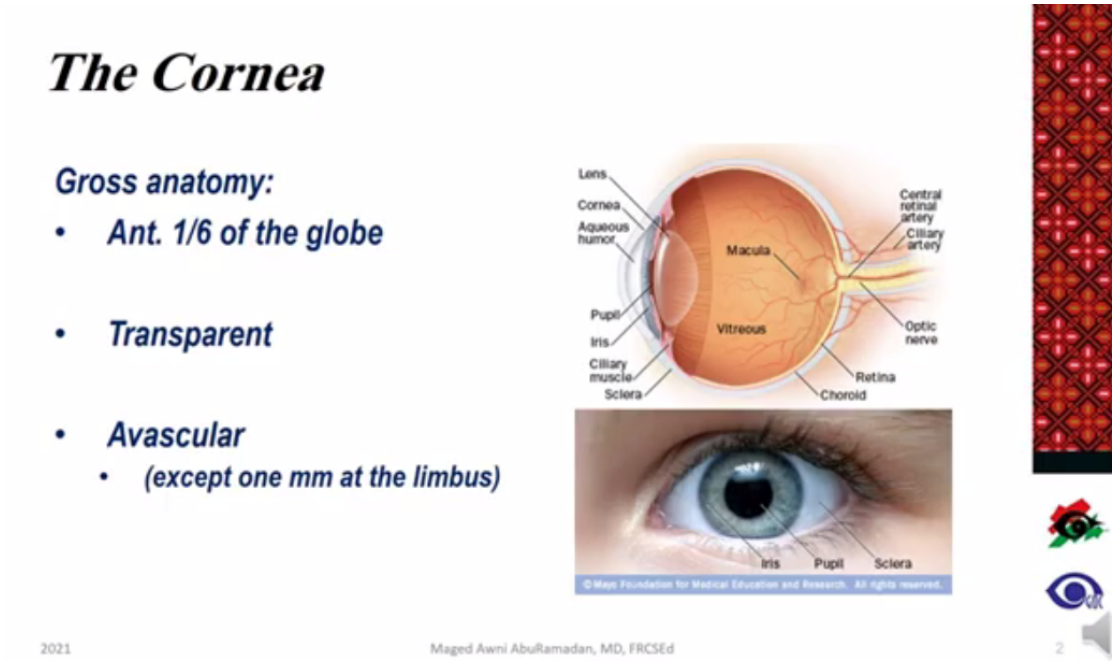
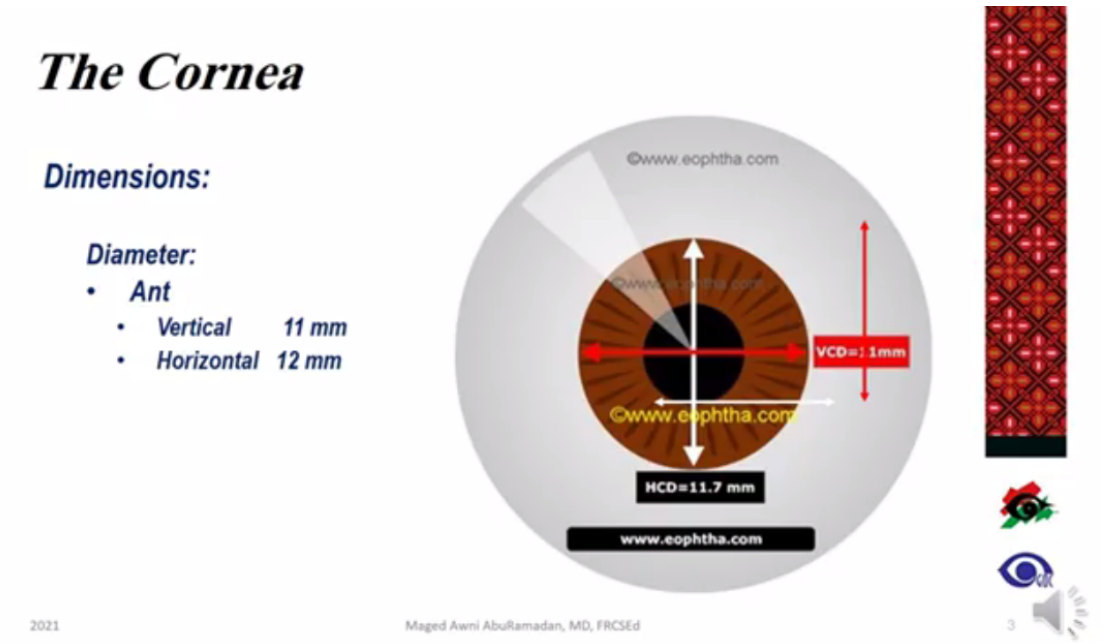


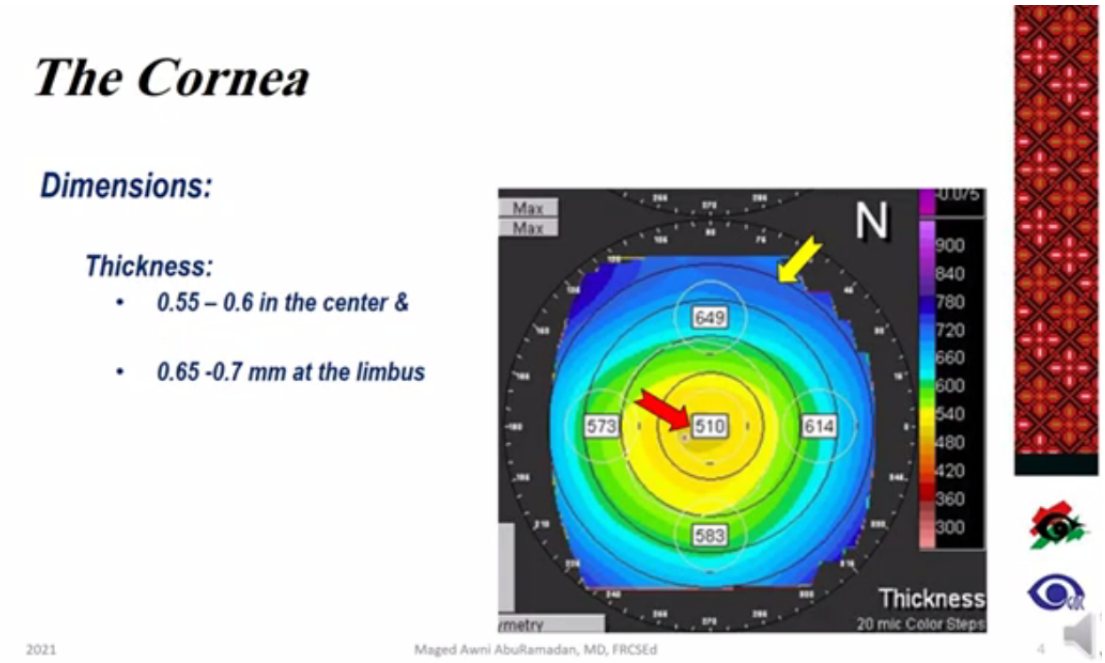
Good morning. This lecture is part one about the cornea and its diseases, mainly the general aspects of corneal infection and ulcer



.the cornea is the anterior one six of the globe it is transparent and avascular .



.It measures 11 millimeter vertically and 12 millimeter in the horizontal



The thickness in the center of the cornea is about 550 microns while it goes up to 700 microns near the limbus

The Cornea

Nerve supply:

- V ophthalmic division
- → Naso - ciliary nerve
- → 2 long ciliary nerves

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The cornea is supplied by the Opthalmic division of the fifth cranial nerve which gives a . nasociliary nerve and two long ciliary nerve

Corneal Reflex

1. Stimulus:
   - Corneal touch
2. Afferent:
   - 5th nerve V
3. Center:
   - Brain Stem (pons)
4. Efferent:
   - 7th nerve VII
5. Response:
   - Lid closure



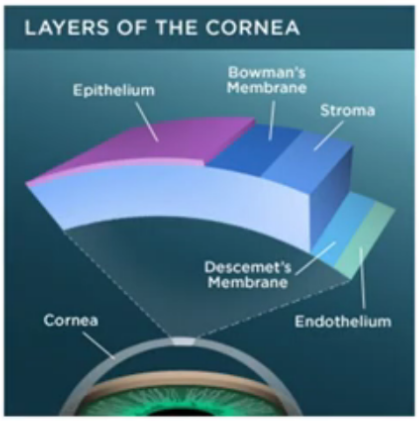
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the corneal reflex is very important in examining neurological and ophthalmic cases as well. . The stimulus is Corneal touch, which gives afferent impulses through the trigeminal nerve into the pons. And then from there, through the seventh facial nerve response leads to lid .closure due to orbicularis oculi contraction

The Cornea

Micro anatomy:

- **Consists of 5 layers**
  1. **Epithelium**
  2. **Bowman's Layer (Membrane)**
  3. **Stroma**
  4. **Descemet's Membrane**
  5. **Endothelium**

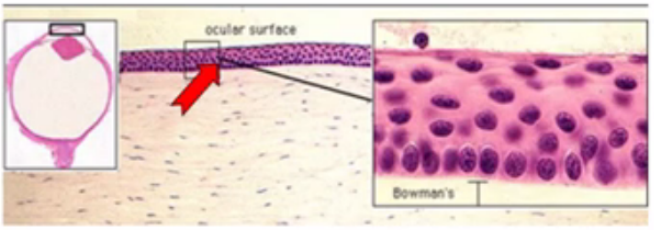


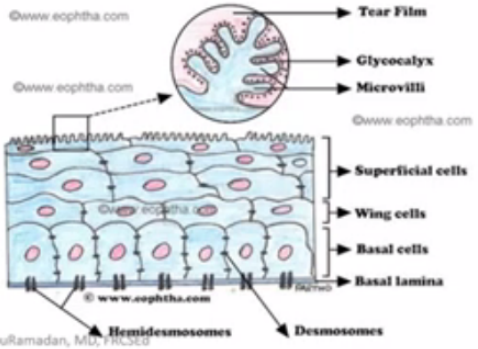
The micro anatomy of the Cornea shows that it consists of five layers: epithelium, Bowman's layer, or membrane stroma, descemet membrane and the endothelium in the posterior aspect

