The White Cataract

How to manage a cortically mature nucleus.

BY WILLIAM J. FISHKIND, MD, FACS; THOMAS W. SAMUELSON, MD; AND SAMUEL MASKET, MD

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Three types of soft cataracts require consideration. One is the cortically mature cataract that has diffusely flocculent cortex but may or may not be associated with increased intralenticular pressure. The second is the cortically mature cataract with flocculent cortex and a brown, mature endonucleus, and this nucleus also may or may not be associated with increased intralenticular pressure. The third type is a uniformly soft cataract with well-formed, gelatinous cortex and a soft, poorly formed endonucleus.

Phacoemulsification of the uniformly soft cataract may be challenging. In these early cataracts, the endonucleus has thick condensations of cortex connecting it to the capsule. Unless the connections are disrupted, the nucleus may be difficult to rotate, thus hindering the surgeon's access to the nuclear and cortical material near the incision. Thorough cortical cleaving hydrodissection is therefore mandatory.

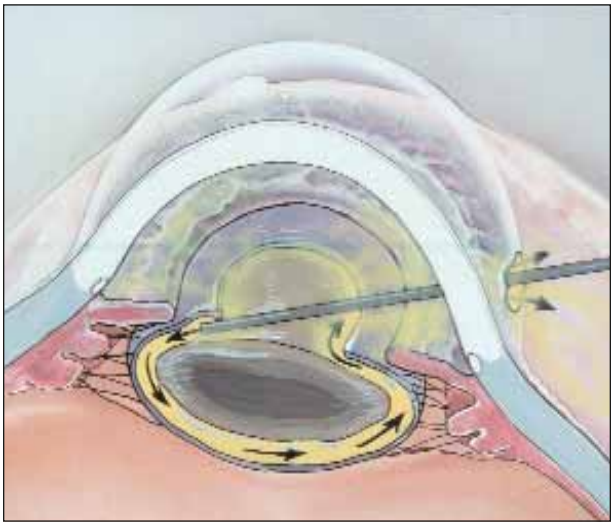

Figure 1. The surgeon places the cannula below the capsulorhexis and injects fluid anteriorly to pass around the equator and cleave cortex from the capsular bag. (Reprinted with permission from Fishkind WJ, ed. *Complications in Phacoemulsification: Avoidance, Recognition, and Management*. 1st ed. New York, NY: Thieme Medical Publishers; 2002.)

After creating a 5.25-mm capsulorhexis, I attach a 27-gauge cannula to a 3-mL syringe filled with BSS and place it just below the anterior capsular edge, 90º away from the incision. I inject a firm but gentle stream of BSS anteriorly such that fluid passes around the lens' equator and creates a fluid wave posteriorly (Figure 1). Once the fluid traverses most of the way across the posterior lens, I replace the cannula 180º from the initial injection site and instill more BSS to complete the hydrodissection.

The endpoint of fluid injection is the elevation of the nucleus as fluid accumulates behind it. Gentle posterior pressure on the nucleus completes the hydrodissection by forcing fluid to accumulate behind the nucleus, around the equator for 360º. It will lyse all the nuclear-bag connections (Figure 2). A gentle second infusion of BSS will then collect behind the lens and elevate it, through the capsulorhexis, into the anterior chamber. There it can be aspirated, with only occasional bursts of low-powered phacoemulsification.

If large amounts of cortex remain stuck to the capsular bag that I cannot mobilize, I use a 0.3-mm I/A tip for safe and trouble-free removal. Effective cortical cleaving hydrodissection will transform a possibly difficult case into an uncomplicated one.

THOMAS W. SAMUELSON, MD

Successfully removing a white, mature cataract in an otherwise healthy eye is one of the most gratifying procedures in ophthalmology. Preoperatively, it is prudent to inquire about a history of trauma or previous ocular surgery that may have compromised the integrity of the lens capsule or zonules. It is important to note the presence or absence of a relative afferent pupillary defect, phacodonesis, phacomorphic angle narrowing, or an inflammatory response to the mature lens.

