Abd El- Haleem

Summary Of OPHTHALMOLOGY

by
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PART I

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Part I

I would like to express my thanks to my wife for her understanding & patience during those times when there is no light at the end of any thing. She encourages me. Words cannot express my appreciation to my daughter.

EMBRYOLOGY OF THE EYE

See atlas page (102)

Origin of the eye

1) Neural ectoderm (mesenchyme): give rise to

1- Retina & optic nerve

2- Definitive vitreous.

3- Zonules of the lens.

4- Epithelium of the iris & CB.

5- Dilator & constrictor pupillae ms.

2) Surface ectoderm: give rise to

1- Lens.

2- Lid: skin, glands, lashes & eye brow.

3- Epithelium of the cornea, conjunctiva & lacrimal system.

4- Lacrimal & conjunctival glands.

3) Mesoderm: give rise to

1- Outer & middle coats of the eye (except epith.)

2- Blood vessels of the eye.

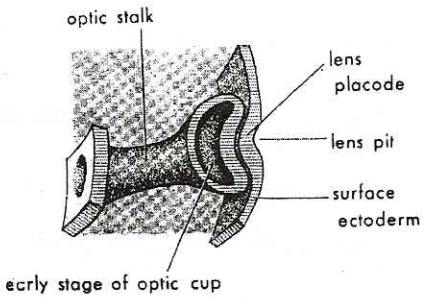
3- Sheath of the optic nerve.

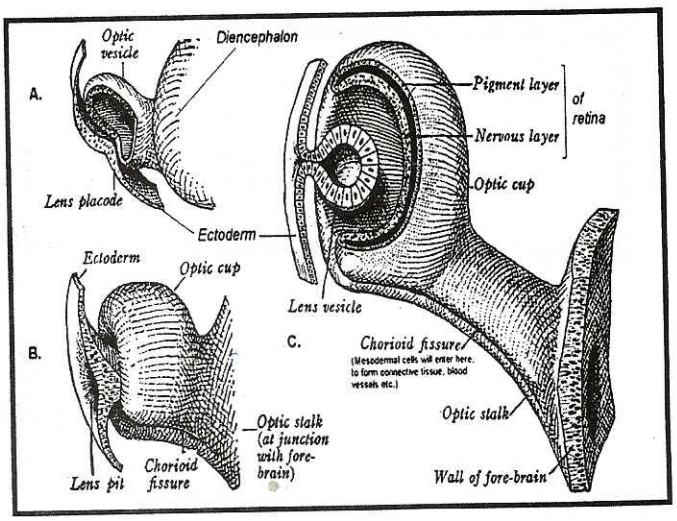
4- Extra-ocular muscles.

5- Orbital tissue & walls.

6- Connective tissue of the lids, conjunctiva & lacrimal system.

7- 1ry vitreous.





EYE LID

Anatomy of the eyelid

- Gross
- Minut

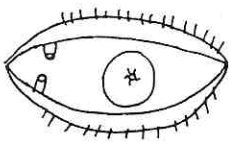
(1) Gross (surgical) anatomy:

♦ **Definition :** The eye lids are 2 movable muco-cutaneous folds that meet at the canthi **(commisures):**
- Medial canthus → has rounded angle.
- Lateral canthus → has acute angle.

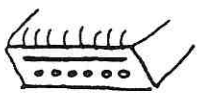
♦ **Position :** In the primary position :
- UL: covers the upper 1/6 of the cornea (1-2 mm).
- LL: is at the level of the limbus.

♦ **The palpebral fissure :** فتحة العين oval
- It's the space between lid margins when lids are open.
- *Shape*: Elliptical بيضاوي & more wide medially, so medial conj. is more exposed to light.
- *Size:* 1- Horizontally: about 30mm 2- Vertically: about 10mm

♦ **The lid margin:**



* It is the free margin of lid.
* **Width**: 2- 3 mm.
* **Parts**: the lid margin is divided by the lacrimal papilla (at the junction between the medial 1/6 & the lateral 5/6 of the lid margin) into:
  - *Lacrimal part*: (medial to the punctum) 6mm
    , Contains the lacimal canaliculi & no lashes .
  - *Ciliary part*: (lateral to the punctum) >>shows:



  1) Ant. Border: Rounded & carry lashes (arranged in 2-3 rows).
  2) Grey line: - Just posterior to the anterior border.
  - Important anatomical & surgical landmark.

Incision here opens into the submuscular layer (مهم فى الجراحة)
It divides the lid into anterior lamella (skin & orbicularis)
& posterior lamella (tarsus & conjunctiva).

Eyelid

3) White line: Openings of meibomian glands.

4) Posterior border : sharp& placed against globe, this sharpness is important in: oral & MCQ

- Upper lid .. for uniform distribution of tears زي مساحة العربية.

& - Lower lid .. this sharpness makes acute angle between lid margin & cornea

→ help conduction of tears by capillarity (الخاصية الشعرية)

to punctum→nose,

Lashes: modified hairs (without erector pilli ms) arranged in 2-3 rows. MCQ

	Number	direction
Upper lid:	150	directed upward, forward &laterally
Lower lid:	75	directed downward, forward &laterally

لذلك لا يحدث تداخل بين الرموش عند غلق العينين

(2) Minute anatomy:

A sagittal section in the upper lid shows (6 layers): See atlas page (4)

1- Skin.

2- Subcutaneous layer.

3- Muscle layer:

* Striated (voluntary) muscle layer:

- Orbicularis→ for lid closure (protractors)

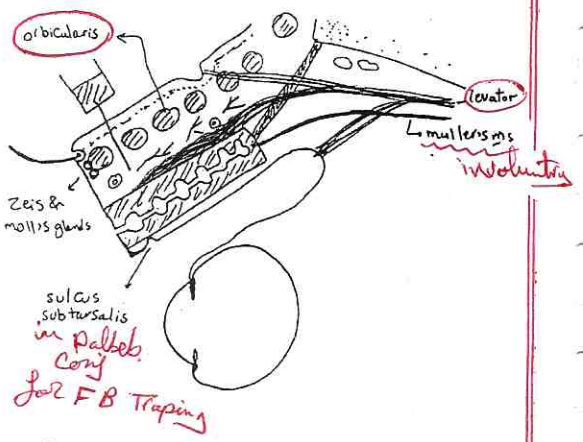
- Levator ms→ for lid elevation (retractors)

* Unstriated (involuntary) muscle layer:

- Muller's ms→ help levator ms.

4- Submuscular layer.

5- Fibrous layer: tarsus & orbital septum. 6- Palpebral conj.



1)Skin: thin, elastic & loosely adherent to the underlying tissues where oedema is collected .

2)Subcutaneous layer. C.T. devoid of fat.

3) Striated "voluntary" ms. layer:

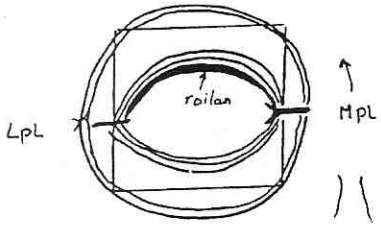
1)Orbicularis oculi ms: It is the sphincter of the lid (closure)

* Parts: 3 – palpebral, orbital, lacrimal

1- Palpebral part:(central part of the ms)

- **Origin**: from Medial Palpebral Ligament.

- **Insertion**: to Lateral Palpebral Ligament.

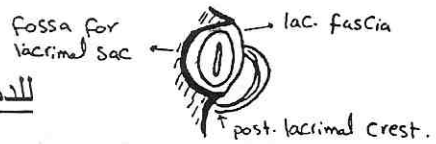


Eyelid

- **Action**: 1- Blinking(simple closure), winking. 2- Support lower lid against gravity.
- **Parts**: 1- Preseptal : infront of the orbital septum.
  2- Pretarsal : infront of the tarsus
  3- Marginal (ms. Of Riolan = pars ciliaris) it is the part of ms fibers that run in the lid margin, it keeps the lid margin closely opposed to the globe.

2- Orbital part: للغلق بقوة

- **Origin**: Med. palp. ligament & nearby bone(nasal bone)
- **Insertion**: Fibers complete a circle around orbital margin to be inserted in med. palp. Ligament & nearby bone.(هتعمل لفة كاملة)
- **Action**: Tight closure of lids (blepharospasm).



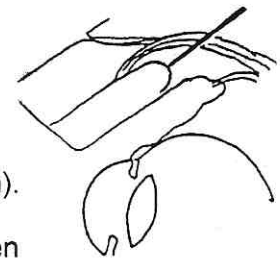
3- Lacrimal part (Horner's muscle = pars lacrimalis): للدموع

- **Origin**: post. Lacrimal crest.
- **Insertion**: lacrimal fascia.
- **Action**: on contraction → sac expansion → -ve pressure in the lac. Sac → suction of tears to help tear drainage " lacrimal pump".
  → tears reach the sac→ then the tears by gravity reach the nasal cavity.

* Nerve supply : Zygomatic branch of facial n. (7th n.)

* Orbicularis Paralysis → Lagophthalmos, paralytic ectropion & epiphora d.t. failure of lacrimal pump.

2) Levator palpebrae superioris:



* **Site :** In upper lid ONLY.

* **Origin:** From orbital apex (under surface of lesser wing of sphenoid above the annulus of Zinn).

* **Course:** Run forward under orbital roof & above superior rectus muscle, then The ms change from fleshy ms into triangular or fan shaped Aponeurosis >> atthaced to the whole width of lid (1 cm behind the orbital septum).

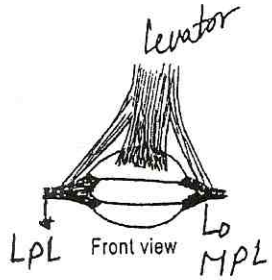
* **Insertion:**

1- Ant. surface of the lower 1/3 of tarsus (or upper border of tarsus)

2- Skin : forming→ upper lid crease(sulcus) in the upper lid only (4-8 ml above the lid margin)

3- Upper fornix.

4- Medial & lateral horns: Into medial & lateral palpebral ligament & nearby bone.



* **Action:** Elevation of upper lid (it's antagonised by orbicularis).

* **N. Supply:** Superoir division of oculomotor n. (3rd n.).

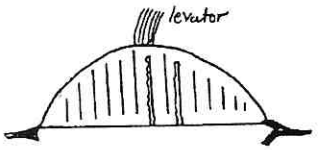
Eyelid

* **Paralysis:** → Severe ptosis.

4) Sub – muscular layer:

- Contains main blood vs (arches) & nerves so it's the site for local anaethesia injection & also it's traversed by the fibers of the levator.

5) Fibrous layer : 1- Tarsus 2- Orbital septum



1)Tarsus: Meibomian gland inside it

It's the skeleton of the lid الهيكل (as its consists of dense fibrous C.T. plate).

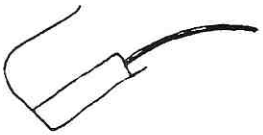
* **Shape:** D-shaped.
* **Dimensions:** - **Horizontally**: 25 -30mm.
  - **Vertically:** Upper 10mm & lower 4-6mm (so lower tarsus is smaller)
  - **Thickness:** 1mm.
* **Attachement**: Superiorly : to levator , Muller's ms& orbital septum.
  Medial & lateral : to the med. & lat. palpebral ligament
* **Embedded in it :** - 20-30 vertically arranged meibomian glands (*upper lid*) .
  - 10-15 (*In the lower lid*).

2) Orbital septum..

- Fibrous membrane extends from the border of the tarsus to the orbital margin.
- Action: 1- Separate lid from the orbit so any infection of the lid can't enter the orbit
  2- Act as diaphragm keep the orbital fat within the orbit.

6) Non—striated (involuntary) muscle layer

1) Superior Muller's (tarsal) ms



- **Site** : In upper lid.
- **Origin** : From orbital apex &inferior aspect of the levator muscle.
- **Insertion**: Upper border of tarsus.
- **Action** : Help in elevation (prevent levator exhaution)
- **N.supply** : Sympathetic (from superior cervical sympathetic ganglion).
- **Paralysis** : In Horner's syndrome See atlas page (7)
  - Partial ptosis - Miosis
  - Anhydrosis (reduced sweating): if the lesion is preganglionic
  - Apparent enophthalmos due to…..
  - Heterochromia in congenital cases (iris will be lighter in color)

Q.. how u can diagnose Horner's pupil?

* **Give 4% cocaine drpos:** كهن
  - Normal pupil will→ dilate (cocaine will inhibit the active uptake of nor-adrenaline at the postganglionic sympathetic nerve endings).
  - Horner's pupil will → not dilate.

* **Hydroxyamphetamine 1% :** بن
  - in preganglionic lesion the Horner pupil will dilate
  - in post ganglionic lesion the Horner pupil will not dilate

(hydroxy amphetamine will ↑ the rlease of NA from post ganglionic nerve ending الو سليم)

2) Inferior Muller's (tarsal) ms.. (lower lid Retractor)

- **Site** : in lower lid.
- **Origin** : from inf. rectus ms.
- **Insertion**: lower border of lower tarsus.
- **Action**: lower lid retraction on looking down(help inferior rectus).
- **N.supply** : sympathetic (from superior cervical sympathetic ganglion).

RETRACTORS OF THE LOWER LID :

1- Inferior Muller's (tarsal) ms

2- Inferior tarsal aponeurosis:

its an expansion of the capsule of IR ms & analogue to levator aponeurosis in upper lid (1,2 Both attached to lower border of lower tarsus).

7) Palpebral conjunctiva(tarsal)

- Firmly adherent to tarsus.
- Shows sulcus-subtarsalis (depression 2 mm from the lid margin):
  important surgical landmark & it is acommon site for FB embaction.

Glands of lid

(i) Meibomian glands: See atlas page (4)

It is a modified **sebaceous** gland

- **Number**: 20-30 (in the upper lid)
  10-15 (in the lower lid)
- **Site:** in the tarsus, vertically arranged.
- **Opening:** on the lid margin → **white line**
- **Secretion:** oily.
- **Function:** of oily secretion:
  1. Prevent overflow of tears on lid margin.
  2. Retard evaporation of tears.

* Tear film ① water ② oil ③ prevent evaporation lubricant

Eyelid

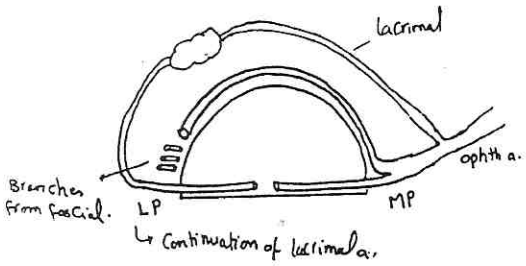
(ii) Zies glands: Modified **sebaceous** gland related to lashes (for lubrication).

(iii) Moll's gland: Modified **sweat** gland related to lashes (for lubrication).

→ no inflamation in Moll's

Blood supply of lids:

Arteries:



From the terminal branches of the ophthalmic artery:

1- Medial palpebral artery from ophthalmic a.

2- Lateral palpebral artery from lacrimal a.

These vessels anastomose freely to form **2 arches:**

* **Upper (peripheral) arch:** along the upper border of the tarsus

((Upper branch of MPA. & some branches of fascial A.))

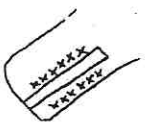
* **Lower (marginal) arch:** near the lid margin

((Lower branch of MPA& LPA. It self))

N.B. Arches are present in the **sub-muscular layer.**

N.B. lower lid has one arch only → **marginal arch..**

Veins: start from 2 plexus



1- Pre-tarsal plexus → facial & temporal veins.

2- Post-tarsal plexus → ophthalmic vein.

Nerve supply:

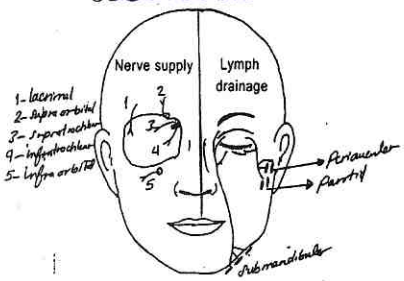
1) Sensory: from the trigeminal nerve 5th n.

(i) Upper lid : Ophthalmic nerve (supra orbital, supra trochlear , infra trochlear & lacrimal).

(ii) Lower lid : Maxillary nerve (infra-orbital nerve).

2) motor: **(i) Orbicularis:** 7th n. **(ii) Levator:** 3rd n. **(iii) Muller's:** sympathetic fibers.

Lymphatic drainage:



(i) Lateral 2/3: drained to the pre-auricular & parotid L.N.

(ii) Medial 1/3: drained to the submandibular L.N.

Both are drained to the upper deep cervical L.N.

* Functions:

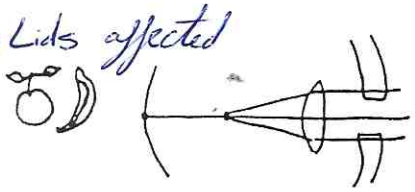
1. **Protection** of the globe from external injury.
2. **Help** tear distribution→ proper wetting of the eye
3. **Help** tear drainage (through the lacrimal pump).
4. **Help** aqueous drainage by ocular massage.

N.B. anatomy of the lower lid
1) No levator ms (بدلها Inferior tarsal apponeurosis)
2) Muller's of the lower lid is different.
3) B.V. of the lower lid: lower lid has one arch only called marginal arch.

Inflammations of the lid

Blepharitis

- **Definition:** Chronic inflammation of the lid **margin** usually 4 Lids affected

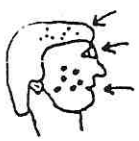


- **Predisposing factors:**
  - **(I) General :** ↓ immunity
    - **1-** Malnutrition & avitaminosis **2-** Old age **3-** DM & gout.
    - **4-** Bad habits: excessive carbohydrates in diet , alcoholics.
  - **(II) Local:** 1- Dusty hot atmosphere جو المصانع
    - 2- Uncorrected error of refraction: e.g. Uncorrected myopia leads to → frowning العبوس pt tends to close his palpebral fissure partially to cut the peripheral rays → ↓ blood supply to the lid → blepharitis.

- **Classification of blepharitis:** 1.Anterior: squamous & ulcerative.
  2.Posterior: meibomianitis(Meibomian gland dysfunction)
  3. Angular

Anterior blepharitis

(1) Squamous (قشره scaly) or (seborrhic) Blepharitis



- **Definition:** Chronic inflammation of lid margin with formation of white Scales "dried sebum" See atlas page (19)

- **Etiology:** 1) Predisposing factors: as before.
  2) As a part of generalized seborrhea →↑ oily secretions → dandruff, acne & scaly blepharitis).
  3) Infection of the lid margin by Weak non specific organism >> (Corny bacterium acne or pityrosporum ovale) >>split sebaceous gland secretion (Lipid) into triglycerides & fatty acids (FAA) which is very irritant .
  ↳ Tear film instability

- **Clinical picture:**
  Symptoms: 1) Burning sensation ,Itching , frequent falling of lashes d.t. destruction of collagen bonds بس الحمد لله هيطلع تاني.
  2) Lacrimation, photophobia …

Eyelid

Signs: Small white scales (dried sebum) at lash root

When removed → hyperaemic lid margin (No ulcers). DD from ulcerative blepharitis

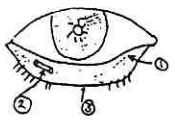
• Complications:

1- Tylosis: Thickening of lid margin d.t. oedema→ Mechanical ptosis & epiphora.

2- Permanent redness of lid margin

3- Partial Madarosis: Permanent loss of lashes (rare).

4- Cornea: Xerosis.



• Treatment: 1- General: - ttt of predisposing factors+diet control (↓ fat)

- Systemic tetracycline in sever long standing cases.

2- Local: - Lotion.. * 3% $NaHCO_3$ to dissolve scales.

* 50% solution of baby shampoo.

- Antibiotics & steroids.

- Tear substitutes ليه؟ bec. ↑FFA → Tear film instability

- Lid massage to squeeze the sebaceoues glands secretion.

(2) Ulcerative (Staphylococcal) Blepharitis

♦ Definition: Chronic inflammation of lid margin with formation of yellow crusts & ulcers on the lid margin See atlas page (19,20)

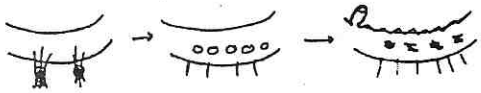
♦ Etiology: - **Predisposing factors:** as before.

- **Causative organism:** staph. aureus & staph epidermidis.

The infection involves hair follicles , sebaceous & sweat gland

♦ Clinical picture:

Symptoms: (as before but severe)



Signs: - Redness & swelling of lid margin

- Lashes gluded together by yellow crusts when removed It shows minute bleeding ulcers.

♦Complications:

1) Lids: 1- Trichiasis (more than 4 rubbing lashes) : d.t. scarring at the lash roots(Healed ulcers).

2- Madarosis: d.t. destruction of hair follicles.

3- Tylosis:+ irregular posterior border →severe epiphora → eczema→ cicartricial ectropion→ epiphora ((Vicious circle)).

4- External (stye) & internal hordulum. 5- Poliosis

2) Conjunctiva: Recurrent chronic conjunctivitis.

3) Cornea: - Marginal corneal ulcer : called catarrhal ulcer due to hypersensitivity satph. toxins)

- Xerosis

4) Lacrimal: Punctal block d.t. fibrosis → ↑ epiphora.

5) Any intraocular operation during the inflammation > may lead to Endophthalmitis. مهمه

♦ **DD :** 1- Squamous blepharitis. 2- MPC.

(Crusts when removed leave an intact lid margin)

♦ **Treatment:** **1- General:** ttt of predisposing factors(DM)

+ systemic antibiotics(tetracycline 1 tab /day/3moths)

2- Local: - Lotion: * $NaHCO_3$ 3% to remove the crusts.

* 50% solution of baby shampoo.

- Antibiotics: drops& ointment (erythromycin)

- Any maldirected lashes do epilation not electrolysis.

(الابره → spread of the infection.)

- Local steroids in chronic cases.

- Artificial tears.

N.B. As the organism is hidden in the lash root:

1. The ointment **should be rubbed** well against the lid margin.
2. ttt should be **continues 2-3 weeks** after apparent cure.

(3) Angular Blepharitis

See atlas page (20)

Angular الوحيد → Common with xerosis due to ↓ Tears at angles. So Causes Ankyloblepharon

◊ ***Etiology:*** Infection of the canthi by Morax- Axenfeld diplobacillus (which is gram -ve organism secreting proteolytic enzymes → epithelial maceration.

◊ ***Clinical picture:***

Symptoms: Itching + burning sensation (maceration) + discharge

(falling of lashed as no hair at the canthi. ماتقولش)

Signs: - Macerated ,fissured& hyperemic "inner & outer canthi "

- White foamy discharge at the canthis (from inflammed goblet cells)

◊ ***Complications:*** 1- Marginal corneal ulcer(atypical hypopyon ulcer).

2- Angular conjunctivitis. 3- Ankyloblepharon.

◊ ***Treatment:***

1- Zinc sulfate drops 0.5% t.d.s. (to inactivate the proteolytic enzymes).

2- Terramycin ointment 0.5% minimum for 3 weeks (to kill the organism).

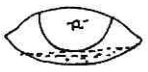
3- Gentian violet 1% paint (for macerated skin to prevent 2ry bacterial infection).

4- Systemic oral erythromycin or tetracycline in resistant cases.

5- Mild corticosteroid : to decrease the itching

Why angular?

Due to relative tear deficiency at the angle.

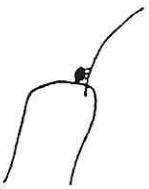


(Deficiency of lysozymes which has anti bacterial effect)

N.B. angular blepharitis is more common with xerosis.

(4) Parasitic Blepharitis المعتقلين

See atlas page (20)



- **Etiology:** Infestation of lid margin with Public louse or rarely head louse.
- **Clinical picture:**

Symptoms: Itching & burning sensation.

Signs: 1-Grayish (or tiny pearly white) nits cemented to lash root by *Alkaline cement substance.*

2- Slit lamp examination: Adult lice between lashes. See atlas page (20)

- **Treatment:**

1- **General:** General hygiene.

2- **Local:** a- Acidic lotion(acetic acid 1%): to loosen the nits.

b-Yellow oxide of mercury ointment 1% : to kill the larvae.

(T.D.S. / 3 weeks & thick application to suffocate the parasite)

c-Cut lashes (trimming): help in resistant cases.

في طريقه معينه لقص الرموش علشان الدكتور مايتعداش؟؟

(5) Allergic Blepharitis

Etiology: commonly from cosmetics or some local eye drops like atropine.

Treatment: Removal of the cause + Topical steroids.

(6) Specific Blepharitis

Due to TB or syphilis.

Posterior blepharitis (meibomian gland dysfunction)

- **Pathogenesis:** excessive abnormal meibomian gland secretions.
- **Symptoms :** redness & burning.
- **Signs :** - Posterior lid margin inflammation & redness.
  - Capping of meibomian gland orifices with oil globules See atlas page (21)

- Pressure on lid margin → retained secretions like toothpast (THICK) .
- Foamy discharge on the lid margin.

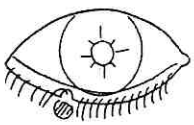
- **Complications :** 1) Recurrent chalazia
  2) Dry eye.

- TTT: 1) Systemic tetracycline(vibromycin) one cap/ for 3 months ليه؟؟
  2) As seborrhic blepharitis: ① Lid massage ② Topical steroids ③ Tear subistitutes

Inflammations of the glands of the lid

(1) **Zies gland:** acute inflammation → Stye (Hordeolum externum)
(2) **Meibomian gland:** a- Acute → Infected chalazion(Hordeolum internum)
b- Chronic → Chalazion

Acute (1) Stye (Hordeolum externum) دمل الشعرة



See atlas page (17,18)

- **Definition:** Acute suppurative inflammation of Zies gland & lash follicle
- **Etiology:** - Predisposing factors: As in blepharitis (especially DM > recurrent)
  - Causative organism: Staph. Aureus.
- **Clinical picture:**

Symptoms: Painful red swelling of eyelid at the lash root (Pain at first is dull then it becomes throbbing "Pulsating" due to pus formation).

Signs: 1) Red, tender swelling with diffuse edema of the lid.
2) Then localization occurs & Pus accumulates and point at lash root.→ **diagnostic**.

- **Complications:**
  (1) Recurrence: is common in diabetes and uncorrected error.
  (2) Madarosis: due to destruction of hair follicles (of significance only if recurrent).
  (3) Spread of infection: leads to (orbital cellulitis and cavernous sinus thrombosis as it's in the dangerous area of the face).

- **DD:** From infected Chalazion.

	H. externum "stye" Acute	H. internum "inf. chalazion" chronic
1- Suppuration of:	Zies gland	Meibomian gland
2-Related to (site)	A lash root	Distance away from lid margin (at the tarsus deep to orbicularis)
3- Pointing	On lid margin **ant.** To the grey line	On the conj or at the lid margin **behind** grey line

Eyelid

	Stye	Inf. Chalazion
		May also point through the skin
4- Pain	Less	More (meib.gl is larger & embeded in the tarsus making pus under tension)
5- Orb .contraction سفسطة	More prominent	Less prominent
6. Drainage by:	Horizontal incision on the lid margin + epilation don't squeeze	Vertical , conjunctival incision As the glands arranged vertically.

Treatment:

(1) General: - Remove predisposing factors.
- Systemic antibiotics: in sever cases complicated by cellulites.

(2) Local: 1) Hot fomentation.
2) Antibiotic drops & ointment.
3) Pus drainage when pointing occurs by:
i- Epilation + gentle pressure (don't squeeze).
ii- Horizontal incision parallel to lid margin (less fibrosis than vertical one, this fibrosis on the lid margin will lead to irregular post. border & epiphora) .

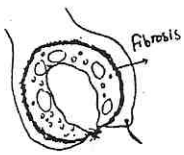
عشان مقطعش orbicularis occuli

(2) Chalazion

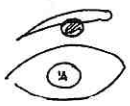
Chronic

See atlas page (15,16)

- **Definition:** Chronic inflammatory granuloma of meibomain gland (Lipogranuloma)
- **Etiology:** Obstruction of duct of Meibomian gland by:
  a.Dry secretion. b.Fibrosis from blepharitis. c.Desquamated epithelium due to vit. A ↓.
  → Retention of secretions→ leakage of secretion to the tarsus
  → F.B. reaction (Granulomatous reaction).



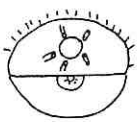
- **Pathology:** Granulomatous reaction :
  - Contains many giant cells, chronic inflammatory cells .
  - Surrounded by fibrous capsule (V. imp.).



- **Clinical picture:**

(1) Symptoms: Chronic, slowly progressive, painless, disfiguring lid swelling.
(Pain occurs only when it becomes infected).

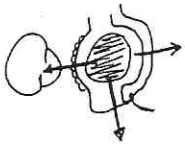
(2) Signs: *1) Skin side:* - Better palpable than seen → لانه deep to the ms
- Firm.
- Well defined (fibrous capsule)
- Not attached to the skin.



2) Conjunctival side: pale or bluish area surrounded bycongestion.(بتشاور عليه)
(لأنه بيضغط علي ال BVs)

• **Fate:** (1) Resolution (Lid massage with hot fomentation+ A.B.+ steroids) (2) Complications.

•Complications:



(1) Infection: Infected chalazion.

(2) Projection: - Skin: Disfigurement.

- Palp. Conj.: Irritating granuloma See atlas page (16)

- Lid margin: Marginal chalazion >>

(The granulation tissue forms only in the duct & project on the lid margin)

(3) Large size: * *in upper lid* → Ptosis.

* *In lower lid* → Mechanical ectropion.

* *Press on globe* → Change curvature of cornea → astigmatism.

oral Chalazion & Astigmatism يجي يعلوا

(4) Cyst formation: Tarsal or meibomian cyst.

(5) Multiple.

(6) Malignant transformation >> carcinoma .

D.D: from other causes of lid swelling

(1) Adenoma or carcinoma of meib. glands: hard, ill-defined

& recurrent after excision→ **Excisional biopsy& histopathology.**

(2) Sebaceous cyst: attached to skin (chalazion not).

(3) Granulomatous inflammation: Syphilitic gumma& Tuberculoma.

(4) Stye from infected chalazion جدول.

• Treatment MEDICAL: - Lid massage with hot fomentation: may open the duct.

- A.B.: to prevent 2ry bacterial infection.

- Steroids: ↓ inflammation& fibrosis so no increase in size .

SURGICAL:

Chalazion

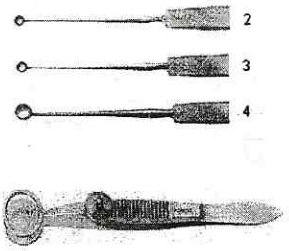
Small → AB+ steroids local

Large

- **Infected** → 1) Vertical, conj. incision 2). ABs 3) Hot foments
- **Not**
  - *Firm & localized* → **Incision &scraping operation.** See atlas page (17)
  - *Hard , ill defined & recurent Cancer ??* → **Excisional Biopsy with safety margin.**

Marginal Shaving by a knife followed by diathermy

Eyelid



♦ **Steps of incision & scraping operation :**

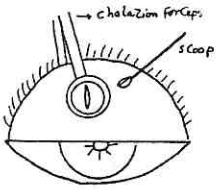
1) Infiltration anaesthesia .

2) Insert the chalazion forceps : ↓ Bleening (Compression)

3) Incision: vertical & conjunctival side. Why vertical???

4) Scraping: by chalazion spoon.

