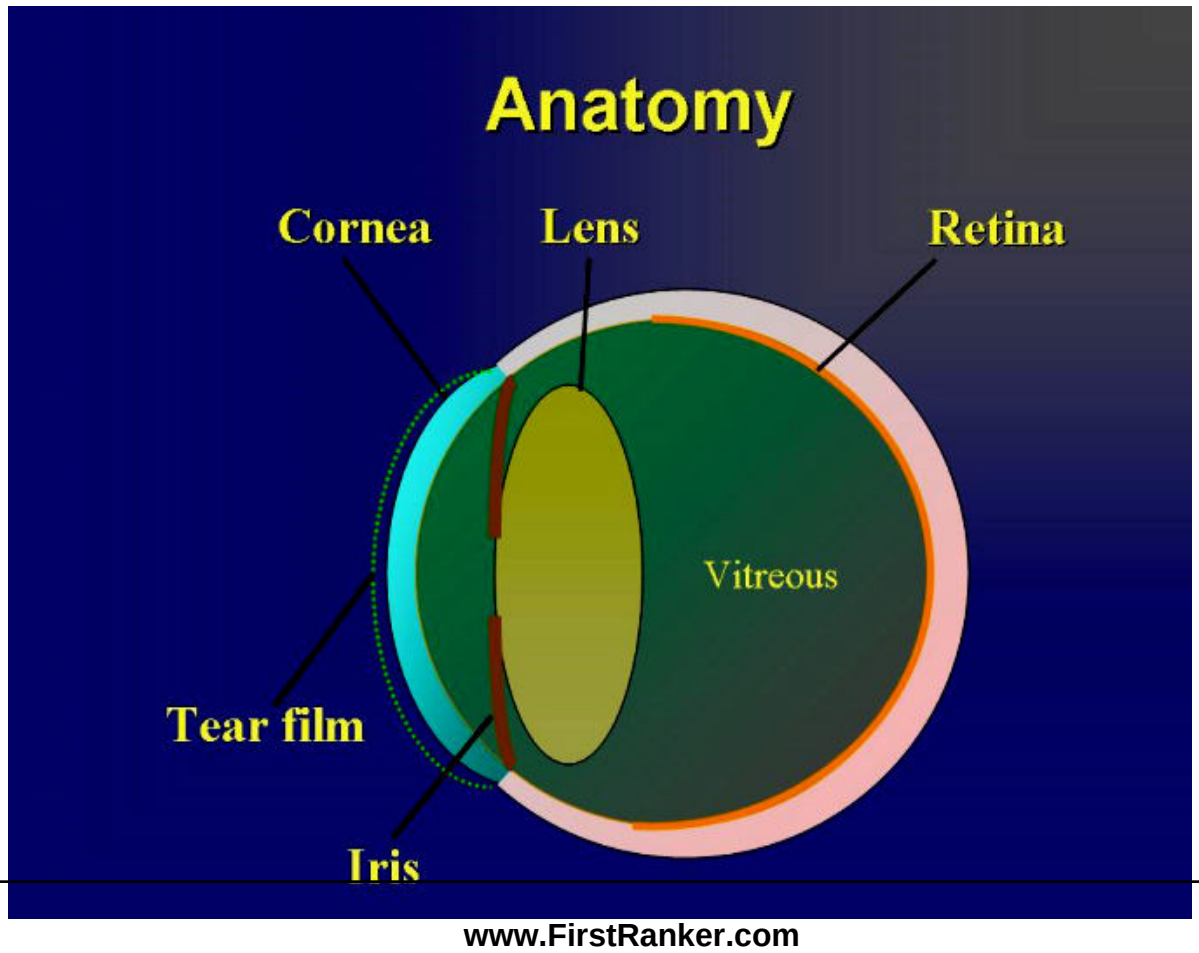
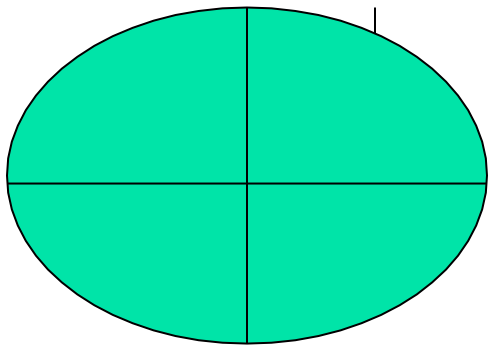
DISEASES OF THE CORNEA

