

Completing Surgery With a Compromised Rhexis

A range of techniques is available to safely remove the nucleus under these challenging conditions; however, if in doubt, do not do it.

BY BRIAN LITTLE, MA, DO, FRCS, FRCOPHTH

If the capsulorrhexis has been torn during cataract surgery while the nucleus is still in the bag, then you are faced with the sizeable challenge of completing surgery without the tear extending around to the posterior capsule. These are hazardous conditions to face, but by using the right techniques the surgeon can still prevail.

THREE PRINCIPLES

This article covers in practical detail some of the techniques that enable safe removal of the cataract and allow IOL implantation when the capsulorrhexis has been compromised. A supplementary video describing the content outlines in this article is available at <http://eyetube.net/v.asp?giweni>. A selection of case illustrations best serves this purpose, but to begin there are three key principles to take on board.

The first and most important principle is that the right technique is always the one that is the safest in your hands. Your selection will depend mainly on your level of experience but also on the instruments and selection of ophthalmic viscosurgical devices (OVDs) that are available to you.

The second principle is that the safest option for many of us is to do nothing and close the eye. There is absolutely no shame in doing this, only credit for having the humility to know your limitations and taking the course of action that is most likely to result in the best possible visual outcome for your patient. If you are inexperienced or lack the confidence to continue, you should willingly hand over the case to someone who is more likely to successfully manage this complication. No one will ever thank you, nor should they, for continuing against the odds and ending up with a dropped nucleus or worse. Bravery is not a virtue under

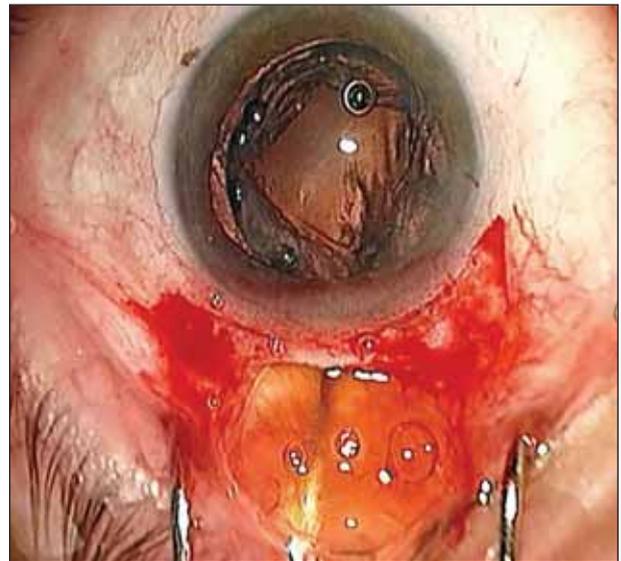


Figure 1. Controlled delivery of the nucleus through the incision is afforded with the use of an OVD.

these circumstances.

The third principle is that if you have an early tear-out of the capsulorrhexis and you are uncomfortable with either continuing endocapsular phaco or performing anterior chamber phaco, then converting to extracapsular extraction through an enlarged incision may well be the best option.

SURGICAL OPTIONS

Viscoexpression. The traditional instrument used for nucleus extraction is the irrigating vectis loop. The irrigating vectis is still the preferred choice for many surgeons;



Figure 2. A radial tear in the rhesis occurred early during phaco of this rock-hard brunescient nucleus.



Figure 3. Radial excursions used to divide the nucleus cause the tear to extend.

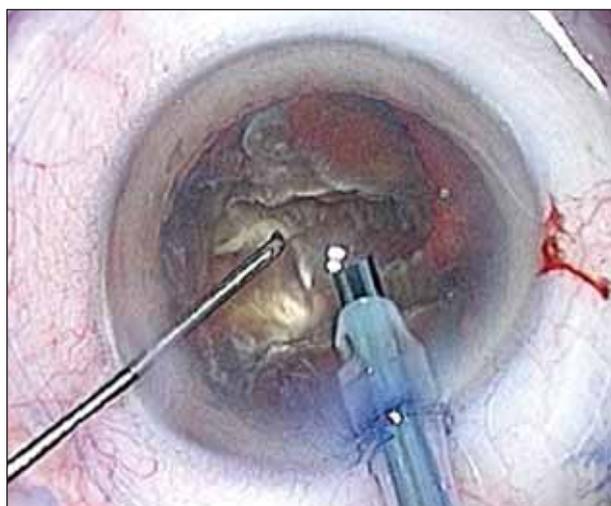


Figure 4. A decentered nucleus is one sign of posterior capsular rupture.

