



Phacoemulsification

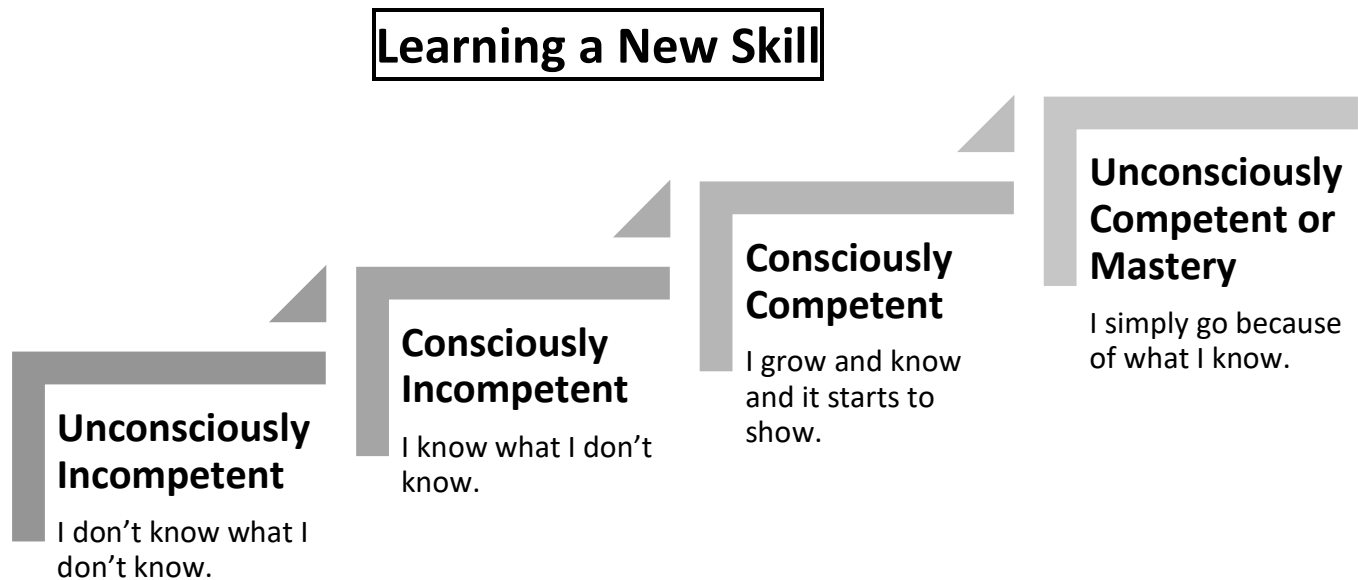


All India Institute of
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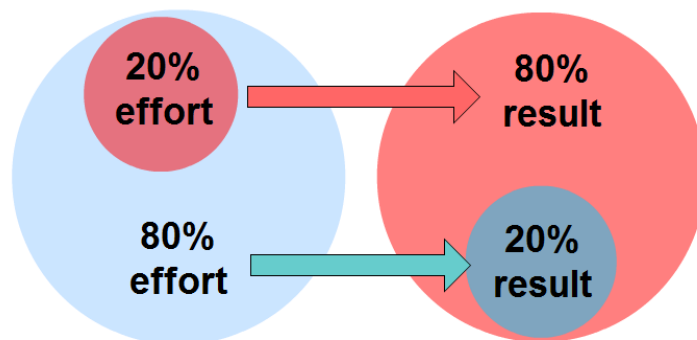


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**Pareto's
80-20
Principle**



WISDOM GAINED

1. Phacoemulsification, just like any surgery, is a “*mind game*”. Stability of your mind is equally or *more* important than that of anterior chamber.
2. Never get over-confident after doing hundreds of cases without complications and never loose confident after doing few consecutive complicated cases.
3. *Knowledge* is managing PCR.
Experience is identifying PCR.
Wisdom is preventing PCR.
4. **Hope** for the **BEST**, but **Prepare** for the **WORST**.

Anaesthesia for Cataract Surgery

1. Intraconal Block (Retrobulbar)

- 1.25-inch, 23-25G needle

2. Extraconal Block (Peribulbar)

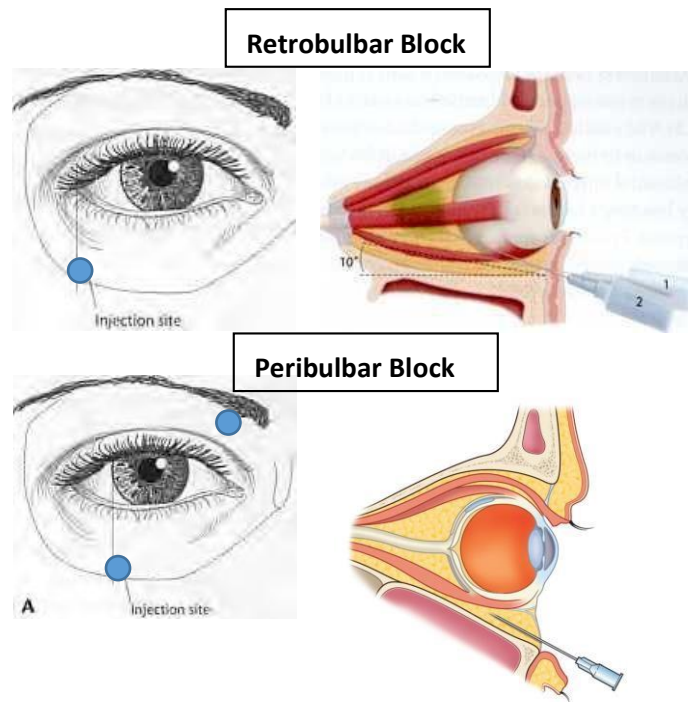
- 1-inch, 26-27 G needle

3. Topical Anesthesia

4. Sub-Tenon's Block (Parabulbar)

5. Intracameral Anesthesia

6. General Anesthesia



Complications of Injectational Anesthesia

1. Retrobulbar hemorrhage.
2. Optic nerve damage.
3. Accidental injection of anesthetic agent in retrobulbar blood vessels.
4. Globe perforation.
5. Conjunctival and lid hemorrhage.

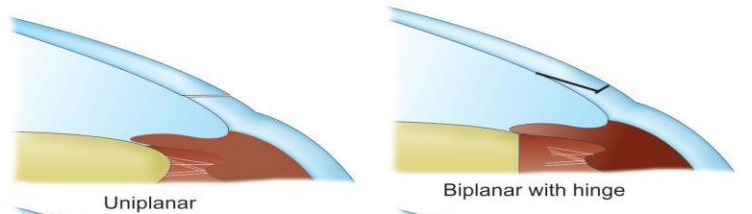
Contraindications to Topical Anesthesia

1. Absolute: Nystagmus, Allergy to topical anesthetic eyedrops
2. Relative: Uncooperative patients, Deaf patients, Language barrier between surgeon and patient, difficult surgery, prolonged surgery

Wound Construction

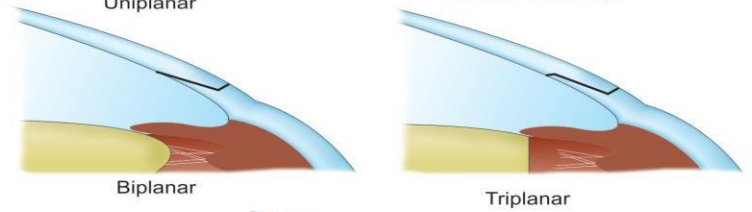
1. WOUND TYPE

- a. Clear Corneal Incision
- b. Scleral Tunnel Incision



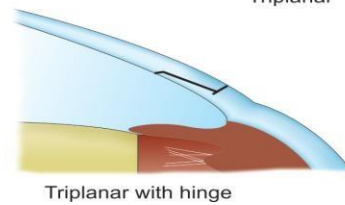
2. WOUND LOCATION

- a. Astigmatism
- b. Ocular Disease
- c. Ergonomics

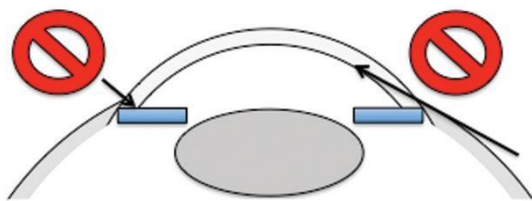


3. WOUND ARCHITECTURE

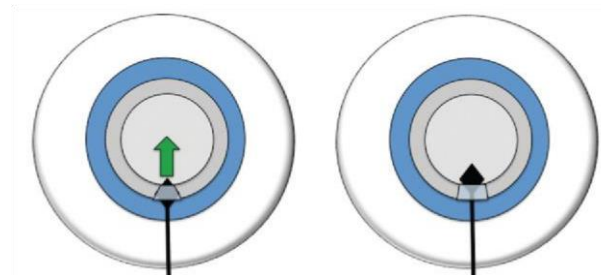
- a. Incision Width
- b. Tunnel Length



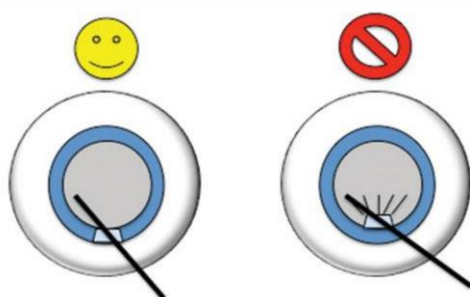
The 'Rule of Too's' describes most of the root causes of wound complications: too short, too long, too wide, too narrow, too central, too peripheral, too superficial, or too deep.



