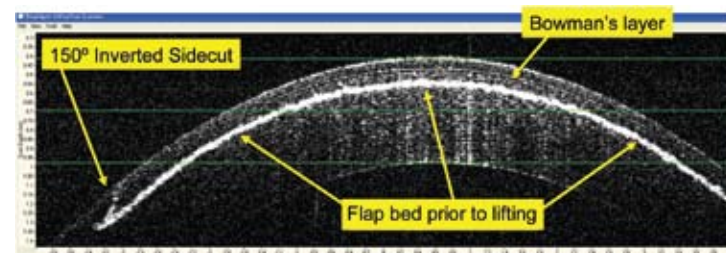


Figure 1. 150° inverted side cut as seen with a Biotigen OCT.

## Results (continued)

A double-angle plot of the change in astigmatism (Fig.4) shows symmetrical angular distribution centered at the origin for both round and elliptical flaps, confirming that neither round nor elliptical flaps cause significant astigmatism changes.

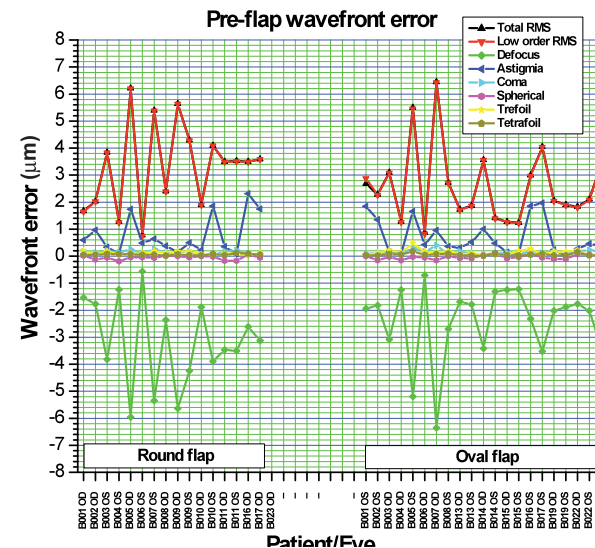


Figure 2. Baseline measurements of wavefront aberrations of the eyes.

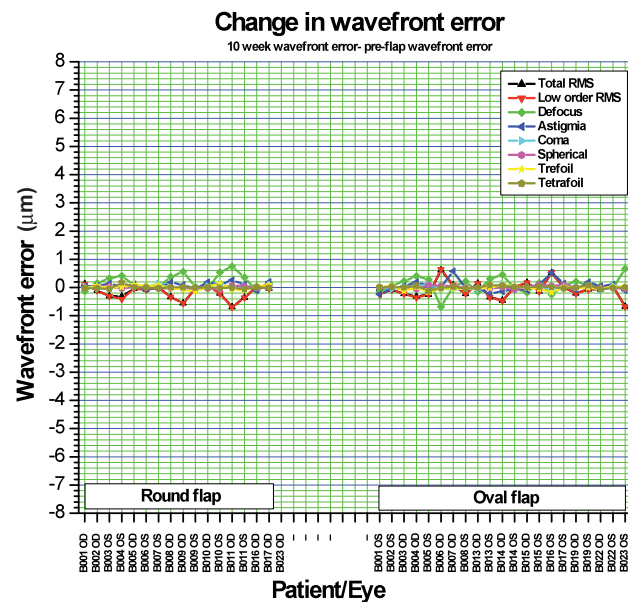


Figure 3. Change in wavefront aberrations at 10 weeks and before excimer ablation.

## Results (continued)

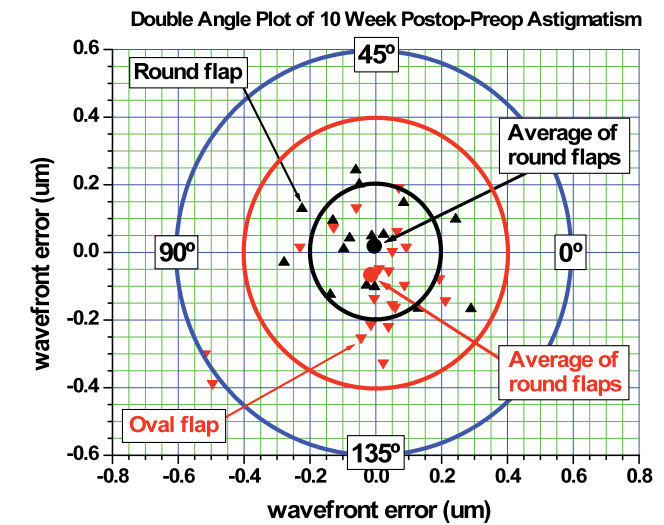


Figure 4. Double-angle plot of the change in astigmatism.

## Conclusions

Elliptical flaps, which are similar to the natural shape of the eye, do not induce astigmatism aberrations. Moving the hinge peripherally allows maximum exposure of the stromal bed and full delivery of excimer ablation. Additionally, inverted side cuts may produce biomechanically stronger flaps. Elliptical flaps also prevent resection of the vital peripheral corneal fibers that lend biomechanical strength to the cornea.<sup>2</sup>

## References

1. Tran D, Sarayba M, Bor Z, Garufis C, et al, Randomized prospective clinical study comparing induced aberrations with IntraLase and Hansatome flap creation in fellow eyes. Potential impact on wavefront-guided laser *in situ* keratomileusis. J Cataract Refract Surg. (2005) 31:97–105
2. Knorz M, Vossmerbaeumer U. Comparison of flap adhesion strength using the Amadeus microkeratome and the IntraLase iFS femtosecond laser in rabbits. J Refract Surg. (2008) 24:875–8