5) Removal of part of the capsule: to prevent recurrence. مهم



NB. Multiple chalazia: combined excision of tarsus & conj

(leaving the lower 1/3 of the tarsus to avoid lid notching with replacement of the defectby mucous graft from the lip).

♦ **What are inflammations caused by staph. Aureus?** سؤال مهم جداً

1- Ulcer. Blepharitis 2- Stye 3- Infected chalazion

4- Atypical hypopyon ulcer. 5- Endophthalmitis. 6- Acute dacryocyctitis.

Lashes disorders

(I) Rubbing lashes

• **Definition:** A condition in which *4 lashes or less* are Mal-directed backward that rub against the cornea & bulbar conj.

• **C/P: Symptoms:** F.B sensation + corneal symptoms.

Signs: 1. Conj. Hyperaemia. 2. Maldirected lashes (4 or less).

• **Etiology & complications:** as acquired trichiasis.

• **Treatment:**

1- Epilation: Removal of lashes using forceps , used as a temporary measure

(**Re growth** of stronger lashes within 2-3 weeks → 2 months it will be full size).

* Indications: - Before urgent op. (e.g. rupture globe.)

- Inflammation of the cornea or conj. or the lid .

2- Electrolysis(catholysis): [chemical coagulation] See atlas page (32)

- **Aim:** to destroy the hair follicle permanently.

- **Procedure:** *a.Anaesthesia:* local "surface + infiltration" فين؟ in the sub-muscular layer

b. 2 electrodes are used :

-Negative one (needle) is introduced into the hair follicle .

-& other positive one (a piece of flat metal) on cheek or forehead.

C. Current is switched: 2-5 mA for 10-30 sec.

-ve electrode attracts Na from the tissue

& analyze $H_2O \rightarrow H + OH$

Na + OH →NaOH "very strong alkali" that destroy the hair follicle (chemicalcoagulation)

*** Signs of success:**

- Hydrogen ions (H) → bubbles.
- Easy removal of lash without resistance.

*** Advantages :** Less fibrosis so not affect the normal nearby lashes.

3- Diathermy: [heat coagulation]

(i) The hair follicle is destroyed by coagulation of its proteins by heat.

(ii) Diathermy is obsolete as it leads to fibrosis (heat →burn → fibrosis→ may distort nearby lashes). يبوظ السليم

(iii) Current is switched : 30mA for 3 sec.

4- Argon laser: The best is LASER as it's localized not affect nearby lashes.

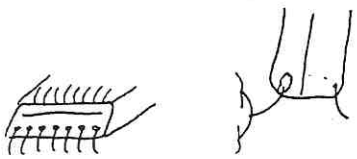
(II)Trichiasis

◊ Definition: A condition in which **more than 4** lashes are mal-directed & rub against cornea & bulbar conj. See atlas page (11,12)

◊ Etiology:

1- 2ry to entropion (pseudo-trichiasis): (Lid المعوج هو ال)

2- Pure trichiasis: (lashes المعوج هو ال)



(i)Congenital (distichiasis) : See atlas page (12)

There is **extra raw** of mal-directed lashes at the position of opening of Meibomian glands which are found rudimentary or absent→ dry eye

NB. Distichiasis usually affects the 4 lids

(ii)Acquired : Due to fibrosis on the lid margin → distorting the H. follicles → (abnormal lashes & normal are the **the same line**) :

1- Trachoma (most common)
2- Ulcerative blepharitis
3- Diphtheritic conjunctivitis
4- Burns & injuries of lid margin
5- Cicatricial pemphigoid.
6- Operation of the lid.

◊ C/P: عادي جداً

* Symptoms: 1- F.B. sensation. 2- Corneal symptoms.

NB. Distchiasis becomes only symptomatic after the age of 6 years.مهم

* Signs: 1- Maldirected lashes (> 4).

2- Conjunctival hyperaemia & discharge.

Eyelid

◊ **Complications**: **1- Conjunctiva:** 1- Chronic conjunctivitis (Mechanical irritation).

2- Conj. Ulceration.

3- Epidermalization (Epithelial plaque).

2- Cornea: - Ulceration.

- Vascularization & opacification.

- Epidermalization (Epithelial plaque).

N.B. Epidermalization: is deposition of keratin on the epithelium of the cornea& conj. to protect themselfes, with ttt the cornea becomes transparent again.

From where comes the keratin ???

◊ **TTT :**

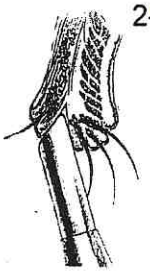
1- 2ry to entropion:→ ttt of entropion.

2- Pure trichiasis:

(i) Congenital distichiasis: destroy the extra raw by:

1- Electrolysis: one by one.

2- Cryotherapy after lamellar division :(-60 ˚c for 30 seconds) See atlas page (12)



1) Incision along grey line divides the lid into ant. & post .lamellae.

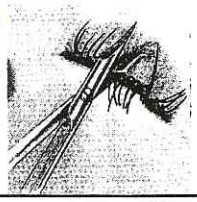
2) Post. Lamella & lash follicles are frozen by cryotherapy.

3) Lamellae are surgically re-apposed.

- **Advantages**: Act in groups not one by one.

- **Disadvantages**: - Affects the normal nearby lashes (as the ice ball reach large size to be effective)→madarosis.

- Depigmentation of lid margin.



Full thickness wedge resection

(ii) Acquired:

(a) Upper lid → Van millengen's operation.

(b) Lower lid → Webster's operation

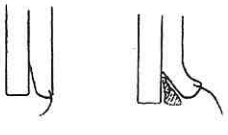
(c) Full thickness wedge resection :may be useful in localized lashes.

(d) Z- plasty : if the tichiasis localized & lateral.

Van millengen's operation

◊**Principle**: The lashes(normal & abnormal)are displaced away from cornea by putting a mucous membrane graft (From lower lip) in an incision in the grey line.

◊ **Indication:** Pure trichiasis of upper lid.



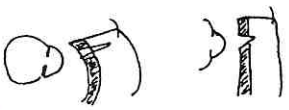
◊ **Contraindications**: 1-Trichiasis of lower lid (Cosmetically bad).

2-Entropion: as mucous graft will rolls with lid margin. (المشكلة في الtarsus)

3-Distichiasis: as the graft will be anterior to the extra raw.

Webster's operation

* **Principle:** The lashes are displaced away from cornea by putting a mucous membrane graft in an incision in the sulcus subtarsalis.

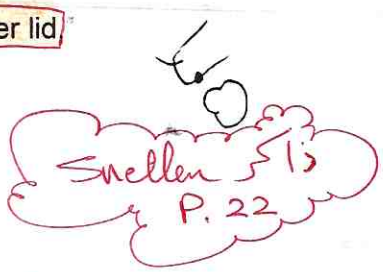


* **Effect:** this will straighten the deformed tarsus& lengthen the palpebral conj.

* **Indications:** 1- Cicatricial entropion of lower lid, 2- Trichiasis of lower lid.

* **Contraindication**: in upper lid as mucous graft will rub against cornea.

(as the upper lid is more movable).



(III) Poliosis

See atlas page (21,22)

Def: Localized whitening of hair which may involve lashes or eyebrows.

Causes: * Chronic anterior blepharitis. * Sympathetic ophthalmitis

* Marfan's syndrome مهم * Vogt-Koyanagi-Harada syndrome مهم

(IV) Madarosis

See atlas page (21)

◊ **Def:** Permanent loss of the eye lashes d.t. destruction of the hair follicle.

◊ **Causes:**

1. General: i- Alopecia areata الثعلبه ii- Leprosy (Loss of the outer1/3)

iii- Vit. A deficiency iv- Myxedema.

2. Local: **(A) Inflammation:** - Ulcerative bleph - Stye **[Staph.]**

(B) Trauma: - Surgical: Excessive electrolysis or cryocautery, snellen's op, Van millengen's op.

- Thermal & chemical injuries

- Irradiation: X-ray in the ttt of intra ocular tumours.

(C) Poisons: Thallium & Arsenic.

(D) Congenital: with coloboma see atlas page (24)

(e) Infiltrating lid tumour

◊ **TTT:**

-TTT of the Cause + Artificial lashes.

- Recently : transplantation of hair follicles (زرع).

(V) Hypertrichosis

See atlas page (12)

Definition: Excess number of lashes (Polytrichosis)
and/or abnormally long luxuriant lashes (trichomegaly).
It is either cong. or drug induced (latanoprost).

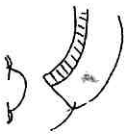
Malpositions of the lid

entropion
ectropion
ptosis

N.B. ectropion & entropion → Lower eye Lid disease

Cicatricial is only type upper eye lid

(I) Entropion



See atlas page (8,9,10)

♦ **Def.:** Rolling in of lid margin (Eversion inwards) with eye lashes rubbing against the eye ball.

♦ **AE.:**

upper **(1) Cicatricial**= Fibrosis: : d.t. fibrosis of palp. conj as in : See atlas page (10)

- Trachoma (+++) usually affects th upper lid.
- Cicatricial pemphigoid (autoimmune disorder).
- Memb. Conjunctivitis (fatal). - Burns & caustics.
- Post operative : as a complication after lid surgery.

lower **(2) Spastic:** "2 factors are essential for its occurence:

1- Spasm of Riolan ms. d.t - Corneal & conjunctival irritation.
- Post operative sutures. - Tight bandage.

2- Lack of support of lid by globe as in:
- Senile enophthalmos. - Atrophic or enucleated eye .

N.B : Spastic usually affects lower lid as it has small tarsus (easly rolled), while cicatricial affecst upper lid (due to Trachoma).

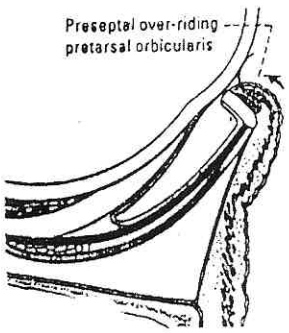
(3) Congenital:

1- Usually associated with microphthalmos ① or anophthalmos ② ((upper lid)).
2- Dehiscence or absence of lower lid retractors ((lower lid))
3- Affects the whole lid.

DD: from epiblepharon see atlas page (9)

- Extra horizontal fold of skin of the lower lid → makes the lashes vertical
- Can be corrected manually.
- Usually affect the medial aspect.
- TTT: spontaneous resolution or skin & ms operation

(4) Senile (involutional):



- Mainly affect lower lid, as it has small tarsus.

- Pathogenesis of senile:

1) Horizontal lid laxity: weak palp. Ligaments.
2) Vertical lid instability: d.t attenuation of lower lid retractor.
3) Over-riding of preseptal over pretarsal part of Orb. O. ms. during lid closure. → cause inward rotation of lid margin.
4) Orbital enophthalmos.

- TTTof senile (involutional) entropion:

1) Lid everting sutures.

2) Weis operation: it will make fibrosis between preseptal & pretarsal part of Orb. O. ms, this fibrosis prevent the over-riding .

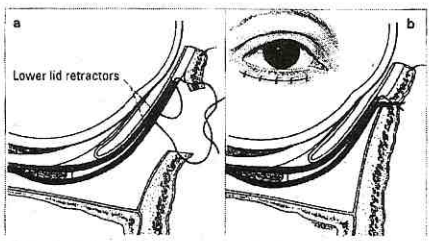
3) Jones procedure: tucking (repair) of the lower lid retractors.

4) lateral tarsal sling: fixation of lateral part of tarsus to lateral orbital rim

♦ C / P: *1.Symptoms:* As in Trichiasis.

2.Signs: as Trichiasis .+ Rolling in of lid margin.

♦ Complications: As in Trichiasis — Conj: ulcer + conjunctivitis, epithelialization; Cornea: ulcer, vascularization, epidermalization



Jones procedure

♦ Treatment:

(1) Spastic:

(i) Remove any cause of irritation: suture, Keratitis, conjunctivitis.

(ii) Put an artificial eye in case of enucleation.

- **Mild cases :(add temporary measures):**

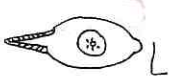
لصقة 1 - T. shaped adhesive plaster.

حقنة 2 - Injection of 0.1 ml Botulinum toxin in orbicularis muscle(to weaken the ms).

قطعة 3 - Lat. canthotomy: incision at lat. canthus to interrupt fibers of ms of Riolan To prevent spasm.

خياطة 4- Lid everting sutures.

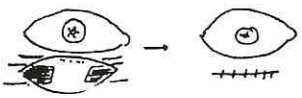
- **Chronic resistant cases :(add permanent measures):**



1 - Lat. Canthoplasty : cosmetically bad.

lat. Canthotomy & covering the edges by a mucous graft from the bulber conj. to prevent healing of edges.

2 - Skin & ms. Operation (Hotz procedure) : Excision of ellipse of :



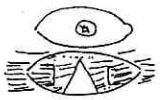
1- Skin→ stretch it .

2- Orbicularis ms: to excise Riolan ms.

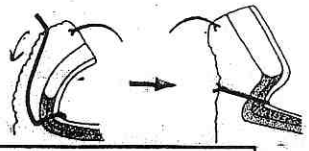
3 – *Wheler's Operation* : As skin& ms operation (excision of skin& central part of orbicularis) +

- Overlap the 2 flaps of O.O. → stretching it → correcting the tarsus.

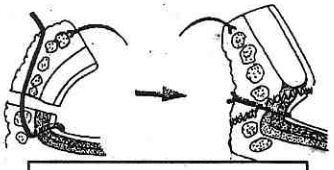
4 - *Modified Wheler's op.*: as Wheler's Operation+ Remove central part of orbicularis + **triangle of tarsus (apex at lid margin)**.



5- *Weis operation*: Total blepharotomy with marginal rotation using lid everting sutures.



Lid everting sutures



Weis ***operation***

(2) Cicatricial:

- Upper lid: - *Snellen's op.*
  - *Anterior lamellar reposition or posterior lamellar advancement:* it is done in recurrent cases with small tarsus .
  - Wies operation
- Lower lid: - Webster's op. - Wies operation

(3) Congenital:

1- Improve spontaneously.

2- Skin & ms operation.

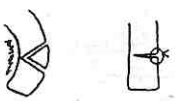
3- Lid everting sutures.

4- If dehiscence of lower lid retractors → reattachment of lower lid retractors to the lower border of tarsus.

Snellen's operation

- **Principle**: straighten the deformed tarsus by removing a wedge from its Substance (its apex towards the conj. & base towards the skin)
- **Indication:** cicatricial entropion of the upper lid.

Contraindications:



1- Entropion of the lower lid : as the tarsus is small (do Webster).

2- Recurrent cases: as the tarsus becomes small (do posterior lamellaadvancement).

3- Pure trichiasis of the upper lid: as tarsus is straight (do Van Millengen).

Complications: - Under or over correction - Madarosis - Lagophthalmos

(II) Ectropion

See atlas page (13,14,15)

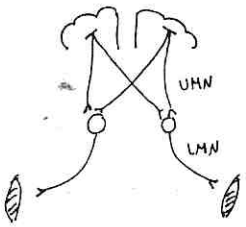
★ **Definition:** Rolling out (eversion outwards) of lid margin (Mostly affects the lower lid due to gravity).

A.E. :

(1) Senile: d.t Laxity of Orb. Ms & palpebral ligaments with redundant skin See atlas page (13)

★**(2) Mechanical :** d.t ↑ Weight of the lower lid by chalazion - tumor- trachoma papillae.

★**(3) Paralytic:** due to paralysis of orb. Ms. "7th n. palsy" lower motor neuron lesion. LMNL = (Bell's palsy).



(4) Spastic: "2 factors": 1- Spasm of ms of Riolan

2- Well support of lid by the globe as in:

Exophthalmos- children – staphyloma

(5) Cicatricial: d.t Scarring of skin of the lid: in burn - operation - dermatitis

MCQ: the most common cause of upper lid ectropion is cicatricial.

(6) Congenital: rare usually associated with other lid anomalies

as in "blepharophimosis syndrome": See atlas page (25)

Narrow palp. Fissure +

1- Ptosis 2- Ectropion

3- Epicanthus inversus (inversus ليه هنا اسمه)

4- Telecanthus 5- Poorly developed nasal pridge.

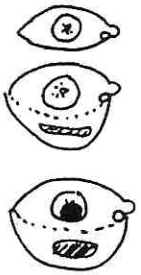
★C/P:

1) Symptoms:

1. (Epiphora) watering of the eye due to :
   1) Loss of capillarity as the lid & punctum are rolled out.
   2) Failure of lacrimal pump.

   Epiphora→ vicious circle.
2. Burning sensation: d.t exposure (in paralytic cases).
3. Complications (corneal ulceration → corneal symptoms اكتبهم).
4. Bad cosmetic appearance.
5. Lagophthalmos in severe cases→ incomplete closure of lid.

2) Signs: Ectropion may be:



1. Mild: Punctum is visible without lid eversion . See atlas page (15)

2. Moderate: Palp. Conj. Is exposed & hyperemic.

3. Severe: - Palp. Conj. Is exposed & thickened(d.t. keratinization) .

- Fornix may be seen - Cornea may ulcerate

★Complication:.

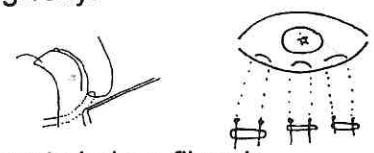
1) Conjunctival exposure leads to: - Xerosis - Chronic conjunctivitis

2) Corneal exposure leads to:

- Xerosis (no distribution of tears + epiphora)
- Ulceration in lower 1/3 due to Bell's phenomenon (rolling up of the eye ball during sleep so the lower part of the corneal only is exposed) (if the Bell's is absent the ulcer will be central)

3) Lid: Epiphora → Vicious circle.

★ Treatment: care of the cornea until deformity is corrected surgically.



(1) Senile:

1. Mild →→ Cautary puncture in lower fornix (using red hot platinum needle) to induce fibrosis
2. Moderate. →→ Snellen's sutures:

> Three double armed sutures Passed from lower fornix, then through periosteum of inferior orbital Margin to appear on skin of cheek,
> Where they are tied over 3 pieces of rubber (حتت كاوتش 3)
> then removed after 2 wks. (Fibrous bands are formed to maintain lid in normal position).

3- Severe → **1) Dimmer's modification of Kuhnt op.**

To stretch lid by:

-Resection of triangle of tarsus & Conj. in the middle. With apex toward the fornix.

- Another triangle of skin & ms at lateral canthus

(After the lid is splitted into 2 layers through an incision in the gray line).

Recently: → full thickness resection at the lateral canthus = **Horizontal lid shortening**

→ **2) Lateral canthal sling** : fixation of the lateral part of the tarsus to lateral orbital rim.

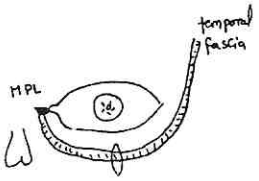
(2) Mechanical:

ttt of the cause.

(3) Paralytic:

- ttt of the cause.
- Vit. B complex, cortisone & V.D. ساعد العصب
- Lid massage, electrical stimulation حافظ علي العضلة
- Artificial tears during the **day** & ointment+ strapping of lids during **sleep**

(or Lateral tarsorraphy) حافظ علي القرنية



- (in permanent paralysis)

AIM *is to reduce the size of the palpeberal fissure*

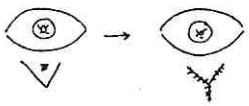
1- Subcutaneous Fascia Lata sling op: Strips of fascia lata are sutured medial to MPL

& lateral to → LPL or temporalis fascia.

2- Tarsorraphy. *3- Lateral tarsal sling.* *4- Gold weight implant in the upper lid*

(4) Spastic: - ttt of cause: keratitis – Conjunctivitis – sutures.
- Snellen's sutures.

(5) Cicatricial:



1- Small Scar →" V – Y op." or "Z-plasty"

The scar is removed through V- shaped incision & skin is sutured as Y.

2- Large Scar → Skin grafting.

Graft sources: post- auricular area, supra clavecular region,
inner side of the arm (non hairy areas – excellent colour matching).

(III) Ptosis(Blepharoptosis)

سقوط الجفن See atlas page (5,6,7)

Definition: it is drooping of the upper lid to cover more than the upper 1/6 of the cornea, In the 1ry position (Pt. looks straight straight)

N.B: normal position: it covers upper 1/6 (upper 2 mm) of cornea in 1ry Position.

AE:

Congenital	Acquired
- Most common	- Less common
- Bilateral	- Unilateral
- Since birth	- Any age
- Usually associated with other cong. anomalies.	

(1) Congenital:

- Cause: - faulty development of levator ms (dystrophy). Or its nerve supply.
- Levator dystrophy → poor contraction & poor relaxation
  (So in down gaze the ptosed lid is higher than the normal = lid lag مهم
  due to poor relaxtion of levatore)
- Associated cong. Anomalies are:-

1- Weak SR-ms: as SR& levator developed from the same dermatome.

2- Epicanthus: skin fold covers the medial canthus → pseudo convergent squint

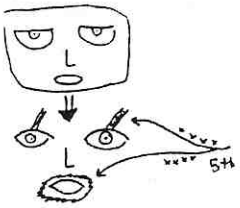
See atlas page (5)

3- Marcus Gunn phenomenon: "Jaw winking" periodic ptosis

ptosed lid elevates on moving the jaw or mandible See atlas page (5,6)

d.t. faulty innervation " fibers from the 5th nerve reach the levator instead of 3rd nerve (misdirection).

* Appears during chewing , sucking , movement of the jaw by side.



4- Blepharophimosis: narrow palpebral fissure See atlas page (25)

(2) Acquired:

1- Neurogenic (paralytic):

as in : - 3 rd n. palsy(ptosis+ squint without diplopia) See atlas page (6)

((3rd nerve plasy ازكر اسباب ال))

- Horner's syndrome (Muller's ms paralysis) See atlas page (7) يكتب كاملا

2- Myogenic: as

* **Myotonia dystrophica.** سلم عليه

* **Myasthenia gravis** وهن العضلات → periodic ptosis

Appears at the evening when the pt is tired & disappears at the morning.

- **Tensilon test:** Tensiolon 10mg IV in ICU → rapid relief of ptosis → M. gravis.
- **Fatigue test:** مهم جد Ask the pt to look up without blinking for 30 sec →progressive drooping of one or both lids.
- **Ice test:** مهم جدا

3- Aponeurotic (senile) ptosis : weakness in the levator aponeurosis (وحش tendon ال)

Characters: 1- Ptosis with good levator function

2- High lid crease

3- Lower postion of ptotic lid in down gaze

A- Senile See atlas page (6)

B- Post operative: Cataract or RD surgery. مهم >>- Speculum. - SR bridle sutures.

TTT : aponeurosis repair (advancement).

4- Traumatic: trauma to levator ms or its nerve supply . See atlas page (7)

5- Mechanical: ↑ wt. Of lid (tumor like neurofibromatosis or multiple chalazia or papillae of spring catarrh , trachoma).

6- Hysterical: - Young female with emotional disturbance.

- Usually bilat.
- No corrugation of forehead or arching of eyebrow.

Pseudoptosis:

The U.L. is abnormally low although levator& muller's ms are normal .

1 * Epsilateral : - Enophthalmos , Atrophic eye or microphthalmo:
Due to lack of support of upper lid.

- Brow ptosis: excessive skin on brow.
- Dermatochalasis: redundant skin of upper lid. See atlas page (24)
- Hypotropia .(لو صلحتها يتصلح الجفن >> cover the normal eye)

2 * Contralateral : Exophthalmos or lid retraction:

N.B. Periodic ptosis: 1) Marcus gun. 2) Myasthenia Gravis.

C / P:

*** Symptoms:** 1) Bad cosmetic appearance d.t dropped lid.

2) Interfere with vision: if pupil is covered by ptosed lid See atlas page (5)

*** Signs:**

1- Signs of the cause: in acquired cases eg.: - Mass→ mechanical.
- Scar → traumatic.

2- Associated anomalies in congenital cases.

3- Laterality: * Bilateral in cong., hysterical, Myasthenia gravis.
* Uilateral in acquired باقي ال

4- in addition to :

(1) Mild: - Dropping of upper lid 1-2 ml.
- Absent lid crease (flat lid).

(2) Severe: Compensatory changes:

1- Contraction of frontalis ms. : lead too
- Forehead is wrinkled (corrugated) - Arching of the eye brow.

2- Head thrown backward (chin elevation)& Eyeball rolled downward. (If bilat.)

3- Head is tilted in علي نفس الجهة المريضة(if unilat.)

Complications:

(1) Unilat. : - Amblyopia & squint due to occlusion & disuse in the 1st 6 yrs.
- Ocular torticollis:تخشب العنق d.t contracture of sternomastoid ms.

(2) Bilat. : MR , Nystagmus & bilateral amblyopia.

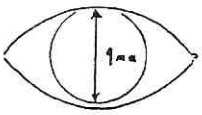
Important Clinical points: هامة

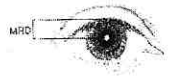
(1) Measurement of degree of ptosis:

Eyelid

1)VFH: Measure the vertical distance bet. Center of upper lid margin & lower limbus

- Normally: 9mm
- **Mild**: dropping 1- 2mm
- **Mod**: dropping 3mm
- **Severe**: dropping 4mm or more





Mild

Mod.

2) Margin- reflex distance (MRD):

measure the distance between upper lid margin & corneal light reflex.

- Normally: 3.5- 4.5mm.

(2) Determine the levator function: تحدد نوع العملية See atlas page (5)

- Correct head position & ask patient to look down to relax frontalis ms.
- Fix eye brow against supra-orbital margin using the thumb to prevent elevation by frontalis
- Ask patient to look up.
- Measure elevation of lid margin in mm using ruler: **Grades:**

Normal → > 15mm

Good → 12 - 15 mm

Fair → 5- 11mm

Poor → < 4 mm

(3) Test of extra-ocular ms movement: to exclude 3rd n. Palsy. If present, treat squint 1st, to avoid diplopia.

(4) Test corneal sensation: if lost → 5th nerve palsy → delay op. till cornea is treated.

(5) Test for Marcus Gunn phenomenon. : if present don't strengthen the levator → this will worse the condition. مهم

(6) Test for Bell's phenomenon (by holding the lids opened & ask the pt to close his lids & observe the upward rotation of the globe)

Absent Bell's phenonmenon carry the risk of post operative exposure keratopathy

(7) Test for increased innervations :مهم

Increased innervations to the ptosed lid & also the contralateral normal lid → lid retraction.(Hearing law)

- Manually correct the ptosed lid & look for a drop of the opposite lid

if this occurs the pt should be awarned that surgical correction may induce a ptosis in the other lid.

(8) Test for Myasthenia gravis:مهم

(9) Examine pupil: Ptosis + mydrisis >> 3rd n. palsy

Ptosis + miosis >> Horner syndrome .

Treatment: (usually surgical)

(1) Acquired: ttt of cause.

1- Mechanical: remove the cause (tumor or chalazion).

2- Hysterical: psycho- therapy.

3- Myasthenia gravis: prostagmine(anti-cholinesterase) or thymectomy.

4- Traumatic or Paralytic ptosis : wait for 6 months:

1- Edema to subside 2- Hge. To be absorbed3- Nerve. to regenerate

Then re-evaluate the ptosis.

5- Senile ptosis : - Ptosis prop (wire fixed on spectacle frame).

- Levator aponeurosis repair or levator resection.

(2) Congenital:

(a) Age of interference:

1) Mild to moderate: wait till the 5-6 yrs(school age) as some spontaneous improvement may occur.(to allow normal ms development).

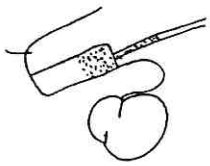
2) Severe (lid cover pupil) :

* unilat: →2 yrs, "for fear of amblyopia".

* Bilat:→ Younger age even 3- 6 months. "for fear of MR & nystagmus".

(b) Choice of op: depends on — Amount of ptosis.

— Levator function.



1) Moderate to degree: if the levator function is:

- Good or fair: do (levator resection& advancement with or without partial tarsectomy) either by:

1. Blascovic's op. (from conj. side) 2. Everbusch op. (from skin side)

- Poor levator function: Hess op. or Modified Hess op.(use frontalis ms.for elevation).

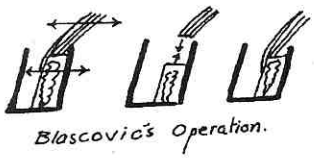
2) Mild degree:

→ **Fasnella- servate op. (tarsectomy + Mullerectomy)**

NB. This operations is done after **phenyl ephrine test.**

→ **Levator tucking.**

Blascovic's operation


Blascovic's Operation.

Principle: -Resection of part of levator: to strengthen it. & ± Tarsus: to

-Every 1mm ptosis needs resection about 3-4mm of levator or more according to levator function.

Indications: Mod. to severe ptosis with good or fair levator function. (Poor مش).

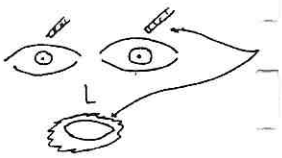
Contraindications:

1- Complete levator paralysis: no effect (do Hess op) .

2- Complete 3 rd n. palsy: as ptosed lid prevents diplopia of paralytic squint (correct the squint 1st).

3- Corneal anesthesia (5th n. palsy) : as ptosed lid protect cornea from exposure keratitis. (post pone the op. until sensation recover).

4- Marcus Gunn phenomenon: the op will worsen the cosmetic app.without correction of ptosis. Do bilat. levator tenotomy (cut tendon → change periodic ptosis to complete ptosis) then Hess op.



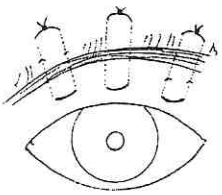
5- Absent Bell's phenomena: do Sling operation (u can remove it any time)

6- Myasthenic ptosis → medical.

Hess operation (Frontalis sling) = brow suspension

See atlas page (7)

- **Principle** : Elevate lid by frontalis ms. (the upper lid is suspended to the frontalis ms)
- **Indications:** 1- Ptosis with complete levator paralysis
  2- Marcus Gunn phenomena.



(1) 3 double armed sutures passed under skin above lid margin to frontalis ms., tied 4 mm above eyebrow.

(2) Sutures removed after 2-3 wks. After forming fibrous bands connecting lid margin & frontalis ms.

N.B: *Modified Hess op*: use **Fascialata** or **prolene** or **supramid** or eithbond suture (non absorpable)instead of silk sutures.→ less fibrosis → no over correction.

Lagophthalmos

See atlas page (28,29)

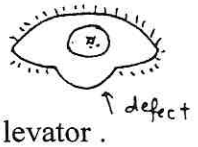
- **Definition**: Inability to close palpebral fissure completely
- **Etiology:**

1- local causes:

(i) Lids: a) paralysis of orbicularis (as in Bell's palsy = 7th n palsy LMNL).

b) Severe ectropion (esp. cicatricial with large scar) & Symblepharon.

c) Coloboma of the lid See atlas page (24)



d) Post operative over correction :

- Blascovic's op (ptosis surgery) : resection of large part of levator .
- Snellen' s op : resection of large part of tarsus.

e) Spastic lid retraction an in thyroid ophthalmopathy.

(ii) Globe : as in proptosis – staphyloma See atlas page (29)

2- General causes: Sever illness (typhoid ,cholera, coma) due to ms atony.

3- Nocturnal(physiological) lagophthalmos :

Especially in children during sleep due to lack of tone of orbicularis.

