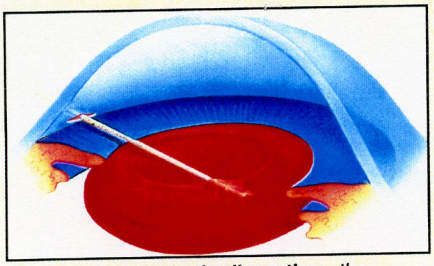
You can throw away your I/A tip: cortical cleaving hydrodissection

This month's column features the cortical cleaving hydrodissection technique described by I. Howard Fine, MD. Howard and I first discussed this technique at the American Academy of Ophthalmology meeting in Anaheim, October 1991. During one of our regular mutual update sessions, where we get together and share our thoughts on what's new with other members of the faculty, Howard convinced me that I should begin altering my hydrodissection technique in an attempt to cleave the capsule from the cortex. When combined with our crack-and-flip phaco technique, it theoretically would allow for all the cortex to be removed with the outer epinucleus, thereby eliminating the irrigation/aspiration step all together.



Cortical cleaving hydrodissection: *the cannula gently elevates the anterior capsule away from the cortex before injecting.*

Now six months later I can confidently tell you that it works. I have used cortical cleaving hydrodissection on every case since October 1991 and, after a two- or three-week learning curve, have found that I need to use my I/A handpiece in less than 10% of my cases. When a separate cortical removal step is required, it is usually just for a small portion of the cortex. Further, what cortex is present is easily removed.

This is good news since every experienced phaco surgeon will tell you that when he or she has capsular breaks, 90% occur not during phaco, but rather during I/A. This is particularly true since the advent of capsulorhexis, which has made the already stubborn 12-o'clock cortex that much less accessible.

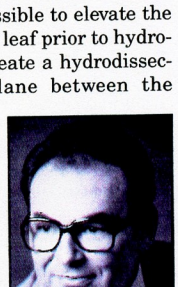
In my experience, the technique is the same as traditional hydrodissection with the exception that the cannula is elevated in order to "tent" the anterior capsule slightly away from the anterior cortex before the gentle infusion is initiated.

I always listen carefully when Howard Fine makes a suggestion. It usually turns out to be a brilliant yet practical innovation. It almost always works exactly as Howard says it should. Cortical cleaving hydrodissection is no exception. I recommend it to you highly. It is the most valuable technique I have learned since capsulorhexis—and that says a lot.

—William F. Maloney

by I. Howard Fine, MD
Special to Ocular Surgery News

Like most phacoemulsification surgeons, I have been frustrated that most of my capsule ruptures have occurred during cortical cleanup, the time at which the "difficult" portion of the procedure has already been completed. For a long time I have been fascinated by the fact that when a continuous curvilinear capsulorhexis is performed, the elevated capsular flap is pristine; it is completely clear with no cortex attached. I began to wonder whether it wouldn't be possible to elevate the anterior capsular leaf prior to hydrodissecting and create a hydrodissection cleavage plane between the capsule and the cortex rather than between cortex and epinucleus.



I. Howard Fine

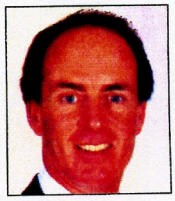
My first several attempts at this were associated with the absence of fluid exiting from the capsulorhexis and then an explosive delivery of the nucleus from the capsular bag into the anterior chamber. In all cases, the capsulorhexis itself remained intact.

We have known for a long time that cortical–capsular connections are strongest in the equator at the capsular fornix. I began to think that perhaps following elevation of the anterior capsular leaf and gentle irrigation, fluid was cleaving cortical–capsular connections posteriorly and running into the firm adhesions in the equator, thereby preventing fluid from exiting the capsulorhexis until there was an explosive rupture of a large portion of the adhesions in the fornix and resulting subluxation of the nucleus.

It occurred to me that I might be able to use posterior loculated fluid to rupture cortical–capsular connections. When I tried this, pushing down on the lens with the side of the hydrodissection cannula and forcing the fluid around the equator of the capsule, the cortical–capsular connections at the equator and under the anterior capsular leaf were cleaved and fluid flowed out from under the capsulorhexis instead of delivering the nucleus. From this point on, there was a very rapid progression to the time when I could achieve cortical cleaving hydrodissection and eliminate cortical cleanup as a separate step in my phaco surgery.

