Managing Traumatic Cataracts

Avoid further damage to the eye at all costs.

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Cataract is one of the most common sequelae of penetrating ocular injury or ocular contusion. This article will omit discussion of surgical complications (eg, subluxation of a clear lens, retinal detachment) so as to focus on two questions: How and when should traumatic cataracts be removed?

DIFFICULTY WITH VISIBILITY

The most difficult challenge for the surgeon is managing a traumatic cataract without the ability to see if the anterior or posterior capsule has been breached or the vitreous has prolapsed into the anterior chamber. Below is a list of traumatic situations with our recommendations for time of cataract removal:

- If the patient has a swollen or fragmented lens, it is mandatory to remove the traumatic cataract immediately to avoid glaucoma or intraocular inflammation.
- If the patient has a penetrating corneal injury with anterior or posterior capsular opening, is mandatory to operate as soon as possible to avoid iridocorneal or iridocapsular synechiae and intraocular inflammation.
- If the patient experienced close ocular contusion and the anterior capsule is intact with presence of a white and intumescent cataract (especially in a young patient), the posterior capsule may be broken. This type of injury must be operated as soon as possible to avoid intraocular inflammation or angle-closure glaucoma (Figure 1).
- If a young patient experienced close blunt trauma, the anterior and posterior capsule could be intact and a cortical cataract could be evident. In this case, we suggest waiting to remove the cataract because the capsular opacity may decrease over time and may not compromise visual acuity.

Figure 1. White cataract with opened anterior capsule.

PREOPERATIVE APPROACH

Preoperative assessment of the eye after trauma is difficult. We do not currently have a noncontact method of imaging the eye to determine if the capsule is intact. The patient may experience pain that prevents him from opening the eye.

Orbital computed axial tomography (CAT) and x-ray are mandatory to locate any metallic foreign bodies in the orbit or eye. Orbital fracture and the posi-

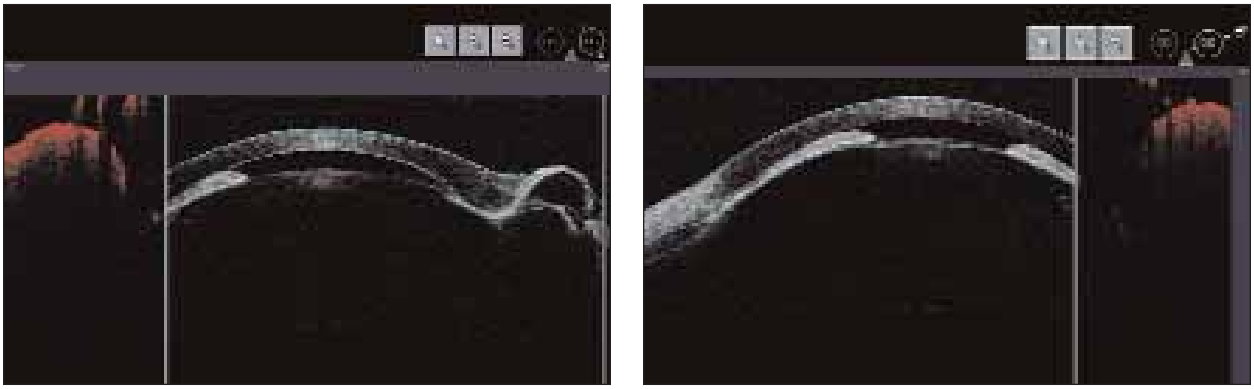

Figure 2. Visante OCT images of iris prolapse; the anterior capsule is intact.

Figure 3. A 23-gauge cannula is placed through the pars plana.

Figure 4. Intraoperative use of trypan blue dye.

tion of the extraocular muscles can also be seen on CAT and x-ray.

The Pentacam (Oculus Optikgeräte GmbH, Wetzlar, Germany) or Visante OCT (Carl Zeiss Meditec, Jena, Germany; Figure 2) are noncontact methods to study the eye; however, these instruments are useful only if the pupil is dilated. Additionally, these methods explore only the anterior chamber and the anterior part of the crystalline lens; in some cases, however, it is possible to see the posterior capsule. Echography may be used to analyze the posterior capsule, but only if the injury is small (eg, caused by a needle) and the anterior chamber is closed. Currently, there are no noncontact echographic systems.

