Australian Journal of Basic and Applied Sciences, 6(10): 511-517, 2012
ISSN 1991-8178

Evaluation of Results of Photorefractive Keratectomy (PRK) With Mitomycin in Selected Refractive Cases

Dr. Tamer Adel Refai MD and Dr. M. Tarek El-Naggar MD,

Research Institute of Ophthalmology, Cairo, Egypt.

Abstract: *Purpose*: To evaluate the accuracy of postoperative refraction ,UCVA,BCVA and possible complications after Photorefractive keratectomy (PRK) using mitomycin C in moderate to high myopia in selected refractive cases that are considered unsuitable for lasik.*Methods:* twenty one eyes (of 14 myopic patients) were subjected to Photorefractive keratectomy (PRK) using the The ALLEGRETTO WAVE EYE-Q 1010 with application of mitoycin C 0.02%. for one and half minutes after excimer laser ablation. All patients were examined 1,4,7,14 days and 1,3 months after surgery. *Results.*The age ranged from 20-46 years with a mean of 26.10±5.91years. The preoperative spherical equivalent refraction (Sph.EQ) ranged from (-2.50 to -9.50D) with a mean of -5.23 ± 2.09 diopters (D). The preoperative central pachymetry ranged from 489-581µ with a mean of 518.11±26.08µ. The preoperative average keratometric readings ranged from 39.8-45.9D with a mean of 43.02±1.63D. The postoperative spherical equivalent ranged from 0.5 to -1.25D with a mean value of -0.26 ±0.49D at 3 months after surgery.The UCVA increased from 0.06±0.03(range 0.017-0.1) preoperatively to 0.76±0.17(range 0.5-1.0) at 3 months postoperatively. The BSCVA increased from 0.84±0.17(range 0.5-1.0) preoperatively to 0.89±0.21(range 0.5-1.2) at 3 months postoperatively. Three months after surgery,all eyes had uncorrected visual acuity (UCVA) of 20/40 or better,14 eyes (81.0%) had uncorrected visual acuity of 20/30 and 4 eyes (19.05 %) achieved UCVA of 20/20.Regarding the BSCVA 3 months postoperatively,1 eye (4.76%) gained 4 snellen lines, 5 eyes (23.8%) gained 2 lines,4 eyes (19.04%) gained 1 line, while 11 eyes (52.36 %) showed no change in BSCVA .No eyes had lost any line of BSCVA.Grade 1 corneal haze developed in 5 cases (23.81%) but disappeared completely by 1 month after surgery by which time topical steroid drops was discontinued. Conclusion: PRK with Mitomycin-C provides a promising treatment line for moderate to high myopia in patients that are considered unsuitable for laser in situ keratomileusis (LASIK). However, further research with longer follow-up is suggested. *Financial disclosure(s):* The authors have no financial interest in any of the materials discussed in this article.

Key words: PRK mitomycin-moderate to high myopia –UCVA-BSCVA-spherical equivalent (Sph.EQ) corneal haze.

INTRODUCTION

Excimer laser ablation of the corneal stroma is popularly used to correct a refractive error by altering the anterior corneal curvature. Currently, 2 procedures are performed to treat myopia: surface ablation like photorefractive keratectomy (PRK) and laser in situ keratomileusis LASIK (Pop M, Payette Y 2000, Ambro´sio R Jr, Wilson SE *et al* 2001). Although LASIK is becoming more popular than PRK, it can result in various complications associated with the creation of an anterior corneal flap(Tham VM-B, Maloney RK 2000; Stulting RD, Carr JD, *et al* 1999 and Shah MN, Misra M, *et al* 2000). There are also cases with insufficient corneal thickness leaving the cornea with an unacceptable residual bed makes LASIK unsafe or limits it to smaller ablation zones that may cause disturbances in night vision when the pupil dilates, or halos and glare (Holladay JT, Dudeja DR, *et al* 1999). PRK for correcting intermediate to high levels of myopia may result in a strong wound-healing reaction, leading to haze formation and suboptimal refractive outcomes (Wallau AD, Campos M; 2009).

