Saudi Journal of Ophthalmology (2014) 28, 214—219

Original Article

Comparison of LASEK, mechanical microkeratome LASIK and Femtosecond LASIK in low and moderate myopia

Khalid AlArfaj, MD [a,b,*]; Mohamed M. Hantera, Ph.D., FRCS, MBA [c]

Abstract

Purpose: We conducted a prospective study to determine the best treatment option for patients with low-to-moderate spherical myopia or myopic astigmatism who are considered equally eligible for LASEK with mitomycin-C (MMC) and LASIK with either mechanical microkeratome or femtosecond laser flap creation.
Methods: Forty-six adult patients (86 eyes) who underwent LASEK with MMC (16 patients, 31 eyes), and mechanical microkeratome LASIK (13 patients, 23 eyes) or Femtosecond LASIK (17 patients, 32 eyes) were assessed for clinical outcomes 1, 3 and 6 months post-operatively.
Results: Six months after surgery, all eyes in all three groups were within 1 D of the intended refractive change. UCVA 20/20 or better was achieved in 96% of eyes undergoing LASEK with MMC 88% of eyes in the mechanical microkeratome LASIK and 72% of eyes in the Femtosecond LASIK group at 6 months. Mean spherical equivalent was −0.12 ± 0.22 D, −0.09 ± 0.28 D and −0.25 ± 0.28 D in the three groups, respectively ($p = 0.077$). Patients in the LASEK with MMC group had less high order aberrations at 3 and 6 months compared to the two LASIK groups. None of the three procedures were associated with early- or late-onset complications or loss of 2 or more lines after surgery.
Conclusions: After an initially slower visual improvement, LASEK with MMC, and to lesser extent, LASIK with mechanical microkeratome, produced better visual acuity and less corneal aberrations compared to Femtosecond LASIK at 3 and 6 months after surgery. These observations deserve further investigation in a randomized controlled trial.

Keywords: Myopia, LASIK, LASEK, Mechanical microkeratome, Femtosecond laser

© 2013 Production and hosting by Elsevier B.V. on behalf of Saudi Ophthalmological Society, King Saud University.
http://dx.doi.org/10.1016/j.sjopt.2013.10.002

Introduction

Laser in situ keratomileusis (LASIK) is the most popular surgical procedure for the correction of myopia.[1] However, reports of post-LASIK ectasia have increased the interest in surface-ablation techniques, such as photorefractive keratectomy (PRK), laser-assisted subepithelial keratomileusis (LASEK) and Epi-LASIK, which eliminate the need for a corneal flap and aim to preserve a thicker stromal bed less prone to mechanical destabilization.[2] LASEK is a relatively new surgical procedure, in which certain elements of both LASIK and PRK are combined, providing an improved benefit/risk ratio. It is particularly valuable in patients with thin corneas who would not qualify for LASIK surgery. The LASEK procedure is known for long-term stable results and the lack of serious complications, including infections, scars, recurrent erosions, or late-onset corneal haze formation. Its major disadvantages compared to LASIK surgery are considered

Received 27 January 2012; received in revised form 7 April 2013; accepted 1 October 2013; available online 11 October 2013.

[a] Ophthalmology Department, Dammam University, Saudi Arabia
[b] Dharan Eye Specialist Hospital, Saudi Arabia
[c] Magrabi Centre Dammam, Saudi Arabia

* Corresponding author at: Ophthalmology Department, Dammam University, Saudi Arabia. Tel.: +966 554488404.
e-mail address: kmarfaj@gmail.com (K. AlArfaj).

Peer review under responsibility of Saudi Ophthalmological Society, King Saud University

Production and hosting by Elsevier

Access this article online:
www.saudiophthaljournal.com
www.sciencedirect.com

to be postoperative discomfort and prolonged visual recovery until the epithelium heals.[3] A more recent improvement in LASIK flap creation has been the femtosecond laser photodisruption.[4,5] Several randomized comparative studies showed that femtosecond laser photodisruption produces comparable or better visual outcome within 6 months after the procedure and fewer complications compared to mechanical microkeratomes,[6–8] although no differences in clinical outcomes at 12 months after keratomileusis were also reported.[9]

The aim of this study was to determine the best treatment option for patients with low-to-moderate spherical myopia or myopic astigmatism by comparing the efficacy and safety of three surgical procedures routinely performed at our center: LASEK with mitomycin-C (MMC) 0.02%, mechanical microkeratome LASIK (MM LASIK), and LASIK with femtosecond laser (Femtosecond LASIK). To the author's best knowledge, this is the first report of a formal comparison of these three laser treatment modalities.

