Prophylactic Use of Mitomycin – C on Haze Formation in Photorefractive Keratectomy

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Purpose: To study the results of prophylactic use of Mitomycin – C on corneal haze after photorefractive keratectomy (PRK).

Material and Methods: Sixty – four eyes of 32 patients with myopia were enrolled in this prospective study. All patients were between the ages 20 years and 37 years with simple myopia range 6.0 D to 9.0 D. All eyes underwent PRK with application of 0.02% Mitomycin – C for 20 seconds and irrigation with 20 ml of normal saline. Patients were examined 1, 3 and 6 months after surgery. A scale of 0 to 4+ was used to grade the haze.

Results: Pre-operatively, mean spherical equivalent refraction (SE) was -8.34 diopters (D) range (6.0 D to 9.50 D). All eyes were examined 1, 3 and 6 months after surgery. One month after PRK, 2 patients (3.12%) having myopia 8.5 D and above developed grade 0.5 to 1.0 haze. However, at 3 months this haze disappeared completely in one patient, whereas, the second one continued to show corneal haze grade 0.5 till 6 months postoperatively. All eyes had uncorrected visual acuity of 6/9 or better, whereas 53 eyes (82.81%) achieved uncorrected visual acuity of 6/6 or better.

Conclusions: To prevent haze development in high myopia, Mitomycin – C makes a useful adjunct to Excimer laser PRK. However, further studies with a longer follow-up are required.

MATERIAL AND METHODS
64 eyes of 32 patients with a spherical equivalent of -6.0 D or above were enrolled in this non comparative, prospective interventional case series. Patients with dry eye syndrome, anterior and posterior uveitis, lens opacities, history of severe eye injuries, ocular surgery, Keratoconus, corneal dystrophies, glaucoma, retinal disorders and systemic diseases like collagen vascular disorders or diabetes were excluded from study. Orbscan was done on every patient preoperatively to rule out ecstatic corneal conditions and predict corneal thickness after PK, which was over 350 microns.

All eyes underwent photorefractive keratectomy using topical anesthesia by a single surgeon.

After marking 7.0 mm to 8mm in diameter by a marker depending upon the pupil size, the corneal epithelium was removed by a mechanical scrape, using a spatula. In all cases the ablation zone was 7.0mm to 8.0mm including 5.5mm to 6.0mm central optical zone and a 1.5mm to 2.0mm transitional zone. Laser ablation was performed with the Technolas 217-C laser.
Mitomycin-C 0.02 % was applied to the ablated area immediately for 20 seconds using microsponge. Then both cornea and conjunctiva were irrigated with 20 ml of normal saline. Bandage contact lens was applied on the cornea and removed on day 4. Patients were advised to take Vigamox, Nevanac and Fluoromethalone (FML) 0.1 % eye drops 4 times a day for 4 days and all eye drops were to be discontinued after day 4 except FML. All patients were advised to use FML eye drops 4 times a day for 1st month, 3 times a day for the 2nd month, twice a day for the 3rd month and once a day for the 4th month. The patients were advised to use artificial tears for irritation and discomfort as required.

Preoperative examination included best-corrected visual acuity (BCVA), manifest refraction, slit lamp examination, applanation tonometry, and corneal topography and dilated pupil examination of fundi for every patient. Bandage contact lenses were removed on day 4 after ensuring corneal healing. UNVA, BCVA refraction, slit-lamp examination, applanation tonometry, Orbscan were performed on every visit 1, 3 and 6 months postoperatively. Corneal haze was evaluated using Hanna scale from zero (no haze) to +4 (Dense corneal haze).

RESULTS

Sixty-four eyes of 32 patients (9 males and 23 females) with mean age of 30 years (range 21 to 39) underwent PRK. All eyes were examined 3 and 6 months after PRK. Pre-operatively, mean spherical equivalent refraction (SE) was -8.34 diopters (D) range (6.0 D to 9.50 D). Post-operatively 53 eyes (82.81%) achieved visual acuity of 6/6 or better. Mean central corneal thickness was 560 microns preoperatively and 357 microns postoperatively. At month 3 postoperatively, 37 eyes (57.81%) were within 0.5 D of emmetropia and 56 (87.5%) were within 1.0 D, while at 6 months the corresponding figures were 42 (65.62%) and 61 (95.31%) respectively. After 3 months, UCVA was 6/9 or better in 58 (90.62%) eyes, and 6/6 or better in 47 eyes (73.43%). After 6 months post-operatively, all(100%) eyes had 6/9 or better, whereas 53 eyes (82.81%) had 6/6 or better. 2 patients (3.12%) with myopia (-8.50 D or more) lost one line due to persistent 0.5 grade haze. No other post-operative complication occurred in any case.

DISCUSSION

There is always a risk of developing corneal haze in patients with high myopia undergoing PRK, which may be enhanced by darker skin color and exposure to sunlight. Mitomycin-C with antimetabolite properties exerts cytotoxic effects through inhibiting DNA synthesis and is used mainly as a systemic chemotherapeutic agent. It is already being used in conjunction with glaucoma, pterygium surgery and in conjunctival or corneal neoplasm. It prevents the stromal keratocyte proliferation and thus inhibits sub epithelial fibrosis. The effects of Mitomycin – C has been studied in experimental models by Talamo et al,9 Xu et al10 Majmudar et al5 and Carones et al6 and they have reported that prophylactic use of Mitomycin – C can eliminate the corneal haze after PRK and Radial keratotomy. Nassaralla BA et al11 found mitomycin C to be effective in preventing sub epithelial corneal haze following radial keratotomy. Fazel E, Roshani L, Rezae L12 also proved Mitomycin C be useful in
preventing frequency and severity of haze formation after PRK. Our results on a group of Pakistani patients with high myopia are comparable with the previous studies.

CONCLUSIONS
To prevent haze development in high myopia, mitomycin – C in addition to pharmacological modulation of wound healing using Fluoromethalone, makes a useful adjunct to Excimer laser PRK. However, further studies with a longer follow-up are required.

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REFERENCES