CORNEAL BLINDNESS & EYE BANKING

BLINDNESS

WHO definition

- Visual acuity of less than 3/60 (Snellen) or its equivalent
- Inability to count fingers in daylight at a distance of 3m

Economic blindness	• Vision in better eye <6/60 to 3/60
Social blindness	• Vn in better eye <3/60 to 1/60
Legal blindness	• Vn in better eye <1/60 to PL
Total blindness	• No PL

CORNEAL BLINDNESS

- 2nd most common cause of preventable blindness in India
- More than 1.3 million people – bilateral corneal blindness
- 10.6 million – unilateral (2020)
- 4-6% among all causes of blindness in India

CAUSES

Infective keratitis/ corneal ulcer

Pseudophakic bullous keratopathy

Hereditary corneal dystrophies

Congenital corneal opacities

Corneal ectasia

Corneal injury – open globe/ chemical/ thermal

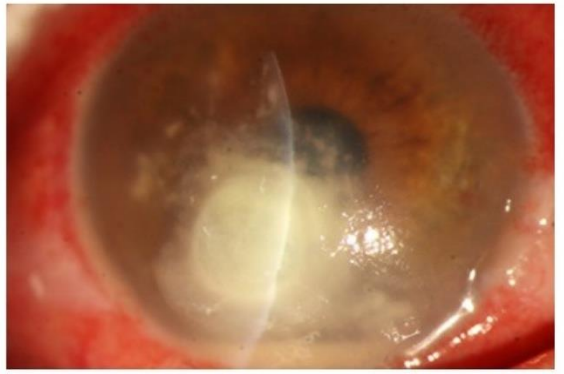
Trachoma

Ophthalmia neonatorum

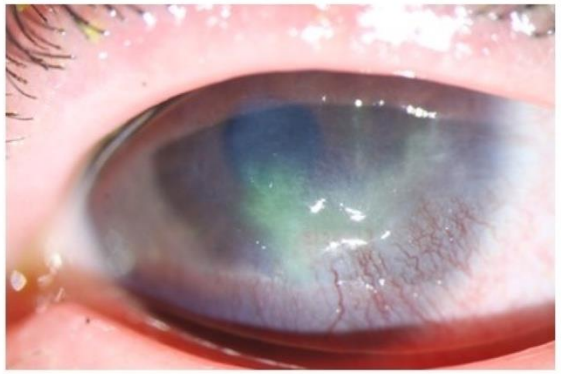
Vitamin A deficiency

Infective Keratitis

Bacterial keratitis



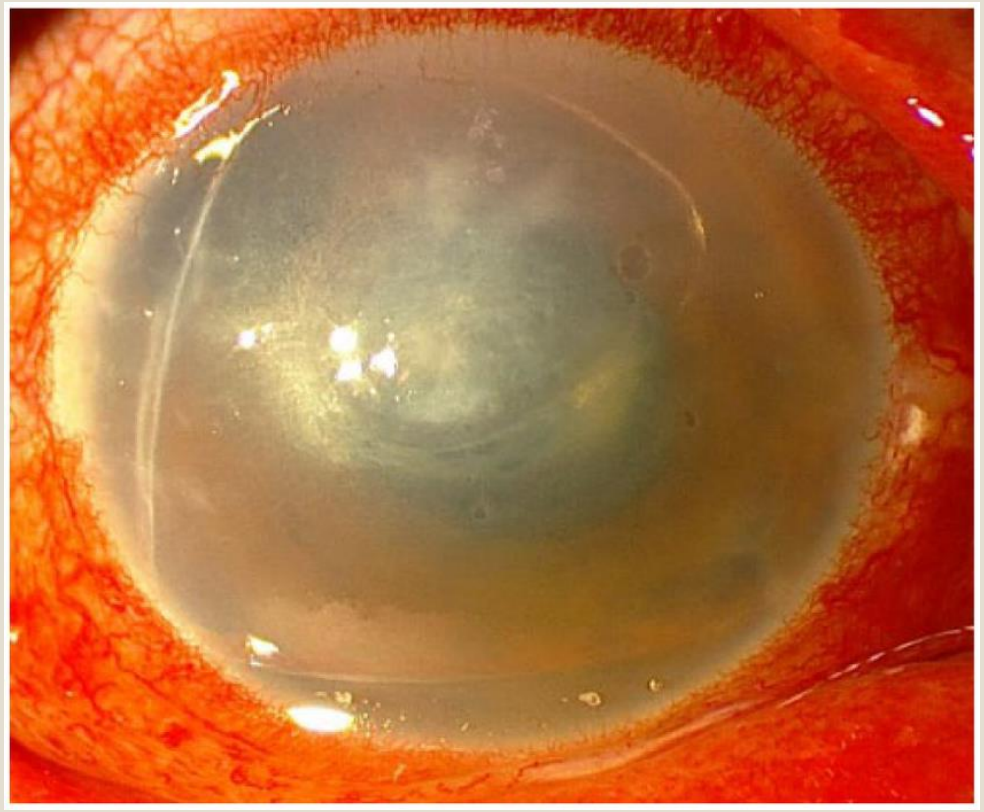
Fungal keratitis



Viral keratitis

Acanthamoeba keratitis

Pseudophakic Bullous Keratopathy(PBK)