Epithelium

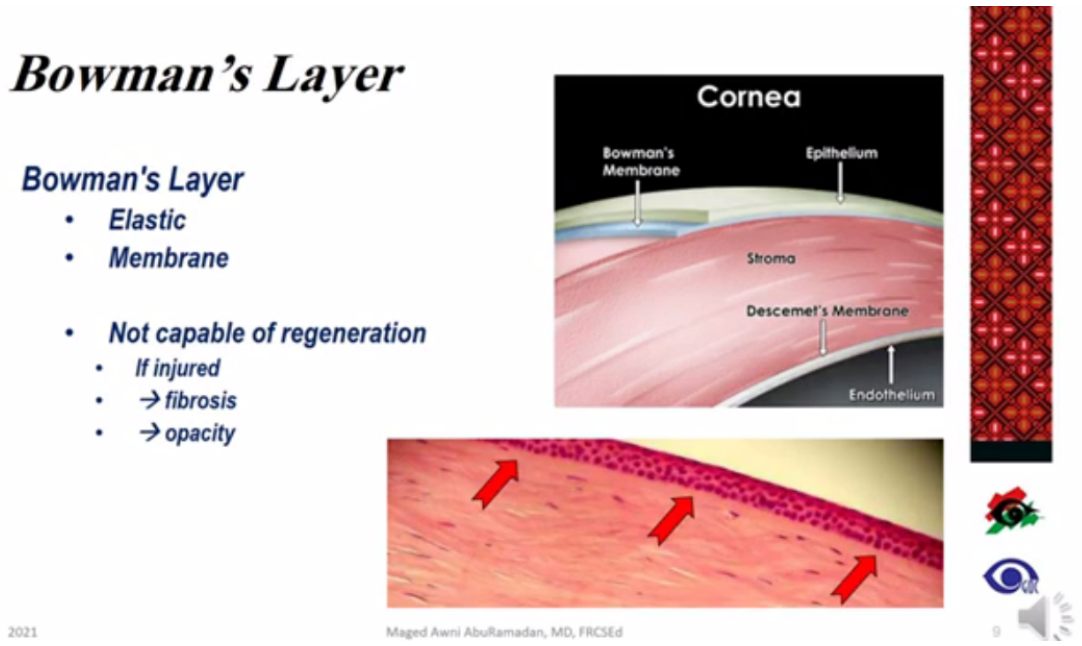
Epithelium

- **5-6 cell layers**
- **Flat**
- **Stratified**
- **Squamous**
- **Non – keratinized**

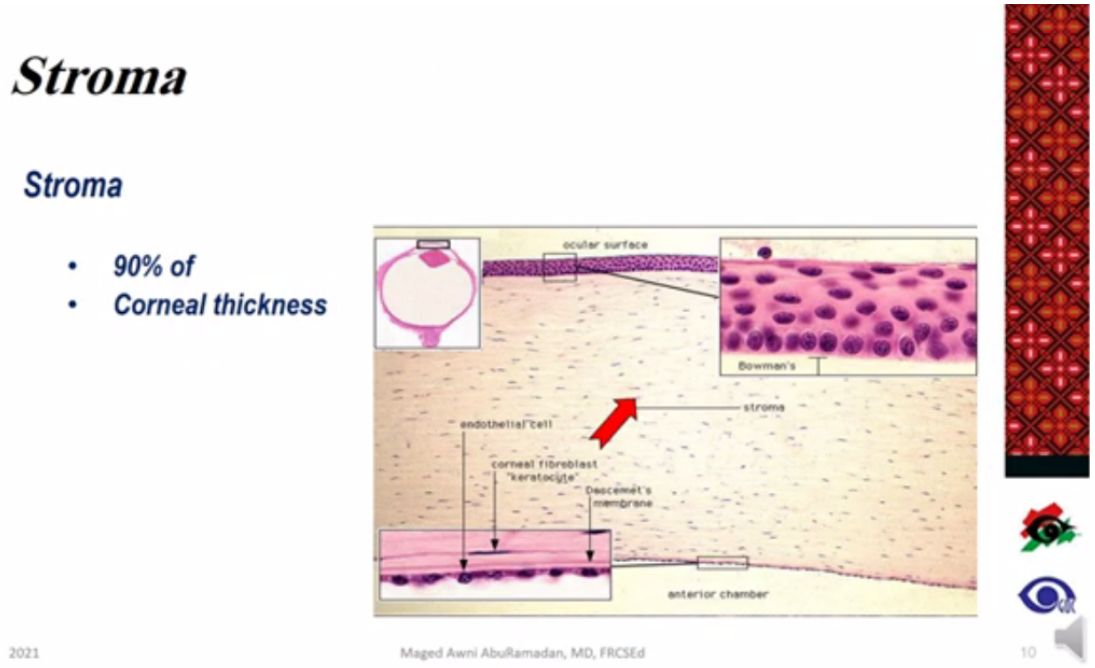




.the epithelium is five to six layers deep which is flat stratified squamous, non keratinized .



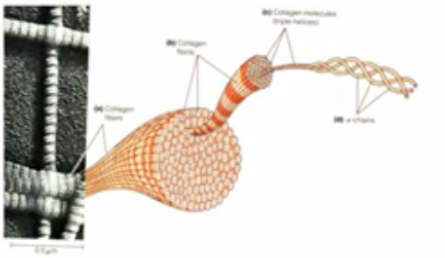
Bowman's layer is elastic membrane, however, it is not capable of regeneration. So if injured, it will lead to obacity due to fibrosis

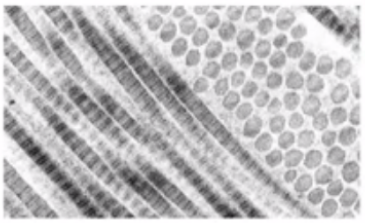


.stroma consist 90% of the corneal thickness .

Stroma

- Formed of collagenous bundles which are:
  1. Parallel to the corneal surface
  2. Cross each other at right angle
  3. Bathed in MPS

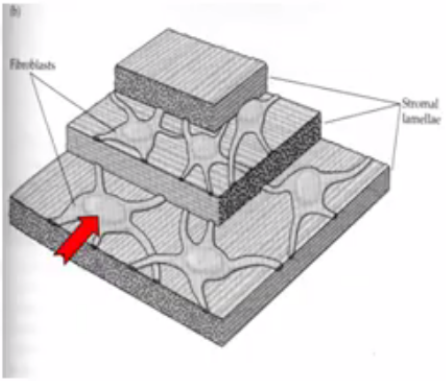




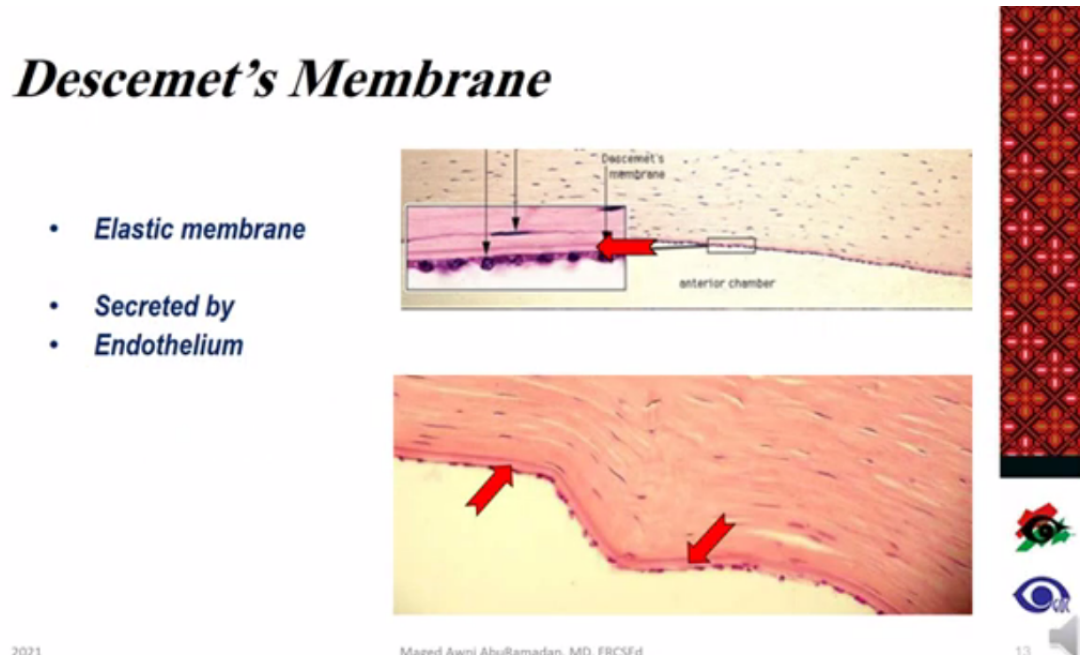
stroma is made of collagen bundles which are parallel to the corneal surface and cross each .other at right angles. This bundles are bathed in mucopolysaccharide matrix

