Case Report

CLINICAL OUTCOMES OF ACCELERATED EPITHELIUM-OFF CORNEAL COLLAGEN CROSS-LINKING FOR: A CASE OF ULTRATHIN POSTLASIK ECTATIC CORNEA

Mounir, A.(*), Korishy, M. & Mostafa, E.
Ophthalmology dept., Faculty of Medicine, Sohag Univ., Sohag, Egypt

*E-mail: dramrmonir@yahoo.com

Received 12/1/2020
Accepted 22/4/2020

Abstract

29-year-old male with left eye diagnosed as post Lasik ectasia with extremely thin cornea after 3 years of uneventful Lasik surgery diagnosed by Scheimpflug based tomography device (Oculus Inc., Wetzlar, Germany). The uncorrected visual acuity (UCVA) in the left eye (LE) was 0.1 in decimal corrected to 0.4 by a refraction of -6.75Ds -4.50DC @120, while the UCVA in the right eye (RE) was 1 in decimal without correction. Accelerated epithelium-off corneal cross-linking with pachymetric-guided corneal epithelial removal by (Avedro, USA) was done for the affected eye. The patient was followed up for one year with improvement of visual acuity as regards UCVA and BCVA and improvement of corneal topographic parameters including keratometry including mean K, Kmax and Belin ABCD keratoconus staging.

Keywords: Epithelium-off corneal collagen cross-linking, Post Lasik ectasia, Ultrathin cornea

1. Introduction

Ectasias post corneal refractive surgery is caused by non-inflammatory biomechanical weakening of the cornea, with associated thinning and protrusion [1]. It is manifested by deterioration in visual acuity due to progressive myopia and irregular astigmatism caused by increasing corneal curvature [2,3]. Deep laser ablation with myopia >8 D and an increased Percentage Thickness Ablation (PTA) were the commonest risk factors for ectasia development in addition to preoperative corneal pachymetry <500 μm and eyes with preexisting topographic abnormalities like forme fruste keratoconus and pellucid marginal degeneration [4,5]. Treatment of ectasia includes various management modalities including glasses, hard contact lenses, Intracorneal ring segments (ICRS) and Corneal Cross-Linking (CXL) [6]. CXL has been approved and is being used in routine basis in for both keratoconus and ectasia after LASIK [7]. As one line of management, corneal collagen cross linking has been proved to be an efficient in halting the ectatic pathological process in the majority of patients with progressive keratoconus [8]. Standard CXL treatment
with epithelial debridement is contraindi-
cated in the presence of corneal thickness
of less than 400 um as it may cause
irreversible endothelial damage [9]. Acce-
lerated corneal collagen cross linking was
developed to maintain total irradiance
with accelerated treatment time by total
irradiation increase [10]. In this case report,
we presented the clinical outcomes of
accelerated epithelium-Off corneal collagen
cross-linking after pachymetric-guided
corneal epithelial removal for a case of
ultrathin postlasik ectatic cornea.

2. Case Presentation
29-year-old male patient presented
to the Cornea clinic of the Sohag Center
for Lasik and Corneal Surgeries, Sohag,
Egypt. The patient complained of left
decreased vision after 3 years of Lasik eye
surgery due to recent developing error of
refraction. The uncorrected visual acuity
(UCVA) in the left eye (LE) was 0.01 in
decimal corrected to 0.4 by a refraction of
-6.75Ds -4.5 Ddc @120, while the UCVA
in the right eye (RE) was 1 in decimal
without correction. Slit-lamp examination
(RM-8900, TOPCON, Japan) of the anterior
segment was normal in both eyes with
bilateral clear cornea. There were no
detected corneal scars or ghost vessels.
In both eyes, there were normal corneal
diameter and normal scleral color, with no
edema or endothelial abnormalities. No
iris abnormalities or lens opacities were
detected. The fundus examination was
performed, and it was normal. There was
no positive family history of ectatic corneal
disorders or systemic metabolic disorders
like diabetes mellitus. Left corneal tomography
was performed with corneal
tomographic examination by Scheimpflug
based tomography device (Oculus Inc.,
Wetzlar, Germany), which revealed a
central cone with steep cornea (mean K:
45.6 um, Max K: 52.6 um). Central
corneal thickness was extremely thin
with thinnest location: 370 um and 375
um at the apex. Anterior and posterior
elevations were high (+30 um, +70 um),
fig. (1-a). Corneal tomography of the
right eye was normal while the left eye
was diagnosed as post Lasik ectasia. The
decision was to do accelerated epithelium-
off corneal collagen cross-linking for the left
eye. Corneal epithelium was mechanically
removed with pachymetric-guided corneal
epithelial removal. The corneal surface
was treated first by Vibex rapid (Isotonic
0.1% riboflavin with hydroxypropyl-
methylcellulose) for 15 mins which was
applied every 90 s during the soak time.
The treated corneal stroma and anterior
chamber saturation were confirmed by slit-
lamp examination. Then the cornea was
treated by the KXL® System accelerated
CXL (Avedro) for 3 minutes using the
pulsed mode with 30 m W/cm² power and
total dose intensity: 5.4 J/cm². A soft contact
lens bandage was applied at the end of
surgery. The postoperative medication in-
cluded topical antibiotics eye drops (e.g.
moxifloxacin hydrochloride 0.5% 5 times/
day for one week), topical steroid eye drops
(e.g. Prednisolone acetate 1% 5 times/day
for one week, Lubricant eye drops and
systemic non-steroidal anti-inflammatory
drugs. The soft contact lens bandage was
removed after 1 week. The patient was
followed up for one year (Every 3 months).
The follow up showed improvement in
UCVA and BCVA together with corneal
tomographic parameters improvement in-
cluding Kmax, K mean and ABCD Belin,
the results are summarized in tab. (1)
and shows in figs. (1-b, c, d).
Table 1: The follow up of the refractive and topographic changes in Left eye after accelerated epi-off CXL through one year by Pentacam Scheimpflug device (Oculus GmBH, Wetzlar, Germany)