MMC is an antimetabolite used in ophthalmology for cases of corneal and conjunctival intraepithelial neoplasms, ocular pemphigoid and during surgical treatment of glaucoma and pterygium. It employs its cytotoxic effects through inhibition of DNA synthesis. The rationale for its use in PRK is based on prevention of keratocyte proliferation and deposition of irregularly generated material leading to scar formation(Sadeghi HM, Seitz B, *et al* 1998, Schipper I, Suppelt C, *et al* 1997). Several studies showed the effects of mitomycin C application on the reduction of PRK postoperative haze formation in animal model(Netto MV, Mohan RR, *et al*. 2006, Huizhuo Xu, MD; Shuangzhen Liu, MD; *et al* 2001). A part from patients with thin corneas, some lasik patients are more liable to flap complications than others ; Patients with flat corneas with mean keratometry below 41.00 are at a higher risk of encountering a free cap (Slade SG. 1999), steep corneas are thought to offer higher resistance to the blade excursion when applanated, resulting in a more superficial pass

Corresponding Author: Dr. Tamer Adel Refai MD, Research Institute of Ophthalmology, Cairo, Egypt.
E-mail:tamerrefai@ hotmail.com

resulting in button hole (Taneri S, Koch JM, *et al* 2005). In cases of previous button holes, a new LASIK flap after 3 to 6 months may interfere with the first pass and lead to the development of a second buttonhole or other flap abnormality (Tekwani NH, Chalita MR, *et al*., 2003), different ablation patterns as a result of altered laser ablation rate through the scar of previous button hole resulting in irregular astigmatism and loss of BSCVA. In these cases, a transepithelial PTK/PRK technique is effective before the onset of scarring (Vajpayee RB, Gupta V, *et al*., 2003; Weisenthal RW, Salz J, *et al*., 2003).

Therefore PRK with application of mitomycin C to inhibit haze formation might provide a good refractive alternative in cases that does not seem suitable for Lasik.

Purpose: To evaluate the refractive outcomes and possible complications after PRK using mitomycin C in moderate to high myopia in selected refractive cases that are considered unsuitable for lasik

Methods: twenty one eyes (of 14 myopic patients) were subjected to Photorefractive keratectomy (PRK) with application of mitoycin C 0.02%. for one and half minutes after excimer laser ablation.

Technique:

After topical anaesthesia,mechanical debridement for the central 8mm diameter epithelium was done in all cases (except post-button hole) starting 3mm away from visual axis with a blunt end of spatula and continued to reach the planned diameter while keeping the cornea w*et all* the time to enable smooth debridement. PTK with 50 µ depth was used for epithelial debridement post-button hole to obtain a regular surface prior to excimer laser ablation by the The ALLEGRETTO WAVE EYE-Q 1010 using a nomogram where 10% undercorection was used in all cases (to avoid overcorrection associated with mitomycin C usage). Mitomycin C 0.02% is applied for 1.5 minutes to the ablation site following laser ablation and then washed thoroughly with cold BSS with meticulous washing of the fornices , the lid margins and the puncti to remove any traces of mitomycin C to avoid endothelial toxicity and conjuctival toxicity followed by application of a drop of antibiotic –steroid combination and the applying a bandage contact lens for 4 days.

Post-operatively:

Antibiotics (morfloxacin 0.5%) eye drops 6 times daily for 1 week, NSAID (diclofenac sodium 0.1%) eye drops 4 times daily for 1week,Steroid drops (Prednisolone Acetate 1%) eye drops 4 times daily for 1month and GABA analogue (gabapentin 300mg tablets) twice daily as a pain killer for 2 days.

