This location is often suitable for the beginning phacoemulsification surgeon and advantageous in patients who have compromised capsular or zonular integrity. In patients with small pupils, this technique permits good visualization and enables safe emulsification. The disadvantages of working at the iris plane include possible difficulty prolapsing the nucleus and risk of damage to the corneal endothelium if the surgeon emulsifies the nucleus too close to the cornea.

**Anterior chamber**
This supracapsular approach involves prolapsing the nucleus through the capsulorrhexis during hydrodissection, which requires a medium to large capsulorrhexis and a relatively soft nucleus. This technique theoretically reduces the stress on the zonular fibers during manipulation of the nucleus. The risks include a greater chance of aspirating the iris in the phaco tip as well as damaging the corneal endothelium. Nevertheless, phacoemulsification in a supracapsular location is useful in situations such as the presence of posterior capsule rupture. Using an OVD to protect the endothelium and minimizing phaco energy are recommended.

**Techniques of Nucleus Disassembly**

**Phaco fracture “divide and conquer” technique**
The most widely used 2-handed technique, referred to as “divide and conquer nucleofractis,” can be effectively applied to all but very soft cataracts.

After adequate hydrodissection (and hydrodelineation if desired), continuous ultrasound is used to sculpt a deep central linear groove or trough in the nucleus that is 1–1.5 times the width of the phaco tip. Signs of adequate groove depth include smoothing of the striations in the groove, brightening of the red reflex in the groove, and sculpting to a central depth of 2 or 3 phaco tip diameters (Fig 8-9).

![Figure 8-9](image-url) A central groove is sculpted under conditions of low vacuum (left). The ideal groove is deeper centrally than peripherally to allow for effective cracking of the lens (right). (Photo courtesy of Lisa Park, MD. Illustration by Mark Miller.)
Clinical Pearl  Because of the scaphoid shape of the posterior lens, the sculpted groove should be deeper centrally and progressively shallower toward the periphery of the nucleus to avoid sculpting through the peripheral posterior capsule.

At this point, the surgeon can either separate the nucleus into 2 pieces (nucleus cracking) or rotate the nucleus 90° and sculpt a perpendicular groove (Video 8-3). The phaco tip and second instrument are then inserted into each groove and spread apart, thereby achieving complete separation/cracking of the pieces.

The surgeon can then engage a quadrant using the phaco tip and a segment removal setting. After adequate vacuum has been attained, the nuclear quadrant is pulled toward the center of the capsular bag and emulsified. Each quadrant is sequentially removed in the same manner (Video 8-4).

Chopping techniques
The horizontal phaco chop technique does not entail creation of a central groove but instead uses the natural fault lines in the lens nucleus to create a fracture plane. After burying the phaco tip in the center of the nucleus while using high vacuum, the surgeon inserts a chopping instrument (Fig 8-10A) under the anterior capsule flap, deeply engages the endonucleus in the periphery, and draws it toward the phaco tip, thereby cracking the nucleus into 2 pieces (Videos 8-5 and 8-6). This technique requires the surgeon to place the chopper under the capsular rim and around the equatorial nucleus. The phaco tip is then buried in one of the nuclear halves, and the surgeon uses the chopping instrument in the same fashion to create multiple small wedges of nucleus for emulsification.
A modification of this procedure entails sculpting a central groove and then cracking the nucleus into 2 pieces. The resulting heminuclei are then chopped into smaller pieces. This technique, known as stop and chop, affords the surgeon more room to manipulate the nuclear pieces in the capsular bag.

Vertical chopping techniques are also used. After the center of the nucleus is impaled with the phaco tip, using high vacuum, the surgeon buries a chopper with a sharp tip within the nucleus, just adjacent to the phaco tip (Fig 8-10B). The phaco tip lifts while the chopper depresses, and the surgeon separates the instruments to complete the chop, which occurs along natural fault lines in the nucleus (Video 8-7).

In practice, either the vertical or the horizontal chopping technique can be used with almost any other strategy for disassembly of the nucleus. Chopping may be difficult in soft nuclei, for example, as with pure posterior subcapsular cataracts. Other techniques, such as hydrodelineation and aspiration with minimal phaco power, may be more appropriate in these cases.


Irrigation and Aspiration

Once phacoemulsification of the nucleus has been completed, a plate of soft epinucleus or transitional cortex may rest on the posterior capsule. The surgeon can use irrigation and aspiration (I/A) alone or the phaco needle with reduced vacuum and flow settings, without ultrasound energy, to aspirate this material from the capsular fornix or posterior capsule.

In the coaxial cortical removal technique, the port is rotated toward the equator of the lens capsule, and the cortical material is engaged under low vacuum and stripped to the center of the inflated capsular bag. The surgeon rotates the port so that it is fully visible, and the cortex can be aspirated under greater vacuum. This procedure is repeated until all of the cortex is removed. If the surgeon finds it difficult to reach the subincisional cortex, a 45°, right-angled (90°), or U-shaped (180°) aspiration cannula may be useful (Video 8-8).