The Use of the Pentacam in Studies of the Anterior Segment of the Eye

Essay

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By

Noha Saleh Abd El - Ghani

M.B.; B.Ch.

Supervised by

Prof. Dr. Omar Mohamed El Zawahry

Professor of Ophthalmology

Faculty of Medicine – Cairo University.

Assist. Prof. Dr. Ghada Ismail Gawdat

Assistant Professor of Ophthalmology

Faculty of Medicine – Cairo University.

Dr. Hany El-Mekawey El-Mekawey

Lecturer of Ophthalmology

Faculty of Medicine – Cairo University.

Cairo University

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Abstract

The key advantages of the rotating imaging process are the precise measurement of the central cornea, the correction of eye movements in extremely short examination time.

It can capture the data behind the opacity because the camera images the eye from many angles and it is also excellent tool for identifying intra lenticular foreign bodies.

Several studies report that the Pentacam has an excellent reliability in measuring CCT and ACD in normal and keratoconus eyes. The repeatability of posterior corneal elevation was also reported in a recent publication.

It is limited in measuring the axial length of the eye and in its evaluation of the anterior chamber angle. Direct angle visualization of the angle, the scleral spur, ciliary body, and ciliary sulcus is only possible with the Anterior Segment OCT and UBM; not the Pentacam.

Key Words :

Anterior Chamber - Axial Length - Intra Ocular Lens .

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LIST OF ABBREVIATIONS

AC=Anterior Chamber.

ACD=Anterior Chamber Depth.

AL=Axial Length.

BFS= Best Fit Sphere.

CBDS= Capsular Bag Distension Syndrome.

CCD=Charged Couple Device.

CCT= Central Corneal Thickness.

CT =Corneal Thickness.

CTSP= Corneal Thickness Spatial Profile .

DSP =Digital Signal Processor.

DLEK = Deep Lameller endothelial Keratoplasty.

DSAEK= Descemet stripping automated endothelial keratoplasty.

3 D=Three dimentional.

EKR = Equivalent K-readings.

EKRs =Equivalent K-Readings .

ICL=Implantable Contact Lens.

ILFB =Intralenticular Foreign Body.

IOL=Intra Ocular Lens.

IOP=Intra Ocular Pressure.

INTACT=Intra stromal Corneal Ring Segment.

KC= Keratoconus.

LED's= Light Emition Diode.

LASIK = Laser Assisted In-Situ Keratomilieusis.

LASEK= Laser Subepithelial Keratomilieusis.

mm=millimeter.

NTG =Normal Tension Glaucoma .

OCT= Optical Coherense Tomography.

Pentacam HR= Pentacam High Resolution.

PXS=Pseudoexfloliation Syndrome.

PEXG =Pseudoexfloliation Glaucoma.

PTI= Percentage of Thickness Increase.

PMD= Pellucid Marginal Degeneration.

PRK= Photorefractive Keratectomy.

PI =Peripheral Iridotomies.

PCO =Posterior Capsule Opacification.

PCT= Posterior Capsule Tear.

PK= Penetrating keratoplasty.

RSB =Residual Stromal Bed.

RK =Radial Keratotomy.

SPC =Scheimpflug Photograph of the Cornea.

TP = Thinnest Point.

μm= microns.

UV= Ultra Violet.

USP =Ultrasound Pachymetry.

UBM =Ultrasound Biomicroscopy.

WTW=White To White distance.

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INTRODUCTION

The Pentacam is a rotating camera that offers a noninvasive way of assessing the anterior segment of the eye **(Jain et al., 2007)**.

It's considered to be a tomographer, which is different than topography. A tomographer enables a mathematical reconstruction of the internal picture of the element studied, whereas topographers study its surface exclusively **(Grewal, 2008).**

This is a new anterior segment imaging device that scans and measures the cornea and the anterior segment by performing 5 **"penta"** functions:

1)Scheimpflug imaging

The Pentacam images the anterior segment of the eye with a Scheimpflug camera that rotates around a common axis, taking 50 three-dimensional image slices with the same center point. This approach allows all of the slices to be reregistered by their common point so that the normal fixation saccadic eye movements do not affect the precision of the result **(Holladay et al., 2005).** A manual measurement function is integrated to measure at each location in the anterior segment.

2)Topography

Topographic maps of the anterior and posterior corneal surfaces, evaluates 500 measurements points from each slit image, totaling 25,000 true elevation points, including tangential and sagittal (axial) curvature and limbus-to-limbus elevation **(Sinjab, 2009).**

The Pentacam is the only instrument that measures and analyses the center of the cornea precisely. This offers a significant advantage in accurate corneal topography measurements prior to refractive surgery **(Grewal et al., 2008).**