All patients were examined 1,4,7,14 days and 1,3 months after surgery. Of the 21 eyes performed ,13 eyes were performed because of thin cornea (<500 µ) to decrease the risk of ectasia,4 cases because of extensive retinal weakness (to avoid suction on the globe by the suction ring in Lasik), 2 cases because of previous button hole (to avoid irregular cut by the microkeratome and to get rid of the haze from the previous button hole),1 case because of irregular cornea with facet (following pterygium removal) avoiding good application of Suction ring) and 1 case because of flat cornea (mean K <40D) to decrease the risk of free cap (Table 1 & fig 1).

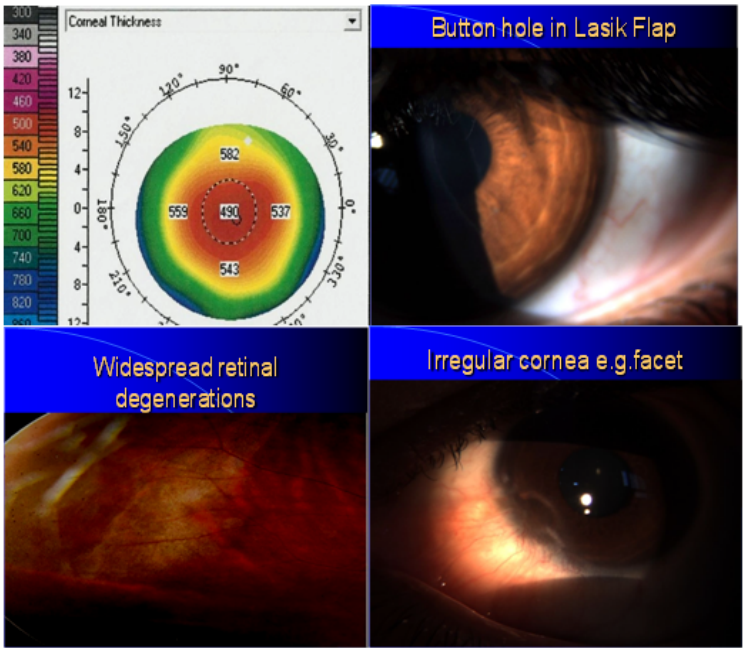

Fig. 1: Photos of some cases included in the study.

Table 1: number and percentage of cases done as PRK with mitomycin in the study according to the various reasons.

Reason for PRK	thin cornea (<500 µ)	extensive retinal weakness	previous button hole	Irregular cornea with facet	flat cornea (mean K <40D)
Number	13	4	2	1	1
Percentage	61.91%	19.04%	9.52%	4.76%	4.76%

Results:

The age ranged from 20-46 years with a mean of 26.10±5.91years. The preoperative spherical equivalent refraction (Sph.EQ) ranged from (-2.50 to -9.50D) with a mean of -5.23 ± 2.09 diopters (D). The preoperative central pachymetry ranged from 489 to 581µ with a mean of 518.11±26.08µ. The preoperative mean keratometric readings ranged from 39.8 to 45.9D with a mean of 43.02±1.63D.

The postoperative spherical equivalent ranged from 0.5 to -1.25D with a mean value of -0.26 ±0.49D at 3 months after surgery. The UCVA increased from 0.06±0.03(range 0.017 to 0.1) preoperatively to 0.76±0.17 (range 0.5 to 1.0) at 3 months postoperatively. The BSCVA increased from 0.84±0.17 (range 0.5 to 1.0) preoperatively to 0.89±0.21(range 0.5 to 1.2) at 3 months postoperatively. Three months after surgery,all eyes had uncorrected visual acuity (UCVA) of 20/40 or better,14 eyes (81.0%) had uncorrected visual acuity of 20/30 and 4 eyes (19.05 %) achieved UCVA of 20/20. Regarding the BSCVA 3 months postoperatively,1 eye (4.76%) gained 4 snellen lines, 5 eyes (23.8%) gained 2 lines,4 eyes (19.04%) gained 1 line, while 11 eyes (52.36 %) showed no change in BSCVA .No eyes had lost any line of BSCVA.Grade 1 corneal haze developed in 5 cases (23.81%) but disappeared completely by 1 month after surgery by which time topical steroid drops was discontinued (Table 2).