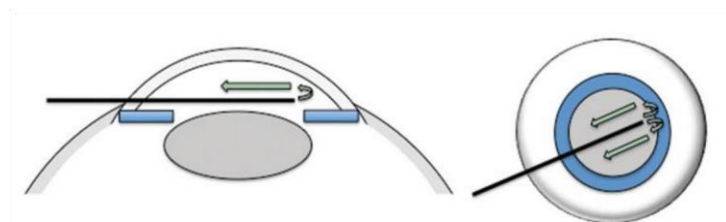
Avoid too short or too long tunnel.



Enter the eye completely till the cutting edge of the blade passes the endothelium.



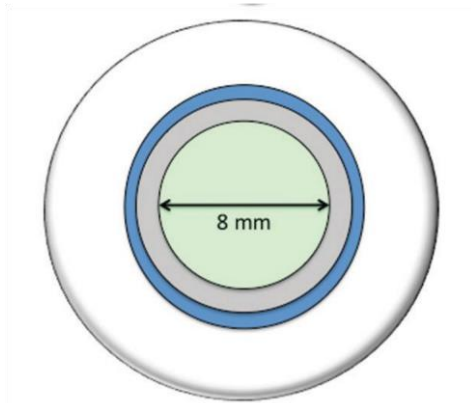
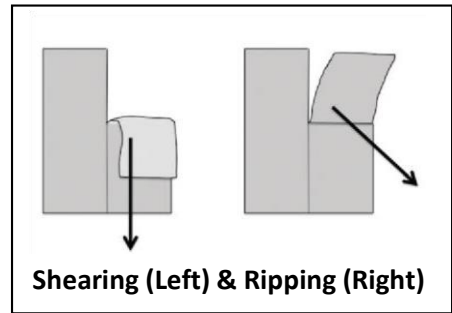
A Peripheral tunnel creates less folds than more central tunnel.



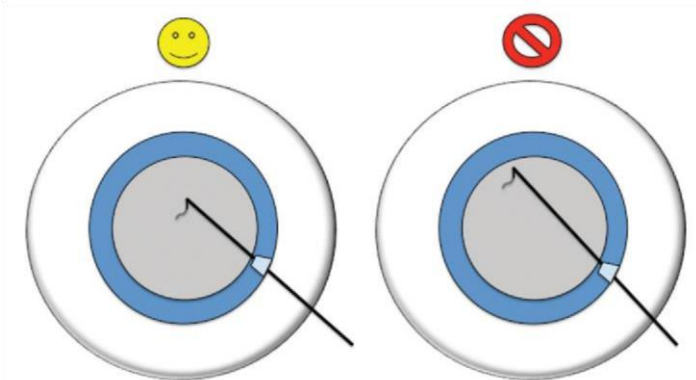
A Peripheral tunnel creates less folds than more central tunnel.

Capsulorrhexis

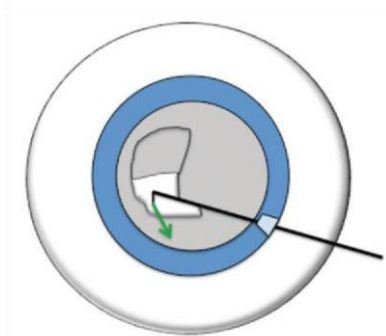
One of the MOST important step in phaco:
So **TAKE YOUR TIME**



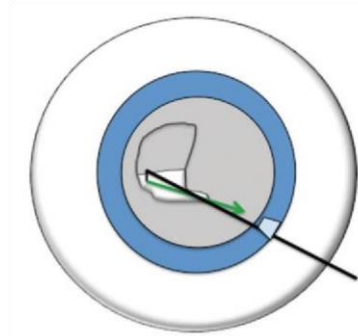
The **SAFE ZONE** of the rhexis which is free from zonular insertion.



As a beginner, do not start rhexis in the periphery.

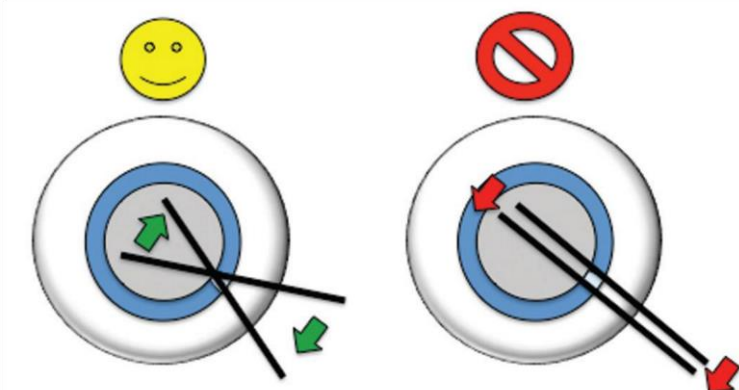


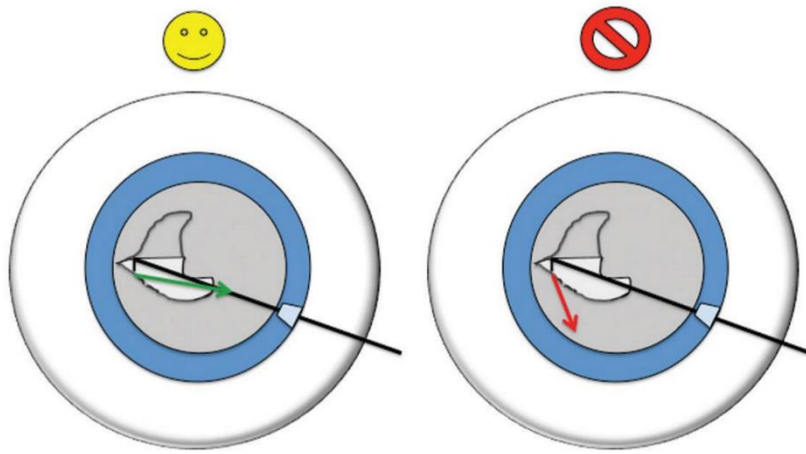
Shearing Technique: attack the flap along the outer border and pull in the direction of desired tear.



Ripping Technique: attack the flap close to the flap base and pull the flap more towards the center.

Use the wound during manipulations as a **PIVOT**.





To stop the TEAR running out, you have to attack the flap close to tear and pull the flap paracentrally. DO NOT forget to fill the OVD before.

PITFALLS:

a. can always be made larger but it can never be made smaller

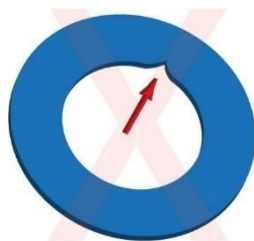
b. unwanted outward radialization:

- recognize the impending problem before the tear extends too peripherally
- Pulling the capsule flap centrally results in a ripping action and not a shearing action
- stop and inject more viscoelastic to flatten the anterior lens surface
- Stop pulling at that site if control cannot be achieved at the tear site
- puncture the capsule again with a 30-gauge needle and begin tearing in the reverse direction

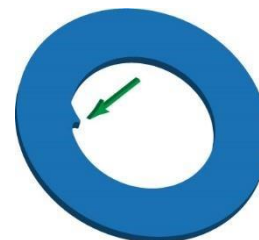
c. difficulty visualizing the capsule

- Importance of Staining
- Good focus and illumination

Hydro



A notch in the capsulorrhexis created by an inside-out manoeuvre produces an area of weakness that can result in radial tears.



A tag in the capsulorrhexis created by an outside-in manoeuvre (indicated by green arrow) is acceptable and stable, since no vulnerability in the capsule is typically introduced.

Manoeuvres

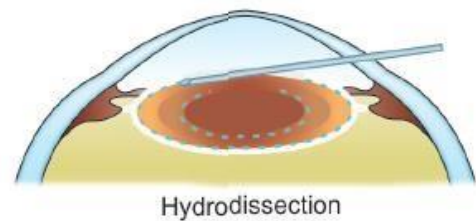
1. INSTRUMENTS

- a. 25-gauge to 30-gauge cannula
- b. 2-3cc syringe

2. Preparation

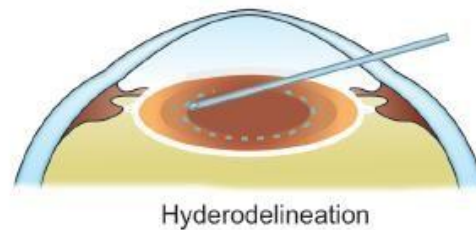
3. Hydrodissection

- a. sufficient force to shear adhesions between the lens capsule and cortex
- b. 2 to 3 times at different locations to ensure complete dissection
- c. gentle depression of the nucleus after irrigating the BSS



4. Hydrodelineation

- a. cannula tip is placed into the edge of the epinucleus
- b. must be injected with more force than during hydrodissection
- c. fluid wave results in the appearance of a “golden ring”



5. Complications

- a. mechanical disruption of the capsule
- b. intracapsular capsular block syndrome
- c. posterior capsule rupture
- d. vitreous hydration

1. Keep the cannula tip beneath the anterior capsule while injecting fluid.
2. Apply slow, constant pressure on the syringe so that the fluid wave will propagate.
3. Watch for a complete fluid wave to ensure adequate hydrodissection.
4. Watch for the “golden ring” sign as confirmation of hydrodelineation.
5. Confirm rotation of the lens before proceeding to phacoemulsification.

