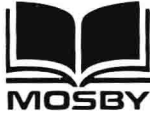


Symposium on cataract surgery

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ACADEMY OF OPHTHALMOLOGY



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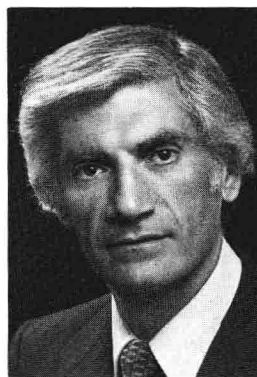
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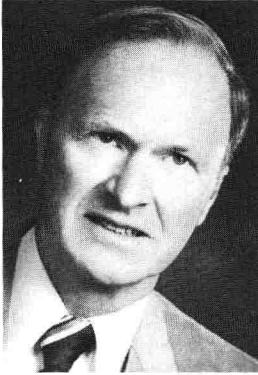
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Preface

The thirty-second Annual Symposium of the New Orleans Academy of Ophthalmology, which was held from April 16 through 20, 1983, presented a contrast between the attitudes and practices of ophthalmic surgeons in the 1970s and those in the early 1980s in regard to cataract surgery and correction of aphakia. Parallels as well as complete disparities of thought between these two eras were brought to the fore. Many of these observations can be found in the Round Table Discussions.

The inevitability of change and the physician's role in keeping current in this very widely practiced and continually updated field was stressed at this meeting of Academy members.

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Symposium on cataract surgery

TRANSACTIONS OF THE NEW ORLEANS
ACADEMY OF OPHTHALMOLOGY

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The intracapsular-extracapsular controversy

Norman S. Jaffe

The intracapsular-extracapsular controversy is currently the most important and hotly debated subject in cataract surgery. The intracapsular method has enjoyed 40 years of unrivaled acceptance as the preferred method of cataract extraction. However, as a result of the clinical research of Binkhorst, Kats, and Leonard² and the introduction of phacoemulsification by Kelman⁹ in 1967, the extracapsular method is gaining and will probably overtake the intracapsular technique in popularity. Is this change justified?

One must be reluctant to abandon the intracapsular technique, since it has achieved extraordinary sophistication and success since its introduction. It is fairly easy for surgeons of average skill to learn. There are fewer demands on the surgeon, and the complications tend to be less disastrous than in extracapsular surgery. Yet there are advantages of the extracapsular over the intracapsular method, some claimed and some real. Extracapsular surgery requires more skill. Therefore the surgeon is faced with the responsibility of making a personal assessment of his or her own ability. I am convinced that a surgeon who has performed intracapsular surgery satisfactorily for a long time and is intimidated by challenging surgical situations should not change to extracapsular surgery. Furthermore, if the surgeon's facility with the surgical microscope is not excellent, the transition should not be made. Such a surgeon is asking for trouble and will surely get it. On the other hand, surgeons of better-than-average skill can be expected to make the change with little difficulty, and the results will justify the effort.

Certain advantages of the extracapsular over the intracapsular method are usually cited. Let us examine these advantages and try to place them in perspective according to available knowledge. They are as follows:

1. Retention of an avascular membrane between the vitreous and the anterior chamber
2. Less likelihood of a redetachment in patients who have had previous retinal detachment surgery who require cataract extraction
3. Greatly reduced endophthalmodonesis
4. Preservation of a barrier between the aqueous and vitreous, which protects the retina from possible toxic constituents of the aqueous
5. For cases in which operative loss of vitreous is likely
6. Preservation of a membrane anterior to the vitreous in the event that a secondary lens implant becomes necessary
7. In corneal dystrophy possible protection of the endothelium from vitreous touch by the preservation of the posterior capsule

8. Aphakic penetrating keratoplasty being safer and technically easier with an intact posterior capsule

9. For cases in which intracapsular surgery is difficult or contraindicated

Sometimes other advantages are claimed, but these are the most frequently cited.