Table 2: number and percentage of cases that postopertaively gained or lost Snellen lines of BSCVA in in the study.

Change in BSCVA	No change	Gained 1 line	Gained 2 lines	Gained 4 lines
Number	11	4	5	1
Percentage	52.36%	19.04%	23.8%	4.76%

The mean value for the spherical equivalent decreased from -5.23 ± 2.09 diopters (D) preoperatively to a of -0.26 ±0.49D at 3 months after surgery with t-test showing a value of 3.35(P=<0.01) denoting a significant difference (Table 3 & chart 1).

Table 3: Comparison of the mean change between preoperative and postoperative 3rd for the Spherical equivalent among patients in the study.

Item	Preop.	Postop.3 month	"t" test	P value	Significance
	Mean ± S.D.	Mean ± S.D.			
Spherical Equivalent in Diopters (D)	-5.23 ± 2.09	-0.26 ±0.49	3.35	< 0.05	Significant

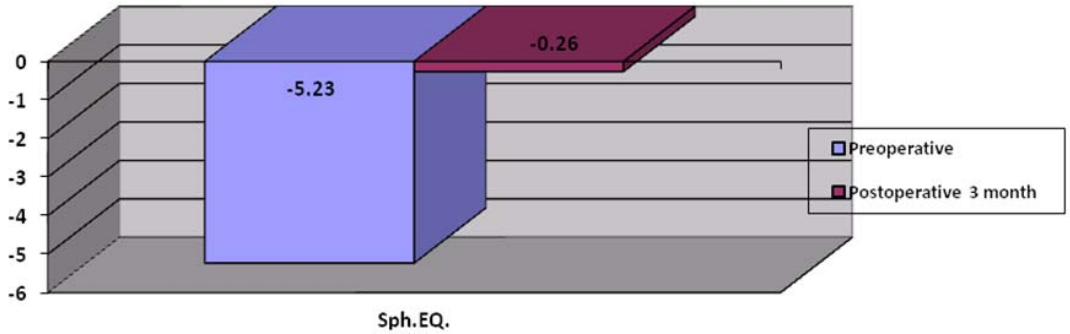

Chart 1: Showing the mean value of the Spherical equivalent (Sph.EQ) in diopters preoperatively and 3 month postoperatively.

The mean value for the uncorrected visual acuity (UCVA) in snellen lines increased from 0.06±0.03 preoperatively to a of 0.76±0.17 at 3 months after surgery with t-test showing a value of 3.47 (P=<0.01) denoting a significant difference (Table 4 & chart 2).

Table 4: Comparison of the mean change between preoperative and postoperative 3rd for the uncorrected visual acuity (UCVA) in snellen lines among patients in the study.

Item	Preop.	Postop.3 month	"t" test	P value	Significance
	Mean ± S.D.	Mean ± S.D.			
uncorrected visual acuity (UCVA) in snellen lines	0.06±0.03	0.76±0.17	3.47	< 0.05	Significant

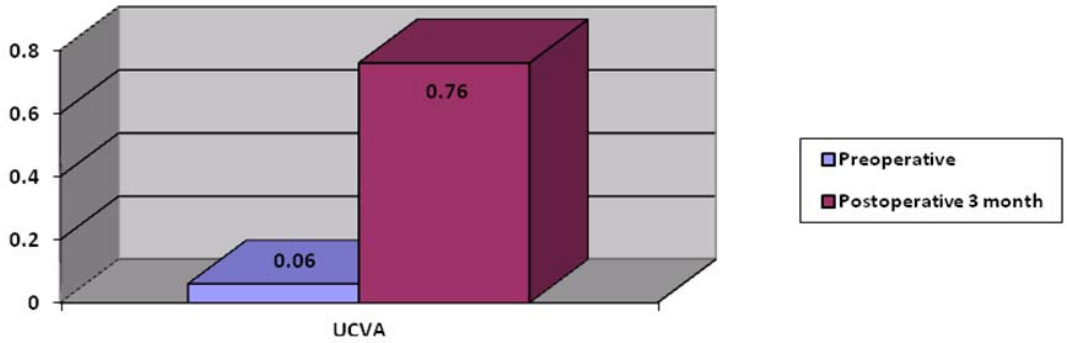

Chart 2: Showing the mean value of the uncorrected visual acuity (UCVA) in snellen lines preoperatively and 3 month postoperatively.

