Salwa Akl

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني

Salwa Akl

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

Salwa Akl

بعض الوثائق الأصلية تالفة
وبالرسالة صفحات لم ترد بالأصل

Zagazig University
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PREVENTION OF POSTERIOR CAPSULAR OPACIFICATION AFTER EXTRA-CAPSULAR CATARCT EXTRACTION

A THESIS
Submitted for partial fulfilment of the
M.Sc. Degree in Ophthalmology

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بسم الله الرحمن الرحيم

(قالوا سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم)

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CONTENTS

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Introduction

and

Aim of the Work

INTRODUCTION

Most surgeons agree that the extracapsular cataract extraction (ECCE) procedure decreases major postoperative complications particularly if the posterior capsule is not damaged (Little, 1980 and Downing, 1986). The most common complications attributed to defects in the posterior capsule include cystoid macular oedema, alterations in the structure and stability of the vitreous, and retinal detachment (Anand et al., 1983).

The results of cataract extraction and lens implantation usually please most patients, but patients may become upset at having even minimal visual aberrations (such as glare) occure from alterations of the posterior capsule. Also there may be a frank visual loss. This is understandable when significant postoperative capsular opacification (PCO) occurs (Jaffe et al., 1997).

Treatment of PCO by secondary capsulotomy either surgically or with Nd: YAG laser, is generally successful to the point of becoming almost trivialized. In reality, it is not a completely innocous procedure, and the complications that may occure include retinal detachment and cystoid macular oedema. In addition, the cost of secondary posterior capsulotomy adds a significant economic impact to the total cost of cataract treatment (Fastenberg et al., 1984 and Fallor et al., 1985).

According to Sterling and Wood, (1985) the incidence of late onset PCO after ECCE and IOL implantation varies from 18.4% to 50% in patients followed postoperatively for as long as 3 to 5 years. A review of their studies suggests that the incidence of this complication is almost the same with ECCE alone as after implantation of either iridocapsular or anterior chamber lenses.

McDonnell and co-workers (1983) state that there is an age related tendency toward membrane formation, with nearly 100% of pediatric patients developing capsular clouding within 2 years of surgery. In general, the older the patient age, the lower the frequency of capsular opacification. The rate may drop below 10% in patients over the age of 70. In general, improved results are achieved using posterior chamber IOL designs. Even with modern IOLs, almost 50% of PCO cases cause sufficient visual disability to require Nd: YAG laser capsulotomies. Many methods now being studied for destruction and removal of epithelium by cryo surgery, use of cytostatic and cytotoxic agents to destroy or retard epithelial cells, and attempted development of monocolonal antibodies against lens epithelial cells (Apple and Maurice, 1991).

Aim of The Work

This thesis aims at investigating the prevention of posterior lens capsular opacification using the antimitotic drug mitomycin-C. It is an experimental study done on rabbits.

Three different low drug concentrations are investigated to find out a suitable drug concentration used in a simple way that prevents the development of posterior capsular opacification after ECCE with minimal or no complications.

This thesis also investigates the complications that could happen due to the introduction of the drug intraocularly, on clinical and histopathological levels.

Review of Literature

ANATOMY OF THE LENS

The lens of the eye is a transparent bi-convex body of crystalline appearance placed between the iris and the vitreous. The diameter of the lens is 9-10mm, its thickness from 4-5mm, varies greatly as the eye is focused for distant or near objects. Like all lenses, that of the eye presents two surfaces, anterior and posterior, and a border where these surfaces meet, known as the equator (equator lentis). The anterior surface is less convex than the posterior and is the segment of a sphere whose radius is 8-14mm. It is in relation in front through the pupil with the anterior chamber of the eye, with the posterior surface of the iris, the pupillary margin of which rests on the anterior surface, with the posterior chamber of the eye, and with the ciliary processes. The centre of the anterior surface is known as the anterior pole, and is about 3mm from the back of the cornea. The posterior surface, more curved than the anterior surface, forms a segment of a sphere whose radius is 6mm. It is usually described as lying in a fossa lined by the hyaloid membrane on the front of the vitreous, but is separated from it by a slight space filled with "primitive" vitreous (Wolff, 1976).

The equator of the lens forms a circle lying 0.5mm within the ciliary processes. The equator is not smooth, but shows a number of dentations corresponding to the zonular fibres. These tend to disappear during accommodation, when the zonular fibres are loose. After the age of 20 years, the rate of anteroposterior growth exceeds equatorial growth (Weeker et al., 1973 and Farnsworth & Shyne, 1979).

The equatorial axis increases from about 6 to 9 mm during the first 15 years of life, changing little thereafter. The anteroposterior axis increases at a rate of about 0.023mm/year throughout life (Charles and Brown, 1975).

Lens Capsule: (Fig. 2-b)

At the light microscopic level, the capsule appears quit homogenous (Wislocki, 1952), but with electron microscope, a structure consisting of 40 lamellae is revealed. The capsule appears to increase in thickness by the deposition of discrete lamellae, each approximately a typical unit basal lamina in thickness (40 nm). At higher resolution, fine fibrils may be identified which are in the region of 2.5nm in diameter (Fisher and Hayes, 1979).

The lens capsule is a tremendously hyper-trophied basement membrane elaborated by the lens epithelium anteriorly and by superficial fibres posteriorly (Young and Ocumpaugh, 1966).

The capsule of the lens forms a transparent homogenous, highly elastic envelop. When cut or ruptured, its edges roll out. It is much thicker in front than behind. It is thickest both preequatorially and postequaterially and is thinnest posteriorly. Its thickness is 2.8 µm-15.5 µm (Bron et al., 1997).

The lamellae run parallel to the capsular surface. There is some suggestion that the lamellar structure becomes modified with age since it disappears from the posterior pole during the first decade and from the anterior aspect four or five decades later (Seland, 1974).

The layer of inserting zonular fibres and the related capsualr layer were termed the zonular lamella. This superficial layer of the capsule is 0.6 to 0.9 µm in thickness (Berger, 1882).

Like all basal laminae, the capsule is rich in type IV collagen. It also contains type I and III collagens, in addition to a number of extracellular matrix components, which include laminin, fibronectin, heparin sulfate proteoglycan and entactin (Bron et al., 1997). The capsule is freely permeable to water, ions, and other small molecules, and offers a barrier to protein molecules (Fisher, 1973).

Neither Friedenwald, (1930) nor Fisher (1973) noted a difference in permeability of capsules between normal and cataractous lenses.

Lens Epithelium: (Figs. 2-a & 2-c)

The epithelium consists of a single sheet of cuboidal cells spread over the front of the lens, deep to the capsule and extending outwards to