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Femtosecond-assisted Myopic LASIK and CXL: Long-term Comparison of LASIK Combined with Prophylactic High-fluence Cross-Linking to Stand-alone LASIK.

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Purpose

To evaluate the possible topographic epithelial profile thickness changes (remodeling) following high myopic femtosecond-LASIK with concurrent prophylactic high-fluence cross-linking in comparison to standard femtosecond LASIK.

Methods

140 eyes of consecutive patients with myopic LASIK were recruited.

- Group-A: 65 eyes treated additionally with concurrent prophylactic high fluence CXL (LASIK-CXL; soaking 60" then 45mW × 80");
- Group-B: 75 eyes subjected to stand-alone procedure.

- The following parameters were evaluated pre-operatively and one-year post-operatively:
  - manifest refractive spherical error (MRSE),
  - refractive astigmatism,
  - best spectacle-corrected distance visual acuity (CDVA),
  - uncorrected distance visual acuity (UDVA), and
  - corneal keratometry (via Scheimpflug imaging and autorefraction keratometry).

Background

What was Known

• There can be regression after LASIK in high myopia treatments. This may reflect altered cornea biomechanical properties.

• Comparative clinical data are lacking of the combined procedure of LASIK with prophylactic CXL application.

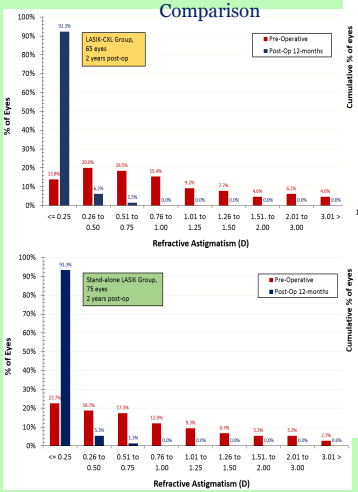
What this Work Adds

• LASIK combined with CXL in higher myopia appears to be a safe and effective treatment.

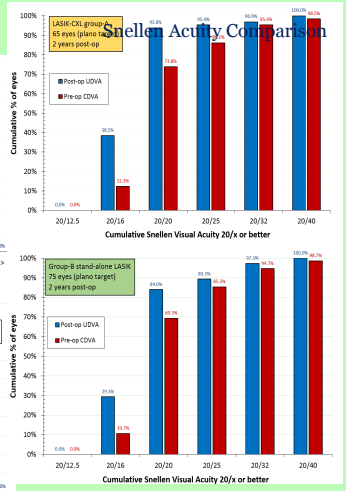
• LASIK combined with CXL appears to reduce the likelihood of postoperative regression.

Results

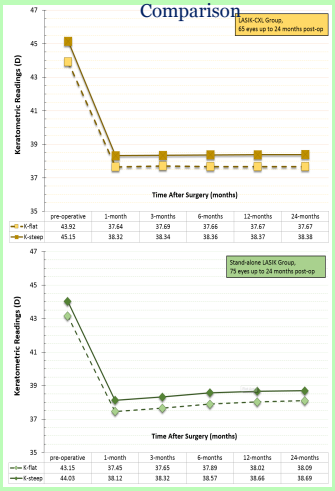
Refractive Astigmatism Comparison



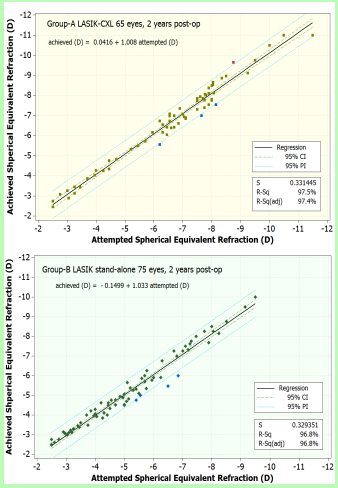
Snellen Acuity Comparison



Keratometric Stability Comparison



Predictability Comparison



Discussion

Our group has reported a large number of successful LASIK-CXL procedures over the last 8 years and we view this prophylactic treatment as a pivotal biomechanical enhancement of a LASIK procedure in young adults under the age of 30, with high myopia and/or astigmatism, and any patient with a difference in the amount of the astigmatism between the two eyes of over 0.5D.

In our opinion, it does not merit "leniency" with pre-operative form-fruste keratoconus criteria. All cases studied in this work, as well as in previous reports by our group, have been screened thoroughly for any signs of tomographic cornea irregularity.

We propose and document in this study that keratometric stability may be a more objective measure of 2-year efficacy, and proved in our data to be statistically better in the LASIK-CXL group-A ($p = 0.032$). This correlation is compelling in our opinion.

Regarding Visual Acuity results: the differences between the percentage of cases between the two groups in achieving UDVA of 20/20 and 20/25 levels were statistically significant: p=0.045 and 0.039, respectively with the LASIK-CXL group performing superior.

Conclusions

- High-myopic LASIK combined with prophylactic cross-linking intervention appears to provide predictability, as well as refractive and keratometric stability in comparison to stand-alone similar LASIK data. The data reported in this study provide evidence of the safety and efficacy of this approach.
- The adjuvant cross-linking procedure may provide enhanced corneal biomechanical stability, especially in high myopic and younger eyes.
- The procedure is safe and opens up a new potential for LASIK application in myopic corrections.

Commercial Relationship(s) Disclosure:
A. John Kanellopoulos: Consultant for Alcon, Avedro, OptoVue, i-Optics
G. Asimellis: none