



Gaza Ophthalmic Centre

3.2 The Cornea

(Part 2)

Ophthalmology

FOR GP's & MEDICAL STUDENTS

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Gaza Ophthalmic Centre

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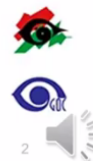
Good morning. This lecture is part two of the corneal diseases. In this lecture, we are going to talk about some specific corneal ulcer as well as other degenerative or non inflammatory .corneal diseases

Dendritic (Herpetic) Ulcer

DEFINITION:

1. **Superficial**
2. **linear**
3. **branching**
4. **ulcer**

- **due to infection of the cornea with**
- **herpes simplex virus HSV**



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dendritic or herpeptic ulcer is a superficial linear branching ulcer due to the infection of the .cornea with herpes simplex virus

Dendritic (Herpetic) Ulcer

Etiology:

- ***HSV is an***
 - *EpithelioTropic virus*
- ***Commonly present in***
 - *the body*
 - *mucous membranes*
- ***Dormant @ Trigeminal Ganglion***



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Herpes Simplex Virus is an epithelial tropic virus. It is commonly present in the body and .mucous membrane and it may be dormant at the trigeminal ganglion

Dendritic (Herpetic) Ulcer

- ***NO symptoms***
- ***But***
 - *when the body resistance decrease*
 - *it becomes active*
- ***→ infection***
- ***→ Epithelial vesicles***



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Usually there is no symptoms however, when the body resistance decreased by any reason, the virus becomes active and it goes down the peripheral nerves to cause infection. The .infection in the periphery leads to epithelial vesicles

Dendritic (Herpetic) Ulcer

Types of HSV:

- 1. Type 1:**
 1. Responsible for 75% of
 2. Adult infection
- 2. Type 2:**
 1. Responsible for 25%
 2. Congenital type



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There are two types of herpes simplex virus that affects humans. Type one the adult infection which causes 75% of the infections in the eye and type two, the congenital type .which is responsible for the other 25% and it's acquired from the birth passage

Dendritic (Herpetic) Ulcer

Predisposing Factors:

Trigger mechanisms → Activates the virus

1. Fever:
 1. as in pneumonia,
 2. influenza.... Etc.
2. Stress:
3. Pregnancy
4. Onset of menstruation
5. Immuno – suppressant drugs:
 1. local or systemic
6. Over exposure to UV rays



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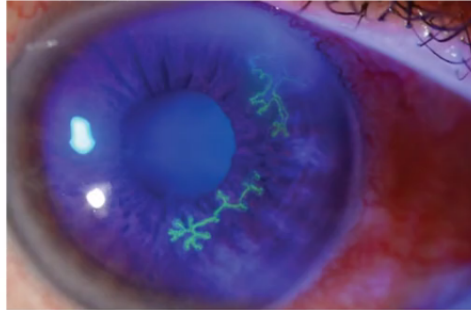
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herpeptic ulcer is predisposed for by what we call trigger mechanisms, which activates the virus, fever due to any cause, as in pneumonia, influenza, or common colds, stress, pregnancy, onset of menstruation, or immunosuppressive drugs like steroids whether local or systemic. And ultraviolet rays over exposure can all trigger the dormant virus to activate .and cause epithelial infection

Dendritic (Herpetic) Ulcer

Clinical Picture:

- **Symptoms:**
 - ? Mild Pain
 - Corneal Hypoesthesia



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Clinically there is usually mild pain or irritation because there's associated Corneal .
.hypoesthesia due to damage of the corneal nerves

Dendritic (Herpetic) Ulcer

Signs:

- **Cornea shows:**
 1. **Superficial Punctate Keratitis**
 2. **Dendritic Ulcer**
 3. **Amoeboid ulcer**
 4. **Trophic ulcer (keratitis metaherpetica)**
 5. **Hypoesthesia**



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On examination we can have one of several forms superficial punctate keratitis, which may resemble other viral infections of the cornea, dendritic ulcer which is dichotomous branching, typical pathognomonic sign of herpetic ulcer. If that ulcer was mistreated, especially by steroids, it can lead to extensive amoeboid ulcer at the end due to damage of the sensory nerves trophic ulcers or Keratitis metaherpetica may present you to the severe .hypoesthesia of the Cornea