The mean value for the best spectacle corrected visual acuity (BSCVA) in snellen lines increased from 0.84±0.17 preoperatively to a of 0.89±0.2 at 3 months after surgery with t-test showing a value of 0.18 (P=>0.05) denoting a non significant difference (Table 5 & chart 3).

Table 5: Comparison of the mean change between preoperative and postoperative 3rd for the best spectacle corrected visual acuity (BSCVA) in snellen lines among patients in the study.

Item	Preop. Mean ± S.D.	Postop.3 month Mean ± S.D.	"t" test	P value	Significance
best spectacle corrected visual acuity (BSCVA) in snellen lines	0.84±0.17	0.89±0.2	0.18	> 0.05	Non Significant

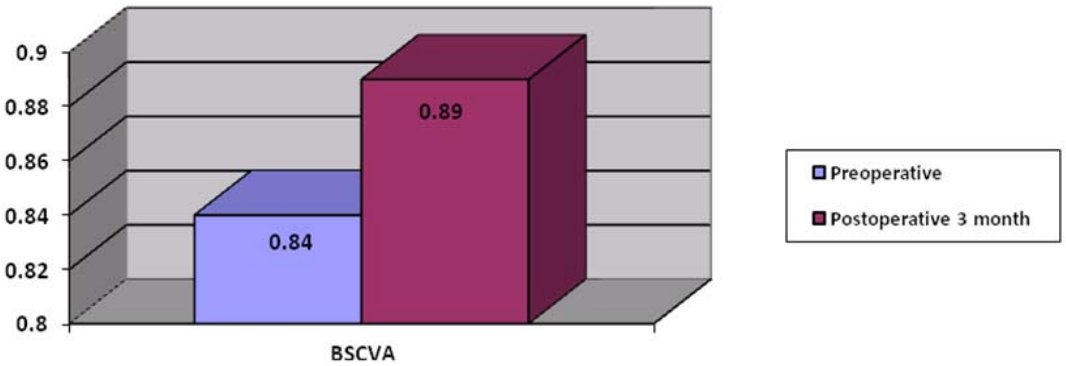

Chart 3: Showing the mean value of the best spectacle corrected visual acuity (BSCVA) in snellen lines preoperatively and 3 month postoperatively.

Grade 1 haze developed in 5 cases within the first week but disappeared completely by 1 month after surgery by which time topical steroids were discontinued. Pearson correlation test showed a value of 0.41(P=<0.01) denoting a highly significant correlation between preoperative spherical equivalent and the development of Grade 1 corneal haze in the first week after surgery (Table 6).

Table 6: showing the correlation between preoperative spherical equivalent and the development of Grade 1 corneal haze in the first week after surgery.

Item	Correlation coefficient "r"	P value	Significance
Preop.Sph.EQ vs Grade 1 corneal haze week-1	0.41	<0.01	Highly significant

Minimal subepithelial infiltrates developed in 3 cases within the first week but disappeared completely by 1 month after surgery by which time topical steroids were discontinued. Pearson correlation test showed a value of 0.28 (P=<0.05) denoting a highly significant correlation between preoperative spherical equivalent and the development of minimal subepithelial infiltrates in the first week after surgery (Table 7).

Table 7: showing the correlation between preoperative spherical equivalent and the development of minimal subepithelial infiltrates in the first week after surgery.

