The Antiblockage Technique

Use of the Ultrachopper can help surgeons avoid intraoperative capsular block syndrome.

BY LUIS ESCAF, MD; LUZ MARINA MELO, MD; AND JUANA LONDOÑO, MD

Phacoemulsification is the technique of choice for most cataract surgeons around the world. The technique, however, is not exempt from complications that may occur at any stage, intraoperatively or postoperatively. The frequency of intraoperative complications varies according to the surgeon’s experience, the type of cataract, and the available instrumentation.

Capsular block syndrome (CBS) is one complication that occurs, though rarely, during phacoemulsification surgery. This complication can lead to posterior capsular rupture (PCR) and possible posterior dislocation of the crystalline lens. Suggestions for the avoidance of CBS include performing hydrodissection carefully or eliminating it altogether. Alternatively, we have developed a surgical technique, which we call the antiblockage technique, to prevent its occurrence.

PATHOPHYSIOLOGY AND ETIOLOGY

CBS is characterized by the accumulation of fluid in front of the posterior capsule and behind the epinucleus (Figure 1). When hydrodissection is performed abruptly, the rapid increase in the volume of posterior fluid, in conjunction with impeded fluid egress from the capsular space, can move the nucleus forward, blocking the capsulorrhexis and producing distension in the posterior capsule. Other signs that subsequently appear include outflow of ophthalmic viscosurgical device (OVD), iris prolapse, shallowing of the anterior chamber, and increase in intraocular pressure (IOP).

Vasavada¹ and Khng² have shown that, of any maneuver in phaco surgery, hydrodissection produces the greatest increase in IOP (Table 1). When the capsulorrhexis opening is blocked by abrupt anterior displacement of the nucleus, it is more likely that PCR and dislocation of the nucleus into the vitreous cavity will follow. If CBS is not detected and surgery continues, surgery may become complicated, and the cataract or lens fragments may fall into the vitreous.³

Miyake⁴ has classified CBS according to the time at which it occurs during surgery (intraoperative CBS, early postoperative CBS, and late postoperative CBS). Intraoperatively, it is characterized by hyper-expansion of the capsule, anterior displacement of the IOL, and shallowing of the anterior chamber. Postoperatively, it is characterized by myopic shift.⁵-¹⁴

**TAKE-HOME MESSAGE**

- The antiblockage technique is designed to prevent intraoperative CBS.
- With this technique, a deep groove is made in the nucleus with an ultrasonic knife; immediately after, nucleus fracture is completed and hydrodissection is initiated; fluid should flow through the space created between the cataract fragments and proceed upward, discharging into the anterior chamber.

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Figure 1. Graphics depicting the pathophysiology of CBS: Occlusion of the anterior capsulotomy ring by the nucleus or the IOL occurs due to injection of infusion fluid (A), which is trapped within the capsular bag (B); PCR is the result of the distension produced by the fluid (C).
CBS can be caused by the cataract (ie, capsular lens block) or by the IOL, whether placed in the sulcus or in the bag (capsular IOL block). The etiology can be further classified according to the type of capsulotomy (capsular block with capsulorrhexis or capsular block with can-opener capsulotomy). Differential diagnosis of CBS should include other pathologies such as acute choroidal detachment, expulsive hemorrhage, and misdirection syndrome.

ANTIBLOCKAGE TECHNIQUE

Our antiblockage technique, which utilizes an ultrasonic knife (Ultrachopper; Alcon), is designed to prevent intraoperative CBS (Figure 2). It is also useful for beginning phaco surgeons, as it can help them to avoid PCR and increase their surgical security in challenging cases. After performing a continuous curvilinear capsulorrhexis of 5 to 5.5 mm diameter, a deep groove is made in the nucleus with the Ultrachopper.24-26 Immediately after the central groove is achieved, nucleus fracture is completed with either a nucleus divider (Escaf Nucleus Divider K3-2387; Katena Products) or a mechanical prechopper (Escaf Prechopper; ASICO).

Hydrodissection is then initiated; in this step, the infusion fluid should flow through the space created between the two cataract fragments and proceed upward, discharging into the anterior chamber. This new pathway facilitates fluid circulation and prevents its accumulation in the posterior region, the area in which is known to produce distension of the posterior capsule and PCR (Figure 3).

One way to verify that the infusion fluid is circulating through the new route is by staining with trypan blue. Once this is confirmed, each half of the nucleus can be rotated and the fracture of the cataract completed with the Ultrachopper. Phacoemulsification is then performed, followed by IOL implantation. The antiblockage technique is suitable for surgeons in training and for challenging cases, such as patients with shallow anterior chambers, bulky cataracts, short eyes, small pupils, posterior polar or posterior subcapsular cataracts, small to medium capsulorrhexis size, intraoperative floppy iris syndrome, or pseudoxefoliation.

Additionally, one issue with new femtosecond laser technology for cataract surgery is that gas accumulation can jeopardize the procedure. The antiblockage technique can be used to enhance laser-assisted cataract surgery (LACS), in a variation we call ultrachopper femtosecond laser-assisted cataract surgery, or U-FLACS. It has been extremely useful, as it allows the release of gas and, thus, prevents CBS.

CONCLUSION

The antiblockage technique is a logical and reproducible method to avoid intraoperative CBS and prevent PCR during hydrodissection. This technique is especially useful for surgeons in training; it also adds safety to femtosecond LACS.

TABLE 1. IOP DURING PHACO SURGERY PHASES

<table>
<thead>
<tr>
<th>STEP OF SURGERY</th>
<th>IOP (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscoelastic Injection</td>
<td>163</td>
</tr>
<tr>
<td>Irrigation/Aspiration</td>
<td>82</td>
</tr>
<tr>
<td>IOL Implantation</td>
<td>121</td>
</tr>
<tr>
<td>Hydrodissection</td>
<td>223</td>
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</tbody>
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Figure 2. A central groove is created in the nucleus (A). The nucleus is split in half, allowing a pathway from the anterior capsule to the posterior capsule (B).

Figure 3. Fluid flows between the halves, releasing the tension on the posterior capsule and avoiding blockage of the capsulorrhexis rim.

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