NON - TOPOGRAPHY – GUIDED PHOTOREFRACTIVE KERATECTOMY COMBINED WITH CORNEAL CROSS LINKING FOR TREATMENT OF EARLY STAGE KERATOCONUS

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Introduction

Keratoconus is a progressive, bilateral ectatic disease affecting adolescents, causing apical corneal bulging, thinning, and distortion, leading to ocular aberrations, in severe cases may lead to reduced vision, and irregular astigmatism. The etiology and pathogenesis of keratoconus are not known; however, various genetic and environmental risk factors have been implicated. Keratoconus management varies, with mild patients using eyeglasses and moderate patients using contact lenses. Corneal transplantation was once the only option, but keratoplasty is now considered as an alternative. Laser-assisted in situ keratomileusis (LASIK) and photorefractive keratectomy (PRK) considered contraindication for over a decade due to increased risk of keratectasia, but advances in technology and corneal collagen cross-linking (CXL) allow rethinking. Todays, PRK considered alternative to keratoplasty with CXL. CXL treatment for keratoconus uses UVA activation, riboflavin, and collagen fibrils to strengthen cornea. Treatment with PRK / CXL is to strengthen the cornea and stop disease progression.

Aim of the Work

The aim of this study was to evaluate the visual outcomes of simultaneous non - topography guided photorefractive keratectomy (PRK) and corneal collagen cross - linking (CXL) in eyes with early stage keratoconus.

Patients and Methods

The study was conducted over a period starting from February 2021 to December 2021.
Inclusion criteria: Patients between the age of 18 and 40ys with keratoconus (stage 1 or 2), intolerant to contact lens, had a corneal thickness of > 400µm at the thinnest point.
Exclusion criteria: Pregnant and lactating women, patients with any of the following (advanced keratoconus, diabetes mellitus, corneal scarring, previous intraocular surgery, incomplete documentation, concomitant eye disease e.g. glucoma, autoimmune disease, or with a history of herpetic keratitis).
Methods: All the patients were subjected to: History-Taking. (**Examination:** Visual acuity, slit lamp, keratometry).
(Surgical procedures: Topical anesthesia with benoxinate HCL, Benox.

Then the corneal epithelium was removed 8-9mm manually using a hockey knife. Non topography–guided PRK was performed by wave light Ex 500excimer laser system (Alcon laboratoris; Ft Worth, TX, USA) with an optical zone 6.0mm with maximal ablation depth 60µm. Mitomycin 0.2mg/ml was then applied for 20 to 40 seconds according to ablation depth. PRK was followed by CXL. Irrigation with balanced salt solution was followed by corneal soaking with riboflavin (0.1% riboflavin sodium phosphate ophthalmic solution) for 30 minutes. Cornea was irradiated for 5 minutes by ultraviolet 365nm light with fluence. A bandage soft contact lens (Focus Dailies, CiBA vision) was applied on the cornea until complete epithelialization.

Results

Table 1: Comparison between preoperative and 6 months postoperative according to visual acuity (UCVA &BCVA) (n = 36)

	Preoperative	6months Postoperative	Z	P
UCVA(decimal)				
Range	0.05 – 0.40	0.20 – 1.0	5.180*	<0.001*
Mean ± SD.	0.22 ± 0.11	0.81 ± 0.18		
Improvement	↑0.60 ± 0.19			
BCVA (decimal)				
Range	0.50 – 1.0	0.50 – 1.0	5.067*	<0.001*
Mean ± SD.	0.65 ± 0.12	0.92 ± 0.12		
Improvement	↑0.27 ± 0.13			

SD: Standard deviation
p: p value for comparing between Pre and Post
Z: Wilcoxon signed ranks test
*: Statistically significant at p ≤ 0.05

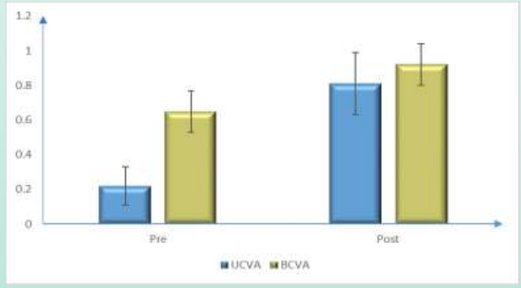

Figure 1: Comparison between preoperative and 6 months postoperative according to UCVA and BCVA.

Table 2: Comparison between Preoperative and 6ms Postoperative according to topographic findings (n = 36)

	Preoperative	Postoperative	t	p
K1 (D)				
Range	41.0 – 51.0	40.0 – 46.0	7.943*	<0.001*
Mean ± SD.	44.42 ± 1.94	42.36 ± 1.59		
Decreased	↓2.06 ± 1.55			
K2 (D)				
Range	43.50 – 53.0	41.0 – 48.0	7.780*	<0.001*
Mean ± SD.	46.46 ± 1.97	44.53 ± 1.89		
Decreased	↓1.93 ± 1.49			
KM (D)				
Range	44.0 – 60.40	41.0 – 53.0	7.212*	<0.001*
Mean ± SD.	47.76 ± 3.87	44.39 ± 2.60		
Decreased	↓3.38 ± 2.81			
Central corneal thickness (microns)				
Range	422.0 – 574.0	370.0 – 556.0	14.315*	<0.001*
Mean ± SD.	495.7 ± 39.88	458.0 ± 39.67		
Decreased	↓37.67 ± 15.79			

SD: tandard deviation
t: Paired t-test
p: p value for comparing between Pre and Post
D:diopter
*: Statistically significant at p ≤ 0.05

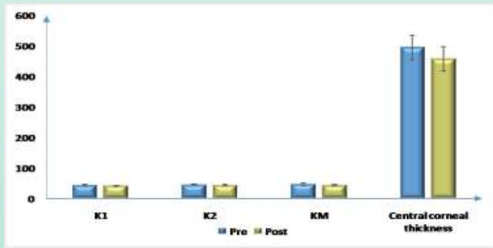

Figure 2: Comparison between preoperative and 6ms postoperative according to topographic findings.

Conclusion

Combined non-topography – guided PRK and CXL is an effective and safe option for correcting mild refractive error and improving visual acuity in patients with early stable keratoconus.