Item	Correlation coefficient "r"	P value	Significance
Preop.Sph.EQ vs Subepithelial infiltrates week-1	0.28	<0.05	significant

Discussion:

Laser in situ keratomileusis (LASIK) is becoming increasingly popular for the correction of a wide range of myopia as it preserves the corneal epithelium and Bowman's layer, significantly reducing the incidence of corneal haze, scarring and regression seen in photorefractive keratectomy (PRK) (Sugar A,Rupano CJ, etal 2002). But insufficient corneal thickness leaving the cornea with an unacceptable residual bed makes LASIK impossible or limits it to smaller ablation zones causing disturbances in night vision when the pupil dilates, or halos and glare (Holladay JT, Dudeja DR, *et al* 1999). Also cases with previous button holes (Tekwani NH, Chalita MR, *et al* 2003),Very flat corneas (Slade SG. 1999),Steep corneas (Taneri S, Koch JM, *et al* 2005) are associated with a higher incidence of flap complications.Excimer laser photorefractive keratectomy was however associated with development of corneal haze and subepithelial infiltrates in a variety of studies(Carson CA, Taylor HR 1995; Teal P, Breslin C, *et al* 1995, Probst LE, Machat JJ 1996, O'Brart DP, Corbett MC *et al* 1996, Maldonado MJ, Arnau V, *et al* 1996). The addition of mitomycin C (MMC) as an adjunctive to Excimer laser photorefractive keratectomy (PRK) has recently been used as an alternative to laser in situ keratomileusis (LASIK) for surgical correction of refractive errors with promising results (Gambato C, Ghirlando A., *et al* 2005, A D Wallau, M Campos 2009).

In this study we will study the safety,efficacy and predictability of PRK with mitomycin 0.02% in moderate to high myopia to find if it can provide a good alternative treatment to cases that are unsuitable for Lasik or are associated with a high risk of Lasik complications.

The age ranged from 20-46 years with a mean of 26.10±5.91years. The preoperative spherical equivalent refraction (Sph.EQ) ranged from (-2.50 to -9.50D) with a mean of 5.23 ± 2.09 diopters (D). The preoperative Central pachymetry ranged from 489-581µ with a mean of 518.11±26.08µ. The preoperative mean keratometric readings ranged from 39.8-45.9D with a mean of 43.02±1.63D.

The mean value for the spherical equivalent decreased from -5.23 ± 2.09 diopters (D) preoperatively to a of -0.26 ±0.49D at 3 months after surgery with t-test showing a value of 3.35(P=<0.01) denoting a significant difference The UCVA increased from 0.06±0.03(range 0.017-0.1) preoperatively to 0.76±0.17(range 0.5-1.0) at 3 months postoperatively with t-test showing a value of 3.47 (P=<0.01) denoting a significant difference. The BSCVA increased from 0.84±0.17(range 0.5-1.0) preoperatively to 0.89±0.21(range 0.5-1.2) at 3 months postoperatively with t-test showing a value of 0.18 (P=>0.05) denoting a non significant difference. Three months after surgery,all eyes had uncorrected visual acuity (UCVA) of 20/40 or better,14 eyes (81.0%) had uncorrected visual acuity of 20/30 and 4 eyes (19.05 %) achieved UCVA of 20/20.Regarding the BSCVA 3 months postoperatively,1 eye (4.76%) gained 4 lines, 5 eyes (23.8%) gained 2 lines,4 eyes (19.04%) gained 1 line, while 11 eyes (52.36 %) showed no change in BSCVA .No eyes had lost any line of BSCVA.Grade 1 corneal haze developed in 5 cases (23.81%) but disappeared completely by 1 month after surgery by which time topical steroid drops was discontinued.Pearson correlation test showed a value of 0.41(P=<0.01) denoting a highly significant correlation between preoperative spherical equivalent and the development of Grade 1 corneal haze in the first week after surgery. Minimal subepithelial infiltrates developed in 3 cases within the first week but disappeared completely by 1 month after surgery by which time topical steroids were discontinued. Pearson correlation test showed a value of 0.28 (P=<0.05) denoting a highly significant correlation between preoperative spherical equivalent and the development of minimal subepithelial infiltrates in the first week after surgery.