The first two advantages are concerned with a lowered incidence of postoperative retinal detachment. The retention of an avascular membrane (intact posterior capsule) presumably lowers the incidence of retinal breaks by keeping the vitreous from bulging forward, thus lessening vitreous shock. Most retinal surgeons accept the concept that keeping the vitreous in its place is advantageous. There are still no valid statistics currently available to support this premise, but many such claims have been made. My associates and I⁷ compared the incidence of retinal detachments in patients with moderate to high myopia after intracapsular and extracapsular cataract extractions. There were seven retinal detachments in 122 consecutive intracapsular cataract extractions (ICCE) in patients observed for an average of 2.8 years (none less than 1 year) and one retinal detachment in 151 consecutive extracapsular cataract extractions (ECCE) followed for an average of 2.1 years (none less than 1 year). These were all uncomplicated operations, and the posterior capsule was left intact in all extracapsular cases. The follow-up ranged from 1 to 4 years. Because of the difference in follow-up time in the two series, the results were subjected to a life-table analysis using the Lee-Desu statistic. The difference was statistically significant ($p = .036$). There are still some unavoidable weaknesses in this type of retrospective study; however, there was no bias in case selection, since each series included consecutive cases.

It is difficult to determine the true prevalence of postoperative retinal detachment from reports in the literature. There are varying postoperative times; some cases have posterior capsulotomies, and others do not; and, finally, most surgeons who report large series are those with better than average surgical skill. In 1976 Kratz¹¹ reported an incidence of retinal detachment of 1.2% in 2000 phacoemulsification cases followed for 2 years. Most of these were done with intact posterior capsules. On the other hand, Wilkinson, Anderson, and Little¹⁵ reported an incidence of 3.6% in 1500 cases. More than 90% of these had either a total capsulectomy or a capsulotomy.

The third advantage of an ECCE is a greatly reduced endophthalmodonesis. This is a term coined by Binkhorst; it refers to the mobility of certain structures inside the eye, such as the iris or an intraocular lens (IOL), in relation to stationary structures, such as the cornea, sclera, retina, and so on. Aside from its important optical function, the lens-zonule system provides an important stabilizing function inside the eye. In an ICCE this system is completely removed. In an ECCE it is partly removed. The loss of the stabilizing lens-zonule system results in increased mobility within the eye (endophthalmodonesis). This permits biochemical substances to spread more easily and to a larger extent, thus having remote effects. The loss of the lens-zonule system also allows saccadic movements to result in aqueous oscillations. During oscillations of the aqueous, turbulences exist in the outer lamina of the aqueous, which is in contact with the slightly uneven surface of the corneal endothelium. Disturbances resulting from this are seen physiologically (Krukenberg's spindle) and pathologically (cornea guttata, diabetes mellitus, and chronic glaucoma and after intraocular surgery). Binkhorst¹ has referred to these changes as *turbulence endotheliopathy*.

Endophthalmodonesis also affects the posterior segment of the eye. After an ICCE

the vitreous often undergoes degeneration, resulting in vitreodonesis. Saccadic movements of the eye induce oscillations in the posterior segment as soon as posterior vitreous detachment occurs and a preretinal aqueous film forms. Because of the slightly irregular profile of the basal lamina of the retina the outer lamina of this fluid pool is subject to turbulences. This causes microconcussions of the retina, which result in capillary leakage in much the same way that a contusion of the eye may cause retinal edema. There are topographic variations in the thickness of the basal lamina of the retina.⁵ The lamina is thick everywhere except at the macula, the papillary area, and the ora serrata. Degenerations, holes, and ruptures occur in these areas, and the retinal capillaries there are less protected against concussions. I would suggest the term *turbulence retinopathy* for these phenomena.

If we presume that endophthalmodonesis and turbulence endotheliopathy are the common denominators of corneal and retinal complications, we may expect them to coexist. I had noted this in the early 1970s as a result of my experience with the Copeland IOL. Nordlohn¹⁴ also noted that the occurrence of corneal dystrophy and cystoid macular edema was not independent. The high incidence of cystoid macular after an aphakic penetrating keratoplasty is probably not the consequence of the keratoplasty. The cystoid macular edema probably occurs in association with the corneal dystrophy.

