PHACOEMULSIFICATION

Essay

SUBMITTED IN PARTIAL FULFILMENT

OF THE MASTER DEGREE IN

(OPHTHALMOLOGY)

PRESENTED By :

Amal Ibrahim Mohamed

SUPERVISED BY :

Prof. Dr. WAFIK HEFNY

Prof. of Ophthalmology

and Head of Ophthalmic Dept.

AIN SHAMS UNIVERSITY

FACULTY OF MEDICINE

AIN SHAMS UNIVERSITY

(CAIRO)

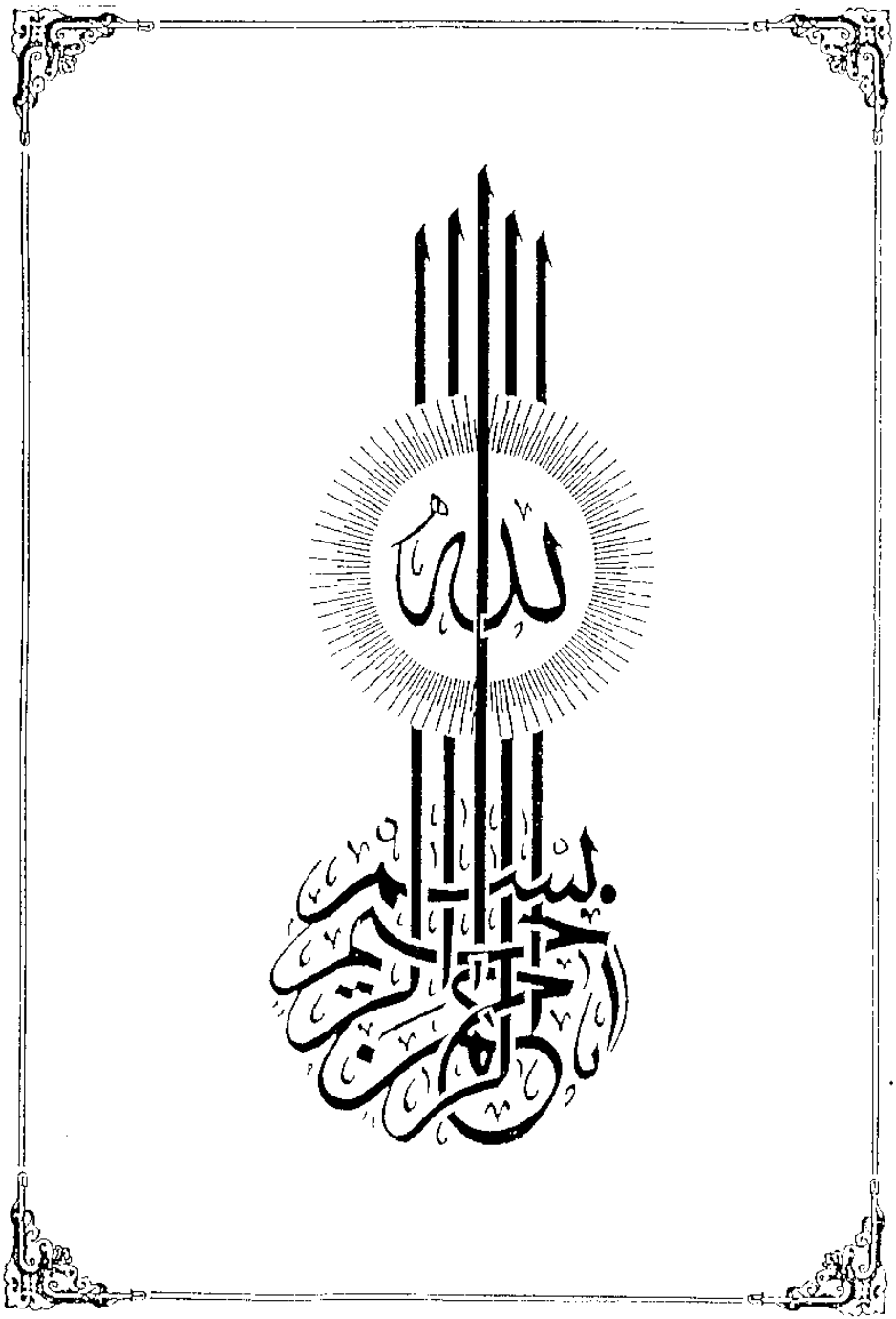
1987

ACKNOWLEDGEMENT

I wish to express my deepest gratitude and appreciation to **prof. Dr. WAFIK HEFNY**, professor of ophthalmology, Ain Shams University, for supervising the details of this work, for his encouragement, unlimited support and helpful criticism.

I would like to take this apportunity to extend my thanks and appreciation to all the professors and staff members of the ophthalmic department, Ain Shams University who contributed in deepening my knowledge in ophthalmology.

