Femtosecond laser-assisted implantation of a single intrastromal corneal ring segment for type I and II keratoconus based on Q value and corneal topography: a new modified nomogram

Protocol study

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INTRODUCTION

Keratoconus is an ectatic disease of the cornea characterized by localized progressive thinning and forward protrusion of the cornea.[1] There have been several management options discussed for keratoconus including collagen crosslinking (CXL), topography guided ablation, intrastromal corneal ring segment (ICRS) implantation and keratoplasty.[2-7]

Both the surgeon and the patient are likely to be reluctant to opt for a keratoplasty when the cornea is clear because of the possible post-operative complications. These potential complications could be avoided by a relatively less invasive surgical intervention like ICRS implantation.[8-10]

ICRS have been found to be useful in correcting ectatic corneal disorders by reducing corneal steepening and decreasing irregular astigmatism thus potentially improving the visual acuity. It can also be considered as an option to defer if not eliminate, the need for keratoplasty in these patients.[1-7]

Keratoconus (KC) is a non-inflammatory, ectatic, bilateral and progressive corneal stromal disorder with a reported prevalence of 20 in 100,000 in the general population.1 Beginning in adolescence and young adulthood, its pathology involves progressive thinning and steepening of the cornea which manifests early on as reduced vision due to progressive myopia, corneal

astigmatism which eventually becomes of the irregular type, and appreciable higher-order aberrations, and may end in corneal scarring.2

Improvement in visual acuity and refraction after ICRS implantation is accomplished by a shortening of collagen lamellae along the arc length of the ring. There is a redistribution of corneal stress due to the change in the shape of the cornea after implantation of ICRS.[11,12]

Keraring is an orthosis implanted in the corneal stroma. It acts upon corneal tissue by altering its central curvature and shape, thus reducing or eliminating morphological irregularities and existing myopia and astigmatism. They are available as 160° segments made of PMMA. They are triangular in cross-section with a 600 micron base and an apical diameter of 5 mm. They come in variable thickness (0.15, 0.20, 0.25, 0.30 and 0.35 mm) in 0.05 mm steps.[5]

The change in the corneal structure induced by any ICRS can be roughly estimated by the Barraquer thickness law; therefore, the outcome achieved is directly proportional to the thickness of the ICRS and inversely proportional to its diameter.[1, 7, 11]

PURPOSE

To analyze the results of outcomes of Femtosecond laser-assisted implantation of a single intrastromal corneal ring segment for type I and II keratoconus based on Q value and corneal topography.

PATIENTS AND METHODS

Design: A prospective non-comparative clinical study.

The author will obtain the approval of the ethical committee in faculty of medeicine in Sohag University Hospital and informed consent will obtained from all patients**.**

This study will be conducted on 100 eyes. Control group will include KC 50 eyes as control group with matching the same age group and subjected to surgery. Q Value group will include 50 eyes with type I and II keratoconus. All patients were subjected femtosecond laser single segment keraring implantation based on Q value for keratoconus management. The patient will followed up for 3 months after surgery.

All patients were subjected to complete ophthalmologic examinations that included measurement of the uncorrected visual acuity (UCVA), best spectacle-corrected visual acuity (BSCVA), manifest refraction, slit lamp examination of anterior segment, intraocular pressure measurement and a detailed fundus examination.

patients were subjected to preoperative and postoperative UCVA, BCVA, refraction, Pentacam pachymetry and keratometry examinations at 1, 3 and 6 months follow up period.

The ring segments were chosen based on a nomogram from the manufacturer.

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تقييم ادخال تعديل فى المخطط التقليدى لزرع الحلقات بالفيمتو ليزر اعتمادا على قيمة الكيو مع زرع حلقه واحده فقط لعلاج المرحلة الأولى والثانية من القرنية المخروطية

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