PEARLS AND PITFALLS IN CCC

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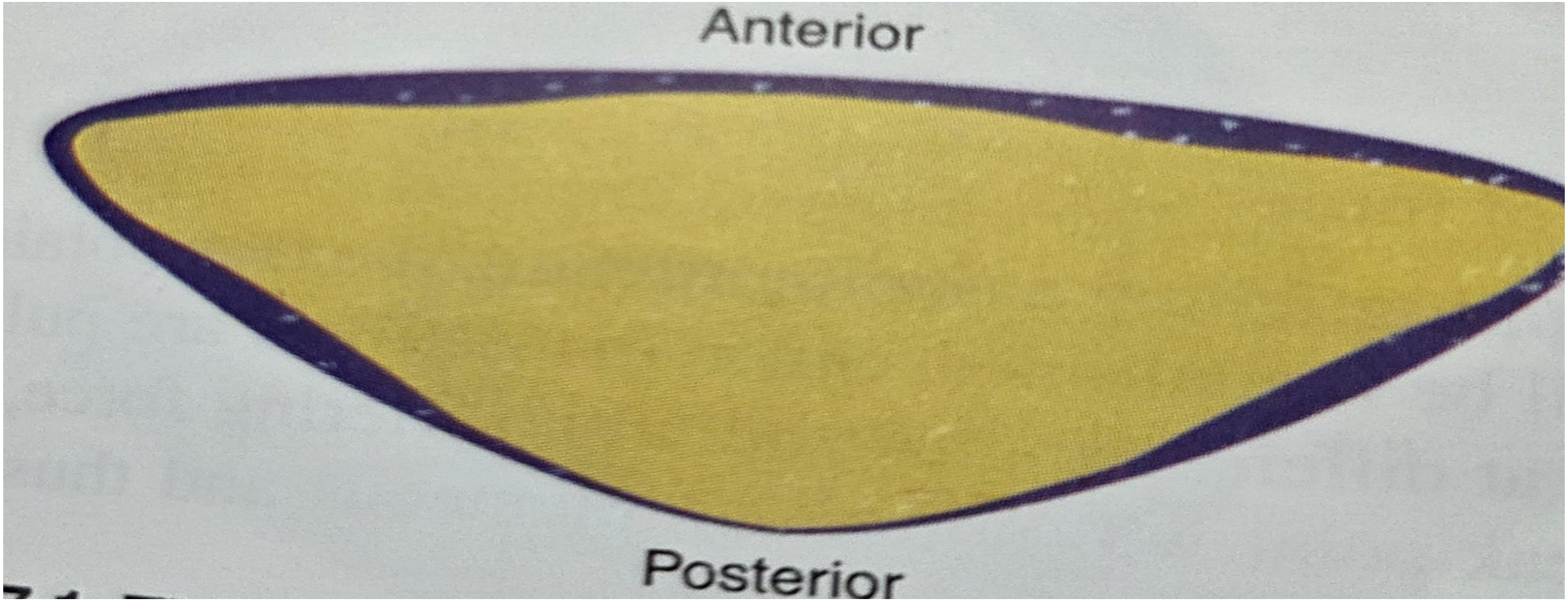
I do not have any Financial interest to disclose

INTRODUCTION

- CONTINUOUS CURVILINEAR CAPSULORHEXIS (CCC) AS DESCRIBED BY DRS. HOWARD GIMBEL AND THOMAS NEUHANN.
- THE OPENING SHOULD BE LARGE ENOUGH TO ACCOMMODATE THE LENS OR LENS FRAGMENTS WITHOUT CAUSING COMPLICATIONS SHOULD IDEALLY ALLOW 360° OF CAPSULE, OPTIC OVERLAP.