Fluidics

1. INFLOW

- gravity feed system in which the pressure is created by a difference between the bottle height and the patient's eye
- Importance of bottle height
- inflow of fluid must be greater than the outflow of fluid, ***If outflow > inflow***, even for just a fraction of a second → ***surge***, this can cause chamber instability, collapse of the eye, and aspiration of the posterior capsule

2. OUTFLOW

- Factors: incision architecture; phaco tip, I/A tip, and port size; pump type; tubing size; and compliance, vacuum, venting, and aspiration settings
- phaco machine pumps

Peristaltic	Venturi
Flow based	Vacuum based (Bernoulli's principle)
Vacuum created only when phacotip is occluded by cataract material	--Vacuum created instantly via pump once surgeon press foot pedal -- No need of occlusion of phaco tip
<i>vacuum limit can be set independent of the flow</i>	Vacuum level and aspiration flow rates are not independently controlled
Flow is constant until occlusion, flow rate is controlled by the speed of the rollers	Flow varies with vacuum level, a flow of gas or liquid across a port creates a vacuum proportional to the rate of flow
Drains into a soft bag	Rains into a rigid cassette.

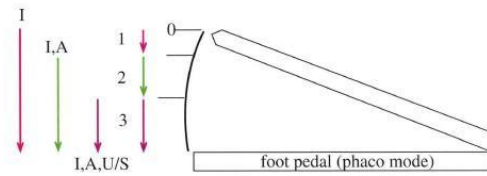
Peristaltic is DELUXE CAR --- SAFE and RELIABLE
Venturi is RACING CAR --- FASTER and DANGEROUS

3. SETTINGS

4. FOOT PEDAL CONTROL

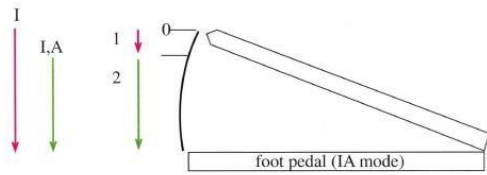
a. Position 1: irrigation

- **No linear control of the infusion**— the infusion is either turned on or turned off.
- To keep the eye inflated during surgery, we need to ensure that the fluid inflow rate is greater than the fluid outflow rate.



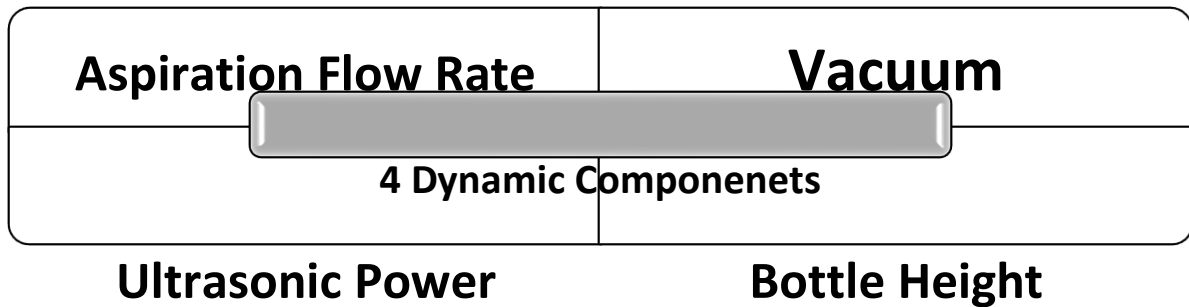
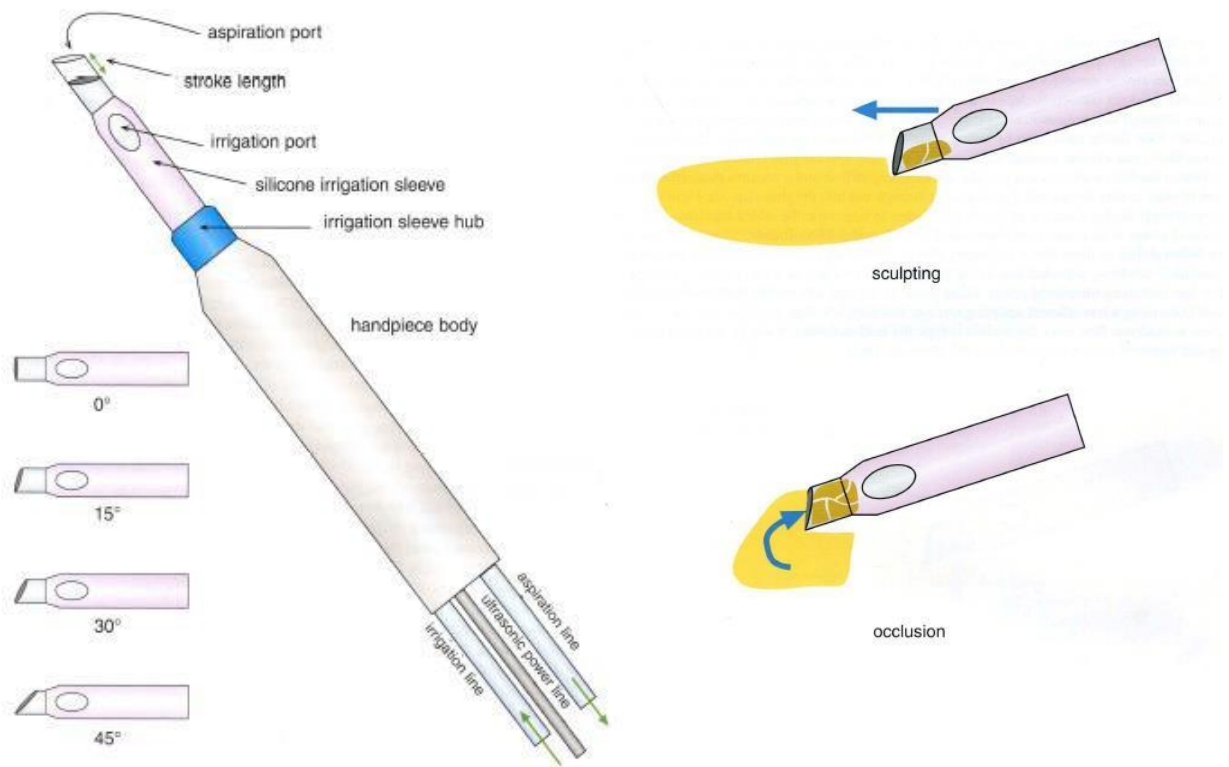
b. Position 2: irrigation + aspiration

- There is **a linear control** of vacuum and flow, so that the top of foot position 2 provides less vacuum or flow than the middle or bottom range of the same foot position 2.



c. Position 3: irrigation + aspiration + phaco

- There is **linear control** of the ultrasound energy level so that more the pedal is depressed in position 3, more ultrasound energy, such as would be needed for denser cataract.
- **Ultrasound energy should only be applied once the tip of the phaco probe is in contact with part of the cataract.**
- When we titrate the amount of ultrasound energy we place into the eye, we are keeping the **frequency constant but we are increasing the stroke length** and therefore, the total amount of energy.



5. Some DEFINITIONS

a. $APT = EPT \times AVG$

EPT----Elapsed Phaco Time

AVG----Average phaco power

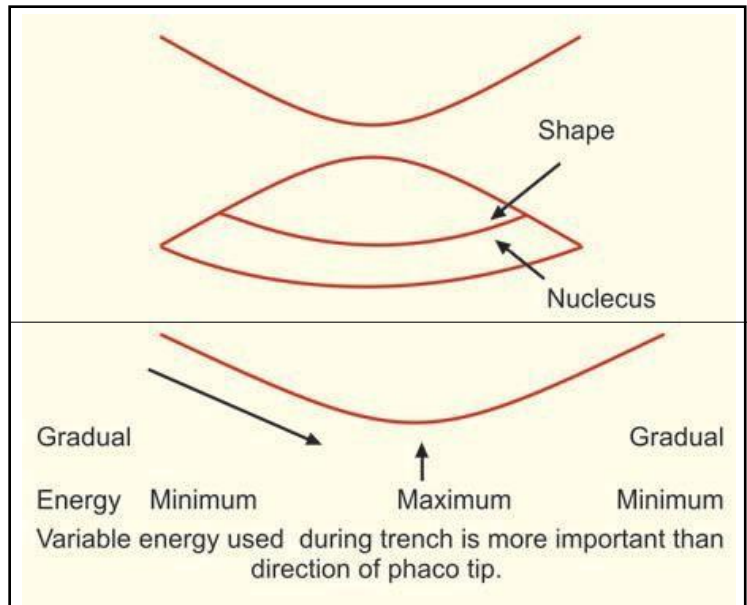
APT—Absolute Phaco Time, Total amount of phaco energy used

- b. **Aspiration Flow rate (AFR):** how fast the things (lens material, fluid) is coming to phaco tip. More flow rate---rapid movement of the material to tip. (**Followability**)
- c. **Vacuum:** Negative pressure measured in millimeters of Mercury (mm Hg). Vacuum determines how well, once occluded on the phaco tip, nuclear material will be held to the tip. (**Holding power**)
- d. **Ultrasonic Power:** Means *change in stroke length*. It is displayed in %. It means how much % of length of tip is moving forward out of total length of tip.
- e. **Bottle Height:** Adjusting bottle height proportionally affects IOP. It relates to AC Depth. Higher flow rate requires higher bottle height to maintain IOP. Lower bottle height requires lower flow rate to prevent AC Collapse.
- f. **Rise time:** The measurement of how fast the vacuum builds. It is directly related to AFR. The faster the AFR, the shorter the rise time.
- g. **Compliance & Non-compliance:** Compliance is the ability of an object to yield elasticity when force is applied. The more compliance, the slower the responsiveness and performance.
Non-compliance is the ability of an object to maintain rigidity when a force is applied. The more non-compliant a fluidic system is, the more responsive its performance will be. (I.e. True control)
- h. **Surge:** An effect caused by fluidic imbalance. It occurs when AFR/Vacuum exceeds irrigation. It causes chamber fluctuations, mini-collapses, movement of PC and iris flutter.