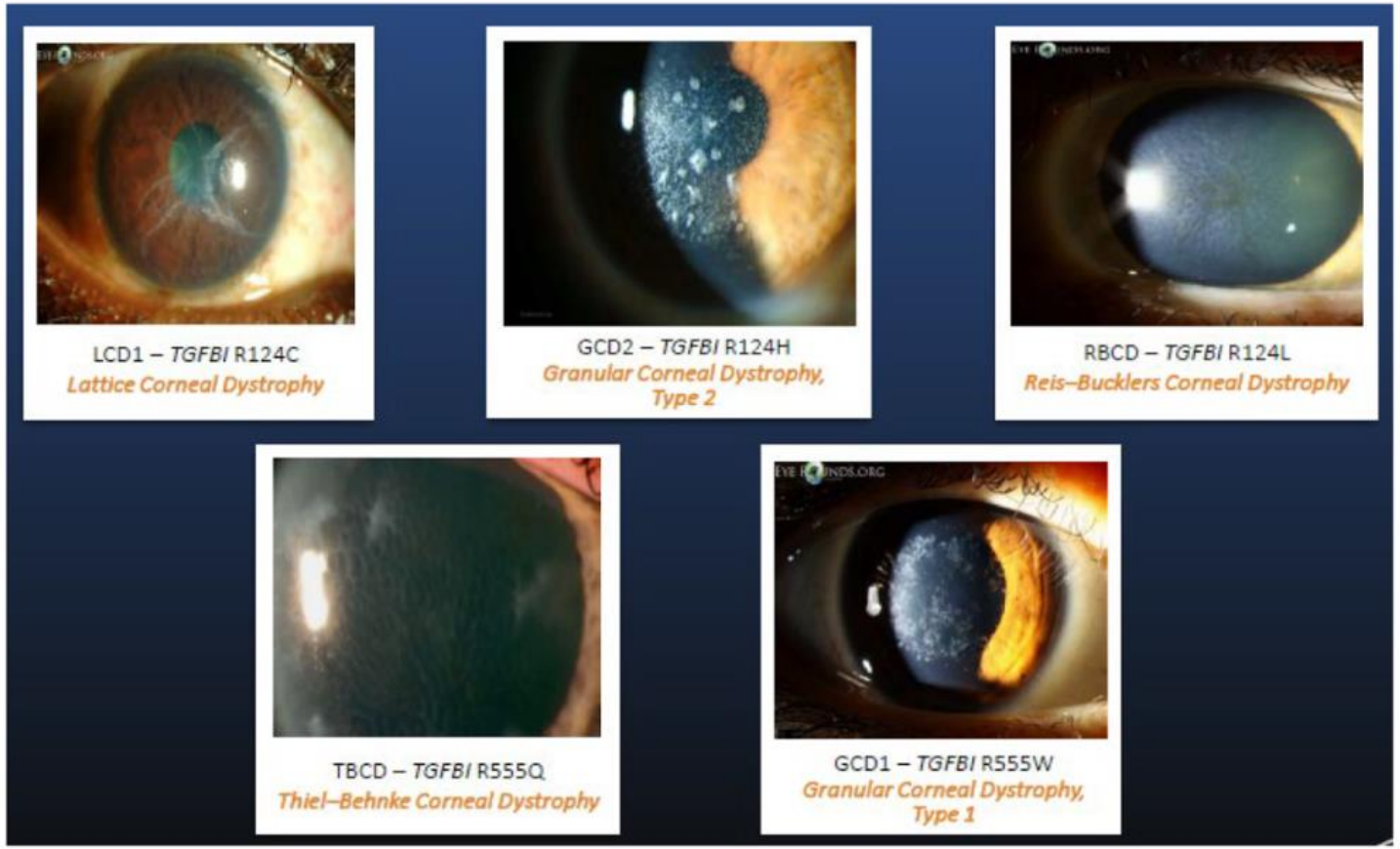


Irreversible corneal edema after cataract surgery due to endothelial cell loss

Characterized by presence of corneal epithelial bullae

Usually develops 8 months-7 yrs after Sx

Corneal dystrophies



Group of non-inflammatory, inherited, bilateral disorders of the cornea characterized by deposition of abnormal materials in cornea

May be epithelial/subepithelial, epithelial-stromal, stromal, and endothelial dystrophies

