A Prospective Evaluation of Femtosecond Laser Arcuate Incisions to Treat Low-Corneal Astigmatism using a Femtosecond Laser System

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PURPOSE

To evaluate the safety, efficacy, and predictability of laser arcuate incisions in reducing low level corneal astigmatism in patients undergoing cataract extraction using the CATALYS Femtosecond Laser System, the Cassini Ambient topographer to measure anterior and posterior corneal astigmatism, and the Donnenfeld arcuate nomogram.

METHOD

Astigmatism will be evaluated preoperatively, 1 and 3 months postoperatively by automated keratometry, Cassini Ambient corneal topography, IOL master 700 keratometry, automated and manifest refraction.

The arcuate incisions were performed using the CATALYS Femtosecond Laser System employing cOS 6.0 software based on measurements of the anterior and posterior cylinder from the Cassini Ambient topographer.

Incision depth was 80% corneal pachymetry, incision angle 90 degrees, and incision optical zone 8 mm. Arc lengths were A. 0.375.

RESULTS

- 82 eyes of 82 patients with a mean age of 68.9 years had cataract surgery with femtosecond laser arcuate incisions to reduce preop astigmatism
- Mean total preop Cassini Ambient astigmatism was 0.87D SD 0.30, Group A 0.55D; SD 0.29, Group B 0.78D; SD 0.10, Group C 1.01D; SD 0.17, Group D 1.28D; SD 0.13.
- Cassini Ambient astigmatism at 1 month postop of 0.64D, SD 0.39 (P=0.0001) and 3 months 0.48, SD 0.31 (P=0.0001) was statistically reduced
- Manifest astigmatism preop was 0.74D, SD 0.47 was reduced to 0.40D, SD 0.26 at 1 month (P=0.0001) and 0.20D, SD 0.25 at 3 months (P=0.00001).
- Mean Logmar UCVA of 0.67, SD 0.32 improved to 0.13, SD 0.13 at 1 month (P=0.00001) and 0.06, SD 0.10 at 3 months (P=0.00001)

CONCLUSION

Astigmatic arcuate incisions for low cylinder using the Catalys femtosecond laser, the Donnenfeld nomogram, and automating the registration of the axis and the magnitude of the cylinder from the Cassini Ambient topographer resulted in a significant reduction in objective and refractive astigmatism contributing to an improvement in UCVA.