Nucleus Emulsification: Non-Chop to Chop

1. Nonchopping phacoemulsification/nuclear-fracturing techniques

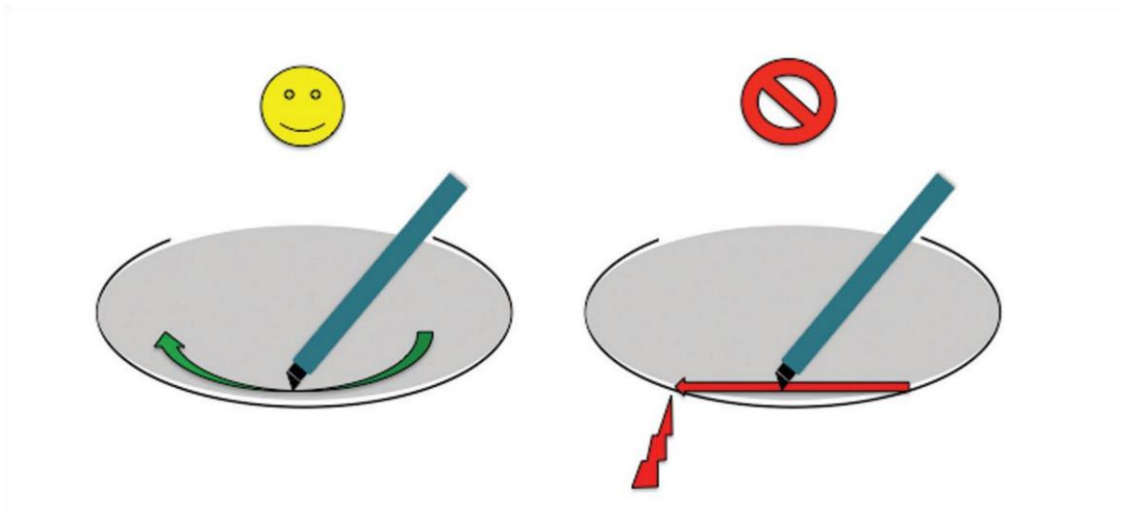
- a. divide-and-conquer
 - i. Grooving
 - ii. Cracking
 - iii. Quadrant Removal
- b. chip and flip
- c. down slope sculpting
- d. phaco sweep



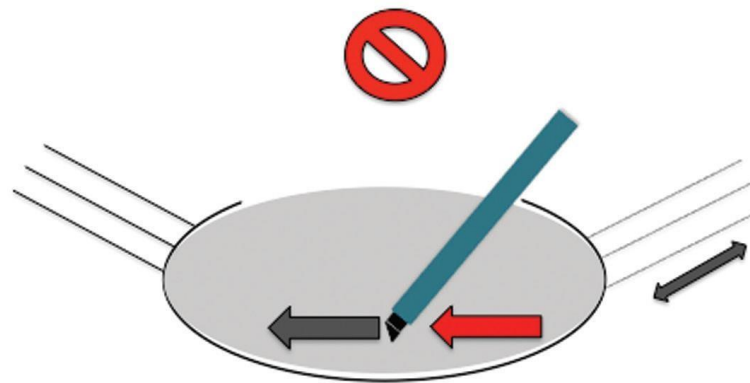
First stroke should represent marking of trench and confirm its central location, if not then redirect next stroke in center only.

Second and third Strokes of trench will give you idea about density and size of nucleus and energy parameters may be reset accordingly.

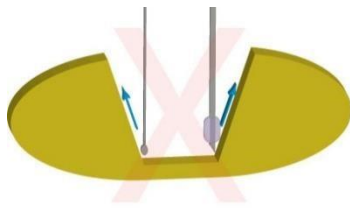
Ideal shape of trench should be shallow in periphery and deep in the center.



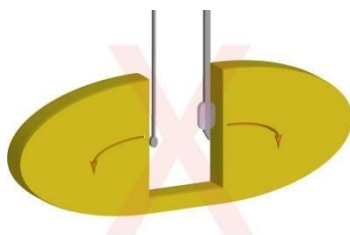
Groove DEEP centrally but not too deep in the periphery.



„If the lens is moving forward during grooving, you push too much on the lens. You are pulling on the zonules. Move slower and/or increase phako power...“

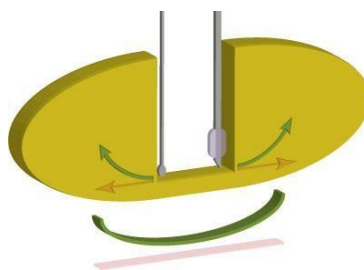


Improperly sculpted groove walls can lead to difficulty in cracking, as instrument tips are unable to maintain proper positioning and can slip along sloped walls.

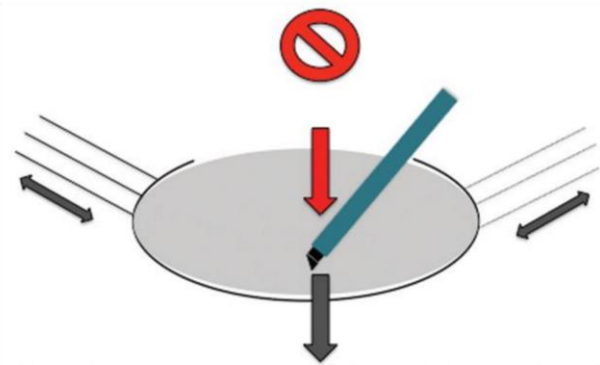
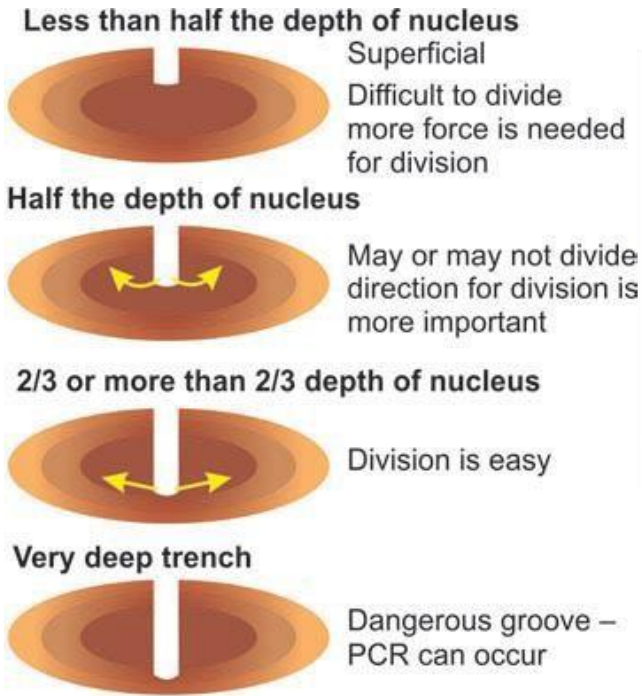


Positioning of instrument tips at inadequate depth can lead to poor delivery of cracking force, and potentially push the posterior plate closer together. Such improper cracking can also mash the groove walls making subsequent attempts at cracking more difficult.

deep in the groove. A instrument tips produces displacement. An “out and produces much greater minimizes zonular stress pressure.



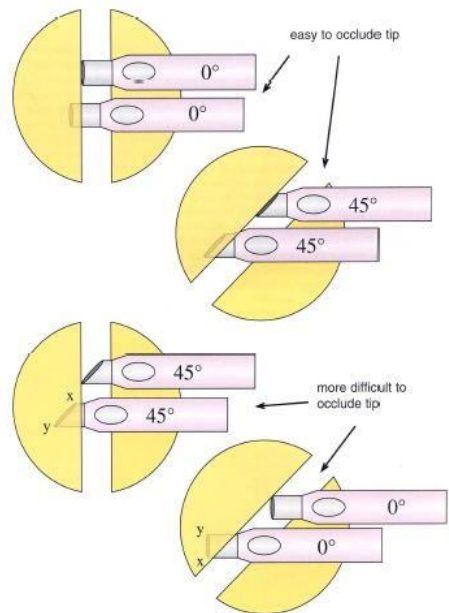
Proper positioning of instrument tips horizontal-only displacement of the only minimal posterior plate up” movement of the instrument tips posterior plate displacement as well as through avoidance of downward



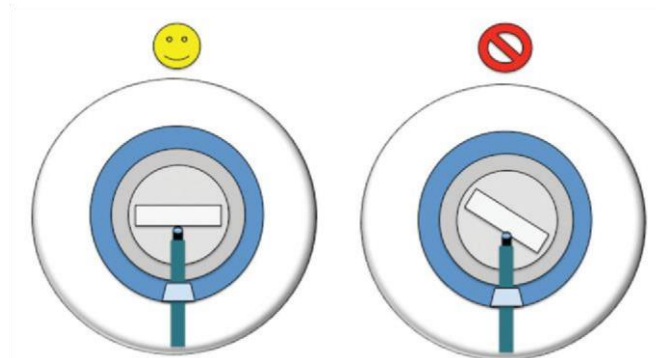
„Do not press too much on the lens during manipulations.
You are pulling on the zonules...“

