

NUCLEUS MANAGEMENT

CONQUERING SOFT, MEDIUM AND HARD CATARACTS



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Basic Phaco Course

To be a complete phaco surgeon you should have a verity of strategies to be able to deal with all cataract grades from **Soft**, **Medium**, **Hard** and **rock-hard**

As you learn phacoemulsification, you will find a technique that works for you most of the time.

IN PHACOEMULSIFICATION
ONE SIZE DOES NOT FIT ALL



SOFT CATARACTS

Can be problematic for novice phaco surgeons

Conventional cracking or chopping of soft nucleus will not work and will lead to repeated and unnecessary manipulations and potential complications.

This can be as a result of **Cheese wiring** of the instruments through the soft nucleus.

Soft Cataracts

TECHNIQUES FOR SOFT CATARACT

PHACO FLIP TECHNIQUE 1



PHACO FLIP TECHNIQUE 2

Good hydrodissection and hydrodelamination to obtain cleavage plain circumferentially

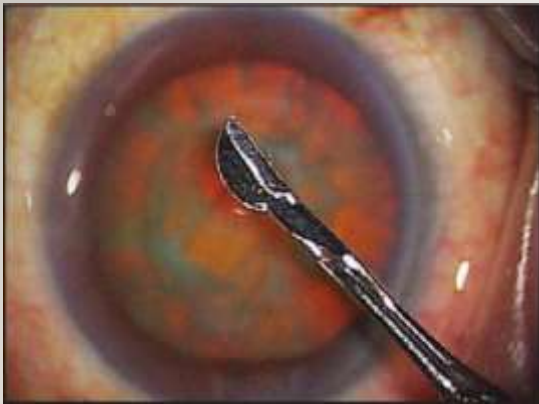
Low ultrasound power (30%)

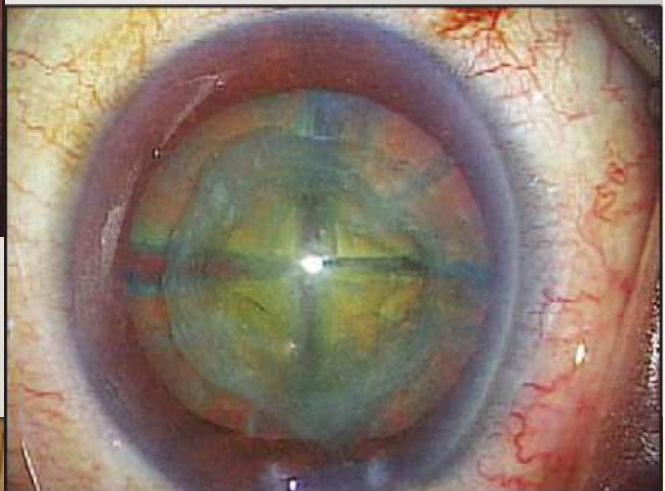
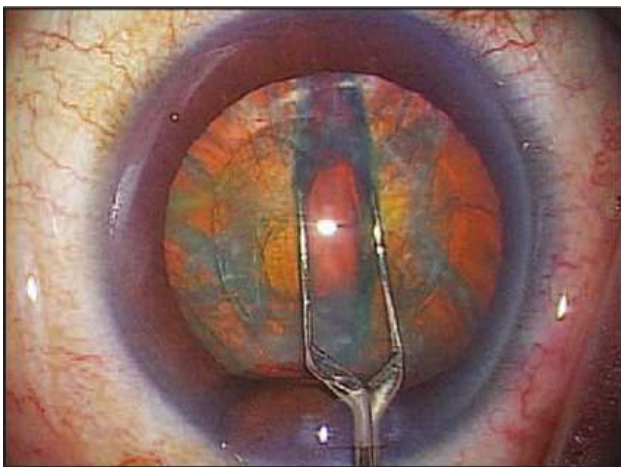
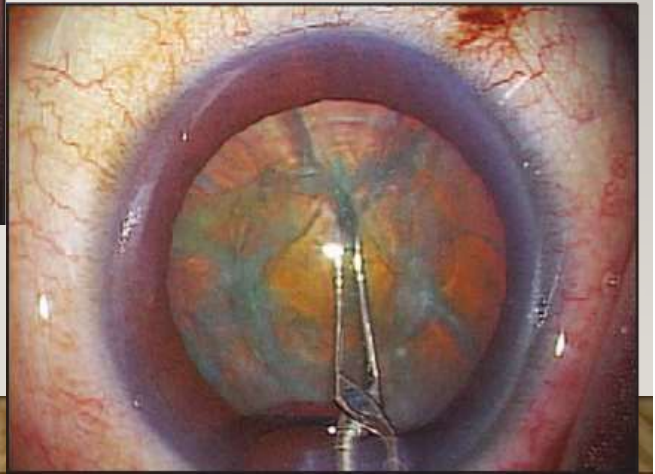
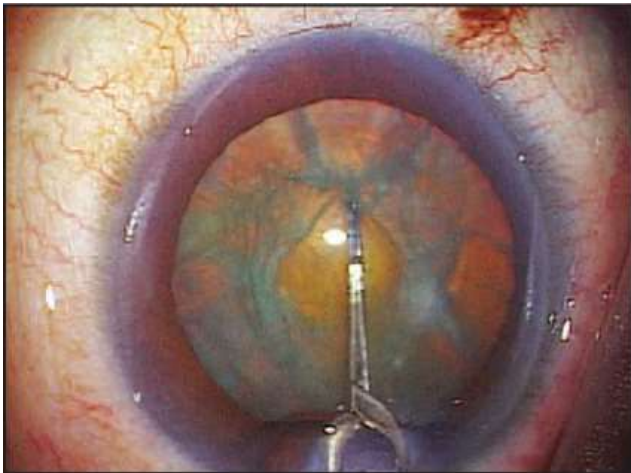
Moderate vacuum (300-350mmgh)

