بسم الله الرحمن الرحيم

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Evaluation of Endothelial Cell Density after Torsional Phaco-emulsification in Patients with Pseudo-exfoliation

Thesis

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List of Abbreviations

Abb.	Full term
AUC	Area under curve
AVG	Average cell size
CD	Cell density
CDE	Cumulative dissipated Energy
CV	Coefficient of variation of cell area
DL	Dua's layer
DM	Descemet's membrane
ECC	Endothelial cell count
ECD	Endothelial cell density
FMS	Flow measurement system
IOP	Intra ocular pressure
LOXL1	lysyl oxidase-like 1 gene
Max	Maximum cell area
MIN	Minimum cell area
NPV	Negative predictive value
NSE	Neuron- specific enolase
OVD	Ocular viscoelastic device
POAG	Primary open angle glaucoma
PPV	Positive predictive value
PXS	pseudo-exfoliation syndrome
ROC	Receiver operating characteristic curve
SD	Standard deviation
SNPs	Single nucleotide polymorphisms

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Introduction

The corneal endothelium is a single layer of hexagonal cells that do not have the ability to regenerate. The normal density of corneal endothelial cells in adults is approximately 2500 cells/mm² and it is reduced by about 0.6% a year. The endothelium performs an essential function of maintaining the hydration of the cornea. When the endothelial cells density is reduced to approximately 800cells/mm², it may lead to corneal decompensation causing corneal edema and loss of corneal transparency which disrupts vision. (1)

The pseudo-exfoliation syndrome (PXS) is a systemic age-related disorder with a strong genetic component. PXS conferred by three single nucleotide polymorphisms (SNPs) in the lysyl oxidase-like 1 (*LOXL1*) gene. It is characterized by the production and accumulation of extracellular granular amyloid-like material in many tissues and organs. (2)

A typical sign of PXS syndrome visible during an examination with the slit lamp bio microscope is white deposits accumulating on the pupillary border and on the anterior lens capsule.(3)

Deposits of the pseudo-exfoliative material can also be found on the inner layer of the ciliary epithelium, the zonules of Zinn, the iris epithelium, in the anterior chamber angle structures and in the front part of the vitreous. (4)

Deposits of the PXS material can also take the form of irregular clumps on the corneal endothelium. These changes are closely related with cataract, glaucoma, lens subluxation, pseudo-uveitis, retinal vein occlusion, and keratopathy. [5]

Aim of the Work

The aim of this study is to compare pre-operative corneal thickness between normal subjects and subjects with pseudo-exfoliation and to determine the effects of phaco-emulsification surgery on corneal endothelial cell density in cataract patients with pseudo-exfoliation syndrome.

Review of Literature

Anatomy of the Cornea

The cornea is the transparent avascular anterior coat of the eyeball which allows light transmission. Its function is to provide a proper refractive surface together with the overlying tear film (Total refractive power of the cornea is about 43D, 70% of that of the eye). Also, it helps to protect the contents of the globe from infection and structural damage. [6]

The human cornea consists of five layers: The multilayered epithelium with its basement membrane, Bowman's layer, substantia propria, Dua's layer, Descemet's membrane and the endothelium (figure 1).

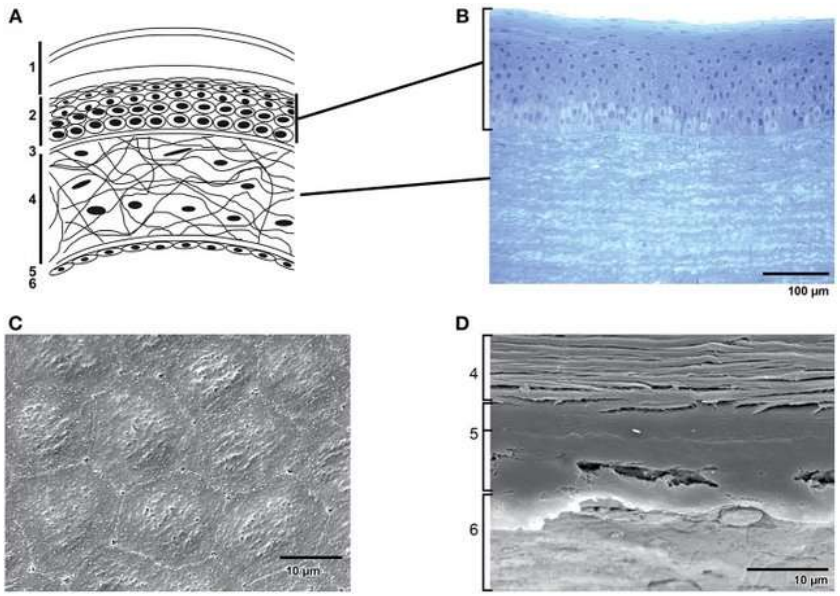

Figure 1: Structure of the cornea. [6]