Various challenging cataract cases\(^1,2\) can cause complications during surgery.

**Mature Cataracts**

Cataract surgery in mature cataracts is a challenge (Figure 18-1). The decision whether to do a phacoemulsification or a planned extracapsular phacoemulsification (ECCE)/a small-incision manual cataract surgery (SICS) should be made by each individual surgeon not only based on his or her experience and skill set but also based on the type of cataract, endothelial count, zonular status, etc. For instance, it might be advisable in a patient with a brown, leathery cataract and low endothelial count, zonular weakness, or a nondilating pupil to go for a planned ECCE/SICS rather than undertake a phacoemulsification.

Certain techniques help in successful phacoemulsification in brown and white cataracts and it is essential to learn these for performing uncomplicated surgery. Capsular staining dyes (Figures 18-2 and 18-3) and endocapsular rings have made surgery safer in these cataracts. The soft shell technique proposed by Steve A. Arshinoff utilizing a combination of Viscoat, a dispersive viscoelastic, and ProVisc, a cohesive viscoelastic, also makes the surgery more endothelium friendly. At the same time, it is also important to know how to convert from a complicated phacoemulsification to an ECCE/SICS as well as how to handle a posterior capsular rupture, both of which may occur with increased frequency in such cases. Chopping of the cataract can be done and the nucleus emulsified (Figure 18-4). One should be also careful in handling hard brown cataracts (Figure 18-5).

**Subluxated Cataracts**

The surgical management of cataract associated with zonular dialysis is a real challenge for the ophthalmic surgeon. Due to recent advances in equipment and instrumentation, better surgical techniques, and understanding of the fluidics, the surgeon is able to perform relatively safe cataract surgery in the presence of compromised zonules. Implantation of a capsular tension ring (CTR) can stabilize a loose lens and allow the surgeon to complete phacoemulsification and intraocular lens (IOL) implantation. Insertion of a ring into the capsular bag fornix (equator) to support the zonular apparatus was first described by Hara and coauthors in 1991. Hara et al introduced the concept of “equator ring,” “endocapsular ring,” or “CTR.” In 1993, the first CTR for use in humans was designed. In 1994, Nagamoto and Bissen-Miyajima suggested using an open polymethylmethacrylate (PMMA) ring to provide adaptability.

An endocapsular ring offers 4 main advantages:

1. The capsular zonular anatomical barrier is partially reformed, so that vitreous herniation to the anterior chamber during surgery is reduced or even avoided.

2. A taut capsular equator offers counter traction for all traction maneuvers, making them easier to perform and decreasing the risk of extending the zonular dialysis. The great advantage of using the capsular ring during the phacoemulsification rather than after, just to center the lens, it is a great deal safer. Any force that is transmitted to the capsule is not applied directly to the adjacent zonules, but rather distributed circumferentially to the entire zonular apparatus.