CATARACT

V.SREEJEEVA
PG-II nd year
Dept of Ophthalmology
Introduction

• The word Cataract comes from the Greek word meaning “Waterfall”

• Until the mid 1700’s, it was thought that cataract was formed by opaque material flowing, like a waterfall into the eye

• Cataract is caused by
  – Degeneration or opacification of lens fibres
  – Formation of aberrant lens fibres
  – Deposition of materials in the lens
Embryology of lens

Lens plate

- Cells of surface ectoderm that overlie optic vesicles become columnar, this area of thickened cells is called lens plate or lens placode.

**lens pit or fovea lentis** is a small indentation inferior to center of lens plate

- lens pit continue to invaginate, the stalk of cells that connects it to surface ectoderm constricts and eventually disappears
- The resultant sphere is called **lens vesicle**
A. Optic vesicle formation (25 days)

B. Lens plate formation (27–29 days)
EMBRYONIC NUCLEUS –
1 – 3 Months of GA
FETAL NUCLEUS –
3 months GA – Birth
INFANTILE NUCLEUS –
Birth to puberty
ADULT NUCLEUS –
Adults
Anatomy of the lens

- Transparent biconvex structure
- Placed between iris & vitreous, suspended by zonule of zinn from ciliary body
- Radius of curvature
  - Anterior: 10mm
  - Posterior: 6mm
- Diameter of lens: 8.8 to 9.2mm
- Refractive index: 1.37
• Dioptric power of lens 15-18D
• Thickness 4mm
• Weight at birth 65mg
  at 80 yrs 258mg
• Accommodative power at birth -------14-16D
  at 25 yrs------ 7-8D
  at 50yrs------- 2D
Human crystalline lens is a transparent+biconvex+crystalline structure placed between iris & vitreous in a saucer shaped depression called patellar fossa.
**Function of lens**

- Maintenance of transparency
- Refraction
- Accommodation
- Protection from U-V rays
• Loss of transparency, or opacification of lens is called Cataract.
Epidemiology

• Cataract is the leading cause of blindness in the world

• The prevalence of blindness in India is 14.9 per 1000. sixty two percent of this blindness is due to cataract alone

• Recent data from the World Health Organization (WHO) shows that there is a 25% decrease in blindness prevalence in India.
Classification of Cataract

Etiological classification:
- Congenital and Developmental
- Acquired
1. Age related (senile)
2. Cataract associated with ocular diseases (complicated or secondary)
3. Cataract associated with systemic diseases:
   Diabetes, Hypoglycaemia, Hypoparathyroidism
4. Skin Diseases – Atopic Dermatitis

5. Traumatic Cataract:
   Trauma
   Electric Shock
   Radiation

6. Drug induced cataract:
   Corticosteroids, Anticholinesterases, Chlorpromazine, Busulfan, Choroquine
Morphological types of Developmental cataract

- Dense Blue Dot Cataract
- Sutural Cataract
- Anterior Capsular Cataract
- Posterior Polar Cataract
Cataracta pulverulenta  lamellar cataract

dense lamellar cataract with riders
Complicated cataract

posterior sub capsular cataract

glaucoma flecken
Cataract in systemic diseases

- Snowflake cataract
- Stellate cataract
- Shield cataract
Traumatic cataract

Vossius’ ring

Flower-shaped

Penetration
Morphological classification

1. Capsular
2. Subcapsular
3. Cortical
4. Supranuclear
5. Nuclear
6. Polar
Senile Cataract

Types:

1. **Cortical Cataract**: hydration followed by coagulation of protein appears in cortex
2. **Nuclear or Sclerotic Cataract**: slow sclerosis of nucleus.
Stages of cortical cataract

• Stage of lamellar separation
• Incipient cataract
• Immature cataract – intumescent
cuneiform
cupuliform
• Mature cataract
• Hypermature cataract – morgagnian cataract
  Sclerotic or shrunken
Symptoms

• Blurring of vision
• Frequent change of glasses due to rapid change in refractive index of the lens
• Painless, progressive, gradual diminution of vision
• Second sight or myopic shift - nuclear cataract
• Monocular diplopia or polyopia
• Glare
• Colored haloes
• generalized reduction - Visual field
Signs of senile cataract

- Lenticular opacity - grey or white opacity in lens
- Iris shadow in immature cataract
- No iris shadow in mature cataract
- Morgagnian Cataract - liquefied cortex - which is milky and nucleus is seen as brown mass
Morphological types

Nuclear Cataract

Cortical Cataract

Mature Cataract

Hypermature Morgagnian Cataract
Fig. 12.1
Age-related cataract. (a) Posterior subcapsular; (b) posterior subcapsular seen on retroillumination; (c) nuclear; (d) early nuclear cannot be seen on retroillumination
Management