Moderate aspiration flow rate (20-25 ml/min)



PHACO PRECHOP





MEDIUM CATARACTS

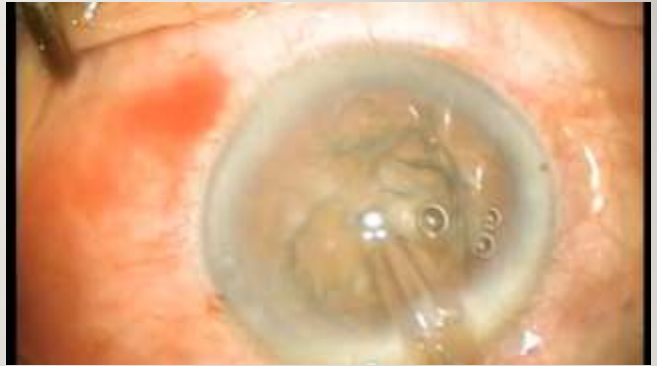
4-QUADRANTS NUCLEOFRACTIS TECHNIQUE (DIVIDE AND CONQUER)

TRENCHING, SCULPTING, GROOVING

Start the groove at the proximal margin of the capsulorrhexis. Carry the groove across to the distal margin

Keep the tip **unoccluded**

Use phaco power **only** as you sculpt the groove



Moderate flow, low phaco power, and low vacuum

Divide & Conquer

DEEPENING THE INITIAL TRENCH

Carry the groove posteriorly until you see a good fundus reflex

three times the width of the phaco tip is usually deep enough for most nuclei.

The lens is a biconvex structure so focus the ultrasound on the centre rather than the periphery



Divide & Conquer

CRACK THE NUCLEUS

Place the phaco tip and a second instrument at the base of the groove, distal to the intersection of the two grooves.

Lateral movement in a horizontal plane is required as the two instruments are pulled apart. Downward pressure should be avoided



Divide & Conquer

PHACO THE QUADRANTS

Using higher flow and vacuum levels, engage a nuclear quadrant distal to the intersection of the grooves

Impale the quadrant, wait just a moment for vacuum to increase and then draw the quadrant to the center of the pupil in the pupillary plane, and begin emulsification.



