

Inadvertent Air Bubble

BY DAVID S. ROOTMAN, MD, FRCSC; DENISE M. VISCO, MD;
WILLIAM J. FISHKIND, MD, FACS; AND SAMUEL MASKET, MD

CASE PRESENTATION

In the midst of an otherwise “routine” cataract procedure on a medium-density lens, a very large air bubble is inadvertently injected into the subcapsular space behind the nucleus during the wave of hydrodissection. Neither posterior pressure on the anterior surface of the lens nor an additional wave of hydrodissection caused any change (Figure 1).

What alterations, if any, would you make to your usual technique in completing this case and why?

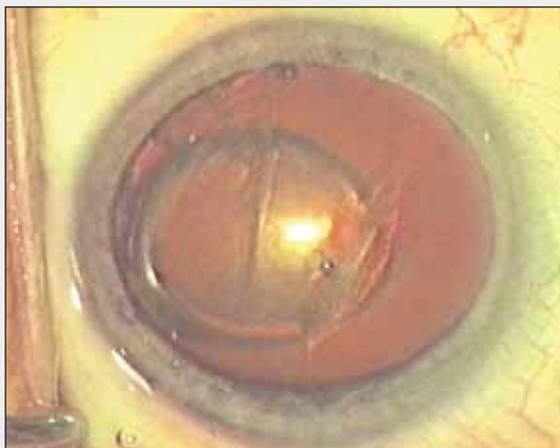


Figure 1. The eye had this appearance through the operative microscope after the first wave of hydrodissection, apparently admixed with air.

DAVID S. ROOTMAN, MD, FRCSC

Fortunately, air is a gas and therefore compressible. The good news is that the air bubble does not appear to have ruptured the posterior capsule and may be more elastic and forgiving than a pressurized bubble of fluid. I would soften the anterior chamber to see whether the bubble expanded and, conversely, gently pressurize the anterior chamber to determine if it contracted. Its uniform shape suggests that the sensitive anatomy has not been compromised by the injection. Nevertheless, I would attempt

to aspirate the bubble by gently inserting a cannula under high magnification into the air bubble and drawing on the syringe. Alternatively, if the lens were soft, one might try aspiration with the I/A device and perform hydrodissection again after ensuring that there was no residual air in the syringe. One also might simply ignore the air and proceed as usual, because the air bubble will come out during phacoemulsification.

Obviously, if the posterior capsule were ruptured, the situation would be totally different. In that case, I would cease hydrodissection, gingerly try to prolapse the lens in front of the anterior capsule, and perform phacoemulsification in the anterior chamber while watching for vitreous. A lens glide behind the nucleus might help to prevent the loss of the lens into the vitreous.

DENISE M. VISCO, MD

My usual technique is to bisect the lens in situ after hydrodissection and then back-crack both pieces; I do not necessarily rotate the lens at any point of the procedure. I have had air bubbles travel posterior to the lens during hydrodissection and have not significantly modified my technique in such situations. I have tried to phacoemulsify as much as possible into the air pocket to release most of the air from above. The surface tension of the air makes it less moveable than balanced salt solution, and forcing it one way or another around the capsule could risk a broken capsule. I would therefore advise caution in rotating the lens in this situation.

Although cataract surgeons generally dislike having air in the eye, I would recommend against trying to force out the air bubble. Instead, I would try to release as much air as possible during phacoemulsification (as noted earlier) and debulk the lens in the process. If hydrodissection were incomplete, I would repeat it at this time. Surgery should proceed routinely thereafter.

WILLIAM J. FISHKIND, MD, FACS

The air bubble is located between the nucleus and the posterior capsule. It will not move with hydrodissection

or posterior nuclear depression, because, like hydrodelamination fluid, it has found a plane between the cortex and epinucleus. The bubble is of no concern. If the anterior chamber is not markedly shallow, phacoemulsification can proceed as usual. The bubble may make the visualization of the chopping maneuvers somewhat more demanding (requiring more precise focus of the microscope), but it will do little else.