Dendritic (Herpetic) Ulcer

Signs:

1. Superficial Punctate Keratitis

2. Dendritic Ulcer:

- **spread along the**
- **branching nerve**
- **(ending in knobs)**



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This is superficial punctate keratitis and this is the typical dendritic ulcer, (notice that the branching ends and the knobs)

Dendritic (Herpetic) Ulcer

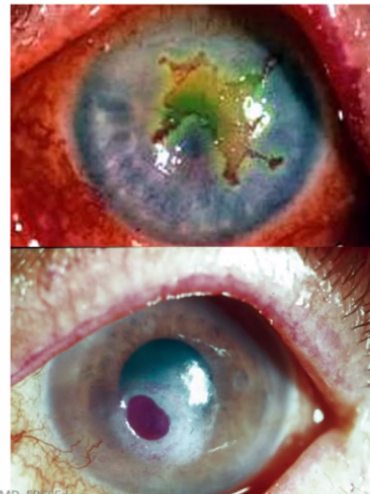
Signs:

3. Amoeboid ulcer:

- **usually occurs if**
- **steroids are used**

4. Trophic ulcer (keratitis metaherpetica)

5. Hypoesthesia



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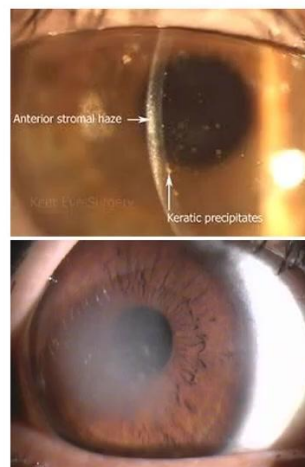
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.amoeboid ulcer above and the trophic ulcers below ,

Dendritic (Herpetic) Ulcer

Stromal lesions:

- ***Disciform keratitis:***
 - ***Stromal infiltration &***
 - ***Edema***
- ***(Ag-Ab reaction)***



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Herpetic disease of the eye can also affect the corneal stroma, which can lead to Disciform keratitis with stromal infiltration and edema and it's regarded as antigen antibody reaction

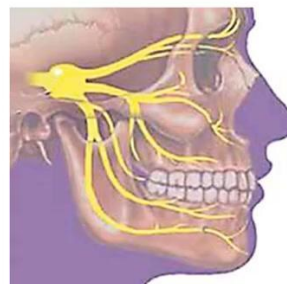
Dendritic (Herpetic) Ulcer

Primary contact with virus:

- ***It goes to CNS***
- ***→latent in***
 - ***Trigeminal ganglion***
 - ***(HSV type 1)***
 - ***Spinal ganglion***
 - ***(HSV type 2)***

Recurrence

- ***Virus travels***
- ***Peripherally to***
- ***Target tissues***
- ***(Epithelium)***



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On primary contact with the HSV virus, the virus goes into stage of viremia, which leads it to the central nervous system. The virus lies dormant there or latent in the trigeminal ganglion in type one, and in the spinal ganglia in type two. However, when there is any reactivation and or recurrence of the infection, the virus travels peripherally to the target tissue in the epithelium like in the corneal epithelium for example

Dendritic (Herpetic) Ulcer

Treatment:

- ***Specific:***
 - ***Antiviral drugs:***
 - ***Zovirax***



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the herpes simplex disease is treated by specific antiviral drug

Dendritic (Herpetic) Ulcer

Zovirax:

- ***Converted into its***
- ***Active form***
- ***Acyclovir triphosphate***
- ***In the presence of***
- ***HSV thymidine kinase***
- ***(ie. only in infected cell)***
- ***Specific = non toxic***



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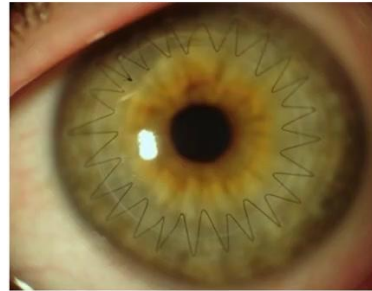
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Zovirax is converted into its active form Acyclovir triphosphate, only in the presence of : HSV thymidine kinase. That means only in infected cells and that's why it is highly specific .and non toxic

