Background: Photorefractive keratectomy combined with corneal collagen crosslinking (Athens protocol) and intrastromal corneal ring segments are procedures used to stabilize the cornea and improve visual acuity in patients with progressive keratoconus and contact lens intolerance.

Purpose: To compare visual and refractive results in keratoconic eyes submitted to photorefractive keratectomy and corneal collagen crosslinking (Athens protocol) with those obtained with intrastromal corneal ring segments.

Methods: Retrospective study. Thirty-four patients with keratoconus were studied preoperatively and at months 1, 3 and 6 for visual acuity with Snellen scale, anterior segment OCT (Spectralis® or Optovue®) and topography (Orbscan II®, Bausch & Lomb, Rochester, New York, USA and Pentacam®, Oculus Optikgerate GmbH, Wetzlar, Germany). Two groups were formed, ie, Athens group (Athens protocol) and Intrastromal Corneal Ring Segments group (ICRS). Third and sixth month changes in visual acuity, keratometry and pachymetry were evaluated.

Results: We included 20 patients in Athens group and 14 in ICRS group. In the Athens group the mean age was 28.79 ± 7.85 years (range from 15.00 to 42.00) and in the ICRS group was 23.20 ± 2.93 years (range from 19.00 to 29.00).

There was a significant improvement in visual acuity, expressed as the difference between 6th month and preoperative corrected distance visual acuity (CDVA) of -0.14 ± 0.26 logMAR (p=0.039) for Athens group and of -0.14 ± 0.23 logMAR (p=0.030) for ICRS group.

There was no significant difference in CDVA between both groups at 1st, 3rd or 6th month. A non-significant reduction in spherical equivalent was observed in both groups.

In Athens group we observed a reduction in pachymetry at the 3rd month (p=0.001), that stabilized at the 6th month (p=0.052). The ICRS group did not demonstrate a significant difference in pachymetry. The K1, K2 and Kmax were significantly reduced at the 6th month in the Athens group (p<0.05). In ICRS group, K2 and Kmax also decreased significantly at 6th month (p<0.05).

Conclusions: Both procedures proved to be safe and effective in patients with keratoconus, achieving a significant improvement in visual outcomes. Topography-guided PRK combined with cross-linking also led to a faster visual recovery and more complete corneal regularization (reduction of K1, K2, Kmax) at the expense of a small decrease in pachymetry, which tends to recover towards the 6th month follow-up.