Congenital corneal opacties

Developmental anomalies- Sclerocornea, Congenital glaucoma, Peter's anomaly

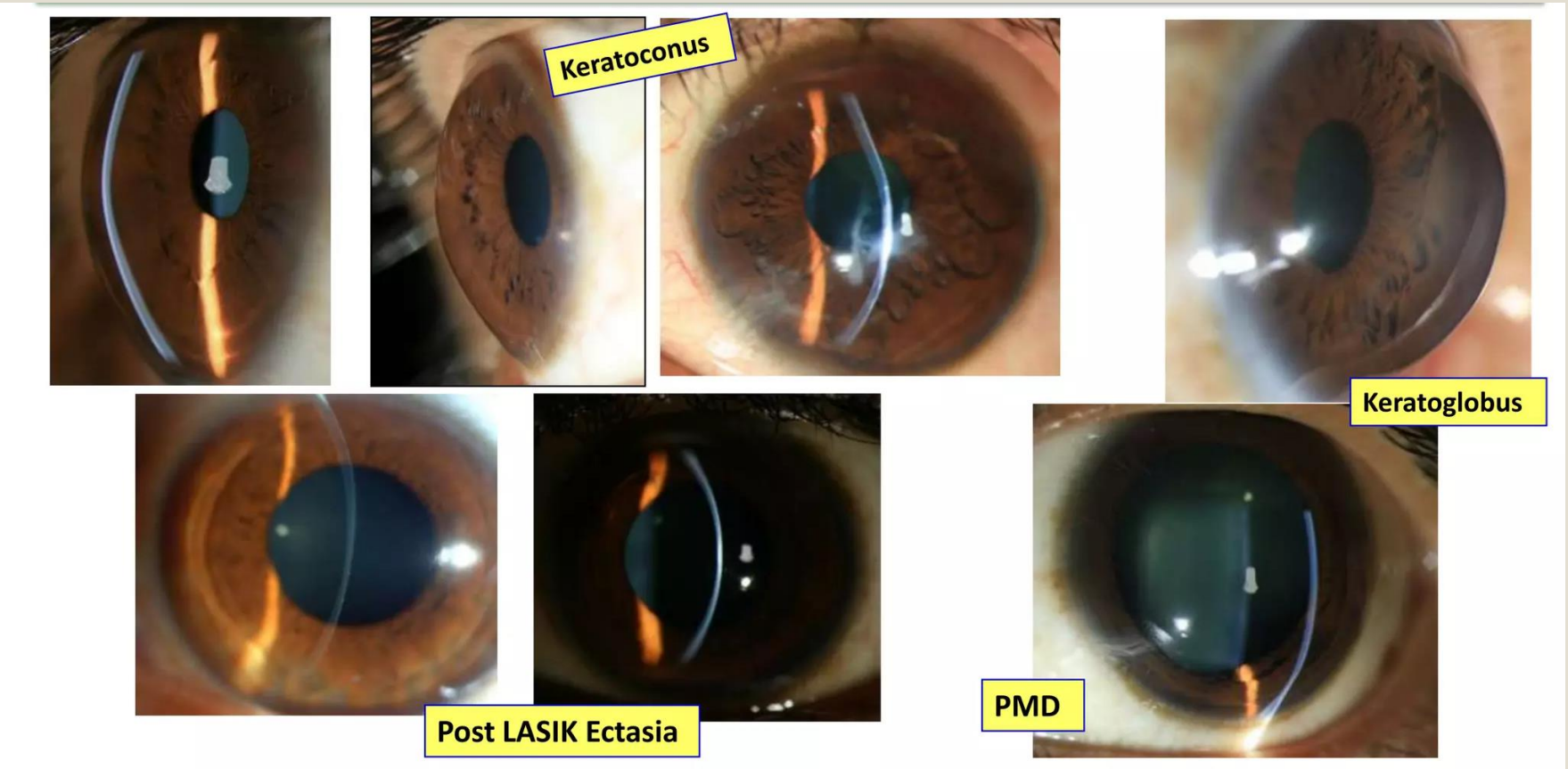
Forceps delivery trauma

Infections – congenital rubella, herpes simplex

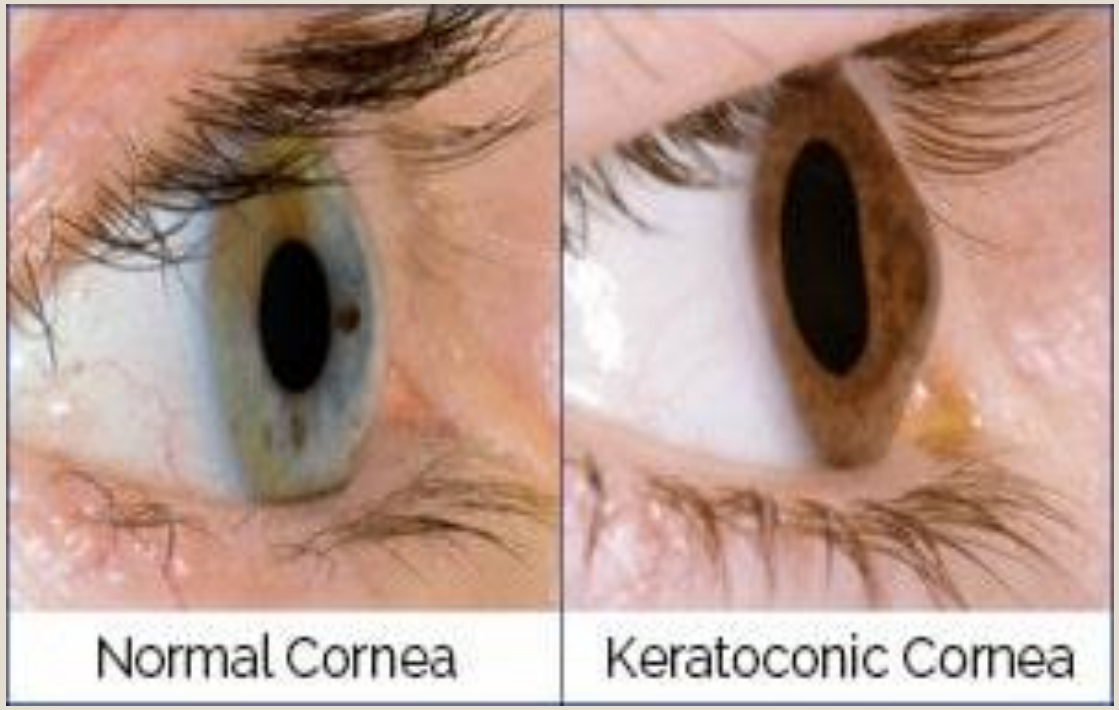
Metabolic – mucopolysaccharidosis

Dermoid

Corneal ectasia



Keratoconus

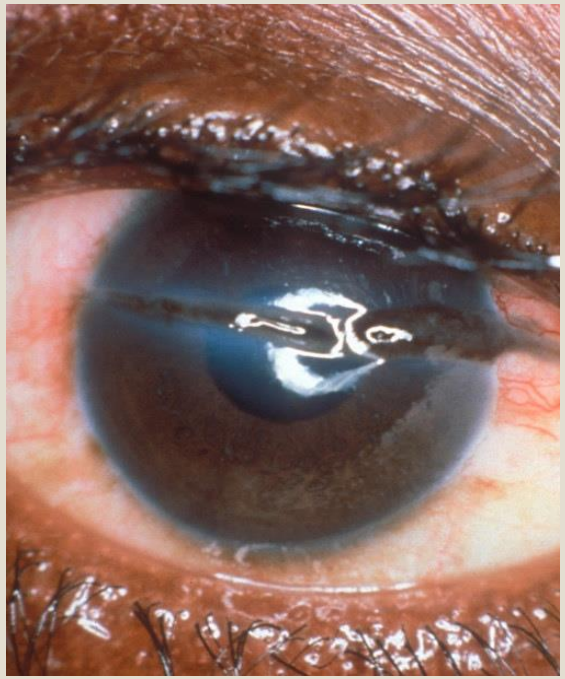


Corneal disorder where the central or paracentral cornea undergoes progressive thinning and steepening, causing irregular astigmatism