Dendritic (Herpetic) Ulcer

Therapeutic Keratoplasty:

- ***For resistant cases***
- ***Cover with antiviral***
- ***High recurrence***
- ***Steroids!!***



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In severe cases, with severe opacity we might need to do therapeutic keratoplasty for resistant cases, and we need to first cover with antiviral treatment, knowing that there will be high recurrence of the virus and the steroids should be used very cautiously as it's needed .to. For the graft survival. However, it promotes the activation of the HSV itself

Herpes Zoster Ophthalmicus

Etiology:

- ***Caused by varicella***
- ***(chicken pox) virus***
- ***Which is***
 - ***Neurotropic***
 - ***(travel along nerve)***



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Herpes Zoster ophthalmics is another virus that can affect the eye and the cornea. It is .caused by the varicella chickenpox virus, which is neurotropic and travels along the nerve

Herpes Zoster Ophthalmicus

- **VZV**
 - *Varicella Zoster Virus*
 - *1ry infection*
 - *Young child*
 - *No immunity*
 - →
 - *Chicken pox*
 - *2ry infection*
 - *Adult*
 - *Immune*
 - →
 - *Shingles*
 - *HZO*



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VSV or Varicella Zoster virus. primary infection usually occurs in young children with no immunity, and leads to the clinical picture of chickenpox, on secondary infection or secondary activation, especially in adults who are immune at least to shingles or herpes .zoster ophthalmics if it is affecting the trigeminal ganglion

Herpes Zoster Ophthalmicus

Clinical picture:

- **Symptoms:**
 - *Pain*
 - *Redness*
 - *in area of*
 - *Distribution of nerve*
 - *This precedes*
 - *appearance of*
 - *Vesicles*



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The clinical picture there is usually severe pain there is a lot of redness and edema and swelling in the area of distribution of the nerve. And in the eye, there might be some vesicles .or pseudomicro dendrites

Herpes Zoster Ophthalmicus

Signs:

5th Cranial nerve (Trigeminal nerve):

1. Ophthalmic division
 1. Frontal n.
 1. Vesicles involve lids
 2. Naso Ciliary n
 1. Cornea
 2. → vesicles
 3. → ulcers
2. Nose vesicles
 1. (Hutchinson's) sign
3. Anesthesia:
 1. Deep keratitis
 1. (keratitis profunds)



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On examination, it depends on the distribution of the affected nerve in the fifth cranial nerve, the ophthalmic division. It goes through the frontal nerve and vesicles will involve the upper eyelids. However, if it goes and involves the nasociliary nerves then there's the cornea will show vesicles and ulcers and also there is a lesion at the tip of the nose which is known as Hutchinson sign. anesthesia or loss of sensation happens with deep keratitis or keratitis profunds

Herpes Zoster Ophthalmicus

- Optic Nerve
 - Optic neuritis
- 3rd, 4th & 6th cranial nerves
 - Paralytic Squint

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optic nerve affection can lead to severe optic neuritis and loss of vision third, fourth and sixth cranial nerve affliction will lead to paralytic squint

Herpes Zoster Ophthalmicus

Other Ocular signs:

1. ***Lid inflammatory signs***
2. ***Punctate keratitis***
3. ***Pseudodendrites***
4. ***Scleritis***
5. ***Iritis***
 - → ***sectoral iris atrophy***



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Other ocular signs involved lid inflammatory signs might involve punctate keratitis or .
.pseudodendrites, it might also lead to severe sort of sclerites and sectoral atrophy of the Iris

Herpes Zoster Ophthalmicus

Treatment:

- ***Usually if ulceration occurs***
- ***Specific:***
 - ***Acyclovir***
 - ***may be useful***
 - ***Systemic***
 - ***Before vesicles appear***
 - ***Sedatives (pain)***
 - ***Antibiotics***
 - ***to prevent 2ry bacterial infection***
 - ***Skin lesions treated with***
 - ***Calamine lotion***
 - ***Antibiotic powder***



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Treatment is usually indicated if there is an ulcers. The treatment is a specific Acyclovir, which may be useful provided it's used systemically and before the vesicle appear on the skin. sedatives are very important, antibiotics are given to prevent secondary bacterial infection .and calamine lotion ,antibiotic powder is necessary to treat the skin lesion