Pujara T, Sridhar M etal 2008, presented 12 eyes of 6 patients underwent the PRK with mitomycin C application. All were females with age range of 20 to 45 years. Pre-operative refractive error ranged from -6.75 Ds to -9.25 Ds. Indications for PRK was thin cornea in 8 eyes and forme fruste keratoconus in 4 eyes. The corneal thickness ranged from 457 U to 502 U in thin cornea group. In all eyes 10% under correction was planned and Mitomycin C was applied for 30 seconds to 1 minute. 6/12 or better vision was achieved in all except 1 eye (91.6%). Only one had a visual acuity of 6/18 with a spherical equivalent of + 2Ds at one month follow up visit.

Fazel F, Naderibeni A., *et al*., 2008. studied 37 high myopic patients (72 eyes) who had PRK surgery with mitomycin C. The mean follow up period was 27.2 ± 7.9 months. The spherical equivalent error was significantly reduced, from a mean of -9.10 ± 2.12 diopters (D) (range of -7 to -18.25 D) before PRK to a mean of -1.81 ± 1.57 D (range of -8.5 to 0 D) after (P = 0.001). Postoperatively, 34.72% of eyes were within ± 0.5 D of attempted correction and 58.33% within ±1 D and 84.72% within ±2 D. 80.5% of eyes had a vision of 20/40 or better. Best corrected visual acuity(BCVA) was unchanged or improved in 93.05%. Corneal haze formation was seen in 5 patients (6.9%) with grade +1.

Taneri S, MD, Koch M, MD *et al*., 2005. studied a case report where MMC assisted transepithelial PTK/PRK was successful in removing central haze formation and epithelial ingrowth originating from a buttonhole and in preventing its recurrence and any loss of visual acuity for a follow-up period of 12 months with relatively quick visual rehabilitation.

Conclusion:

PRK with Mitomycin-C provides a promising treatment line for moderate to high myopia in patients that are considered unsuitable for laser in situ keratomileusis (LASIK), due to various causes with no case showing any grade of residual haze by one month postoperative and with increase in BSCVA in most cases and with excellent refractive predictability. However, further research with longer follow-up is suggested.

Financial Disclosure(S):

The authors have no financial interest in any of the materials discussed in this article.

REFERENCES

Ambro´sio, R.Jr, SE. Wilson, 2001. Complications of laser in situ keratomileusis: etiology, prevention, and treatment. J Refract Surg, 17: 350-379.

Carson, CA., HR. Taylor, 1995. Excimer laser treatment for high and extreme myopia. Arch Ophthalmol, 113: 431-436.

Fazel, F., A. Naderibeni, F. Eslami, H. Ghatrehsamani, 2008. Results of photorefractive keratectomy with mitomycin C for high myopia after 4 years; Journal of Research in Medical Sciences, 13(2): 80-87.

Gambato, C., A. Ghirlando, E. Moretto, *et al*., 2005. Mitomycin C modulation of corneal wound healing after photorefractive keratectomy in highly myopic eyes. Ophthalmology, 112: 208-18.

Holladay, JT., DR. Dudeja, J. Chang, 1999. Functional vision and corneal changes after laser in situ keratomileusis determined by contrast sensitivity, glare testing, and corneal topography. J Cataract Refract Surg 25: 663-669.

Huizhuo, Xu., MD. Shuangzhen Liu, MD; Xiaobo Xia, MD; Peigang Huang, MD; Pingbao Wang, MD; Xiaoyin Wu, MD, Mitomycin C Reduces Haze, 2001. Formation in Rabbits After Excimer Laser Photorefractive Keratectomy; Journal of Refractive Surgery, 17: 342-349.

Maldonado, MJ., V. Arnau, A. Navea, *et al.*, 1996. Direct objective quantification of corneal haze after excimer laser photorefractive keratectomy for high myopia. Ophthalmology, 103: 1970-1978.