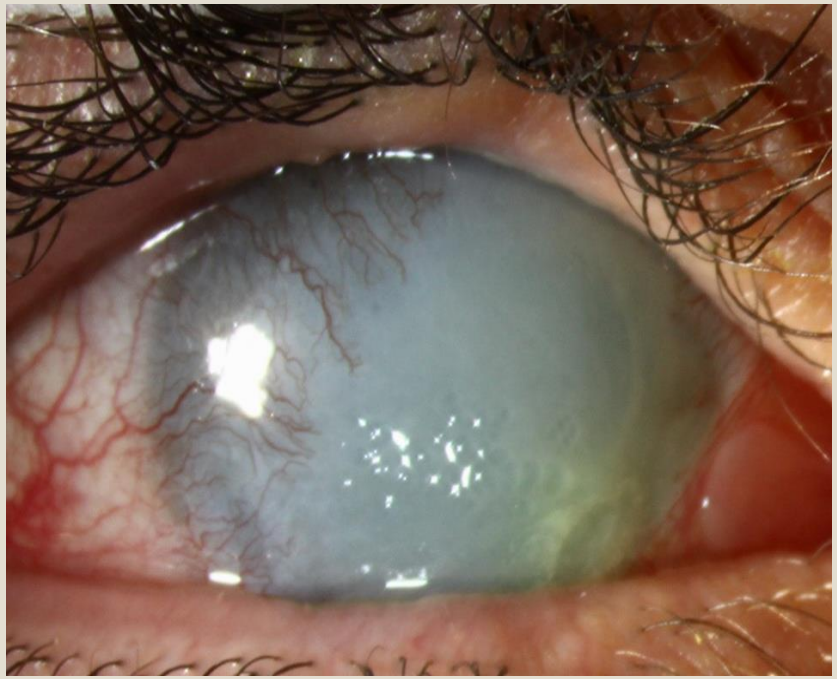
Cornea thins out and bulges like a cone

Corneal injuries

Open globe injury

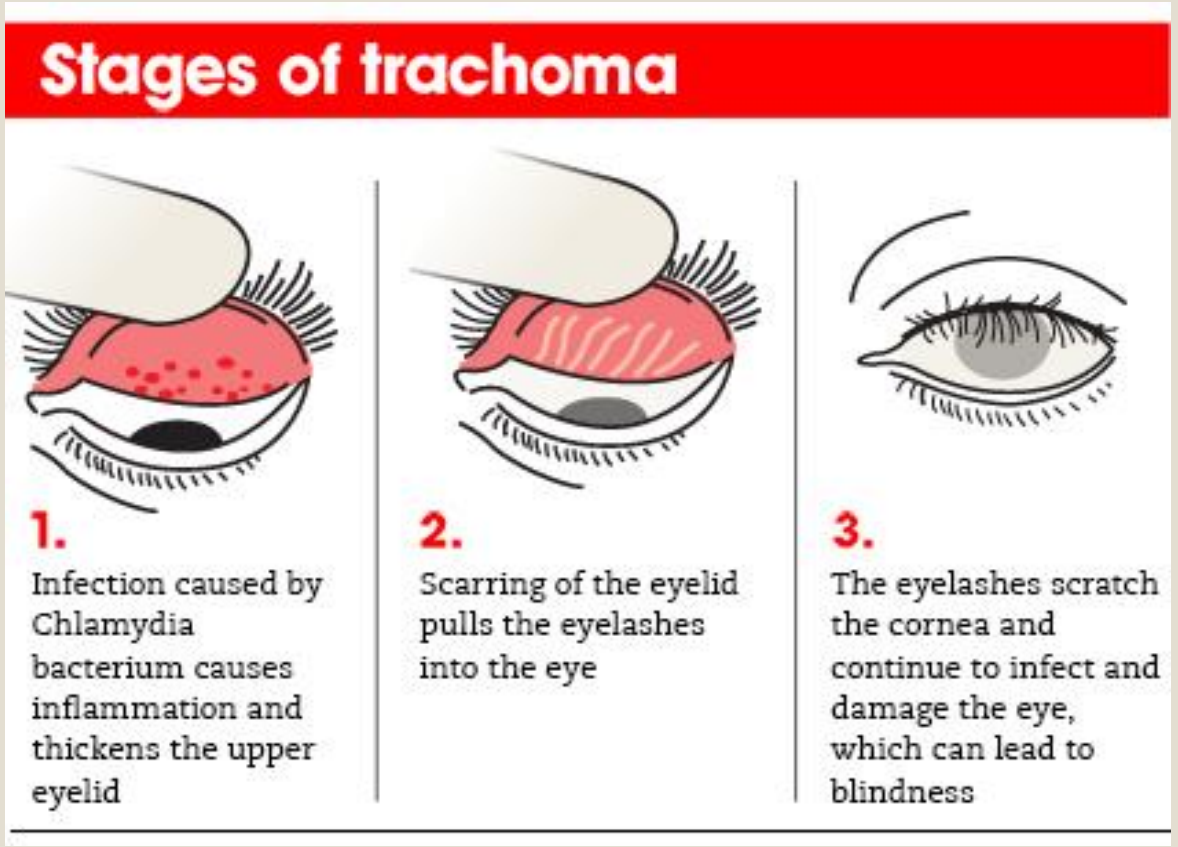


Chemical injury



Thermal injury

Trachoma


Stages of trachoma
1.
Infection caused by Chlamydia bacterium causes inflammation and thickens the upper eyelid
2.
Scarring of the eyelid pulls the eyelashes into the eye
3.
The eyelashes scratch the cornea and continue to infect and damage the eye, which can lead to blindness

Ophthalmia neonatorum

Conjunctival inflammation occurring within the first 30 days of life

Typically contracted during vaginal delivery from exposure to bacteria from the birth canal, most commonly *Neisseria gonorrhoeae* or *Chlamydia trachomatis*

Complications range from mild hyperemia and scant discharge to permanent corneal scarring and blindness

Keratomalacia

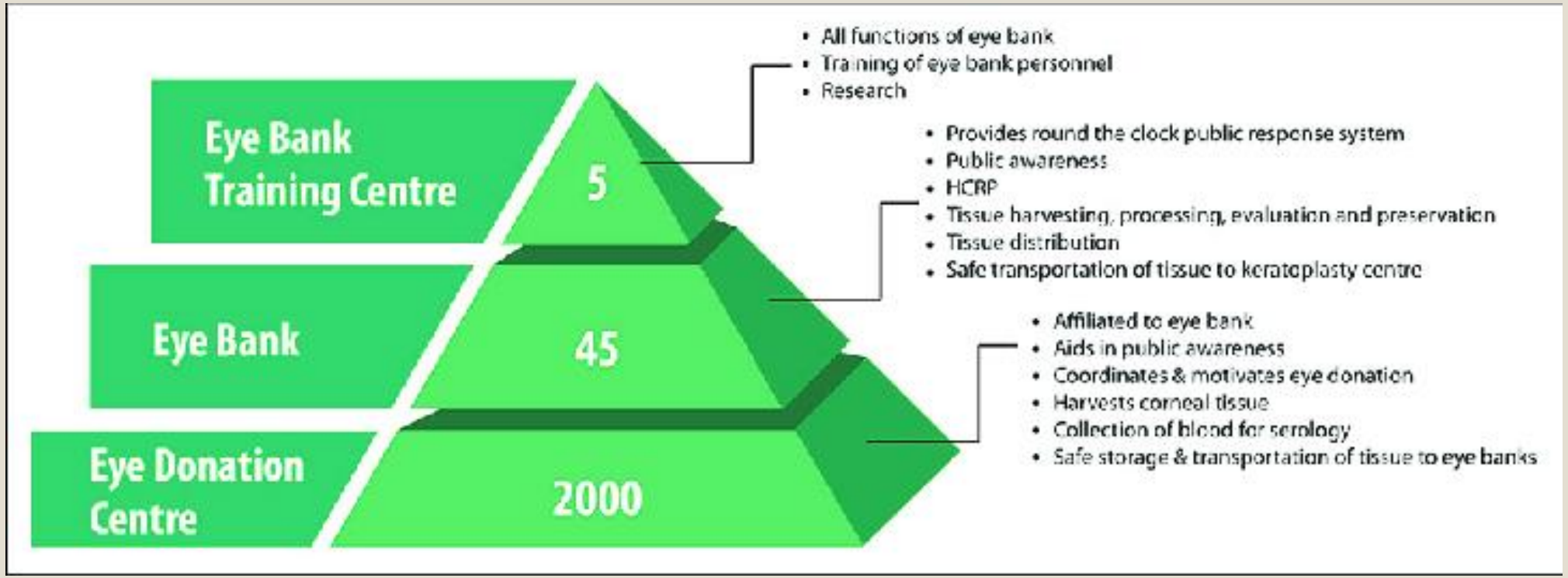
Vit A deficiency

Characterized by liquefaction of part or whole of the cornea due to necrosis

EYE BANKING

Eye Banking is a non-profit organization which deals with the collection, storage & distribution of cornea for the purpose of corneal grafting, research & supply of the eye tissues for other ophthalmic purposes.

For an efficient eye banking system, a three tier organization structure has been recommended.



EBTC (EYE BANK TRAINING CENTRE)

The top tier comprises of 5 Eye banking training centers (EBTC) responsible for

1. Tissue harvesting, processing & distribution.

2. Creating public awareness.

3. Training and skill up-gradation of eye banking

personnel.

EYE BANKS

Middle tier would comprise of a strong network of 45 Eye Banks(EB)

- Cater to a population of 20 million each.

- Would be closely linked with 2,000 Eye Donation Centers- EDC (ratio of 1: 50 suggested)

EYE DONATION CENTERS

Publicity of the voluntary donation

Registration

Arrangement for the collection of the eye after death

Processing , packing & transportation of collected eye to attached eye bank

Would cater to a population ranging from 50,000 to 100,000.

