

UNILATERAL, HYPERMATURE, TAN CATARACT

Surgical considerations and approaches.

BY LISA BROTHERS ARBISSER, MD; ASHVIN AGARWAL, MS; AND JOHN C. HART JR, MD, FACS

CASE PRESENTATION

A 68-year-old man presents with a complaint of gradual vision loss in his left eye. The patient dabbled in amateur boxing as a young man but states that he never experienced ocular trauma. His BCVA is 20/50 OD, consistent with a 2+ nuclear sclerotic cataract, and hand motion with good projection OS, consistent with a dense, tan, hypermature crystalline lens. No efferent or afferent pupillary defect is evident in either eye. The corneas are clear. Gonioscopy is unremarkable and symmetric. No phacodonesis is evident in either eye. The anterior chamber depth of both eyes is similar and proportional to the axial length. The IOP is

15 mm Hg OU. On examination, the fundus is unremarkable in the right eye and barely visible in the left eye.

The patient elects to undergo cataract surgery on the left eye. He is able to fixate adequately on a muscle light to allow topical anesthesia. Emmetropia is targeted to complement the mild myopia in the fellow eye.

What precautions would you take in this case? Please describe your surgical technique in detail.

– Case prepared by Lisa Brothers Arbisser, MD



ASHVIN AGARWAL, MS

I approach most complex cases—especially those where I cannot view the back of the eye—by preparing more than one surgical plan. After reading through the case presentation, three types of cataract came to mind: intumescent cataract with a brown nucleus, Morgagnian cataract, and hard brown cataract.

Manual small-incision cataract surgery (MSICS) would be my preferred approach. I find that it places the least amount of stress on the capsular bag and zonules, which have already been affected by the hypermature cataract. MSICS also helps keep the cornea clear at the end of the surgery and postoperatively. Care would be taken

intraoperatively to preserve the integrity of the capsular bag.

An MSICS tunnel would be created, and trypan blue dye would be instilled. The capsulorhexis would determine the trajectory of the case. If a bimanual technique is required to complete the tear, then my inclination would be to use a glued IOL technique.

► **Step No. 1.** After completion of the capsulorhexis, the MSICS tunnel would be incised, and an OVD would be injected into the anterior chamber.

► **Step No. 2.** The nucleus would be elevated into the anterior chamber and expressed with a viscoexpression technique using an OVD.

► **Step No. 3.** Depending on the integrity of the capsular bag, either the IOL would be implanted in the bag or, if the integrity of the bag is compromised, scleral fixation of the lens would be performed via a glued IOL or Yamane technique.



JOHN C. HART JR, MD, FACS

Despite a densely brunescient cataract, the patient reports a gradual decrease in vision in the left eye. Cataracts of this sort develop over years. Of course, his definition of *gradual* may differ from mine. He also reports dabbling in amateur boxing but not experiencing ocular trauma. Sometimes, surgeons must read between the lines when interpreting a history. It is likely that the patient received blows to the head and forgets or is ignoring ocular trauma.

The normal gonioscopy, lack of phacodonesis, and similar anterior chamber depth of the two eyes decreases the likelihood of zonular weakness but does not rule it out. Given the history of boxing and asymmetric

cataract development, zonular insufficiency is possible.

Because visualization of the fundus is compromised, B-scan and immersion A-scan ultrasound would be ordered preoperatively to rule out retinal detachment and determine axial length for IOL power calculations.

Intraoperatively, the anterior capsule would be stained with trypan blue dye. I would watch for subtle signs of zonular weakness, especially during the capsulorhexis, and be prepared to stabilize the capsular bag with capsule retractors and standard and suture-fixated capsular tension rings (CTRs) and/or capsular tension segments. If zonular support is adequate, the nucleus would be divided into quadrants with a miLoop (Carl Zeiss Meditec) and fragmented further with a phaco chop technique and torsional ultrasound. Given the likely history of blunt trauma, a standard CTR would be placed in the capsular bag before IOL implantation.



WHAT I DID: LISA BROTHERS ARBISSER, MD

The patient was counseled on comorbidities that might be associated with the unexplained gross asymmetry in the cataracts and the possible treatment of zonulopathy if detected. A variety of devices, including a backup three-piece IOL and CTRs, were available in the OR in case a comorbidity was discerned during surgery. Because of the hypermature cataract, mannitol was delivered as a bolus 0.25 g/kg intravenous push 20 minutes before surgery. The size of the anterior capsulotomy was estimated with calipers to help ensure a capturable continuous curvilinear capsulorhexis. A dispersive OVD (Viscoat, Alcon) was instilled followed by a heavy cohesive OVD (Healon GV, but Healon5 would have been used had it been available at

the time; both from Johnson & Johnson Vision), to create an endothelial barrier (Arshinoff's softshell technique¹) and, more importantly, maintain an anterior chamber pressure that was higher than intralenticular pressure. (Scan the QR code to watch the surgery.)

Trypan blue dye was irrigated under the cohesive OVD with an Osher cannula to stain the anterior capsule. After a brief pause for adequate uptake, the dye was removed from distal to proximal with the heavy, cohesive OVD. The lens material was not aspirated to minimize the risk of moving the nucleus forward and permitting development of the presentation known as the Argentinian flag sign. I never encountered the complication after adopting this methodical technique.

Once the chamber was stable and the anterior lens curvature had been minimized, a cystotome was used to create a small curvilinear flap in the anterior capsule, which allowed a plume of lens milk to escape into the OVD. Additional amounts of a dispersive OVD were injected as needed to move lens milk aside, improve visualization, and maintain adequate pressure in the anterior chamber. The capsulorhexis was guided with Utrata forceps to prevent radialization of the tear. Keeping the continuous curvilinear capsulorhexis small in situations like this is prudent; the tear can be enlarged as needed after all pressure has been eliminated.

Care was taken to mobilize the nucleus, which was easily accomplished because of the largely liquefied cortex. I used my circumferential disassembly technique to remove the brunescient nucleus (scan the QR code for a demonstration of the technique). The endonucleus was systematically debulked from the inside out by opening the nucleus like a clam shell with cross-action vertical chop maneuvers (not through the posterior plate) with



a Rosen splitter in the nondominant hand. Repeated rotation to peel away dense endonucleus maintained the stiff epinuclear shell and protected the posterior capsule. Burst mode at an appropriately high panel-set percentage facilitated only brief pulses of ultrasound energy to gain purchase on the lens, which allowed mechanical forces to do the splitting and assist aspiration flow for particle removal. Cumulative dispersed energy was low as a result. The floppy posterior capsule was protected with a blunt Rosen splitter during removal of the final fragments of stiff epinucleus. Peripheral cortex was then aspirated methodically starting subincisionally to leave the bag clean. No zonular anomaly was detected, so a CTR was not placed. A one-piece acrylic IOL was implanted, and the case was completed.

One day after surgery, the patient's UCVA was 20/20 OS, making him aware of the effect on his vision of the less mature cataract in the contralateral eye. Uneventful surgery was performed on the second eye 1 week later at his behest. ■

1. Arshinoff SA. Dispersive-cohesive viscoelastic soft shell technique. *J Cataract Refract Surg.* 1999;25(2):167-173.

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