

Rescuing an Errant Capsulorhexis

A discussion of the three main causes and how to address them.

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A well-executed capsulorhexis is the first step toward a successful cataract procedure. No matter how skilled you are at performing the capsulorhexis, however, it begins to go badly once in a while. The best response is to stop, analyze the situation, and correct the underlying condition(s) that is leading to difficulty. In general, problems are the result of one or more of the following: an unstable anterior chamber, poor visualization, or difficulty with access.

UNSTABLE ANTERIOR CHAMBER

The most common reason for difficulty with a continuous capsulotomy is an unstable anterior chamber. The loss of anterior chamber volume or a failure to adequately fill the chamber with an ophthalmic viscosurgical device (OVD) leads to forward vaulting of the anterior lens/iris plane. The resultant stress on the margin of the capsular

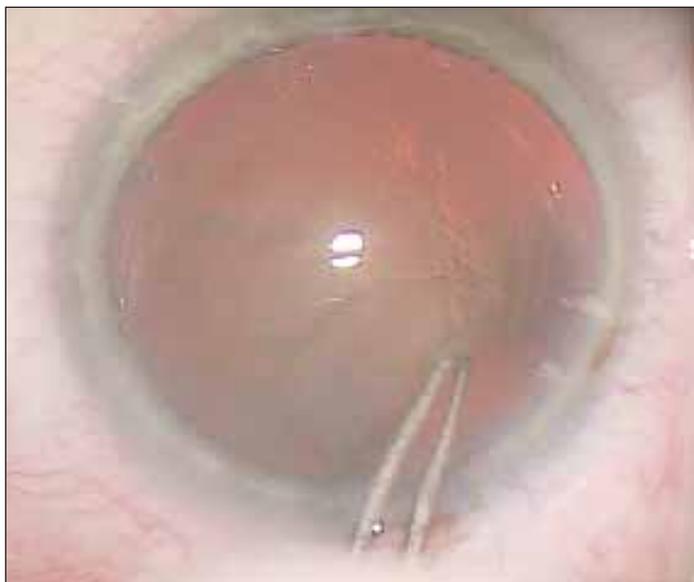


Figure 1. During the capsulorhexis, poor visualization and restricted access can make it very difficult for the surgeon to manage an errant anterior capsular tear.

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tear tends to direct the capsulorhexis peripherally.

Dispersive OVDs with a low molecular weight, such as Viscoat (Alcon Laboratories, Inc., Fort Worth, TX), are very good at coating the corneal endothelium and protecting it during phacoemulsification. These agents tend to be runny, however, and often exit the eye during manipulation of the anterior chamber. Cohesive OVDs have a higher molecular weight. They tend to be much more retentive and better at maintaining anterior chamber volume under conditions of zero shear (ie, when there is no fluid movement in the eye). When a capsulorhexis begins to take off peripherally, it is imperative to immediately stabilize the anterior chamber volume and flatten the lens/iris plane with the most cohesive OVD available to you. I prefer Healon5 (Abbott Medical Optics Inc., Santa Ana, CA) in this instance, because it is the most highly retentive of all OVDs. Healon5 creates a virtual cast of the anterior chamber and the most stable environment possible for me to redirect an errant tear. An additional benefit of this OVD is that I can use it to mechanically increase pupillary dilation, thus allowing me a better view of a tear that has slipped peripherally. Shallowing of the anterior chamber is common with mature and hypermature lenses.

POOR VISUALIZATION

The second most common cause of difficulties with a capsulotomy is poor visualization. Eyes with preexisting corneal haze or very dense nuclei

are often troublesome. You may start the capsulorhexis in these eyes with what seems to be adequate visualization, but as you create the tear, the leading edge may become increasingly difficult to see (Figure 1). Sometimes, folds of the torn capsule become superimposed and tangled over the leading edge of the capsule, which further reduces visualization and makes it difficult to know what part of the capsule to grasp next.

In this instance, it is important to remember that staining makes it much easier to see the capsule clearly. Capsular staining is usually performed before the capsulorhexis is begun, but it can be performed just as easily and effectively after the capsulorhexis is started. The key to using trypan blue after starting the capsulorhexis is to maintain the anterior chamber's volume so that the margin of the capsulorhexis does not radialize. One approach is to use Healon5 and the technique for primary capsular staining originally described by Robert Osher, MD.¹ Under a clear, highly retentive dome of Healon5, instill a small amount of balanced salt solution on the surface of the lens and capsule. Placing trypan blue in this tiny layer of balanced salt solution stains the capsule effectively (Figure 2). If necessary, you can gently irrigate the dye out of the shallow chamber of balanced salt solution without losing anterior chamber volume. Once the flap and leading edge of the capsule are stained and can be visualized clearly, it becomes much easier to complete the capsulorhexis safely.



Figure 2. Using Healon5 to stabilize the anterior chamber, the surgeon can place trypan blue on the capsule to improve visualization even after the capsulorhexis has been started. Microforceps, introduced through a sideport incision, provide the surgeon with better access and exquisite control of the tear.

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DIFFICULTY WITH ACCESS

An ideal clear corneal incision is square (ie, the intrastromal length of the incision equals its width). Incisions constructed in this way are less likely to be associated with postoperative hypotony than are shallow rectangular incisions, the intrastromal length of which is shorter than their width.² Long incisions tend to restrict access to the capsulorhexis in the quadrant of the incision. If you stop the capsulorhexis in this quadrant, it can be difficult to regrasp and continue the tear using ordinary capsule forceps.

Fortunately, this problem of access can be solved by using one of the new microforceps, such as those manufactured by MicroSurgical Technology (Redmond, WA). Introduced through a sideport incision, these microforceps allow you to approach an errant tear at a more advantageous angle. With a stable chamber and good visualization provided by a cohesive OVD, you can complete the capsulorhexis with extraordinarily fine control using a microforceps.

CONCLUSION

The capsulorhexis is the single most important step in phacoemulsification. If this part of the procedure goes well, the entire case is likely to do the same. If the capsulorhexis goes awry, every subsequent step in the procedure becomes difficult. A key element to consistently successful cataract surgery is the ophthalmologist's vigilance in both identifying and correcting conditions that can lead to difficulty with the anterior capsulotomy before irreversible problems occur. ■

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