Stroma

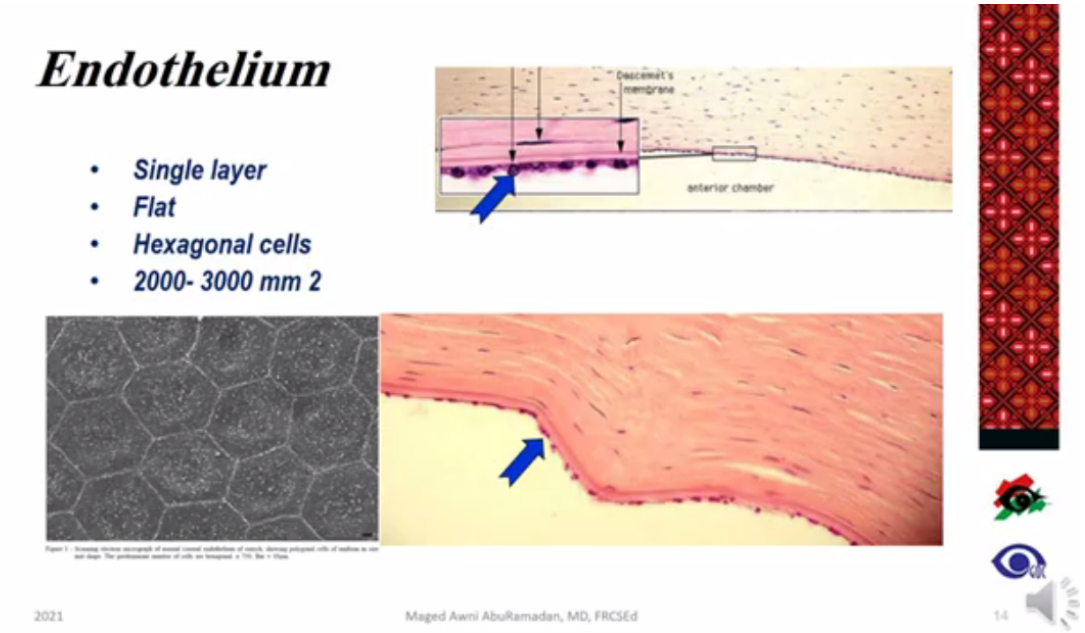
- In between
  - there are spaces
  - which contain
    1. Fixed keratocyte
    2. Wandering macrophages



In between these Lemonly there are spaces which contain fixed keratocyte as well as .wandering macrophages



.Descemet membrane is an elastic membrane secreted by the underneath endothelium

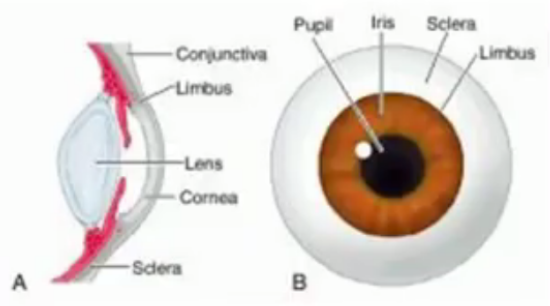


the endothelium is one single layer of flat hexagonal cells each millimeter contains 2000 to .3000 cells in average

The Limbus

The Limbus

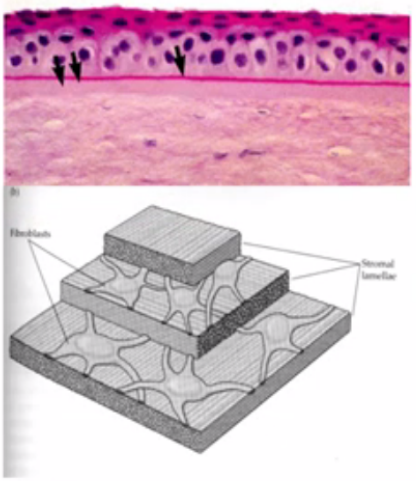
(Corneo-scleral junction)



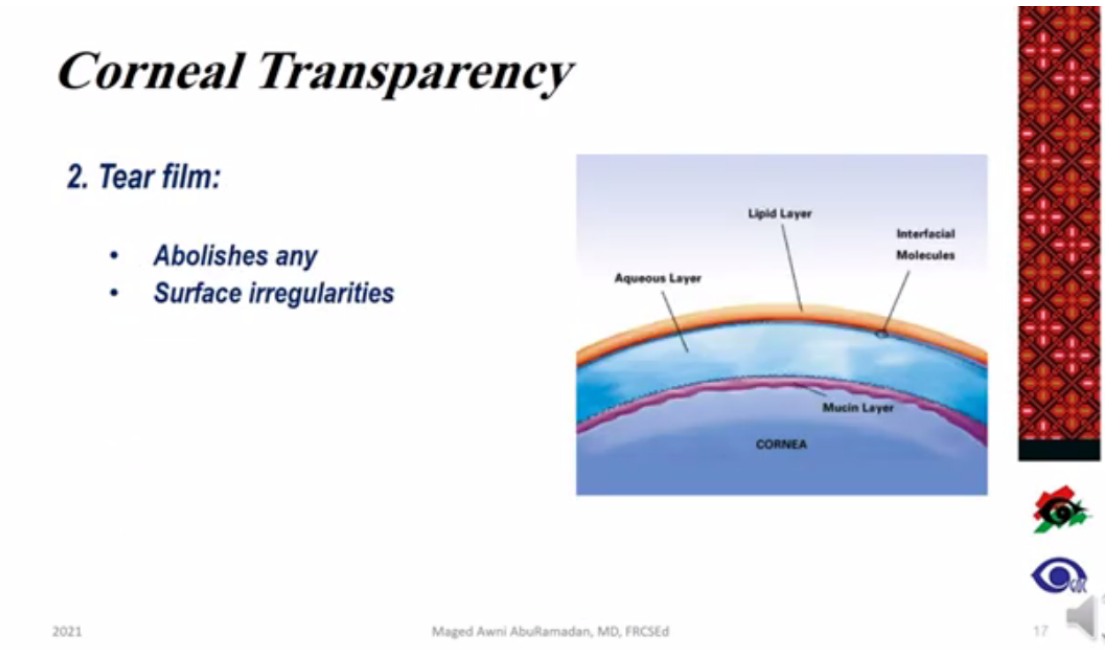
.the Limbus is Corneoscleral junction

Corneal Transparency

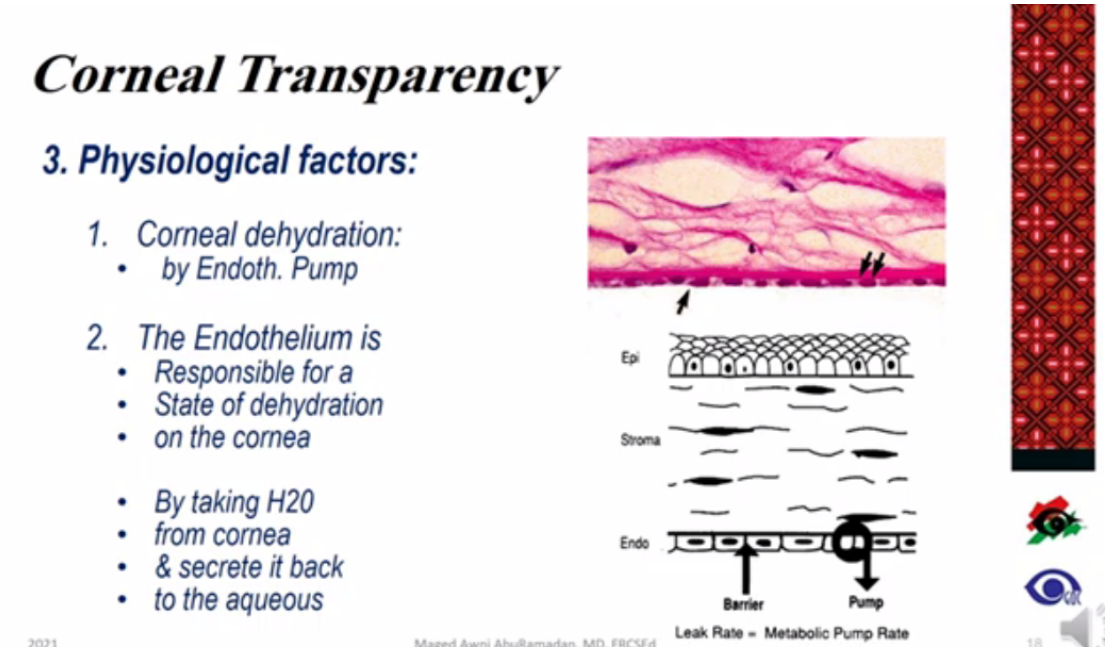
1. Anatomical factors:
   1. Epithelium:
      - Non keratinized
   2. Stroma:
      - Regular & packed
   3. BV:
      - Avascular
   4. Nerves:
      - Non-myelinated



