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Visual and refractive outcomes of combined excimer laser ablation with corneal collagen cross linking in subclinical keratoconus

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Introduction: Excimer laser surgeries correct refractive error by corneal tissue ablation, which also lead to the weakening of the biomechanical strength of the cornea and therefore, increase the risk of developing postoperative keratectasia. The incidence of post-refractive surgery ectasia is greatly enhanced by the presence of conditions associated with low residual stromal bed thickness (< 250 μm) either from excessive ablation (high myopia) or thick flap creation, or presence of pre-existing topographic abnormalities such as sub-clinical keratoconus. As the risk of post-refractive surgery ectatic complications, sub-clinical keratoconus is considered as a contraindication to LASIK. There are reports which suggest that patients with preoperative risk factors could be offered PRK as an alternative to LASIK; however, the risk of progression to keratoconus after PRK still prevails. As such, general consensus has been that excimer laser ablation procedures should be avoided in eyes with sub-clinical keratoconus. In recent years, riboflavin-ultraviolet A (UVA) corneal collagen cross-linking (CXL) has been successfully used to halt the progression of keratoconus. CXL alone has helped in retarding or eliminating the progression of keratoconus and post-refractive surgery ectasia. Additionally, in highly irregular corneas with progressive keratoconus, the combination of topography-guided PRK with CXL has also been found to significantly decrease corneal irregularity and improve visual acuity as well as halt the progression of keratoconus at the same time. The combination of LASIK and accelerated CXL has also been evaluated for reducing the risk for postoperative keratectasia in a population at risk but with no corneal abnormalities and has been found to be safe and effective with respect to refractive outcomes. It has been established that prophylactic collagen cross-linking is safe in routine LASIK cases. Due to the successful use of CXL alone or in combination with topography guided PRK in eyes with manifest keratoconus, there has been a revival of interest about the possibility of performing laser vision correction safely in eyes with sub-clinical keratoconus. In patients with subclinical keratoconus, simultaneous CXL with PRK may offer both spectacle/contact lens freedom and stability of their ectatic disorder at the same time. This paper presents a series of patients with subclinical keratoconus, who have undergone combined, same-day, topography-guided PRK followed by accelerated CXL.

Aim: The purpose of the study was to evaluate the efficacy, safety and stability of visual and refractive outcomes of the combined topography guided PRK with accelerated CXL in eyes with subclinical keratoconus.

Methods: Simultaneous topography-guided PRK with accelerated CXL was performed in 140 eyes of 75 patients (mean age 25.73±5.2 years) with subclinical keratoconus and were followed up at 1, 3, 6 and 12 months. Study parameters included preoperative and postoperative uncorrected distance visual acuity (UDVA), corrected distance visual acuity (CDVA), manifest refraction and keratometry (flat and steep).

Results: All refractive and keratometric parameters demonstrated a statistically significant improvement from baseline to postoperative 12 months. UDVA of 20/20 or better was achieved in 90.7% (127/140) eyes and 20/40 or better was achieved in 96.4% (135/140) eyes at last follow-up. Regarding refractive outcomes; 94.3% (132/140) eyes were within ±1.00 D of attempted refractive correction and 82.9% (116/140) eyes had an astigmatism of ≤ 0.25 D postoperatively as compared to 22.9% (32/140) eyes at preoperative levels. Regarding safety, 90.7% (127/140) eyes maintained their preoperative CDVA; 2.1% (3/140) eyes lost 1 line, 3.6% (5/140) eyes lost 2 lines and 3.6% (5/140) eyes lost 3 or more lines of CDVA. Corneal haze was observed in 7.14% (10/140) and corneal ectasia developed in 1 eye (0.7%).

Conclusion: Combining topography-guided PRK with accelerated CXL appears to be safe and effective surgical refractive procedure to offer spectacle-independence in eyes with subclinical keratoconus.

Biography

Talal Althomali is an Associate Professor of Ophthalmology and the Vice Dean of Hospital Affairs at Taif University and a Consultant Physician of Pediatric Ophthalmology at King Khaled Eye Specialist Hospital, Riyadh and King Abdul-Aziz Specialist Hospital, Tertiary and Referral Center in the Western Region, Saudi Arabia. With outstanding educational and research activities, he has excellent experience in surgeries. He is active member of numerous ophthalmology organizations. Actively participated in many ophthalmology meetings including American academy meeting 2014, American Society of Cataract and Refractive Surgeons 2014, European Society of Cataract and Refractive Surgeon 2008-2015, World Congress of Pediatric Ophthalmology and Strabismus 2012&2015 and International Ophthalmology Congress 2014, where some of his research was selected to be amongst the top studies.

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