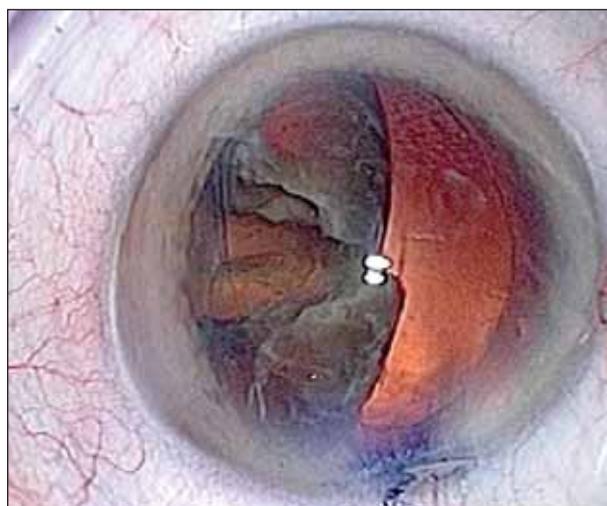


Figure 5. Persistent attempts to rotate the nucleus caused it to partially dislocate posteriorly.

however, viscoexpression is a safe, effective, and less traumatic alternative for delivering the nucleus. This relatively atraumatic technique works best by injecting a dispersive OVD (usually methylcellulose) posterior and inferior to the prolapsed nucleus, and using the cannula to depress the back edge of the wound. Further injection of OVD provides controlled delivery of the nucleus through the incision (Figure 1). The other surgical options all involve continuing with phacoemulsification.

Endocapsular phaco in a dense cataract with secondary anterior capsular tear. It should be clearly stated at the outset that endocapsular phaco is relatively hazardous because of the significant risk of extending the anterior capsular tear; this is particularly so with a dense cataract (Figure 2). The last thing you want to do in this

situation is to apply any centrifugal force because this will propagate the tear around the equator. Even when the central posterior plate is thinned right down, the radial stretching necessary to divide the nucleus will inevitably extend the tear (Figure 3).

There are two telltale signs that appear when the posterior capsule has been ruptured: (1) the nucleus rapidly decenters (Figure 4), and (2) the nucleus no longer rotates, as it did previously. With persistent attempts to rotate the nucleus, it will inevitably partially dislocate posteriorly (Figure 5). Although the nucleus was salvaged in the case depicted in Figures 2 through 5, and a one-piece lens was placed in the sulcus following vitrectomy, this could all have been avoided through an earlier conversion or, perhaps more wisely, an elective extracapsular procedure.

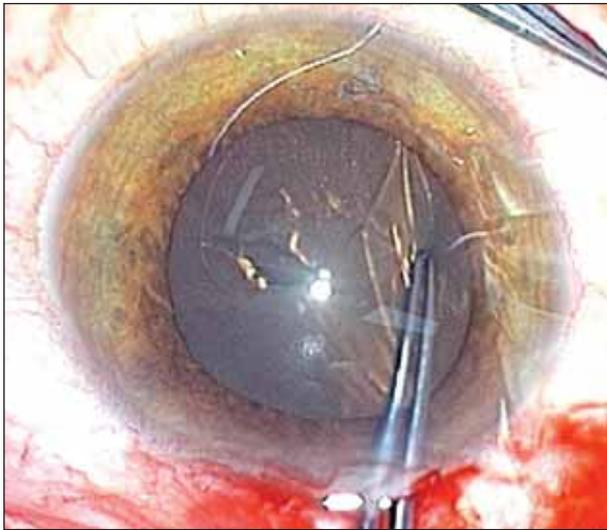


Figure 6. Primary tear-out of the rhexis occurred before hydrodissection in this case.