CAPSULE THINNEST AT POSTERIOR POLE ANS THICKETS AT INSERTION OF ZONULAR FIBERS



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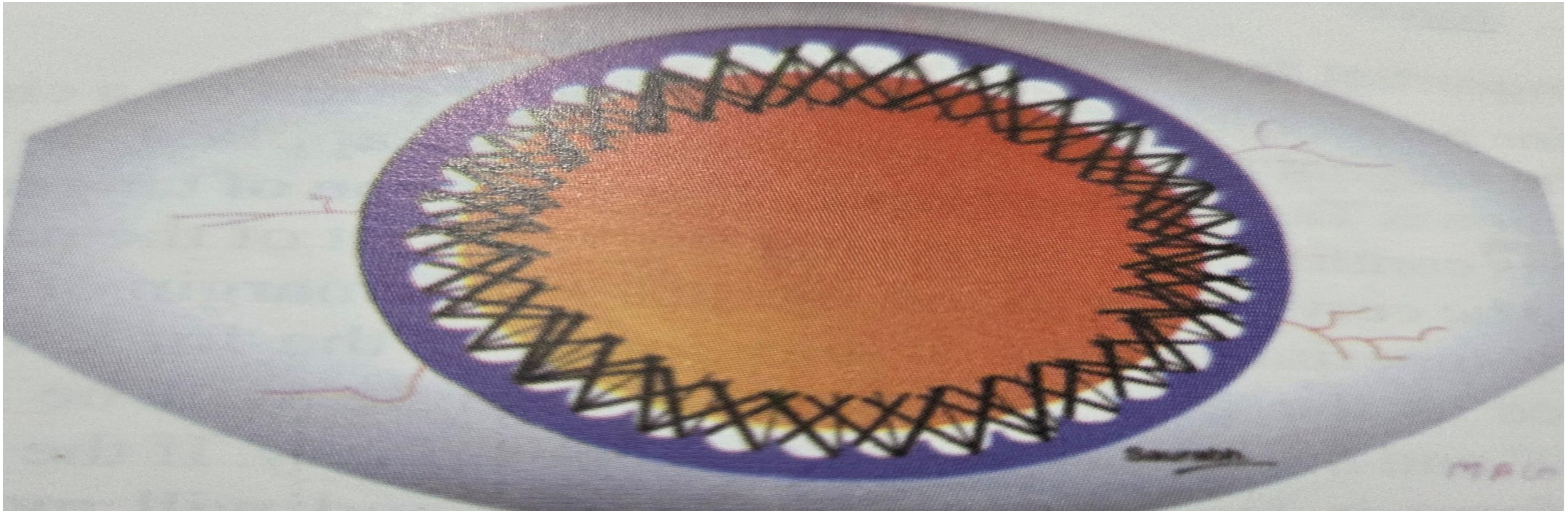
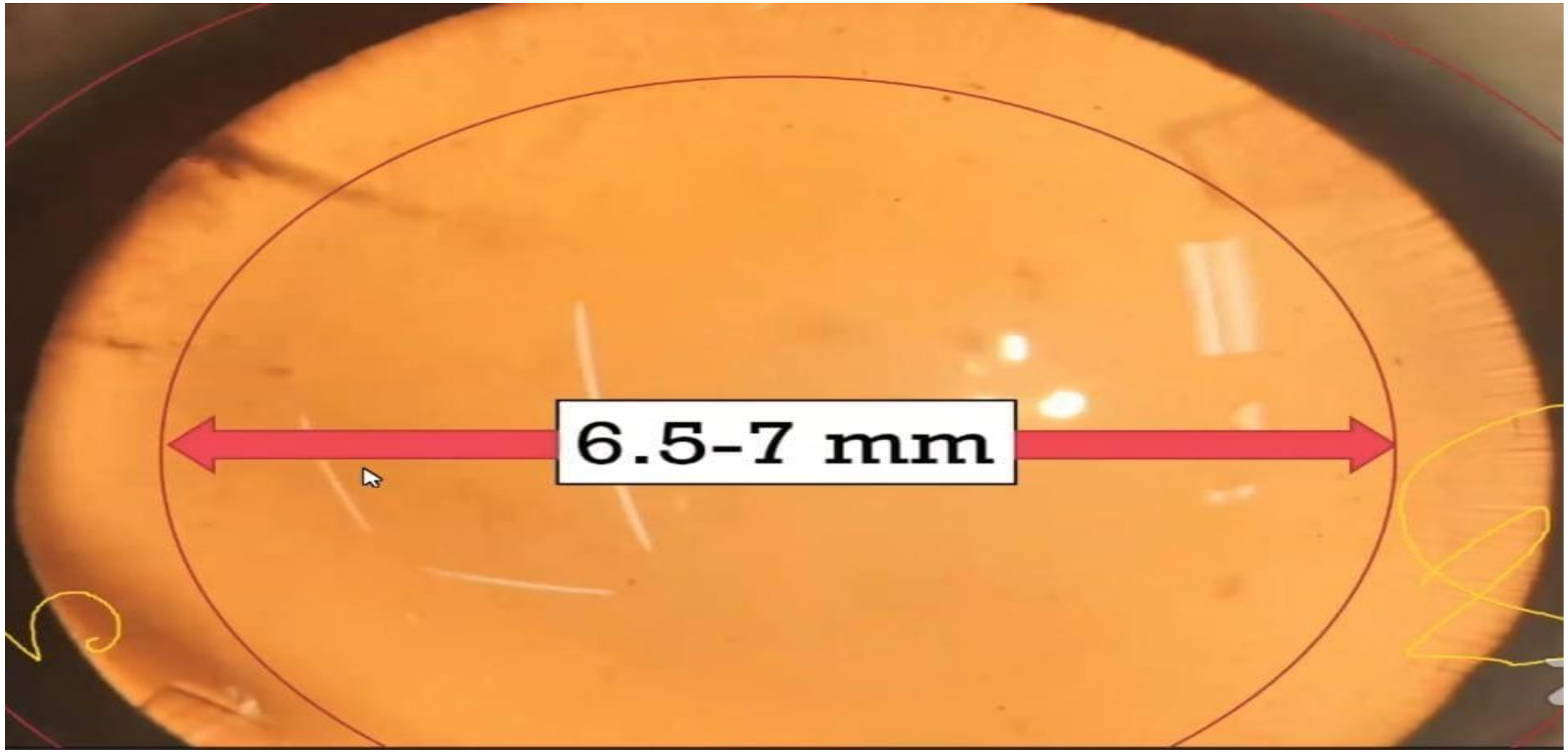
Lense Anatomy