SURGICAL TECHNIQUE

At the outset of the surgical procedure, we usually place a closed infusion line with a 20- or 23-gauge cannula (Figure 3), located 4 mm behind the limbus. The line is placed after we suture any open wound. The role of the infusion cannula is to provide an adequate volume of flow if needed and to set the stage for a pars plana vitrectomy in case of a dropped luxated lens.

Figure 5. Capsulorrhexis.

Another advantage of using pars plana cannula infusion is to create a base for the anterior chamber

during phacoemulsification. If traumatic lens subluxation occurs, the infusion cannula can be opened to create a sort of vitreous hydration that causes vitreous displacement toward the anterior chamber and supports the lens.

We prefer to approach these cases with clear corneal 2.2-mm microincision cataract surgery (MICS), which provides good chamber stability with a relatively low bottle height. MICS with a dual-linear control foot pedal prevents anterior chamber collapse and allows better control of the iris-lens diaphragm with minimal zonular stress.

We use trypan blue (Figure 4) for better visualization of the anterior capsule when a red reflex is not present. In these cases, we also prefer using a heavy ophthalmic viscosurgical device (OVD), such as Healon GV (Abbott Medical Optics Inc., Santa Ana, California), to facilitate the creation of a well-controlled capsulorrhexis. It is important not to overexpand the anterior chamber with OVD before capsulorrhexis and to maintain a low bottle height during phaco. Special attention is required during capsulorrhexis to avoid traction on a breached capsule that might unzip existing traumatic tears of the zonula (Figure 5).

Because it can be difficult to identify a subluxated cataract, after gentle hydrodissection we avoid nucleus rotation. Hydrodelination is useful to allow safe phacoemulsification with low energy. During surgery, we aim to adapt the phacoemulsification technique to the individual case and change it as the eye demands.

We normally use the Stellaris (Bausch & Lomb, Rochester, New York) in vacuum mode during MICS because this allows the phaco tip to remain in the center of the anterior chamber, awaiting the arrival of cataract pieces. This pump system provides complete control in every phase of the procedure, without unwanted surprises such as capsular suction or a breached capsule. In combination with the phaco probe, we use the chopper as a second instrument to crack the lens or perform intracapsular maneuvers. A smooth manipulator can take the place of the chop-

TAKE-HOME MESSAGE

- Surgical protocol differs from one traumatic cataract to the next.
- Pars plana cannula infusion creates a base for the anterior chamber during phacoemulsification.
- A 2.2-mm MICS technique provides good chamber stability.

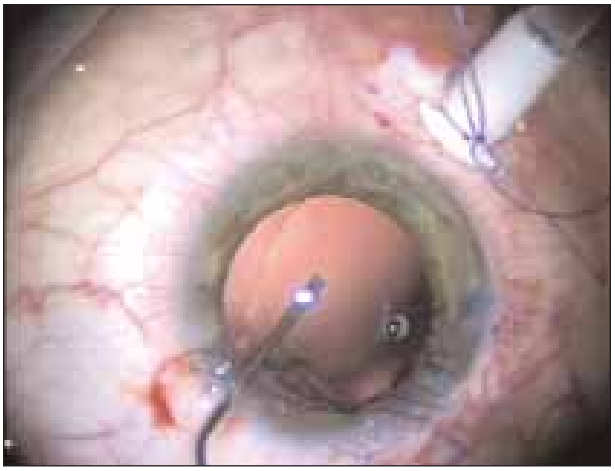

Figure 6. If the capsular bag is intact, an injector or IOL holder or can be used for IOL implantation.

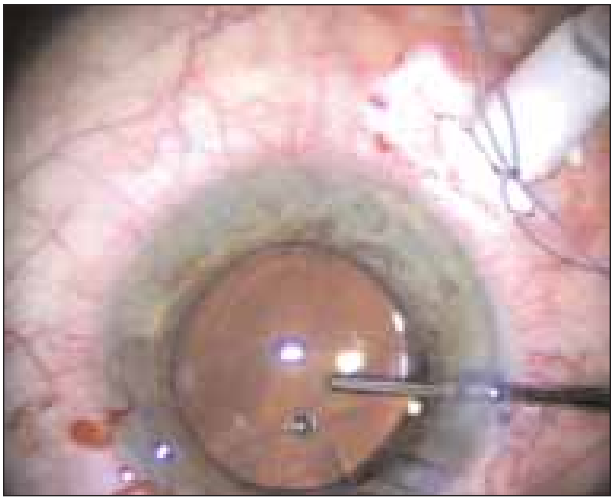

Figure 7. The IOL is placed into an intact capsular bag.