- **C/P:** *ectropion* زي ال

(1) Symptoms: - Epiphora - Burning sensation d.t. exposure

- ↓ Of vision (ulcer) - Disfigurement : Scar or coloboma

(2) Signs: - Lagophthalmos "inability to close palp. fissure completely ".

- Picture of the cause : coloboma – staphyloma.

- Xerosis جفاف : no distribution of tears + evaporation.

- **Complications :**

(1) Conj. : - Chronic conjunctivitis. - Xerosis.

(2) Cornea: 1-Keratitis with lagophthalmos in lower 1/3 d.t. Bell's phenomenon

- if the Bell's is absent the ulcer will be central

(*mcq: most dangerous complication*) .

2- Xerosis (*mcq: most important irritant factor*).

- **TTT:**

(1)ttt of cause: e.g. - Grafting in coloboma & cicatricial ectropion.

- TTT of Bell's palsy.

(2) Protection of Cornea:

1- During Day: -Soft C.L – methyl cellulose drops 0.5 % (artificial tears)

2- During night: eye oint & close the eye with plaster strips.

(3) Tarsorraphy: 1- Lateral: in mild cases See atlas page (28)

2- Median (or 2- paramedian) in severe cases.

(4) Vit B complex + V.D. اساعد العصب

(5) Lid massage& electrical stimulation: for fear of disuse atrophy.

N.B 7th nerve palsy : - lagophthalmos - Keratitis with lagophthalmos
- Paralytic ectropion - Xerosis - Epiphora

Miscellaneous

(I) Symblepharon

• **Definition**: adhesions between lid – globe See atlas page (26,27)

• **AE:** 2 raw surfaces opposite each other: 1- Palpebral. Conj. 2- Cornea & bulbar conj.

As in: 1- Burn & caustics→ *total.* 2- Postoperative (pterygium op.)→ *ant.*

3- Trachoma→ *post.* 4- Diphtheria→ *total.*

5- Ocular pemphigoid.

• **Types:**

Ant. (post op.pterygium) -- Lid margin adherent to bulbar conj. &or cornea.

Post. (Trachoma) fornix is obliterated

Total (Diphtheria) Lid completely adherent to globe.

N.B anterior symblepharon: ms hook can pass under it.

• **Clinical picture (3D)** 1- **D**iplopia: d.t restriction of ocular movement.

2- **D**isfigurement .

3- **D**iminution Of vision: d.t associated corneal opacity.

• **Complications:**

a) Lagophth → Chronic conjunctivitis & exposure keratopathy.

b) Ankyloblepharon. c) Epiphora_ d) xerosis

• **Treatment:**

(1) Prophylactic: till the raw surfaces re-epithelialized

1- Cortisone oint:↓ Fibroblastic activity & barrier between the 2 raw surfaces

Except if corneal ulcer is present.

NB. Heparin eye drops

2- Glass rod(coated with Ab. Oint.) Pass several times/ day, to cut adhesions, But very painful.

3- Contact shell (corneo-scleral contact): complete separation between lid & globe.

(2)Curative: (conjunctivoplasty):

- Separate adhesions .
- Cover the raw surfaces by mucous graft from lip or AMG.
- If the cornea is opaque → keratoplasty.

(II) Dermatochalasis

Definition: Redundant skin of upper lid in old age→ bad cosmotic appearance(fold)

→ pseudoptosis See atlas page (24)

TTT: Excision of redundant skin (Blepharoplasty).

D.D.: Blepharochalasis ⇒ See atlas page (18.19)

Idiopathic repeated attacks of painless eye lid edema in young pt

→thinning & redundancy of the skin(becomes like cigarette paper)

in Sever cases stretching of lecator aponeurosis → **ptosis**

(III)Xanthelasma

See atlas page (29)

- It is bilat. yellowish raised spots or plaques near inner canthus
- Cause: subcutaneous deposition of cholesterol .
- Common in elderly women with hyper-cholestrolaemia & DM.

TTT: Excision for cosmetic appearance.

♦ **What at is the treatment of ptosis with epicanthus?**

* Plastic operation is done for epicanthus after the age of 10 years (waiting spontaneous correction) and then a second operation is done for ptosis.

♦ **What is the cause of spontaneous correction of epicanthus before the age of 10 years in some cases?**

* Because flattened nose may disappear with development of face. (due to late development of nasal bridge)

♦ **Mention the DD of swelling of the eye lid ?**

(1) Painful: 1) Stye. 2) Abscess. 3) Infected chalazion

(2) Not painful: 1) Chalazion. 2) Dermoid cyst. 3) Sebaceous cyst.

BLEPHAROSPASM: الرفاعي

1) Reflex blepharospasm:

• ***Definition:*** Forcible closure of the eye lids due to reflex contraction of the orbicularis muscle from the irritation of the terminal fibers of the trigeminal nerve.

• ***Aetiology:***

1- Corneal irritation: (a) foreign body. (b) Abrasion. (c) Keratitis.

2- Conjunctival irritation: (a) Conjunctival foreign body. (b) Phlyctenular keratoconjunctivitis. (c) Angular blepharoconjunctivitis.

3- Other causes: (a) Iridocyclitis.
(b) Errors of refraction (if uncorrected). (c) Hysterical.

• ***Treatment:*** Treat the cause.

2) Spontaneous (essential) blepharospasm:

• ***Definition:*** Brief successive involuntary eye closure of insidious onset between the ages of 45-65 years which is usually bilateral.

• ***Treatment:***

1- Neurectomy: Of the branches of the 7th nerve to the upper facial muscles.

2- Myectomy: Of the orbicularis muscle.

3- Botulinum toxin: By repeated injections into the lid and eyebrow muscles.

INFECTED CHALAZION (HORDEOLUM INTERNUM)

• **DEFINITION**: Acute suppurative inflammation of a Meibomian gland.

• **AETIOLOGY**: **(1) Predisposing factors:** As in blepharitis.
(2) Causative organism: Staphylococcus aureus.

• **TYPES: (1) Primary:** Acute suppurative meibomianitis.

(2) Secondary: Infection of a chalazion.

- **CLINICAL PICTURE:**

(1) Symptoms: *Painful swelling* of the eye lid (pain is severer than stye as the meibomian gland is larger and embedded in a dense fibrous tissue).

(2) Signs: ***1) swelling:*** Some distance from the lid margin which is tender, localized and yellowish (yellow spot shining through the palpebral conjunctiva on lid eversion).

2) The swelling breaks through: The palpebral conjunctiva, or the skin,or the lid margin behind the gray line.

- **DD:** Stye (table)
- **TREATMENT:** As in stye but pus is evacuated by **a vertical incision** in the palpebral conjunctiva (at right angle to the lid margin and along the meibomian duct).

N.B: Pus is evacuated by a horizontal incision parallel to the lid margin (as in stye) if it points externally on the skin.

Lid edema

CAUSES:

(1) Inflammatory (exudate):

1) Lid infections: Cellulitis, stye and insect bite.

2) Lid Trauma : injuries or insect bite.

3) Infection of the surroundings: Acute dacryocystitis, conjunctivitis, *Corneal* ulcer, Iridocyclitis, Endophthalmitis. Orbital Cellulitis

(2) Non-inflammatory (transudate):

1) Systemic: 1- Cardiac failure. 2- Renal failure. 3- Thyrotoxicosis

2) Angioneurotic oedema: With allergic basis e.g due to local medication as atropine See atlas page (23)

TREATMENT: Treat the cause.

CONGENITAL ANOMALIES OF THE LIDS

(1) EPICANTHUS: See atlas page (25)

- **Definition:** Semi-lunar fold of skin at the side of the nose
- **Etiology:** 1) Congenital. 2) Racial (Mongolians). 3) Familial.
- **Clinical picture:**

1. Usually bilateral.
2. Semi lunar fold of skin is seen covering the caruncle.

3. Pseudo-esotropia: See atlas page (25)

1- Corneal reflex: is central on both sides.

2- Cover test: is negative.

NB. What is epicanthus inversus?

- **Treatment:** Plastic operation after the age of 10 years (puberty) as Z-transposition operation.

(2) LID COLOBOMA: Notching of the lid margin (full thickness developmental defect)

See atlas page (24) TTT: skin grafting.

(3) CONGENITAL MALPOSTION: 1) Ptosis. 2) Entropion. 3) Ectropion.

(4) DISTICHIASIS: Congenital trichiasis.

(5) ANKYLOBLEPHARON: Adherent lid margins. See atlas page (27)

(6) BLEPHAROPHIMOSIS: See atlas page (25)

- **Definition**: Narrow palpebral fissure.
- **Aetiology**: 1) Congenital. 2) Acquired: a- Trachoma. b. Blepharitis.
- **Treatment**: Canthoplasty.

(7) METABLASTIC LASHES: lashes at any abnormal site.

(8) EPI-BLEPHARON: See atlas page (9)

(9) Telecanthus: See atlas page (26)

Wide distance between the 2 medial canthi due to long medial palpebral ligament.

TTT: shortening of the medial canthal tendons.

(10) Cryptophthalmos: See atlas page (32)

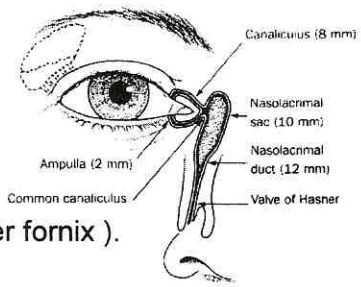
- Complete: lids are replaced by layer of skin which is fused with microphthalmos
- Partial : microphthamols with rudimentary lids

(12) Congenital entropion

The Lacrimal apparatus

Anatomy

See atlas page (50)



The Lacrimal apparatus consists of:

1-Secretory system:

(i) Lacrimal gland.

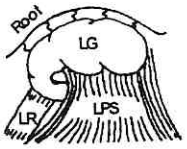
(ii) Accessory Lacrimal glands:40 in the upper fornix & 8 in the lower fornix).

(iii) Goblet cells.(in the epith. Of the conj.)

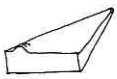
2-Drainage system: (i) 2 puncti. (ii) 2 canaliculi. (iii) Lacrimal Sac.

(iv) Naso- Lacrimal duct (NLD) → nose.

(I) The lacrimal secretory system



1- The main lacrimal gland:



A) Gross anatomy:

* Site: In a shallow bony fossa in the antero-lateral part of the orbital roof

* Shape: Almond shaped.لوزة

* Parts : The gland is divided **incompletely** by the levator aponeurosis into 2 parts:-

1- **Orbital portion:** Superior & larger.

2- **Palpebral portion:** inferior & smaller (rests on sup. Fornix & can be seen if the pt look down & in with elevation of the upper lid by the examiner) .

The 2 parts are continous posteriorly.

* Ducts: 10-12 ducts arise from orbital portion & pass through Palpebral portion to open in the lateral part of the upper fornix.

(So removal of palp. Portion prevents secretion of whole glandbut there will be no xerosis) .

B) Microscopic Anatomy:

The gland is formed of acini.which are lined by 2 layers of cells:

1-Outer flat myo- epithelial cells (contractile). 2- Inner columnar (secretory) .

Blood supply: Lacrimal artery (branch from the ophthalmic artery) ,

The continuation of the lacrimal A. is called → L. P. A.

Nerve supply: **- Sensory:** Lacrimal nerve (branch from ophthalmic n.) .

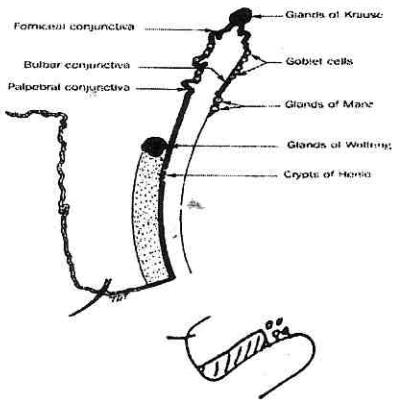
- Parasympathetic: (Secretomotor) : Superior salivatory (lacrimal) nucleus of fascial nerve (pons) → nervus intermedius → form part of grater superficial petrosal n. → relay in the sphenpalatine ganglion → post gangionic fibers reach reach the gland with the lacrimal n.(zygomatic n.)

- **Sympathetic:** (Vasomotor) : from the superior cervical ganglion
  → post gangionic fibers run with the plexus around the internal carotid artery
  → reach the gland with the lacrimal n.

N.B The gland receives afferent fibers from the hypothalamus
→ this explains the pathway of emotional response resulting in tearing.

Lymph Drainage: Preauricular lymph nodes.

Function: Responsible for reflex secretion.



2- *Accessory Lacrimal glands:*

(1) Glands of Krause:

- Site: Upper & Lower fornices.
- Number. 40 (Upper F.) & 8 (Lower F) .

(2) Glands of Wolfring:

- Site: Upper border of upper tarsus. - Number: 5

Function: Responsible for Basic secretion.(الدموع الموجودة طول اليوم)need no stimulus.

NB. Recently : the whole lacrimal tissue responds as one unit.

NB. (1)Destruction or removal of the main lac. gland doesn't lead to xerosis as we can depend on the secretion of goblet cells & accessory lac. glands.

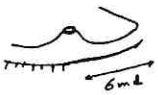
(2) Amount of tear secreted per day is about: 1-1.5 ml / 24 h or 15 h
16 drop/ 15 h
1 drop/ awaking hour

(3) PH of tears is slightly alkaline.(PH = 7.4)

(II) The lacrimal drainage system

A) Gross anatomy:

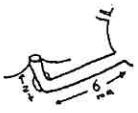
1) Puncti:



- Present on lid margin near its posterior border.
- At a distance of 6 mm lateral to medial canthus on 2 elevations called lacrimal papillae.
- The punctum is directed backwards so it's Not visible (normally).
  except if lids are pulled away from eye or in ectropion.

NB. Punctum is kept patent by a ring of fibrous tissue.

2) Two Canaliculi:



- These are fine tubes which carry tears from the puncti to the Lac. sac.

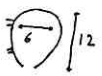
- Each canaliculus is formed 2 portions :
  (a) Vertical: 2mm. (b) Horizontal: 8 mm.

- The 2 canaliculi open into the lacrimal sac by : A common canaliculus (1-2 mm).
  Or open separately.

NB مهمه جدا :Rosenmuller valve at the junction between the common canaliculus & the sac

(They unite in the wall of the sac at the junction of the upper 1/3 &the lower 2/3 of the lac. Sac)

3) Lacrimal sac:



- **Site:** in lac. fossa (in medial orbital wall) .
- **Size:** when distended it's 6 x 12mm.
- **Parts:** *(i) Fundus :* Upper part (extends above med palp. Ligament) .
  (ii) Body: The main part. (المعظم → below MPL)
  (iii) Neck: narrow & continuous with NLD
  (vlave at the junction of the sac &NLD تعرف اسمه؟؟)

- It is enclosed in the lacrimal fascia which give attachement to lacrimal part of orbicularis oculi ms.

4) Naso lacrimal duct (NLD) :

a- It is a tube 12-24 mm long & 4 mm in diameter, which carry tears from lac. sac to the nose.
b- It's present in a bony canal called NLC.
c- It opens in inferior meatus.
d- Direction: downwards, backwards & laterally.
e- Its opening in the nose is gaurded by a valve (Hasner's valve, it's a one way valve, prevents entrance of air or nasal secretions into the NLD) .

N.B. *NLD in females is shorter & narrower so NLDO is common in females.*

B) Microscopic anatomy:

- Puncti & Canaliculi: are lined by St. squamous epith& the stroma is rich in elastic tissue this helps in dilatation of canaliculi by lacrimal dilator .
- Sac & NLD: are lined by 2 layers of epith containing goblet cells:
  - Superficial cells are→ columnar. - Deep cells → flattened.
- NLD: is surrounded by C.T rich in veins (connected with veins of the nose),
  Congestion of this plexus lead to NLDO. اللي عندهم برد عنيهم بتدمع

Blood Supply: - *Arteries:* Infraorbitlal, Angular & Palpebral arteries.
- *Veins:* Infraorbital, Angular & Nasal veins.

Nerve Supply: 5th n.

Lymphatic drainage: to Submandibular lymph nodes.

Lacrimal

NB. The pre-corneal tear film made of 3 layers: See atlas page (50)

(1) **Oily layer:** From Meibomain gland (see lid) .

(2) **Watery layer:** From lac. gland (main & accessory)

- Lubrication.. No friction with the lid.
- Nutrition.. Take O_2 from the atmosphere & supply it to cornea.
- Protection.. This layer contains lysozymes & immunoglobulin A & E .
- Optical.. Abolish any surface irregularities.

(3) **Mucin layer:** From goblet cells (change corneal epith From Hydrophobic to hydrophilic, so the tear can spread homogenously on the cornea) .

Diseases of lacrimal passages

Watering of the eye

It means over-flow of tears over the cheek due to either:-

1-Increased secretion (Lacrimation) . 2- decreased draining (epiphora) .

(A) Lacrimation

Causes:

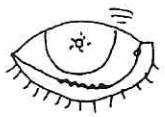
(i) Emotional:
e.g. excitement

(ii) Reflex: affrent 5th & efferent 7th
due to corneal ulcer, iritis, conjunctivitis ,glaucoma
corneal or conjunctival F.B, rubbing lashes
Bright light

(iii) Synkiness with 9th & 10th cranial nerves :as Yawing& vomiting.

(B) Epiphora

Causes :



(A) Diseases of the upper lacrimal passages:

1- Lids: 1- Ectropion.
2- Irregular post. border due to blepharitis or trachoma.
3- Orbicularis paralysis (pump failure) .
1,2,3 are failure of pump mechanism.

2- Punctum: Stenosis or obstruction either:

A- Congenital.

B- Acquired e.g.: - Infection as in trachoma or blepharitis.
- F.B. like lash See atlas page (53)
- Traumatic.

3- Canaliculus: Stenosis or obstruction either:

a- Congenital.

b- Acquired e.g.:* Infection as in streptothrix (actinomyces)infection

(fungal infection → black sulpher granules → gritty sensation on probing).

See atlas page (53)

* F.B. like lash See atlas page (53)

* Post traumatic stenosis. See atlas page (177)

B) Diseases of the Lower Lacrimal passages:

1- Lacrimal Sac: a- Adhesions from repeated inflammations.(خراج كل شويه)

b- Tumors of the lac. Sac. (mass)

c- Fracture of lacrimal bones.(حادثه)

2- Naso- Lacrimal duct: NLDO

a-*Congenital:* Imperforate Hasner's Valve.

b-Acquired: - Venous congestion (nasal catarrh). - Adhesions.

-Tumors or fracture of bony canal. - Periostitis. - Fungal (streptothrix) .

3- Nose: - Polyps or tumors (Rhinoscleroma). - Deviated septum.

- Hypertrophy of inferior turbinate. - Maxillary sinusitis & cancer maxilla.

- Stone.

Investigations

1- Ocular Examination:

i) Exclude causes of Lacrimation.

- Bilateral watering → usually lacrimation.
- Unilateral watering → usually epiphora.

ii) Examine the lid margin (for ectropion, irregularities, punctual obst.).

iii) Examine the lacrimal sac: - Enlarged & tender → acute dacryocystitis.

- Soft with +ve regurge → chronic dacryocystitis.
- Soft with -ve regurge → mucocele.

2- Diagnostic Tests:

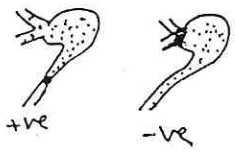
i) Fluorescein test (Dye disappearance test د.عمرو عواره): See atlas page (56)

- Put a drop of fluorescein in the conj. Sac & after 2 minutes.
- Ask patient to blow his nose in a white hand kerchief or a piece of cotton soaked in xylocaine is putted under the inferior turbinate.
- If - Green color is seen → patent passages (lacrimation السبب)
  - No Green color is seen → obstruction (but the level is not determined) .

Or failure of lacrimal pump

Lacrimal

ii) Regurge test:



- Pull the eye lid out to feel the MPL
- Ask the pt to look up to evert the punctum.
- Press by a little finger (or glass rod) on the lac. sac below the medial palp. Ligament: (**backwards, medially & upwards**) against the lacrimal bone.
- If: (-Ve) reg. = Upper segment obstruction (canalicular).
  (+Ve) reg. = lower segment obstruction (NLD obstruction).

See atlas page (52,53)

NB. Normally Regurge test is –ve.

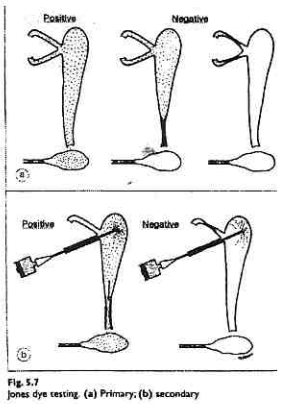


Fig. 5.7
Jones dye testing. (a) Primary; (b) secondary

iii) Jones- dye test:

See atlas page (56)

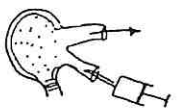
- **Test I** : Fluorescein test is done → if no green color (4 احتمالات)
- **Test II:** The lacrimal passages are irrigated with saline.

IF: - Saline is recovered → Stained→ Partial NLD.
(as the dye already entered the sac)
→ Clear → Failure of pump
or partial canlicular. (as the dye not entered the sac)

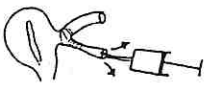
- No saline reach nose→ Complete obstruction.

iv) Diagnostic syringing:-

See atlas page (56)



- Aim: to identify the site of complete obstruction.
- Dilatation of the lower canaliculus, then syringing with saline is done in the lower punctum by lacrimal canula.



- If : - Regurge from upper punctum= NLD obstruction or common canaliculus.

Do probing (Hard stop) (Soft stop)

- Regurge from same punctum= lower canalicular obstruction.

v) Probing:

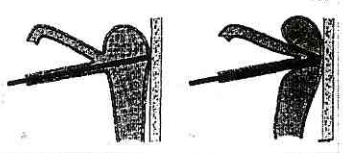
Aim : to identify the site of obstruction & if its passable or not

- Hard stop → NLDO.

- Soft stop → Lower canaliculus or common canaliculus.

Do syringing

- Regurge from upper punctum common canaliculus.
- Regurge from same punctum= lower canalicular obstruction.


Probing. (a) Hard stop; (b) soft stop

3-Radiological Examination:

i) Dacryocystography: اشعة بالصبغة

See atlas page (55)

*A radio- opaque dye (Lipidol) is injected in the canaliculus and repeated X-rays are taken.

*If: - Level of the dye is seen = complete obstruction.

- Rat tail appearance = Stenosis(partial obst) .

- Delayed emptying= failure of lacrimal pump. (Tears بتنزل فقط بالجاذبية)

- Filling defects → tumors.

Normal emptying: - Sac: 15 min. - Duct: 30 min.

ii) Lacrimal scintillography : مهم test that asses tear drainage under more physiological condition than DCG :

- The tear drainage is followed & imaged using gamma camera, after radioactive technetium-99 eye drops are instilled in the conj. sac

iii) X-ray on the nose & sinuses: fracture, sinusitis deviated septum , cancer maxilla.

4- ENT examination: - Polypi, deviated septum or tumors.

-To examine the state of nasal mucosa

Treatment:

1- Lid & nose causes: ttt of the cause.

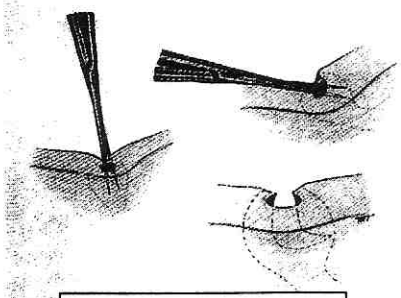
2- Punctum causes:

(i) Stenosis: - Repeated dilatation is done by lacrimal dilator.

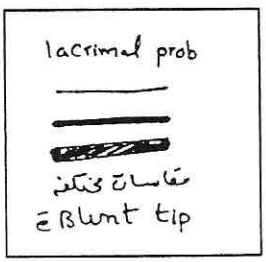
- 1 snip ampullotomy (Vertical 2 mm snip is made in the post. wall)
- Laser punctoplasty : using argon laser.

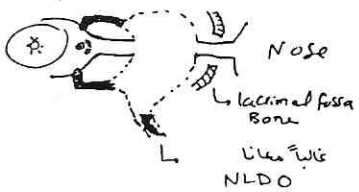
(ii) Obstruction: 2 or 3 snip operation (vertical & horizontal)

(Triangle is removed from the post. Wall)



2 snip operation





3- Canaliculus causes:

(i) Stenosis: dilatation is done by probing or intubation.

(ii) Obstruction: do conjunctivo- DCR.(C-DCR) >> the conjunctiva is connected to the nose a glass tube to overcome the obstruction.

NB *ttt of streptothrix infection :*

- Slit the canaliculi . - Remove the fungus with forceps.
- Paint with 2% iodine(sulpher granules يذوب ال). - Use nystatine ointment.

Probing See atlas page (54)

1- Anesthesia: General (young) , local (adult) .

2- Dilate the punctum & vertical 2 mm of canaliculi by lacrimal dilator.

3- Introduce the probe in the anatomical direction of lacrimal passages:

First: Vertically (2 mm) then horizontally until it hits the bone (of lacrimal fossa) .

Then: Withdraw slightly & direct it down & slightly lateral & backwards.

Till it hits the nasal bone.

Disadvantage: - Painful procedure - False passage.

4- Naso- Lacrimal duct obstruction:

(i) Congenital: (imperforate Hasner's valve):

1- Exclude other cause of lacrimation in children :

- Buphthalmos - Opthalmia neonatorum
- Viral conjunctivitis - Corneal abrasion

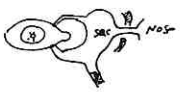
2- *First 9m:* NO SURGERY

Antibiotic drops + Lacrimal massage several times/day

(toward the nose = in downward direction hoping for spontaneous cure) . يفتح لوحده

(By the mother using her little finger).

3- *9-12 m:* Probing + therapeutic syringing. (this pressure يفتح الفالف)



- *90 % successful*
- If failed → second propping - If Failed → intubation (if failed → DCR)

4- *DCR* (dacryo- cysto- rhinostomy : at 3 years ؟وليه بستني لهذا السن if repeated probing failed

(ii) Acquired: 1- ttt of the cause.. adhesions , tumors, congestion, streptothrix.

2- Medical ttt : AB (local & systemic) + VC nasal drops.

3- Probing.. if failed → intubation if failed → 4- DCR.

5- In late cases (sac fibrosed) → dacryocystectomy.

Acute Dacryocystitis

- **Definition:** It is an acute suppurative inflammation of the sac. See atlas page (51)
- **Etiology:** - Organism: usually Staph. Aureus (from the conjunctiva or nose)

  Either: De novo من الاول or on top of chronic inflammation or follow probing.
- **Clinical picture:**

Symptoms: *1- General:* Fever, Headache. FAHM فاهم

2-Local: (i) Painful swelling at the site of the sac (medial & under MPL)

(Pain 1st → dull then it becomes throbbing when bus if formed).

(ii) Epiphora: due to edema of the canaliculi.

Signs: 1- Swelling: red, Hot & tender below the medial canthus.

2- Regurge test: + ve but may be -ve (due to edema of canaliculi) .

- **Complications:** 1-Lacrimal Fistula (open through the skin) See atlas page (51)

  2- Orbital cellulitis → optic nerve atrophy.

  3- Cavernous Sinus thrombosis(it's an abscess in dangerous area of face).

  4- Become chronic dacryocystitis. 5- Pyocele (distension of closed sac with pus).

- **DD : الزيادات**

- **Treatment:** **General**: antibiotics.

  Local:

  1- Hot fomentation & AB.

  2- Pus: Drain (skin incision over the sac under MPL curved or oblique) .

  3- Fistula: fistulectomy + Dacryocystectomy.

Chronic Dacryocystitis

See atlas page (51,52)

◊ **Definition:** It is chronic inflammation of the lac. Sac.

◊ **Etiology:** (i) Stasis of tears in the sac, due to NLD obst. (Cong, or acq)+ .

(ii) Infection: Pneumococci (80% from Conj , nose, sinuses) .

(staph, strept, trachoma, fungus, TB, syphilis, morax : less common)

N.B. *Chronic dacryocystitis is more in menopausal females. this is because:*

1- NLD is anatomically narrower& shorter.

2- Endocrinal disturbances at menopause leading to thickening of the lining mucosa due to hyperplasia of the lining NLD epith.

Also common in children due to congenital imperforate Hasner's valve

→ *Congenital dacryocystitis (Amniocele)* See atlas page (52)

◊ **Clinical picture:**

Symptoms: 1- Fullness. 2- Epiphora due to NLDO (the main complaint)

Signs: 1- Swelling (below the med. Canthus) .

2- Regurge test: +ve. (First watery tears then mucopurulent, lastly frank pus) .

◊ **Complications:** **1- Lid:** Epiphora → Vicious circle.

2- Conj: chronic or recurrent conjunctivitis.

3- Cornea: typical Hypopyon Ulcer due to pneumococci.

4- Lac. Sac: (i) Acute dacryocystitis.

(ii) Obstruction of canaliculi→ pyocele or Mucocele (-ve regurge test).

Mucocele: is a distended sac with mucous from lining goblet cells.

5- Endophthalmitis: if not treated before intra- ocular operations.

◊ **Investigations:** - Cause & site of obstruction : as epiphora.

- Culture & sensitivity to detect the organism.

◊ **D.D:**

1- Cong. Dacryocystitis from ophthalmia Neonatorum: by Regurge test:

- Cong. Dacryocystitis → +ve - Ophthalmia Neonatorum → - ve

2- Mucocele from internal angular dermoid cyst: See atlas page (31)

by the site of the swelling:

(Swelling **below** med. Palpebral ligament→ mucocele→ C-DCR)

(Swelling **above** med. Palpebral ligament→ dermoid→ excision)

3- Ethmoidocele: swelling above MPL ,x-ray & patent passages.

4- Cold abscess TB. 5- Sebaceous cyst: -ve regurge test & patent passages.

◊ **Treatment:**

1- TTT of cause: Congestion (VC drops, nasal polypi

2- TTT of infection: Antibiotics (systemic & local)

3- TTT of NLDO: to restore the communication between the sac & nose

As the obstruction prevent subsidence of the inflammation (see epiphora).

NB. What are the cuases of –ve regure test ? خمسة

Operations

Dacryo-Cysto-Rhinostomy (DCR) See atlas page (55)

* **Principle:** is to make anastomosis between the sac & middle meatus of the nose after making a hole in the lacrimal bone.

* **Indications:** 1-Early Chronic dacryocystitis with relatively healthy sac & nose.

2- NLD obstruction (conj or acq.) if probing is failed.

3- Mucocele.؟؟ ازاي بقي

* **Contra- Indications:**

1-Bad condition of the sac (adhesions) eg. Late chronic dacryocystitis & the nose (atrophic rhinitis)→ will heal by fibrosis .

2- Hypopyon ulcer: fistula will be high "still there is stasis & infection." (ttt is dacryocystectomy)

3- T B or Tumors of the sac → spread. (ttt is dacryocystectomy.)

4- Acute Dacryocystitis (Abscess)

Lacrimal intubation procedure See atlas page (55)

Aim: is permanent fistula between lac. Passages & the nose.

By: Silicone tube (removed after 3-6 months) .

NB. Recently : intubations is monocanlicular

Dacryocystectomy:

Principle: The sac is excised.

Indications: Are contra- indications of DCR (1,2,3)

Complication: Epiphora remain for life.