Department of Ophthalmology



DIMENSIONS

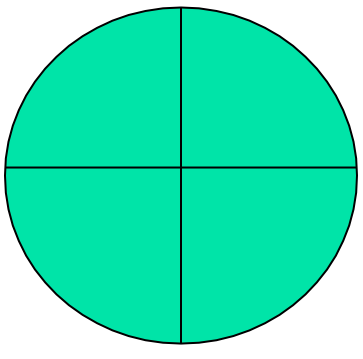
- Ant surface
  elliptical



11-12 mm

10- 11 mm

- Posterior surface
  circular



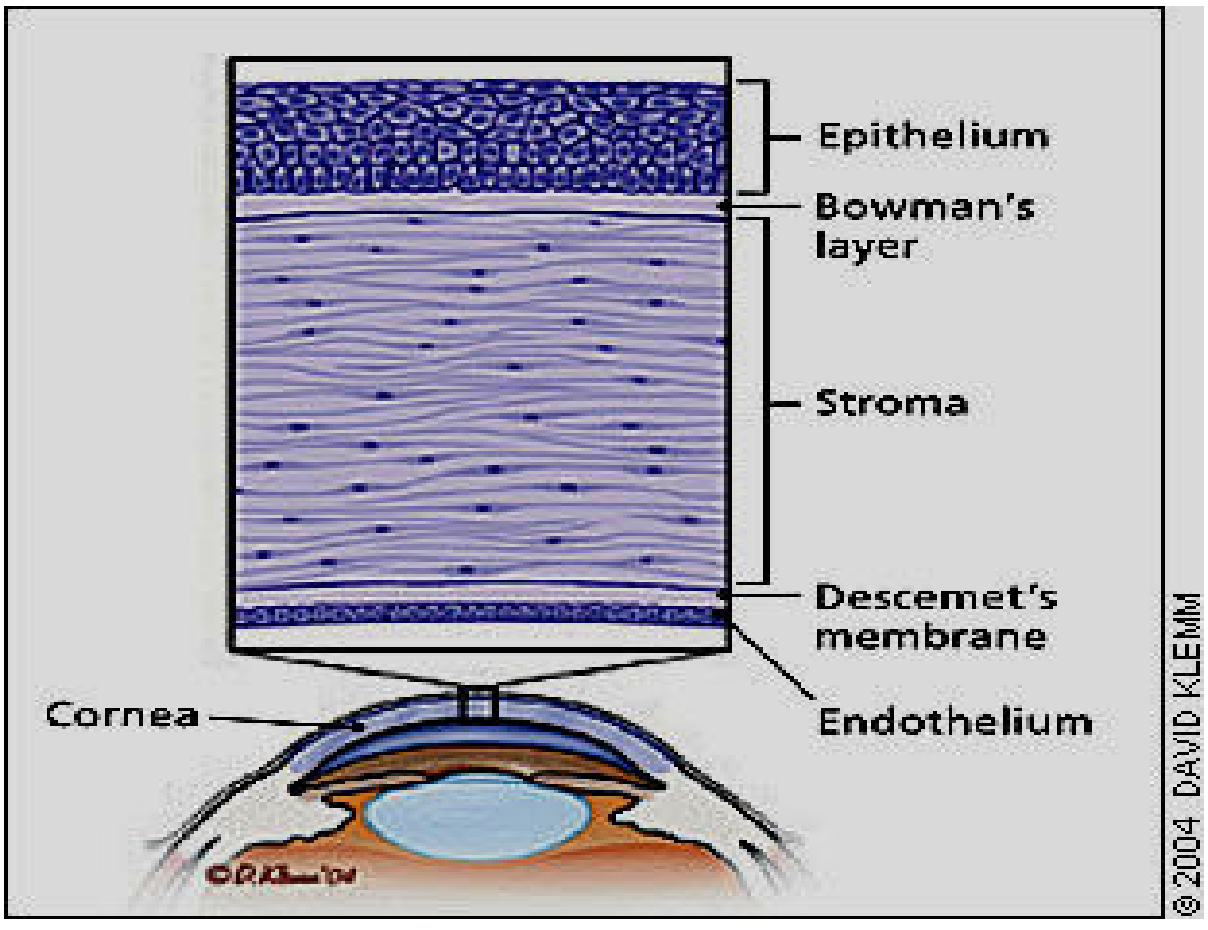
11.5mm

11.5mm

- Shape - Prolate

- Thickness — centre 0.5-0.6 (thinner); periphery 0.7-1.0mm
- Radius of curvature — ant.surface 7.8mm; post surface 6.5mm (steeper)
- Refractive index 1.376
- Refractive power - 40-44D (70% Of total refractive power of the eye

LAYERS OF CORNEA



- Epithelial Layer – Regenerates
- Bowman's Layer- Resistant to trauma and infection
- Stroma – Collagen bundles with keratocytes
- Descemets layer- very tough
- Endothelium – hexagonal cells – 3000cells/mm^2

Limbus

- 1-1.5 mm
- anatomy
- Cells at limbus are unique – Limbal stem cells
- Responsible for growth and regeneration of epithelial cells