Netto, MV., RR. Mohan, S. Sinha, *et al*. 2006. Effect of prophylactic and therapeutic mitomycin C on corneal apoptosis, cellular proliferation, haze, and long-term keratocyte density in rabbits. J Refract Surg., 22: 562-74.

O'Brart, DP., MC. Corbett, S. Verma, *et al.*, 1996. Effects of ablation diameter, depth, and edge contour on the outcome of photorefractive keratectomy. J Cataract Refract Surg., 12: 50-60.

Pop, M., Y. Payette, 2000. Photorefractive keratectomy versus laser in situ keratomileusis; a control-matched study.Ophthalmology, 107: 251-257.

Probst, LE., JJ. Machat, 1996. Corneal subepithelial infiltrates following photorefractive keratectomy. J Cataract Refract Surg., 22: 281.

Pujara, T., M. Sridhar, P. Van Saarloos, 2008. PRK with mitomycin-C for high myopia (>-6 DS) using pulsar-Z from CustomVis,Australia 15 September ESCRS.

Sadeghi, HM., B. Seitz, S. Hayashi, L. LaBree, PJ. McDonnell, 1998. In vitro effects of mitomycin-C on human keratocytes. J Refract Surg., 14: 534-540.

Schipper, I., C. Suppelt, JO. Gebbers, C. Mitomycin, 1997. reduces scar formation after excimer laser (193 nm) photorefractive keratectomy in rabbits. Eye (Lond), 11: 649-655.

Shah, MN., M. Misra, KR. Wihelmus, DD. Koch, 2000. Diffuse lamellar keratitis associated with epithelial defects after laser in situ keratomileusis. J Cataract Refract Surg, 26: 1312-1318.

Slade, SG., 1999. Lasik complications and their management:In:Excimer laser refractive surgery;principles and practice, *Machat JJ(ed.)*.Slack incorporated, Thorofare NJ:, 12: 361-400.

Stulting, RD., JD. Carr, KP. Thompson, *et al*., 1999. Complications of laser in situ keratomileusis for the correction of myopia. Ophthalmology, 106: 13-20.

Sugar, A., CJ. Rupano, WW. Culbertson, D. Huang, GA. Varley, PJ. Agapitos, VP. De Luise, DD. Koch, 2002. Laser in situ keratomileusis for myopia and astigmatism .Opthtalmology, 109: 175-187.

Taneri, S., JM. Koch, SA. Melki *et al*., 2005. Mitomycin-C assisted photorefractive keratectomy in the treatment of buttonholed laser in situ keratomileusis flaps associated with epithelial ingrowth: J Cataract Refract Surg., 31: 2026-2030.

Teal, P., C. Breslin, S. Arshinoff, D. Edmison, 1995. Corneal subepithelial infiltrates following excimer laser photorefractive keratectomy. J Cataract Refract Surg, 21: 516-518.

Tekwani, NH., MR. Chalita, RR. Krueger, 2003. Secondary microkeratome-induced flap interference with the pathway of the primary flap. Ophthalmology, 110: 1379-1383.

Tham, VM-B., RK. Maloney, 2000. Microkeratome complications of laser in situ keratomileusis. Ophthalmology 107: 920-924.

Vajpayee, RB., V. Gupta, N. Sharma, 2003. PRK for epithelial ingrowth in buttonhole after LASIK. Cornea, 22: 259-261.

Wallau, AD., M. Campos, 2009. One-year outcomes of a bilateral randomized prospective clinical trial comparing PRK with mitomycin C and LASIK, Br J Ophthalmol, 93: 1634-1638.

Wallau, AD., M. Campos, 2009. One-year outcomes of a bilateral randomized prospective clinical trial comparing PRK with mitomycin C and LASIK. Br J Ophthalmol, 93: 1634-1638.

Weisenthal, RW., J. Salz, A. Sugar, *et al*. 2003. Photorefractive keratectomy for treatment of flap complications in laser in situ keratomileusis. Cornea, 22: 399-404.