The technique generally uses a small capsulorhexis, with a 4- to 4.5-mm diameter being optimal. This results in a large anterior capsular flap and enables greater ease in accomplishing this type of hydro-

FOCUS ON PHACO



Skills and instrumentation needed to perform phaco

William F. Maloney, MD, of Vista, Calif., founder of the Three Steps to Phaco course, has helped hundreds convert from ECCE to phaco

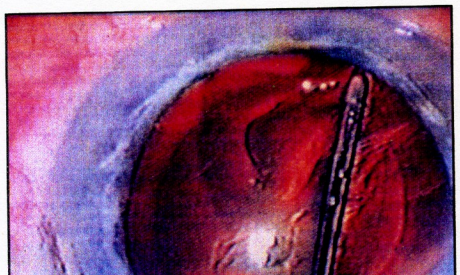


Figure 1— *Fluid wave passes just under the capsule, cleaving cortex from posterior capsule.*

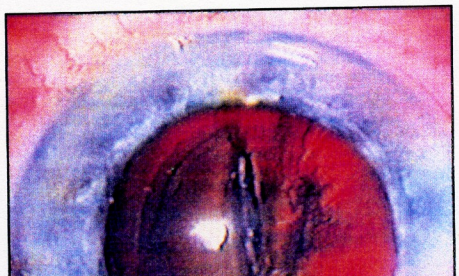


Figure 2— *Central portion of the lens is depressed with the side of the cannula, forcing fluid to cleave cortical–capsular connections.*

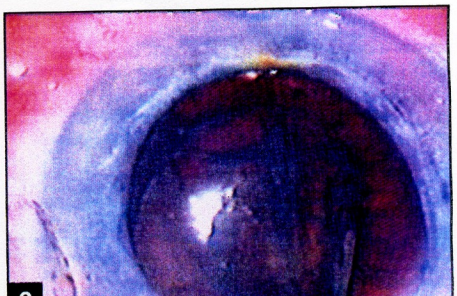


Figure 3— *Hydrodelineation results in a visible golden ring or a dark circle.*

Figure 4— *After removal of the central portion of the nucleus, the epinuclear shell can be mobilized with a flipping maneuver and removed.*

Figure 5— *A very clean capsular bag almost always results.*

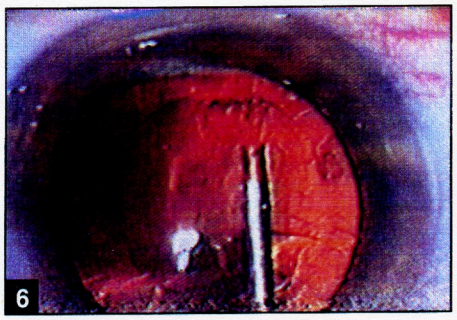


Figure 6— *If a lot of cortex remains, the posterior capsule can be polished in the area exposed by the capsulorhexis.*

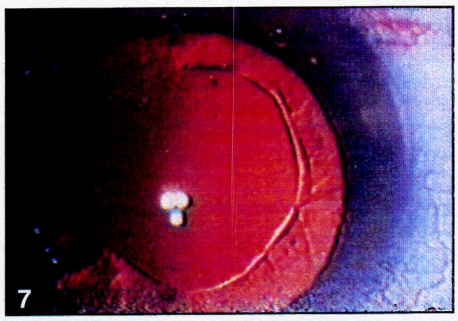


Figure 7— *Filling the capsular bag with viscoelastic drags remaining cortex so that it is draped over the anterior capsular flap.*

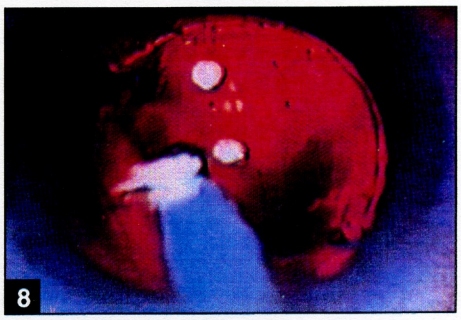


Figure 8— *The IOL is implanted, leaving cortex anterior. Removal of viscoelastic is accompanied by aspiration of residual cortex, leaving a clean capsular bag in most cases.*

dissection. The anterior capsular flap is elevated away from the cortical material with a 26-ga blunt cannula prior to hydrodissection and then fluid is allowed to dissect, gently, just under the anterior capsule, near the equator of the lens. The cannula maintains the anterior capsule in a tented position at the injection site.

Gentle continuous pressure will result in a fluid wave that passes circumferentially just under the capsule, cleaving the cortex from the posterior capsule in most locations. When the fluid wave has passed around the posterior aspect of the lens, the entire lens will bulge forward due to the fluid behind the lens within the capsular bag.

At this point, the capsule is decompressed by depressing the central portion of the lens with the side of the cannula so as to force fluid to come from posteriorly around the equator of the lens, cleaving cortical–capsular connections in the fornix of the capsule and under the anterior capsular flap. The cleavage of cortex from the capsule equatorially and anteriorly allows fluid to exit from the capsular bag via the capsulorhexis and mobilizes the lens so that it can spin freely in the capsular bag. Repeating the hydrodissection and capsular decompression starting in the opposite inferior quadrant may be helpful.