Zonular Attachments

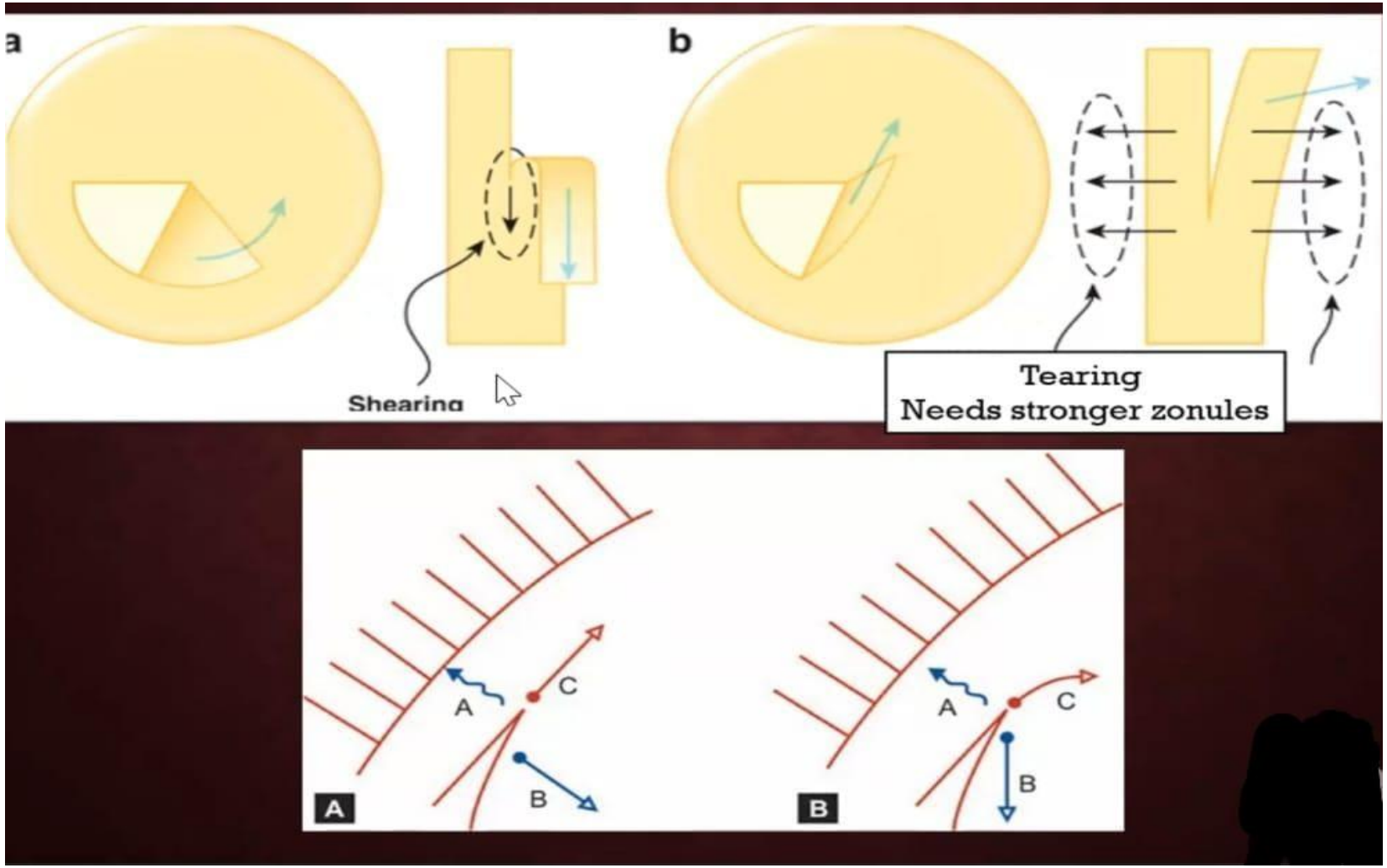
- CCC SHOULD BE KEPT WITHIN THE CENTRAL 6-7MM TO AVOID THE AREAS OF ZONULAR ATTACHMENTS