"Amal Ibrahim Mohamed"



CONTENTS

****

INTRODUCTION

INDICATIONS FOR EXTRACAPSULAR CATARACT EXTRACTION

It will be readily apparent that some of these are highly questionable, although others appear reasonable.

I- Age of the patient:

In patients under fourty years of age, with strong hyalocapsular ligament and zonular attachment, the incidence of vitreous loss is much higher when the cataract is removed by intracapsular than by extracapsular method (Berger et al.,1980). In young active, and atheletic individuals, the architecture of the vitreous is more likely to be maintained. In extracapsular cataract extraction with intact posterior capsule there is less possibility of post-operative rupture of the anterior hyaloid membrane with incarceration of vitreous in the operative wound (Jaffe, 1984a).

On the other hand, older patients who have a subluxated lens with some broken zonular fibres are clearly best treated by intracapsular extraction. Attempts at anterior capsulectomy or nucleus delivery in the presence of broken zonule are almost certain to result in vitreous loss or possibly loss of lens in the vitreous (Emery and Little, 1979).

There is a large middle group that can be treated in either way, and each surgeon has to deside which technique offers the advantages appropriate for him and for the patient (Spaeth, 1982).

II- Patients in whom it is advisable to maintain the physiologically separate eye compartment:

These patients are especially suitable for extracapsular cataract extraction. This group of patients include:

1. High myopes, with vitreoretinal degeneration:

Extracapsular cataract extraction is suggested in patients with high myopia to maintain the posterior capsule and zonular barrier between the degenerated vitreous and the anterior chamber (Roper-Hall, 1980).

Jaffe (1984b) observed two consecutive series of cataract extractions in patients with moderate to severe myopia for the incidence of postoperative retinal detachment. One series consisted of 122 intracapsular cataract extractions without surgical loss of vitreous. The other series consisted of 151 extracapsular cataract extraction without loss of vitreous and with intact posterior capsules. All patients were followed up for one to four years. He found that the rate of postoperative retinal detachment

was greater in the intracapsular series (5.74%) than in extracapsular series (0.66%). The result of this study indicate that an uncomplicated extracapsular cataract extraction is likely to be followed by a lower rate of retinal detachment in patients with moderate to severe myopia than an uncomplicated intracapsular cataract extraction.

2. Patients with significant risk of retinal detachment:

This group of patients includes:

- Patients in whom retinal detachment occured after intracapsular cataract extraction in the opposite eye.
- Patients in whom the opposite eye suffer from retinal detachment (Shock, 1978).
- Patients who have had previous retinal detachment surgery and who require cataract extraction in the same eye (Jaffe, 1984a).

Kelman (1977) suggested that theoretically, the incidence of retinal datachment should be lower with extracapsular cataract extraction, since the zonules are not disinserted from the peripheral retina. The fact which should prevent trauma to the retina and consequently decreases the incidence of retinal detachment. In his series of phacoemulsification and in the series of others who have performed jointly

tens of thousands of these procedures, the incidence was curiosly almost identical: approximately 1% retinal detachments. While a 3 to 5% retinal detachment have been quoted in the literature at that time after intracapsular cataract extraction.

On the other hand Fritch and Jungschaffer (1978) found that retinal detachment was not eliminated nor decreased to a rare complications after extracapsular cataract extraction. This opinion is supported by Wilkinson (1979) and McDonald (1979) who added that in cases of retinal detachment following extracapsular cataract extraction the retinal repair is much more difficult to perform. This is because even in the best cases some cortical material remains under the iris as a minute sommering's ring which makes it most difficult to see the small oral breaks so characteristic of aphakic retinal detachment.

Seward and Doran (1984) analysed the results of extracapsular cataract surgery on 242 patients with minimum follow-up 12 months. They found that aphakic retinal detachment occured in only one patient who had undergone posterior capsulotomy. It is possibly that this detachment may be related to the degree of manipulation required to divide the capsule.

Osterlin's studies (1978) have shown that the hyaluronic acid concentration of the vitreous after an intracapsular cataract procedure is much less than that after an extracapsular procedure. Since hyaluronic acid is considered to serve the function of the shock absorber of the vitreous, its loss might make an eye more subject to trauma during normal ocular movements or during ocular trauma.

Binkhorst (1980), stated that endophthalmodonesis is much greater after an intracapsular than an extracapsular cataract extraction. The loss of lens-zonular barrier after an intracapsular extraction permits greater mobility of the vitreous during saccadic movements of the eye. Therefore one might expect less trauma from vitreoretinal traction after an extracapsular cataract extraction with preservation of an intact posterior capsule.

3- Patients who have suffered a significant cystoid macular edema (CME) after an intracapsular cataract procedure in the fellow eye:

Irvine (1953) felt that the loss of acuity in his patients was associated with rupture of vitreous face and vitreous traction on the posterior retina. Nicholls (1956) proposed that the primary cause was probably a vascular change in the posterior segment.

Gass and Norton (1966) were the first to demonstrate with fluorescein angiography the typical cystoid sapces in a stellate fasion about the macula. They suggested that some inherent deffect in capillary integrity may be present prior to cataract extraction in patients developing this syndrome.