((Some say that excision of the sac will induce reflex inhibition of the lacrimal gland secretions))

- **What is the treatment of epiphora after dacrycoystectomy?**
  (1) Zinc sulphate drops 0.5%.to neutralize the proteolytic enzymes of tear.
  (2) Alcohol injection in larcimal gland.
  (3) Neurotomy of secretory nerve of lacrimal gland.
  (4) Sectioning of lacrimal gland ducts.
  (5) Partial dacryoadenectomy (orbital or paplebral lobe).
  (6) Conjunctivo-rhinostomy silicon tube .

♦ Mention elimination of tears?

(1) Excretion: 1. ACTIVE :Suction action during blinking
(lacrimal pump by contraction of the lacrimal part of the orbicularis)
2. PASSIVE : Capillarity & gravity

(2) Evaporation: 25-50% during day.

NB. 70% of drained tears pass through lower punctum & 30% via upper punctum.

♦ What is the DD of dacryocystitis? (Mass at the inner canthus)

(1) DD of acute dacryocystitis:

1. Skin Cellulitis, abscess or infected sebaceous cyst.
2. Acute ethmoiditis: X-ray , patent passages , pointing above MPL
3. Osteomyelitis of frontal process of maxilla : marked edema of cheek & patent passages

(2) DD of chronic dacryocystitis in adults:

1) Dermoid cyst. 2) Sebaceous cyst. 3) Cold abscess (TB).
4) Ethmoidocele.. - Above the MPL
- Lacrimal passages opened
- X ray.. Finding bone pathology.

(3) DD of chronic dacryocystitis in infants:

1) Congenital NLDO 2) Viral conjunctivitis ((Ophthalmia neonatorum))
3) Osteomyelitis of maxilla. 4) Buphthalmos
5) Opthalmia neonatorum 6) Corneal abrasion

(4) Unilateral conjunctivitis: Must be suspected to be chronic dacryocystitis if it cannot respond to medical treatment.

Dacryoadenitis الرفاعي

(1) Acute Dacryoadenitis

- **Definition:** Acute inflammation of the lacrimal gland.
- **Aetiology: (1) Local infection:** In the eye lid, forehead or orbit.
(2) Systemic infection: As mumps, influenza and measles.
- **Clinical picture:**
(1) Symptoms: 1) Fever, headache and malaise,
2) Pain over the lacrimal gland.
(2) Signs: 1) Upper lid: Redness and edema.
2) Lacrimal gland:
1. Enlarged, tender and displaces the globe down and in. ((orbital part)) See atlas page (55)
2. Leads to mechanical ptosis and S-shaped deformity of the upper lid margin. ((palpebral part)) See atlas page (54)

- **Treatment:**

(1) Treat the cause: of infection.

(2) Medical treatment: 1) Analgesics. 2) Antibiotics (systemic and local).
3) Warm compresses.

(3) Surgical treatment: Drainage (skin or Conjunctival incision)if suppuration occurs

(2) Chronic Dacryoadenitis

* **Definition**: Chronic inflammation of the lacrimal gland
* **Aetiology**: (1) Specific: Syphilis, tuberculosis, Sarcoidosis and trachoma.
(2) Non-specific : On top of acute Dacryoadenitis.
* **Clinical picture:** (1) Mild signs and symptoms of inflammation.
(2) Enlargement of the lacrimal gland.
* **Treatment**: (1) Treat the cause: As corticosteroids for sarcoidosis.
(2) Dacryoadenectomy: If the medical treatment fails.

Chronic dacryocystitis in infants

* **Definition**: Chronic inflammation of the lacrimal sac in infants
(congenital or infantile dacryocystitis)
* **Aetiology**: Obstruction of the nasolacrimal duct due to:
(1) Congenital incomplete canalization or a membrane at its lower end.
(2) Accumulation of epithelial debris.
* **Clinical picture and complications**: As in chronic dacryocystitis in adults,
but acute dacryocystitis is rare.
* **Differential diagnosis**: - Ophthalmia neonatorum:
[Red-eye and – ve regurge test.]
- Buphthalmos.m - Corneal abrasion.
* **ttt**: Is the ttt of congenital NLDO

♦ What is the chemical composition of tears?

(1) Water: 98%.
(2) Proteins:
1)Albumin. 2) Globulin.: 1-Alpha globulin. 2-Beta globulin.
3-Gamma immunoglobulin (A.G.M.D and E).
(3) Lysozyme: bacteriostatic enzyme.
(4) Other substances: Glucose , electrolytes & MPS.

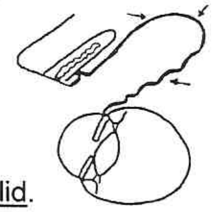
♦ What are the effects of autonomic drugs on lacrimation?

(1) Pilocarpine: Increases secretion of tears.
(2) Atropine: Decreases secretion tears.

CONJUNCTIVA

ANATOMY

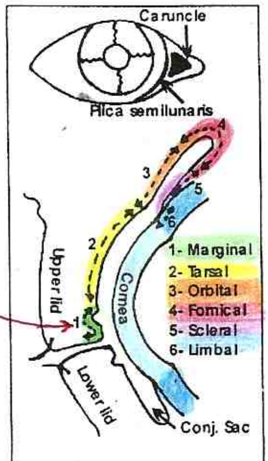
See atlas page (33)



(1) Gross anatomy:

- It is thin semitransparent highly vascular membrane which lines the back of lid.
- Then reflected at fornix to cover the anterior part of sclera.

It consists of 5 parts:



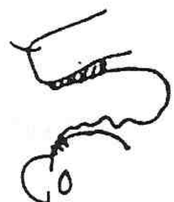
Divisions of the conjunctiva

1) Palpebral conjunctiva: which lines back of lid.

- Is firmly adherent to tarsus.
- It shows sulcus subtarsalis (depression 2mm from lid margin)
- There are 3 parts:
  1- Marginal: from orifice of meibomian gland → sulcus subtarsalis.
  2- Tarsal: from sulcus subtarsalis → upper border of tarsus, firmly adherent to the tarsus.
  3- Orbital: from upper border of tarsus → fornix. That lines the orbital septum

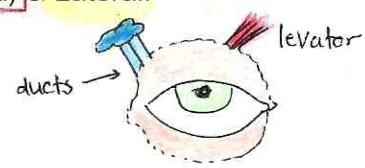
2) Bulbar conjunctiva: which cover the sclera.

- It is loosely adherent to sclera **(scleral part).**
- Except 3 mm around limbus **(limbal part)** .

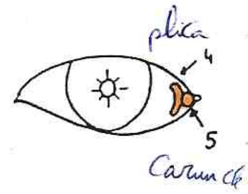


3) Fornix: Site of reflection.

* Number: There are 4 fornices upper, lower, medial (obliterated) & Lateral.
* Upper fornix is the deepest & receives:
  1- Levator insertion. 2- Ducts of main lacrimal gland.
  3- Accessory lacrimal glands.



4) Plica semilunaris: - Is a crescentic fold of the conj. at inner canthus
= Third lid in birds or lower animals (well developed)→
Transparent mucous memb. on the cornea. MCQ



5) Caruncle: rounded, vascular, fleshy elevation (at inner canthus),
Some say it is part of eyelid as it contains:
1- Sebaceous glands. 2- Colourless lashes.

When 2 Lids closed form Conjunctival Sac

Conjunctiva

(2) minute anatomy:

The conj. consists of 2 layers: epithelium + Substantia propria

1) Epithelium: شكله يتوقف علي مكانه

1- Marginal part " from muco-cutaneous junction → S. subtarsalis: St. sq. non k. * stratified Squamous non keratenized

2- From S. subtarsalis → fornix : 2 layers

3- Fornix : 3 layers.

4- From fornix → limbus: cells ↑ in number to become stratified sq. non-keratinized at the limbus (to continue with corneal epith.)

NB. The epithelium contains Goblet cells which secretes the Mucin layer of the tear film.

NB. At the level of muco-cutaneous junction (opening of meibomian glands) The keratinized epith of the epidermis give place to non k. epith of the conj.

2) Substantia propria (stroma): 2 layers:

1- Adenoid layer (superficial): Loose C.T with aggregation of lymphocytes, it develops 3 months after birth.

2- Fibrous layer (deep): Containing main Bl. Vs & nerves & surrounded by a network of fibrous tissue.

(3) Blood supply:

1) Arteries:

1- Branches of Palpebral arteries: *posterior conjunctival Arterie:*

It supplies most of conjunctiva except 4mm area around the limbus.

2. Branches of anterior ciliary arteries: *Anterior conjunctival Arteries:*

- It supplies ant. Part of bulbar conj. (4 mm around limbus).

2) Veins: Accompany the arteries but more numerous:

1. **Anterior conj. Veins:** drain into anterior Ciliary veins.
2. **Posterior conj. Veins:** drain into palpebral veins.

(4) Lymphatic drainage:

P.8

As eyelid: Lateral 2/3→ ..Preauricular + Parotid

Medial 1/3 →...Sub Mandibular

Both to upper deep Cervical L.N.

(5) Nerve supply :

As sensory supply of eyelid:

- Upper → Ophthalmic Nerve
- Lower → Maxillary Nerve

Except : Limbal part (3mm around the limbus) supplied by 2 long ciliary nerves (as the cornea).

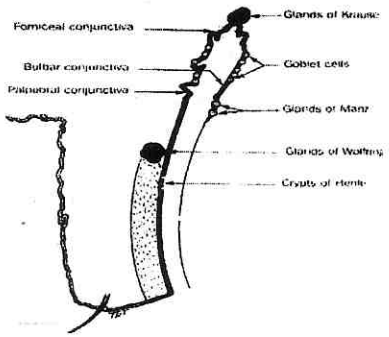
(6) conjunctival glands :

Conjunctiva

1- Accessory lacrimal glands: (lacrimal اكتب من درس ال.)

2- Goblet cells: - Secrete mucous.
- Site: epith.
- Absent near the lid margin & the limbus.
- Maximum at the fornix.

3- Crypts of Henel & Gland of Manz: secrete mucin.



(7) conjunctival Flora(saprophytes) :

- Xerosis bacillus - Staphyloccocu albus - Diplococci مهمه
- Pneumococcus like organisms - fungi.

The conjunctival sac in not free from organisms as the lysozymes of tear film is only bacteriostatic not bactericidal .

Conjunctivitis

Definition: It is inflammation of the conjunctiva characterized by Hyperemia (BV will dilate) and discharge (due to irritation of goblet cells).

Classification

(1) Infective :

1) **Acute:** A- BACTERIAL 1- Mucopurulent conjunctivitis. (org. ضعيف)
2- Purulent conjunctivitis. (org. قوي)
3- Membranous conjunctivitis. (Organism D قوي جدا) e.g. Diphteria

B- VIRAL C- CHLAMYDIAL(D&K): inclusion conjunctivitis.

2- **Chronic:** a) Specific: 1- Trachoma (Chlamydia trachomatis A,B&C)
2- Angular conjunctivitis.(morax).

b) Non specific.. Staph, strept, pneumococci.

(2) Non- Infective :

(a) Allergic: Due to:

1) Exogenous toxin: Vernal conjuncyivitis (Spring catarrh).الرمد الربيعي .

2) Endogenous toxin: Phylectenular conjunctivitis: (Phylecten = nodule)

3) Simple allergic.

(b) Irritative: lashes, FB, Smoke, chemicals.

(c) Systemic: thyroid eye disease . gout.

Conjunctiva

(I) Mucopurulent conjunctivitis (MPC)

• **Definition:** Acute inflammation of conj. Characterized by hyperemia & mucopurulent discharge See atlas page (34)

• **AE:** **(1) Predisposing factors:** 1) Bad hygiene as dirty fingers

2) Flies أهم واحدة. 3) Dirty towels.

(2) Causative organism: 1) Koch-week's bacillus (Haemophylus Egypticus).

2) Staph., strept. & Pneumococci اقواهم.influenza bacillus, B-coli

Koch-week's bacillus	Pneumococci
Gram –ve	Gram +ve cocci
Common in Egypt يحب الحراره	Rare in Egypt لا يحب الحرارة
No pseudo membrane & iritis or corneal ulcer or subconj hge(Complications)	Present.
Sensitive to sulfonamide (bacteriostatic & not act in the presence of pus). So need eye wash before use	Sensitive to sulfa & penicillin (bactericidal).
not Sensitive to penicillin.	
Less severe.	More severe.

Epidemiology: مهم Koch-week' bacillus has 2 seasonal outbreaks in may & September (the breading seasons of flies)

Clinical picture:

* **Incubation period :** short → 1-2 days

* **Symptoms:**

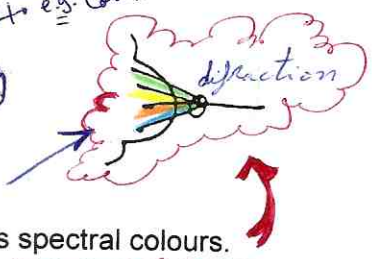
1) Discharge MP & red eye. 2) Ocular discomfort

3) Burning sensation , photophobia & lacrimation.

4) Heaviness: due to hyperemia & edema of the lid and conj.

5) F.B sensation " d.t dried discharge under lid".

6) Colored haloes around light (TRANSIENT): d.t. discharge in front of pupil → diffraction of light crossing pupil into its spectral colours.



DD: form other cause of Coloured haloes :1) ACG 2) Incepient cataract

* **Signs (Bilateral):**

1- Lid: Edema & Lashes gluded together by dried discharge commonly at the morning due to accumulation during night. (Pencils like picture)

2- Conj: - Edema (chemosis) .

- Injection (hyperemia): More marked at the fornices as its highly vascular especially the lower fornix due to gravity.

3- LNs: Preauricular & parotid lymphadenopathy.

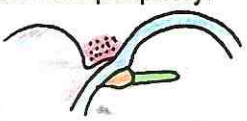
Conjunctiva

- **Investigation:** Conj. smear to show organism.
- **DD:** 1- From ulcerative blepharitis
  2- From other causes of coloured haloes. (page 238 (2 الجزء))
- **Fate:** Spontaneous cure with in 2weeks or after treatment
- **Complications:**

1) Conjunctiva: Chronic conj. If the condition is not well treated & the Pt becomes a carrier

2) Cornea: - *Marginal corneal ulcer*, as chemosis form a gutter خندق between cornea & conj. where discharge accumulates & toxicates corneal periphery.

- *Punctate epithelial erosions*
- *Central corneal ulcer:* due to ischemia (rare)



3) Iritis & hypopyon : In cases of pneumococci **4) Dacryocystitis**: due to pneumococci.

- **Treatment:**

A) Prophylactic ttt: Avoid PPFs by using:

1) Separate towels 2) irradication of flies 3) رفع مستوي المعيشة 4) ttt of carriers.

B) Curative:

1) General: Systemic antibiotics مهم لأن الطفل بيغلبنا في وضع القطرات والمراهم

2) Local:

1-Antiseptic lotion:

* Value: to remove discharge mechanically.
* Examples: Boric acid 4%(max. concentration) & $NaCHO_3$ 3% or Saline 0.9%. or sterile water.

2- Antibiotic drops (every 1-2 hour):

* Value: to kill the organism.
* Examples: a) Penicillin 5000-10000 IU /ml تحضير.
  b) Chloramphenicol 1%.
  c) Sulphacetamide 5-10 % (30% not used → crystalization)
  (not act in presence of pus, so lotion is essential)
  d) Quinolones : Ofloxacin or ciprofloxacin

3-Eye ointment: * Value: 1- To prevent sticking of lid margins during sleep, allowing free exit of the discharge during sleep.
2- Prolong action of Ab.(24 h coverage).

* Examples: -Terramycin 0.5% at night
  - Gentamycin 1%.

4- Hot fomentation:

* Value: produce V.D. which improve the circulation:
  - Bring more antibodies & leucocytes. - Washing the toxins.

Conjunctiva

NB. Bandage is contraindicated due to:

1- Retention of discharge (toxins).

2- ↑ temperature that promote growth of organism .

NB. Painting with $AgNo_3$ 2% (silver nitrates) is obsolete now as it is irritant , Blocks punctum → epiphora. &

Lead to Argyrosis التسمم بالفضه → conj pigmentation. ⇒ See atlas page (47)

(II) Purulent conjunctivitis (PC)

♦ **Definition:** Acute infective inflammation of conj. Characterized by :

Hyperemia, profuse purulent discharge which accumulates rapidly د. اشرف الدسوقي

Corneal involvement & general manifestation. See atlas page (35)

♦ **AE:**

(1) PPFs: as in MPC .

(2) Causative organism:

1)80% of cases: by Gonococci.

Types of gonococcal conjunctivitis:

1- Epidemic: *by non venereal gonococci*

infection is transmitted from one eye to other eye *through : towels, flies* . المصيف

2- Genital (sporadic): *by venereal gonococci*

infection is transmitted from genital tract gonorrhea to eye.

(i) Contaminated hands (autogenous infection).

(ii) Infected discharge from maternal passages during labour (Ophthalmia Neonatorum)

2)20% of cases: by Staph, strept. & pneumococci.

♦ **Incidence:** - Common in children (يدعكو ف عنيهم – ممكن يستخدموا فوط حد)

- & epidemics in summer (July-August).

♦ **Clinical picture:**

Incubation period: few hours to 3 days.

Symptoms: As MPC but more severe with purulent & profuse discharge.

Signs:

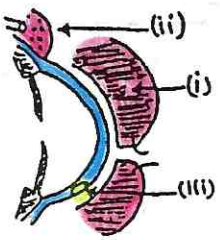
1) Stage of infiltration (1 days): no discharge (or mucoid,watery).

1- Lid: Marked edema close palpebral fissure (can't be everted).

2- Conj. Marked edema (chemosis) See atlas page (35)

, hyperemia& subconjunctival hge. (No discharge).

3- General: Mild fever, headache & Preauricular lymphadenopathy (LN enlarged & tender).



Conjunctiva

2) Stage of discharge (2-3 weeks) يدمع صديد:

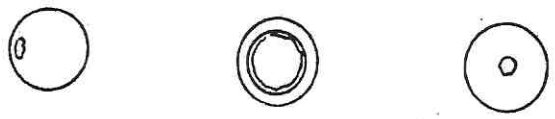
1- Lid, Conj., & general manifestations: decrease

2- But with large amount of purulent discharge with pseudo membrane formation.

3) Chronic stage (2-3 months):

- If condition is not well treated.
- The eye looks quite but there is little amount of discharge full of gonococci + conj. Papillae.
- The patient becomes a carrier who initiates epidemics.

♦ Complication:



1) Corneal ulceration:

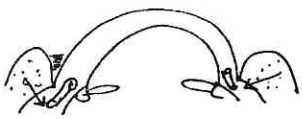
**** Mechanism:***

1) Gonococci can invade intact epith. الاهم

2) Gonoccoci produce proteolytic enzymes.

3) Chemosis: - Forms a gutter at the limbus → Marginal (as in MPC).

- Chemosis presses on limbal capillaries → Central ulcer.



**** Types*** *a) Marginal* *b) Ring:* fusion of multiple marginal ulcer

c) Central *d) Total corneal sloughing = Perforation.*

NB *PC was the 1st cause of blindness in Egypt due to corneal Complications.*

Most common causes of blindness in Egypt

1-OAG 2- DR 3- Cataract 4- PC &Trachoma

World wide the most common causes : AMD , OAG,DR

2) Iridocyclitis. **3) Dacryocystitis:** especially in pneumococci.

4) Spastic ectropion: - Toxins → irritate ms of Riolan.

- In children → there is well support to the lid by globe.

5) Pseudo-pterygium formation. due to chemosis + marginal ulcer

6) Endophthalmitis : as Gonococi can ivade intact epith. Or perforated cornral ulcer,

7) Chronicity & the pt. becomes a carrier.

♦ Treatment:

(1) Prophylactic:

1. Combat flies & ttt of carriers
2. Avoid infection of *other eye* (by using Antibiotic drops in both eyes).
3. Avoid infection of *other persons* by health education, combat flies & simple isolation of the Pt (فوطه واكياس مخداته لوحده).
4. Avoid infection of *doctor* by gloves & protective goggles (وانت بتكشف).

(2) Curative:

1- General: systemic Antibiotic (penicillin) : so important as the lid is edematous so u cant apply local ttt.

2- Local: As in MPC but.

a. Lotion: - More frequent (as the discharge accumulates rapidly)
- Not needed in stage of infiltration.

b. AB drops: - More frequent, every 1 min for 5min → every 5 min. for 30 min. → every 30 min. for 3 hours → every 3 hours for 2 days → t.d.s. for one week (according to bacterial growth curve مهم جدا)
- Use high concentrations (penicillin 10000 IU, sulpha 30%).

c. Eye oint. : - Antibiotic oint. as in MPC.
- Atropine oint. If corneal ulceration occurs.

d. Cold compresses: Edema is marked & hot fomentation may ↑ it , This interferes with : 1- Cleaning of the discharge. 2- Application of the ttt. 3- Inspection of the cornea (for ulceration).

SO use cold not hot fomentation, sometimes we make **lateral canthotomy** to open the eye for examination.

NB. Never apply force to open the lids as the corneal ulcer may perforate.

Ophthalmia Neonatorum

◊ **Definition**: Any form of conjunctivitis occur in newly born in first 3 weeks See atlas page (36)

◊ **AE:**

A) Infectious: organism

* *From maternal passages*: 1- Gonococci (rare عشان البنسلين). 2- Inclusion virus. 3- HSV type II (genital). 4- Chlamydia oculogenitalis (serotypes D&K)

* *After birth*: from contaminated towels, flies: Gonococci, staph , Strept , E-coli.

B) Chemical: Due to irritation by drugs (drops or oint) used for prophylaxis against infection.

◊ **C/P & Complications**: As PC.

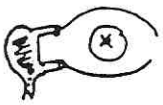
◊ **C/P**

1) Gonococcal infection: IP 1-3 days, severe & purulent.
2) Non- gonococcal bacteria (Stap.& strept): IP4-5 days, variable according to the org.
3) Inclusion virus: IP 5-12 days, mild to moderate , no follicles WHY? (May be pseudo-membranous.)
4) HSV: IP within 2 weeks , may show punctate keratitis + vesicular rash on lid .
ttt : antiviral.
5) Chemical: IP within hours, Mild & self limited within 36 hours, with serous discharge.

Conjunctiva

NB. No follicles are seen in neonates:- ↓ immunity.
- Absence of sub-epithelial lymphoid layer at this age.

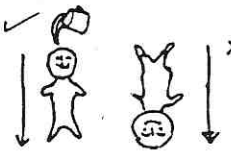
◊ D.D: From other causes of watering of the eye in child.



1- From congenital dacryocystitis: by Regurge test
(-ve regurge in ophthalmia neonatorum).
2- Birth trauma, corneal FB, abrasion.
3- MPC (chemosis is less marked) 4- Buphthalomos.

- Any discharge, even a watery secretion from the eye of a new born durin the 1st 3 weeks is ophthalmia neonatorum (as tears is not secreated at this early life).

◊ Lab. Diagnosis: 1-Conjunctival smear. 2-Immunofluorescent test for Chlamydia.
3- Culture for HSV.



◊ Treatment:

1) Prophylactic ttt : (+ العادي)

1- Treatment of mother before labour (or do caesarian section د.أحمد يوسف)
2- Wash infant with head up
3- *Crede's method:* a drop of Ag No3 2% into the eye after birth.
Now → Ab drops are used instead of silver nitrites)(as a routine for 1 week)

2) Curative ttt : As PC but more **serious** due to :
Thin cornea, no tears (no lysozymes) & the organism can invade intact epith.

(III) Membranous conjunctivitis

See atlas page (35,36)

- **Definition:** Acute infective inflammation of conj. Characterized by:
  - Hyperemia.
  - Bloody purulent discharge.
  - Corneal involvement.
  - General manifestation (severe fatal toxemia)
  - Membrane formation: the necrotic epith. separates as one piece.
- **A / E:** Causative organism: Diphtheria bacilli.
- **Incidence:** - Rare in Egypt (due to vaccination) +تفضل الجو البارد.
  - Common in winter - Age: 2-5 years (Non immunized children).
- **C/P: Incubation period:** few hours – few days.

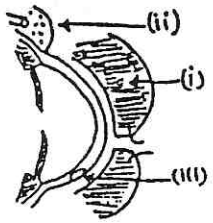
Symptoms:

As PC+ 1) Discharge: blood stained, purulent, & profuse (3P).

2) Diphtheritic throat infection . 3) General weakness and fever.

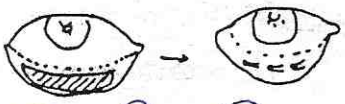
Stages: infiltration, discharge, fibrosis → (no chronicity) → Toxicity

1. Stage of infiltration (1 week) : (purulent زي ال)



- **Lid**: Marked edema closing the palp. Fissure (wood like)
- **Conj:** Marked chemosis, hyperemia + **Membrane**, but no discharge.
- **Cornea:** May ulcerate (peripheral, central, ring).
- **General:** Headache , fever, lymphadenopathy + poor general conditions (Toxemia) .

N.B: Palpebral conj. is covered by a firmly adherent grayish white membrane. That removed with difficulty leave raw bleeding surface.



- **The membrane is formed of**: Necrotic epith+ Fibrin +Bacilli+ RBCs+ WBCs.

2- Stage of discharge (2-3 weeks):

1. **Lid, conj. & general manifestations:** decrease.
2. **Discharge:** Large amount of bloody purulent discharge (serosanguinous discharge)+ pieces of sloughed membrane.
3. **The membrane separates**,(due to fibrinolytic enzymes of pus) leaving a granulating surface which exudates a prulent blood stained discharge.

3- Stage of fibrosis: Healing occurs by extensive fibrosis.→ most of the complications.

• Complications:

A) General: 1- Brain: Toxic neuritis. **2- Heart:** Toxic myocarditis.

3- Kidney: Toxic glomerulonephitrits (albuminurea).

4- Respiratory failure.

B) Local:

1- Lid: Trichiasis, cicatricial entropion. → fibrosis

2- Conj.: - Total symblepharon.

- Xerosis?? Due to :
  - Obstruction of the ducts of the main Lacrimal gland.
  - Destruction of Goblet cells.
  - Destruction of accessory lacrimal glands.

3- Cornea: ulcer (3 types), pseudopterygium (Chemosis + peripheral ulcer).

4- 3,4,6 Cranial nerves → paralytic squint.

5- 3rd nerve involvement . → Loss of accomodation bec. paralysis of ciliary ms. + pupil dilated fixed due to paralysis of sphincter pupillae

6- Optic neuritis & optic atrophy → C&

7- Iritis.

Conjunctiva

• D.D.:

	Membranous conj.	Pseudo-membranous
AE:	Diphtheria bacilli	Pneumococci, viruses, fungus, atropine sensitivity, burns, lime, silver nitrate
Membrane:	Necrotic epith+fibrin+ Bacilli	Coagulated discharge See atlas page (27)
Adhesion :	Firmly adherent	Not→ so removed easily
On removal :	Leaves a raw bleeding surface	No raw surface(leave intact epithelium) See atlas page (34)

• Investigations:
- Conj. Smear stained by Methylene blue.
- Culture on Loffer's serum.

• Treatment:

(1) Prophylactic:
- D.P.T. Vaccine.
- Notification of health office. ابلاغ مكتب الصحه , Complete Isolation of patient in special hospitals
- 5000 unit of Anti toxic serum is given IM to the contacts.

(2) Curative:

1- General: 1- Anti toxic serum 20.000 - 60.000 units is given I.M & a conjunctival smear is taken→ If smear is + ve give a similar does.

2- Penicillin: 1 million units / 24 hs / 5 days I.V.

3- Vitamins, Tonics.

2) Local: (Due to fobrosis): 1. Antitoxic serum drops. (تحضير) كل نصف ساعة

2. Penicillin drops (as in P.C)

3. Atropine ointment (cornea علشان ال) لكن لا تستخدم steroid

4. Prophylaxis against symblepharon (using glass rod)

N.B.1: Avoid lat. Canthotomy: it is ↑ the absorption of toxin.

N.B.2: Avoid steroids as it ↓ immunity.

AVOID السيت فضة قاسم Canthotomy steroid → Argyrosis ($(AgNO_3)$ 2%)

Causes of membranous conjunctivitis:

1- Bacteria: - Diphtheria - Gonococci
- B hemolytic streptococci

2- Viruses: sever epidemic keratoconjunctivitis, herpes ,adenovirus

3- Cicatricial Pemphigoid.

4- Chemical burn.

oral

Conjunctiva

More in upper Lid bec. ↓ Immunity, low blood supply bec. deep & wider area

Chronic coniunctivitis

Trachoma الرمد الحبيبي (Egyptian ophthalmia)

* egyptien ophthalmia

ABC

Definition:

Chronic specific infective inflammation of conj. & Cornea of man

* Caused by atypical virus called → Chlamydia trachomatis.
* Characterized by formation of **follicles- papillae – pannus**.
* Healed by fibrosis→ lid deformity and visual disability.

Q : ? Acute امتي المرض يجي في صوره

Toxins surrounded by Inflammation = follicles

* Cornea → Pannus
* Conj → Papillae
* Both → follicles

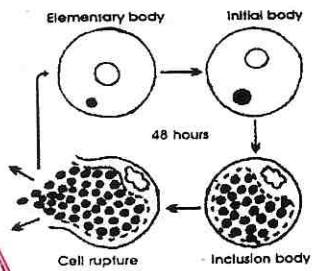
A/E:

- **Incidence:** - Endemic in Egypt affects 80-90 % of population.
  - Age: Children 6 months – 2yrs, but no age is immune.
  - Sex: more in females.
- **PPFs:** Bad environment , flies& bad general health.
- **Causative org.:** Chlamydia trachomatis (Serotypes A,B,Ba & C).

Life cycle of the Chlamydia (48 hrs): مهمه

Cytoplasmic

Elementary body → initial body → Inclusion bodies → cell ruptures & elementary bodies are freed to attack new cells.



Life cycle of chlamydia trachomatis.

N.B:

*** It was considered atypical virus due to:**

- Produce intra-cytoplasmic basophilic inclusion bodies.
- Large in size (250-400 millimicron).
- Produce no solid immunity (epitheliotropic لانه).

*** It is considered (gram –ve bacteria) as it is similar to bacteria in:**

- Sensitive to Sulphonamides & broad spectrum Antibiotics.
- Has rigid (carbohydrate) cell wall.
- Contains metabolically active enzymes like bacteria.
- Contains both DNA & RNA.
- Multiplies by simple binary fission.

*** Some consider it atypical bacteria:**

- As it can't sensitize ATP.
- Not cultured on ordinary media.

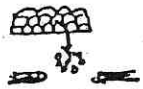
Source of infection: Infected conj. discharge carried by: flies, towels & hands.

Pathology:

1) Chlamydia trachomatis is epitheliotropic virus, it multiplies within the epithelial cells of the conjunctiva , cornea, lacrimal apparatus.

Conjunctiva

2) It secretes toxin that diffuse to subepith. tissue → chronic inflammatory reactions
"early small non-expressible **Follicle" (T1).**



NB. inflammatory cells : - Plasma cells - Lymphocytes - Macrophages (Leber's cells)
- Half moon cells

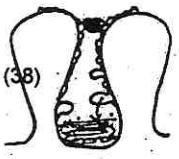
3) Follicle ↑ in size * Pressing on the surrounding blood Vs → Ischemia& central necrosis.
→ "Typical expressible follicles" **(T2a)** See atlas page (37)

* Elevate the epithelium.