Ideal Working Zone

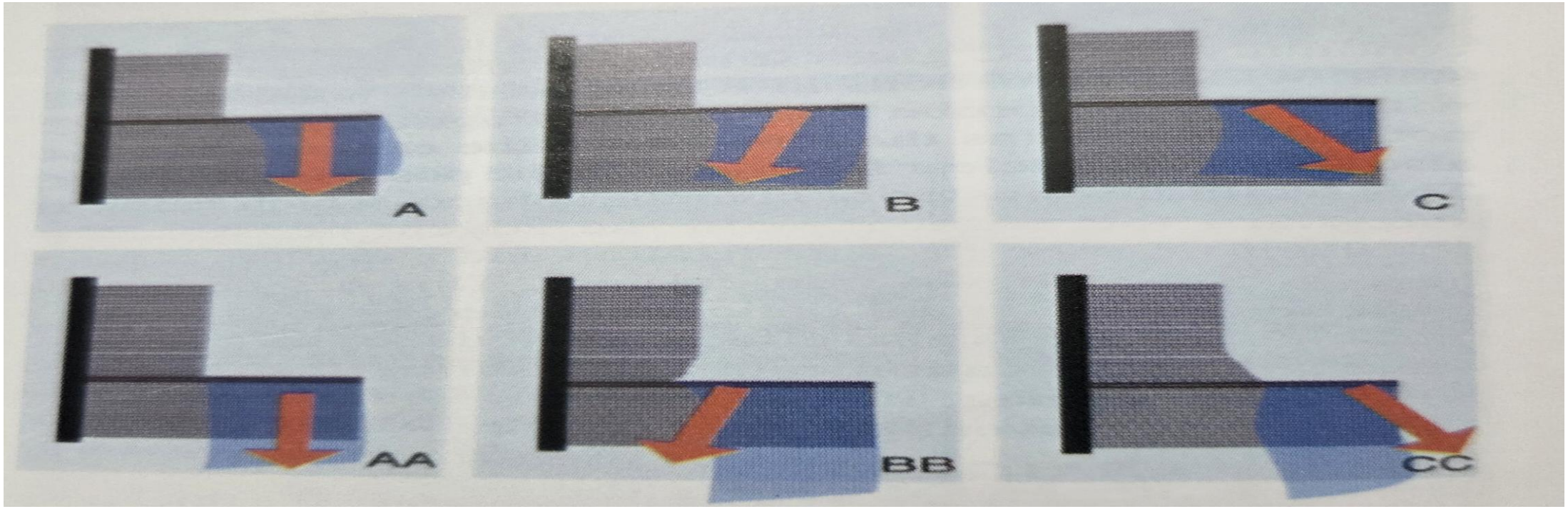


Sharing and Tearing Forces



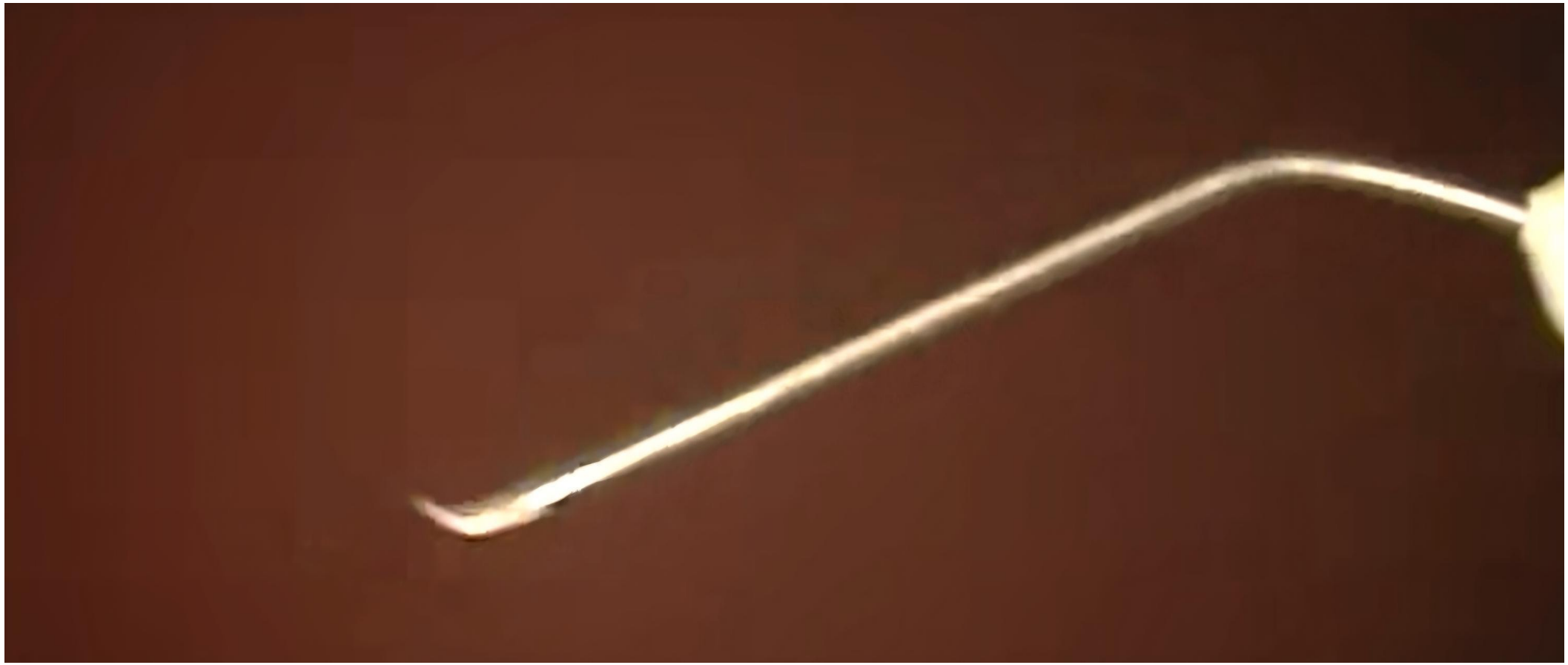
Sharing Forces

- SHEARING FORCE BROCKEN ONE FIBER AT A TIME THUS TEAR IS MORE CONTROLLED AND REQUIRED LESS FORCE.



Making Cystotome

- FRIST TURNED IS 45 DEGREE FOR BETTER VISUALIZATION



Capsular Forces

- A regular margin is best obtained using a continuous tear.
- The direction of the tear is determined by the interaction of
- Forces exerted by
  - The surgical maneuver
  - The elastic properties of the capsular tissue
  - The zonular attachments

DEALING WITH THE CAPSULE

- THE CAPSULE IS AN ELASTIC ENVELOPE SUBJECTED TO FORCES COMING FROM:
  - ANTERIOR CHAMBER PRESSURE
  - LENS SUBSTANCE PRESSURE
  - VITREOUS PRESSURE
  - ZONULAR TRACTION
- THE ELASTIC MODULE OF THE CAPSULE CHANGES WITH AGE, BEING STIFFER IN AN OLD PATIENT AND VERY ELASTIC IN A CHILD.

PRE-REQUICITIES FOR CCC

- GOOD AKINESA
- MODERATE HYPOTONY 30-35MMHG
- GOOD RED REFLEX
- LIPID LAYER OF TEAR FILM IS REMOVED BY SCRUBBING WITH BETADINE-SOAKED SWABTICK AND WASHING WITH BSS SIMULTANEOUSLY.
- CLEAN THOROUGHLY TILL THERE ARE NO OILY/ SHINY REFLEXES.
- POSITION THE EYEBALL AND HEAD IN SUCH A WAY SO AS TO OBTAINED GOOD RED REFLEX.

PRE-REQUICITIES FOR CCC

- MICROSCOPE USE HIGH MAGNIFICATION.
- PUPIL SHOULD BE WELL DILATED WITH MYDRIATIC.
- FOR SUSTAINED DILATATION 1:1000 DILUTION OF ADRENNALINE TO 500 ML BSS FLUID