NERVE SUPPLY OF CORNEA

Cornea has body's highest no. of nerve endings

5th cranial nerve (Trigeminal)

↓

Ophthalmic division

↓

Nasociliary branch

↓

Long ciliary nerves

↓

Annular plexus around limbus

↓ ↓

Subepithelialplexus Intraepithelial plexus

NUTRITION METABOLISM

- Perilimbal capillaries
- Aqueous humour (glucose diffussion)
- Atmospheric oxygen (tear film)

- Epithelium & endothelium metabolically very active
- Both aerobic & anaerobic metabolism

CORNEAL TRANSPARENCY

- Avascularity
- Uniform refractive Index of the cornea
- Arrangement of corneal lamellae
- State of relative dehydration(78%)

Barrier effect of epithelium & endothelium

Endothelial pump

Osmotic gradient

FUNCTIONS OF CORNEA

- Transmission of light/Refractive medium
- Structural integrity of globe/Protects the eye

PATHOLOGICAL CHANGES IN THE CORNEA

- Keratitis
  - Superficial
  - Deep
    - Stromal
    - Endothelial
- Corneal abrasion/erosion
- Corneal ulcer
- Corneal opacity → Nebular, Macular, Leucomatous
- Corneal oedema
- Vascularisation

KERATITIS
MORPHOLOGICAL CLASSIFICATION

ULCERATIVE

- Suppurative/non suppurative
- Superficial/deep/ perforated

NON ULCERATIVE

Superficial

Diffuse sup. Keratitis

SPK

Deep

Non suppurating

Interstitial/disciform

Suppurating

Central/posterior corneal abscess

KERATITIS
ETIOLOGICAL CLASSIFICATION

- **Infective**
- **Allergic**
- **Trophic**
- Asso. with **skin & mucous memb. ds**
- Asso. with systemic **collagen vascular ds**
- **Traumatic**
- **Idiopathic**

  Moorens ulcer

INFECTIVE KERATITIS

PATHOGENESIS

Epithelial damage	Infection
Corneal abrasion	Exogenous
Epith. Drying	Spread from ocular tissue
Epith. Necrosis	
Epith. desquamation	Endogenous

PREDISPOSING FACTORS

- Ocular
  - Trauma
  - Contact lens
  - lids and adenexal infections
  - Topical medications
- Ocular surface diseases
  - Dry eyes – Sjogrens syndrome,SJ synd. , Vit A def
  - Prolonged Corneal Exposure - Proptosis, Lagophthalmos , ectropion
  - Epi. Defect – Entropion , Trichiasis

PREDISPOSING FACTORS

- Systemic
  - Diabetes mellitus
  - Sjögren's syndrome
  - Steven johnsons syndrome
  - Connective tissue disorders
  - AIDS
  - Measles malnutrition
- Occupational
  - Farmers
  - Animal handlers
  - Gardeners

HISTORY

- Pain
- Redness
- Photophobia
- Discharge
- Lacrimation
- Decrease visual aquity

EXAMINATION

- Eyelids
- Lacrimal Sac
- Conjuntiva
- Corneal ulcer
  - size
  - shape
  - location
  - margins
  - infiltration
  - corneal sensation

EXAMINATION

- Anterior chamber
- Iris
- Pupil and Lens
- Scleral involvment
- Posterior segment/ USG

Bacterial corneal ulcers

- Agents :

  Staphlococcus aureus/ albus

  Streptococcus

  Pseudomonas

  Pneumococcus

  N. gonorrhoeae

  C. diphtheriae

  E. coli

PATHOLOGY OF CORNEAL ULCER

- Stage of ulceration- desquamation of the epithelium and tissue necrosis resulting in saucer shaped ulceration

- Progressive infiltration- progression of ulceration with leucocytes infiltration and purulent suppuration