4) Epithelial hyperplasia → "papillae formation" **(T2B).**

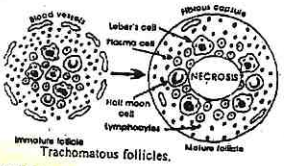
5) Healing occurs by fibrosis **(T3)** :→ close crypts inbetween the papillae.

6) The retained secretions & desquamated epith in the closed crypts will undergo
Hyaline degeneration → PTDs (post trachomatous degenerations) See atlas page (38)



PTDs: Semisolid- yellowish- FB sensation.

7) PTDs may be calcified → **PTCs** (post trachomatous calcifications or concretions).
PTCs: Solid – chalky white.



C/P:

- Incubation period: 1-3 weeks.

- Symptoms "few":

1- F.B sensation (gritty sensation of sand رمل في عنيه) due to PTDs مهم.
2- Little watery discharge (except with 2ry bacterial infection) .
3- Heaviness of lid (mechanical due to papillae).
4- Corneal symptoms (if cornea is involved).

- Signs:

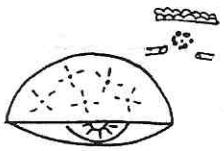
Conjun. Corneal

(I) Conj. Manifestations:

Conjunctival Manif.

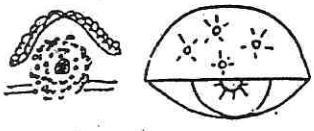
According to **Mac Callen's Classification**, there are "4 "stages that affect upper palpebral conj & upper fornix (due to relative ischemia).

(I) Stage 1 (T1) Early follicle:



- Small < 1 mm, surrounded by dilated capillaries.
- Not raised, not expressible (not rupture with pressure).
- Yellowish. • Fate: either passes to T2 or T4.

(2) Stage 2 (T2):



*** T2a: Typical follicle:** See atlas page (37)

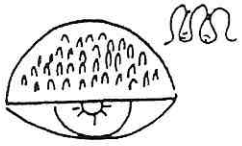
- Large (1-3 mm) , surrounded by dilated capillaries.
- Raised, expressible (if squeezed → gelatinous material = central necrotic tissue).
- Yellowish.

Conjunctiva

*** T2 b: Papillary trachoma:**

The conjunctiva shows fine, pink, finger like& rounded toped projections.

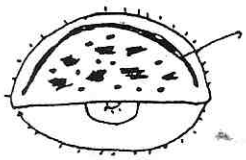
- It gives ***velvety appearances*** of surface.(قماشه قطيفه)
- ↑ the Wt of the upper lid → mechanical ptosis.



(3) Stage 3 (T3): Healing trachoma (stage of complications) مرحلة المشاكل

1) White patches of fibrosis.

2) Von - Arlet's line: white line of fibrosis at suclcus subtarasalis (highly vascularized). See atlas page (38,39)



3) PTDs حبوب صفراء & PTCs حبوب بيضاء.

4) Abnormal vascular pattern

(4) Stage 4 (T4) "Cured = healed trachoma"

- Patient not infective.
- C/P as T3 but conjunctival Scarping shows No I.B. (the marker of the virus)

NB. WHO classification of Trachoma : في الزيادات مهمه P.78

FIST/CO

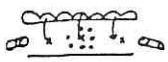
Trachoma
- Common on upper Lid
- Common on upper Part of Cornea

(II) Corneal Manifestations:

Occurs at the same time of conjunctival infection.

(1) Superficial punctuate keratitis: In the upper part.

(2) Corneal follicles:



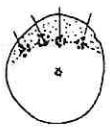
Upper part of cornea (which is covered by the upper lid) shows:

Yellow follicles (Herbert's follicles): See atlas page (60)

Caused by aggregation of chronic inflammatory cells between the Epith. & Bowman's membrane at end of blood vs. → Rosette appear **(Herbert's Rosette).**

- **When follicles heal** → they leave depressed pits (Herbert's pits) Define oral

→ which gives the central (lower) the edge of pannus serrated appearance.



See atlas page (61)

Discuss Pannus

(3) Trachomatous pannus:

1) Definition: Vascularization & **diffuse** infiltration by chronic Inflammatory cells (in the **superficial** part of cornea between epith. & bowman's membrane). See atlas page (61)

in upper part of Cornea

*NB. **Herbert's Rosette** → vascul. + infiltration (localized around the end of BV.)*

*NB **Trachomatous pannus** → vascul + infiltration (diffuse) .*

2) Stages: Progressive, regressive, healing

1. Progressive stage: infiltration(Haze) followed by vascularization (cells infront of BVs).

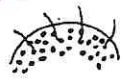
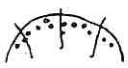
Cornea once Vasc. always Vasc

2. Regressive stage: in this stage infiltration(Haze) regress of inflamatory cells but the vessels never regress,so the BVs is in front of the infiltration.

3. Healing stage: (Dry pannus or pannus siccus)

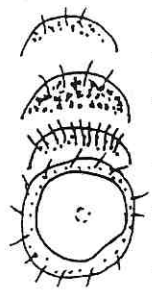
With no ttt the bowman's membrane is destructed → corneal scarring.

Superficial scar is seen at the upper part of cornea showing obliterated vs & Herbert's pits →"serrated edge"


3) Types:

1. **Thin pannus**: *(Tenius):* Vascularization & infiltration are mild.
2. **Thick fleshy pannus** : *(Carnosus)* : infiltration is excessive.
3. **Vascular P.** (*Vasculosus):* Vascularisation is excessive.
4. **Annular** P.*(annulosus):*all around the cornea(if the lower lid affected).
5. **Pannus siccus = dry pannus or healed pannus.**



4) DD:

	Trachomatous	Phylctenular	Leprotic	Degenerative
1- Cause	Atypical virus	Allergy	Lepra bacilli→ iritis& Corneal anesthesia	Absolute glaucoma & iridocyclitis →Degenrated blind eye
2- Site	Up	Anywhere , allaround	Anywhere	Anywhere
3- Border	Serrated	Curved(not end in a straight line)	Irregular	Irregular
4- Vessels	Branching	Straight	Few Bl.V.	Few Bl. V.
5- level	Superficial, anterior to Bowman's mem	Deep, behind Bowman's membrane	deep ,behind Bowman's membrane	Superficial or deep
6- associated signs	Follicles or papillae	phlycten	Iritis , corneal anaesthsia	Absolute glaucoma

5) Fate:

1. **Resolution**: If Bowman's membrane is intact.
2. **Opacity**: If Bowman's membrane is destroyed by toxins.
3. **Keratectasia ex-panno**: d.t pulging of weak pannus scar.

6) ttt of pannus ?

(4) Trachomatous ulcers:

1) Typical: Linear, horizontal & Superficial . never perforates & related to Pannus surface or lower edge. See atlas page (61)

Caused by : sharp posterior border of lid margin.

2) Atypical: Any shape, anywhere.

Caused mechanically by: P.T.Ds, P.T.Cs or rubbing lashes .

Conjunctiva

Diagnosis:

- Pathogenomonic sign
  - Conj → PTD, Arlet's
  - Cornea → Pannus siccus
- Conj Scrapping → Stained with Gimesa stain show inclusion bodies (basophilic-intracytoplasmic)

D.D: other causes of (follicles, papillae & pannus)

(1) Follicles: From other causes of follicular conjunctivitis.

(2) Papillae: From other causes of papillary conjunctivitis in:

1- Palpebral spring catarrh.

2- Chronic purulent (gonococcal) conjunctivitis.

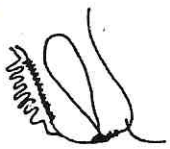
3- Giant papillary conjunctivitis in contact lens wearers.

(3) Pannus: From other types of pannus. (Table)

Complications: of Trachoma

1. LID:

i) Blepharitis ii) Pure trichiasis. iii) Cicatricial entropion. (spastic ectropion in P.C.)



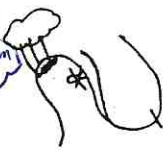
iv) Mechanical Ptosis. (↑ Weight of the lid by papillae + infiltration of Muller's ms).

v) Multiple chalazia (d.t. obstruction of meibomian gl. ducts by fibrosis).

vi) Blepharophimosis. vii) Lagophthalomos due to trichiasis surgery مهمة

2. Conjunctiva:

السم في الزير i) Post. Symblepharon (adhesion bet. lid & globe) (fornix is obliterated). (in diphteria Complete symblepharon)



ii) Xerosis: - Fibrosis & atrophy of Goblet cells & accessory lacrimal glands.

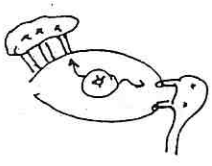
- Obstruction of lacrimal ducts by fibrosis.

القديم iii) StellWag's Brawny edema (T2v) : hyaline degeneration & plasma cell infiltration in the papillae → ↑ size of papillae (plasmoma)→ mechanical ptosis.

3. Cornea: *what are the causes of visual impairment in trachoma?*

i) Ulceration. ii) Pannus. iii) Opacities → irregular astigmatism.

iv) Keratectasia (due to weak pannus). v) Xerosis.



4. Lacrimal:

i) Chronic dacryoadenitis (gland). ii) Chronic dacryocystitis (sac).

iii) Epiphora: due to obstruction of Puncti & canaliculi by fibrosis.

Treatment:

*** Prophylactic ttt :** - Health education (1). - Combat flies (2)- Raising the standard of living (3).

*** Curative ttt :**

(I) Medical: as the trachoma virus is sensitive to sulphonamides & broad spectrum AB :

Conjunctiva

1. Systemic: Sulphadiazine tab. (1gm t.d.s for 10-12 days)

- **Side effects:** - Hypersensitivity reaction(Steven Johnson syndrome).
  - Bone marrow depression.
- **If patient is sensitive to sulphonamides: give**
  - *** For children: Erythromycin suspension for 2 weeks.**
  - *** For adult: Doxycyclin cap 100mg one cap twice daily for 2weeks**

RECENT ***Azithromycin**(zithromax 250 cap) 2×1×3
Suspension for children 2×1×3
& can be repeated after 1 month.

Secreted in tears ← حلو علشان *

2. Local: 1- Sulphacetamide drpos10-30% 5 times / day for 2 months.

2- Terramycin or erythromycin oint. 1/2% before bed for 2 month.

N.B: Atropine oint. 1% if corneal ulcer is present.

(2) Surgical: **1) Surface anesthesia.**

2) Lid is everted by Desmarre's lid retractor: See atlas page (37)

a) Follicles: → expression عصرها

b) Papillae: →scrapping. اكحتها

c) PTDs. PTCs: → Picking by insulin syringe انطرها.

(3) Treatment of corneal signs:

1) Pannus: - P. tenius: Medical treatment.

- P. carnosus: Medical treatment ⊕ scrapping by sharp spoon+ ttt of ulcer.
- P.Vasculosus : Medical treatment ⊕ periotomy ⊕ actual cautery of BVs.

2) Ulcer: Med. treatment ⊕ atropine & bandage if no discharge.

Angular conjunctivitis

Angular Conj
See before angular blepharitis.

Follicular conjunctivitis

Definition: Conj. Inflammation characterized by follicles formation.

Causes: 1- Acute follicular conjunctivitis. 2- Chronic follicular conjunctivitis.

1-Acute follicular conjunctivitis:

A- CHLAMYDIAL CONJUNCTIVITIS :

1) ***Inclusion conj (Swimming bath conj):*** In adults

- **Causative organism:** Chlamydia oculogenitalis (Serotype D&KE&F)

Conjunctiva

- **Source of infection:**

1) Water of swimming bath contaminated with urine from:

1- Male with urethritis 2- Female with cervicitis

2) Auto infection by finger. 3) During labour.

في الدول المتقدمة محدش يقدر يدخل حمام السباحة لوجود صبغة فلوريسين

- **C/P:** **1- follicular conj + hyperemia & MP discharge + peiauricular lymph adenopahty**

2- Differ from trachoma:

a) Follicles with no caseations so leave no fibrosis مهم & affect the lower palpebral conj. mainly.

b) Cornea free or show superficial punctuate keratitis but no pannus.

c) No scarring.

- **Laboratory tests:** epithelial scraping shows intracytoplasmic inclusion bodies as in trachoma.

- **TTT:** as medical ttt of trachoma .

N.B: *There are no follicles in inclusion conjunctivitis in newborn due to absence of adenoid layer in 1st 3 months of life.* مهم

2) Acute trachoma in foreigners . في الاجانب

B- VIRAL CONJUNCTIVITIS:

1) Epidemic Keratoconjunctivitis: Caused by Adenovirus (type 8 & 19).

2) Herpetic conjunctivitis: Caused by Herpes simplex virus.

2-Chronic follicular conjunctivitis:

1- Trachoma.

2- Atropine & eserine (pilocarpine) sensitivity :

Diagnosis by: - History of drug use - Pupil size. -Rapid cure once drug is stoped. مهم

3- Folliculosis (Occur in children as

1) A part of generalized lymphatic tissue enlargement (Enlarged tonsils & adenoids), in response to circulating toxin.

2) Herpes or adenovirus.

NB. Preauricular lymphadenopathy :

1- Inclusion conj. 2- Adenoviral infection (viral)

3- Acute trachoma in foreigner. 4- PARINAUD'S (Oculoglandular syndrome).

Viral conjunctivitis

Causative agents:

1- Adenovirus : causing epidemic Keratoconjunctivitis (EKC)(by droplet infection).

2- HSV, Enterovirus , Newcastle disease virus.

3- Acute viral fevers : as measles, mumps ,influenza.

Conjunctiva

Clinical picture:

1) Conj: - Follicles (in the lower conj), chemosis, hyperemia.
- Watery discharge. - Acute (sudden) subconjunctival hge.

2) Cornea: SPK (superficial punctuate keratitis) >> corneal symptoms due to Ag-AB reaction heal without scar, (superficial لانها)

3) Lid: Vesicles, edema **4) LN:** Preauricular lymphadenopathy.

5) Sore throat & fever.

Fate: 1- Self limited ,resolving in 7-14 days. 2- Affection of the fellow eye in few days.

TTT: 1-Prevention :

ده الى اعتاقى منه لازم اعمى العين التانية

- Protect the fellow eye in unilateral cases.
- The pt should use separate towels & sheets (to be boiled).

2- Curative: 1-Supportive ttt : cold compresses & lubricants.
2- Antiviral drugs in HSV.
3- Local atropine in cases with corneal involvement.
4- AB to prevent 2ry bacterial infection.
5-Steroids locally : ↓ corneal inflammation .

Allergic coniunctivitis

endog Toxin ← **1- Phlyctenular conjunctivitis** **2- Spring catarrh.** → exogen. Toxin
3- Simple allergic conjunctivitis. 4- GPC.

(I) Phlyctenular conjunctivitis

→ nodule

Definition: Acute allergic inflammation of conj. & May be cornea (Phlyctenular kerato-conjunctivitis) in response to **endogenous toxin** characterized by phlycten formation. See atlas page (44,45)

"PHLYCTEN= NODULE"

AE: delayed hypersensitivity reaction =(type 4 hypersensitvity مهمه

Allergy to endogenous toxin as:

1- Exotoxin of strept. "Tonsillitis "
2- Tuberculo protein "T.B"
3- Toxin from intestinal parasites "Ankylostoma"
4- Staph . blepharoconjunctivitis , septic focus.

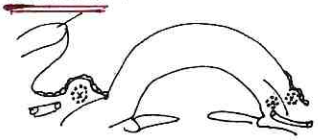
Pathology:

(1) Toxins reach the stroma or the sub-epithelial tissue of bulbar conj. or the limbus.
(2) Toxins becomes surrounded by chronic inflammatory cells (lymphocytic) → nodule(phlycten) formation → elevate the epith.
(3) Epithelial necrosis over phlycten → Phlyctenular ulcer (allergic ulcer) .

tt by steroid

Conjunctiva

Incidence: - Age: malnourished children (5-15 years). - Laterality: bilateral .



C/P:

Symptoms:

* Phlycten alone: 1) Painless nodule on the bulbar conj.
2) Discomfort & hyperemia surround the phlycten.

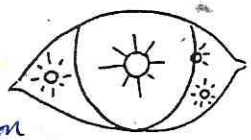
* Phlyctenular ulcer : - Corneal: Lacrimation, photophobia & Blepharospasm.
- Conj.: Discharge (due to 2ry bacterial infection) .

Signs:

1) Conjunctival signs:

Phlycten: Grayish white or yellow nodule at bulbar conj.

- 1-3 mm.
- May be solitary or multiple.
- Surrounded by hyperemia .
- Overlying epith. Is intact then may ulcerate.

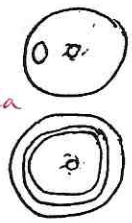


2) Corneal signs:

1- Corneal phlycten (near the limbus) :

(i) It may vascularize → **Phlyctenular pannus** *(Deep to the bowman's)*

(ii) It may ulcerate → **Phlyctenular ulcer** *(infront of the bowman's)*.



2- Phlyctenular pannus: is deep pannus اوصفه من الجدول. P.64

3 - Phlyctenular ulcer: may be

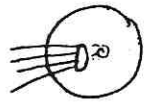
- *Marginal (limbal):* due to ulceration of limbal phlycten .
- *Ring ulcer:* due to fusion of multiple limbal ulcers.
- *Fascicular ulcer:* = الزحلة

زاحفة

Superficial ulcer that creeps over cornea towards center (serpiginous)

the peripheral edge of the ulcer heals but the central edge advances across the cornea supplied by small leash of parallel BVs.

(when it heals → the track leaves superficial opacity maximum where it stops.)



N.B: Serpiginous ulcers: فاهم

1- Hypopyon 2- Fascicular 3- Mooren's

Complications:

1) **Lid:** Spastic ectropion : - toxins → spasm of ms of Riolan.
- the disease common in children.

2) **Conj:** MPC "2ry bacterial infection".

3) **Cornea**: Ulcer & Opacity & pannus.

4) **Recurrence:** if not treat cause. مهم جدا

Conjunctiva

D.D: (1) Phlycten must be differentiated form other masses at the limbus:

	Phlycten	Episcleritis	Pinguecula	Limbal spring catarrh
Age	children	adults	Middle age	children
Discharge	watery	Watery	No	ropy
Itching	No	No	No	severe
Colour	Grayish yellow	Purple	Yellowish	Gelatinous grey
Site	Limbal, paralimbal	paralimbal	nasal	limbal
Level	Moves with conjunctiva	Moves with conj	Conjunctiva moves over	No movement
Tenderness	May be present	Present & severe	absent	absent
Ulceration	May ulcerate	No	No	No
Vascularization	Mild	Marked intense	No	No

(II) Must be differentiating from other cases of pannus: الجدول

Treatment: 1) General: - TTT of cause as AB for septic focus.
- Vitamins, good nutrition.

2) Local: 1. Corticosteroids "drops & oint".
2. Antibiotics For 2ry bacterial inf.
3. Atropine oint. If cornea is involved.
4. **Fascicular ulcer: Atrpine & steroids>> if resistant >>**
   - **Ulcer:** Chemical cautery by carbolic acid.
   - **Bl. Vessels:** periotomy & actual cautery of Bl. Vs. at limbus.

(II) Spring catarrh (vernal conjunctivitis)

الرمد الربيعي

◊ Definition: (A,B,C) Allergic, Bilat, chronic, recurrent & seasonal conjunctivitis caused by exogenous antigen e.g., heat &. U.V. rays, dust. characterized by ropy discharge & itching.

◊ Incidence: - **Age**: children, young adults. -**Sex**: more in boys.
- **Season**: more in summer (hot season = heat & U.V.rays).
- **Onset** : after the age of 5 years & resolves by the age of puberty.

◊ Pathogenesis:

Toxins → type I hypersensitivity reaction → immunoglobulin E is induced → Mast cell wall destruction →releasing chemical mediators(Histamine , serotonin , bradychynine) → severe irritation & hyperemia .

◊C/P: Symptoms:

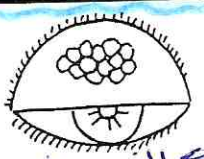
- Itching, red eye.

Conjunctiva

- Photophobia, Lacrimation.
- White thready sticky discharge "Ropy" . فتل بيضاء :
  (toxins → irritate the goblet cells → pure mucous.) See atlas page (40)

Signs: There are 3 types: (Tobgy 1933).

1) Palpebral type: Upper palpebral Conj. shows characteristic papillae:

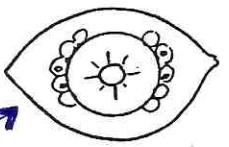


(Toxins → hyperplasia of epith → papillae → mechanical ptosis)

- Large, flat topped due to chronicity & contact with globe.
- Bluish
- Cobble stone arrangement See atlas page (39)
- Fornix is free.

Discharge: Milky white ropy "sticky" film on eversion of lid & left for 1-2 minutes .this discharge is rich in Oesinophils.

2) Bulbar(Limbla) type: Limbal conj. Show: See atlas page (40)

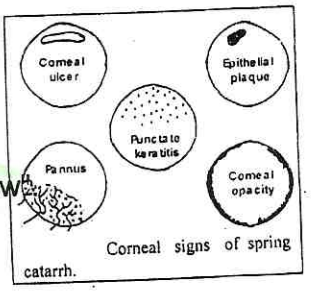


- **Gelatinous masses:** Jelly like masses med. & Lat. then all around.
  (Formed of hypertrophied epith. With hyaline degeneration).
- **Tranta's spots:** white spots within gelatinous masses
  (necrotic epith. & oesinophils & Ca++ deposits) See atlas page (41)

3) Mixed: Palp. & Bulbar.

◊ Complications: {corneal manifestations}

1. Superficial punctate keratitis(keratitis superficialis vernalis of Tobgy).
2. Superficial ulcers= vernal ulcer See atlas page (40)
3. Annular pannus.
4. Corneal epithelial plaques: dried exudates on a minute ulcer. It resists re epithelialization. = shield ulcer مهمه See atlas page (39)
5. Pseudo-gerontoxon : Corneal opacity Arcus senillis like picture (but no clear zone) Due to recurrent limbal disease" Cubid's bow
6. Keratoconus مهم جدا.



Corneal signs of spring catarrh.

◊ D.D: 1- Bulbar type from phlycten. جدول

2- Papillae of palpebral Type from papillary trachoma.

	Spring catarrh papillae	Trachoma papillae
Etiology	Allergic	Chlamydia trachomatis
Symptoms	Itching	Heaviness of the lid
Season	Summer	Not seasonal
Sex	Male ♂	female ♀
Size	Large (cobble stone)	Fine (finger-like) Velvety appearance
Top	Flat	Rounded

Spring Catarrh

Conjunctiva

Color	Bluish red	Pink (red) infection → dilatesmainly A.
Upper fornix	Free	Heavily affected
Discharge:	Ropy, rich in eosinophils	Watery, No eosinophils

◊ TTT: GENERAL TTT: Antihistaminics , steroids tab in resistant cases.

LOCAL TTT :**Symptomatic:**

- Dark glasses (Anti UV glasses).
- Cold compresses.. to resolve the hyperemia.
- Cold lotion: - $NaHCO_3$ 3% to dissolve mucous.
  - Boric acid: as the discharge is alkaline
- V.C. eye drops : prisoline
- Acetyl cystien 0.5% eye drops : mucolytic.

Antiallergic ttt :

- Anti histaminic eye drops: Nostamine
- Corticosteroids:
  - Drops, oint.
  - Supratarsal injection in resistant cases after lid eversion.
  - In severe cases only as prolonged use may lead to complications
    - Local steroids → glaucoma.
    - Systemic steroids → cataract.
  - To minimize the side effects: - use short term therapy,
    - use Fluoro-methelone.
- Mast cell stabilizers: - Disodium chromogylcate "optichrome" 2-4%:
  - Lodoxamide

◊ TTT of resistant cases:

1- Scraping of the papillae followed by B-irradiation to prevent recurrence → EAO.

2- Cryo therapy.→ atrophy of the papillae.

3- Immunosuppressive agent as cyclosporine 2 % تحضير

4- Shield ulcer or epithelial plaque resistant to ttt:

- Depridement. - Superficial keratectomy.
- Excimer laser phototherapeutic keratectomy + AMG or Lamellar keratoplasty .

N.B: *Spring catarrh is self limiting disease that less persistent in adult life.*

(IV) Giant papillary conj

Etiology: Irritation of conj with

1- Contact lenses (soft > hard) & (extended wear > daily wear).

2- Ocular prosthesis (Artificial eyes). 3- Exposed corneal sutures.

Conjunctiva

Clinical picture: Symptoms: - CL intolerance.
- Ocular discomfort, FB sensation, hyperemia, mucoid discharge.
- Vision: blurred (mucous coating the CL).

Signs: Giant, large, flat topped papillae .

TTT: 1-Discontinuation of offending CL.
2-Ttt of spring catarrh (anti allergic ttt).

Degenerations of conjunctiva

(1) Pterygium الزفرة

• Definition: it isa triangular encroachment of conjunctiva over the cornea.

See atlas page (43,44)

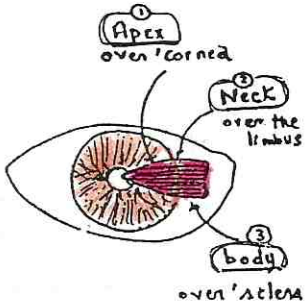
• AE: Unknown,But there is PPFs: Chronic irritation by Ultraviolet rays, heat , dust.
اكتر في الفلاحين(it may follow pingueclua)

• Pathology: 1) Conj. epithelium & fibro-vascular tissue proliferation & encroachment over the cornea.
2) Bowman's membrane & superficial layers of stroma are destroyed. ← Bowman, stroma

• C/P: Symptoms: (4D)
1- Discomfort + irritation. 2- Disfigurement.
3- Diminution of vision (if cross pupil) & compression on the cornea → irregular astigmatism. مهم
4- Diplopia مهم(rare): if associated with symblepharon (adhesion bet. Lid & eye globe) due to recurrent Pterygium operation→ limitation of ocular movements.→ diplopia

Sings: a triangular fold, commonly nasal & bilateral.

• It consist of : 1- Apex: over cornea (a pigmented iron line "Stocker line" مهم may be seen in the corneal epithelium anterior to the head
- **From where comes the iron????**
2- Neck: At limbus.
3- Body: over sclera.



oral
Why nasal ?????? - *Relative tear deficiency medially*
- *As the palpebral fissure is more wide nasally.*

• Types:
1-Stationary: Thin , membranous& less vascular.
2-Progressive(active): Thick (fleshy) more vascular
+ infiltration cap (hazy line) مهم See atlas page (43)
3-Recurrent: After surgical removal (usually associated with ant. symblepharon)

Conjunctiva

• **D.D: (1)**

	True Pterygium	Pseudo Pterygium
Nature	Degenerative condition of unknown AE	A fold of conj. attached to base of a healed ulcer See atlas page (44)
Site	Commonly nasal	Any where
Side	Commonly bilateral	Unilateral
Hook	Cannot pass under neck	Can pass 
Course	Stationary or progressive	Stationary

(2) from pinguecula

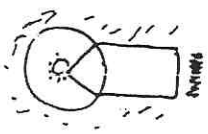
• **Complications:** 1.↓ of vision : if cross the pupil or due to irregular astigmatism مهم.
2.Recurrence مهم. 3.Ant. Symblepharon & Diplopia.

• **Treatment:**

(1) Follow up: If Pterygium is small & stationary as recurrence is common after op.

(2) Operative treatment: * **Indications**: 1.Cosmetically bad. 2.Progressive type.
3.Encroachment on the pupil See atlas page (44)
4.Recurrent.

*** Choice of operation:**



1) Lamellar keratectomy excision with bare sclera operation:

See atlas page (44)

Pterygium is dissected & excised leaving a small bare area of sclera
(to allow the cornea to be covered by corneal epithelium before the conj. epith).
- 10% recurrence : because we leave apart at the base (MR خوفا علي)

N.B: Obsolete operations:

1) Simple excision: as (1) but with no bare sclera, the conj. edges are sutured together so recurrence is common as the conj. Will share in the healing of the cornea.

2) Tucking op. (Mc Reynold):

- Apex of Pterygium burried under lower fornix.
- 0% recurrence but cosmetically bad (conj. mass).

☺ ***Postoperative treatment: to prevent recurrence***

1) Beta irradiation: produce end arteritis obliterance,
Dose: 2500 rad in the 1st week.

2) Mitomycin C or 5 FU: antimitotic (Inhibit proliferation.)

☺ ***give steroids & decongestant before the oper. To make it stationary 1st*** مهم جدا

2) Excision with grafting: (especially in recurrent cases): Excision of pterygium + covering the raw area by: a) Conjunctiva. b) Amniotic membrane graft.

3) Excision with stem cells transplantation: most recent. مهم جدا

4) Excision with lamellar (structural) keratoplasty : due to thinning of the cornea from repeated excision .

5) Retrograde excision.

(2) Pinguecula الشحمة

Definition:

Degenerative condition of conj. In old age with yellow, raised, triangular (base towards the cornea), non vascularized nodule, nasal to limbus.

& it's bilateral See atlas page (42,43)

Etiology: Unknown (heat & UV rays).

Pathology: Area of hyaline degeneration(cholesrerol) ,with deposition of elastic tissue(elastoid degeneration)

Symptoms: Nil.

D.D: From Phlycten جدول.

Treatment: No ttt. , Excision: if cosmetically annoying the pt.

Xerosis

Kerato conjunctivitis sicca = Dry eye

★Definition: It is dryness of conjunctiva & cornea.

★ AE:

A- General:

1- Destruction of lacrimal glands: due to

a) Collagen tissue diseases : as SLE , Scleroderma

b) Autoimmune disorders : Sjogren's syndrome(kerato-conjunctivitis sicca) → dryness allover the body

- Dry mouth with bad odour - Dry vagina - Dry bronchi
- Dry eye - Polyarthritis.

2- Drugs: as Anticholinergics & Antihistaminics & anti anxiety.

3- Vitamin A ↓. goblet cells needs vit A.

4- Inflammation of the lacrimal glands: e.g. Sarcoidosis.

B- Local:

1- Conjunctival scarring: as Trachoma, Diphtheria, Burns, Post irradiation, pemphigoid & Steven-Johnson syndrome.

Conjunctiva

2-Conjunctival exposure: lagophthalmos (no distribution of tears).قول اسبابه

3- Idiopathic :(atrophy of the main & accessory lacrimal glands).

4- Congenital absence of lacrimal glands.

5- Tumors of the lacrimal glands.

★ **C/P: Symptoms:** 1- Discomfort & hyperaemia 2- Gritty (FB) sensation.

3- Burning sensation.

Sings: 1- Loss of luster.(no adequate tear film) See atlas page (42)

2- Thin tear film meniscus See atlas page (42)

3- Dirty tear film د. اشرف الدسوقي

4- The conjunctiva is hyperemic, thickened (keratinized) & Wrinkled.

5- Bitot's spots: See atlas page (41)

- Triangular white patches (keratinization) covered with foamy material (Meibomian glands show abnormal activity)
- Commonly temporal

6- Filamentary keratitis

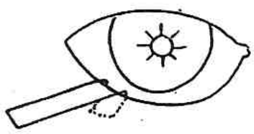
★ Complications:

* Conj.: - Chronic conj. - Conjunctival ulceration. - Keratinization.

* Corneal: - Punctuate epithelial erosions - Ulceration. - Opacification . - Vascularization. - Keratinization.

