Surgical Care

The definitive management for senile cataract is lens extraction. Over the years, various surgical techniques have evolved from the ancient method of couching to the present-day technique of phacoemulsification. Phacoemulsification offers the advantage of a smaller incision size at the time of cataract surgery. Almost parallel is the evolution of the IOLs being used, which vary in ocular location, material, and manner of implantation. Depending on the integrity of the posterior lens capsule, the 2 main types of lens surgery are the intracapsular cataract extraction (ICCE) and the extracapsular cataract extraction (ECCE). Below is a general description of the 3 commonly used surgical procedures in cataract extraction, namely ICCE, standard ECCE, and phacoemulsification. Reading books on cataract surgeries for a more in-depth discussion of the topic, particularly with regard to technique and procedure, is also recommended.

Intracapsular cataract extraction

Prior to the onset of more modern microsurgical instruments and better IOLs, ICCE was the preferred method for cataract removal. It involves extraction of the entire lens, including the posterior capsule. In performing this technique, there is no need to worry about subsequent development and management of capsular opacity. The technique can be performed with less sophisticated equipment and in areas where operating microscopes and irrigating systems are not available.

However, a number of disadvantages and postoperative complications accompany ICCE. The larger limbal incision, often 160°-180°, is associated with the following risks: delayed healing, delayed visual rehabilitation, significant against-the-rule astigmatism, iris incarceration, postoperative wound leaks, and vitreous incarceration. Corneal edema is a common intraoperative and immediate postoperative complication.

Furthermore, endothelial cell loss is greater in ICCE than in ECCE. The same is true about the incidence of postoperative cystoid macular edema (CME) and retinal detachment. The broken integrity of the vitreous can lead to postoperative complications even after a seemingly uneventful operation. Finally, because the posterior capsule is not intact, the IOL to be implanted must either be placed in the anterior chamber or sutured to the posterior chamber. Both techniques are more difficult to perform than simply placing an IOL in the capsular bag and are associated with postoperative complications, the most notorious of which is pseudophakic bullous keratopathy.

Although the myriad of postoperative complications has led to the decline in popularity and use of ICCE, it still can be used in cases where zonular integrity is too severely impaired to allow successful lens removal and IOL implantation in ECCE. Furthermore, ICCE can be performed in remote areas where more sophisticated equipment is not available.

ICCE is contraindicated absolutely in children and young adults with cataracts and cases with traumatic capsular rupture. Relative contraindications include high myopia, Marfan syndrome, morgagnian cataracts, and vitreous presenting in the anterior chamber.

Extracapsular cataract extraction

In contrast to ICCE, ECCE involves the removal of the lens nucleus through an opening in the anterior capsule with retention of the integrity of the posterior capsule. ECCE possesses a number of advantages over ICCE, most of which are related to an intact posterior capsule, as follows:
A smaller incision is required in ECCE, and, as such, less trauma to the corneal endothelium is expected.

Short- and long-term complications of vitreous adherence to the cornea, iris, and incision are minimized or eliminated.

A better anatomical placement of the IOL is achieved with an intact posterior capsule.

An intact posterior capsule also (1) reduces the iris and vitreous mobility that occurs with saccadic movements (eg, endophthalmodonesis), (2) provides a barrier restricting the exchange of some molecules between the aqueous and the vitreous, and (3) reduces the incidence of CME, retinal detachment, and corneal edema.

Conversely, an intact capsule prevents bacteria and other microorganisms inadvertently introduced into the anterior chamber during surgery from gaining access to the posterior vitreous cavity and causing endophthalmitis.

Secondary IOL implantation, filtration surgery, corneal transplantation, and wound repairs are performed more easily with a higher degree of safety with an intact posterior capsule.

The main requirement for a successful ECCE and posterior capsule IOL implantation is zonular integrity. As such, when zonular support is insufficient or appears suspect to allow a safe removal of the cataract via ECCE, ICCE or pars plana lensectomy should be considered.

**Phacoemulsification**

Standard ECCE and phacoemulsification are similar in that extraction of the lens nucleus is performed through an opening in the anterior capsule or anterior capsulotomy. Both techniques also require mechanisms to irrigate and aspirate fluid and cortical material during surgery. Finally, both procedures place the IOL in the posterior capsular bag that is more anatomical than the anteriorly placed IOL.

Needless to say, significant differences exist between the 2 techniques. Removal of the lens nucleus in ECCE can be performed manually in standard ECCE or with an ultrasonically driven needle to fragment the nucleus of the cataract and then to aspirate the lens substrate through a needle port in a process termed phacoemulsification.

The more modern of the 2 techniques, phacoemulsification offers the advantage of using smaller incisions, minimizing complications arising from improper wound closure, and affording more rapid wound healing and faster visual rehabilitation. Furthermore, it uses a relatively closed system during both phacoemulsification and aspiration with better control of intraocular pressure during surgery, providing safeguards against positive vitreous pressure and choroidal hemorrhage. However, more sophisticated machines and instruments are required to perform phacoemulsification.

Ultimately, the choice of which of the 2 procedures to use in cataract extraction depends on the patient, the type of cataract, the availability of the proper instruments, and the degree at which the surgeon is comfortable and proficient in performing standard ECCE or phacoemulsification.

The surgeon should also consider whether to use topical or regional anesthesia during the procedure. A study by Zhao et al examined the clinical outcomes of topical anesthesia and regional anesthesia including retrobulbar anesthesia and peribulbar anesthesia in phacoemulsification. The authors found that regional anesthesia provides better perioperative pain control, but that surgical outcomes were the same for both.

**Other Considerations**

Bell et al reviewed exposure to alpha-adrenergic blockers frequently prescribed to treat benign prostatic hypertrophy (BPH) and their association with serious postoperative adverse effects following cataract surgery. The study included more than 96,000 older men who had cataract surgery over a 5-year period (3.7% had recent exposure to tamsulosin and 7.7% had recent exposure to other alpha-blockers). Exposure to tamsulosin within 14 days of cataract surgery was significantly associated with serious postoperative ophthalmic adverse events (7.5% vs 2.7%; adjusted odds ratio [OR], 2.33; 95% confidence interval [CI], 1.22-4.43), specifically intraoperative floppy iris syndrome and its complications (ie, retinal detachment, lost lens or fragments, endophthalmitis). No significant associations were noted with exposure to other alpha-blocker medications (7.5% vs 8%; adjusted OR, 0.91; 95% CI, 0.54-1.54) or to previous exposure to tamsulosin or other alpha-blockers.
A study by Baker et al found that 23-gauge pars plana vitrectomy is a possible surgical management approach in select cases of retained lens fragments. While 12 patients were successfully treated by this initial intervention, 8 required sclerotomy enlargement to a 20-gauge access.