

**EVALUATION OF THE ACCURACY OF
SUB BOWMAN'S KERATOMILEUSIS (SBK)
MICROKERATOME IN FLAP CREATION
DURING LASIK SURGERY**

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ
الْحَكِيمُ

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Abstract

Purpose: To evaluate the accuracy of SBK microkeratome in flap creation during myopic LASIK surgery using Anterior Segment Optical Coherence Tomography (AS OCT)

Design: A Prospective non-randomized non comparative interventional clinical study.

Methods: Flaps were created using the One Use-Plus SBK microkeratome (intended flap 90 μ m) in 40 eyes of 20 patients. Flap thickness was measured using AS OCT one week after surgery.

Results: The mean achieved central corneal flap thickness in both eyes was 88.67 ± 7.19 , 1.33 μ m thinner than the intended 90 μ m thickness (difference from intended thickness -1.33 ± 7.19) with a p value of 0.067 which is statistically insignificant ($p > 0.05$). The mean achieved central corneal thickness in the right eye was 88.56 ± 7.95 μ m, (ranging from 70 μ m to 112 μ m), 1.44 μ m thinner than the intended 90 μ m (difference from intended thickness -1.44 ± 7.95) thickness with a p value of 0.206 which is statistically insignificant ($p > 0.05$). The mean achieved central corneal flap thickness in the left eye was 88.78 ± 6.41 μ m, (ranging from 77 μ m to 105 μ m) showing a difference from intended thickness of -1.22 ± 6.41 μ m deviation from the intended thickness that is statistically insignificant (p value of 0.185, $p > 0.05$).

Conclusion: In the current study it was found that the use of the One Use-Plus SBK microkeratome for creating an SBK flap is safe and effective. The results of the current study were comparable to the results in previous studies using a femtosecond laser. In conclusion, our results indicate that the One Use-Plus SBK microkeratome created flaps with good central accuracy, predictability and reproducibility, with variable increase in flap thickness towards the periphery.

Studying the effect of variations in flap thickness on post-operative visual outcomes. The effect of flap thickness on corneal biomechanical stability. Increasing sample size. Assessing of flap thickness accuracy using a more objective tool such as real-time online optical coherence pachymetry.

Key words:

LASIK, SBK Microkeratome, Femtosecond laser, Ectasia, Myopia

List of Contents

	Page
List of Abbreviations	I
List of Tables	III
List of Figures	IV
Introduction	1
Aim of the Work	2
Review of Literature	
Chapter (1): ○ Anatomy Of The Cornea	3
Chapter (2): ○ Corneal Biomechanics And Wound Healing	11
Chapter (3): ○ Sub Bowman's Keratomileusis	19
Patients and Methods	38
Results	46
Discussion	51
Conclusion	56
Summary	57
References	58
Arabic Summary	

List of Abbreviations

µm	Micrometer
AS OCT	Anterior Segment Optical Coherence Tomography
BCVA	Distant Best Corrected Visual Acuity
BUT	Break up time
CCT	Central corneal thickness
CD	Corneal diameter
CSNFs	Corneal sub-basal nerve fibers
DLK	Diffuse lamellar keratitis
ECM	Extracellular matrix
FS	Femtosecond laser
FS-LASIK	Femtosecond assisted LASIK
HOAs	Higher order aberrations
IFS	Intralase femtolaser
IOP	Intraocular pressure
K	Keratometry
kHz	Kilo Hertz
LASIK	Laser assisted in situ keratomileusis
MMPs	Matrix metalloproteases
MRSE	Mean refractive spherical equivalent
OBL	Opaque bubble layer
OUP-SBK	One Use-Plus SBK microkeratome
PRK	Photorefractive keratectomy
RSB	Residual stromal bed
SBK	Sub-Bowman's keratomileusis
SD	Standard deviation
SKBM	Summit-Krumeich-Barraquer microkeratome

TLSS	Transient light sensitivity syndrome
UCVA	Uncorrected visual acuity

List of Tables

Tables. No.	Description	Page
1	Demonstrating descriptive optical preoperative data of both eyes before LASIK surgery with Moria SBK microkeratome (Mean, SD, Minimum, Maximum)	46
2	showing descriptive data of achieved and intended central corneal flap thickness in both eyes and the correlation between them (P value)	47
3	Showing descriptive data of flap reproducibility (difference between mean achieved central flap thickness in both eyes).	48
4	Correlation between mean achieved central flap thickness & mean preoperative K readings, mean preoperative refractive spherical equivalent and mean preoperative central corneal thickness of patients who underwent LASIK (with Moria SBK Microkeratome). (P value)	48
5	Showing mean $\pm$ SD of mean flap thickness measurements at each of the 12 locations measured in both eyes. (Variation in flap thickness from the center to the periphery).	50
6	Showing mean deviation from mean achieved central flap thickness in both eyes, at each of the 12 measured points from the flap center.	50