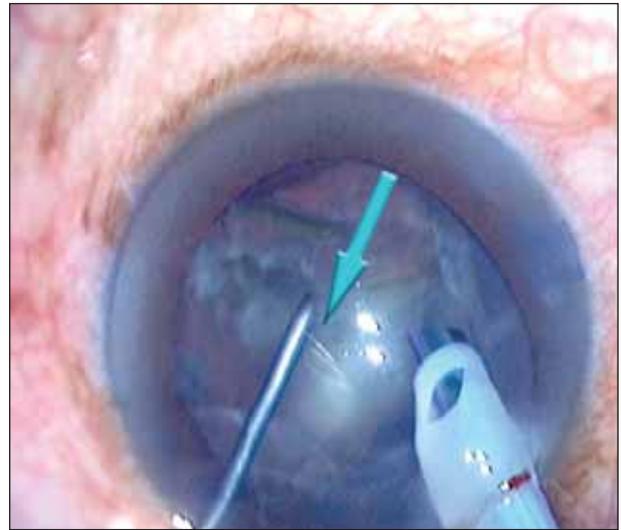


Figure 7. The thin side walls of the bowl are collapsed inward using gentle viscodissection and horizontal mechanical chopping.

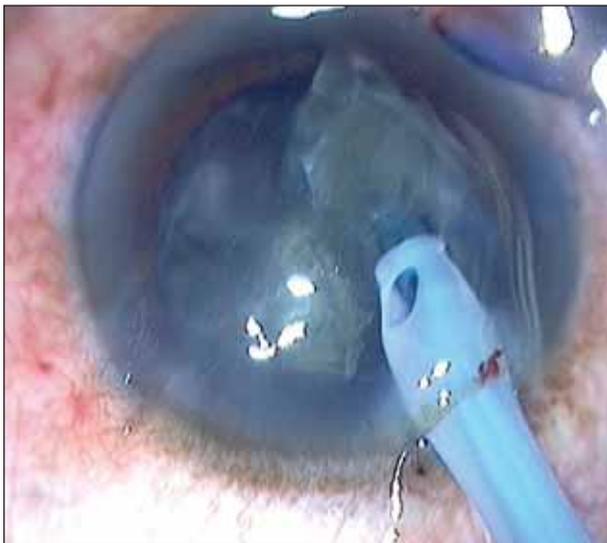


Figure 8. A one-handed technique results in greater chamber stability.

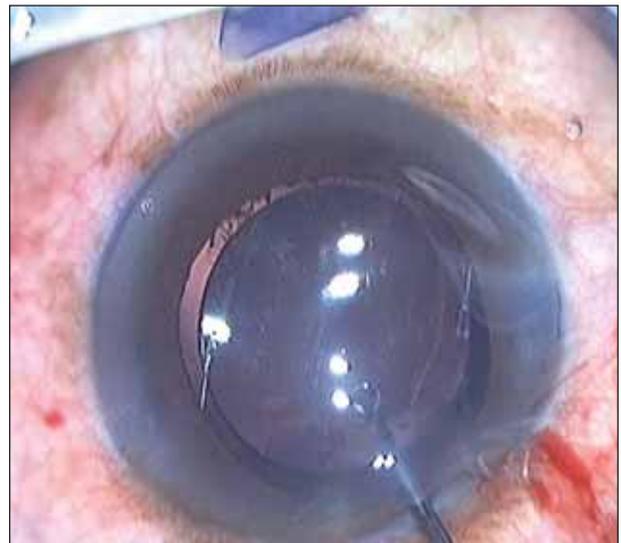


Figure 9. For good centration, the haptics should be oriented perpendicular to the tear.

Endocapsular phaco in the presence of a primary tear-out. When you are faced with an early primary tear-out of the rhexis that occurred before hydrodissection (Figure 6), there is a technique for endocapsular phaco that can be used with good chance for success.¹ This technique is depicted in a video available at <http://eyetube.net/v.asp?giweni>. This maneuver involves substantially debulking the central nucleus without initial hydrodissection. It cannot be overemphasized that, in the presence of a rhexis tear-out, any attempt at hydrodissection or hydrodelineation is highly likely to propagate the tear around the equator, often explosively.