Keratitis with Lagophthalmos:

Definition:

- ***Corneal ulceration***
- ***which occur in***
- ***Lagophthalmos***



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keratitis with lagophthalmos is corneal ulcer which occurs in lagophthalmos due to the exposure and severe dryness of the cornea

Keratitis with Lagophthalmos:

Clinical Picture:

- ***Exposure keratitis***
- ***Ulceration***
 - ***involves the***
 - ***"Lower 1/3" of***
 - ***cornea***
 - ***which is exposed***
 - ***during sleep***



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clinically, the eye doesn't close totally during sleep leading to exposure of the cornea that leads to an ulcer which usually involves the lower 1/3 of the cornea, which is exposed during sleep

Keratitis with Lagophthalmos:

Clinical Picture:

- **Bell's phenomenon**
 - Eye rolls up
 - During sleep
 - →
 - Only lower 1/3
 - Is exposed



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Bell's phenomena means that the eyes rolls up during sleep which is normal and the most of the cornea is covered by the upper eyelid except for the lower third which is exposed as we .can see in the picture

Keratitis with Lagophthalmos:

Treatment:

- **ttt of cause +**
- **Mild exposure**
 - **Artificial tear**
 - Drops @ day time
 - Ointment @ night
- **Severe exposure**
 - **Tarsorrhaphy**

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treatment is usually treatment of the cause. If the exposure is mild, artificial tear drops by day and ointment by night is necessary. However, in severe exposure, Tarsorrhaphy may be .used

Non-Ulcerative Keratitis

1. ***Superficial***
2. ***Deep (interstitial)***



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nonUlcerative corneal inflammation or nonUlcerative keratitis can be superficial or deep .called interstitial keratitis

Non-Ulcerative Keratitis

Superficial:

1. ***Trachomatous pannus***
2. ***Phlyctenular Kerato Conjunctivitis***
3. ***Herpetic keratitis***



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Superficial ones can be seen in trachomatous pannus and phlyctenular keratoconjunctivitis .and also in herpetic non Ulcerative keratitis

Non-Ulcerative Keratitis

Deep (interstitial):

- ***Congenital \$:***
 - *Was most common cause*
- ***Acquired***
 - *\$*
 - *T.B.*
 - *Leprosy*
- ***Viral***
 - *Most common cause "Nowadays"*

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Deep interstitial keratitis used to be the most common cause congenital syphilis, acquire causes involve syphilis TB and leprosy. nowadays, viral deep keratitis is the most common .cause

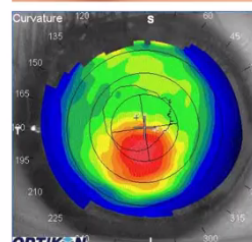
Keratoconus

Definition:

- ***Non-inflammatory***
- ***Conical ectasia***
- ***of the cornea***
- ***Due to***
- ***Stromal weakness***
- ***(usually central)***

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keratoconus is thought to be a degenerative non inflammatory conical ectasia of the .cornea due to stromal weakness usually near the center of the Cornea

Keratoconus

Incidence:

- **Age:**
 - *Presenting around puberty*
- **Sex:**
 - *More in boys*
- **Association:**
 - *Common with*
 - *Spring Catarrh*



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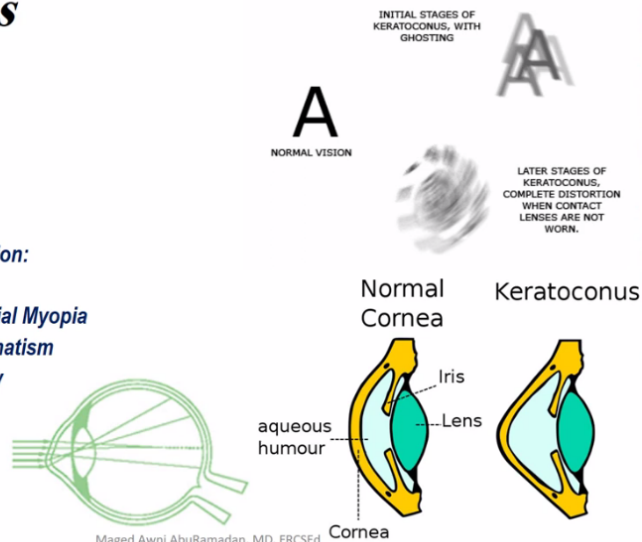
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It is more present in young in children and in young adults around the age of puberty it is more seen in boys and it's associated with spring catarrh, allergic eye disease and eye .rubbing