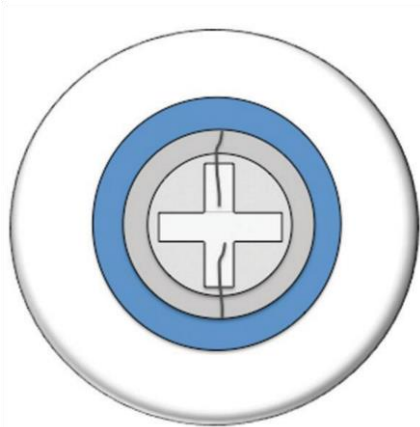
Don't be LASY

**Rotate the nucleus 90
° before making second groove.**

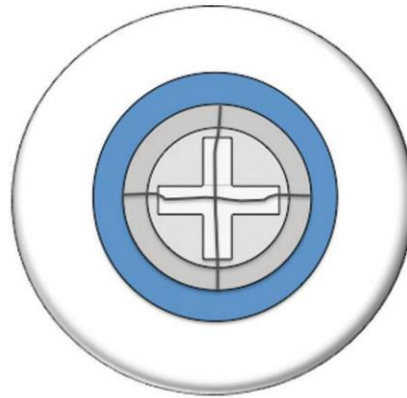


ZERO DEGREE EFFECT

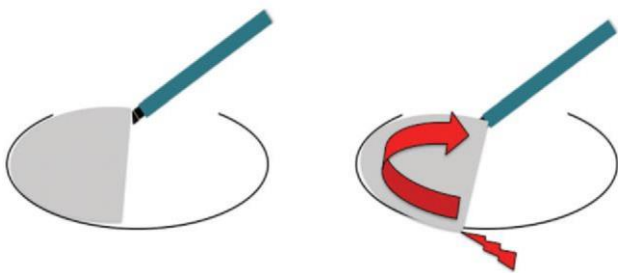




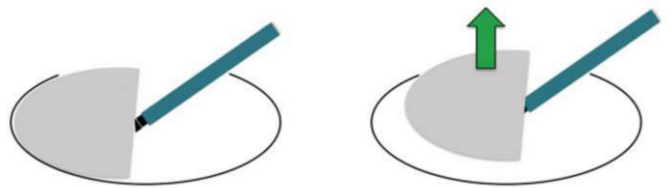
Incomplete Cracking in the center.



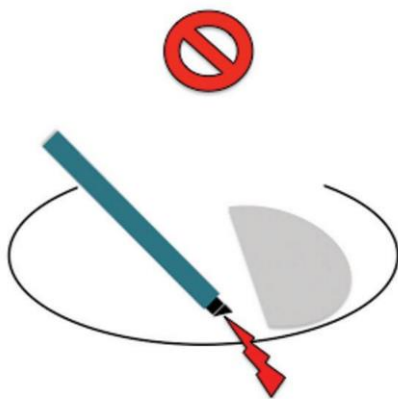
**Cracked Nicely.
Ready to Remove Quadrants.**



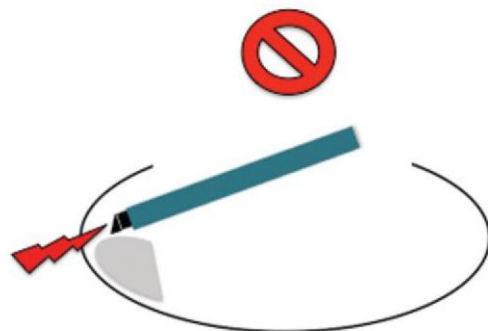
Be careful while you are taking out the nucleus quadrants. Do not attack them anterior otherwise inferior sharp edge of the nucleus may hurt the capsule.



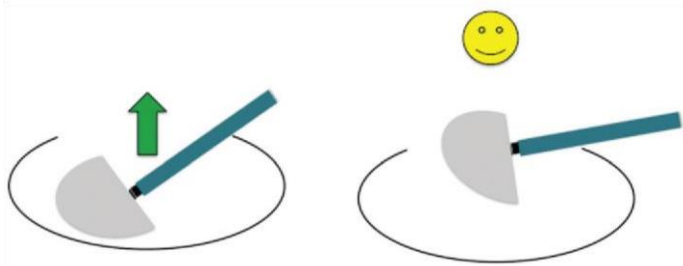
Better attack nucleus quadrants in the middle of the nucleus. The nucleus will not rotate and you can move it away from the posterior capsule.



The opening of the phaco tip should never ever be directed towards the posterior capsule.



The phaco tip should never act in the periphery.

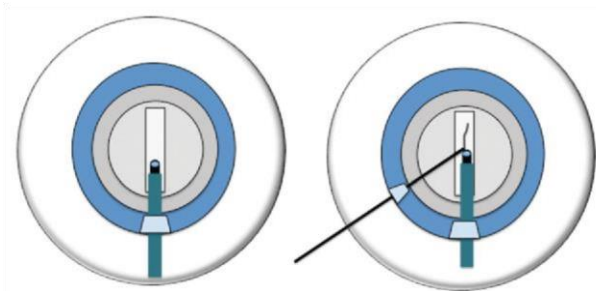


Lift the last piece of the nucleus up before you eat it..You work in a safer zone with regards to posterior capsule.

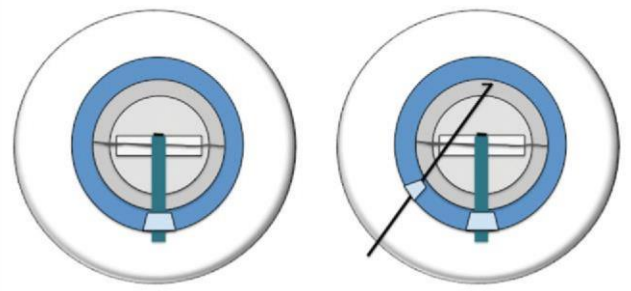


Epinucleus Removal: Aspirate the border of the cup and flip it in occlusion mode. You may also use the blunt instrument to move it towards phaco tip.

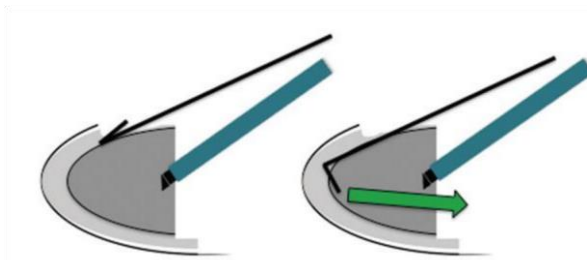
2. Stop & Chop



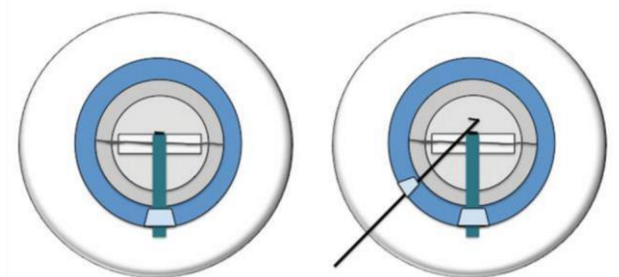
“Stop & Chop” starts like “D & C”: You make nice deep groove and then divide.



Horizontal Chop: Place the chopper between epinucleus & nucleus in distal periphery of the lens.

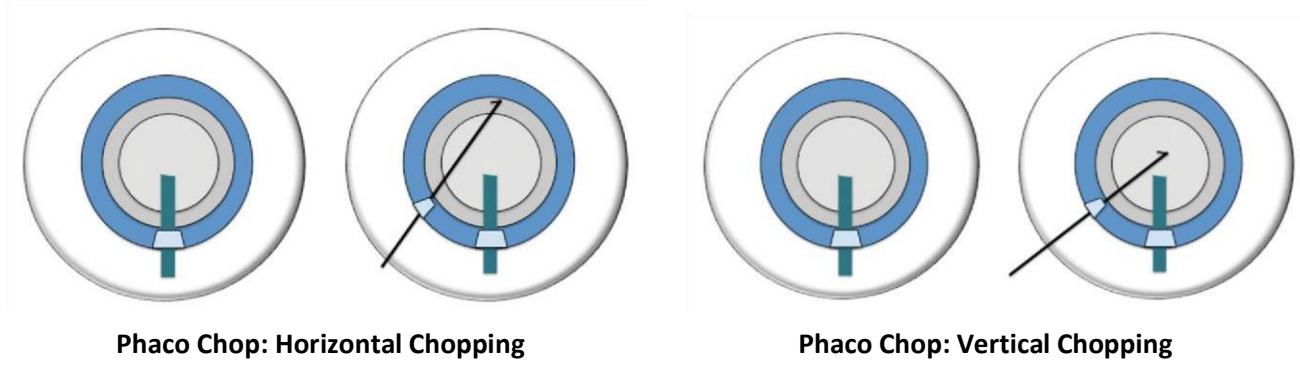


Horizontal Chop: Safely passing the chopper between epinucleus and nucleus and bringing back towards center.



Vertical Chop: Plant chopper about 1 mm anterior to the phaco tip and then pull towards left side.

3. Chopping



Advantages

- i. Reduction in phaco energy.
- ii. Ability to perform supracapsular emulsification.
- iii. Reduction in stress on the zonules and capsular bag.
- iv. Decreased reliance on the red reflex.
- v. Greater reliance on the second instrument than the phaco tip.