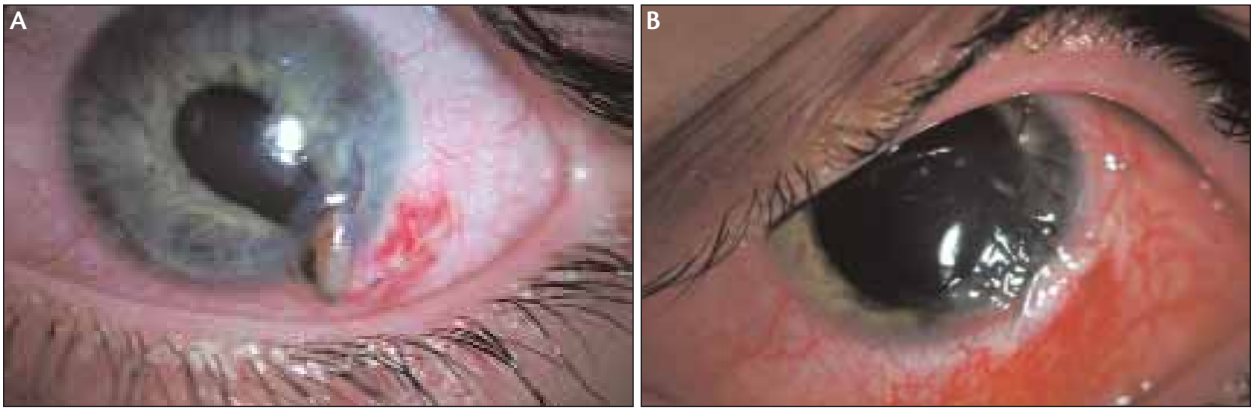

Figure 8. (A,B) Every case of trauma is different.

per, allowing the surgeon to slip into the groove and manipulate nuclear fragments without risk to the capsular bag.

The aim of the surgical technique is to preserve the capsular bag as much as possible. If the eye shows signs of zonular weakness, we suggest implanting a capsular tension ring (CTR) to stabilize the capsule. To prevent deformation of the capsular bag, we usually introduce the CTR after the capsular bag is filled with OVD by placing a hook through the paracentesis and into the buttonhole of the CTR. This can be done before or after cortex removal with the I/A probe.

SETTINGS

Our settings for MICS are as follows: We use a maximum vacuum of 550 mm Hg in linear mode to obtain better holdability; low ultrasound energy (maximum 10%), again in linear mode; 80 micropulses per second; 32% duty cycle; and a bottle height no higher than 90 cm. We use dual-linear foot pedal control because it allows us to perform a controlled procedure with ultrasound energy at any vacuum level.

The aim of the surgical technique is to preserve the capsular bag as much as possible.

In the event of a posterior capsular tear and vitreous loss, we perform an anterior mechanical biaxial vitrectomy after refilling the bag with OVD. With biaxial instrumentation, the inflow can be aimed anteriorly in the direction of the cornea while the vitreous is removed by cutting and aspiration with the vitrector in the posterior chamber. We also use the vitrector as

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an aspiration cannula, turning off the cutting mode with the foot pedal when necessary.

Sometimes, in the presence of a large posterior capsular tear and vitreous loss, phacoemulsification is no longer possible. In those cases, we attempt to remove nuclear fragments from the anterior chamber with an OVD. We create a 4.1-mm incision to perform this viscoexpression technique. We use the highly viscous Healon GV as a spatula, injecting the OVD beneath the fragments to obtain forward movement of the cataract pieces while simultaneously pushing back the vitreous.

When the anterior chamber is free of vitreous and cataract pieces, we consider IOL implantation. If the capsular bag is intact, implantation is performed with an injector or IOL holder (Figures 6 and 7). If the bag is incomplete or broken, we perform scleral or iris fixation of the IOL.

CONCLUSION

It is difficult to standardize a technique or approach for traumatic cases. Surgical timing and protocol differ from one traumatic case to the next (Figure 8); however, there are some common rules that can be followed, as described in this article. The first rule is to avoid further damage to the injured eye. ■

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