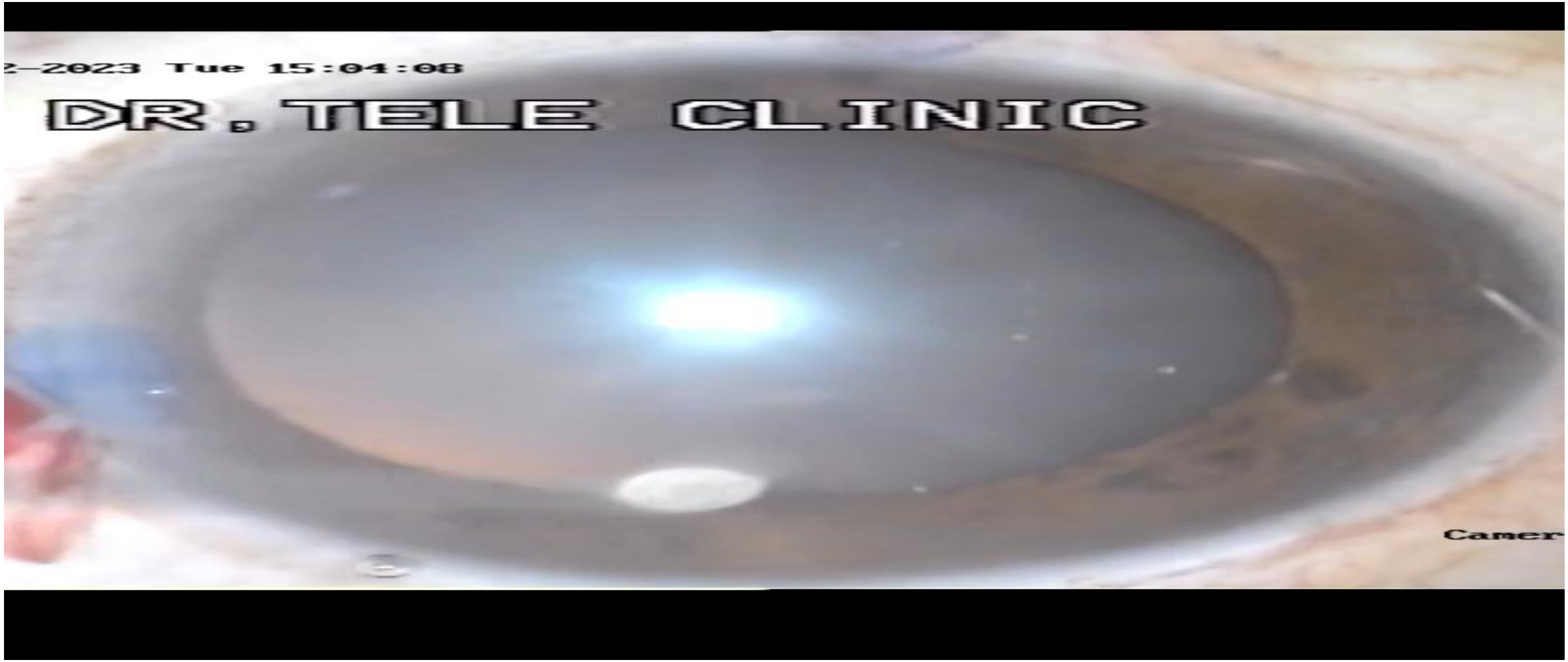
DYES IN CCC TRYPAN BLUE AND INDOCYANINE GREEN

- BOTH DYES ARE EFFECTIVE AND WITHOUT ANY SIDE EFFECTS.
- BUT ICG IS EXPENCIVE SO TRYPAN BLUE IS MORE POPULAR.
- TRYPAN BLUE VIAL CAN BE AUTOCLAVED AND REUSED.

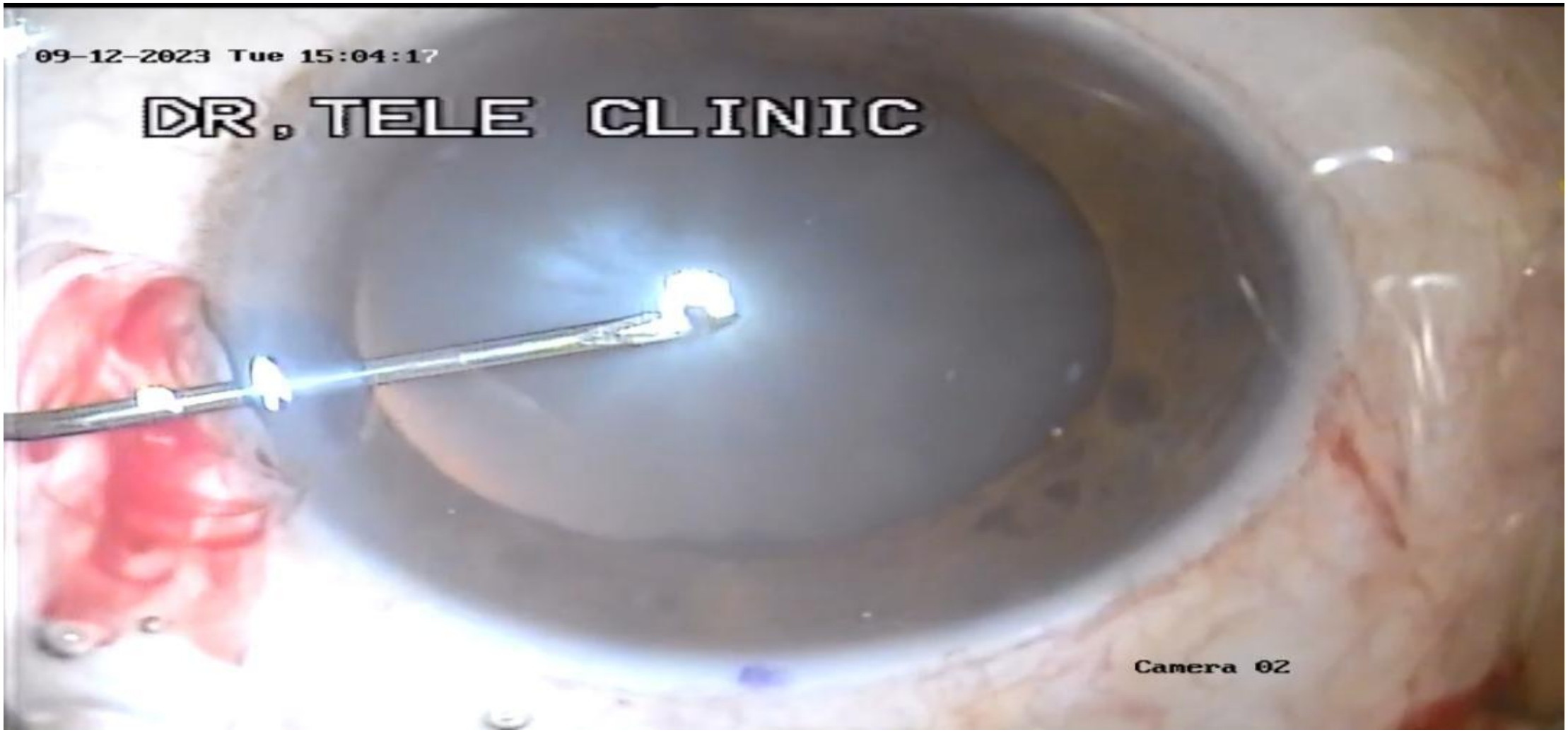
DYES IN CCC

- INDICATED IN CASES WHERE VISIBILITY OF ANTERIOR CAPSULE IS POOR.
- NO RED REFLEX IN HYPERMATURE CATARACT AND MORGAGNIAN CATARACT.
- OPRATING MICROSCOPE DOES NOT HAVE CO-AXIAL LIGHT.