FUNCTIONS OF EYE BANK

- *Promotion* of eye donation – public awareness
- *Registration* of the pledger for eye donation
- *Collection* of donated eyes from the deceased
- *Receiving & processing* donor eyes
- *Preservation* of tissue
- *Distribution* of donor tissues to corneal surgeons
- *Research* activities

EYE BANK PERSONNEL

1. *Eye bank in-charge*
   - Qualified ophthalmologist to evaluate, process & distribute donor tissue

2. *Eye bank technician*
   - To keep eye collection kits ready
   - To assist in enucleation of donor eyes
   - To record data pertaining to donor material & waiting list of patients
   - To process & treat donor eyes with antibiotics
   - To assist in corneal preservation & storage
   - To maintain asepsis in eye bank

3. *Clerk-cum-storekeeper*
   - To maintain meticulous records
   - To coordinate with other eye banks
   - To distribute cornea to eye surgeons/eye banks

4. *Medical social worker or public relation officer*
   - To supply publicity material to common public
   - To promote voluntary eye donation
   - May be a voluntary or paid worker

5. *Driver-cum-projectionist*
   - To maintain vehicle of eye bank
   - To screen films of eye donation promotion in the community

Facts about eye donation

Almost anyone at any age can pledge to donate eyes after death; all that is needed is a clear healthy cornea.

The eyes have to be removed within six hours of death.

Eye donation gives sight to two blind persons as one eye is transplanted to one blind person.

The eyes can be pleged to an eye bank and can be actually donated to any nearest eye bank at the time of death.

The donated eyes are never bought or sold.

Eye donation is never refused.

The eyes cannot be removed from a living human being inspite of his/her consent and wish.

STEPS OF EYE DONATION

1. Donor selection
2. Tissue retrieval
3. Corneal examination
4. Tissue transportation
5. Storage of corneal tissue
6. Distribution

DONOR SELECTION

1) AGE OF DONOR:

No influence of age on transplant outcome.

Older age : usage rate declines

Lower limit : 2 yrs to prevent myopic shift after keratoplasty

2) MEDICAL HISTORY REVIEW

Eye banks must have consistent policies for the examination and documentation of donor's available

- Medical records
- Medical history
- Cause of death
- Medications
- Laboratory reports

CONTRAINDICATIONS

SYSTEMIC

- AIDS
- Rabies
- Active viral hepatitis
- Creutzfeldt-Jakob disease
- SSPE
- Death from unknown causes
- Congenital Rubella
- Active septicemia
- High risk behavioural features
- Leukemia (blast form)
- Lymphoma/lymphosarcoma

OCULAR

- Intrinsic eye diseases
  - ➢ Retinoblastoma
  - ➢ Active conjunctivitis, iritis, uveitis, vitritis, retinitis
  - ➢ Congenital abnormalities (keratoconus)
  - ➢ Central opacities, pterygium
- Prior refractive procedures (radial keratotomy scar, lamellar inserts)

TISSUE RETRIEVAL

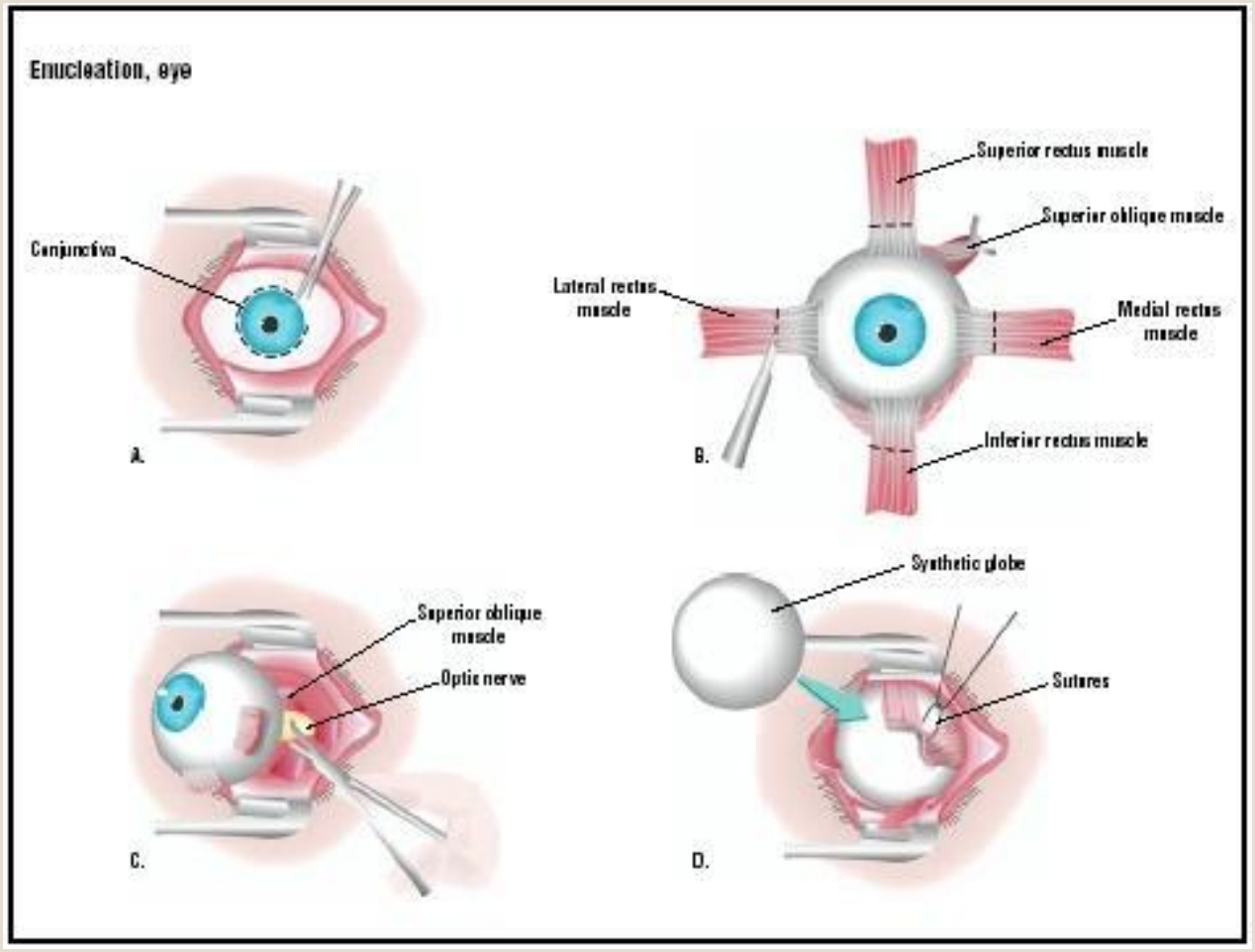
1. Enucleation i.e. Surgical removal of the whole eye