List of Figures

Fig. No.	Description	Page
1	Antomical corneal structure, comprising the six corneal layers.	3
2	Bowman scarring seen after herpes simplex keratitis showing the abrupt termination of Bowman membrane.	4
3	Transmission electron microscopy of the human corneal stroma. A: Keratocyte localized between stromal lamellae .B: Higher magnification view showing a keratocyte in relation to collagen fibers coursing in various directions.	6
4	Micrograph illustrating Descemet's membrane (DM) located between the posterior aspect of the corneal stroma (S) and the underlying endothelium (EN). The anterior "banded" region (A). Posterior "amorphous region" (P).	7
5	Specular photomicrograph of normal endothelium. Note the dark well-defined cell borders, the regular hexagonal array, and the uniform cell size.	8
6	Scanning electron micrographs. A, The anterior surface (star) of the Dua's layer (DL) showing parallel and regularly arranged collagen bundles. The posterior surface of the DL (triangle) shows a smooth pattern.	9
7	Major biomechanical loading forces in the cornea and a model of biomechanical central flattening associated with disruption of central lamellar segments	14
8	A flap with parallel sides is lifted using the microkeratome. The excimer laser is used to remove a lenticule of predetermined power from the exposed corneal stroma. The flap, with its intact epithelium, is then folded back, and as it drapes over the modified stromal surface, the refractive power of the anterior corneal surface is modified. The dotted area in the bottom panel corresponds to the lenticule that was	22

	removed. Usually, no sutures are required.	
9	Microcavitational bubbles coalesce and the cleavage plane is created	23
10	Zyoptix XP microkeratome. (a) Fully assembled microkeratome, (b) console unit, (c) blade, (d) suction ring, and (e) microkeratome blade holder.	25
11	A suction ring adherent to the globe and a pneumotonometer that measures IOP intraoperative.	26
12	Fully assembled AMO Amadues microkeratome.	27
13	Fully assembled Nidek Microkeratome.	28
14	Moria M2 microkeratome with a reusable head.	29
15	Moria M2 microkeratome with a disposable head.	29
16	Details of the single-use head with a pre-inserted blade.	34
17	The Moria One Use- <i>Plus</i> SBK with a single-use plastic ring.	34
18	The Moria One Use- <i>Plus</i> SBK with a reusable metal ring.	35
19	Good visualization through the single-use plastic head for centration then confirmation of suction.	35
20	Figure 25: illustrates a corneal topography showing some of the patient's preoperative data.: HVID= horizontal visible iris diameter (corresponds to corneal diameter), Thk= thinnest location, K readings (K1, K2)	40
21	Sirius Imaging System	40
22	Topcon 3D OCT-2000 series	42
23	Shows points measured in the horizontal meridian (180 ° meridian)	43
24	Shows points measured in the vertical meridian (90° meridian)	43
25	shows points measured in the horizontal meridian (180° meridian)	44
26	shows points measured in the vertical meridian (90° meridian)	44

27	shows points measured in the horizontal meridian (180° meridian)	44
28	shows points measured in the vertical meridian (90° meridian)	45
29	The bar graph showing the mean achieved central corneal flap thickness in both eyes compared to the intended flap thickness.	47
30-A	Shows a bar graph that demonstrates flap thickness variations in the superior and inferior portions from the flap vertex.	49
30-B	Shows a bar graph that demonstrates flap thickness variations at the nasal and temporal portions from the flap vertex	50

INTRODUCTION

Over the past decades, laser in situ keratomileusis (LASIK) has become the most common refractive procedure for the correction of refractive errors [1]. The consistency and predictability of the corneal flap thickness is crucial in producing successful LASIK outcomes. The corneal flap thickness is directly related to LASIK safety; therefore, methods that improve the precision and minimize the degree of variation in corneal flap thickness are worthy of attention.[2]

Today, a variety of microkeratomes, as well as femtosecond lasers, are in clinical use for flap creation.[3] Good microkeratomes are associated with accurate cuts, less flap thickness variation, easy manipulation, and fewer complications. [4]

One of the most feared complications is post LASIK corneal ectasia. Among many other factors, the residual corneal thickness after the ablation is crucial for decreasing the possibility of ectasia occurrence. Also it has been shown that the thinner the flap, the less risk for ectasia. Accuracy of the flap thickness produced using mechanical microkeratomes is mandatory in this calculation.

Percentage of tissue altered (PTA) greater than 40% at the time of LASIK is significantly associated with the development of ectasia in eyes with normal preoperative topography.[5]

Earlier studies using microkeratomes showed that there was a high deviation from the marked thickness for a given blade. Hence the development of SBK microkeratome with 90 μm thickness has shown high reproducible accuracy in different recent studies. This has made this type of mechanical microkeratome a competitor for Femtolaser flap creation that has gained popularity in recent years, with the main advantage of creating accurate thin sub-Bowamn flaps. [6-8]

AIM OF THE WORK

- Major objective is studying the accuracy of LASIK flap thickness created by the mechanical microkeratome SBK using anterior segment optical coherence tomography (AS-OCT).
- Minor objective includes recording any associated complications.