- Regression – characterized by relatively smooth and transparent ulcer area

- Cicatrization – Scar formation

BACTERIAL CORNEAL ULCER

SYMPTOMS

Pain/ FB sensation

Redness

Watering

Photophobia

Blurred vision

SIGNS

Lid oedema

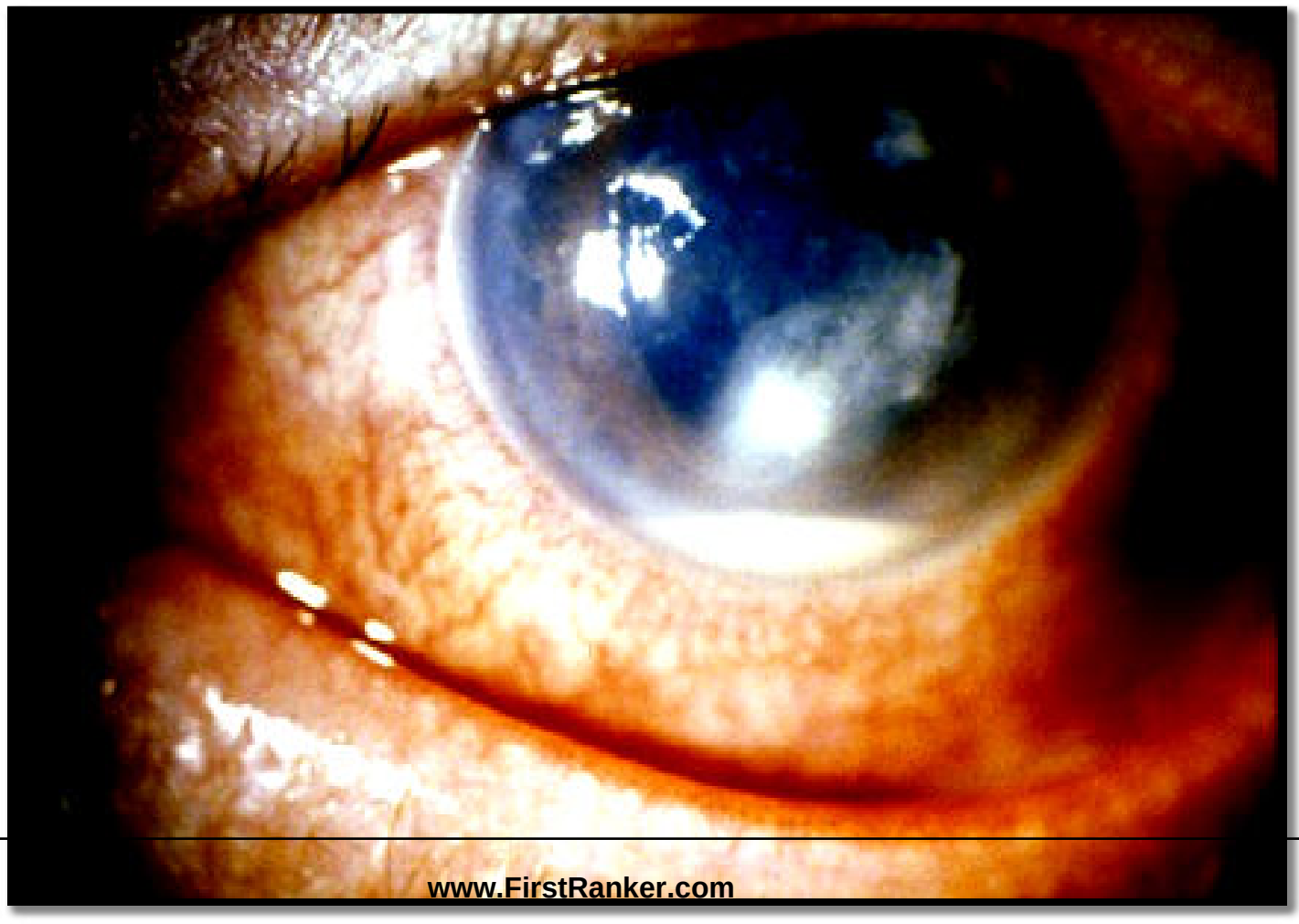
Blepharospasm

Conj.chemosis

Infiltration

Corneal oedema

Hypopyon +/ -



- Symptoms are acute
- Severe clinical signs
- Rapid progression
- Wet looking ulcer area
- Purulent discharge

TREATMENT OF BACTERIAL KERATITIS

UNCOMPLICATED ULCER

- Identify & treat the cause
  - Corneal scraping
  - staining/culture
  - Antibiotics
- Rest to eye → Cycloplegics
- Antiglaucoma medications
- Systemic antibiotics

PERFORATED ULCER

Small < 3mm

- IOP lowering drugs
- Pressure bandage
- Bandage contact lens
- Tissue adhesives
- Conj. flap

Large >3mm

- Therapeutic PK

Fungal keratitis

- Incidence is low
- Most common organism is Aspergillus
- Infections are more common when there is high humidity

Classification

- Filamentous

1. Septate

- Nonpigmented – Fusarium
  Aspergillus
  Penicillium
- Pigmented - Curvularia
  Alternaria

2. Nonseptate

Rhizopus

- Yeast

Candida

FUNGAL (MYCOTIC) CORNEAL ULCERS

- Etiology ⟶ Trauma with organic matter
  Injury with animal tail
  Systemic/ local immune suppresion
- Causative agent Aspergillus , Fusarium
  Candida , Cryptococcus
  Curvularia, Alternaria
- Indolent course
- Symptom – foreign body sensation , photophobia , blurred vision and discharge

