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The Usage Of Mitomycin-C With Photorefractive Keratectomy In Myopic Patients And Its Effect On Density Of Corneal Endothelium

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ABSTRACT: To evaluate the application of mitomycin-C on the density ofcorneal endothelialiumafter photorefractive keratectomy (PRK) in myopia patients. We use case control study to evaluate 92 eyes of 46 patients (23 cases and 23 controls) with mean age of 27.6 years for cases group and 27.4 for control group (range: 20 - 40). All patients were myopic ranged from -3.00 to -6D underwent photorefractive keratectomy (PRK). The first group (cases) was treated with single usage ofmitomycin-c for 30 seconds and second group (control) group was treated without mitomycin-c. The assessment was done by specular microscope before the procedure and after 3 months postoperatively for each eye to evaluate the density in corneal endothelialium (ECD) in both each group. Forty-six eyes of 23 cases and forty-six eyes of 23 control patients with myopia were treated with photorefractive keratectomy. After three months of surgery the mean ECD was decreased significantly.Theuse ofmitomycin-c for 30 seconds in myopic patients treated by PRK would affectcorneal endothelial cell density after three months postoperatively.

1. INTRODUCTION:

Over many years, mitomycin-c has been used to reduce corneal haziness after photo-ablation and in the treatment of already existing haziness [1]. Corneal haziness after photo- ablation may be the result of the healing process[2] that was probably initiated by keratocytesproliferation[3]. Mitomycin-C stop cells from proliferation by cross-linking DNA[4].Mitomycin-C hashold the

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proliferation of keratocytes[5] and widely used during many types of surgeries including pterygium removal, trabeculectomy, and surface ablation surgeries. Mitomycin-C has a disadvantage of potential damage to many types of corneal cells types including limbal cells, and endothelia.Many clinical[6, 7]and laboratory[8, 9] researches have reported significant corneal endothelial toxicity.

2. PATIENT AND METHOD:

We use case control study to evaluate 92 eyes of 46 patients, 23 cases (50%) and 23 controls (50%), with mean age of 27.6 years for cases group and 27.4 for control group (range: 20 - 40). Female were 16 cases and 17 controls .All patient were myopic ranged from -3.00 to -6.00D.Preoperative assessment of all patients were done that include history, visual acuity, manifest and cycloplegic refraction, slit lamp biomicroscopy, fundus examination, intraocular pressure by air puff tonometry, central corneal pachymetry, corneal topography by Sirus topographer, Specular microscopy (EM 3000, TOMY) to measure the density corneal endothelial cells (ECD). All these were performed by the same operator.

3. INCLUSION CRITERIA

Myopic patients of same refractive error in both eyes ranged from -3 to -6 D

4. EXCLUSION CRITERIA

keratoconus, corneal dystrophy, previous ocular trauma or surgery, cataract, glaucoma, retinal diseases and severe dry eye were excluded from our study as these are contraindications of photorefractive surgery.

5. SURGICAL TECHNIQUE

All patients were treated by photorefractive keratectomy by two ophthalmologist (at AL Basira eye center/ Basra / Iraq) using Carl Zeiss Mel 90 excimer laser machine.

Topical anesthetic eye drops was used .The removal ofcorneal epithelium was done by hockey spatula. Then the ablation was done with optical zone of 6.0 mm and manifest refractive error was taken as our target for correction in all patients. After that, a sponge soaked with mitomycin-C 0.02% (0.2 mg/mL, diluted in normal saline), was put over the treated area for 30 seconds in the first group followed by copious irrigation with normal saline, and finally we put a contact lens.

6. FOLLOW-UP PERIOD:

After surgery, all patients were given steroid/antibiotics eye drops (tobramycine+dexamethasone) every 4 hours, artificial tears eye drops (tear natural II) for 5 days. After 3 to 5 days the contact lens was removed. Then dexamethasone eye drop 0.1% 6 hourly for 4 weeks.

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The schedule of follow-up examinations were set 1, 5, 14, 30 days and 3 months after surgery, and we assess visual acuity and manifest refraction, and tonometry. Specular microscopy was repeated3 months after surgery.

The same were done for the second control group except the application of mitomycin-C and the patients was given the same eye drops and follow up examinations were set 1, 5, 14,30 days and 3 months. Specular microscopy was repeated 3 months after surgery.

7. RESULT

All patients had success photorefractive surgery with an average surgery time of 10-15 minutesand peaceful follow-up period without any complication in both group.

The analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 23 software.

Ninety-two eyes of 46 patients (23 cases &23 controls) with mean age of 27.6 years for cases group and 27.4 for control group (range: 20 - 40). Female were 16 (69.6%) cases and 17 controls (73.9%) as in the figure (1) and (2).

