

Evaluation of the Biomechanical Properties of Ectatic Cornea Using Ocular Response Analyzer

Essay

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

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✍ **Haytham El-Saeed Seleem**

Contents

Subjects	Page
• List of abbreviations	I
• List of Tables.....	II
• List of Figures.....	III
• Introduction.....	1
• Aim of the work.....	3
• Review of literature	
- Chapter 1: Corneal Biomechanics	4
- Chapter 2: The Ocular Response Analyzer.....	17
- Chapter 3: Factors Affecting Corneal Hysteresis.....	27
- Chapter 4: Corneal Ectasia	68
• Summary & Conclusion.....	92
• References.....	95
• Arabic summary	

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
LASEK	Laser-Assisted Sub-Epithelial Keratectomy
LASIK	Laser in Situ Keratomileusis
MZ	Mono-Zygotic
NTG	Normal Tention Glaucoma
OPA	Ocular Pulse Amplitude
ORA	Ocular Response Analyser
PKP	Penetrating Keratoplasty
POAG	Primary Open Angle Glaucoma
PRK	Photo Refractive Keratectomy
PTK	Phototherapeutic Keratectomy
SBK	Sub-Bowman's Keratomileusis
STCT	Selective Tissue Corneal Transplantation

List of Tables

Table No.	Title	Page
Table (1)	ORA readings: differences in corneal biomechanical properties in non smokers versus smokers.	33
Table (2)	Characteristics of normal & myotonic patients.	35
Table (3)	Demographic details of twin pairs included in the study.	38
Table (4)	Changes in ORA parameters after cataract surgery	59
Table (5)	Data collection of the patients included in the study.	66
Table (6)	Data collection of the patients included in the study.	77
Table (7)	Changes in IOPCC, IOPG and corneal biomechanics after UVA & riboflavin CXL.	86

List of figures

Fig. No	Title	Page
Figure (1)	Experiments illustrating elastic and viscoelastic properties in a 7 mm, full-thickness horizontal corneal strip from a 63 year old donor.	10
Figure (2)	Major biomechanical loading forces in the cornea and a model of biomechanical central flattening associated with disruption of central lamellar segments.	13
Figure (3)	The Ocular Response Analyzer	18
Figure (4)	Method of Operation of ORA.	18
Figure (5)	Measurement of CH using the ORA. The difference between the inward and outward applanation is called corneal hysteresis.	19
Figure (6)	Typical CH distribution of a normal population.	23
Figure (7)	Correlation of CH & CRF versus IOPG (“GAT”).	23
Figure (8)	Identifying Normal Signals.	26
Figure (9)	Graph showing profiles of 24 hour change pattern in CCT, sitting IOP, and CH. Solid symbols represent	28

Fig. No	Title	Page
	the older group and open symbols represent the younger group. Error bars, standard error of mean (n = 15).	
Figure (10)	Scatter plot showing the correlation between mean 24-hour CCT and mean 24-hour corneal hysteresis. Linear regression showing a positive correlation in the older subjects (solid circles; n = 15) and in the younger subjects (open circles; n =15) the two regression lines were statistically different (P = 0.014	29
Figure (11)	Comparison of CH distribution of normal, keratoconic, and Fuchs' subjects.	39
Figure (12)	Histogram of CCT.	42
Figure (13)	Scatter plot of relationship between hysteresis and CCT.	43
Figure (14)	Typical relationship between CCT and IOPG in a normal population (N=182 eyes).	44
Figure (15)	Plotting the inward and outward applanation events versus GAT on the same corneas at 3 pressure	45

Fig. No	Title	Page
	levels.	
Figure (16)	Comparing the CH distribution of normal and glaucomatous subjects.	46
Figure (17)	IOPCC and IOPG in 24 NTG eyes.	47
Figure (18)	IOPCC versus CCT for a population of normal eyes (N = 182).	49
Figure (19)	IOPCC pre and post LASIK in 14 eyes.	50
Figure (20)	Time-dependent changes of CH, CRF, and CCT. CCT and CRF significantly increased after three hours of lens wear with eye closure. Both returned toward baseline with time. CH did not change significantly in response to lens wear with eye closure .	51
Figure (21)	Change in CH in each of the 83 eyes, comparing the pre and postoperative findings following the INTRACOR procedure.	53
Figure (22)	Mean values of CRF and CH, pre and postoperatively following the INTRACOR procedure.	54
Figure (23)	Graph showing preoperative CCT,	56

Fig. No	Title	Page
	and on the first postoperative day (CCT postoperative) after clear corneal cataract surgery as well as CCT of the pseudophakic control group (CCT-IOL).	
Figure (24)	Graph showing preoperative CH, and on the first postoperative day (CH postoperative) after clear corneal cataract surgery as well as CH of the pseudophakic control group (CH -IOL).	56
Figure (25)	Pre-therapeutic correlation of CH with IOPG. CH was negatively correlated with IOPG in CPACG eyes before IOP-lowering therapy.	67
Figure (26)	Post-therapeutic correlation of the change in CH and the change in IOPG. Decreases in IOPG were positively correlated with increases of CH at 2 weeks ($\Delta 2$ weeks) and 4 weeks ($\Delta 4$ weeks) after IOP-lowering therapy in chronic PACG.	67
Figure (27)	Advanced keratoconus. (a) Histology shows a defect in Descemet's membrane; (b) acute hydrops; (c) histology shows	69

Fig. No	Title	Page
	oedema of basal epithelial cells and partial loss of Bowman layer; (d) apical scarring	
Figure (28)	Typical signals from a keratoconic eye. CH value of 6.4 mmHg.	73
Figure (29)	Severe keratoconus signal (measurement values will be unreliable).	73
Figure (30)	Identifying ectasia signals.	74
Figure (31)	Pre-operative ORA profile showing CH.	78
Figure (32)	Post-operative ORA profile showing CH.	78
Figure (33)	Distribution of CH values in normal corneas (Group 2) and in corneas following DXEK (Group 1).	82
Figure (34)	Typical ORA signal from a normal human cornea (Group 2). CH value of 10.8 mmHg.	83
Figure (35)	Typical ORA signal from a cornea following DXEK (Group 1). CH value of 7.5 mmHg.	83
Figure (36)	Typical signal from a normal subject's eye pre-LASIK. CH value is 11.1 mmHg.	89

Fig. No	Title	Page
Figure (37)	Signal from the same subject's eye one week post-LASIK. CH value is 7.8 mmHg.	90
Figure (38)	CH of 15 eyes pre- and post-LASIK.	90
Figure (39)	Twenty-eight eyes Pre/Post LASIK IOPCC.	91

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 (*Kotecha et al., 2009*).

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 (*Gunther Grabner et al., 2005*).

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 (*Luce, 2005*).

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 (*Luce, 2005*).

Thus a new era of knowledge about the cornea was elicited and the ophthalmologists had to take that in considerations. Also in the field of ocular surgeries, ophthalmic-surgeons can get a broader view in prediction of the post-operative state of the cornea and the surgical results (*Luce, 2005*).