Divide & Conquer

PHACO CHOP TECHNIQUES

WHY LEARN CHOPPING?

- # *Faster, safer surgery*
- # *Reduction in Phaco Energy and Heat Delivery*
- # *Clearer day one corneas*
- # *Ability to break hard nuclei more easily*

HORIZONTAL VERSUS VERTICAL CHOP

In horizontal chopping, the 2 instrument tips move toward each other in the horizontal plane during the chop



In vertical chopping, the 2 instrument tips move toward each other in the vertical plane in order to create the fracture



WHAT ARE THE REQUIREMENTS OF CHOPPING

A suitable instrument designed for the technique of your choice.

Appropriate machine power and fluidics parameters that allow nucleus entry and holding for the chopping maneuvers

An understand of the mechanical forces required to create chop

CHOPPERS



STOP AND CHOP

The stop and chop method of Paul Koch is a hybrid of divide and conquer and chopping, which avoids having to make the difficult first unsculpted chop. Although chopping the heminuclei does reduce total phaco time

STOP AND CHOP

SCULPTING

A longitudinal groove is sculpted in the nucleus.
Moderate flow, low vacuum and continuous ultrasound power based on nuclear density is used

CRACKING

The nucleus is then cracked into two hemisections by cracking

CHOPPING

The settings are then changed to high vacuum, high flow rate and moderate power using phaco mode. The nucleus is then broken into mid-depth and chopped



Stop & Chop

HORIZONTAL CHOP

The phaco tip impales deeply

Horizontal chopper tip passes beneath the capsulorrhexis to hook the opposite nuclear equator

The chopper tip passes directly toward the phaco tip. The initial compression force generates the fracture

Sideways separation of the 2 tips extends the fracture

After slight rotation of the nucleus, the next chop is initiated by repeating this sequence of



HARD CATARACTS

OBSTACLES IN PHACO OF HARD NUCLEII

Lack of good visualization

leathery posterior plate

Wound burn

Endothelial damage

TECHNIQUES OF HARD AND ROCK-HARD CATARACTS

DIVIDE AND CONQUER



Hard and rock-hard cataracts

STOP AND CHOP

The main obstacle is the presence of **leathery posterior plate** very resistant to crack



Hard and rock-hard cataracts



Hard and rock-hard cataracts

TIPS FOR CHOPPING HARD CATARACTS

- # At least 6mm anterior capsulorhexis
- # Lengthen the amount of phaco tip emerging from the sleeve
- # create a space for work under the dispersive OVD before using any power



Hard and rock-hard cataracts

HARD AND ROCK-HARD CATARACTS

- # Chop slowly with the phaco tip well buried at maximum vacuum
- # Multiple separations may be needed in the same chop
- # use power modulations to minimize power dispersion inside the eye when removing segments



After finishing to chop half of the nucleus *recoat* the corneal endothelium with dispersive OVD

WHITE CATARACTS

The main issue in white cataracts is the **anterior capsulorhexis** especially in intumescent ones



Usually white cataracts are **brittle**

WHY NOVICE PHACO SURGEON MAY FAIL TO HORIZONTAL CHOP

Use of inappropriate second instrument

Loose hold of the nucleus due to

- * superficial hold

- * inappropriate fluidic settings

Superficial placement of the chopper that **scratches** rather than cutting

Inappropriate use of chopping forces

DURING LEARNING CURVE OF HORIZONTAL CHOP



THE KEY MESSAGE

You must know your machine

Revise the machine parameters before starting the surgery

Go through the learning curve from divide and conquer, stop and chop and finally direct chop

THE KEY MESSAGE

Augment the rule of mechanical separation to minimize power usage

Use power modulation to reduce ultrasound power delivery during phaco

Grade 2 to grade 4 cataracts are ideal for novice phaco surgeon to start with

THE KEY MESSAGE

Never disrespect soft cataracts

Chopping works better with hard cataracts

Be flexible to change your strategy when the situation requires

Thank You