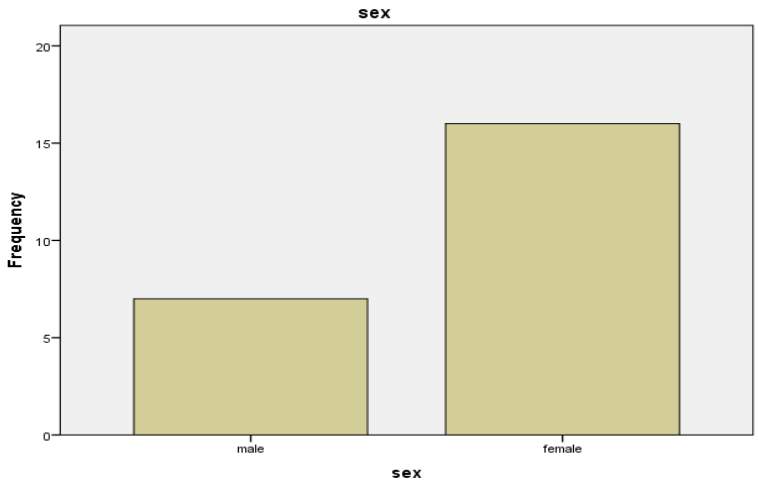

Figure (1) sex distribution of cases group:

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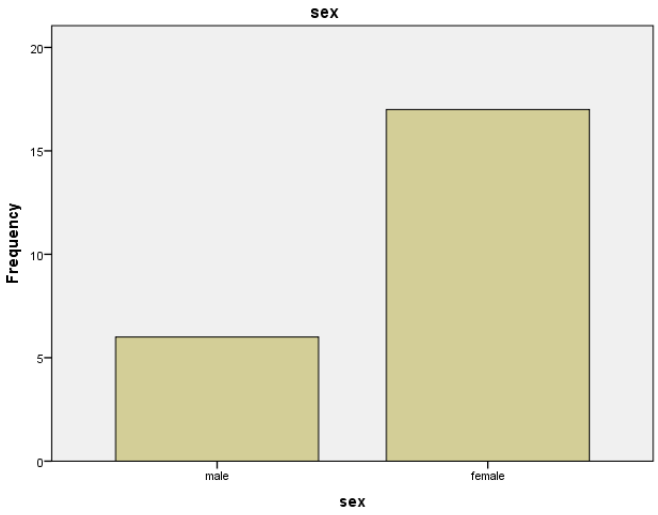

Figure (2) shows the sex distribution among control group:

All patient were myopic ranged from -3.00 to -6.00D with mean refraction of -4.57 D for cases group and -4.23 D for control group without differences regarding between central corneal thickness, and ablation depth between both groups.

For patients with mitomycin-c, 3 months after the procedure the mean ECD was reduced by 6.4% (p=0.01) from 2865.12 cells/mm² to 2679.32 cells/mm² for right eye and 5.1 %(p=0.02) from 2764 cells/mm² to 2623 cells/mm² for the left eye as show in table (1) below.

Table (1)

The mean corneal endothelial cell density of cases group

Eye	ECD prePRK	ECD AFTER 3MONTHS	P value
Right	2865.12	2679.32	0.01
Left	2764	2623	0.02

The mean ECD change insignificantly in the control group (without mitomycin-c) 3 month after the procedure from 2745 cells/mm² to 2662 cells/mm² for the right eye (3.02%) and from 2754 cells/ mm² to 2676 for the left eye (2.83%) as shown in table 2.

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Table (2)

The mean corneal endothelial cell density of control group

The Eye	ECD prePRK	ECD AFTER 3 MONTHS
Right Eye	2745	2662
Left Eye	2754	2676

8. DISCUSSION

Several researches have studied the application of mitomycin-c during photorefractive surgery and its effect on the corneal endothelium density. Although, most of these researches have concluded that insignificant reduction in corneal endothelium density with observation time from 3 to 18 months but with less application time[10, 11,12,13].

In contrast, clinical researches that found the application of mitomycin-c in photorefractive surgery causes significant reduction in corneal endothelium density are few in number and more recent. Two recent articles found significant decrease of endothelial central density after PRK with mitomycin-c [6, 7]. Nassiri et al[7] found that usage of 0.02% mitomycin-c led to significant decrease in corneal endothelial cell after a 6-month period and correlated with the application time of mitomycin-c during procedure. Morales et al[6] determined that 0.02% mitomycin-c application of 30 seconds caused significant reduction of corneal endothelium density after 3 months.

In our research we found the reduction in ECD was 6.4% in the RE and 5.1% in the LE after 30 seconds application time of mitomycin-c while the control eyes show reduction rate 3.02% in the RE and 2.83% in the LE.In the prime operation, the application time of mitomycin-c were twelve seconds to two minutes. Due to the interest about mitomycin-c benignity, a chain of alterations on the application of mitomycin-c have been proposed which conducted to reduce the application time of mitomycin-c with the target of haziness inhibition and least toxic effects.

Application of mitomycin-c 0.02% for 12 seconds with PRK had no significant effect on endothelial cell density or qualitative morphometric parameters[10].

If the concentration is high, mitomycin-c can be toxic to cornea [14, 15, 16].

9. CONCLUSION:

The use mitomycin-c 0.02% for 30 seconds with PRK in myopic patients would affect central corneal endothelial cell density after three months postoperatively.

So it is recommended to assess the corneal endothelial cell density in any suspected cases prior to any type of ocular surgery that needs adjuvant application of the mitomycin-c

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especially in the old patient or patient with history of trauma and take a special interest to the time of application.

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