1. Phaco chop improves safety by limiting ultrasound energy and reducing stress on the capsule and zonules.
2. To fracture the nucleus, horizontal chopping utilizes compressive forces, while vertical chopping relies upon shearing forces.
3. With horizontal chop, the chopper passes beneath the capsulorrhexis edge and hooks the nuclear equator, while the phaco tip is embedded just within the proximal capsulorrhexis edge to encompass as much nucleus as possible in the chopper's path.
4. With vertical chop, the chopper stays central to the capsulorrhexis and incises just in front of the phaco tip, which is deeply embedded in the center of the nucleus to maximize fixation.
5. Using horizontal chop to subdivide mobile fragments into progressively smaller pieces reduces chatter and particle turbulence.

Fragmentation Style	Advantages	Disadvantages
Sculpt and Prolapse	Easy on bag	Slow Energy close to cornea Lots of ultrasound power
Divide and Conquer	Classic easy to do Energy away from cornea Can do with one hand	Lots of ultrasound power
Stop n Chop	Fairly easy to do Less ultrasound power	Needs two hands
chop	Little stress on bag Least ultrasound power Fast	Hard to do Needs two hands Get anterior capsule with chopper Jig saw problem

Phaco Location	Advantages	Disadvantages
Endocapsular	No flip required Energy away from cornea	Tear anterior capsule with chopper or phaco tip Nuclear pieces tight in bag - Jigsaw puzzle problem
Supracapsular	Less risk of hitting ant cap No jigsaw problem	Ultrasound energy close to cornea Nuclear flip close to cornea
AC shell	Little stress on bag	Slow Energy close to cornea Old school
½ bag ½ AC	No jigsaw problem Less risk of hitting ant cap	Energy closer to cornea

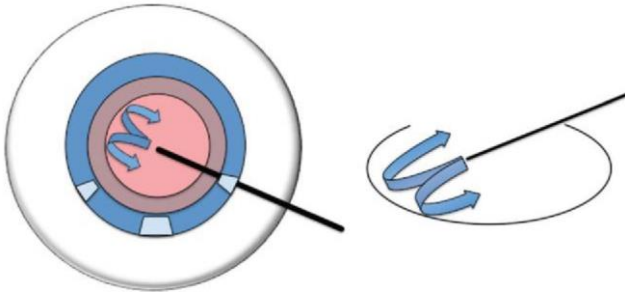
Irrigation and Aspiration

1. INSTRUMENTATION

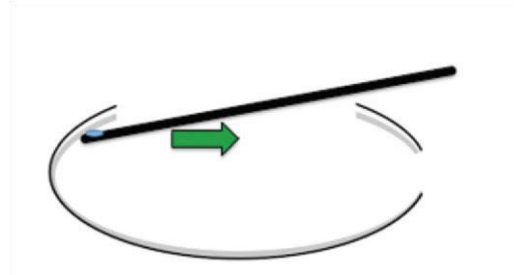
- a. Coaxial Versus Bimanual
- b. Soft Versus Metal Sleeve
- c. Straight Versus Angled Tips

2. PRACTICAL TIPS

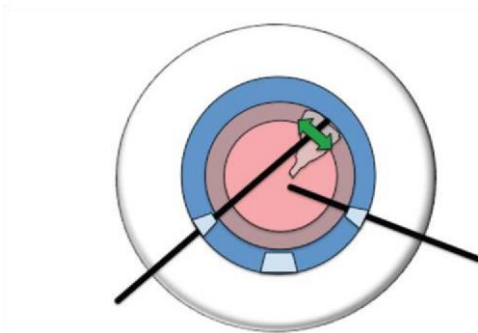
- a. Proper Instrumentation
- b. Rotational Technique
- c. Insertion of Intraocular Lens as Tamponade



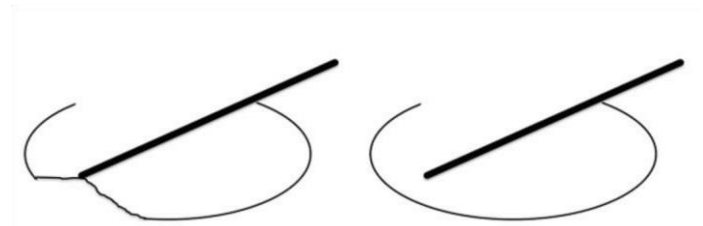
Irrigating port of bimanual I/A should be in the middle of the bag to get the inflated bag.



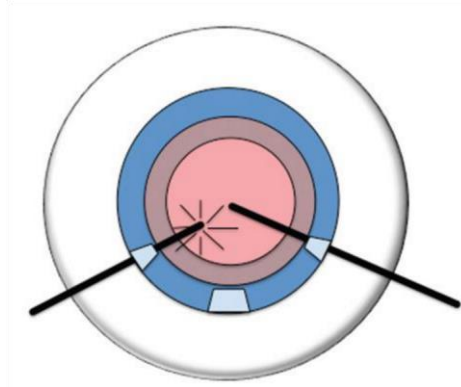
Go under anterior rhexis margin in periphery, aspirate with opening of tip upwards, get occlusion and then pull in to center of the bag.



Move the aspiration tip peripheral under the anterior cortex from side to side. This will engage more cortex and loosen it from cortex.

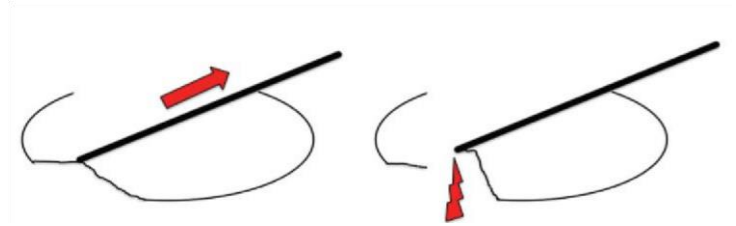


If you aspirate the posterior capsule, then stop the aspiration to release posterior capsule.



If you see such small starfolds in the posterior capsule, stop aspiration without removing the tip.

you will have posterior capsule tear.



If you aspirate posterior capsule and then pull it,

1. Choose an angled tip for easier access to subincisional cortex.
2. Consider a bimanual I&A system, especially for cortical material that is difficult to reach.
3. Avoid trauma to the capsule through diligent attention to the aspiration tip and by stripping cortical fibers toward the pupillary center.
4. Modify the I&A settings based upon the situation and particulars of each case.
5. Perform careful capsular polish with consideration to settings and specialized tips, while remembering that later nd:YAG capsulotomy is an option for resilient posterior plaques.

Intraocular Lens

1. IOL Calculations

2. IOL Insertion



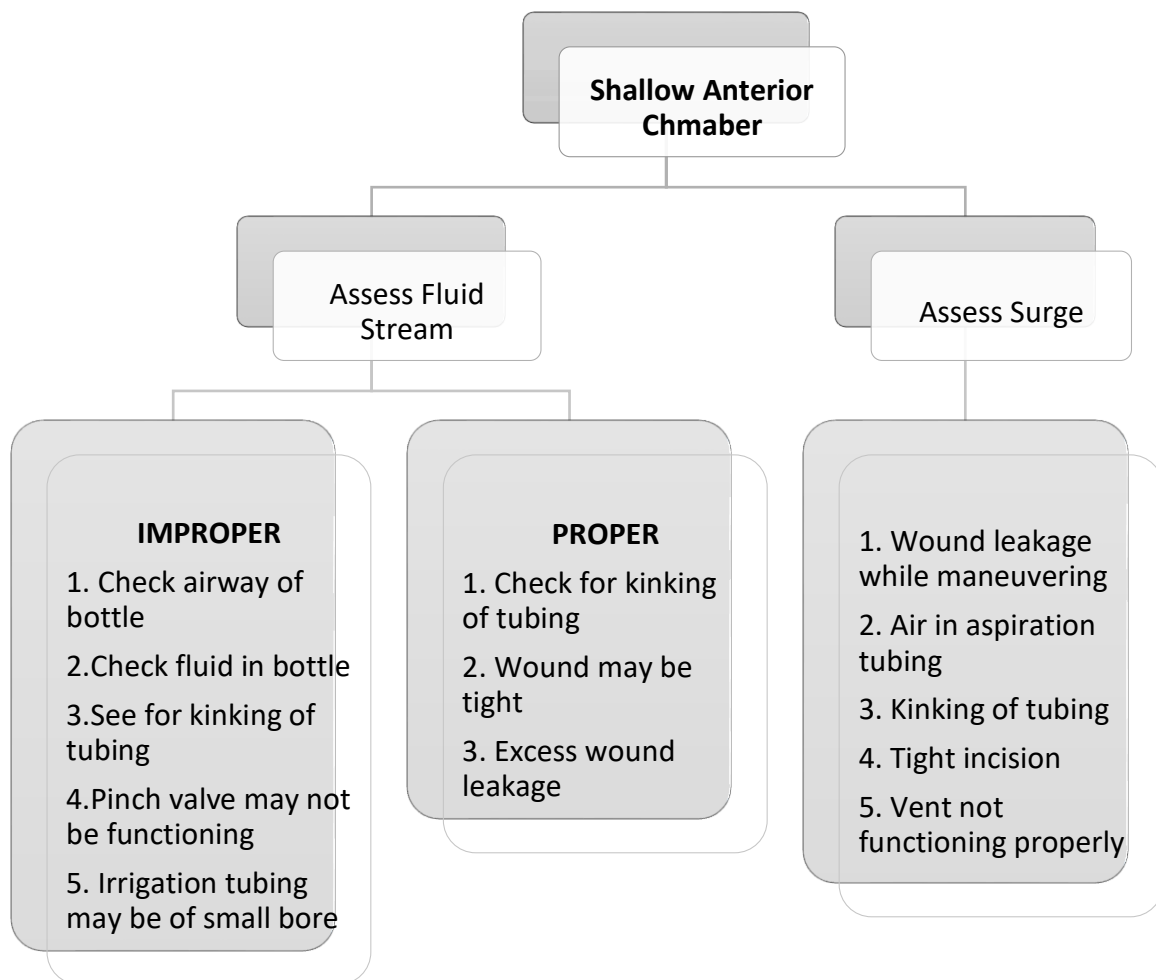
Potential Complications	What to do about it
Place IOL up-side down	Can leave as is - accept myopic shift, or Take one haptic out of wound with Sinsky hook, Fill with OVD above and below IOL, One hook above and one below -- Flip IOL
Inadvertent sulcus placement	Fill with OVD -- Rotate into bag with hook If a 3 piece can leave in sulcus with myopic shift Do not leave single piece acrylic (Alcon SA60) in sulcus
IOL doesn't center	Usually one haptic in sulcus one in bag: dial both into bag or both into sulcus Possible zonular dialysis if nearly centered leave it alone rotate IOL carefully for best centration with 3 piece often haptics best at weak area check wound for vitreous consider placement of CTR place miochol to help check for vitreous Haptic damage (especially with 3 piece IOL): may have to replace IOL
Tear in Descemet's	Use care to not extend tear Place Air Bubble at end of case – post op position wound up -- bubble seals Descemets
Marred IOL	If not central forget about it, If central replace IOL
Lens Material behind IOL	Rotate haptic 90 deg from wound: Toe down with I/A and get under IOL, With aspiration tip showing at all times aspirate