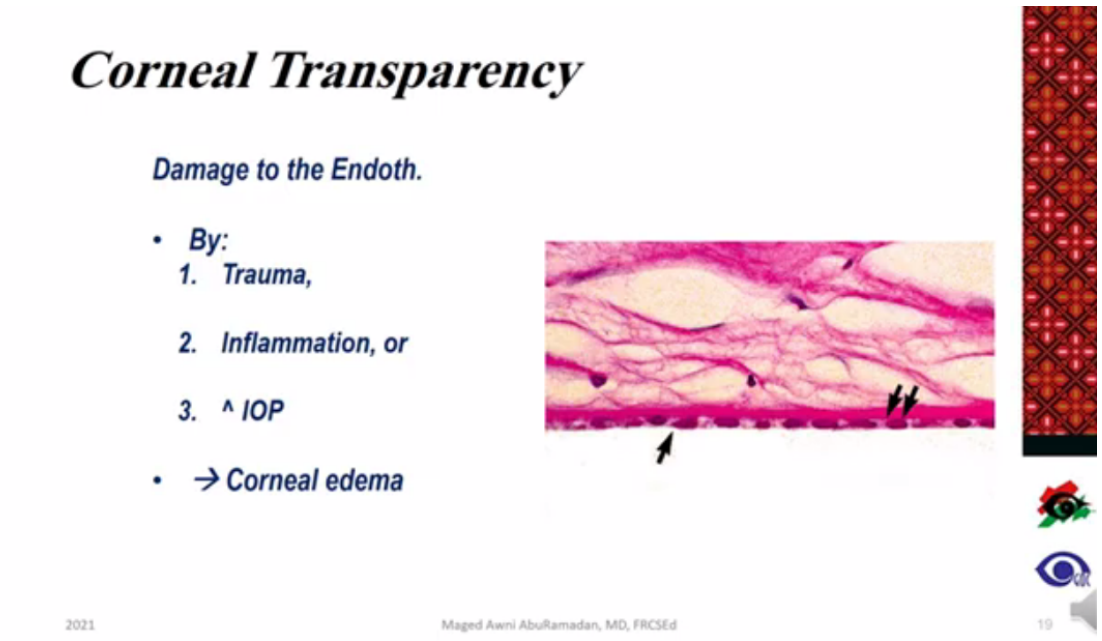
Cornea is transparent due to several factors first anatomical factors including the non keratinized epithelium. The regularly packed stroma., the avascularity of the cornea, as well as the non myelinated nerves



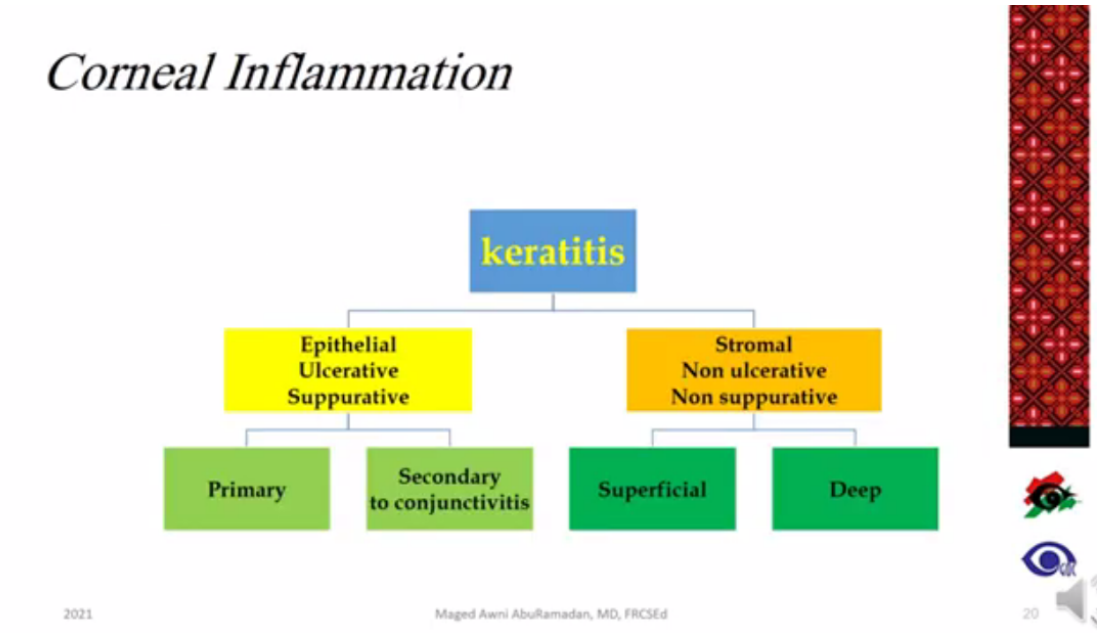
.the tear film abolishes any surface irregularity



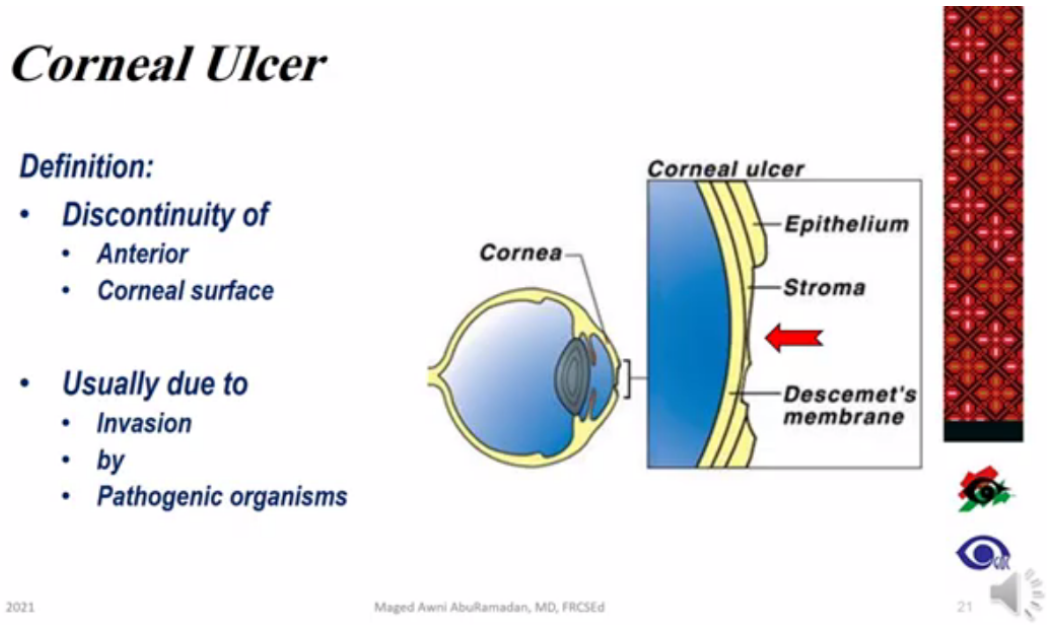
physiological factors including corneal dehydration because of the endothelial pump. the epithelium is responsible for the state of dehydration on the cornea. It takes water out from .the cornea and secreted back into the aqueous humor



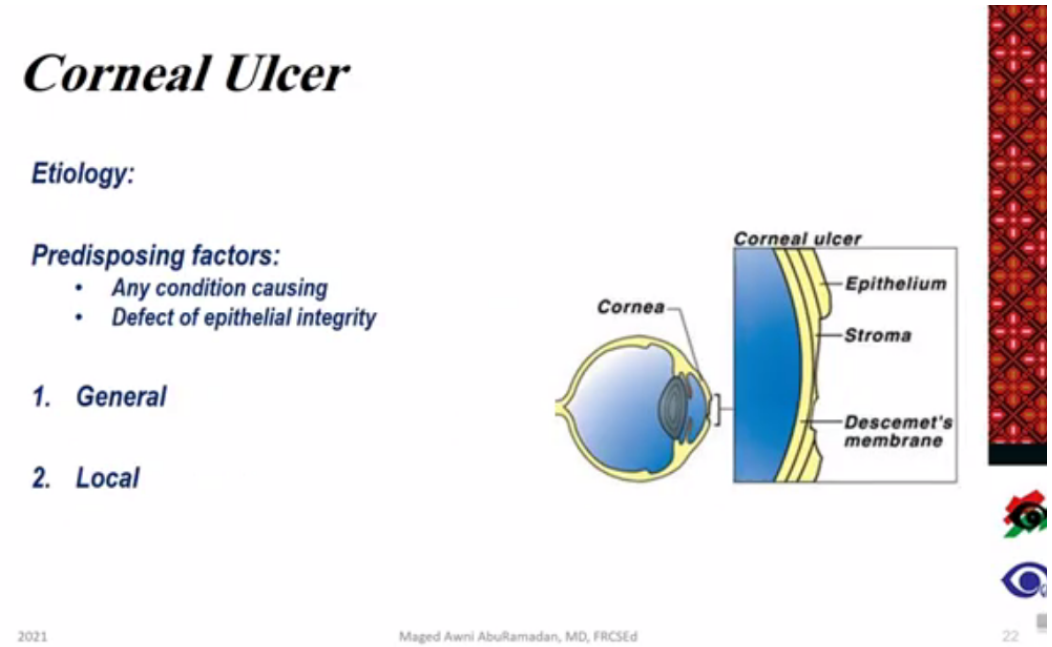
Damage to the endothelium by trauma inflammation increased intraocular pressure or any .cause may lead to corneal edema