STAR CCC FROM CENTER OF CAPSULE



CENTRAL PUNCTURE INCISION LIKE CRUCIATE SHAPE



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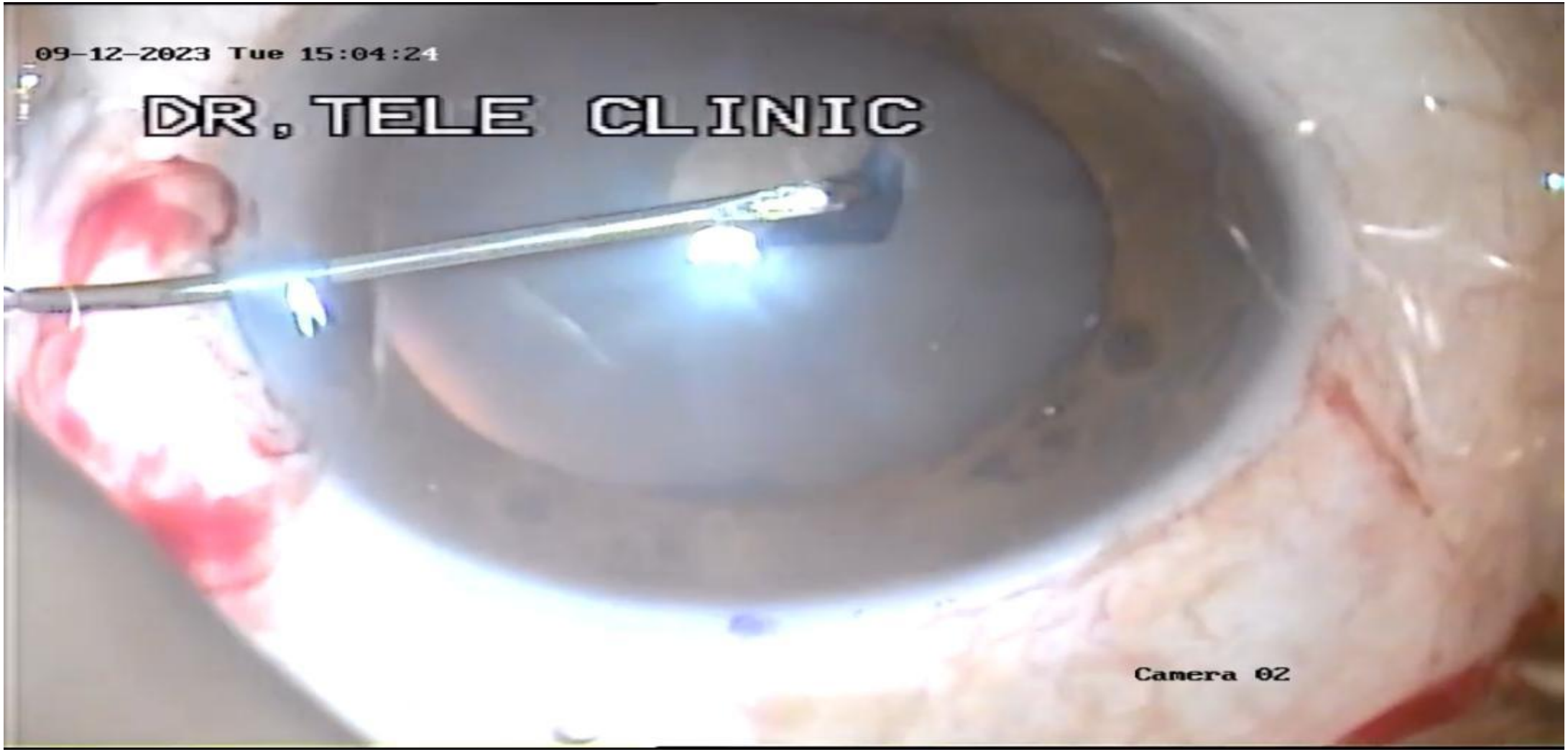
SHEARING FORCE MOVE FROM OUTWARD TO INWORD DIRECTION



