The Value of Studying Corneal Hysteresis in Ocular Surgeries

An Essay
Submitted for the Partial Fulfillment of Master Degree in Ophthalmology
By

Ahmed Kamal Mohammed Hussein
(M.B., B.Ch.)
Ain Shams University

Under the Supervision of:

Prof. Dr. Hassan Ezz-Eldin Alsamaa
Professor of Ophthalmology
Faculty of Medicine - Ain Shams University

Dr. Mohammed Gamil Metwally
Assistant Professor of Ophthalmology
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
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قيمة دراسة التباطؤ القرنى فى جراحات العين

رسالة
تمهيداً للحصول على درجة الماجستير
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مـقدمـة من

الطبيب / أحمد كمال محمد حسين
بكالوريوس الطب و الجراحة
كلية الطب – جامعة عين شمس

تحت إشراف

أ.د./ حســـن عــزالـدين الســماع
أستاذ طب وجراحة العين
كلية الطب – جامعة عين شمس

د./ محـــمد جــميل مــتولى
أستاذ مساعد طب وجراحة العين
كلية الطب – جامعة عين شمس

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Ahmed Kamal Mohammed Hussein
(M.B., B.Ch.)-Ain Shams University

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Prof. Dr. Hassan Ezz-Eldin Alsamaa
Professor of Ophthalmology
Faculty of Medicine - Ain Shams University

Dr. Mohammed Gamil Metwally
Assistant Professor of Ophthalmology
Faculty of Medicine - Ain Shams University

Discussion Committee:

Dr. Mohammed Hamed Ali
Assistant Professor of Ophthalmology
Faculty of Medicine – Alazhar University

Dr. Tamer Mohammed Alraggal
Assistant Professor of Ophthalmology
Faculty of Medicine - Ain Shams University

Prof. Dr. Hassan Ezz-Eldin Alsamaa
Professor of Ophthalmology
Faculty of Medicine - Ain Shams University

قيمة دراسة التباطؤ القرنى فى جراحات العين

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الطبيب / أحمد كمال محمد حسين
بكالوريوس الطب و الجراحة - كلية الطب – جامعة عين شمس

تحت إشراف :

أ.د./ حســـن عــزالـدين الســماع
أستاذ طب وجراحة العين - كلية الطب – جامعة عين شمس

د./ محـــمد جـــميل مــتولى
أستاذ مساعد طب وجراحة العين - كلية الطب – جامعة عين شمس

لجنة المناقشة:

د / محمد حامد على (ممتحن خارجي)
أستاذ مساعد طب وجراحة العين- كلية الطب (بنين) - جامعة الأزهر.

د / تامر محمد الرجال (ممتحن داخلي)
أستاذ مساعد طب وجراحة العين- كلية الطب - جامعة عين شمس.

أ.د / حســـن عــزالـدين الســماع (عن المشرفين)
أستاذ طب وجراحة العين- كلية الطب - جامعة عين شمس.

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List of abbreviations

CCT	Central Corneal Thickness
CH	Corneal Hysteresis
CPACG	Chronic Primary Angle Closure Glaucoma
CRF	Corneal Resistance Factor
CXL	Collagen Cross Linking
DM	Descemet's Membrane
DM1	Dystrophia Myotonica
DXEK	Descematorhexis & Endokeratoplasty
DZ	Di-Zygotic
GAT	Goldman Applanation Tonometer
ICRS	Intra-Corneal Ring Segments
INTRACOR	Femto Second Laser Intrastromal Flap
IOL	Intra Ocular Lens
IOP	Intra Ocular Pressure
IOPCC	Corneal Compensated Intra Ocular Pressure
IOPG	Goldman Correlated Intra Ocular Pressure
LASIK	Laser in Situ Keratomileusis
LASEK	Laser-Assisted Sub-Epithelial Keratectomy
MZ	Mono-Zygotic
NTG	Normal Tention Glaucoma
OPA	Ocular Pulse Amplitude
ORA	Ocular Response Analyser
POAG	Primary Open Angle Glaucoma
PKP	Penetrating Keratoplasty
PRK	Photo Refractive Keratectomy
PTK	Phototherapeutic Keratectomy
SBK	Sub-Bowman’s Keratomileusis
STCT	Selective Tissue Corneal Transplantation

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Chapter 1

Introduction

The cornea as a viscoelastic structure contains a component of static resistance and a component of dynamic resistance, the response of the cornea to an applied force such as tonometry depends on the magnitude of the force and on the rate of change of the force. [1]

The cornea reacts to stress as a visco-elastic material. This means that for a given stress, the resultant corneal strain is time dependent. the visco-elastic response consists of an immediate deformation followed by a rather slow deformation. [2]

It has been suggested that hysteresis may be a measurement which is the result of the damping of the cornea because of its visco-elastic properties and is derived from the difference of the two applanation measurements during the applanation process. Thus the hysteresis is a measure of visco-elasticity due to the combined effect of the corneal thickness and rigidity. [3]

Corneal hysteresis is determined by releasing an air puff from the ocular response analyzer (ORA) that causes inward and then outward corneal motion which in turn provides two applanation measurements during a single measurement process, the device utilized a rapid air impulse to deform the cornea, and the shape changes were monitored by an electro-optical system. [3]

Thus a new era of knowledge about the cornea was elicted and the ophthalmologists had to take that in their considerations. Also in the field of ocular surgeries, ophthalmic-surgeons can get