<table>
<thead>
<tr>
<th></th>
<th>Refraction</th>
<th>UCVA</th>
<th>BCVA</th>
<th>Mean K</th>
<th>K Max</th>
<th>Thinnest Location</th>
<th>ABCD Belin Staging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>-6.75 Ds</td>
<td>0.01</td>
<td>0.3</td>
<td>47.00D</td>
<td>56.1D</td>
<td>367 um</td>
<td>A3B5+C3D4</td>
</tr>
<tr>
<td>3rd month post-CXL</td>
<td>-4.00 Ds</td>
<td>0.1</td>
<td>0.3</td>
<td>46.60D</td>
<td>54.72D</td>
<td>381 um</td>
<td>A2B4+C3D3</td>
</tr>
<tr>
<td>6th month post-CXL</td>
<td>-3.25 Ds</td>
<td>0.1</td>
<td>0.4</td>
<td>45.60D</td>
<td>52.44D</td>
<td>370 um</td>
<td>A2B4+C3D2</td>
</tr>
<tr>
<td>12th month post-CXL</td>
<td>-2.75 Ds</td>
<td>0.3</td>
<td>0.6</td>
<td>44.9D</td>
<td>50.3D</td>
<td>370 um</td>
<td>A1B4+C3D2</td>
</tr>
</tbody>
</table>

![Figure (1).](image1) (A) Pre CXL (B) Post one year CXL (C) Post one year CXL (D) Post one year CXL

3. Discussion

Post-LASIK ectasia can be defined as a progressive corneal deformation causing a refractive and optical instability after uneventful laser in situ keratomileusis surgery [11]. The clinical signs of this complication include a combination of corneal stromal thinning, anterior and posterior corneal steepening, a progressive increase in myopia, irregular astigmatism, and corneal aberrations, followed by a progressive loss of corrected distance visual acuity [12-14]. In our case, post Lasik ectasia developed in one eye after 3 years of uneventful Lasik eye surgery presented
with recent developing error of refraction. The treatment decision was to do corneal collagen crosslinking, but the main limitation of this treatment was the very low corneal thickness (367 µm) after corneal tomographic examination. Usually, CXL is performed on eyes with a corneal thickness of at least 400 µm to avoid the cytotoxic impacts of the UVA on the corneal endothelium, lens, and other intraocular tissues [15]. So, standard CXL is considered a challenge in such ultrathin ectatic with previous Lasik surgery [16-17]. Multiple studies investigated CXL in such thin ectatic corneas, in a study of Kymionis GD et al, [18] they investigated a modified method for epithelial removal prior to CXL in 2 patients with regional thinning (less than 400 microns corresponding to the area of corneal steepening), they found no intra- or postoperative adverse events seen by the nine months follow up examination with stabilization of the corneal ectasia. Also, in a study of Hafezi F., et al, [19] they investigated a modified treatment protocol by swelling thin corneas to a stromal thickness of at least 400 µm using hypoosmolar riboflavin solution. This treatment protocol was done in a case series of 20 patients, and no complications were observed. However, the use of this technique was limited due to increased intraoperative time and a relatively lower concentration of collagen in the hydrated stoma [20]. We avoided to use the transepithelial CXL treatment because of its low efficacy as compared to conventional treatment especially in stabilizing or improving keratometry [21]. After performing accelerated epithelium-off corneal collagen cross-linking, follow up was done for one year, no complications were detected and with improvement of visual and topographic parameters including ABCD Belin staging system which had been proven to be an effective method to reflect the anatomical changes seen in keratoconus and other ectatic diseases [22].

Conclusion

Accelerated epithelium-Off corneal collagen cross-linking after pachymetric-guided corneal epithelial removal was found to be safe and effective method in stabilizing and improving a case of ultrathin post Lasik ectatic cornea after one year follow up.

References