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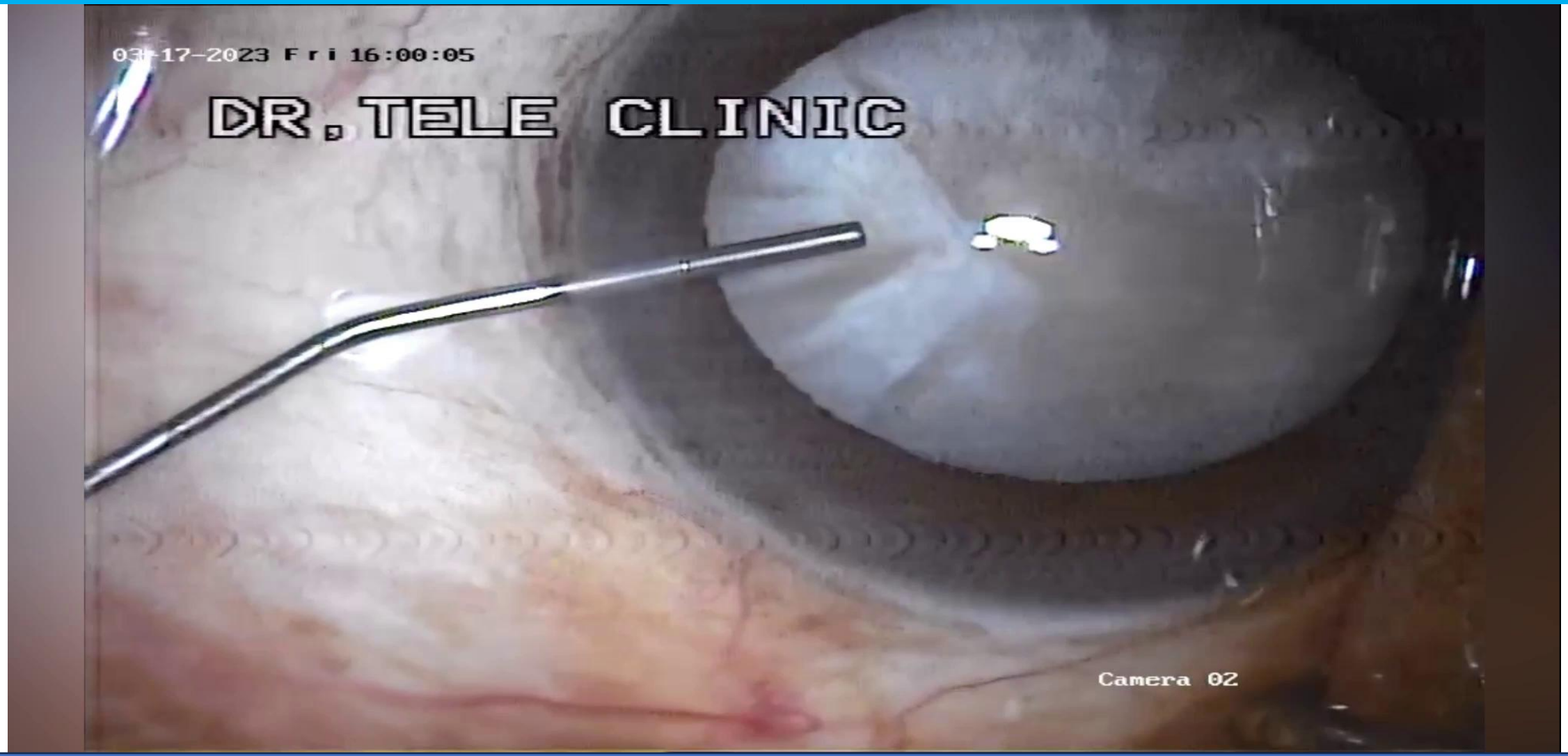
LET’S DO CCC



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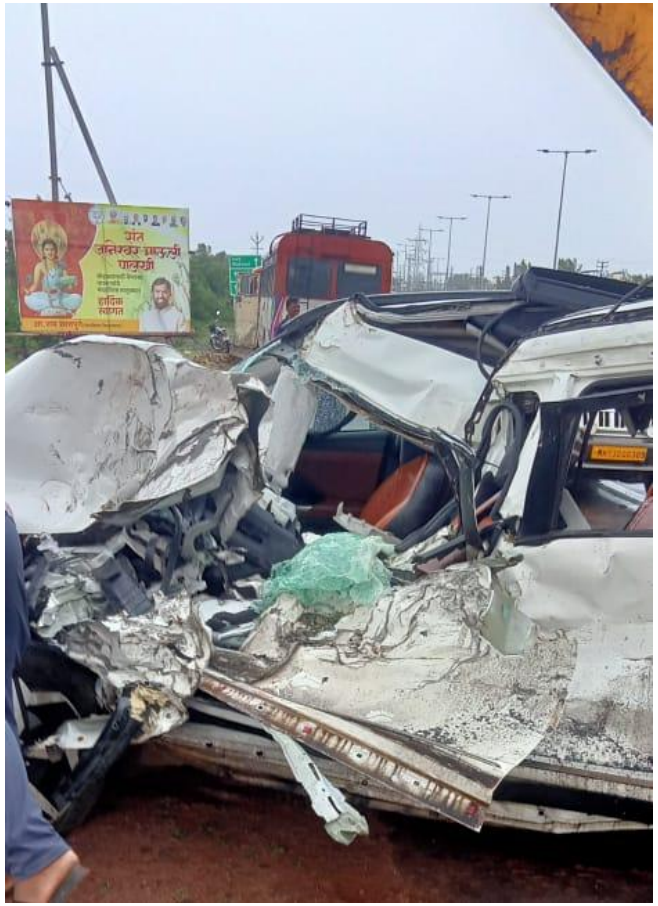
COMPLICATIONS AND PITFALLS

1. DISCONTINUITY OF THE ANTERIOR CAPSULAR MARGIN
2. TEAR INTO THE ZONULES
3. DIAMETER BEING TOO SMALL.

WHY WE LOSE CONTROL

- IN SOME SITUATION TEAR RUN OUT AS SOON AS THE CAPSULE IS OPENED.
- THIS IS BECAUSE OF HIGH INTRALENTICULAR PRESSURE.
- APPLICATION OF WRONG FORCES OR RIGHT FORCE IN WRONG MANNER

HIGH RISK CASES



GOOD
INVESTMENTS

GOOD
HABBITS

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HIGH RISK CASES

- HIGH VISCOSITY VISCOELASTIC IS A GOOD INVESTMENT TO PREVENTING THE CCC FROM EXTENDING.

DISCONTINUITY OF THE ANTERIOR CAPSULAR MARGIN

- THE MAJOR CAUSATIVE FACTORS IN THIS INSTANCE ARE: COMPLETING THE CAPSULORRHEXIS “FROM INSIDE OUTWARD”
- NICKING AN ORIGINALLY INTACT MARGIN WITH THE SECOND INSTRUMENT DURING LENS EXTRACTION, OR BREAKING THE RIM WITH THE ACTIVATED PHACO TIP.
- A DISCONTINUITY IN AN OTHERWISE INTACT CCC MARGIN WILL, IN MOST CASES, EXTEND INTO A RADIAL TEAR INTO THE CAPSULAR FORNIX; IT WILL