Keratoconus

Clinical picture:

- **Symptoms:**
 - **Gradual loss of vision:**
 - **due to:**
 1. *Curvature & axial Myopia*
 2. *Irregular astigmatism*
 3. *Corneal opacity*



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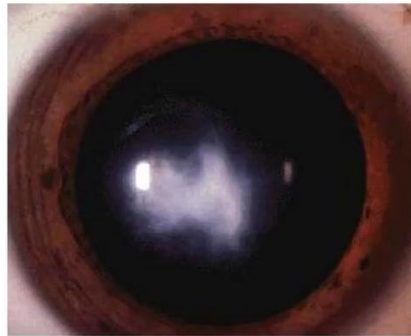
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Clinically, the patient starts to complain of gradual loss of vision due to change in the .curvature and axial myopia and the irregular astigmatism together with corneal opacity

Keratoconus

Symptoms:

- *Rapid loss of vision:*
 - *May occur due to*
 - *Rupture of*
 - *Descemet's membrane*
 - *→*
 - *Corneal edema*
 - *(Acute Hydrops)*



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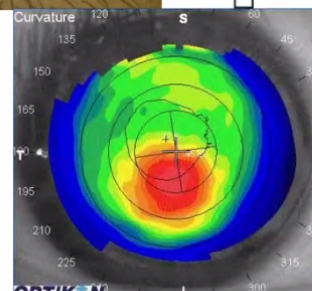
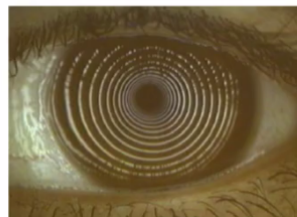
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rapid loss of vision may be due to the rupture of Descemet membrane which leads to severe .corneal edema called acute hydrops

Keratoconus

Signs:

- *Early cases:*
 - *Diagnosed by:*
 1. *Placido disc*
 1. *→ irregular circles*
 2. *Retinoscopy*
 1. *→ Spinning (scissor) Reflex*
 3. *Keratometry*
 4. *Corneal Topography*



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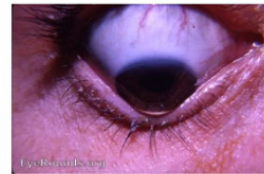
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early cases are diagnosed by using placido disk which shows irregular circles retinoscopy can be helpful as well as keratometry however, corneal topography is now the definitive line of .the diagnosis

Keratoconus

- **Late cases:**
 - **Centre of the cornea:**
 1. Thin
 2. Cone shaped
 3. Resembling a drop of water
 - **Cone is best seen on:**
 - Profile view
 - Looking downward
 - → Angulation of lower lid
 - (Munson's sign)



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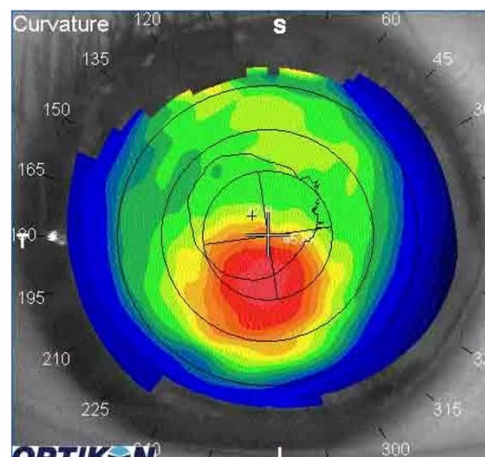
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in late cases the center of the cornea is very thin, it gets cone shaped and resembles a drop of water. cone is best seen in the profile view looking while the patient is looking downward, .and that causes angulation of the lower lead called Munsons sign