Debulking the nucleus has two main benefits. First, as the irrigation sideports begin to descend below the level of the rhexis margin during progressive grooving, the irrigating fluid usually forces its way under the capsule and gradually loosens the corticocapsular attachments—a sort of auto-hydrodissection. Second, the bowling out of the central nucleus allows the thin side walls of the bowl to readily collapse inward using a combination of gentle viscodissection (Figure 7) and horizontal mechanical chopping—more like central dragging—of the anterior wall. The remaining nucleus can be prolapsed into the anterior chamber and safely aspirated under a dispersive



Figure 10. In a hard nucleus, it is often safer and easier to mechanically dislocate one edge and tilt it forward.

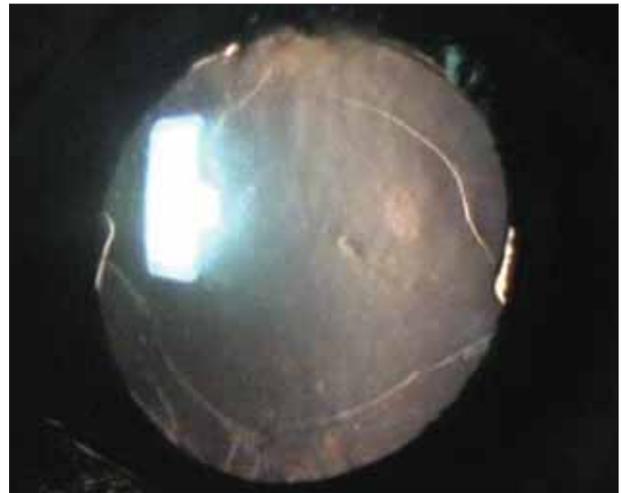


Figure 11. The capsule should overlap the optic on both sides.

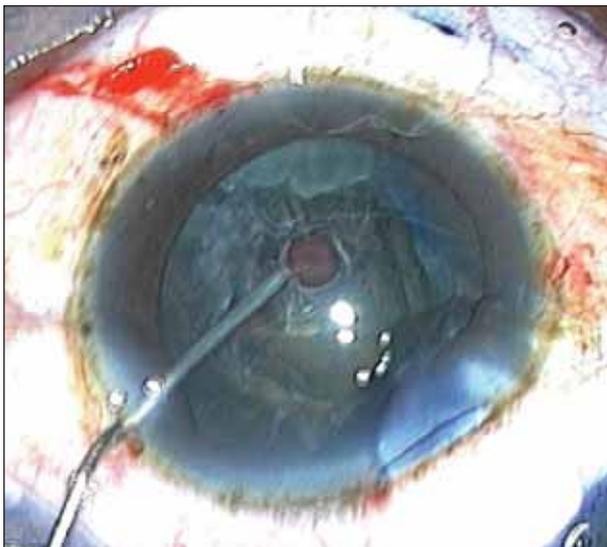


Figure 12. A red hole through the floor of the nucleus is visible in this case.

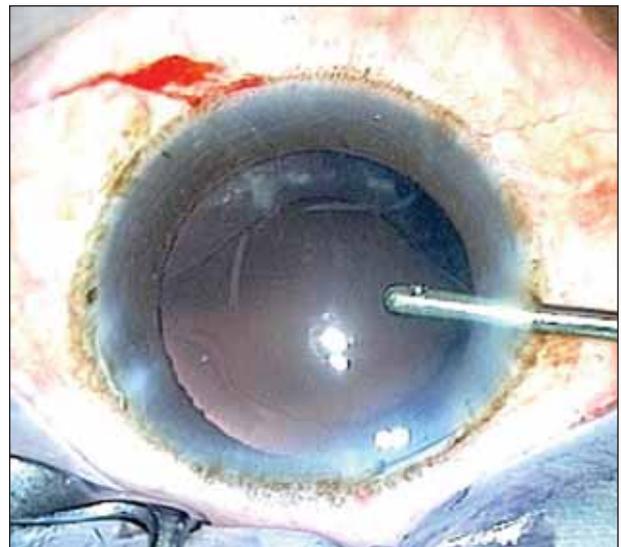


Figure 13. The posterior capsule is intact with diametrically opposite tears in the rhexis.