2. By in-situ cornea-scleral excision (globe is retained in the orbit)

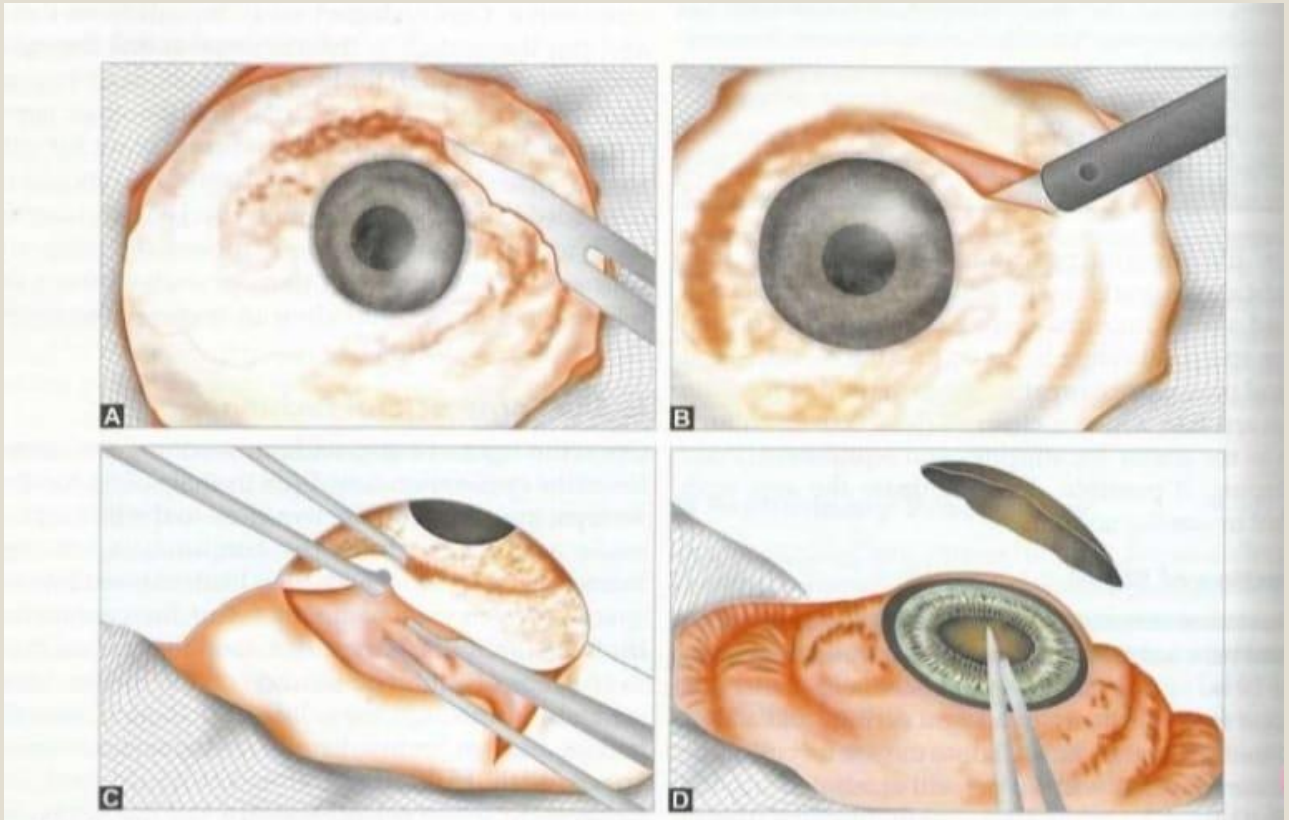
PRELIMINARY PREPARATIONS

- Obtain legal permission.
- Go through the donor's medical records for any contraindications.
- Wash hands and be prepared with aseptic dressing, draping etc.
- Identify the donor.
- Collection of postmortem blood:10ml
  - Femoral vein
  - Subclavian vein
  - Heart
  - Jugular vein

ENUCLEATION



CORNEOSCLERAL BUTTON EXCISION



Figs 32.2A to D: Corneoscleral button excision procedure. Scleral incision 4-5 mm in length at 2-3 mm behind limbus (A) is made, scleral incision is extended for 360 degrees (B), iris is pulled away from the cornea (C, D)

EVALUATION OF THE DONOR TISSUE

Gross examinations:

- *Whole globe*: eyes with excessive stromal hydration should be discarded unless specular microscopy can be done for endothelial cell count.
- *Corneoscleral button*: colour of the tissue storage media is to be noted.
  - Yellowish colour-acidic media-contamination