DO SO VERY READILY BECAUSE THE DISTENSIVE FORCES WILL CONCENTRATE

DISCONTINUITY OF THE ANTERIOR CAPSULAR MARGIN

- ON THIS SINGLE POINT OF WEAKNESS THE RISK OF THIS RADIAL TEAR EXTENDING AROUND THE CAPSULAR FORNIX INTO THE POSTERIOR CAPSULE INCREASES WITH SPARSE AND FRIABLE ZONULES AND WITH ALL MANEUVERS THAT DISTEND THE ANTERIOR CAPSULAR OPENING, SUCH AS HYDRODISSECTION, EXPRESSION OF THE NUCLEUS, NUCLEAR FRACTURING TECHNIQUES THAT RELY ON PUSHING THE NUCLEAR SECTIONS WIDELY APART, AND IOL IMPLANTATION MANEUVERS

TECHNICAL TIPS

- THE MOST IMPORTANT RULE IS TO ALWAYS CLOSE THE CIRCLE FROM OUTSIDE INWARD.
- THIS WILL AUTOMATICALLY OCCUR WHEN STARTING THE TEAR SOMEWHERE IN THE CENTER OF THE CAPSULE.
- IF THE FLAP BREAKS OFF DURING THE COURSE OF THE TEAR,
- THE SURGEON MUST BE SURE TO GRASP THE REMAINING FLAP AND CONTINUE THE OUTWARD POINTING TEAR EDGE.

TECHNICAL TIPS

- WHEN A DISCONTINUITY HAPPENS, TIMELY RECOGNITION IS OF KEY IMPORTANCE.
- ITS EDGE MUST INSTANTLY BE GRASPED WITH FORCEPS AND BLUNTED OFF BY BLENDING
- INTO THE MAIN CONTOUR WHEN A TEAR HAS OCCURRED
- INTO THE CAPSULAR FORNIX, UTMOST CAUTION IS WARRANTED NOT TO
- EXTEND THE TEAR FURTHER BY AVOIDING THE PREVIOUS RISK FACTORS.

TECHNICAL TIPS

- RELAXING COUNTERINCISION OPPOSITE THE FIRST TEAR MAY BE CONSIDERED.
- IMPLANTATION IF MANIPULATIONS ARE APPROPRIATELY GENTLE.
- THE LENS HAPTICS SHOULD BE PLACED AT 90 FROM THE RADIAL TEAR SUCH A TEAR IS A RELATIVE CONTRAINDICATION FOR IMPLANTATION OF PLATE HAPTIC IOLS.

TEAR INTO THE ZONULES

- IF THE TEAR ENCOUNTERS ZONULAR FIBERS, EITHER BECAUSE IT IS TOO PERIPHERAL OR BECAUSE ZONULES ARE INSERTED ABNORMALLY CENTRALLY, IT CANNOT READILY BE CONTINUED.
- FURTHER TEARING WILL RISK DEVIATION OF THE TEAR TO THE PERIPHERY, LIKE TEARING PAPER ALONGSIDE A RULER WITH THE HELP OF HIGH MICROSCOPE MAGNIFICATION.

TEAR INTO THE ZONULES

- AN OPTIMIZED RED REFLEX OR SPECULAR REFLEX, AND OPTIMAL FOCUSING, THE RESPONSIBLE ZONULES CAN BE IDENTIFIED AND THEIR INSERTIONS REMOVED FROM THE CAPSULE WITH THE NEEDLE OR FORCEPS TIP.
- THEN THE SURGEON BRINGS THE TEAR MORE CENTRALLY AND CONTINUES

TEAR INTO THE ZONULES

- SOMETIMES THIS SITUATION CAN ALSO BE MANAGED BY GRASPING THE FLAP CLOSE TO ITS EDGE AND BRISKLY PULLING IT CENTRALLY. THIS MANEUVER, HOWEVER, CARRIES A HIGHER RISK AND IS ONLY ADVISED WHEN THE MORE CONTROLLED APPROACH DOES NOT SEEM POSSIBLE.

TEAR INTO THE ZONULES

- HEALON 5 (PHARMACIA), WITH ITS EXCEPTIONALLY HIGH DENSITY, CAN ALSO HELP REDIRECT AN EXTENDING CAPSULORRHEXIS TEAR. A RELATIVELY SMALL AMOUNT OF HEALON 5 IS INJECTED INTO THE ANGLE, WITH THE EXPANDING BOLUS REACHING THE EDGE OF THE TEAR.
- THE DENSE HEALON 5 WILL HELP REDIRECT THE TEAR BACK CENTRALLY

TOO SMALL SIZE OR TOO BIG CCC

- CAPSULORRHEXIS WITH TOO SMALL A DIAMETER IF THE SURGEON REALIZES THAT THE DIAMETER OF THE CCC IS BECOMING SMALLER THAN DESIRED, HE OR SHE MAY JUST CONTINUE THE TEAR IN A SPIRAL MANNER UNTIL THE DESIRED DIAMETER IS REACHED (WHEN A LARGE AND HARD NUCLEUS COINCIDES WITH A VERY SMALL DIAMETER OF THE ANTERIOR CAPSULAR OPENING, HYDRODISSECTION MAY LEAD TO A PRESSURE-INDUCED RUPTURE OF THE POSTERIOR CAPSULE.
- THE NUCLEUS BLOCKS THE CAPSULAR OPENING, AND THE INJECTED FLUID HAS ONLY ONE WAY TO ESCAPE: POSTERIORLY. AN INITIAL BULGING FORWARD OF THE LENS FOLLOWED BY A SUDDEN, SNAPLIKE DROP BACKWARD INDICATES THE OCCURRENCE.

TOO SMALL SIZE OR TOO BIG CCC

- IN SUCH AN EVENT, CONVERSION TO PLANNED EXTRACAPSULAR CATARACT EXTRACTION IS INDICATED.
- A LENS LOOP BEHIND THE NUCLEUS IS NECESSARY. CONSIDERATION SHOULD BE GIVEN TO “POSTERIOR ASSISTED LEVITATION” WITH EITHER AN INSTRUMENT OR INJECTION OF VISCOELASTIC THROUGH A PARS PLANA SCLEROTOMY TO SUPPORT THE NUCLEUS FROM BEHIND.

I M BACK

THANK YOU EVERY ONE FOR THE BLESSINGS

THANK YOU ORGANSERS TEAM, SYNERGY 2025