“When confronted with the atypical, I tend to consider the worst-case scenario and proceed accordingly.”
—Samuel Masket, MD

If the anterior chamber is shallow, one may deepen it with a dispersive ophthalmic viscosurgical device. Then, one may carry out the phacoemulsification with a single trough and pass the phaco needle ever deeper, until the bubble is exposed and evacuated. The process can continue as a stop-and-chop procedure.

SAMUEL MASKET, MD

Surgeons will often observe small air bubbles within the lens' substance during or after hydrodissection, and the phenomenon may generally be ignored, because the bubbles are liberated and aspirated as the lens is divided and emulsified. In this case, however, a large bubble seems to be trapped and could be external to the lens capsule, as further hydrodissection did not appear to influence the bubble's position.

When confronted with the atypical, I tend to consider the worst-case scenario and proceed accordingly. Although this large bubble may simply be trapped within the lens' cortical fibers, either the peripheral/posterior capsule may have torn, or the zonules may have been breached. Careful observation is warranted as a first maneuver. Tilting of the nucleus, hyperdeepening of the anterior chamber, and/or the appearance of vitreous in the anterior chamber are helpful but undesirable telltale signs.

Assuming that all appears to be normal except for the air bubble, I would attempt to rotate the lens' nucleus within the capsular bag. As a rule, nuclear rotation is not smooth and is difficult in the face of a peripheral/posterior capsular tear. If the rotation seemed to be routine, I would vertically chop the nucleus and proceed as normal with an expectation that the bubble would come forward and be aspirated. On the other hand, if I had firm evidence of a capsular rent at any time with the bulk of the nucleus remaining, I would place a three-piece IOL in the sulcus, capture the lens' optic behind the anterior capsule, and

remove all cortex, viscomaterial, and vitreous from the anterior chamber. I would immediately contact a vitreoretinal consultant and arrange for a pars plana lensectomy in the very near term after discussing the complication with the patient. Although one could consider maneuvers to bring the nucleus out of the bag anteriorly, the likelihood is that surgery will be prolonged and complicated by a loss of lenticular material into the posterior segment. I would attend the second surgery in case further surgical management of the IOL were necessary.

The alternative is that the complication is related to the injection of the air/fluid mixture through the zonules. That problem could be far less disconcerting than a rupture of the capsule in the presence of the full nucleus. For example, James Gills, MD, of Tarpon Springs, Florida, has indicated that he routinely injects an anti-inflammatory steroid through the zonules at the end of cataract surgery. In this case, one must carefully look for vitreous strands in the chamber and manage them accordingly. Unless a large zonular dialysis has occurred, surgery may be nearly routine should this be the case.

Finally, although the history in this case was not suggestive, the possibility remains that this patient has a residual bubble of silicone oil from prior vitreoretinal surgery. I have managed that situation by removing the cataract and performing a posterior capsulorhexis to allow the aspiration of the remaining silicone oil from the anterior chamber prior to placing the IOL in the capsular bag. ■

Section Editors Robert J. Cionni, MD; Michael E. Snyder, MD; and Robert H. Osher, MD, are cataract specialists at the Cincinnati Eye Institute in Ohio. They may be reached at (513) 984-5133; rcionni@cincinnatieye.com.

William J. Fishkind, MD, FACS, is Co-Director of the Fishkind and Bakewell Eye Care and Surgery Center in Tucson, Arizona, and Clinical Professor of Ophthalmology at the University of Utah in Salt Lake City. Dr. Fishkind may be reached at (520) 293-6740; wfishkind@earthlink.net.

Samuel Masket, MD, is Clinical Professor at the UCLA Geffen School of Medicine and is in private practice in Los Angeles. Dr. Masket may be reached at (310) 229-1220; sammasket@aol.com.

David S. Rootman, MD, FRCSC, is Associate Professor at the University of Toronto. Dr. Rootman may be reached at (416) 603-5401; d.rootman@utoronto.ca.

Denise M. Visco, MD, is Medical Director of and in private practice at Eyes of York Cataract and Laser Center in Pennsylvania. Dr. Visco may be reached at (717) 767-2000; idry999@aol.com.