Keratoconus

The cone

- **Direction:**
 - Down & nasal



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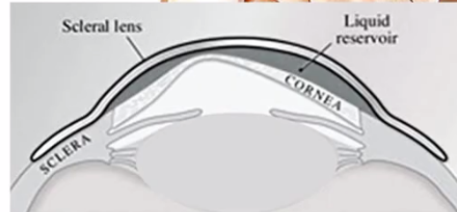
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In typography, we can see and diagnose the cone itis direction which is usually downward . and nasally

Keratoconus

Treatment:

- **Glasses:**
 - only in early cases
- **Hard Contact lens:**
 - for irregular astigmatism



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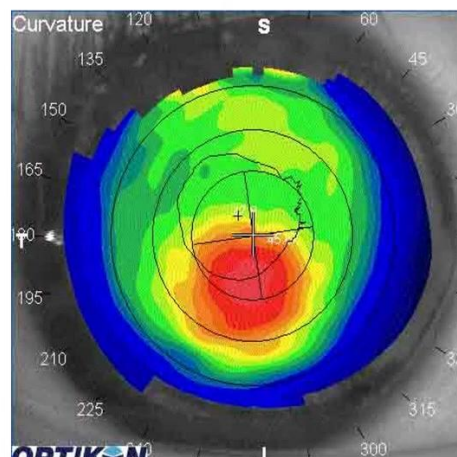
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treatment, glasses for very early cases however, hard contact lenses can be used for irregular .astigmatism

Keratoconus

Treatment

Corneal Collagen Cross Linking



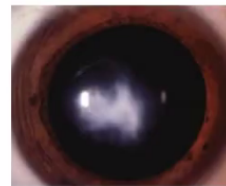
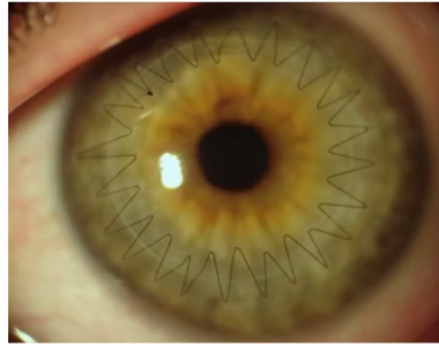
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Corneal Collagen cross linking is the most efficient way to stop or halt the progression of the .disease, especially if used properly and in early cases, it is a prophylactic treatment as well

Keratoconus

- **Keratoplasty:**
 - **When**
 1. **Glasses:**
 - **don't improve vision**
 2. **Hard C.L.:**
 - **don't improve vision or**
 - **not tolerated**
 3. **Opacity**
 - **at the apex of the cone**



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keratoplasty is the definitive treatment when there is a severe keratoconus in a way that the glasses do not improve the vision and hard contact lens is either does not improve the vision or not tolerated by the patient, main indication is always when there is severe opacity at the apex of the cone in the center of the cornea

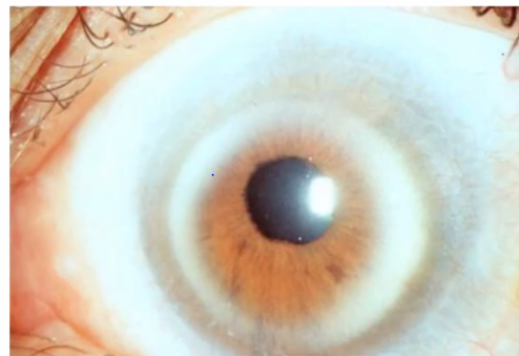
Arcus senilis

Definition:

- **Annular infiltration**
- **of the corneal periphery**
- **by lipoid material**

Which is seen in

1. **Old aged people**
2. **Hyperlipidemia**



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Arcus Senilis is an annular infiltration of the Corneal periphery by lipid like material. This is usually seen in old age people and in hyperlipidemic case

Arcus Senilis

N.B.:

- **Arcus senilis:**
 - is an aging process
 - But if seen in young
- →
- **Arcus Juvenilis**
 - which may indicate
 - Hyperlipemia &
 - Hypercholesterolemia



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Arcus Senilis is an aging process. However, if it was seen in younger patients, it can be called .Arcus juvenilis, which may indicate hyperlipidemia and hypercholesterolemia