Patients and methods

In this prospective, non-randomized study, 86 eyes of 46 patients (29 men, 17 women, mean age 27.8 ± 5.6 years) with low-to-moderate myopia were treated with one of three laser refractive procedures (LASEK with MMC, MM LASIK, or Femtosecond LASIK), at the Magrabi Centre Dammam, Kingdom of Saudi Arabia, between March and December 2009. The study was conducted according to the principles of the Declaration of Helsinki and approved by the local institutional review board. All participants were informed about the risks and benefits of the procedures and provided written informed consent.

Patients were included if they were above 18 years of age, had a confirmed low (−0.50 to −3.00 D) or moderate myopia (−3.10 to −8.00 D), stable refraction for at least 12 months, and had no known ocular or medical contraindications for laser refractive surgery. Baseline characteristics of study patients are provided in Table 1.

Pre-operative assessments

Pre-operative assessments included a complete medical and ophthalmological history and a thorough ocular examination, including uncorrected visual acuity (UCVA), manifest refraction, best spectacle-corrected visual acuity (BSCVA), using a Snellen's chart, central corneal thickness by ultrasonic pachymetry (DGH Technology Inc., USA), and slitlamp biomicroscopic examination of both anterior and posterior segments. In addition, corneal topography, ocular wavefront aberrations (HOA), autorefraction and pupil diameter measurements were measured by Optical Path Difference scan (OPD Scan II, Nidek Co., Ltd., Japan). Additional measurements, including surface regularity index (SRI), area compensated surface regularity index (SRC) and Strehl ratio were obtained from the OPD station (Nidek Co. Ltd., Japan). SRI is correlated to potential visual acuity and is a measure of local fluctuations in central corneal power, whereas SRC is a weighted form of the surface regularity index.

All treated eyes were considered suitable for vision correction using any of the three laser treatment modalities. After they received a detailed explanation regarding the known risks and benefits of the three treatment options, patients were asked to decide about the method that they considered most suitable. The selection was not guided or otherwise influenced by the treating surgeon.

Surgical procedures

All surgical procedures were performed by a single surgeon (M.M.H.). For patients in all three groups, who required refractive surgery in both eyes, the selected procedure was performed simultaneously, starting with the right eye and followed by the left eye. Conventional excimer laser ablation was performed using the Nidek platform (EC-5000 CXIII, Nidek Co. Ltd.), with a mean optic zone (OZ) of 5.51 ± 0.61 mm and mean transitional zone (TZ) of 8.14 ± 0.71 mm. The target in each case was full correction and pupil tracking was used in all eyes. Astigmatism between 0.25 and 1.00 D was treated with an attempted astigmatic correction.

The ocular surface pre-treated with moxifloxacin eye drops (Vigamox®, Alcon Laboratories Inc., USA) and anesthetized with five drops of oxybuprocaine hydrochloride eyedrops (Novesin®, Novartis, Switzerland) administered at five-minute intervals.

LASEK with MMC 0.02% application

Thirty-one myopic eyes (15 right, 16 left) of 16 patients underwent LASEK with the use of Nidek EC 5000 CXIII

Table 1. Baseline patient characteristics.

	LASEK + MMC group	MM LASIK group	Femtosecond LASIK group
Age, mean (SD), years	29.5 (5.3)	25.7 (3.9)	27.9 (6.6)
Gender, M/F	9 M/7 F	10 M/3 F	10 M/7 F
Number of eyes	31	23	32
UCVA 20/400 or worse, *n* (%) of eyes	12 (39%)	11 (48%)	18 (56%)
BSCVA 20/20, *n* (%) of eyes	28 (90%)	22 (96%)	26 (77%)
Manifest refraction, mean (SD), D			
SEQ	−2.60 (1.05)	−3.26 (1.25)	−4.67 (2.34)
Sphere	−2.36 (1.12)	−3.01 (1.24)	−4.42 (2.27)
Cylinder	−0.47 (0.61)	−0.50 (0.43)	−0.50 (0.38)
HOA, mean (SD), μm			
Coma	0.15 (0.09)	0.10 (0.06)	0.15 (0.14)
Trefoil	0.26 (0.13)	0.25 (0.15)	0.23 (0.20)
Tetrafoil	0.09 (0.06)	0.09 (0.24)	0.06 (0.05)
Spherical	0.07 (0.05)	0.07 (0.05)	0.07 (0.05)

Abbreviations: D, diopter; F, female; HOA, high-order aberration; LASEK, laser epithelial keratomileusis; LASIK, laser in situ keratomileusis; M, male; MM, mechanical microkeratome; MMC, mitomycin-C; SD, standard deviation; SEQ, spherical equivalent.

Download English Version:

https://daneshyari.com/en/article/2700656

Download Persian Version:

https://daneshyari.com/article/2700656

Daneshyari.com