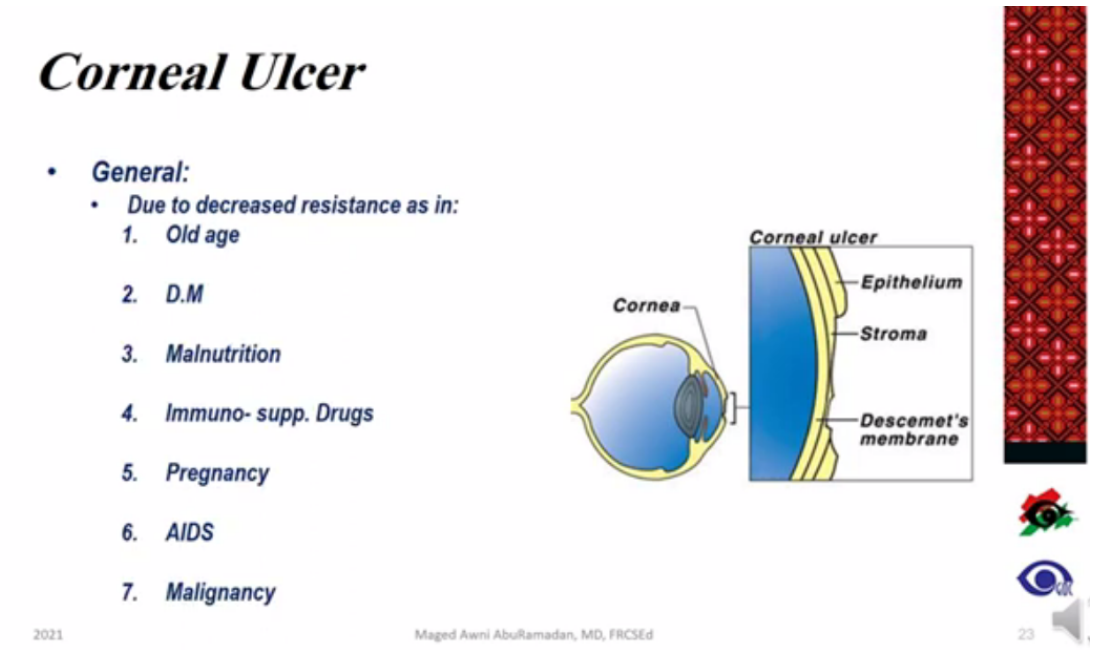
infection or inflammation of the cornea is called keratitis. keratitis can be either epithelial or stromal, the epithelial ulcer is usually suppuration. While the trauma is no ulcers, and there is no separation in most cases, endothelial ulcers can be primary or secondary to .conjunctiva. While stromal inflammation can be superficial or deep



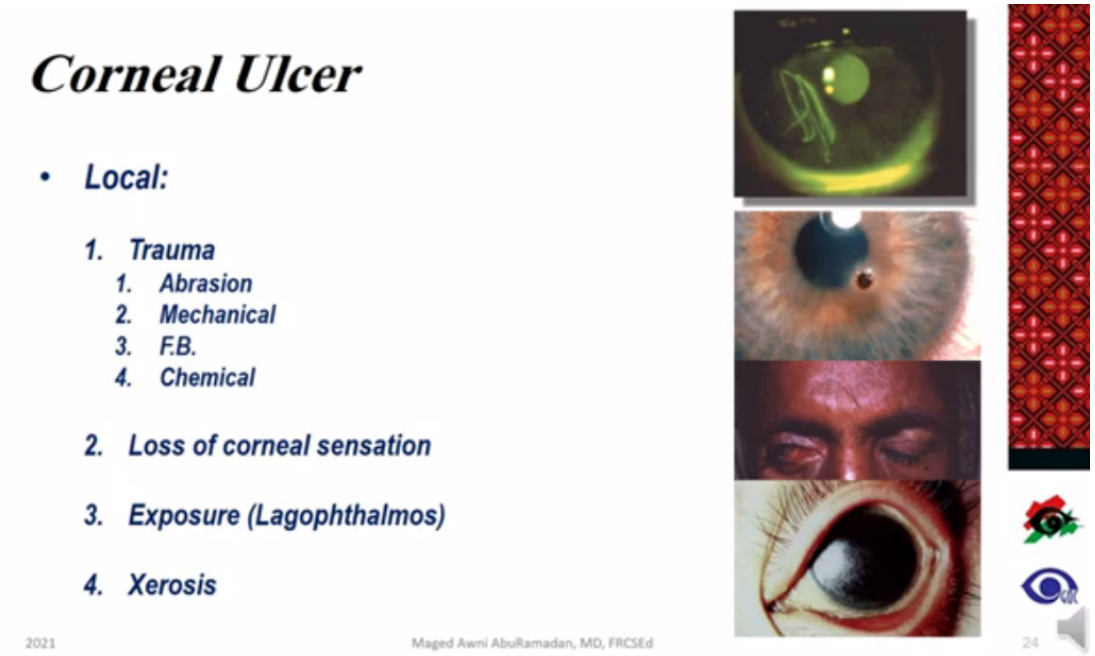
An ulcer is a discontinuity of the anterior Corneal Surface, usually due to invasion by pathogenic organisms which destroys the epithelium and expose the underlying collagenous stroma



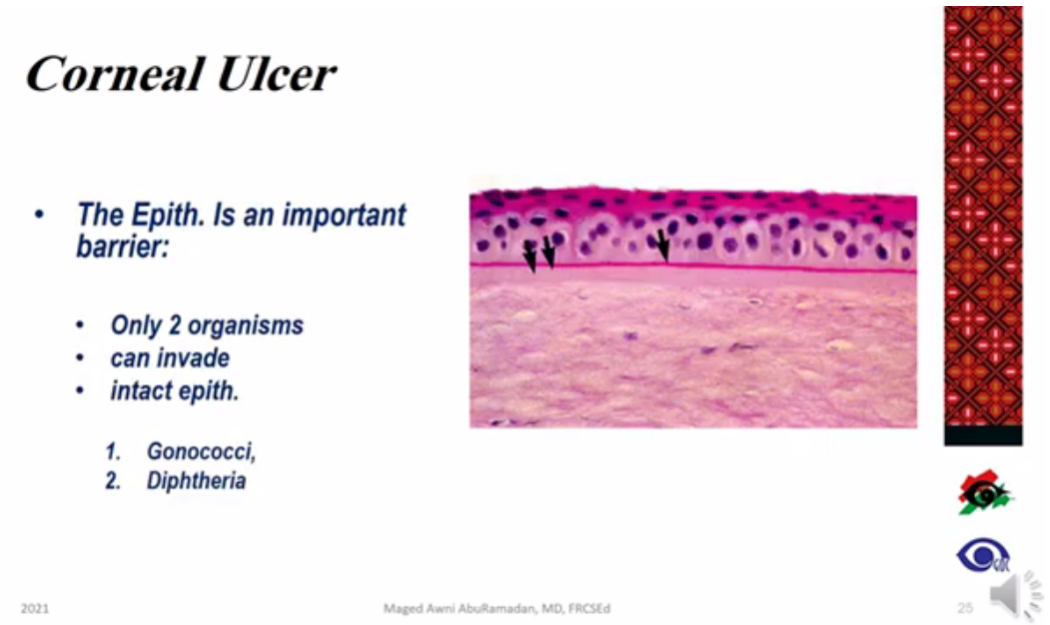
.predisposing factor can be general or local .



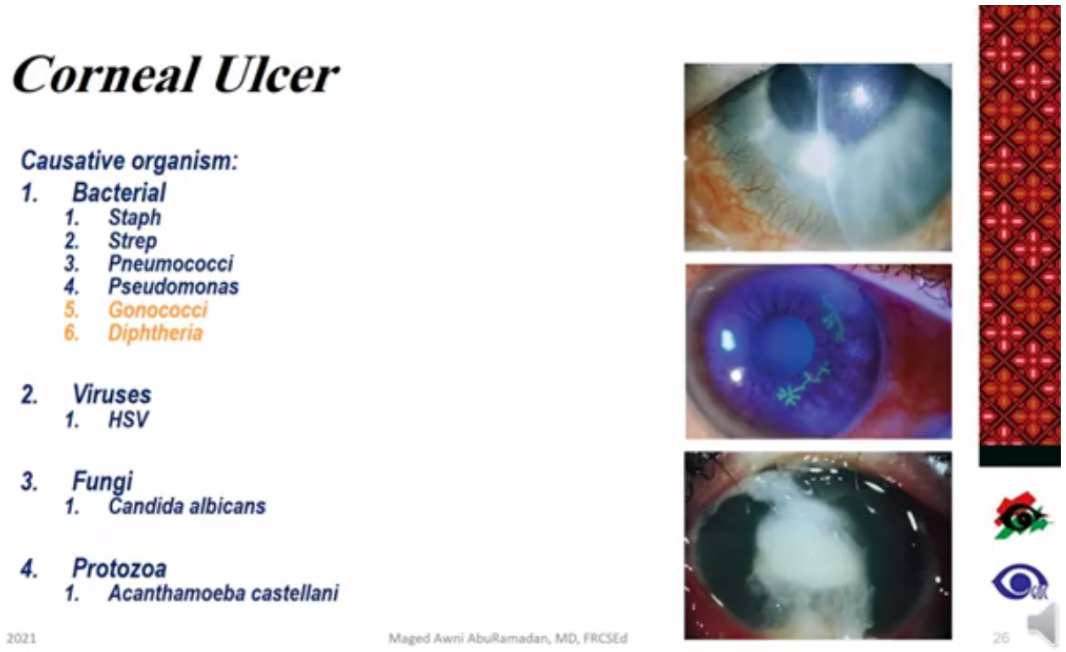
general factors is usually due to decreased resistance in the body as we can see in old age in .diabetes or malnutrition in immunosuppressive drugs, pregnancy AIDS and in malignancy