• Cataract is the most treatable cause of decreased vision

• Observation and Refraction – Early cataract

• When the glare, loss of contrast sensitivity or polyopia are present

  or

• When activities of daily living, such as driving, reading, working, and self-care are affected

  Surgery can be advised
Pre-operative evaluation

• Detailed history

• Systemic examination

• Dental and ENT examination – to rule out any septic foci

• Ocular examination
• **Ocular examination**
  – Visual acuity testing

  – Anterior Segment Examination:
    • Lens Grading
    • To rule out other anterior segment diseases

  – Dilated Fundus Examination: To assess the posterior segment

  – If fundus examination is not possible – B-Scan Ultrasonography
– Intraocular pressure measurement

– Examination of lacrimal apparatus and Syringing

– Intraocular lens Power Calculation
Anaesthesia

• **Local anaesthesia**
  – Peribulbar or Retrobulbar Block
  – Adjuvant Facial Block if needed
  – **Drugs used:** 2% Xylocaine and 0.5% Bupivacaine in the ratio of 2:1

• **Topical anaesthesia**

• **General anaesthesia** ➔ children, psychiatric patients
METHODS OF CATARACT SURGERY

- ICCE
- ECCE
Surgical Techniques

• Intracapsular Cataract Extraction (ICCE)
  – Entire lens is removed by rupturing the zonules
  – Obsolete
  – Indications: Dislocated lens
• **Complications of ICCE:**

  – Intraocular lens cannot be placed
  – Vitreous herniation into Anterior chamber can occur
  – Aphakic glasses –
    • Magnified images
    • Spherical aberrations
    • Jack-in-the-box phenomenon
    • Prismatic effect
    • Reduced visual field
    • Heavy spectacles
ECCE- SURGERY OF CHOICE

- AGE- UPTO 30 Yrs – LENS ASPIRATION
  LENSECTOMY
  AFTER 30 Yrs -CONVENTIONAL ECCE
  SICS
  PHACOEMULSCIFICATION
• Extracapsular Cataract Extraction (ECCE)
  – Part of anterior capsule, nucleus and cortex are removed leaving behind the posterior capsular bag

  – So that intraocular lens can be placed
• **Conventional ECCE**

• Large incision (10-11mm) – needs suturing
• Time consuming procedure
• Longer wound healing time
Extracapsular cataract extraction

1. Anterior capsulotomy

2. Completion of incision

3. Expression of nucleus

4. Cortical cleanup

5. Care not to aspirate posterior capsule accidentally

6. Polishing of posterior capsule, if appropriate
7. Injection of viscoelastic substance

9. Insertion of inferior haptic and optic

11. Placement of haptics into capsular bag

8. Grasping of IOL and coating with viscoelastic substance

10. Insertion of superior haptic

12. Dialling of IOL into horizontal position
• **Small Incision Cataract Surgery (SICS)**
  – Sutureless surgery
  – Sclero-corneal tunnel is made
  – 6-7mm incision – Post-operative astigmatism
Phacoemulsification

1. Capsulorrhexis
2. Hydrodissection
3. Sculpting of nucleus
4. Cracking of nucleus
5. Emulsification of each quadrant
6. Cortical cleanup and insertion of IOL
Femtosecond Laser cataract surgery

Incision with femtosecond laser

Capsulotomy

Lens Fragmentation
complications

Pre operative complications:
  Anxiety
  Nausea and gastritis
  Irritative /allergic conjunctivitis
  Corneal abrasion

Due to local anesthesia:
  Retrobulbar hemorrhage
  Globe perforation
  Oculocardiac reflex
  Sub conjunctival hemorrhage
Intra-operative complications:
- Detachment of descemet’s membrane
- Iridodialysis
- Posterior capsular rupture
- Nucleus drop in to vitreous cavity
- Expulsive choroidal haemorrhage
Early post-operative complications:

- Hyphaema
- Iris prolapse
- Striate keratopathy
- Flat anterior chamber
- Endophthalmitis
Late post-operative complications:

- Cystoid macular oedema
- Pseudophakic bullous keratopathy
- Retinal detachment
- After cataract
- Lens dislocation
Elschnigs pearls

Soemmerings ring

dense posterior capsular opacity
Summary

• Opacification of crystalline lens is called Cataract

• Causes diminution of vision, glare, reduced contrast sensitivity

• Treatment is only surgical removal of cataract and implantation of intraocular lens

• Thorough pre-operative evaluation is necessary

• Advances in surgical technique and more sophisticated technology have helped make surgery a safe and effective treatment for cataracts
THANK YOU!!!!