Several studies^{4,8} have shown that endophthalmodonesis is greatly reduced after an ECCE compared to an ICCE.

The fourth advantage is that there is a preservation of a barrier between the aqueous and vitreous, which protects the retina from possible toxic constituents of the aqueous. This is speculative. It is not known whether the posterior capsule is impermeable to the posterior passage of electrolytes. It is also difficult to accept this because the zonular apparatus is probably permeable to the posterior passage of blood and electrolytes.

The fifth advantage of an ECCE is that it is less likely to result in vitreous loss when there is a high risk of this complication. This would affect patients with a short, thick neck, patients with exophthalmos, and patients who have suffered vitreous loss in the opposite eye. This would also include young patients and those with moderate to high myopia. It must be cautioned, however, that during the learning period there may be higher rate of vitreous loss with an ECCE. In most instances the rate of vitreous loss is less with increased experience.

The sixth advantage is that there is preservation of a membrane anterior to the vitreous in the event that a secondary lens implant becomes necessary. I consider this one of the most valid advantages of an ECCE. In some patients a cataract extraction is performed in anticipation of successful contact lens wear. If contact lens wear proves unsuccessful, a secondary lens implant could solve the problem. This type of surgery is much simpler and safer in the presence of an intact posterior capsule. I have used this approach many times.

The seventh advantage is that in corneal dystrophy the endothelium may be protected from vitreous touch by preservation of the posterior capsule. This advantage is somewhat minimized by the fact that an ECCE may result in slightly more loss of endothelial cells than an ICCE.

The eighth advantage is that an aphakic penetrating keratoplasty is safer and technically easier with an intact posterior capsule. This is undoubtedly valid and would be accepted by most corneal surgeons. The performance of a triple procedure (cataract extraction,

lens implantation, and penetrating keratoplasty) is also safer and technically easier with an ICCE as part of a triple procedure.

The final advantage is that an ECCE may be performed in those cases in which an ICCE is difficult or contraindicated, for instance, in a young patient or in a patient with proliferative diabetic retinopathy. Most vitreous surgeons feel that an ECCE is less likely to result in postoperative neovascular glaucoma. I consider this opinion valid.

The concept that has impelled more cataract surgeons to turn to the extracapsular procedure than any other is that there appears to be a lessened rate of postoperative cystoid macular edema after an ECCE. My co-workers and I⁶ have shown in a fluorescein angiographic study that there is less cystoid macular edema following an ECCE than after an ICCE. This is particularly apparent in a study of the rate of fluorescein cystoid macular edema and not as impressive in a study of the rates of clinical cystoid macular edema (less than 20/40 vision in eyes with fluorescein leakage into the macula). Many other studies point to a higher rate of clinical cystoid macular edema after an ICCE.^{10,12,13} Another study showed that there is less cystoid macular edema after an ECCE when the posterior capsule is left intact than when a capsulotomy is performed.³ Therefore one must realize that the advantage of an ECCE is somewhat lessened when late opacification of the posterior capsule occurs and must be discussed.

In making the transition to the extracapsular surgery technique, many responsibilities are obligatory. The surgeon in practice who has performed satisfactory ICCEs for many years must decide whether to make this change. It is not recommended that a surgeon with a low volume of cataract practice make the transition. Most surgeons with a high volume of cataract practice have the expertise and the opportunity to learn extracapsular surgery with a minimum of difficulty. We have a great responsibility to residents in training: no resident in ophthalmology should finish training without being educated in modern extracapsular surgery. This is the most appropriate time to learn the method. It is now estimated that nearly 50% of the cataract surgery performed in the United States is with the extracapsular method. Undoubtedly this percentage will increase in the next few years. As more reports become available, it will become clear if this transition has been justified.

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