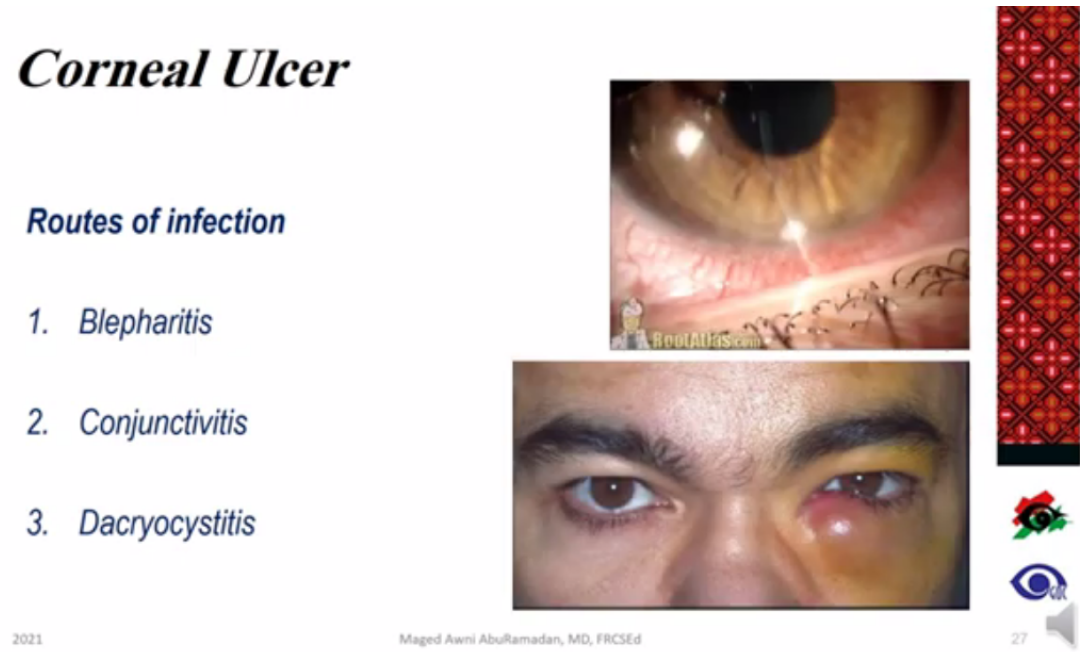
Causes and predisposing factors include trauma with weather abrasion or mechanical force or foreign body or chemical burn, as well as loss of corneal sensation, exposure in case of lagophthalmos is a major factor. the xerosis can be a result of severe dryness due to either .previous conjunctival infection or vitamin A deficiency



The epithelium is an important barrier against the invading organism. Only Gonococci and diphtheria can invade an intact epithelium all other organisms to reach the stroma have to .go through a damaged epithelium



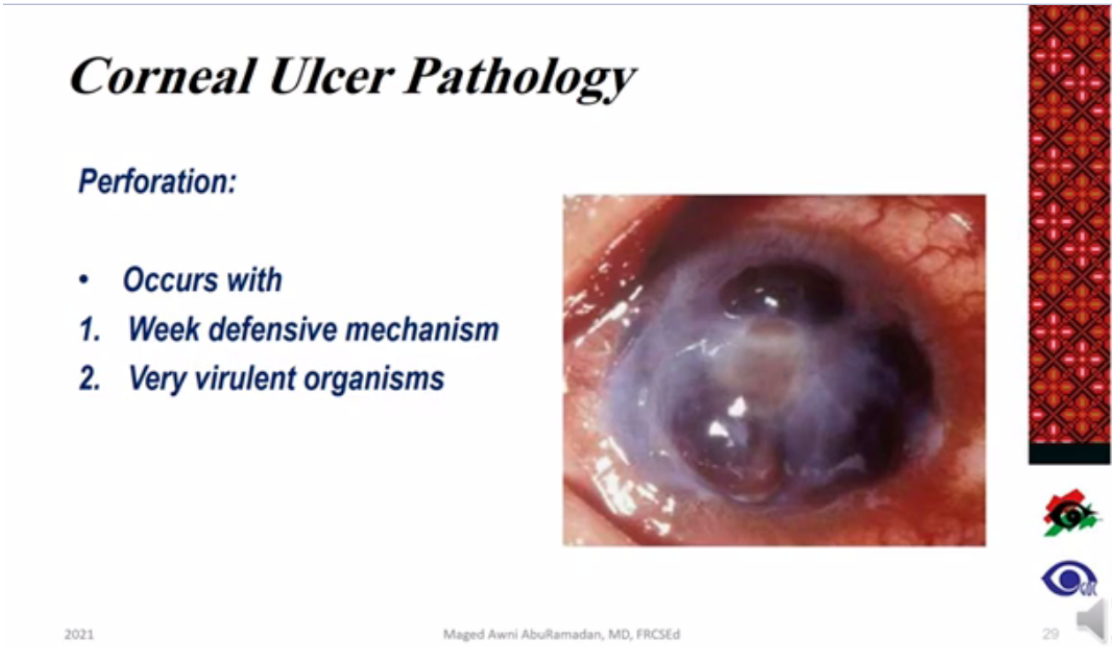
causative organism might be bacterial as staph, strep, strepto pneumonia or Pseudomonas and as well as of course Gonococci and diphtheria. It can be virus as herpes simplex or fungus as in Candida albicans, protozoan acanthamoeba castellanii is also a causative of .severe painful keratitis



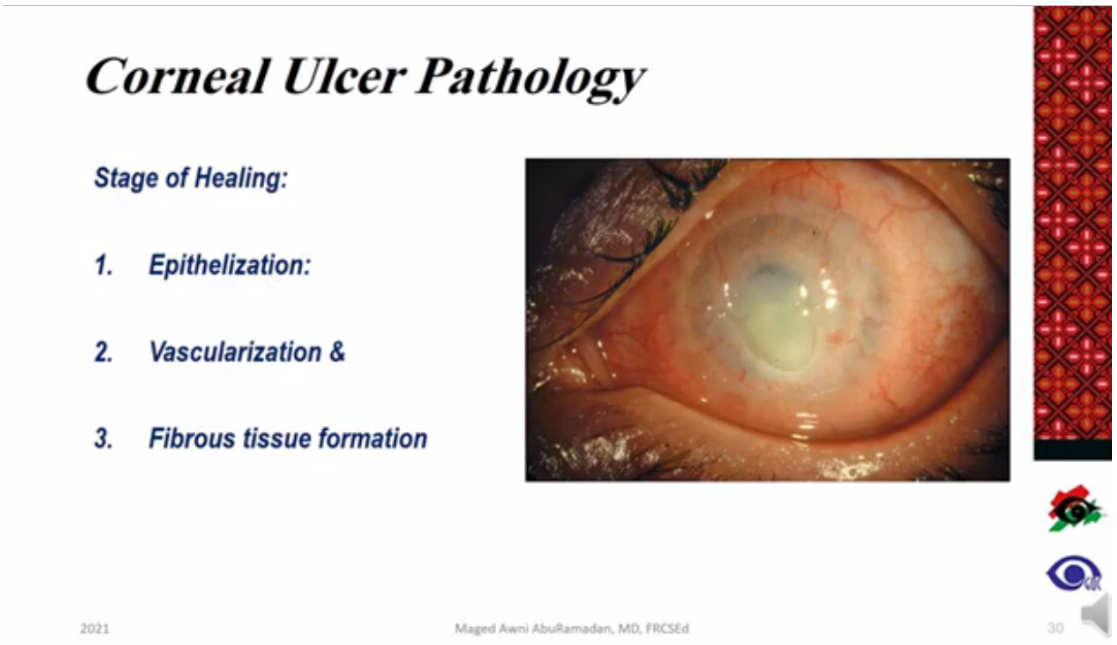
The route of infection is either through blepharitis and conjunctivitis or secondary to .dacryocystitis



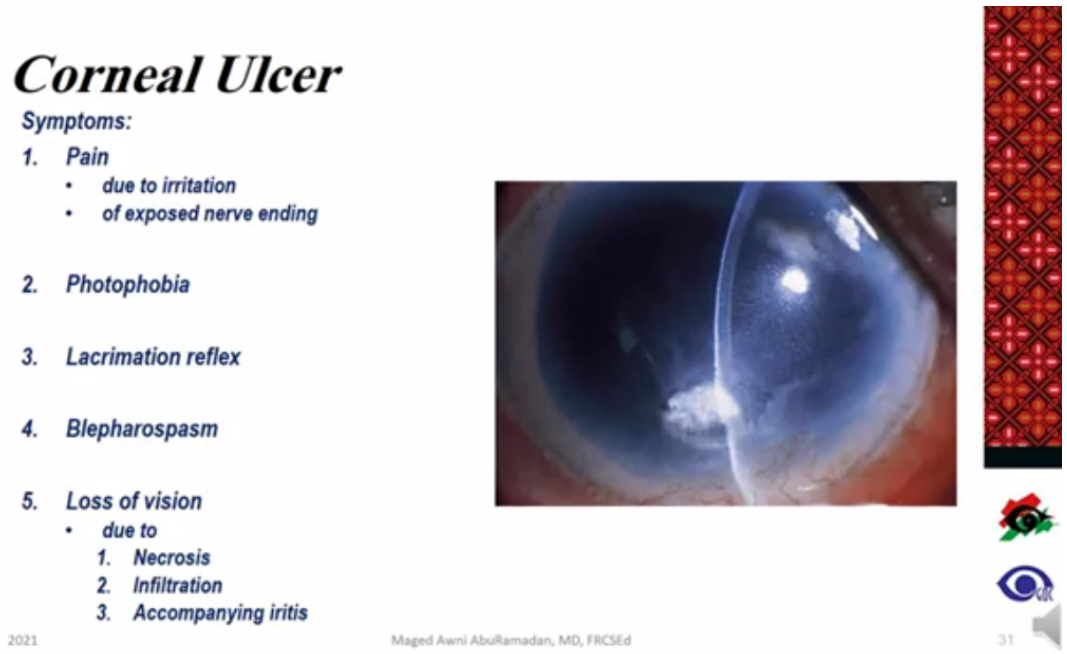
A corneal ulcer passes through several stages like the stage of infiltration in the very early case and then that leads to ulcer which can be early or late and finally the stage of healing .with fibrosis and new vessels