1. Choosing the correct IOL power requires accurate biometry. The method chosen to obtain these measurements may not be as critical as careful technique. Small errors in axial length and keratometry can result in significant IOL power errors.
2. Second- or third-generation IOL power calculation formulas should be used with the appropriate A-constant or ACD-constant.
3. Careful consideration of a patient's specific vision needs and expectations is a critical component of IOL power selection.
4. Incorrect IOL implantation does occur. "Refractive surprise" is a complication that can occur with even the most careful planning. Once an IOL power has been chosen, this

selection should be verified for each patient in the operating room and the packaging inspected immediately prior to implantation.

Flow Charts

1. What to do when anterior chamber collapses



Secret of success is to get up when we fall down

Skills aren't enough. It's your attitude that makes the difference

About the nucleus drop:

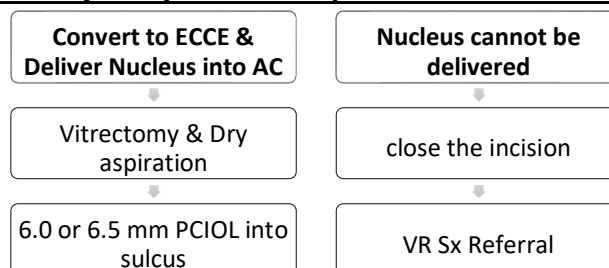
Every time I did well and that I heard never, once I did bad and that I heard forever

2. Stepwise Management of PCR

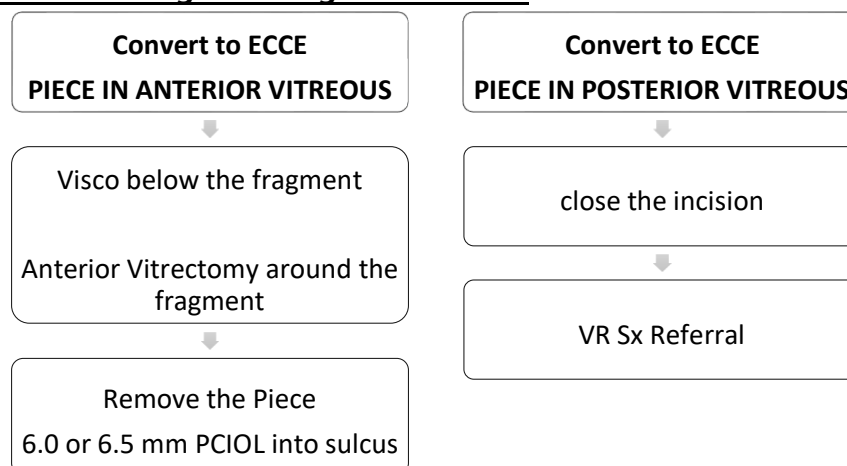
Identification:

- **Deepening of the anterior chamber:** There is, at the time when the capsule is broken, a sudden change in the eye as pressures between chambers equalize. This can result in a sudden and sometimes transient deepening of the anterior chamber and an increase in pupil size.
- **Movement of the lens away from the phaco tip and loss of followability:** The coaxial irrigation of the phaco tip can push the nuclear pieces backward because there is now no barrier to posterior movement. In addition, the pieces may be knotted up in vitreous and not easily aspiratable.
- **Vitreous in the phaco or aspiration tip:** In many cases, the first sign the cataract surgeon has of vitreous prolapse is the presence of strands of material in the phaco or aspiration tip that do not behave the way nucleus or cortex would.
- The sudden appearance of an **area at the level of the posterior capsule that is “too clear.”** □
The **absence of lens material that has not yet been removed.**

Immediately after Hydro-procedure (Posterior Polar Cataract)



Rent after or during Cracking the Nucleus



Rent while removing the cortex

Do close chamber vitrectomy with no or less irrigation. Make another side port incision. Through this vitrectomy can be done. Do bimanual irrigation aspiration with closed chamber. Cortex aspiration is easy with this procedure, as it is a closed chamber aspiration. Put IOL in the bag or on anterior capsule.

10 Pearls for Your First 10 Phaco Cases after Residency

AAO, Young Ophthalmologist Article

Pearl #1: Know Your Team

You are the new kid on the block, and yet you are — and must be — the boss. Communicate your needs and expectations to your staff, but remember that a calm and confident demeanor is necessary to avoid ruffling feathers during your first surgical days. How you shoulder this burden demonstrates your character. Remember that arrogance is often the mask of insecurity. If something is not going the way you want, look within yourself to find the fault. That's probably where it is.

Pearl #2: Know Your Equipment

Knowing how to set the phaco machine is critical to your success. Vacuum, power and flow — as well as other secondary settings such as duty cycle, rise time and occlusion mode — represent essential tools in your surgical technique. They are just as important as incision size and capsulorhexis diameter.

Do you know your phaco tip size in terms of gauge or diameter, bevel angle and design? Do you know what type of tubing you use? Can you translate all of this information to a new machine from a different manufacturer? Do you know your phaco parameters? And we don't mean "phaco one" and "phaco two."

Pearl #3: Take Your Time

Speed kills. The old warning about methamphetamine abuse is true. Rapid, deft and efficient surgery is not achieved by trying to go faster; it is achieved by concentrating on perfecting technique. Trying to go faster only leads to sloppiness and complications. Take your time and do it right. That's where the intrinsic (and extrinsic) rewards remain.

Pearl #4: Be Honest

Answer honestly when asked, "How many of these have you done?" In fact, your first

patient may be excited about being your first. As we have gone through medical school, internship and residency we have lost all perspective. Patients assume we are welltrained, competent and expert in surgery. They may prefer a young doctor who knows all the latest information. In truth, patients fundamentally want a doctor they trust. Honesty inspires trust. Deceit does the opposite.

Pearl #5: Have a Back-Up Plan

You should always know what to do next because you have already thought it through. Rarely is the operating room the place to think. It is the place to act. Have a plan to deal with common and well recognized complications. Here are a few tips:

- Leaking incisions are hydrated, then, if necessary, sutured.
- A capsulorhexis that tears out is managed with Brian Little's capsulorhexis rescue technique.
- Unstable capsular bags receive capsular tension rings.
- Posterior capsular breaks are managed with maintenance of irrigation, dispersive viscoelastic and anterior vitrectomy, followed by kenalog instillation.

Pearl #6: Talk to Your Patients

Hearing the reassuring voice of your surgeon reduces anxiety, aids relaxation and makes everything go more smoothly. Mark says things like, "Hi, it's Dr. Packer, how are you doing under there?" and "Everything's going great" and "You may get a bit of a light show now as I loosen up your cataract" and "The cataract is all out, we're just getting ready to put in your implant. Are you doing okay?"

We always have the patient's name posted in the OR so we know how he or she wants to be addressed.

Pearl #7: Record and Watch Your Surgery

Mark was watching a video recording of his surgery, and he could see an instrument just sitting there in the eye, and nothing happening. Why not? What on earth was he doing? He can't remember.

As you watch, don't attempt to criticize or second guess. Just absorb. Learning often occurs subliminally. Pay special attention to your complications. Identify the precise instant when the capsule got sucked into the phaco tip and tore. Watch the incision construction in slow motion until you see exactly when you entered Descemet's too soon and got a leaky wound. Play the capsulorhexis over and over until you can identify the motion of the forceps that produced an extension to the periphery. Once you see how things go wrong, ask yourself how to make them go right.

Pearl #8: Focus

When you are operating, you should be completely focused on what you are doing. Don't listen to music or chat about politics. Take your responsibility seriously. Use your internal monologue to tell yourself what to do next. Make sure you have the best possible view through the microscope, the right angle of approach, the right ergonomic position of your hands and feet. If it doesn't feel comfortable, then re-arrange your position until it does. Don't proceed with surgery until you have made everything the best possible.