★ Diagnosis:

1) Shirmer test :(test the aqueous layer) See atlas page (41)



- **Shirmer II with anesthesia** (measure the basic secretion)
  - Put a drop of local anesthesia (to avoid reflex lacrimation)
  - Insert one end (5mm) of filter paper (no.41 Whatman) (35 x 5 mm) into lower fornix (at the junction of the middle & lateral 1/3 of lower lid for 5 min.

> - Take care not to touch the cornea or lashes.
> - The test is done in dim illumination

  - If less than 6 mm is wetted → Xerosis.

- **Shirmer I without anesthesia with nasal stimulation**:
  (measure the basic & reflex secretion=total)
  if less than 10 mm is wetted → Xerosis.

2) Tear film BUT: diminished (it measures the mucin layer)

Method:
- Instill a drop of Fluorescein into the conj. sac.
- Using the slit lamp with cobalt blue filter examine the pt.
- Ask the pt to blink several time (for distribution) then to stop.
- Time between the last blinking & the 1st appearance of dry spot (black) is estimated:

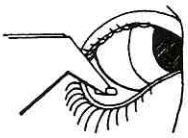
Conjunctiva

> 10 sec → normal.

< 10 sec → mucin deficiency See atlas page (42)

3) Rose Bengal stain: the devitalized epith will be stained red . See atlas page (41)

★ Treatment:



Lacriset

(1) Treat the cause: e.g. Vit A.

(2) Tear substitutes: - Methyl cellulose drop 0.5%: during day.

- Vit A. oint: during night.

(3) Lacriset : rod shaped pellet of hydroxyl propyl cellulose is inserted into the lower fornix.

(4) Tear preservative:

contact lens, punctal occlusion by cautery or

Punctal plug فله . See atlas page (42)

(5) Bitot's spots: scraping by a sharp spoon.

(6) Parotid duct transplantation: rarely used.

Conjunctiva زيادات

♦ **Recent WHO classification of trachoma:** مهم جداً

(I) Active trachoma with follicles **(TF)** 1) Active moderate infection
2) Upper tarsal conjunctiva shows < 5 follicles
3) Some papillae may be present.
4) Blood vessels are visible through follicles & papillae

F1(insignificant) **F2** (mild) **F3** (moderate) **F4** (severe)

(2) Active trachoma intense **(TI)** : 1) Severe infection with a high chance of complications.
2) Many follicles and or papillae.
3) > 50% of blood vessels are not seen
(obscured by follicles and papillae)

(3) Trachomatous scarring **(TS)** : white scars on the upper tarsal conjunctiva.

(4) Trachomatous trichiasis **(TT).**

(5) Corneal opacities **(CO):** Superficial corneal opacification with visual affection(6/18 or less)

♦ **What are the signs of cured trachoma?**

(1) No sings of active trachoma.1) NO conjunctival hyperaemia.
2) NO conjunctival follicles.
3) No active pannus. 4) No epithelial keratitis or ulcers.

(2) Signs of scarring: 1) Conjunctival : Scarring and Arlet's line.
2) Corneal: Dry pannus, Herbert's pits and corneal opacities.

(3) Laboratory tests: negative for inclusion bodies:
1) Direct smear stained with Giemsa stain.
2) Epithelial scraping stained with Giemsa stain.

♦ **What are the diagnostic signs of active trachoma?**

(1) Basophilic intracytoplasmic inclusion bodies. (2)Expressible follicles.
(3)Rectangular papillae with flat tops (finger like processes).
(4)Pannus and Herbert's rosettes.

♦ **What are the causes of chemosis ?**

* ***Chemosis*** *(conjunctival oedema) is due to :*
(1) Acute inflammations of eye and its adnexa especially :
1) Gonococcal conjunctivitis.
2) Hypopyon ulcer. 3) Orbital cellulitis. 4) Endophthalmitis.
(2) Circulatory obstruction: As in thyrotropic exophthalmos.
(3) Allergy: As angioneurotic oedema.

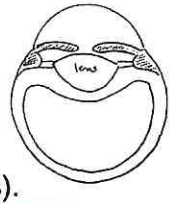
♦ **What is the DD of mass at the limbus ?**(1) Bulbar spring catarrh
.(2) Phlycten.(3) Episcleritis.(4) Apex of pterygium.(5) Foreign body.
(6) Tumour as dermolipoma or epithelioma.

The crystalline lens

Anatomy

- **Definition:** it's elastic (زي البالونة), transparent, avascular, and biconvex structure which is suspended in its place by the zonules (Suspensory ligaments).

- **Gross anatomy:**

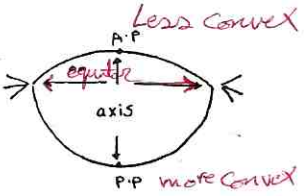


1. Relations:

- **Anteriorly:** iris (separated by posterior chamber which contains aqueous).
- **Posteriorly:** vitreous (separated by retro-lental space)which contains aqueous.

2. Shape: biconvex in cut section & disc shaped in front view & it has:

- ***Anterior surface:*** Less convex (radius= 10 mm), its center: is the ant. pole.
- ***Posterior surface***: More convex (radius R= 6mm) ,its center is the post. pole.
- ***Axis of the lens= thickness:*** Line joining the ant.pole & the post. pole (4-5 mm).
- ***Equator (rounded lens edge= where the 2 surfaces meets):***
  - Gives attachment to the zonules.
  - Equatorial diameter= 9 -10mm (الضعف).



3. Consistency: - Young → soft - Old → hard .

4. Color:
- Children: colorless (d.t. high content of water).
- Adult: yellowish tinge أصفر خفيف.
- Old: grayish(physiological lens sclerosis).

5. Refractive index (معامل الانكسار) = $\frac{\text{Velocity of light in air (aqueous)}}{\text{Velocity of light in medium}}$ unitless number.

- RI cortex: 1.39 - RI nucleus 1.42 - RI lens (average): 1.4

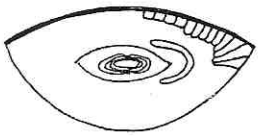
6. Refractive power: It's the ability of convergence of parallel rays.

- inside the eye" & unaccommodative" = +15 : +18 D (at birth that reduce to 1D at 60 yrs old).
- Outside the eye= +70 D d.t. :
  - ↑ curvature d.t. loss of stretch by zonules,
  - ↑ RI = $\frac{\text{سرعة الضوء في الهواء}}{\text{سرعة الضوء في ال Lens}}$.

N.B. Refractive power of cornea= 42 D so, the cornea is the main refractive surface of the eye.

The lens

Minute anatomy (structure) :



1- Capsule: - Highly elastic membrane خاصة في الاطفال.

- Secreted by ant. Sub capsular epith..
- Thickness: ant. Capsule thicker than post. Capsule

Function: 1. Accommodation.

2. Semi permeable membrane (nutrition in& waste products out).

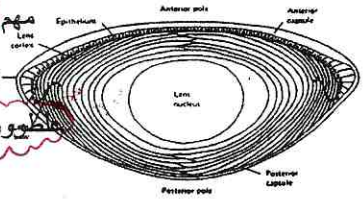
3. Protection: of the lens fibers from the proteolytic enzymes of aqueous.

2- Sub-capsular epithelium

- **Site**: single layer of cells lines the capsule anteriorly& at the equator
- **Shape**: cubical, columnar, and pyramidal at the equator.
- **Function:** **1- Ant. cells:** secrets the ant.& post. Capsule.

2- Equatorial cells (pyramidal): secretes lens fibers.

3- Post. Subcapsular epith: in the 1st trimester of pregnancy → form the embryonic nucleus.



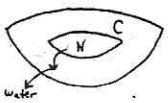
3- Lens fibers

(i) Secreted by : equatorial cells(active mitosis through out life)

(ii) Divided into:

1- Peripheral fibers: soft (cortex) .

2- Central fibers: hard being compressed and sclerosed (nucleus) , due to pumping of water to the outside "physiological lens sclerosis".



NB. Nucleus ↑ in size with age.

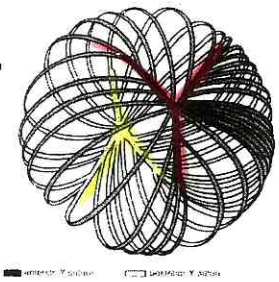
NB. Old fibers are central but new fibers are superficial.

NB. Nuclei of old lens fibers→ breaks into granules (un-nucleated), but new fibers are nucleated.

iii) Sutures: site of articulation of lens fibers:

* In fetus: → Y shaped: erect anteriorly "Y" & inverted posteriorly " λ"

See atlas page (105)



- In adult : → Star shaped sutures.

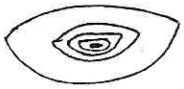
N.B: The Nucleus (by slit lamp): is divided into:

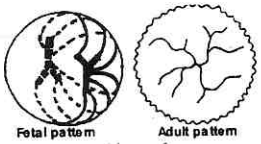
1- **Embryonic nucleus:** 1-3 months intra uterine.

2- **Fetal nucleus:** 3-8 months (I.U).

3- **Infantile nucleus:** up to puberty.

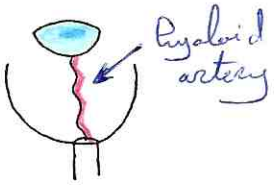
4- **Adult nucleus:** after puberty.





The lens

Nutrition:



1) **After birth:** It is avascular & nutrition is obtained by diffusion from aqueous.

2) **Before birth (intra uterine) :** → vascular.

* **Posterior :** Hyaloid artery See atlas page (104)

- *Course:* Emerge from the optic disc run in vitreous to end at posterior pole of lens.

NB. Reminants of Hyaloid artery → *Congenital post. polar cataract.*
→ *Vitreous opacities.*

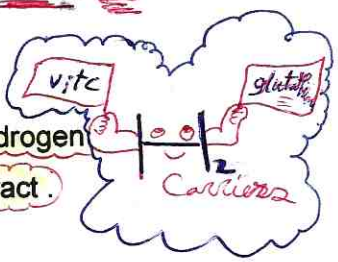
* **Anterior :** Anterior vascular sheath.

Composition:

1- Water: 65% (↓ with age) 2- Proteins: 34% 3- Minerals 1%.

Metabolism:

Anaerobic (as the lens is avascular , so no enough O_2) ,
Oxidation occurs by dehydrogenation. Which requires Hydrogen carriers as Vit. C & Glutathione >> their absence >> cataract .



Functions of the lens:

1. One of the refractive media of the eye (converging).
2. Accommodation.
3. Protect the retina from U.V. rays which is toxic to the retina → Phototoxicity.

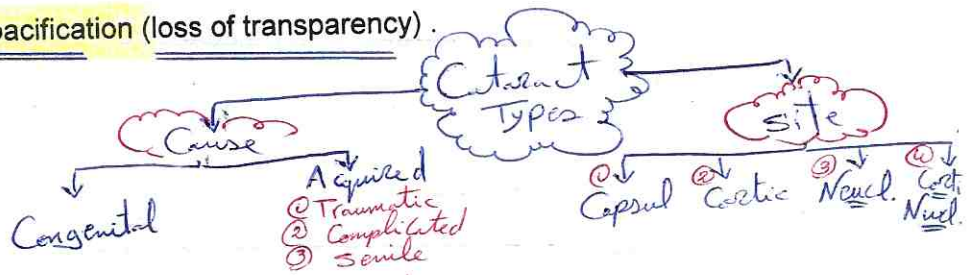
Accommodation: it is the ability of the eye to change its diopteric power to see at different distances (near & far) clear.

Cataract

Definition:

It is lens opacification (loss of transparency) .

Classifications:



1) According to the cause:

1- Congenital.

2- Acquired:

① *** Traumatic** (rupture capsule→ aqueous enzymes act on lens ptn → polypeptides which is opaque molecules)

② *** Complicated:** e.g. iritis.

③ *** Senile.**

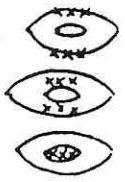
The lens

2) According to the site:

1- Capsular (sub-capsular): ant. or post. See atlas page (103)

2- Cortical: ant. or post.

3- Nuclear 4- Cortico-nuclear.



3) According to the Age:

	1- Soft cataract	2- Hard cataract
Incidence	before the age of 25 years.	before the age of 25 years.
Includes	Congenital, traumatic & complicated cataract (except senile)	Congenital, traumatic & complicated cataract. + Senile
Nucleus	No hard nucleus	No hard nucleus except congenital
Lens ptn.	Mainly crystalline ptn (soluble ptn) , can be digested byaqueous enzymes, so If the lens capsule is ruptured by trauma or operation→ complete absorption of lens matter → no after cataract. (soluble ptn→ polypeptides→ a.a. which is clear , small molecules & can be washed with aqueous)	mainly albuminoid ptn (insoluble) which can not be digested byaqueous enzymes. So, if the lens capsule is ruptured by trauma or operation → soft lens matter(cortex) will be absorbed but the nucleus not → after cataract. (Insoluble ptns → polypeptides which is opaque)
TTT	as congenital cat. (I/A or lensectomy).	as senile cat.(ICCE or ECCE).

Congenital cataract (Developmental)

- **Definition:** It is lens opacification which occurs since birth (congenital) or shortly after birth (developmental) .
- **Etiology:**

1) Hereditary وراثة
2) Chromosomal abnormalities e.g. Down
3) Malnutrition of mother during pregnancy - ↓ VitD & Ca++.
   - ↓ Vit C & glutathione. → Hydrogen Carriers
   or infantile malnutrition .
4) Intra- uterine infection (e.g.. Rubella).
5) Exposure to teratogenic drugs or irradiation during pregnancy.
6) Fetal hypoxia as in cases of placental hge.
7) Metabolic diseases e.g. glalctosemia, DM.

• Characteristics:

1- Commonly bilateral. عيب
2- Commonly associated with other congenital anomalies. عيب e.g aniridia
3- Commonly stationary. ميزة (except rubella cataract ,It starts as nuclear cataract → soon progress to total cataract.)
4- Hereditary may play a role.
5- It's soft cataract. ميزة

• Types: (ALPTشينو)

1- Ant. Polar.
2- Lamellar "zonular".
3- Post. Polar
4- Total
5- **Others:** شينو ▪ Blue dot. ▪ Sutural. ▪ Coronary.

1) Anterior polar cataract:

See atlas page (103,104)

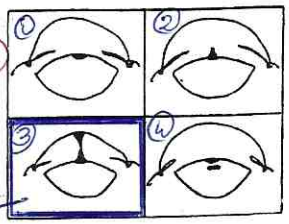
*** Etiology:** Delayed formation of A.C., as prolonged contact between the cornea & lens → irritation of sub-capsular epithelium at the ant. Pole → proliferation and formation of mass of cells + calcium deposition → Opacity at the ant. pole.

*** Symptoms:** usually asymptomatic as it's small & away from nodal point.

*** Signs: it may be**

1- Disc shaped with persistent pupillary membrane

See atlas page (103)



2- Pyramidal opacity.
3- Hour- glass opacity (opacity involves both lens & cornea)
4- Reduplicated opacity: pyramidal + ant. Cortical cat. separated by clear lens fibers.

*** D.D:** From acquired type (more common) due to: **Small central corneal perforation.**

	Congenital	Acquired
History of red eyes:	-ve	+ve
Corneal opacity:	Absent (hour glass الا في)	Present
Side:	Bilateral	Unilateral
Age:	Since birth	Any age
Consistency :	Soft	Soft or hard

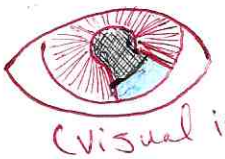
*** Treatment:** - If small opacity (common) → No TTT is required.

- If large opacity (less common) → *Do visual iridectomy.*

See atlas page (95)

(If vision improved by mydriatics)

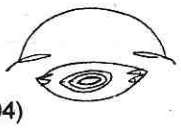
to avoid lens replacement& to preserve accommodation.



The lens

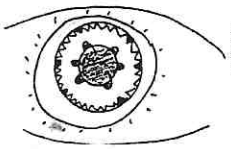
2) Lamellar cataract (zonular cat.) :

- **Definition:** it is lens pacification involving one or more lamellae of the lens (Opacity between clear embryonic nucleus & cortex) See atlas page (104)



- **Etiology:** 1- Hereditary.
  2- Malnutrition of the mother during pregnancyespecially vitamin D and Ca++ ↓,
  As the child often shows: i.Evidences of rickets. أسنان وعظام
  ii.Abnormality of permanent teeth.

- **Clinically:** - It affects the vision as the opacity is large.
  - With the pupil is dilated, the lens opacity is composed of:
    1- Central disc. 2- Projections (riders) . See atlas page (104)
    This resembles: Steering wheel of a ship دفة السفينه
    Or cart wheel appearance. عجلة العربة الكارو



Explanation:

1- **Disc:** vit. D & Ca deficiency → affection of metabolism of pyramidal cells→ formation of opaque fibers. On recover from this deficiency, clear fibers are formed pushing opaque fibers inwards → Opaque lamella (this could be repeated).

2- **Riders:** The equatorial cells don't recover at the same time. As some of them recover forming clear fibers, but those beside them continue to form opaque fibers (Riders).

3) Posterior polar cataract: See atlas page (104)

- **Etiology:** persistence of remnants of the Hyaloid artery (or posterior vascular sheath).
- **Clinically:** Disc shaped opacity at the posterior pole.
- **Vision:** markedly ↓(as the opacity is close to the nodal point) .
- **DD:** other causes of posterior cortical cataract:
  1- Complicated cataract 2- Concussion cataract (trauma).
- **TTT:** - Lensectomy
  - Irrigation aspiration + Posterior rehexis + ant. vitrectomy.

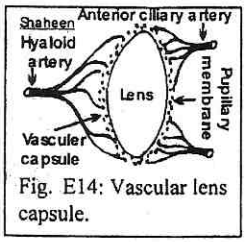
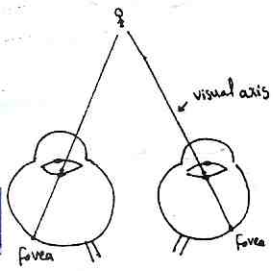


Fig. E14: Vascular lens capsule.

NB. What is the nodal point ?

- A point by which light must pass to fall on the fovea.
- Or it's the point through which rays entering the eye undergo no refraction
- Site: 7 mm behind the center of the cornea (just anterior to post. Pole).



4) Total cataract:

* Due to rubella infection (german measles) to the mother in the 1st Trimester (History of RASH)

The lens

* It start as nuclear cataract → soon progress to total cataract.

* The cataract operation is risky in this patient due to:

1- Associated cardiac anomalies (risk during general anesthesia) .

2-The virus remains dormant inside the lens for 2-3 years.

(Operation→ viral Endophthalmitis. شفوى)

NB. Recent opinion says : lens can be removed very early

(by a single complete removal using vitrectomy machine .

NB. Other features of congenital rubella syndrome:

- Microcephaly ,MR, Deafness, PDA.
- In the eye : Cataract , Miotic pupil (so difficult examination)

Micro-ophthalmos, buphthalmos .

5) Other types: شينو

1) Blue dot cataract (Punctate) : Small blue dots scattered in the lens .

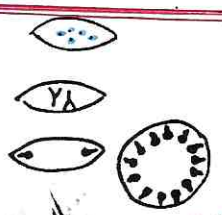
See atlas page (105)

2) Sutural cataract (opacities at the Y sutures) :

does not affect the vision especially if it is anterior . See atlas page (105)

3) Coronary cataract (club shaped opacities at equator).

NB. 1,2,3 not affect the vision, only discovered during routine examination at puberty.



• Clinical picture: Of Cong. Cataract.

Symptoms: given by the mother. الأم تشتكى عن ابنها

1- White pupil (if the cataract is extensive).

DD from other causes of white pupil (الجزء التاني)

2- Defective vision.

Signs: - One of the previous types is seen .

• Complications:

1-Bilateral opacity:

- Mental retardation.
- Nystagmus = non fixing eye في اول 3 شهور من العمر

(as opacity interferes with foveal development = no fixation reflex) .

2) Unilateral: - Amblyopia : after 6 years amblyopia will be dense irreversible.

& - Squint : usually convergent

• Treatment (at the age of 4-6 wks)

(1) Unilateral cases: operate as early as possible (before the age of 6 yrs)

to avoid dense irreversible amblyopia.

The lens

(2) Bilateral cases:

- **If unequal:** Manage as unilateral cases.
- **If equal:** Dense or not dense.

***Preoperative evaluation to assess the opacity & V/A by:**
(سؤال evaluation of congenital cataract)

(I) Objective methods: < 2 yrs

1- Red reflex : rough method.

2- Child resist occlusion of seeing eye. مهم

3 Fundus examination مهم under general anesthesia :

- Fundus can be seen with direct & indirect ophthalmoscope→ Not dense.
- Fundus can be seen with indirect ophthalmoscope only → Medium density.
- Fundus can't bee seen with direct or indirect phthalmoscope → Dense opacity

4- Optokinetic nystagmus : on looking to movable object like

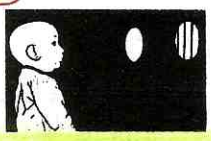
Cat Ford drum → rhythmic involuntary nystagmus.

See atlas page (118)

NB. *Nystagmus disappears at certain velocity of the drum*
As the nystagmus disappears at higher velocity as the vision is good

5- Preferential looking : See atlas page (118)

child will Fixes more at striped cards.



6- VEP : visual evoked potential

recording the electrical activity of occipital cortex in response to light or pattern.

(II) Subjective methods: > 3 yrs

- Hand test.
- Sheridan cards. See atlas page (118)

* **If dense opacity:** Operate as early as possible (before 3 months) to avoid nystagmus.

However, early operation (before the age of 3 ms) is risky due to:

1- A.C. is shallow.
2- Pupil not dilate properly (as dilator ms. not well developed) .
3-The operation may interferes with the development of the eye.

* **If not dense:**

Wait until the patient can till about his V.A. (school age 5-6 yrs).

NB. *ليه بستني ؟ → to avoid power changes with the age .*
(Adulthood علشان أخد مقاس العدسة أقرب لحياة ال)

The lens

If the V/A is 6/18 or better:

1- With glasses or pin hole test → Give glasses. (This means that the ↓ of vision in mainly due to error)

2- After mydriasis → Do visual iridectomy. (P. 95 Atlas)

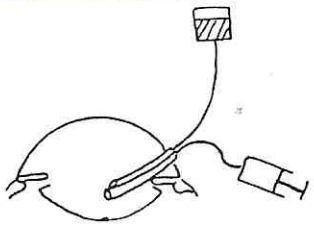
If the V/A is still bad: Do cataract extraction.

Lines of TTT:	**a.Surgical TTT.**	**b.Correction of aphakia.**	**c.Correction of ambylopia.**

(1) Surgical TTT:

→ IA
→ Lensectomy

1) Irrigation/ Aspiration operation: (IA)



1) 2mm. limbal incision.
2) Anterior capsulotomy.
3) Aspiration of lens matter(no nulecus) with simultaneous irrigation with saline using Double way canula ☞ See atlas page (120) (To avoid collapse of lens bag).
4) Posterior capsulotomy + anterior vitrectomy to prevent post. capsular opacity PCO. مهمه

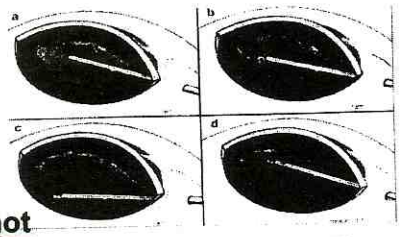
Complications: 1- After cataract (PCO) 2- Iritis.

2) Lensectomy: ☞ See atlas page (105)

The lens is removed using the vitrectomy machine:

- Limbal or pars plana incision.

NB. Some say الرفاعي pars plicata incision (2ml) as pars plana is not mature in infants with high risk of post operative RD.



Lesectomy operation

- Suction of lens & ant. Vitreous using vitrectomy machine.

- **Advantages:** No post. capsule opacification, decrease incidence of iritis.
- **Disadvantages:** RD & Vitreous loss (due to very strong zonules & hyalo-capsular ligament في الأطفال)

NB. recently : vitrectomy machine with knife to avoid traction

(2) Correction of aphakia:

Lensectomy

Aim: to avoid amblyopia

Methods:

1) Glasses: - 2 pairs - Heavy - Constricted field - Psychic trauma

- Not suitable in unilateral cases. May Cause diplopia

2) Contact Lenses : * Difficult insertion & removal *Complications (CU) Corneal ulcer

3) IOL (1ry or 2ry implantation) : power change with the age.

NB. Recently→ Piggyback IOL مهمه

*** All these complication explains why 6/18 with accommodation better than 6/6 without accommodation.**

oral + McQ

The lens

* الخلاصة :

1- In unilateral cases: give C.L, replaced at 2 years by IOL (- 20% مهمه)

2- In bilateral cases: Give glasses, replaced at 2 years by IOL.(-20% مهمه)

This 20% is putted as glasses.

N.B.: Intraocular lens implantation can not be done before 2 years due to rapid growth of eye with rapid power changes in the 1st 2 years of life.

Senile Cataract

◊ Definition: It is:
- Bilateral (asymmetrical), slowly progressive lens opacity.
- Affecting old people(hard cataract).
- Not suffering from local or general disease.

◊ Incidence:
- **Age:** Above 50ys. - **Sex:** Equal (male= female) .
- **Hereditary:** May play a role.
- **Side:** Bilateral (but one eye precedes the other = asymmetrical)

◊ Etiology: Unknown, But the metabolic disturbance may be due to:

1- Disturbed capsular permeability.
2- Disturbed PH ↓ (acidification of the lens)
3- Deficiency of metabolically important substances as **Vitamin C.&Glutathione.**
4- Increase level of Ca++ inside the lens→calcification.
5- General endocrinal disturbances "aging process".
6- U.V. rays: may be toxic to the lens (اكتر في الفلاحين).

Pathogenesis: The lens undergoes "2 processes"

1- Change in the water content (Hydration or sclerosis)
2- Coagulation of lens proteins: as ↓PH (due to accumulation of lactic Acid= acidification of the lens).
→ activates dormant enzymes (α & β) proteases→ breakdown of lens proteins "insoluble" → amino acids "small amount" & polypeptides (opacity) .

◊ Types: 1) Cortical 75%. 2) Nuclear 20%. 3) Cortical-nuclear 5%.



Method of Examinations of lens

(1) Oblique illumination.

1) By: -Torch
- Slit lamp: with powerful illumination & Magnification

2) Aim: to examine (4) — Lens, Ac depth, Lens caps, Iris shadow

① → oblique illumination
② → Red reflex
③ → Tonometry

The lens

1- The lens opacity.
2- AC depth. (Eclipse sign) See atlas page (92,93)
3- Lens capsule.
4- Iris shadow.

Iris Shadow

Normally not found
mature Cataract not found

Definition: it is the shadow of the iris on the lens opacity.

Shape: Black (dark) crescent in the pupil. See atlas page (106)

When?: - It is present in immature cataract & becomes smaller as the cataract approaches maturity (approaches the anterior capsule)

→when it becomes mature cataract no iris shadow.

- Occasionally: the shadow is seen in hypermature stage.

- Iris shadow is present also in nuclear cataract.

The shadow is present only if → **Clear interval** between iris & **opacity**.

* In immature stage, this interval is occupied by clear fibers. But in hypermature stage, it is occupied by aqueous.

MCQ
the deeper opacity the bigger shadow

(2) Red Reflex: done in a dark room with dilated pupil.

Clear areas→ red. Opacity → appears dark.

(3) Tonometry: As IOP may be↑ in some types of cataract.

(Glaucoma should be treated 1st for fear of optic n. damage).

glaucoma + Cataract
① Rubella
② Hypermature
③ Intumescent

Senile Cortical Cataract

Stages:

A- Immature stage

pt. Counting finger and hand movement
(The lens is not totally opaque)
= partially opaque

Showing:

1- Sectorial opacities at the periphery of the lens (*Incipient stage*)

→ **Sectorial cat. (Cuneiform)** See atlas page (106)

Triangles with its apex directed toward the center.

Tringle present infront & behind the nucleus

→ **Posterior subcapsular (cupuliform)** See atlas page (103)

(Sheet of opacity in the post. Cortex leads to marked ↓ of vision as it's close to nodal point)

→ **Punctate (perinuclear) cat.:** Small dots around the nucleus.

That progress gradually towards the center.

2- The last fibers to be affected are the "anterior sub-capsular lens fibers."

Symptoms: هاله العمشه ماسكه الجردل والدبله

uniocular diplopia ↓ gradual diminution ↓ muscae ↓ Cataract

The lens

1-Gradual painless ↓ of vision (from 6/6→ C.F.) : due to

① **- Opacity**. ② **- Index hypermetropia**: (↓ power of lens due to ↑ RI cortex)

③ **- Irregular astigmatism:** due to irregular refraction.

2- Fixed Musca: due to lens opacity it will cast a shadow on the retina.

(Dark spot in the visual field → fixed opacity)

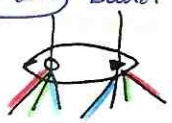
* DD from musca volitans due to vitreous opacities → moving opacity.

3- Uniocular diplopia or polyopia :(due to changes in R.I → Irregular refraction.).

4- Night Blindness: as the peripheral opacity interferes with the entry of rays to peripheral retina.

5- Glare & colored halos around light (rainbow):

due to prismatic effect of sectorial opacities & water droplets in the lens.



Signs:

(1) Oblique illumination:

- Lens → shows grayish sectors at the periphery. See atlas page (106)
- AC depth → normal.
- Capsule → normal.
- Iris shadow → present.

(2) RR: black sectors against a reddish background. See atlas page (106)

(3) Tension: normal. (no glaucoma)

Intumescent lens See atlas page (108)

- **Pathogenesis:** the process of hydration is suddenly exaggerated

(Due to rapid breakdown of lens ptns→ rapid↑ in osmolarity).

- **Symptoms:** 1- Rapid ↓ of vision→ CF or HM. (Counting fingers or Hand movement)

2- Pupillary block (in predisposed small eye) →↑ IOP→ ocular pain & headache.

- **Signs:**

1) Oblique illumination:

* Lens→ shows water vacuoles, swollen lens.
* Capsule→ Glistening زي الصدف, thin & stretched.
* A.C.→ Shallow (As iris is pushed by the swollen lens) .
* Iris Shadow→ may be present (clear لو لسه فيه حته)

2) Red Reflex: may be seen with difficulty (small areas appear red) .

3) Tension: May be↑ (in predisposed eyes) **(Phacomorphic glaucoma)** .

B- Mature stage

The lens is totally opaque after affection of the ant. subcapsular lens fibers)

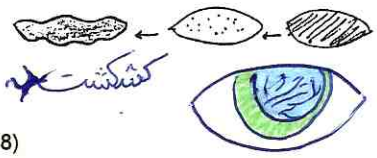
See atlas page (107,108)

- **Symptoms:** Drop of vision (Hand movement H.M.) no Counting finger
- **Signs:** ***1- Oblique illumination:***

* Lens: is totally grayish white. * Capsule: Normal .
* A. C.: Normal depth. * I. SH: Absent.

2- *Red Reflex:* Absent (black). **3-*Tension:*** Normal.

C- Hypermature stage



(the lens loses water & liquefied ptns→ shrinks) See atlas page (108)

In long standing cataract the lens matter will undergo degeneration & liquefaction of lens matter→lost to the outside→shrunken lens.