EVALUATION OF DONOR TISSUE

Biomicroscopic examination

Rate	Criteria
1. Excellent	1. No epithelial defects 2. Crystal clear stroma 3. No arcus senilis 4. No folds in descemet's membrane 5. Endothelium-no defects
2. Very good	1. Slight epithelial haze/defects 2. Clear stroma 3. Very slight arcus 4. Few folds in descemet 5. Endothelium-no defects
3. Good	1. Moderate epi. Defects 2. Moderate stromal cloudiness 3. Arcus < 2.5mm 4. Numerous but shallow folds 5. Few vacuolated cells in endothelium
4. Fair	1. Epithelial defects > 60% 2. Mod to heavy stromal cloudiness 3. Numerous deep descemet's folds 4. Arcus > 2.5mm 5. Low endothelial cell density
5. Poor	1. Central epithelial defects 2. Heavy stromal cloudiness 3. Marked folds 4. Marked endothelial cellular defects

METHODS OF CORNEAL PRESERVATI0N

1. Short-term storage methods
2. Intermediate-term storage
3. Long term storage

PRESERVATION METHODS

Short Term (48hrs) - Moist Chamber

Intermediate Term (4 days)

- McCarey-Kaufman medium – 4 days
- K-Sol medium - 7 days
- Dexsol medium - 10 days
- Optisol medium - 14 days

Long term storage - Organ Culture – 35 days

Cryopreservation - 1 year

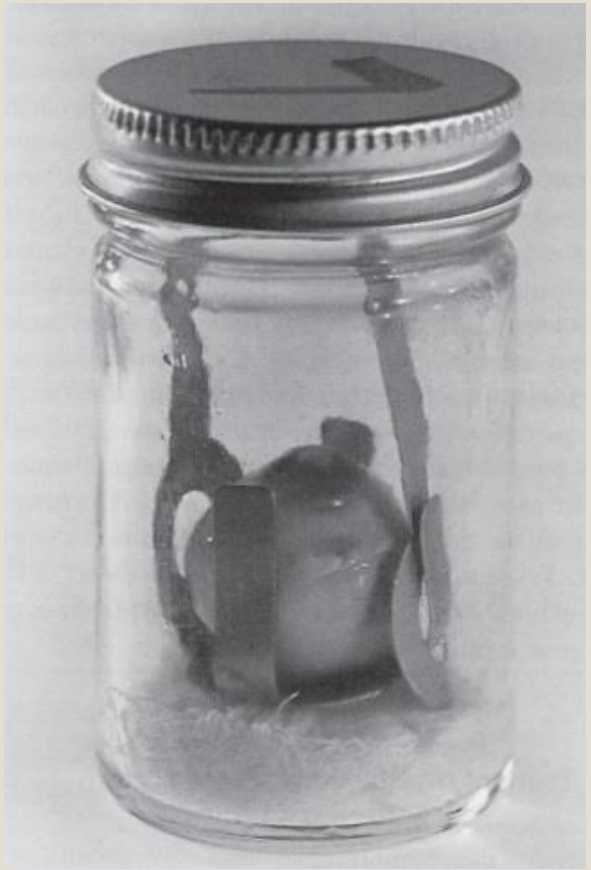
SHORT TERM STORAGE METHODS

Moist chamber storage

- Storage of the whole globe for short period of time at 4 degree

- It is a closed container with cotton gauze moistened with sterile saline

- Container is never completely filled with liquid



INTERMEDIATE TERM STORAGE METHODS

TISSUE MEDIA PRESERVATION

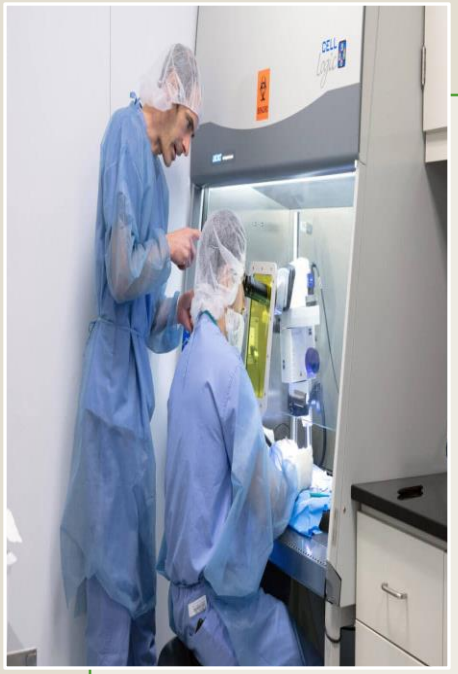
Advantages:

1. Provides a chemically defined & stable environment
2. Helps support & enhances metabolic activities
3. Reduces the stromal swelling
4. Keeps the tissue under sterile condition till use
5. Provides time for EB to serologically screen the donor for communicable diseases

INGREDIENTS

1. Dextran
2. Chondroitin sulphate
3. Electrolytes
4. pH buffer system
5. Antibiotics
6. Essential aminoacids
7. Antioxidants, ATP precursors
8. Insulin
9. EGF
10. Antiproteases & anticollagenases

DISTRIBUTION OF CORNEA



Distribution to only hospitals and ophthalmologists registered under HOTA

- Maintenance of waiting list
- Distribution record
- Feedback from the hospital receiving cornea


WORLD
EYE DONATION DAY
10 JUNE


“ DON’T JUST LEAVE A WILL, LEAVE A VISION. ”
The Fresh Quotes


NATIONAL
EYE DONATION
FORTNIGHT
AUGUST 25 - SEPTEMBER 8


EYE
NEED TO
SAY
thank you!