SIGNS MORE THAN SYMPTOMS

SIGNS

Soft creamy raised exudates

Dry looking

Feathery margins

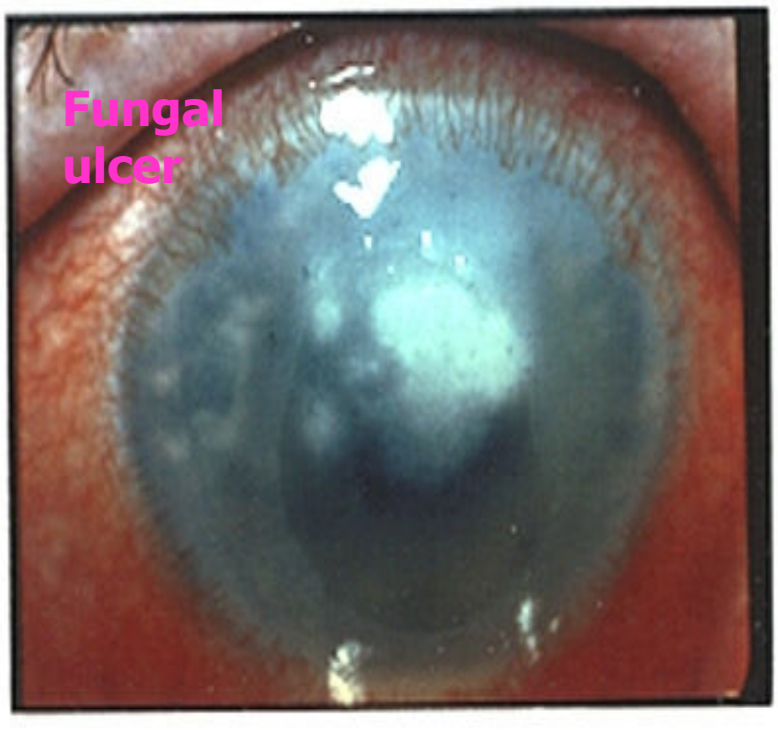
Satellite lesions

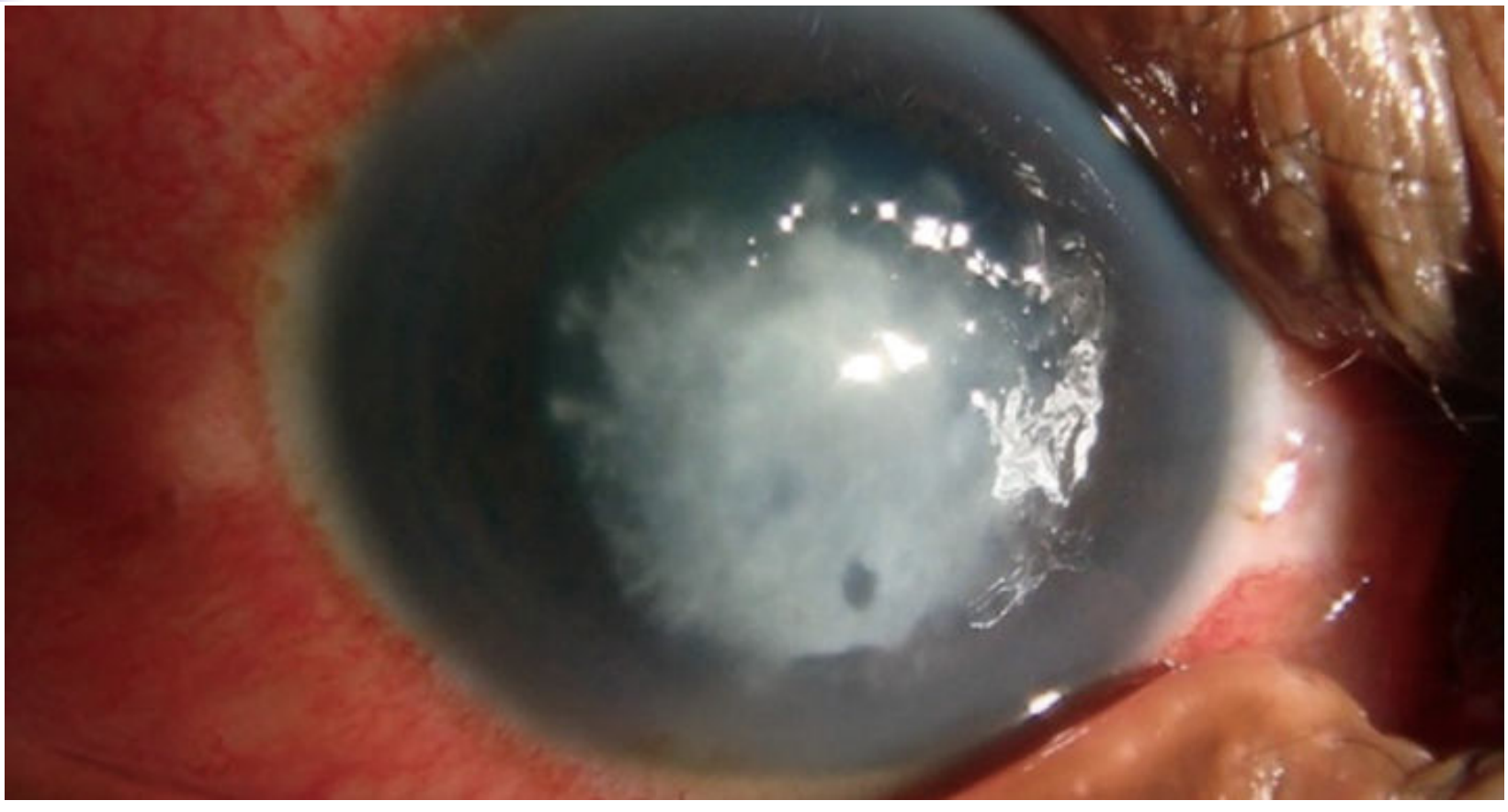
Immune ring of Wesseley

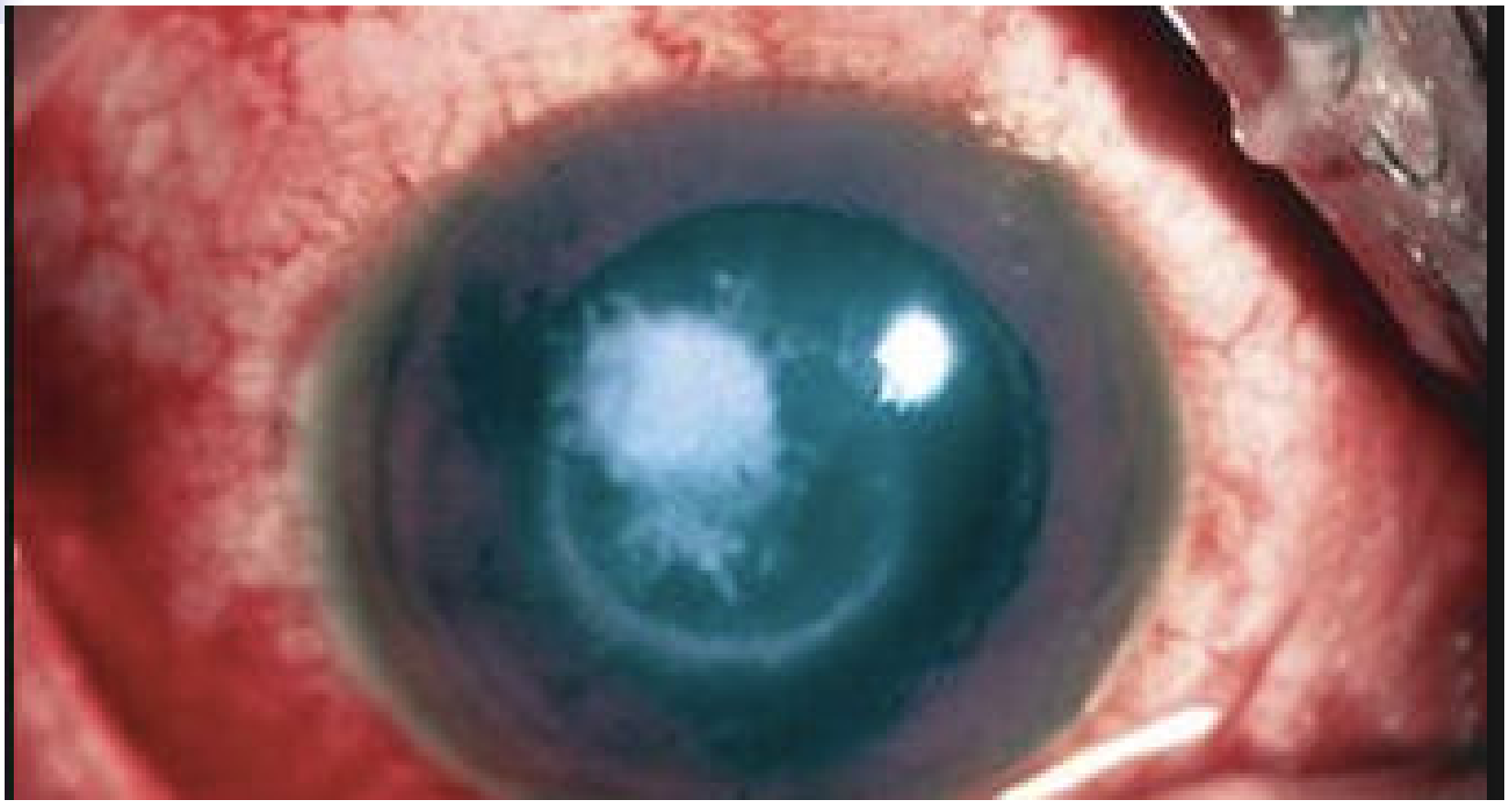
Hypopyon +/-

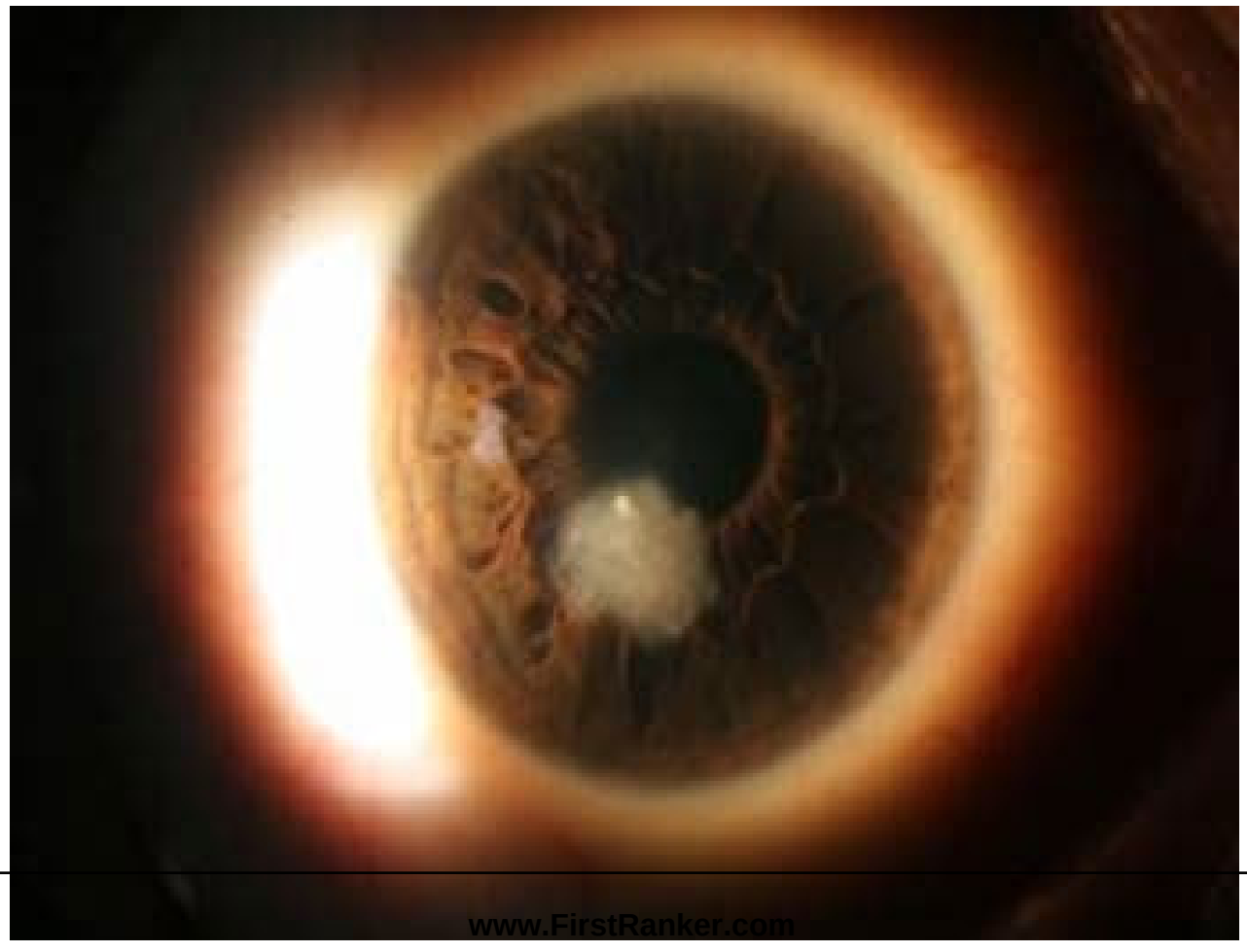