Symptoms: Drop of vision (H.M.) only (no Counting finger)

* Intumecent + Hypermature = Cataract + GluComa

Signs:

1) Oblique illumination:

* Lens: Shrunken & totally opaque.
* Capsule: Thickened, wrinkled with white (Ca++) & Yellow (cholesterol) deposits.
* A.C.→ Deep.
* Iris→ Tremulous (iridodonesis) due to lack of iris support.
* I. Sh. → May be present (as the lens is shrunken & becomes separated from the iris by clear interval occupied by aqueous).

2) Red reflex: Absent.

3) Tension: May be increased.

Complications:

1. Leakage of degenerated (irritant) lens proteins: leading to:
   - Phacolytic glaucoma (macrophages will engulf the ptns→ the swollen macrophages trapped in the angle→ closure of the angle.
   - Phacotoxic uveitis.
2. Degeneration of Zonules: leading to lens displacement (subluxation & dislocation)

See atlas page (108)

Q how can the pt see after hypermature cataract without surgery?

TTT: ICCE - less manipulation. → (intra Caps. Cataract extraction)
- Degenerated zonules.

Types: 1) Typical hypermature cataract: as before.

2) A typical (Morgagnian type) : In which, the lens does not shrink as the capsule is thick & doesn't allow the leakage of liquefied lens matter to the outside.

The lens matter becomes liquefied into a milky fluid in which the **nucleus sinks by gravity to the lower portion of lens.** See atlas page (108,109)

{ DD from mature cataract}

NB. In hypermature & mature cataract there is no diplopia as the lens is totally opaque.

The lens

Stages of Cortical Cataract

	Immature	Intumescent	Mature	hypermature
vision	6/6 → CF	CF or HM	HM	HM
(1) Oblique illumination:				
- lens opacities	Sectorial	Sector + H_2O	Totally opaque	Shrunken
- Capsule	Normal	Glistening	Normal	Thickened
- AC	Normal	Shallow	Normal	Deep
- Iris	Normal	normal	Normal	Tremulous
- Iris shadow	Present	May be present	Absent	May be present
(2) R.R.	Seen	May be seen	Absent	Absent
(3) IOP	Normal	May be ↑	Normal	May be ↑
TTT	ECCE	Laser ridotomy(urgent)+ ECCE د.احمد غنيم	ECCE	ECCE&ICCE

Senile Nuclear Cataract

pathological physiological

• It is pathological lens sclerosis, in which the lens (nucleus) transparency is affected, due to marked loss of water especially from the nucleus → affect the metabolism.

See atlas page (106,107)

• Characteristics:

1) Very slow in progression. (marked loss of water ↓action of α & β enzymes→↓ break down of ptns)
2) No stages(as those of cortical cataract) i.e. No intumescent, No hypermaturity .
3) The nucleus may acquire a color (Early→ Yellow & late → Brown) .
   - Due to melanin deposition, derived from a.a tyrosine (Old theory) .

• Grades:

Grade I→ Grey. Grade II→ Yellow.

Grade III→ Light brown. Grade IV→ Brown or black (Cataracta Nigra) :

See atlas page (107)

→ marked affection of vision.

• Symptoms: سكسة الضبشة ماسكه الجردل والدبله → Second sight

1) ↓Of vision (according to the stage) due to
   → Opacity. → Increased R.I. (index myopia).
2) Fixed musca.
3) Uniocular diplopia.
4) Day blindness, (miosis during the day → light can't pass through opaque nucleus) اخلاقه باظت
5) 2nd sight: As the process of sclerosis markedly ↑ RI & so ↑ lens power

Cortical بتاع night blindness

(leading to index myopia) & so a presboype may read again without reading glasses. رجع يقرأ كويس من غير النظارة

Cortical Cataract → hypermetropia

- **Signs:** **1- Oblique illumination:**
  - Lens: central lens opacity. - Capsule→ Normal.
  - A.C.→ Normal depth.
  - I.sh.→ present.

(د.أيمن حشيش) → **Iris shaddow absent in nuclear cataract especilly Cataracta Nigra)** grade IV

2- RR: Dark central disc in a red background . See atlas page (106)

3- Tension: Normal. → indecates the nucleus

D.D. (1) From Senile nuclear sclerosis:

Which is physiological lens sclerosis that not interfere with the lens transparency → giving the pupil grayish color only.

By: - Red reflex: Normal in S.N. sclerosis.
- Side: Bilateral & symmetrical in S.N. sclerosis.

(2) From other causes of gradual painless diminution of vision. اكتبهم

- OAG - Senile macular degeneration - High myopia
- Retinitis pigmentosa - 1ry optic atrophy

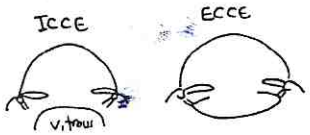
(3) Senile from complicated :جدول

- **Treatment of senile cataract:** لازم جراحة **Surgical→ Lens extraction.**

1) Time of operation:

- When patient is unable to do his work irrespective to the stage (Elective surgery) = not urgent
- If vision reach HM the operation should be done for fear of complications.
- If the cataract develop glaucoma . ↑ICP
- If cosmetically annoying the pt.

NB. If Phaco technique is decided the earlier the surgery the better.



2) Type of operation:

1- Intra Capsular Cataract Extraction (ICCE) . قديمة

Rarely used now except in hypermetroic cases with subluxation

* Disadvantages:
- Very large incision (from 3 to 9 o'clock)
- High incidence of vitroues prolapse
- Inability to implant PC IOL (Anterior chamber IOL)

2- Extra Capsular Cataract Extraction (ECCE) . See atlas page (119,120)

3- Phaco-emulsification.

3) Which eye 1st??

- The more advanced stage

Except in intumescent stage (Due to 2ry glaucoma) → "urgent"

- We never operate the 2 eyes in one sitting (علي الاقل فرق اسبوع)

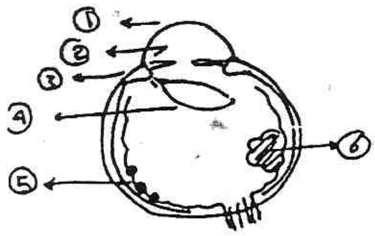
→ For fear of bilateral complications e.g.endophthalmitis due to hidden septic focus.

Complicated Cataract

Definition: It is lens opacity due to local eye disease or general disease.

Etiology:

(1) Local causes: (Usually unilateral)



1- **Cornea & sclera:** as Keratitis& scleritis → due to toxins
2- **IOP: Glaucoma:** due to ↓ aqueous drainage.
3- **Uveal tract:** - Iridocyclitis→ toxins.
4- **Lens:** as - Subluxation → iritis.
   - Dislocation→ it will enter the vitreous & loose its nutrition.
5- **Retinal causes:**
   o Retinal detachment →anaerobic metabolism of the retina→ lactic acid→ iritis
   o Retinitis pigmentosa. o Chorio retinitis. → toxins.

6- Other causes:

* High myopia: stretch on the eye BVs→↓ blood flow.
* Topical drugs: as - Long term use of steroids (الرمد الربيعي)→metablic disturbance
  - Pilocarpine - Adrenaline.
* Intraocular tumors as Retinoblastoma & malignant melanoma
  → Toxins & metabolites.

Mechanism:

The metabolic disturbance it due to

(1) Diffusion of toxins. (2) interference with lens nutrition.

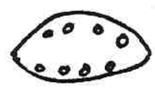
(2) General causes: (Usually bilateral)

*** Diabetes Mellitus:** 2 types may develop:

1- Pre senile cataract: - Cataract occurs earlier in DM < 45 yrs.
- Nuclear cataract or cortical & tend to progress rapidly

2- Snow flack cataract (True diabetic cataract):

- Occurs in Juvenile, uncontrolled D.M.
- Begins as milky white dots under ant & post. Capsule then grayish discoloration of all the lens.



The lens

- Early → reversible (with insulin) "oedema مجرد" → only Cataract ### by medical early cases of Snow flake Cataract
- Late→ irreversible & total .

* **Hypoparathyroidism:** may shows cataract & tetany due to ↓Ca++ level
→ Disturbance of pyramidal cells metabolism.

* **Infestation:** as Ankylostoma (common in Egypt) due to: (parasite injection)
1- Anemia (↓ nutrition). 2-Toxins of the worm.

* **Toxicity:** by 1-Steroids. 2- Ergot (generalized VC used in the ttt of migraine & post partum hge→↓ blood supply to the eye) 3- Thallium

* **Irradiation:** by a) X-ray (in the ttt of intraocular tumor)
b) Infra-red rays (مصانع الحديد والصلب ومصانع الزجاج)
→ Glass blower's cataract.
& the heat also → exfoliation of the lens capsule →**exfoliation glaucoma.**

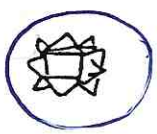
* **Electrical cataract.**

* **Other diseases:** 1) Cretinism (hypothyroidism في الاطفال).
2) Mongolism (كروموسوم 21بايظ).
3) Galactosaemia (↓ lactase enzyme). 4) Atopic dermatitis.

Clinical picture:

1- **History:** of any local eye disease or general disease.
2- **Age:** any age.
3- **General examination:** for any general disease.
4- **Local examination.**
i) Lens:
a) Early : →(1) Posterior cortical opacity d.t. - Thin post. Capsule.
-No support of post subcapsular epithelium.
(2) Rosette shaped (due to delineation of the lenssutures & lens fibers).
(3) Poly-chromatic luster (لمعان متعدد الالوان)
(Rain bow display of colors) See atlas page (109)
due to diffraction of the slit lamp light by th granular opacity " cholesterol".

b) Late: → Chalky white lens (طباشير) due to Ca++ deposition
Called (Cataracta Gypsium) → زى الجبس والطباشير



ii) Signs of a local disease: -↑ IOP (Glaucoma) . - Posterior synechia (iritis) .
iii) Vision: is always less than expected from the density of cataract due to :
1- Cataract + affection of the retina.
2- Posterior cortical close to nodal point.
iv) Other eye: may shows the causative disease (if bilateral) .
v) Retinal function tests: often bad.

5- Investigation : ultrasonography → to exclude tumour

5- **Investigations:** as Ultra sonography .

D.D:

	Senile Cat.	Complicated cat.
(1) History	-ve	+ve(local or general disease)
(2) Age	Above 50 years	Any age.
(3) Opacity: - early	Grayish sectors	Posterior cortical with PC luster
- late	Grayish white	Chalky white.
(4) Eye	Free	May show local disease.
(5) Ret. Function	Good	Often bad
(6) Side.	Bilateral	Unilateral (except with systemic causes)
(7) Course:	Slow	Rapid progress.
(8) Prognosis.	Good vision	Bad vision.

Management (retina must be functioning)

1) Treatment depends on the cause. 2)Prognosis is usually not good.

(A) Due to local eye disease:

1) Iridocyclitis: ttt of inflammation by corticosteroid first ,then 6 months after recovery → cataract extraction(under umbrella of steroids)

(NO IOL or heparinized IOL)

2) Glaucoma: Do either:

a) 2 separate operations: Glaucoma operation first and after 1-3 months → **do cataract op.**

b) Combined glaucoma cataract operation.

NB. Cataract (intumescent) → glaucoma: ttt lens removal after urgent laser iridotomy

3) High myopia: do ECCE (for fear of vitreous loss & R.D)

4) RD: hopeless.

(lens removal may be done to explore استكشاف the RD) in one eyed pt

(B) Due to general disease: control the general disease 1st, then do cataract extraction.

N.B.: Cataract Extraction: Depends upon the age of patient.

Soft cataract→ as congenital cataract.

Hard cataract→ as senile cataract.

N.B: The dangers of operation in uncontrolled D.M.

(1) ↑ possibility of infection (d.t.↓↓ of immunity).

(2) ↑possibility of Haemorrhage (during or after the operation).

(3) Delayed wound healing.

Traumatic cataract

Definition: It is lens opacity due to lens injury.

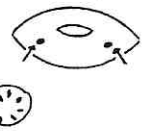
AE: 1) Perforating trauma → **Rupture of capsule.** → Aqueous humour → lens ↑ hydration

Q. acute cataract in hours ؟؟؟ شفوي

* if small	* if large
Leads to :	leads to :
Localized opacity as the rupture will seal	1) Total cat.
	2) Lens matter float into AC → iritis ,glaucoma .

2) Blunt trauma: (concussion cataract) :

- **Site:** post. Cortical → marked affection of vision.
- **Shape:** Rosette shape See atlas page (110).

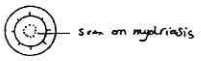


due to disruption of lens architecture at the star shaped cortical suture

- **Mechanism:** d.t. minute rupture of post. Capsule → allowing aqueous entry. thinner than Ant. Capsule

Vossius ring: "diagnostic sign" it is ring of brown pigment on the anterior capsule (due to impression of the pupillary border of iris on the lens)

it's seen on mydriasis . See atlas page (110)



Vossius ring بتحصل فين تاني؟

Complications: 1) Iridocyclitis. 2) 2ry glaucoma.

Treatment: Careful ocular examination (US =سونار) to detect other ocular complications e.g. Vitreous hge – RD – F.B.

→ **Medical TTT:** Topical steroids and atropine & diamox.

→ **Surgical TTT:** Wait till the eye is quite (No iridocyclitis or glaucoma) then do cataract extraction → Soft .....

→ Hard.....

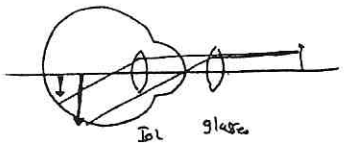
N.B. Follow up of other uninjured eye for early symptoms of Sympathetic ophthalmitis.

→ Injury to CB
→ FBSO → elevated Immune response
→ Incarcerated uveal tissue in wound

Unilateral Cataract

***Causes:**

(1) Traumatic cataract.
(2) Complicated cataract (2ry to local dis) .
(3) Rarely congenital.
(4) Senile (as one eye precedes the other).



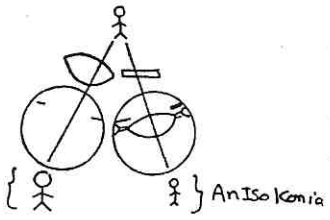
The problem in correction of Aphakia

Glasses cannot correct unilat. Aphakia:

1- Aphakic eye needs large plus lens, magnify retinal image.

2- Other eye is normal & retinal image is normal.

3- Difference in retinal image size (Anisokonia) interferes with fusion by Brain → Binocular diplopia.



N.B: Brain can accommodate till difference 4 D.

-Glasses 30%	-C.L. 6-8%	-IOL 0-2%

*** Treatment:**

1- Cataract extraction.

2- Correction of unilat. Aphakia: By contact lenses, IOL or Refractive surgery.

After cataract

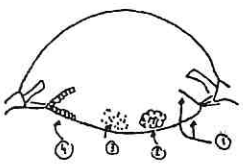
• **Definition:** It is an opacity in the pupillary area seen after cataract operation (ECCE) or Trauma (with capsular rupture).

NB. Cataract: lens opacity with intact capsule.

NB. After cataract: lens opacity with opened capsule.

See atlas page (111)

• **Composition:**



(1) Part of ant. Capsule & post. capsule.

(2) Remnant of lens matter(only in senile pt).

(3) Hge & exudates.

(4) Proliferated subscapsular epithelium: due to irritation by trauma or ECCE.

• **Clinical Types:**

1) Posterior capsule opacified (PCO) (thin after cataract)

- Due to proliferation of subcapsular epithelium with Ca++ deposition.
- **Clinically:** whitish membrane in the pupillary area See atlas page (111)

2) Sommering ring. 3) Elsching pearls.

Sommering ring: See atlas page (111)

It is opaque ring behind the iris due to adherence of the ant. & post. Capsule with lens fibers in between (2-6 months after surgery).

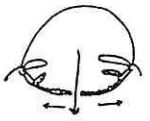
Elsching's Pearls: See atlas page (111).

It is proliferation of the subcapsular epith. With formation of transparent pearls like soap bubbles in the pupillary area.

- **Complications:**

1. Iridocyclitis. 2. 2ry glaucoma.
3. ↓ of vision : opacity – glaucoma – iritis. 4. Posterior synechia.

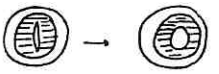
- **Treatment: {If interfere with vision}**



(1) YAG laser Capsulotomy (cutting) .: for thin after cataract. See atlas page (112)

YAG laser Capsulotomy is done 6 months after the cataract operation ? ليه

(2) Surgical Capsulectomy: For dense after cataract.



(3) Capsulo-iridectomy: for very dense membrane + posterior synechia.

NB. Recent soft cortical matter : removed by aspiration using double way canula.

Displacement of the lens

(A) Subluxation of the Lens

تحرك من مكانه

- **Definition:**

It is displacement of the lens due to partial absence or tearing of the zonules,
The lens will be displaced towards the still intact zonules .

- **AE:**

(1) Congenital (ectopia lentis): As in *** Marfan's syndrome:**

See atlas page (113)

- Cardiac anomaly (die before 20 yrs).
- Tall , lax joints.
- Eye: sublax., glaucoma,cataract, Myopia, RD, blue sclera.

*** Homocystinuria =**
inborn error to metabolise homocystine.

*** Down syndrome**

(2) Acquired:

1- Blunt Trauma ++++.
2- Degenerative condition as: Hypermature cataract/Iridocyclitis ,
High myopia & buphthalomos: due to stretch.

- **Clinical picture:**

Symptoms: 1) Drop of vision due to:

1- Myopia (due to ↑ lens curvature) : in the phakic part.
2- Astigmatism (Due to lens tilt).
3- Hypermetropic shift in the aphakic part.
4- Complications e.g. iritis, cataract.
5- Interference with accomodation

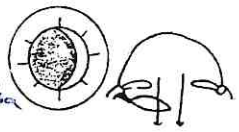
MAHcI

5- Interference with accommodation due to lost zonules.

2) Uniocular diplopia: If the edge of the lens crosses the pupil:

See atlas page (113)

* One image through the phakic part of the pupil. → myopia
* Another through the aphakic part. → hypermetropia



Signs:-

1) **A.C:** Irregular depth.
2) **Iris:** Tremulous (iridodonesis) .
3) **Lens:** - Edge may be seen through pupil. - Phacodonesis.
   - Lens displaced up: sun rise.
   - Lens displaced down: sun set. See atlas page (113)
4) **Slit lamp:** May show vitreous herniation through the pupil.

- Complications:

(1) Iridocyclitis. (2) 2ry glaucoma (papillary block) (3) Cataract. (4) Dislocation

- Treatment:

- MEDICAL : Antiglucoma

- SURGICAL:

(1) No complication or diplopia → Glasses to correct myopia & astigmatism.

(2) If there are complications or diplopia → Lens extraction by I.C.C.E + correction of aphakia.

- Old age (hard lens) → Scooping (or cryoextraction) + ant. Vitrectomy.
  RECENTLY: PFC oil + fragmatome (intravitral phaco) + ant. Vitrectomy
- Young age (Soft lens)→ Pars plana lensectomy + ant. Vitrectomy.
  (using vitrectomy machine)

NB. Recently in mild case → Capsulorehexis + capsular tension ring مهمه جداً
phacoemulcification + IOL.

(B) Dislocation of the lens

◊ **Definition:** It is displacement of the lens due to total absence or tearing of the zonules.

◊ **AE:** As subluxation (the most common cause is blunt trauma).

◊ **Types:** 1) **Anterior Dislocation** (with mild trauma by counter action of the vitreous).

See atlas page (113)

2) **Posterior Dislocation.** (with severe trauma). See atlas page (113)

3) **Other types** - Wandering lens (liquefied vitreous لازم).
   - Subconjunctival dislocation See atlas page (113)
   (from a scleral rupture) With very severe trauma → rupture globe.

◊ Clinical picture:

(1) Anterior Dislocation: "emergency"

The lens becomes spherical & resembling a globule of oil in AC

→ Pupillary block See atlas page (113)

Complications: 1) Corneal opacification (due to endothelial damage) .

2) 2ry glaucoma: due to pupillary block (Glaucoma inversus)معكوسة .

3) Iridocyclitisdue to trauma.

4) Cataract. See atlas page (114).

5) Myopia if the lens is still clear like a globule of oil in AC.مهمه

N.B.: Glaucoma inversus that improved by mydriatics (As papillary dilatation relieves the pupillary block →↓IOP

- But miotics worsen it.

(Mydriatics will improve the pupillary block but the lens will be lost into the vitreous)

(2) Posterior dislocation:

- The same clinical picture of aphakia (deep AC , tremolous iris , jet black pupil) +

1 - Lens can be seen by ophthalmoscope in the vitreous (Especially if opaque lens).

2 - No history of operation but there is a history of trauma.

Fate: • Remains quite.

• Leads to complications (As iritis, 2ry glaucoma, pupillary block glaucoma by the vitreous face, cataract)

• Absorped.

Treatment:

1) Anterior: "emergency"

* Preoperative→ Miotics, to keep the lens in A.C. Diamox & mannitol to ↓ IOP

* Lens extraction → by Scooping (or cryo)+ anterior vitrectomy.

2) Posteriors:

* **If quite:** correction of aphakia (glasses) with follow up.

* **If complications:** do lens removal through posterior approach using pars-plana vitrectomy

NB . If the nucleus is hard in old age we can use intravitreal phaco((Fragmatome))

Operations for Cataract

(I) preoperative Examination:

Q : what are the contraindications of cataract surgery?

The lens

(A) General:

1- Mentality & cooperation: (تحدد anesthesia local or general).

2- Dental and ENT examination: for any septic foci (Tonsillitis, teeth) .

3- Medical examination for: - Blood pressure, bleeding time.
- Causes of straining e.g. chronic cough, constipation.

4- Uro-genital examination : for prostatic enlargement.

5- Urine analysis. 6- Glucose level analysis.

(B) Local:

1- **Lid:** Free from infection (stye, Blepharitis) , PTDs , Trichiasis.

2- **Lacrimal Regurge test:** should be –ve to exclude chronic dacryocystits .

3- **Conjunctiva:** Smear & culture (if +ve → Specific antibiotic) .

4- **Cornea;** Free from keratitis.

5- **Iris:** Exclude iridocyclitis.

6- **Lens:** For stage of cataract & Lens position.

7- **Tension:** If glaucoma→ Do glaucoma operation 1 st or combined op.

8- **Fundus:** To evaluate the retina & optic n .
(if the fundus can't be seen as the cataract is mature :
look to the fundus of other eye or do RFT eg. Ultrasound)

9- **Vision :** Should be corresponding to the cataract.

(C) Retinal function test: Q:how u can asses visual prognosis of a cataract pt?

(1) Macular function tests (Cone function)
(Retinal central function tests)

1. **Vision:** If HM or better→ Good prognosis.
If less (PL, or No PL) → Bad prognosis. (No PL- NO surgery)

2. **Colored vision:** by colored light not Ishihara cards. See atlas page (162)

3. **Pupillary reaction** : affected in optic neuropathy or in extensive retinal disease as RD or Ischemic CRVO .

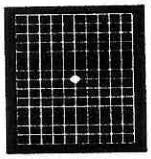
4. **Testing the form sense:** Black perforated disc (with 2 or 3 holes) is put in a trial frame & Light is thrown on the patient's eye.

If can count the holes→ Healthy macula.

(Macula has a wide area of presentation in the occipital cortex).

5 . **Visual evoked potential (VEP) .**

6. **Amsler grid chart :** See atlas page (162)



- 10 ×10 cm chart divided into small squares 5×5 mm.
- It is held at a distance 30 Cm & the pt wear his reading glasses if indicated & one eye is covered.

-The pt is asked to look to the central Spot & ask the pt some questions :

1- Do you see the central spot ? if no → central scotoma

2- Do you see the 4 corners of the big square ? if no → Arcute or annular scotoma

3- Are all the vertical & horizontal lines are straight (wavy_ ?

if no → metamorphopsia (macular lesion) .

7. Macular photo stress test: مهم

- The best VA is measured.
- The pt fixates a light from a torch (3cm away for 10sec) → visual pigment bleaching.
- The recovery time to the pretested VA is measured.
- If less than 50 sec→ normal.

(2) Testing the retinal periphery: (Rod function)

1- Visual field examination:

1- Perimetery: If vision 6/6→ 6/60 See atlas page (127)

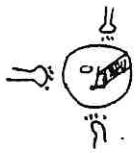
2- Confrontation test: vision 6/60→ 1/60 See atlas page (134)

Detect gross lesions only e.g. total or subtotal RD

3- Light projection: < 1/60

- In a dark room. - looking forward. - With other eye covered.

Light is thrown from different directions up, down, nasal & temporal & the patient is asked to point to light by his finger.



- If can→ Good projection.
- If the pt cant see the light in one or more directin → Bad projection.

2-Test for dark adaptation

(3) Other tests:

(a) Electro-physiological test:

(1)Visual Evoked potential (VEP): وسم شبكية

Light stimulation of the retina → waves recorded over the occipital lobe.

1) Used in: 1. Assessment of V.A in children.

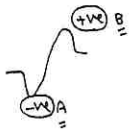
2. Macular function test in adult as the macula has a large cortical representation.

Normal response → double peaked .

3. Diagnosis of optic neuritis.

(2) Electroretinogram (ERG): see atlas page (163)

- It is the electrical activity of the retina on exposure to light.
- Recorded is by an electrode on the cornea (CL).
- -ve A wave is recorded from photoreceptors.
- +ve B wave is recorded from bipolar cells.



(3) EOG electro-oculogram:

- Electrodes placed on the medial & lateral Canthus.

See atlas page (163)

While the pt is looking from side to side in light & dark interval.

- EOG& ERG base on the standing potential of the eye (where the cornea is +ve in relation to the retina).
- It records the changes in RPE& photoreceptors

(b) Ultrasonography: See atlas page (162)

*** Waves (A Scan)(BIOMETRY):** See atlas page (116)

It produce vertical spikes along baseline,& Measures the axial length of the eye for IOL power calculation& ACdepth

*** Picture (B scan):** Detects vitreous Hge, R.D, IOFB, Intraocular tumors. Even in the presence of media opacities like total cataract or opaque cornea or vitroues hge.

NB. UBM High frequency B-sacn is ultilised for imaging of the ant. segment of eye

(II) Pre-operative medications:

1. **The night before operation:** Enema & sedation.
2. **just before operation:**
   a) General: - Diamox tablets or Mannitol. I.V. 25% 250 ml.
   - Sedative & analgesics.
   b) Local:- Cutting the lashes short & mydriatics.

(III) Anaesthesia:

1) General anaesthesia : - In children & psychoneurotic patients.
- In adult (according to choice of surgeon or patient) .

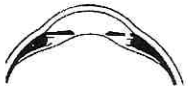
2) Local anesthesia

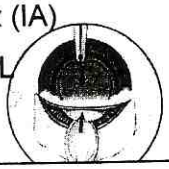
1. Surface.
2. Retro bulbar anesthesia (for the EOMs & the sensation) : inside the ms cone to block the ciliary ganglion.
3. Peribulbar anaesthesia : outside the cone.

(Xylocaine 2% + hyalouronidase to help the diffusion)

4. Akinesia: Atonia (temporary paralysis) of orbicularis ms. to prevent squeezing of eye (To avoid vitreous loss) .:
   - Over the neck of the mandible (O'brien's method).
   - At the lateral canthus (Van-lint method).
5. Intra cameral → in A.C.

(IV) Cataract extraction operation:

	ICCE	ECCE See atlas page (119,120)
(1) Principle	Complete removal of lens within its capsule after breaking of zonules. 	Capsulotomy, nucleus delivery & cortical clean up. (Leaving part of anterior capsule &whole posterior capsule = capsular bag) 
(2) Indications	Hypermature cataract with subluxation.	All cases.
(4) Advantages:	1) Short operative time 2) Less manipulation (less iritis & glaucoma) 3) No after cataract.	1) ↓ incidence of : - vitreous loss- RD-CME as u leave PC (natural barrier between vitreous & PC) 2) PC IOL is possible 3) Smaller incision
(5) Disadv:	عكس→adv. of ECCE	عكس→adv. of ICCE
(6) Steps :	1- Upper limbal incision. 2- Zonulotomy : - Mechanical →by pressure by strabismus hook at the limbus - Chemical→ by φ-chemotrypsin 3- lens extraction :Cryo extraction 4- Implantation of AC IOL as no capsular support 5- Peripheral iridectomy (بعد الزرع علشان دراع العدسه ما يدخلش في الاريديكتومي) 6- Closure of the wound	1 Upper limbal incision 2- Ant. Capsulotomyusing cystitome : - Can-opener method  - Capsulorhexis 3- Delivery of nucleus :  by ***Nucleus expression** (curette 12 & strabismus hook 6)→ counter pressure (need 6-8 mm corneal incision) * **Phacoemulcification** * **Phacolaser** 4- Removal of the cortex (IA) 5- Implantation of PC IOL 6- Closure of the wound



Delivery of nucleus by nucleus expression

(3) Phacoemulsification: الأحدث See atlas page (121)

- **Principle:** - Peripheral small corneal incision
  - Remove circular part of the capsule (capsularehexix) then
  - The ultrasonic probe of the phacoemulsifier machine (through the corneal incision) vibrates very rapidly to transform the lens substance into an emulsion which is removed by IA .
  - The the foldable IOL is injected by injector to get unfolded inside the bag.
  - Closure of the wound by stromal hydration (sutrureless)
- **Advantages:** small incision (3 mm) instead of 8 mm (ECCE)
  →↓ post operative astigmatism.
- **Disadvantages:** not highly recommended in hard nuclear cataract, as the hard nucleus will need high amount of US vibrations to be emulsified → corneal endothelial damage , iritis &wound burn.

Complications of cataract operations

(A) Preoperative complications (during anaesthesia) :

1. Retro bulbar haematoma→
2. Globe perforation → Caused by: Retro bulbar anaesthesia.
3. Optic n. damage →
4. Shock if reach the systemic circulation.

(B) Operative complicationa:

(1) Improper section : intralamellar.

(2) Haemorrhage: a. Bleeding from the wound lips.
b. Hyphema.
c. Expulsive Hge: rupture of choroidal vessels (more in glaucoma) due to sudden ↓ of IOP.

(3) Rupture of post. Capsule.

(4) Vitreous loss: More in ICCE.

- **Cause:** 1- Squeezing of the lids. 2- Tear in the post. Capsule.
- **Sequel:** 1. Iris: Iridocyclitis. 2. Pupil: Drawn up pupil.
  3. Cornea: edema (vitreous touch) . 4. Retina: RD & cystoid macular oedema.
  5. IOP: 2ry glaucoma or papillary block glaucoma.
- **Treatment**: ant. vitrectomy.

(5) Post. dislocation of lens: → Removal with vitrectomy.

(c) Postoperative complications:

(I) Early post operative complications:

1- Delayed reformation of the anterior chamber:

Causes: wound leak due to: 1.Vomiting, cough or straining.
2.Inadequate sutures. 3.Iris prolapse.

Sequlae: PAS with secondary glaucoma.

TTT: - Rest in bed - Binocular bandage - Diamox tab - Resuturing

N.B. Normally the anterior chamber is reformed in the second day (24-48 hours) .

2- Intraocular haemorrhage: 1- Hyphaema 2- Expulsive haemorrhage.

3- Iridocyclitis: d.t. surgical trauma & irritation by retained lens matter.

4- Iris prolapse: See atlas page (92)

- Causes: wound gapping due to: 1- Vomiting, cough or straining.
2- Inadequate sutures.

- Sequel: 1- Delayed reformation of AC and secondary glaucoma due to PAS.
2- Drawn up pupil. 3- Infection (entry of organisms) .

-Treatment: Excision of the prolapsed part of the iris & resuturing .

5- After cataract: Do YAG laser capsulotomy.

