Intraocular lens Difficulties

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IOL in history

- Sir Harold Ridley, in the 1940s,discovered that shards of acrylic cockpit canopies remained inert in the eyes of a British pilot who was blinded when his aircraft crashed during World War II.
- Ridley developed and implanted the first artificial lens in November, 1949, and reported on the first 27 cases in 1952 .It was the first medical device implanted in a human being and generated considerable opposition from his peers

IOL development

- ICCE: Rigid anterior chamber IOL, iris clip IOL (UGH syndrome, bullous keratopathy)
- ECCE:

1977:Shearing J looped haptic IOL

1981:Sinskey C-looped haptic IOL

AC-IOL:Closed loop then open loops

- Phacoemulsification: Foldable IOL

Sources of problems

1-Improper choice of the IOL

2-Improper technique

Improper choice

1-Material

2-Design

3-Power

Ideal IOL

- Mimicking the natural lens
- The lens should be
  - Transparent
  - Durable over extended periods of time
  - Non-reactive (biocompatible)
  - Accommodation
  - Stable position
  - Non adhesive for cells and bacteria (low water content)
  - Able to restore vision (and correct preexisting refractive problems)
  - UV blocking (restore biological visual spectrum)
  - Additional functions eg Toric

MATERIALS USED FOR INTRAOCULAR LENSES

Optic materials

1.Non-foldable-rigid IOL
- Polymethyl methacrylate(PMMA)

2.Foldable IOL
- Silicone
- Hydrophobic acrylic
- Hydrophilic acrylic

3.Rollable/Ultra-thin IOL
- hydrogel

Haptic materials

- Polypropylene
- PMMA
- Acrylic

IOL materials

- The most common materials used today are:

1- Foldable silicone and acrylic, as they can be implanted through a small incision.

2-Polymethyl methacrylate (PMMA), less commonly used, is a rigid material suitable for rigid 1- and 3-piece IOL designs or for haptic materials.

3-Heparin- Coated

4-yellow- tinted

IOL design

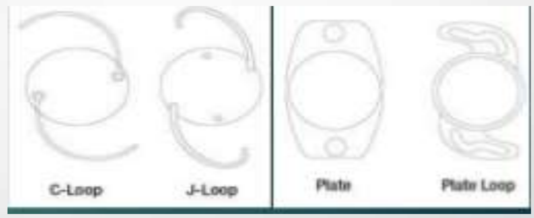
Haptic designs;

*PC-IOL

1-Plate haptic

2-Loop haptic (J, C, modified C)

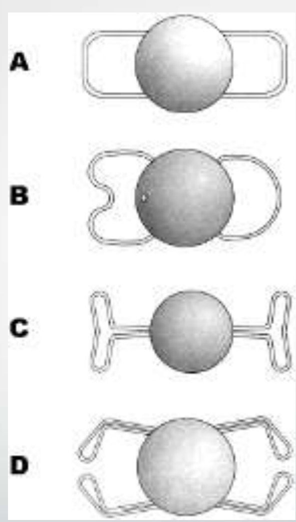
2-Plate loop



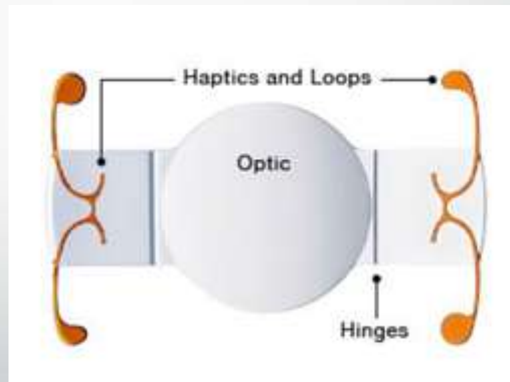
*AC-IOL

1-Closed loop

2-Open loop



- Accommodating IOL



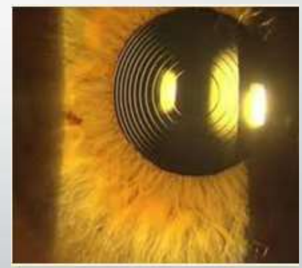
- *Iris fixation clips

Optic Design

Monofocal

Multifocal

Toric

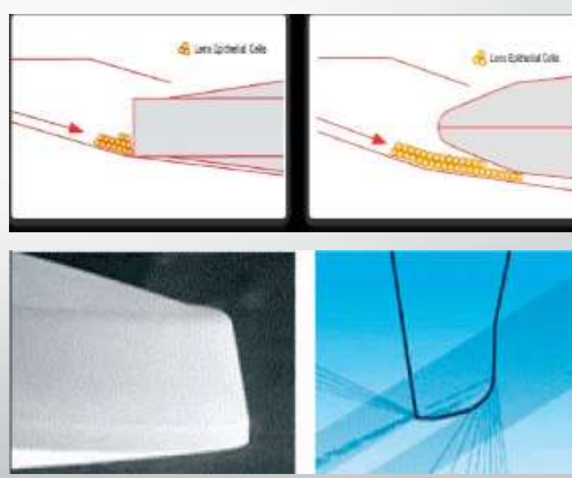


Edge design:

1-Sharp edge

2-Square edge

3-Rounded anterior and sharp posterior edge



IOL power Calculation

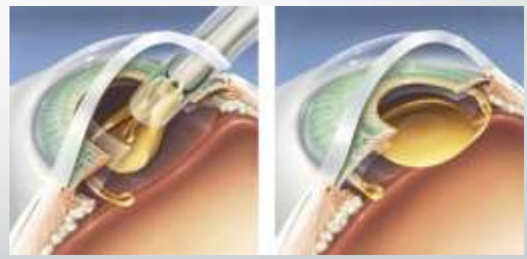
- Machines, A constant, IOL type
- Other factors: Other eye refraction, patient needs, silicone filled eye
- Formulas
- 1-Short eyes: Hoffer-Q, Haigis, Holliday II
- 2-Long eyes: Wang-Koch, SRK/T

IOL calculation after refractive surgery

- Problems:
- 1- Conventional keratometers can not accurately measure anterior corneal power
- (solution : topography or Pentacam)
- 2-distorted ratio between anterior and postereior corneal surfaces
- (solution: directly measure posterior surface power with pentacam)
- 3-conventional formulas mispredict ELP
- (solution:IOL master or pentacam to directly measure ACD) and use the correct formula eg Haigis L or Shammas

Ideal techniques

- Minimal eye disturbance:
  - Better delivery systems and smart materials
  - Ideal Location of the IOL



Intraoperative difficulties

- 1- stuck haptic in the injector leading to broken haptic
- Reasons: improper loading
- Prevention: preloaded IOL
- Detection ;resistance during injection
- Treatment: if detected early reload or replace

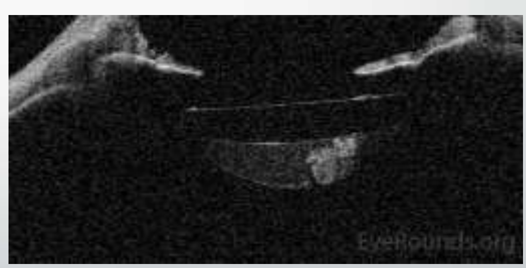
, If cut haptic explant

Incomplete or slow unfolding

- Reason: insufficient viscoelastic in the cartridge or dried out
- Treatment: wait and help with second instrument or viscoelastic injection

Capsular block syndrome

- Reasons : small CCC
- Detection High IOP, shallow AC , Iris Prolapse
- Treatment : push IOL posteriorly with second instrument



Unstable IOL

- Reasons : Large CCC, asymmetrical CCC, Incomplete CCC, subluxated capsular bag, PC hole
- Treatment: larger optic or 3 piece IOL, opposite capsular relaxing incision, CTR, sulcus implantation
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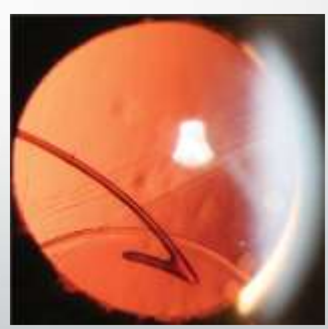
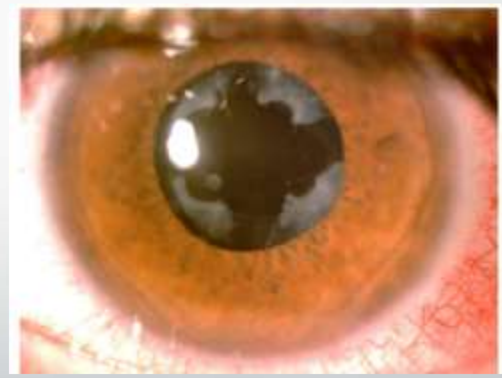
Postoperative complications

- 1- early
- Malpositions



Late Postoperative IOL complications

- 1-Posterior Capsule Opacification
- 2-Anterior Capsule Opacification
- 3-Interlenticular Opacification



Continued

- **4-late postop.endophthalmitis**
- **5-Pigment dispersion**
  - Anterior implants – Iris contact
- **6-Corneal edema**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Thank You!