Kelman (1977) stated that the high rate of subclinical macular edema (40%) which was reported by Irvine-Gass as evidenced by fluorescein angiography seems to be reduced by extracapsular procedure. In Kelman's series of fluorescein angiography after phacoemulsification the incidence was closer to 15%. He added that the permanent maculopathies following phacoemulsification were proportionally reduced compared to intraocular surgery.

Worst (1978) noted that the common denominator in cystoid macular edema is a broken anterior vitreous surface. He added that the advantage of extracapsular surgery is to preserve the vitreous face and probably vitreous integrity by leaving the posterior capsule intact. With disruption of the anterior vitreous surface he assumed that the anterior chamber influences reached the macula, where they exert their patho-physiological effects.

Attia and Osman (1983) observed 18 eyes operated by intracapsular method of extraction. They found that seven out of the 18 eyes examined by fluorescein angiography showed evidence of CME (38.8% of all cases). While Jampol et al.(1985) found that the incidence of CME in 205 patients operated by extracapsular methods was 39 patients (19.1%).

The macula is particularly vulnerable structure because of its extremely thin protective basal lamina (Yamada, 1969). The loose structure of Henle's fiber layer that predisposes it to imbibition of fluid (Cogan and Guzak, 1971). The avascularity of the central area of the macula and its lack of capillaries that limit absorption of fluid (Duke Elder and Dobree, 1967).

The incidence of CME rises abruptly with surgical complications such as operative loss of vitreous, uveitis, and postoperative rupture of the anterior hyaloid membrane, especially with incarceration of vitreous in the operative wound. Intracapsular cataract extraction with an intact anterior hyaloid membrane and extracapsular cataract extraction with an intact posterior capsule are associated with a lowered incidence of CME. Yet it does not prevent its occurence (Jaffe, 1984a).

In recent years, considerable attention has been directed toward prostaglandins as the chemical mediators of intraocular inflammation and CME. Prostaglandins E_1 and E_2, isolated from the aqueous of the eye, are known to produce increased capillary permeability as well as signs of ocular inflammation such as increased protein concentration in the aqueous, miosis, vasodilatation, and increased intraocular pressure. The action of these prostaglandins on the perimacular capillaries after lens extraction may explain the development of CME (Jaffe, 1984a).

4- <u>In diabetic patients or other patients with ischemia in the fundus</u>:

In patients with retinal ischemia the posterior lens capsule may serve as a protective barrier to a diffusion of vasoproliferative factor from the vitreous or retina which may lead to rubeosis iridis and neovascular glaucoma (Weinreb et al.,1986). Aiello et al.(1983) found a significantly increased incidence of postoperative iris neovascularization and neovascular glaucoma in eyes without proliferative diabetic retinopathy that had undergone intracapsular cataract extraction. Furthermore, (Poliner et al. 1985) reported a significantly lower incidence of neovascular glaucoma in diabetic eyes after extracapsular surgery with

the posterior capsule left intact, as compared with those that had intracapsular surgery or extracapsular surgery with primary capsulotomy.

5- In corneal dystrophy:

Cataract extraction by extracapsular method in patients with corneal endothelial dystrophy has been the subject of great controversy.

Emery and Little (1979) said that, the surgeon must have clear visibility into the anterior chamber to perform a safe extracapsular cataract extraction. Even localized opacities can lead to potentially serious problems because of inadequate visualization of the key structures underlying them. Furtheremore, corneal endothelial guttate are a warning. This endothelium will not tolerate manipulation or contact of the lens in the anterior chamber. The presence of central corneal guttate is generally a contraindication to performing an extracapsular cataract extraction. On the other hand they said that in the hand of the highly skilled surgeon, however, the posterior chamber emulsification is probably less traumatic to the corneal endothelium than is intracapsular cataract extraction in case of Fuch's endothelial dystrophy. There is also the distinct advantage of an intact posterior capsule in case the patient later requires

a corneal transplant because of progression of the dystrophy.

Extracapsular cataract extraction protect the corneal endothelium from vitreous touch by preservation of the posterior capsule. This is undoubtedly true, but this becomes less of an advantage when one considers that an extracapsular cataract extraction probably causes more endothelial cell loss than an intracapsular cataract extraction according to most studies (Jaffe, 1984a).

6- <u>When the intracapsular operation, or postoperative course, has been complicated in the other eye</u>:

Emery and Little (1979) advised to extract the lens by extracapsular method if there was a history of depressed healing and wound dehiscence after surgery on the opposite eye, or if there was history of vitreous loss. They stress the advantage of phacoemulsification if there was history of expulsive haemorrhage in the fellow eye. The posterior capsule may prevent vitreous from gaining access to the wound. This advantage may be especially valid if the first eye suffered from corneal edema due to vitreocorneal adherence. The preservation of the posterior capsule may prevent this complications in the second eye.