The cannula is then used for hydrodelineation, resulting in a visible golden ring or a dark circle. After removal of the hard central portion of the nucleus by a chip-and-flip or cracking technique, the resulting epinuclear shell can be mobilized with a flipping maneuver and removed. This almost always results in a very clean capsular bag, with the exception of a few loosely adherent scattered strands of cortex. After scrubbing the posterior capsule with a Terry squeegee and inserting the IOL, these strands can be removed along with residual viscoelastic using the I/A tip, leaving a clean capsular bag.

If there is a lot of cortex remaining, the posterior capsule can be polished in the area exposed by the capsulorhexis using a 27-ga capsule polisher (Alcon #865-428220). The capsular bag is then filled with Viscoat (Alcon) at the center of the bag posteriorly. The viscoelastic spreads horizontally and, because of its viscosity, drags remaining cortex so that it is draped over the anterior capsular flap. The posterior capsule is then deepened with Viscoat.

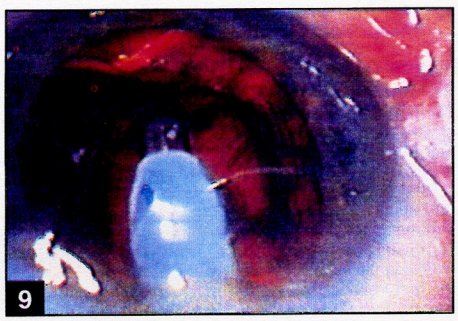
The cleavage of cortex from the capsule equatorially and anteriorly allows fluid to exit from the capsular bag via the capsulorhexis and mobilizes the lens so that it can spin freely in the capsular bag.

The IOL is implanted through the capsulorhexis, leaving cortex anterior to the IOL. The removal of viscoelastic is accompanied by aspiration of residual cortex without difficulty anterior to the IOL, leaving a clean capsular bag in most cases.

If one wishes to complete cortical cleanup prior to lens implantation, the residual cortex can almost always be mobilized as a separate shell (similar to the epinucleus) and removed without ever turning the aspiration port down to face the posterior capsule. Alternatively, the phaco handpiece can be left high in the anterior chamber while the second handpiece strokes the cortex-filled capsular fornices. Frequently the cortical shell floats up as a single piece and exits through the phaco tip in I/A mode. This occurs because careful hydrodissection has cleaved most of the cortical–capsular adhesions.

In this technique, irrigation and aspiration of cortex as a separate step can be omitted, thereby eliminating that portion of the procedure during which posterior capsule disruption most frequently occurs. Residual cortical cleanup is accomplished in the presence of a posterior chamber IOL which protects the posterior capsule by holding it remote from the aspiration port. ■

Figure 9— *To complete cortical cleanup prior to lens implantation, the residual cortex can almost always be mobilized as a shell. . . .*



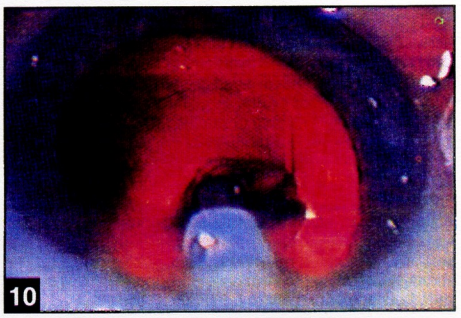
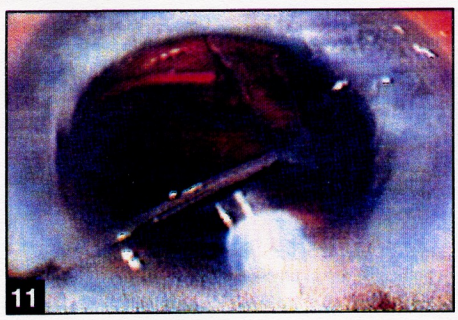


Figure 10— *. . . .and removed without ever turning the aspiration port down to face the posterior capsule.*

Figure 11— *Alternatively, the phaco handpiece can be left high in the anterior chamber while the second handpiece strokes the capsular fornices.*



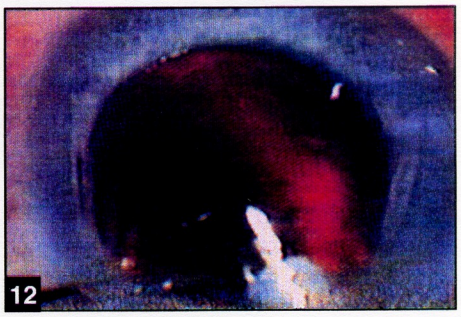


Figure 12— *Frequently the cortical shell floats up as a single piece and exits through the phaco tip in I/A mode.*