OVD. Some surgeons prefer a one-handed technique at this stage because it facilitates greater chamber stability due to the absence of sideport leakage associated with a second instrument (Figure 8).

With particular care, safe implantation of a foldable lens inside the bag is possible in these cases. The haptics should be oriented perpendicular to the tear for good lens centration (Figure 9).

Mechanical dislocation of a hard nucleus. When you are dealing with a primary tear-out in a mature cataract, simply debulking it in the bag can be hazardous if the nucleus is hard. It is often safer and easier to mechanically dislocate one edge of the nucleus and tilt it forward (Figure 10). In this position, the edge can

then be emulsified in the iris plane and gradually reeled in by the phaco tip safely, rotating it like a carousel.

As in the previous case, a foldable lens was implanted into the bag with the haptics orthogonal to the tear. To ensure long-term stability, the capsule should overlap the optic on both sides (Figure 11).

Red hole in the nucleus. If you are a little too aggressive during bowling of the nucleus, you can all too easily create the infamous red hole through the floor (Figure 12). If this happens through pulling with aspiration, rather than through pushing excessively with the phaco tip, often the underlying lens capsule remains intact. To be safe, a balanced saline solution–OVD exchange should be performed before removing the phaco tip, thus preventing chamber

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- Cataract surgery can be completed despite an early tear in the capsulorrhexis.
- Liberal use of an OVD is essential in these cases to protect the endothelium, tamponade the capsule, and reduce the risk of a wrap-around tear.
- Bravery is not a virtue in these cases; close and refer if you feel unsure.
- Eyetube direct link: <http://eyetube.net/v.asp?giweni>



collapse. A relieving cut can then be made in the rhexis opposite from the original tear. The nucleus is then pro-lapsed forward using a combination of mechanical lift with the chopper and injection of OVD behind the nucleus. The lens can then be dialed into the anterior chamber. With a dispersive OVD to protect the endothelium, the nucleus can be removed one-handedly in the iris plane, leaving the posterior capsule intact and diametrically opposite tears in the rhexis (Figure 13).

Liberal use of OVD is essential in all these cases; it protects the endothelium, tamponades the capsule, and reduces the risk of a wraparound tear.

CONCLUSION

This article presented a selection of cases with early anterior capsular tears to illustrate the principles of management of this hazardous complication. These cases have hopefully helped to demonstrate the range of techniques that can be used to safely remove the nucleus and the options for lens implantation, either in the bag or the sulcus. But, most important, remember the maxim: "If in doubt, do not do it," and always ask for help when you need it. Your main priority must be to ensure the best possible outcome for your patient. ■

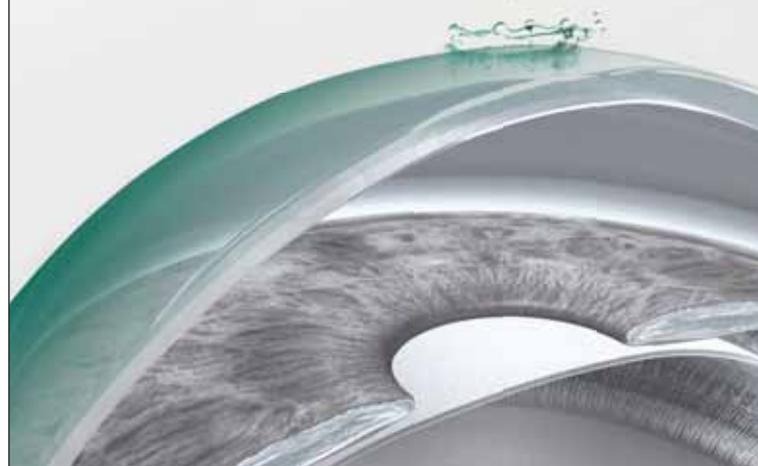
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1. Angunawela RI, Little B. Endocapsular phacoemulsification without hydrodissection: an effective technique for cataract surgery following anterior capsular tear. *Br J Ophthalmol.* 2008;92(8):1054.

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