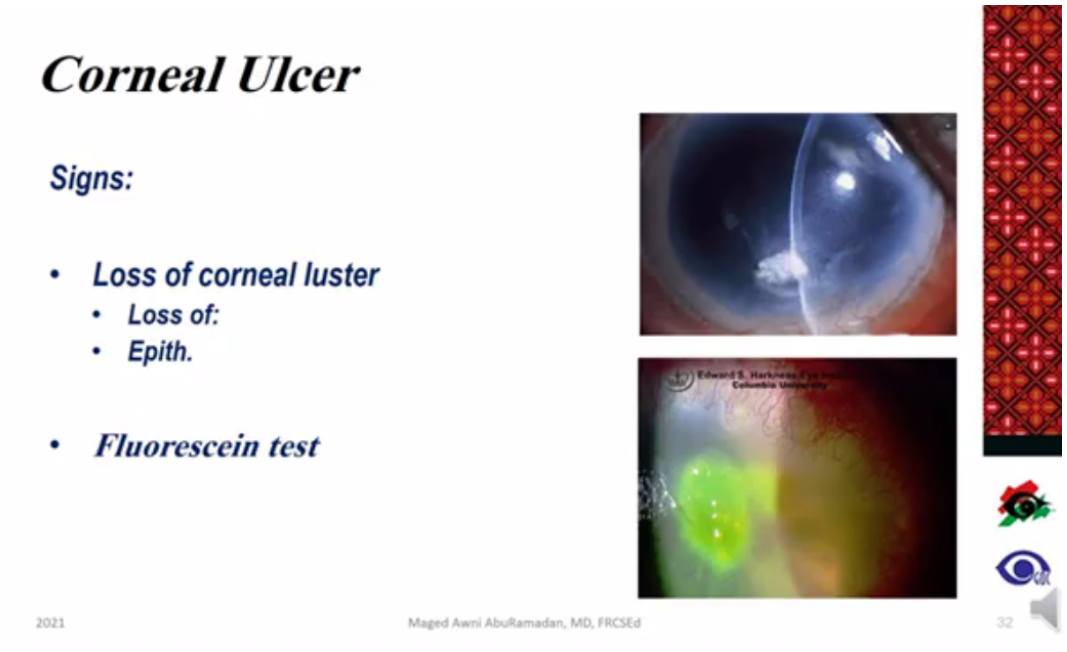
perforation may occur if we have a weak defensive mechanism or very virulent organism or .both



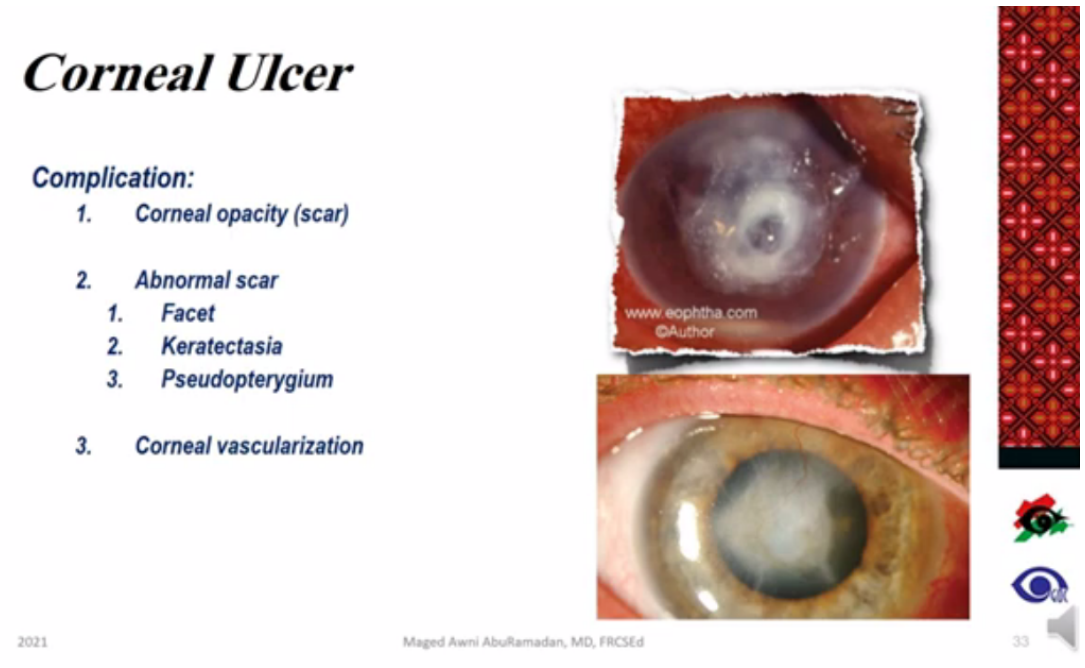
in healing there are three stages: epithelialization, vascularization and collagen fibrous tissue . formation



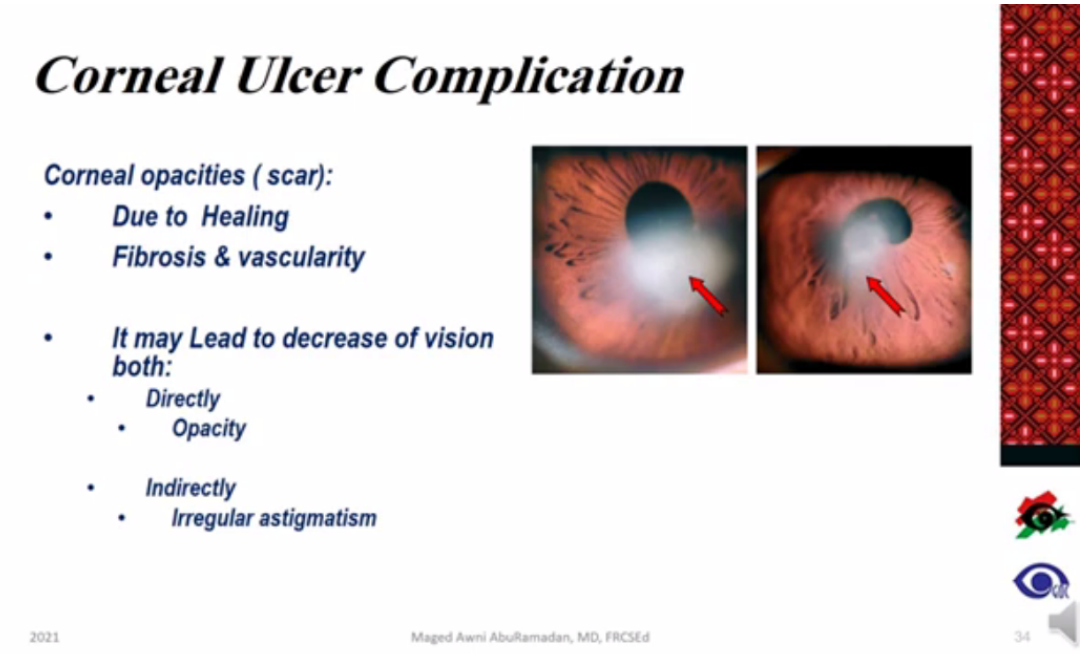
in corneal ulcer the patient might complaint from severe pain due to irritation of the exposed nerve endings, by the toxin or the organism there will be also reflex associated photophobia ,lacrimation and blepharospasm .loss of vision may be due to necrosis infiltration itself or due to the accompanying Iritis



On examination there is loss of corneal luster when lost with epithelium which we can. delineate by doing fluorescent test, the green staining means the epithelium is damaged and .the stromal collagen is stained by the pigment



Corneal ulcer can give rise to several variety of complication, mostly Corneal opacity or scar which can have several forms either as a facet or keratoectasia or even pseudopterygium. .Corneal vascularity whether superficial or deep is also a very well known corneal conflict

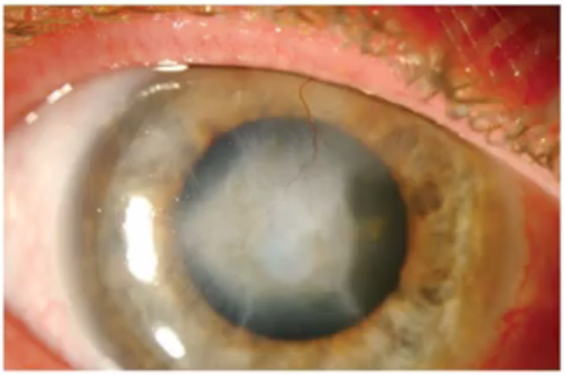


Corneal opacity is due to healing process with the position of collagen leading to fibrosis and vascularity. It may lead to decreased vision either directly by the opacity itself or indirectly by . inducing irregular astigmatism in refractive Corneal

Corneal Ulcer Complication

Corneal vascularization

1. Superficial NV
2. Deep NV



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.Corneal vessels can be superficial or deep

Corneal Ulcer

Treatment:

1. local ttt
2. General ttt
3. ttt of complication

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The treatment have three main forms: local treatment, general treatment and the treatment .of complication

Corneal Ulcer

local ttt:

1. Antibiotics
2. Bandage!
3. Hot fomentation

local treatment involves mainly antibiotics, especial bandage contact lens may be used in certain selected cases under the strict observation of an ophthalmologist. Hot fomentation is .usually used

