Pearls for Addressing Brunescent Cataracts

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Brunescent, or brown, cataracts present a challenge even for expert cataract surgeons, due to the increased nuclear density. Surgery is associated with more complications than with other cataracts. In this editorial, Elizabeth Yeu shares her tips for successful removal of brunescent cataracts, including pre-operative considerations, the optimum methods for disassembling and fragmenting the nucleus, and the use of advanced technology devices.

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Mature cataract, brunescent cataract

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Brunescent, or brown, cataracts are found in advanced cataracts and can cause decreased visual acuity, with poor contrast and color discrimination, especially at the blue end of the visible light spectrum.[1] They are particularly challenging to treat due to the increased nuclear density, and surgery is associated with a higher rate of complications compared with other cataracts.[2] Manual extracapsular cataract extraction of the undivided cataract is still used in some countries, where brunescent cataracts are common, but can induce significant astigmatism from the wounds themselves.[3] Phacoemulsification has advantages over extracapsular cataract extraction.[4] However, virtually every step of phacoemulsification is more difficult in the setting of a mature, brunescent nucleus. These nuclei require greater phaco energy for emulsification, and surgery times are often lengthy. As a result, the chances of endothelial injury and wound burn, increases greatly, and substantial postoperative inflammation is common.[2,5]

This practice pearl includes some tips for removing a brunescent cataract as discussed in a presentation at the Hawaiian Eye and Retina Meeting, Koloa, HI, USA, January 18–24, 2020.

Pearl 1—pre-operative considerations

It is important to understand how the lens became brunescent; whether it was from senility alone, or if there is a history of prior trauma, intravitreal injections, or previous retinal surgery. If possible, we should examine the anterior and posterior capsules for any fibrotic or dense areas. Any opacification could suggest prior penetrating compromise to the capsule, and it is important to recognize it.

Pearl 2—perform needle decompression where needed

If the lens appears to have a white cortical shell, but on closer examination, has a brunescent core, the lens is likely under pressure the way a dense intumescent lens is. In this scenario, it is best to perform needle decompression with a 27- or 30-gauge needle on a 1–3 cc syringe, bevel down and bent at the hub of the needle. You can enter through the peripheral cornea or use one of the surgical wounds and pierce through the center of the capsule where you would normally pierce the anterior capsule with a bent-25 g cystotome needle to start your capsulorhexis. It is then essential to start gently drawing back on the syringe as soon as you pierce through the anterior capsule, and decompress the liquified lens milk that is causing the intracapsular pressure and thus, prevent the Argentinian flag sign—a spontaneous tear in the capsule which extends into the periphery—giving the stained capsule beside the white cataract the appearance of the Argentinian flag.

Pearl 3—disassembling the nucleus

Particularly when a lens has a mostly brunescent quality to it, an ample capsulorhexis size of at least 5 mm is helpful for disassembly. I also use different fluidic settings, with increased use of longitudinal and torsional energy, as well as two separate settings to engage the nucleus for chopping and to emulsify the piece once it has been released from the periphery into the center of the eye. The lens nucleus is often dense and crowded. In order to engage the nucleus for chopping, I start with a "burst" setting (equal on/off time with variable phacoemulsification energy), with lower aspiration and a slightly higher vacuum, and only longitudinal phacoemulsification. Using these settings, I can really engage that piece in order to separate and lift it out of the capsular bag. There is often a lot of mechanical manipulation needed to pry the fragment free from the fibrosis, and that leathery plate that can occur on the more posterior surface of the nucleus. Once the nuclear piece has been created, I draw the piece to the center of the eye, and switch to a separate quadrant nuclear removal setting. This second setting allows for a more efficient emulsification of the fragment: pulse setting (variable on/off time which can move into more continuous use of energy), with higher aspiration flow and a lower vacuum.

Pearl 4—take your time to fragment the nucleus into at least six to eight fragments

I found that fragmenting the nucleus into at least six to eight pieces, not just the four quadrants, when breaking the lens up mechanically, can help with the ultrasound energy. My advice is to chop and re-chop, using repeated viscoelastic protection after each quarter.

Pearl 5—advanced technology devices can be helpful

Femtosecond laser-assisted cataract surgery can soften brunescent lenses (2.0–3.5+ NSC [nuclear sclerotic cataract]), but does not do much for mature brunescent lenses (≥4+ NSC) at the standard settings. Modification of the laser settings to higher energy with decreased spot size spacing can help with breaking up a dense nucleus. The miLoop® (Carl Zeiss Meditech Inc., Dublin, CA, USA) can be extremely helpful as the ring can effectively bluntly slice and break through the fibrotic, leathery posterior plate.

Pearl 6—extra protection of the posterior capsule

Finally, there is going to be very little cortex so, when you are removing the last quadrant piece, be cognizant that you will have a flop in the capsular bag with little cortical protection, and that is where the posterior capsule can be compromised at times. Therefore, I advise reapplying viscoelastic and slowing everything down, and I prefer to use a blunt, and flat instrument, like my Koch spatula in that scenario.

In conclusion, treatment of brunescent cataracts can be challenging, even for an expert surgeon. Surgical judgment develops with experience,[6] and individual surgeons must assess their personal abilities in terms of how brunescent a lens they can safely emulsify. It is important to have a contingency plan ready for unexpected problems that may arise during surgery. However, with careful planning and a stepwise approach, they can be successfully treated. Surgery can transform the life of patients, restoring normal vision and allowing them to resume their normal activities of daily life. ❑

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