Pearl #9: Keep Track of Your Outcomes

Patients deserve the best we have to offer. In order to help our patients develop reasonable expectations of surgery, we can provide them with our own data on outcomes from our own experience.

What percentage of post-op refractions is within 0.5 D of the target? How many patients see 20/30 or better without correction? Knowing these results will allow you the confidence you need to offer refractive solutions.

In the near future, Medicare and other payers may also want to know this information through PQRI. It is the surgeon's ultimate responsibility to know his or her results. Make sure you do.

Pearl #10: Never Stop Learning

The first time Mark operated after his residency, he put in his first foldable IOL (it was 1995). He implanted his first multifocal IOL in 1997. He made the transition to clear corneal incisions and topical anesthesia in 2000, the same year he implanted his first accommodative IOL. He began doing bimanual micro incision surgery in 2003.

Since 1995, there is a long list of exciting and useful technology that has emerged, including capsular staining; the capsular tension ring and its modifications; new multifocal, toric and accommodative IOLs; limbal relaxing incisions; LASIK enhancements in pseudophakia; piggyback IOLs; and phakic refractive lenses.

Transitioning from Supervised Cataract Surgery to

Independent Cataract Surgeon

AAO, *Young Ophthalmologist Article*

1. **Do not underestimate the transition.** In your final year of training, surgery often becomes less challenging as your comfort level rises. Surgeons often assume the same comfort level will follow them to the real world. The reality is that operating on your own in a new environment can generate significant anxiety, and you suddenly miss having an attending surgeon by your side. Do not underestimate this transition and make every effort to prepare for it.
2. **Replicate your residency operating room experience as much as possible.** The fewer changes you make to your operating environment the better. Try to find an operating room (OR) that is equipped with the same phaco machine, microscope, viscoelastics, etc. Before graduating from your training program, make a list of every instrument you use, along with its brand and catalog number. Be sure to include the specific phaco tubing, handpiece and tips.

Ask the equipment rep for your phaco machine to transfer all your settings to the machine in your new OR.

Before operating without an attending physician, make sure the new OR has all the same instruments. Something as seemingly trivial as the surgical drape, lid speculum or the focal length of the objective lens on the microscope can have a significant impact on your comfort level and, therefore, the success of your surgery.

3. **Know more about your equipment than everyone in the room.** You are ultimately responsible for the outcome of your surgical procedures. Therefore, the burden is on you to know how to operate all the equipment, especially in the event of an unforeseen complication or malfunction. Read the manual for the phaco machine and microscope in your OR and ask the equipment reps to provide educational sessions for you and the OR staff. If you do not know the specific equipment settings you have been using as a resident, now is the time to learn them and learn why your attending(s) chose them for you.
4. **Work out of one surgery center at a time.** The practice you join after training may use several surgery centers. It is wise to establish yourself at one center and become comfortable with surgery and outcomes there before adding services at a second or third center. Again, the fewer variables you can change at once, the more comfortable you will be.
5. **Focus on difficult cases at the end of residency.** Never again will you have the access to skilled teachers that you have during training. Now is the time to learn advanced techniques such as iris retractors, pupil-expansion rings, capsular tension rings, sutured IOLs, etc. Gain as much exposure to such techniques as you can during residency, as it is much more difficult to learn them on your own.
6. **Do not focus on speed.** If, in the back of your mind, you are considering adding an extra step to a surgical case, such as a pupil-expansion ring or a retrobulbar block, then by all means do it. When you are starting your practice, your surgical volume will be low and time will not be of the essence. Just because every other

surgeon at your surgery center performs cataract surgery under topical anesthesia does not mean that you must. So, if using retrobulbar anesthesia for the first few months alleviates your anxiety, then do so. Always focus on achieving the best possible outcome with the least amount of anxiety, regardless of how many minutes are added to the procedure.

7. **Schedule less-complicated cases early, difficult cases later.** A count-fingers cataract in an eye with pseudoexfoliation and a 4mm pupil is an example of a case best avoided during your first few months of practice. Choose cases with the least potential for complications initially, then add cases with increased difficulty as time goes on.
8. **Ask for help.** Every surgeon had to make the same transition you are making, so we all understand. Ask for help when you need it, and do not be afraid to refer a patient to a colleague for a second opinion.
9. **Change one variable at a time.** Your surgical technique will evolve with time as your comfort level improves and new technology is introduced to the field. When changing your technique, change only one variable at a time. For example, avoid changing both the type of viscoelastic you use and the phaco machine you are using at the same time. Change one of these variables first, then when you are comfortable, change the second.
10. **Practice complication management.** Complications happen in the hands of even the very best surgeons. Complications are less likely to result in a poor visual outcome if you are prepared to handle them in advance. Stage

complication drills with your OR surgical staff so that everyone knows what is expected, where the supplies and equipment are located and what equipment settings are required to manage the problem. The staff will appreciate the effort, and you will be able to manage complications more efficiently and successfully when they inevitably occur.

11. **Add premium services later.** Industry will bombard you with enticing technology, such as multifocal and astigmatismcorrecting IOLs. This technology is exciting and is the future of ophthalmology, but approach it with caution. Patient expectations are very high when they are asked to pay for these services, so your surgical outcomes must meet these expectations to avoid unhappy patients. Look at your outcomes retrospectively and establish your own A-constants and surgeon factors. Track your complication rate and ensure that it is within accepted norms. Once you are providing excellent, consistent outcomes, you can then consider adding premium services.
12. **Be humble.** You are graduating from an excellent training program with excellent surgical skills. Enter the world of ophthalmology with confidence, but maintain humility. The learning curve for the practice of ophthalmology is very steep in the first few years of practice, so do not lose perspective of where you are in your career and do not become discouraged by the steep climb.

Tips for Complex Cases

Small Pupil

Causes

<i>Etiologies of Small Pupil</i>	<i>Mechanism</i>
Pseudoexfoliation syndrome (PXF)	Atrophic changes of dilator and sphincter ¹
Synechiae	Trauma, uveitis, angle closure, prior surgery
Diabetes	Autonomic dysfunction, rubeosis iridis
Horner syndrome	Sympathetic denervation
Advanced age	Atrophy of iris
IFIS	Selective blockade of α -1A of iris dilator muscle
Chronic miotic therapy	Fibrosis of the iris sphincter

Management

1. Prepare yourself and the patient before surgery.
2. A cohesive viscoelastic can help throughout the case.
3. Achieve adequate visualization (trypan blue staining, dilate pupil).
4. Modify the surgical technique for a small pupil by doing the following:
 - Choose the minimal intervention needed to achieve sufficient dilation.
 - Phacoemulsification: use vertical chop or deep grooves in divide-and-conquer. · I/A may require bimanual handpieces.
5. The general principles of good phaco surgery are even more important in complicated cases:
 - Carefully complete each step adequately before moving to the next.
 - Avoid heroics.

Mature Cataract

1. Preoperative glaucoma and inflammation should be controlled.
2. Pupillary miosis and posterior synechiae frequently are present.
3. Capsular visualization is enhanced by capsular dyes.
4. The capsule and zonules are frequently fragile or weakened.
5. Phaco chop may allow safer removal of the remaining nucleus.

Zonular Instability

1. If a patient has a history suggestive of previous ocular trauma or a physical finding of zonular instability, be prepared to alter your surgical technique to compensate for zonular weakness.
2. Allow sufficient surgical time for cases with zonular weakness. These cases typically take significantly more operating room time than a typical case. Allow these cases the time they deserve.
3. Keep the anterior segment formed with a dispersive OVD. Never allow collapse of the anterior chamber in a patient with weak zonules because this will stress the zonules and increase the risk of vitreous prolapse into the anterior chamber.
4. Do not use an ECTR if there is a tear in the capsulorrhexis or posterior capsule.
5. Choose the appropriate ECTR for the patient. For moderate zonular weakness or small zonular dialyses, a standard ECTR is sufficient. For advanced, progressive zonular damage or zonular dialyses greater than 4 clock hours, use a Cionni modified ECTR with suture fixation.

Cataract in Glaucoma Patients

1. A number of options exist for the management of visually significant cataracts in patients with glaucoma, and these should be considered in relation to the patient's long-term plan for management.
2. Miotic drops may contribute to the visual symptoms of patients with cataract and glaucoma. Consider withdrawing the medication, if the clinical situation permits, to allow assessment of the degree to which the miotic is affecting vision.
3. In patients with mild, well-controlled glaucoma, cataract extraction alone may be considered as a choice for surgery.
4. Combined cataract extraction with a glaucoma-filtering procedure is appropriate for patients with advanced glaucoma or who difficulty tolerating medical therapy.
5. Surgeons need to be aware of and strive to avoid complications that occur more frequently during cataract surgery in patients with glaucoma (eg, severe postoperative uveitis, IOP spikes after surgery, and CME).

I hear and I forget. I see and I remember. I do and I understand. - Confucius

Points to Ponder

- Our motto should be, **Learn: But not at the cost of vision.**
- Remember that there is always 'U' turn possible from Phaco to routine extracapsular cataract extraction and you should never mind shifting back to extracapsular cataract extraction at any step. The rule is, "**At whatever step you feel uncomfortable, convert to routine ECCE**".
- Follow the dictum of patting yourself for the good steps you have learnt and at the same time considering your areas of improvement (or your shortcomings).
- Most of the time nucleus drop is because of faulty hydrodissection procedure rather than Phaco itself.

**The mediocre teacher tells.
The good teacher explains.
The superior teacher demonstrates.
The great teacher inspires.**

-William Arthur Ward

