Comparative Study of Risk Factors for Opaque Bubble Layer Formation in Femtosecond-Laser Assisted LASIK

Thesis

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Dedication

I would like to thank all my family, my mother, my father, my brother, my sister and my colleagues, for their valuable help and support.

I want to dedicate this work to the soul of my beloved grandma and my uncle.

Ahmed Salah

CONTENTS

List of Abbreviations

AK	: Astigmatic keratotomy
ALK	: Anterior lamellar keratoplasty
BCVA	: Best corrected visual acuity
CCT	: Central corneal thickness
CO_2	: Carbon dioxide
D	: Diopter
DALK	: Deep anterior lamellar keratoplasty
DLK	: Diffuse lamellar keratitis
DSAEK	: Descemet's stripping automated endothelial keratoplasty
FDA	: Food and drug administration
FLEx	: Femtosecond laser assisted refractive lenticule extraction
FSL	: Femtosecond laser
H_2O	: Water
ICRS	: Intrastromal corneal ring segments
IOP	: Intra ocular pressure
IQR	: Inter quartile range
K1	: Flat keratometry reading
K2	: Steep keratometry reading
kHz	: Kilohertz
Laser	: Light amplification by stimulated emission of radiation
LASIK	: Laser-assisted in situ keratomileusis
LIOB	: Laser induced optical breakdown
MK	: Mechanical microkeratome
ND-YAG	: Neodymium-doped yttrium aluminum garnet
OBL	: Opaque bubble layer
SD	: Standard deviation
SE	: Spherical equivalent
SMILE	: Small incision lenticule extraction

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INTRODUCTION

Refractive surgery had undergone a remarkable evolution during the last 25 years. The introduction of excimer laser in practice of refractive surgery was an exciting innovation ***(Alio., 2014).***

Laser-assisted in situ keratomileusis (LASIK) is a widely accepted method for correcting the refractive error ***(Mastropasqua et al., 2017).*** In recent years, the use of bladeless LASIK surgery utilizing a femtosecond laser (FSL) (named for its ultrashort pulses, with duration of few femtoseconds) for lamellar flap creation, as an alternative option to the mechanical microkeratome (MK) ***(Chen et al., 2017).***

A second laser involved in the procedure, the excimer provides the ablation and has also evolved significantly over the course of the past 10 years. Excimer lasers for refractive surgery can provide customized ablation, including aspheric ablation profiles, wavefront-guided, or topography-guided treatments ***(Kasetsuwan et al., 2016).***

FSL becomes one of the most important advances in refractive surgery as it increases the predictability, precision and accuracy of LASIK flap creation. Also, it allows for flap customization (thickness, diameter, side cut angle) and is better for thin cornea, high spherical ametropia and high astigmatism ***(Aristeidou et al., 2015).***