Corneal Neovessels

	<i>Superficial</i>	<i>Deep</i>
<i>From</i>	<i>Conjunctival BV</i>	<i>Anterior ciliary</i>
<i>Run in</i>	<i>Superficial stroma</i>	<i>Posterior 2/3 of stroma</i>
<i>Ccc</i>	<i>Branch dichotomously</i>	<i>Straight Bright red</i>
<i>Etiology</i>	<i>Ch Inflammation Chronic irritation Trichiasis Pannus Pterygium</i>	<i>Deep keratitis</i>



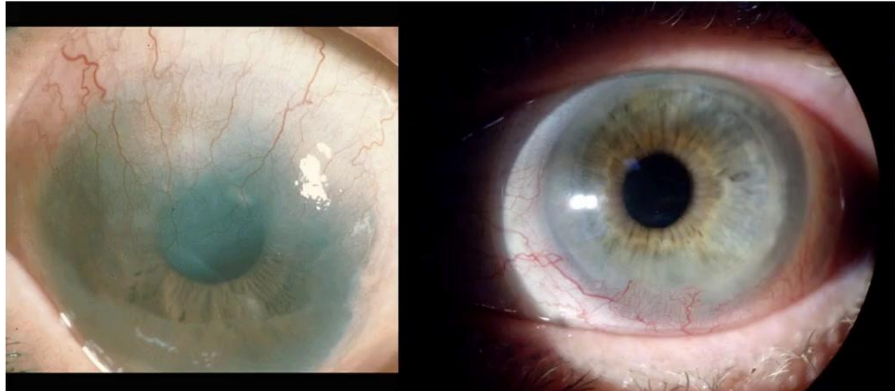
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Corneal new vessels can be either superficial or deep. The superficial ones arise from the conjunctival blood vessels and they invade the superficial stroma, they branch usually dichotomously and they are present in chronic inflammatory processes with chronic irritation Like trichiasis, however, deep corneal new vessels are derived from the anterior ciliary vessels so it is present in the posterior two thirds of stroma usually they are bright red .and straight and they are associated with deep interstitial keratitis

Superficial Neovessels



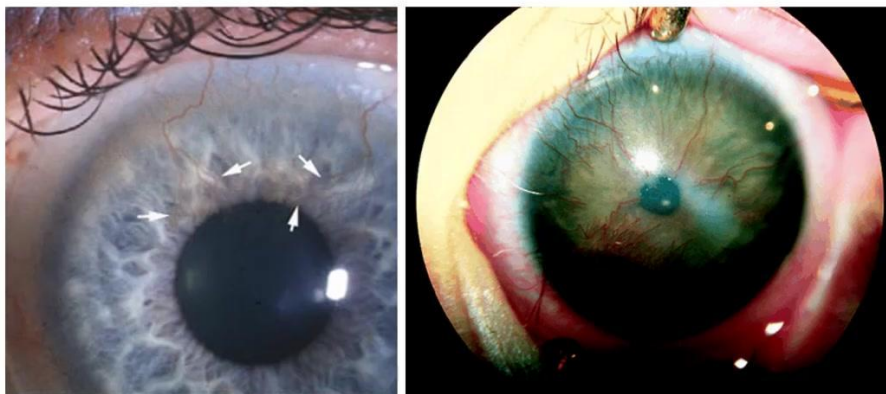
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These are two forms of superficial new vessels on the left we see the new vessels arising after trachomatous pannus and severe vernal keratoconjunctivitis on the right side that's in the lower part due to a case of acne rosacea causing severe blepharitis and chronic inflammatory process

Deep Neovessels



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Deep new vessels as you can see here, the arrowheads show on the left they are bright red there are not as branched as the superficial ones, they are in the deep stroma. On the right side we can see a mix of severe superficial and deep Neo vessels of the cornea

Keratoplasty

Corneal Grafting or Corneal Transplantation

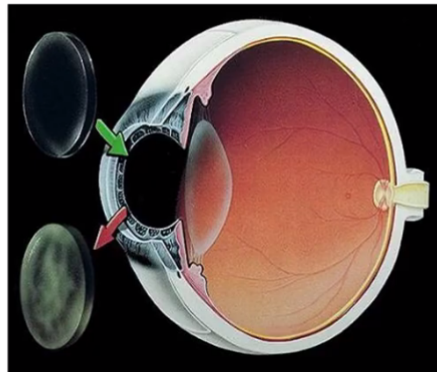
Definition:

1. Removal of

- **the diseased part**
- **of the cornea &**
- **replacing it by a**

2. Clear donor's graft

- **from a cadaver eye**



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Keratoplasty is corneal graft or corneal transplant. In keratoplasty, we remove the diseased part of the cornea and replace it from with a clear donor grass from a cadaver eye

Keratoplasty

Types:

- **Lamellar**
 - **Partial thickness**
- **Penetrating**
 - **Full thickness**

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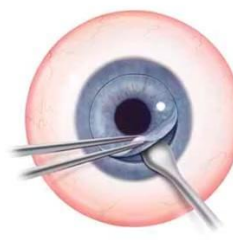
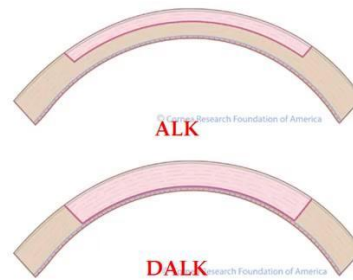


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It might be either lamellar which means partial thickness and exchange of the cornea or penetrating full thickness exchange

Lamellar Keratoplasty

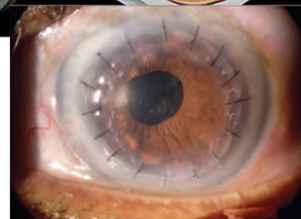
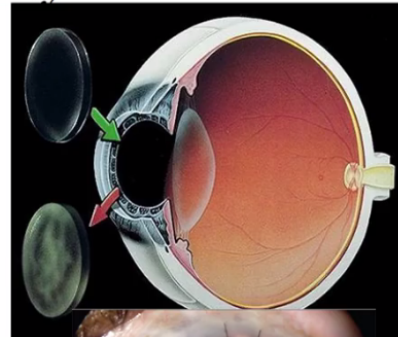
**Removal of a
Superficial lamella
to be replaced by
similar
Donor button**



It might be either lamellar which means partial thickness and exchange of the cornea or .penetrating full thickness exchange

Penetrating Keratoplasty

**Removal of a
Full thickness
to be replaced by
similar
Donor button**



penetrating keratoplasty we use it refined to cut totally a desk of the cornea or five layers .and replace it with an equivalent desk of donor button

Refractive Corneal Surgery

Aim:

- **Change**
 - *the corneal curvature*
 - *to correct*
 - *Refractive errors*
- **Done with**
 - **Laser**
 - *(excimer laser)*

2021

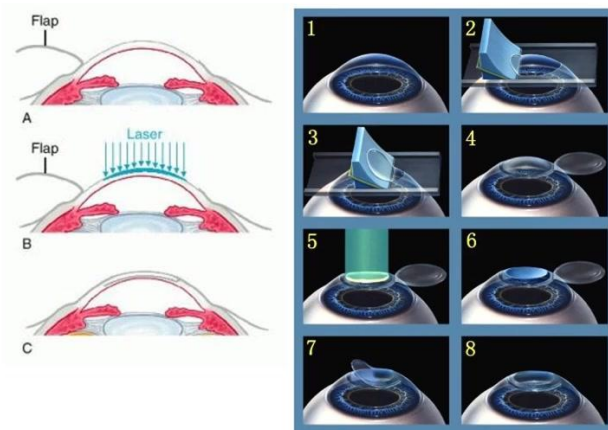
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In lamellar keratoplasty we remove the superficial lamella and we keep the endothelium .with a minor part of the stroma and that was replaced by similar donor one

Keratomileusis

1. **PRK**
2. **LASIK**
3. **LASEK**
4. **LAASA**



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it has several forms. The superficial one is PRK. The LASIK is the one that needs to do a flap and then we treat the stroma below the flap and then return the flap to its place. As you can

see, this form is now not used as much as before because it might lead to the severe corneal weakness and ectasia later on, LASIK is a form of superficial PRK when we remove the epithelium by using of alcohol. LAAZA or laser assisted advanced surface ablation is the very new method which gives better safety profile preserves much of the cornea ,does not affect the depth of the cornea. It heals, usually well and in long term results are even better than .what we can get by LASIK

.Thank you very much