In virtually all cases, the mature lens will preclude the surgeon's view of the fundus. Although B-scan ultrasound should be considered to rule out a retinal detachment or

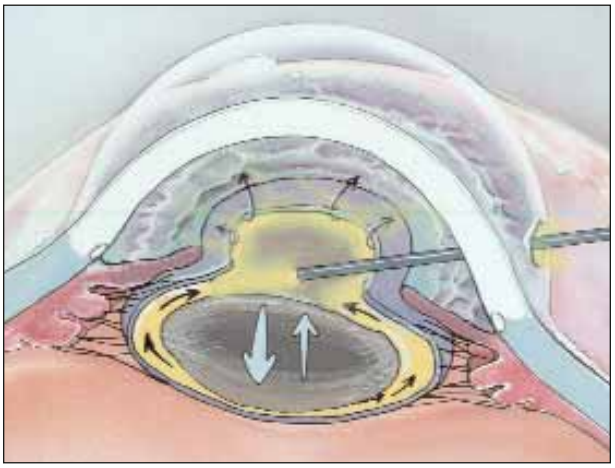

Figure 2. Gentle posterior pressure forces fluid trapped behind the cataract around the equator for 360º. (Reprinted with permission from Fishkind WJ, ed. *Complications in Phacoemulsification: Avoidance, Recognition, and Management*. 1st ed. New York, NY: Thieme Medical Publishers; 2002.)

intraocular tumor, I do not obtain ultrasonography for every mature cataract. For instance, I may omit it when the examination of the pupil is normal, with no evidence of a relative afferent pupillary defect, and I have visualized the fundus within the last few years prior to surgery. I counsel patients that the density of their cataract precludes my ability to rule out macular or optic nerve disease.

The use of a dye such as trypan blue to enhance visualization of the anterior capsule and facilitate a continuous-tear capsulectomy has made these cases nearly routine. The importance of an intact and continuous capsulotomy cannot be overemphasized, however. It is desirable initially to enter the anterior capsule centrally rather than in the periphery of the capsule, because the intumescent lens will often be expelled anteriorly and propagate radially as soon as the capsule is opened. I prefer a dispersive or viscoadaptive cohesive viscoelastic agent in such cases to help limit this tendency. Often, milky white, liquefied cortical material will cloud the anterior chamber as the capsule is opened. It can be evacuated with gentle I/A to restore visualization. Subsequent surgical steps are essentially the same as in routine phacoemulsification.

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The capsulorhexis remains the most critical step for modern-day cataract surgery—particularly in eyes with cortically mature white cataracts—because lost control of the capsulotomy can initiate a series of intraoperative complications. Maintaining a flat or scaphoid anterior capsule greatly enhances the surgeon's ability to successfully complete an anterior continuous-tear capsulotomy.

Generally, in an eye with a routine cataract and average anatomical characteristics, it is relatively easy to achieve an appropriate capsulorhexis. Certain conditions, however, pose obstacles to the surgeon, especially cases of intumescent, cortically mature cataracts. In these cases, the cataract is often under high intralenticular pressure, which can allow for several surgical challenges: the anterior capsule may split peripherally with the first puncture; the liberated liquefied cortex may obscure the surgeon's view; and a convex anterior capsule tends to extend peripherally during an attempted circular capsulotomy.

Although no remedy is perfect, if the surgeon can render the anterior capsule scaphoid (flat) prior to attempting the capsulorhexis, the chances for success are great. A cohesive ophthalmic viscosurgical device (OVD) with a high molecular weight exhibits high viscosity at low stress (without high fluid inflow) and can facilitate the capsulotomy, particularly with capsular staining to improve visualization. A dispersive agent is less desirable in this situation, because it cannot maintain space to the same degree as a cohesive OVD.

After staining the capsule with trypan blue and deepening the chamber with an appropriate OVD, the surgeon can proceed routinely with the capsulotomy in the great majority of situations. Should the chamber be unusually shallow or the cataract particularly distended, however, it may not be possible to render the anterior capsule scaphoid. In this situation, the surgeon may opt to perform a limited vitrectomy through the pars plana while adding OVD to the anterior chamber. Another strategy is to make a very small, central anterior capsular puncture, which will release some of the liquefied cortex and decompress the high intralenticular pressure. At this juncture, it might be helpful to aspirate some of the cortex to enhance visibility. Following this maneuver, the surgeon may slowly add more viscoelastic and complete the capsulorhexis. ■

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