Endothelial plaque

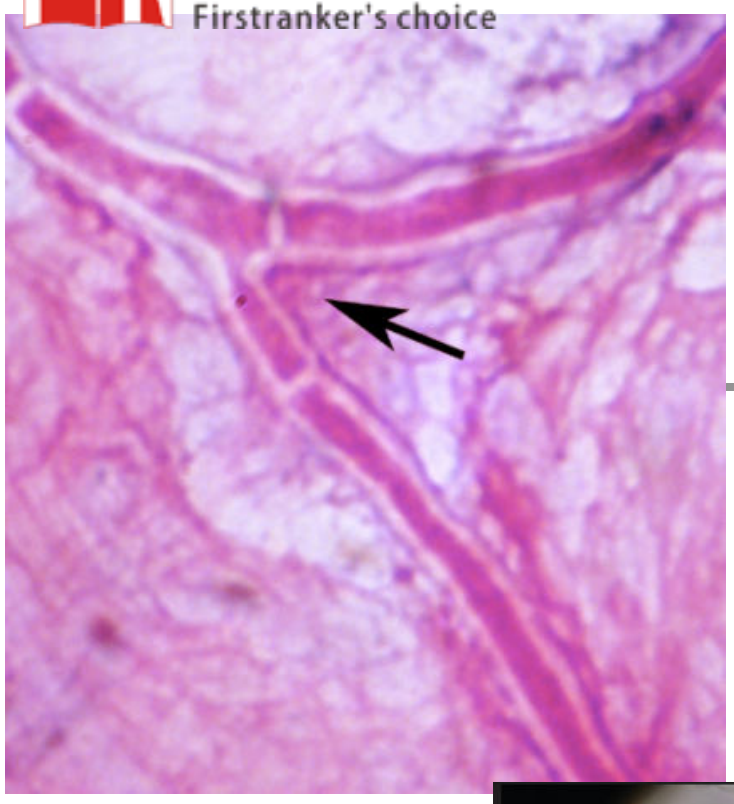
Posterior abscess

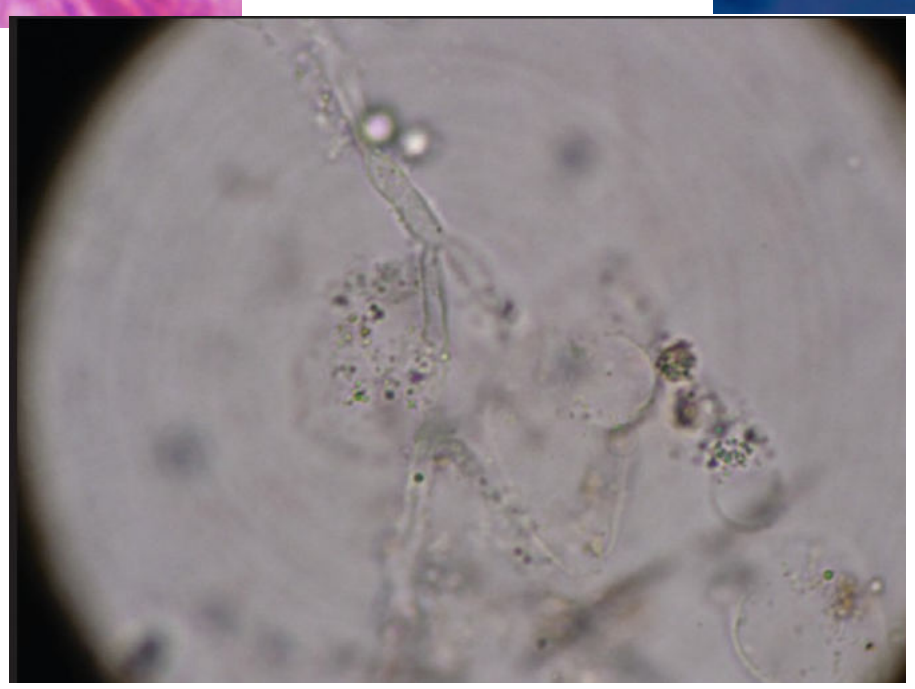












DIAGNOSIS

- History ⟶ Organic matter
- Typical clinical picture
- Corneal scrapings ↓

  KOH wet mount
  Gram, Giemsa staining
  Calcoflour white
  Culture on SDA

TREATMENT

- Topical antifungals
  Natamycin 5%
  Itraconazole 1%
  Fluconazole 0.2%
  Amphotericin B 0.1-0.2%
- Systemic antifungals
- Cycloplegics
- Anti inflammatory drugs
- Therapeutic PK in unresponsive cases

COURSE OF CORNEAL ULCER

Healing Deep penetration Sloughing

Descemetocele → Perforation → Adherent leucoma

Pseudocornea → Ant. Staphyloma

COMPLICATIONS

- Toxic iridocyclitis
- Secondary glaucoma
- Descemetocele
- **Perforation**

  Iris prolapse

  Ant. Capsular cataract

  Corneal fistula

  Spontaneous expulsion of lens & vitreous

  Intraocular haemorrhage ⟶ Expulsive hmg.

  Purulent uveitis ⟶ Endophthalmitis/ Panophthalmitis
- Corneal scarring/ opacification