Corneal Ulcer

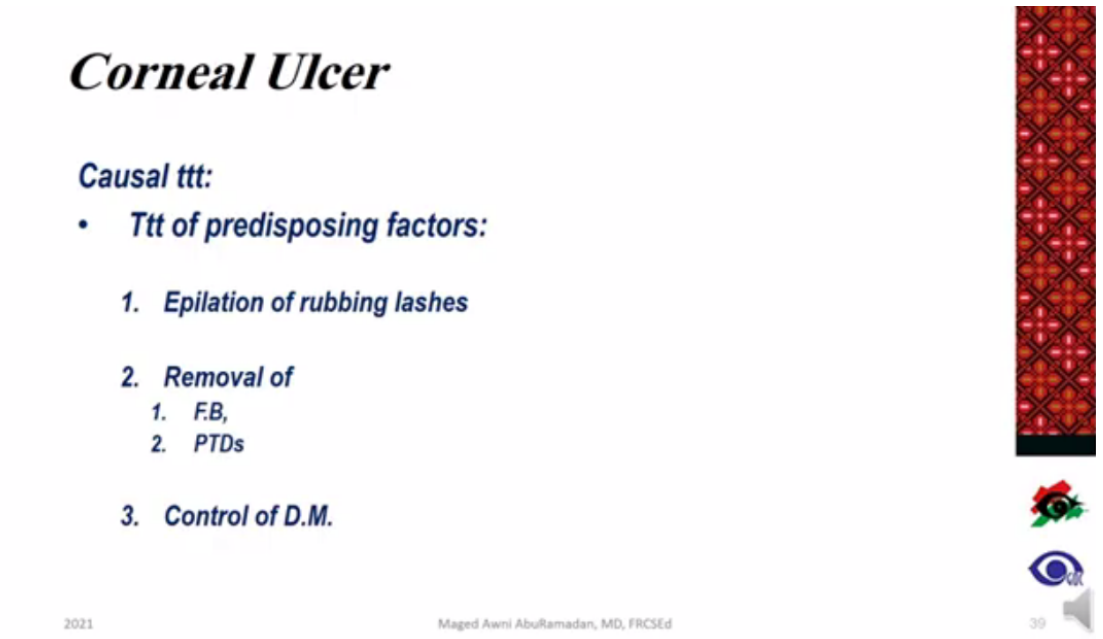
Antibiotics

- Route

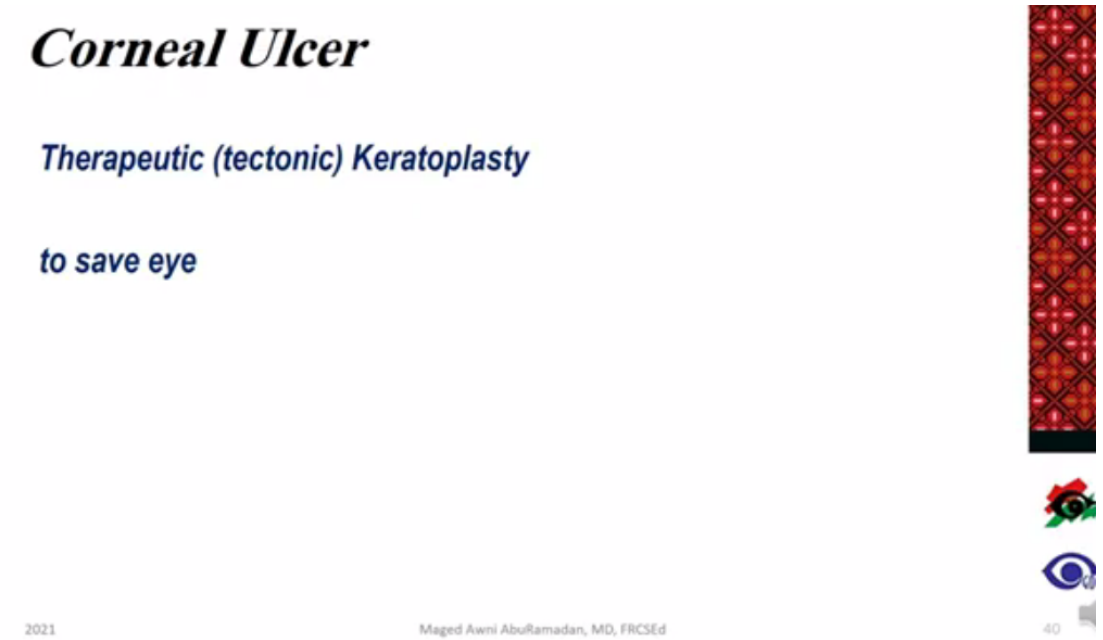
1. Drops
2. Ointment
3. Sub conjunctival injection



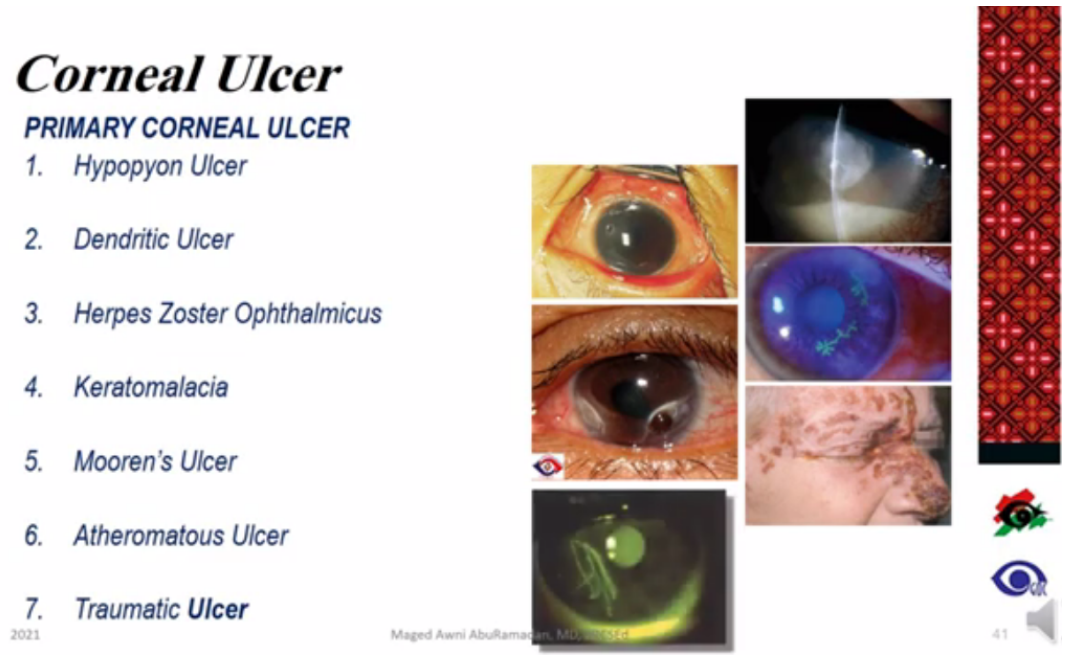
Antibiotics can be installed as drops or ointment or can be given as a Subconjunctival ,injection in severe cases



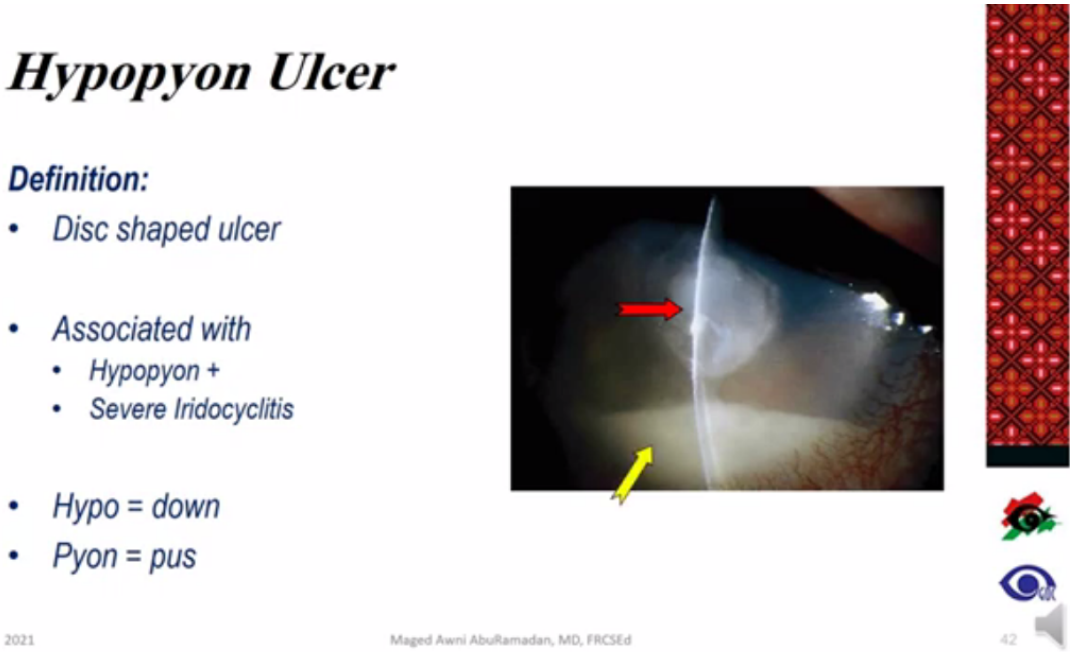
Causal treatment as a epilation or rubbing of the lashes, removing of the foreign body or .PTDs. And control of diabetes mellitus is also important



At the end if the Cornea is severely damaged therapeutic or Tectonic keratoplasty may be .needed to save the eye



Corneal ulcer, primary ones can be either hypopyon ulcer, dendritic ulcer ulcer associated with herpes zoster ophthalmicus, Keratomalacia, Maoren's ulcer ,atheromatous ulcer or .traumatic ulcers



hypopyon ulcer is defined as the disk shaped ulcer in the central cornea, which is associated with hypopyon and severe Iridocyclitis. hypo is down, pyon means pus and hypopyon means pus in the lower part of the anterior chamber of the eye which accumulates there by gravity.

.Thank you