6- Ocular infections: Endophthalmitis is the most serious.

Treatment: By intensive antibiotics, Vitrectomy or evisceration.

7- Corneal decompensation: due to endothelial damage.

8- IOL: - Tilting See atlas page (115)

- Captured IOL See atlas page (115)

- Fall on the retina (post. dislocation of IOL) See atlas page (115)

(II) Late postoperative complications:

1) 2ry glaucoma (aphakic glaucoma): d.t.

- Delayed reformation of the anterior chamber→ PAS.
- Epithelial invasion to the AC. - Vitreous loss.

2) Drawn up pupil: See atlas page (92)

d.t. - Iris prolapse or vitreous loss

- Clinically: Eccentric pupil, drawn up towards the wound.
- Treatment: Laser iridotomy.

3) Retinal detachment: d.t vitreous loss especially with high myopia & ICCE.

4) Cystoid macular oedema (Irvin gass syndrome): See atlas page (140)

After complicated surgery with vitreous loss.

- Clinically: - Visual affection - Characteristic appearance in F.A.
- TTT: Systemic CAI مهم جدا – Topical non-striods د. حموده غرابه

Vitrectomy for refractory CMO

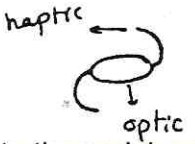
The lens

N.B. the" most serious" operative complication is expulsive haemorrhage and the "most serious" postoperative complication is ocular infection (ENDOPHTHALMITIS).

Intraocular lens implantation
(pseudo-phakia)

Types:

See atlas page (114,115)



1) According to the sight:

(1) P.C: is the best correction of aphakia because it is the nearest to the nodal point.
- In the bag - in the sulcus.

(2) A.C.: ① Angle fixed : lead to corneal decompensation.
② Iris fixed (supported =iris claw) See atlas page (114)

(3) Scleral fixating. مهمه جدا
(2,3,4 in case of aphakia with tear in the post. Capsule)

1) According to the material of IOL:

1) **Hard lenses**: PMMA (polymethyl methacrylate).
2) **Soft (Foldable) lenses**:
- Material: silicon & acrylic.
- Advantage: foldable, see atlas page (116) so implanted through small incision 3 mm (Phacoemulsification) .

Advantages: The best optical correction of aphakia (Normal size of retinal image)

Complications:
- U. G. H. syndrome (uveitis + glaucoma+ hyphema).
- IOL dislocation.

C/P

The same C/P of aphakia but:
- Refraction here is normal.
- Purkinge images are 2 → one from the cornea&
→ one from posterior lens capsule (if its present).

Biometry: To determine power of IOL by special formula.
(SRK formula: P = A - 2.5L - 0.9k) مهمه
(A)→ Constant.
(L) → Axial length of eye → **A-scan ultrasound (biometry).**
(k) → Corneal curvature → **Keratometry.**
NB. AC IOL = PC IOL - 2

♦ **What are the dangers of septic foci, hypertension, straining and diabetes in cataract surgery?**

- **Septic foci:** Endophthalmilits.
- **Hypertension:** Expulsive haemorrhage.
- **Straining:** Raised IOP with postoperative hyphaema, iris prolapse and delayed reformation of AC.
- **Diabetes:** Infection, haemorrhage and delayed wound healing + difficult dilatation

♦ **What are the signs of bad prognosis of cataract operation?**

(1) Abnormal retinal function:

1) PL. 2) Absent papillary reactions.

3) Absent colour differentiation. 4) Bad projection of light.

(2) Complicated cataract: Due to local eye disease.

(3) Signs of ocular inflammation: Associated iridiocyclitis.

♦ **When we do not operate for cataract?** **(1)**No PL. (2) Bad projection of light.

♦ Incipient stage: الرفاعي

1) <u>Sectorial cataract:</u> common:

Symptoms: 1- Slight diminution of vision (6/6 to 6/18).

2- Early symptoms as fixed spots, diplopia,....etc.

Signs: The pupil should be dilated by a mydriatic for examination of the triangular or sectorial opacities in the periphery of the cortex (with the base of the triangle towards the lens capsule and the apex towards the nucleus) by:

1- Oblique illumination: Greyish white opacities in a dark background.

2- Ophthalmoscopic mirror (RR): opacities appear black within the bright red reflex

2) <u>Posterior cortical cataract</u> : Rare:

Symptoms: Vision may diminish considerably because the opacity is near the nodal point.

Signs: As in the sectorial type except that the opacity is in the posterior cortex.

3) <u>Perinuclear (punctate) cataract:</u> Multiple small opacities around the nucleus (very rare).

TTT

Medical care of incipient cataract:

1) Eye glasses: for temporary correction of the resulted error of refraction (early).

2) Arrangement of illumination:

1) Peripheral cortical cataract: Brilliant illumination.

2) Central cataract: Dull illumination.

3) Follow –up: Periodic examination till the time of the operation.

Surgical treatment: cataract extraction is the only effective treatment for senile cataract.

♦ **What are the complications of cataract?**

(1) Intumescent cataract: 2ry glaucoma.

(2) Hypermature cataract:

1) Lens displacement: 1-Subluxation. 2-Posterior dislocation.

2) Phacotoxic uveitis.

3) Phacolytic glaucoma.

♦ Brown cataract (black cataract or cataracta nigra):

* **Pathogensis:** it is coloured nuclear cataract due to:

1- Deposition of melanin pigment: Derived from the amino-acids in the lens (old theory).

2- Photo- oxidative processes: Related to glutathione and or vitamin C (Recent theory).

* **Symptoms:** vision may diminishes considerably.

* **Signs:** 1) oblique illumination: Dark brown or even black central disc shaped opacity.

2) Ophthalmoscopic mirror (RR): The red reflex may be absent.

3) Iris shadow : absent as the colour of the shadow is the same of the nucleus

♦ Differential diagnosis of senile cataract :

(1) Gradual painless diminution of vision

(2) Fixed black spots from musca voiltans

(3) Colored haloes

(4) Senile cataract from complicated cataract

(5) Nuclear cataract from senile nuclear sclerosis

♦ **What are the main causes of loss of vision after cataract extraction?**

(1) After cataract. (2) 2ry glaucoma. (3) R.D.

(4) Intraocular haemorrhage. (5) Endophthalmitis. (6)Complication of Anaesthesia

♦Senile nuclear sclerosis

* **Definition**: it is a physiological sclerosis of the lens nucleus with advanced age which cannot interfere with the lens transparency (giving the pupil a grayish colour).

* **Clinical picture:**

(1) <u>Vision:</u> is not affected (as the lens is transparent).

(2) <u>Oblique illumination:</u> Grayish pupil (due to increased refractive index of the lens).

(3) <u>Ophthalmoscopic mirror:</u> normal red reflex(as the lens is transparent).

* **Differential diagnosis**: Senile nuclear cataract.

* **Treatment**: Eye glasses to correct the resulted presbyopia.

Congenital anomalies of the lens

(1) Congenital cataract: Discussed.

♦ **What are the dangers of septic foci, hypertension, straining and diabetes in cataract surgery?**

- **Septic foci:** Endophthalmilits.
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* **Differential diagnosis**: Senile nuclear cataract.

* **Treatment**: Eye glasses to correct the resulted presbyopia.

Congenital anomalies of the lens

(1) Congenital cataract: Discussed.

(2) Microphakia : lens diameter is small than normal

(3) Spherophakia: Spherical lens (may leads to secondary glaucoma due to pupillary block).

(4) Microspherophakia : lens with small diameter & spherical shape. See atlas page (117)

- Lenticular myopia - Subluxation - Total dislocation into the AC

(5) Ectopia lentis: bilateral subluxation of the lens which may be associated with:

1. Marfan's syndrome. 2.Homocystinuria.

(6) Coloboma of the lens: See atlas page (117)

Notch or sector shaped defect at the inferior equator of the lens, associated with coloboma of iris & fundus.

(2) **Lenticonus:** See atlas page (116)

1) Posterior lenticonus: conical posterior surface of the lens.

2) Anterior lenticonus: Conical anterior surface of the lens

(less common & may be associated with posterior polar cataract.).

♦ **What are the causes of posterior cortical cataract?**

1) Congenital
2) Acquired : - Blunt trauma - Complicated cataract.
   - Senile post. Cortical cataract.

Cornea

ANATOMY

Main refrative Power of eye 42 diopters

Lens = 15 D

(A) Gross anatomy:

- The cornea is transparent & avascular (except one mm. at the limbus→ limbal capillaries which is a branches of Ant. Ciliary artery).
- It forms the anterior 1/6 of outer coat of the eye ball & fits into the sclera as watch glass.

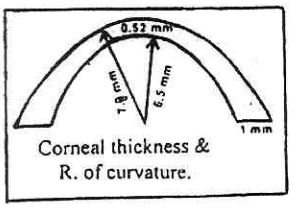
*Dimensions مقاساتها

1. **Diameter:** - Post. → 12 x 12 mm.
   - Ant. → a- Vertical 11 mm. b- Horizontal → 12 mm.

   (This one mm difference is due to conjunctival & scleral overlap which is more vertically than from the sides).

NB. هذه الارقام اقل 1m في الاطفال

2. **Thickness:** - 0.55-0.6 mm in the center (550- 600 micron).
   - 0.65- 1 mm at the limbus.



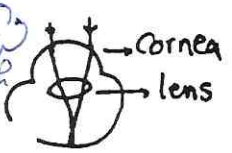
Corneal thickness & R. of curvature.

3. **Radius of curvature:** نق - Anterior→ 7.8 mm. ≈ 8 mm
   - Posterior → 6.5 mm.

4. **Refractive index:** 1.37 معامل الانكسار unitless number = Velocity of light in air / Velocity of light in medium

5. **Refractive power:** 42 diopters. → unit of lens power
   - It's the ability of convergence of parallel rays.
   - It is affected mainly by the curvature & RI.

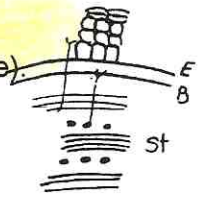
Power = 100 / focal length = ... diopter

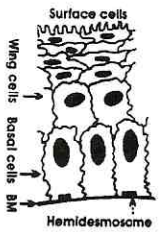


***NB.** Refractive power of the lens = 15 D.*

(So the cornea is the main refractive surface of the eye).

Q: عندنا كام عدسه في العين ؟ → 2 = Cornea + lens





(B) Minute anatomy: See atlas page (57)

In section, the cornea consists of 5 layers: epithelium, Bowman, stroma, descement membrane, endothelium

1) Epithelium:

- 5-6 layers of Stratified squamous non-keratinized.
- Epith. has a high regenerative power, any abrasion → in 24 hours → complete healing
- Thickness: 50 micron. مهم
- Epithelium consists of 3 layers of cells:

  1) Superficial cells: **2-3** layers of flat cells, has microvilli.

  2) Intermediate (wing) cells: **2** layers of polyhedral cells send wings

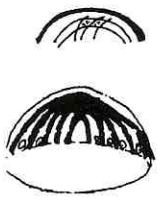
Cornea

(processes)between the basal cells.

3) Basal cells: **single** layer of columnar cells resting on a basement membrane (Hemidesmosomes)

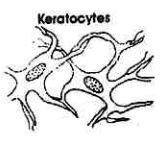
2) Bowman's membrane:

- Structureless, non-elastic, low resistance (week membrane).
- Not capable of regeneration (if injured → fibrosis→ corneal opacity).
- It's condensed superficial layer of the stroma.
- Thickness: 10 micron.



3) Stroma (Substantia propria):

* 90% of corneal thickness.
* It's formed of 200-250 lamellae of collagenous bundles + 2 types of cells.
  1- Parallel to corneal surface.
  2- Perpendicular to each other.
  3- Bathed in MPS = ground substance (has the same RI as the collagen bundles).
  4- **in the center**: they are regular & packed = compressed.
  5- **in the periphery**: they are separated by lymph spaces(lacunae):



These spaces contains:

- Fixed keratocytes(corpuscles) flat branching CT cells → fibroblasts (concerned with healing)
- Wondering macrophages from limbal BVs(concerned wit inflammation).

4) Descement memb:

- Elastic membrane, highly resistant (Strong).
- Secreted by endothelium
- Capable of regeneration if injured →leave no opacity (but corneal edema)
- Thickness : Children → < 4 micron. Adult → 10-12 micron.
- It's the basement membrane of the endothelium.

5) Endothelium:

- Single layer of flat (cut section), regular hexagonal cells (front view).
- **Endothelial count:** 2000-3000 / mm^2 = 1/3- 1/2 million at birth which↓ with age & aftet any intra-ocular operation.
- **Function:** corneal dehydration **(endothelial pump)**

***NB**, the minimal number needed to maintain the cornea transparent* 300-500/mm^2.

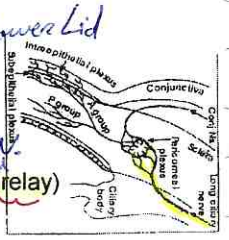
- The endothelium has no regenerative power (the cells ↑ in size = cells spread to cover the defect with no regeneration).
- Examined by specular microscopy which detect (number, size & shape). See atlas page (75)

Cornea

Nerve supply:

No motor
sensory فقط

Trigeminal → ① mandibular ② maxillary → infra-orbital → Lower Lid ③ ophthalmic → frontal → upper Lid, Naso ciliary, lacrimal → gland



From **the 2 long ciliary nerves**:

- **Origin:** 5th n. → ophthalmic division → Naso-ciliary n. (traverse the ciliary ganglion without relay)
  Trigeminal → 2 long ciliary nerves.
- **Course:** they pierce the sclera around the optic n. to run in the suprachoroidal space → to pierce the sclera again 4 mm before the limbus → forming annular plexus within the sclera (**precorneal plexus**) >>gives branches to the cornea : intraepithelial & Sub epithelial plexus & **posterior stroma** plexuses

NB. The 2 long ciliary nerves also supply: iris & C.B. & 2-4ml of con.j around the limbus.

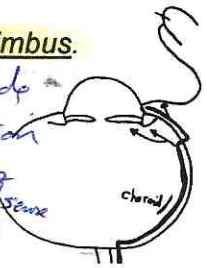
- **Corneal reflex:** See atlas page (65)

  Stimulus → corneal touch.

  Afferent → 5th.

  Efferent → 7th n.(facial) → supply the orbicularis → lid closure(bilateral).

Precaution of testing & examination:
1- Compare with other side
2- " " " person
3- don't touch Lashes
4- don't stimulate visual sense
5- in dim light



NB. *After you finish the corneal reflex now you have an idea about the corneal sensation if its - Normal - Hypothesia - Anaesthesia compare with the other side or other person, touch the cornea over the lesion.*

NB. Cornea is sensitive to: ***pain, cold*** *(so cryotherapy is painful) &* ***touch*** *(no heat receptosr)*
NB. the cornea has the least pain threshold .

Corneal ulcer

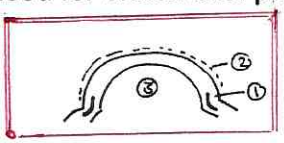
تحس البارد ولا تحس النار

sensation of the cornea في جهاز نستخدمه في قياس ال ؟

Nutrition

Being avascular, the cornea derives its nutrition by diffusion from:

- Limbal capillaries: the main source.
- Tear film (O_2 from atmosphere dissolved in the tear film), so the metabolism of cornea **Aerobic** & energy produced is stored in the form of ATP & used for endothelial pump).
- Aqueous (glucose).



The limbus (corneo-scleral junction):

- It is semi transparent (grayish blue) & vascularized transition zone in between cornea on one hand & conj. with sclera on other hand.

The anterior limit (anatomical limbus): line joining the ends of the Bowman's & Descement m.

The posterior limit: line perpendicular to the surface of conj. passing through scleral spur.

NB. From ant. limit to post. limit >> **surgical limbus.** See atlas page (122)

Cornea

- Characterized by presence of Bl. Vs & lymph vs.
- 1.5 mm width .

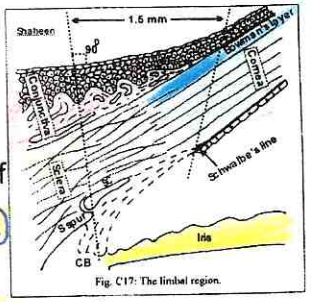
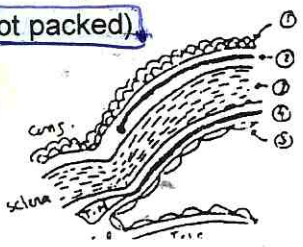
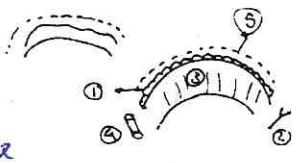


Fig. C17: The limbal region.

The following events occur:

1) **Corneal epith**: →continous with the conjunctival epith. the 5 layers of the corneal epith will give place to 12 layers on the conj.
2) **Bowman's memb**: → Ends abruptly in a rounded border (so the last 1mm of the cornea has no Bowman's memb.) MCQ
3) **Stroma**: →continous with the sclera (Lamellae become irregular & not packed).
4) **Descemets memb**: →give place to Shwalbe's line→ Continous with the trabecular meshwork.
5) **Endothelium**: →Continous with the endothelium of angle & iris.





Physiology: (anatomy سؤال ال يكتب مع)

1) Corneal transparency:

A) Anatomical factors:

1. **Epithelium**: Non-keratinized.
2. **Stroma**: Regular , packed & filled with MPS. (Mucopolysaccharide)

NB. The arrangement of stromal fibers >> destructive interference

3. **Nerves:** Non-myelinated (after 1-2 ml inside the cornea).
4. **Bl. Vessels:** Avascular. 5. **No lymph vessels.**
6. **Tear film:** abolish any surface irregularities.

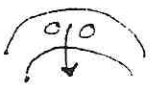
B) Physiological factors:

Corneal dehydration: by endothelial pump.

-The endothelium is responsible for a state of dehydration of the cornea (by taking H_2O from it & secrete it back to the aqueous in the AC)

- Damage to the endoth.:By operative trauma, inflammation or ↑IOP → corneal edema.

2) Why the cornea is avascular?



3) 1- Compactness.
2) 2- High content of MPS (cartilages زي ال).
1) 3- Stem cells that present at the upper & lower part of the cornea مهمه جدا

3) Drugs: should be biphasic مهمه جدا

1) - Fat soluble → to path through epith.
2) - Water soluble → to path through stroma.

} oral + MCQ

→ fluorescine stain water sol. so not pass epith normally But if ulcer → pass

Function of the cornea:

- The main refractive media of the eye (its power is 42 D).
- Corneal sensation has a protective function.

Cornea

Inflammation of the cornea

(Keratitis)

Classification:

1- **Ulcerative (suppurative) K.** 2- **Non ulcerative.**

Corneal ulceration

ULCERATIVE (SUPPURATIVE) KERATITIS

• Definition:

It is discontinuity of the surface epith of cornea + affection of Bowman'smembrane.

(Usually due to invasion by pathogenic organism → toxins → necrosis→ cast off & leaves ulcer) . *Discontinuity of corneal epith. Only → corneal abrasion.*

• AE: * **predisposing factors:**

- **General:** due to ↓ resistance as in: - Old age - DM - AIDS - Malnutrition (Vit A ↓) - Immunosuppressives
- **Local: (loss of one of the protective mechanisms)**

epith. , corneal sensation, lid& tears

1- Trauma → Abrasion (mechanical by: F.B. , C lens wearer , rubbing lashes).

NB. Epith is an important barrier, if intact it can't be invaded except by :
- N. Gonorrhea - Diphtheria - Listeria -H. infl. + Shigella

2- Loss of corneal sensation (C. anaesthesia) e.g. trauma to trigiminal n. → neuroparalytic keratitis.

3- Exposure (as in lagophthalmos).

4- Xerosis (dryness of the eye).

*** Causative organisms:**

1) **Bacteria:** Staph, Strept. Pneumococci, Pseudomonas .

- N. Gonorrhea - Diphtheria - Listeria -H. infl.(can invade intact epith).

2) **Viruses:** H.S.V. **3) Fungi:** Candida albicans.

4) Protozoa: Acanthamoeba. **5) Chlamydia:** Ch. Trachomatis.

***Routes (Sources) of infection:**

1) Blepharitis : inflammation of the lid margin.
2) Conjunctivitis.
3) Dacryocystitis: inflammation of the lacrimal sac
4) Skin of face infections. 5) Atmosphere.

Cornea

• Pathology: قوله باختصار مع اي نوع

1) Stage of infiltration (progressive stage):

1. The organisms invade the cornea & their toxins produce localized necrosis.
2. Polymorphs from the dilated limbal capillaries migrate & surround the necrotic area.

Clinically: The cornea shows

- Grey area (necrosis & infiltration).
- Ciliary injection (dilated limbal vessels)

See atlas page (48,49)

2) Stage of ulceration:

The necrotic portion cast off → ulcer.

- **Early: Unclean ulcer** : Shallow – irregular - Grey ulcer.
  (Due to the presence of: necrotic material and dense infiltration).
- **Late:** either clean ulcer or perforation.
  (Depending on: defense mechanisms & virulence of organisms)

*** Clean ulcer (regressive stage):**

- occurs with good defense mechanisms. Macrophages clean the necrotic material & the infiltration ↓ (of good prognosis).
- It is deeper - Smooth - more transparent .

*** Perforation:** Occurs with : Weak defense mechanisms & very virulent organisms.

3) Stage of healing

1- Epith. >> **Epithelialization:** the epith grows from edges of ulcer by mitosis.

2- Stroma & Bowman's >> **Vascularization & fibrous tissue formation:** See atlas page (71)

fibroblasts from fixed keratocytes & limbal BVs.

NB. Vascularization occurs in large & marginal ulcers.

*** Complications of Vascularization:**

1) After healing the BVs obliterate & leave permanent opaque lines.
(Cornea once vascularized always vascularized)

2) Fibrosis will leave corneal opacity: N Nebula, M Macula, L Leukoma.

3) Rejection of any keratoplasty. → due to immune response in BVs

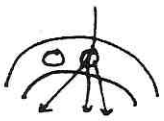
• Clinical picture:

Symptoms: (CORNEAL SYMPTOMS)

1. **Pain:** Stitching (Pricking) as FB sensation : d.t.
   - Irritation of exposed n. endings by toxins &Lid movement.
   - accompanying iritis(spasm of constrictor & ciliarys ms by toxins)
2. **Lacrimation:** excessive tears (exaggerated protective mechanisms) .
   (Afferent 5th nerve & efferent 7th nerve)

Cornea

3. **Blepharospasm:** reflex lid closure (exaggerated protective mechanisms)
4. **Photophobia:** intolerance to light : light→ blinking & miosis (both ↑ pain)
5. **↓of vision:** d.t. - Corneal edema ,necrosis, infiltration especially if central.
   - Accompanying iritis → corneal edema.
6. **Colored halos around light:** d.t. corneal edema → diffraction of light.



Signs: 1- **Lid:** Edema (d.t. anastomosis bet Limbal & Lid BVs).

2- **Conj:** Edema & Ciliary injection . (dilated limbal vessels)

3- **Cornea:** → Loss of luster.(due to diseased epith).

→ Grey area.

→ The ulcer (+ ve Fluorescien test.)

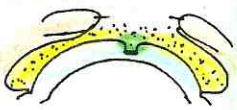
4- **Iritis:** - A.C.: Aqueous flare due to plasmoid aqueous & even hypopyon

- Pupil: miosis. - Iris: Muddy iris.

5- **Signs of complications** as perforation.

6- **Fluorescein test:** See atlas page (76)

- Instill a Drop of fl. 2% in the conj. (2% Na Fl in 2% $NaHCo_3$)
- Wait for a min. → wash with saline & examine.
- Green coloration is seen at the site of the ulcer (more marked with Cobalt blue light of Slit lamp)→ + ve test See atlas page (58,59)

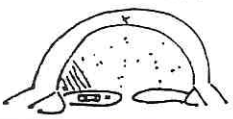


if epithelium intact :: -ve fluorescein test

7- Rose Bengal 1% stains diseased epithelium

Complications

- non perforating → early / Late
- perforating → prephizal / Central



(A) Of non perforating ulcer:

1) Early: "with unclean ulcer"

a. 2ry iritis: d.t. diffusion of toxins "not the organism" from the ulcer to the iris. (which pours its exudates → A.C. → plasmoid aqueous → Hypopyon (in severe cases)

How hypopyon formed

NB. What is inverted hypopyon ? See atlas page (64)

b. 2ry glaucoma: due to block of the angle by :

1- Early: By plasmoid aqueous , hypopyon.

2- Late: by PAS (Peripheral ant Synechia) = fibrous scar at the angle → due to fibrin of the exudates

Cornea ant. + Lens post. → adhesion of iris

NB. HYPOPYON : hypo =down pyon= pus

It is sterile pus that settled in the bottom of the A.C. (viscid & yellow)

c.Complicated cataract .

e.Endophthamitis : if the cornea is opaque do U/S.

Cornea

f. Descematocele (keratocele):

* **Definition**: herniation of Desment memb " Infront of IOP"
  d.t destruction of whole thickness of cornea except D. memb.
* **Clinically**: clear vesicle at base of ulcer. See atlas page (59)
  → sign of impending perforation.
* **Fate**: - Rupture → perforation. See atlas page (59)
  - Healing → scar formation.

N.B: It is rare in → **Children** d.t .very thin Desc
→ **Hypopyon ulcer** d.t post.
or post

* Descematocele = Herniation (Keratocele) of Desment memb.
* Keratectasia = Bulging of Corneal scar
* Staphyloma = Conical pulging of Cornea + iris incarceration

2) Late: "with clean ulcer & healing stage"

1- Typical corneal opacities :

* Due to: healing (fibrosis + vasc.)
* Types: (according to the depth of the ulcer)

a. **Nebula:** faint, superficial. (iris can be seen through it) See atlas page (70)

b. **Macula:** Medium density. (iris can be seen through it but with difficulty)

c. **Leucoma non adherent:** deep dense (iris can't be seen through it)

See atlas page (71)

* Lead to: 1) ↓ of vision by ① Opacity & → if unilateral → Amblyopia & Squint (non Paralytic) (Brain neglection)
  → if bilateral → Nystigmus (no fixation reflex) & in child → + mental Retardation
  ② Irregular astigmatism. اللانقطية (peripheral كانت اسوأ)

2) Atheromatous ulcer: ulcer in old degenerated scar.

2- Atypical corneal opacities:

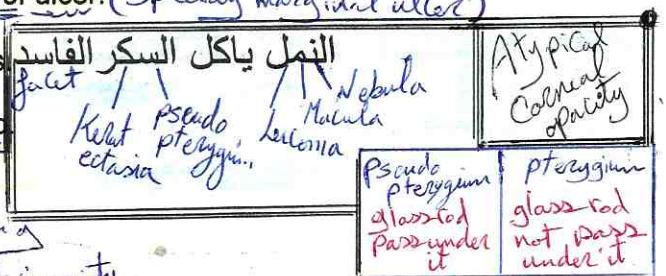
a. **Facet:** Depressed scar covered by epith. Due to insufficient scarring (-ve FL test)

b. **Keratectasia (ex ulcero):** See atlas page (70
(Bulging) Ectasia of a weak corneal scar infront of IOP.

c. **Pseudo pterygium:** See atlas page (44)

A fold of conj. Becomes adherent to the base of ulcer. (specially marginal ulcer)

① ② لازم شرطين → Peripheral ulcer & Chemosis



3 - Corneal Vascularization: Either superficial or deep

It will leave permanent opaque lines .

(B) Of perforating ulcer:

organism strong
patient → ↓ immunity

- Cause of Perforation: **sudden ↑ of IOP** d.t. squeezing of eye زر علي عنية, cough , sneezing, crying & straining الحزق (so Laxative & anti tussive given as prophylaxis)
- Sequelae of Perforation: depend on site & size.

Cornea

f. Descematocele (keratocele):

* **Definition**: herniation of Desment memb " Infront of IOP"
  d.t destruction of whole thickness of cornea except D. memb.
* **Clinically**: clear vesicle at base of ulcer. See atlas page (59)
  → sign of impending perforation.
* **Fate**: - Rupture → perforation. See atlas page (59)
  - Healing → scar formation.

N.B: It is rare in → **Children** d.t .very thin Descemnt memb.
→ **Hypopyon ulcer** d.t. post. Abscess formation or post. Ulcer formation.

2) Late: "with clean ulcer & healing stage"

1- Typical corneal opacities :

* Due to: healing (fibrosis + vasc.)
* Types: (according to the depth of the ulcer)
  - **a. Nebula:** faint, superficial. (iris can be seen through it) See atlas page (70)
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* Lead to: 1) ↓ of vision by Opacity & → if unilateral → Amblyopia & squint
  → if bilateral → Nystagmus & in child → + mental Retardation
  2) Irregular astigmatism. اللانقطية
  2) Atheromatous ulcer: ulcer in old degenerated scar.

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- **a. Facet:** Depressed scar covered by epith. Due to insufficient scarring (-ve FL test)
- **b. Keratectasia (ex ulcero):** See atlas page (70
  Ectasia of a weak corneal scar infront of IOP.
- **c. Pseudo pterygium:** See atlas page (44)
  A fold of conj. Becomes adherent to the base of ulcer.
  لازم شرطين → Peripheral ulcer & Chemosis

3 - Corneal Vascularization: Either superficial or deep
It will leave permanent opaque lines .

النمل ياكل السكر الفاسد
Facet / Nebula / Macula / Leucoma / Kuhnt pseudo pterygium / ectasia

Atypical Corneal opacity

Pseudo pterygium	pterygium
glass rod pass under it	glass rod not pass under it

(B) Of perforating ulcer:

- Cause of Perforation: **sudden ↑ of IOP** d.t. squeezing of eye زر علي عنية, cough , sneezing, crying & straining الحزق
- Sequelae of Perforation: depend on site & size.

Cornea

1) Peripheral perforation:

1. Small peripheral: → Ant. Synechia :

(Small part of the iris close perforation& becomes adherent to back of cornea).

2. Large peripheral:

→ Iris prolapse, which becomes covered by fibrin & soon transformed to fibrous tissue **scar which contains iris.**

If strong scar قوي→ **Leucoma adherent:** See atlas page (71)

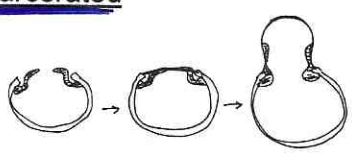
It's corneal scar in which the iris is incarcerated

(Glaucoma may occurs due to partial closure of the angle by the iris).

- If weak scar ضعيف → it will plug → **Ant. Staphyloma.**

Ectatic (weak) corneal scar in which iris is incarcerated

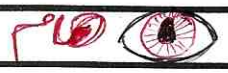
(Glaucoma is common).



Keratectasia إ
iris sinta ي

NB. Ant. Staphyloma may be : partial or total See atlas page (70)

- **Partial**: conical pulging of a big corneal scar + iris incarceration.
- **Total**: if **total** cornea slough → **total** iris prolapse → covered by exudate → pseudo cornea → hemispherical pulging.

	Leucoma non-adherent	Leucoma adherent
1) Cause	- Healing of central small perforation والعيان هادي - Healing of non perforating ulcer	- Healing of peripheral, Large perforation
2) A.C.	Regular,	Irregular
3) pupil	Rounded	Pear shaped 
4) IOP	Tn	May be increased
5) colour	Not pigmented (grayish white)	May be pigmented : iris فيها
		

2) Central perforation:

Small
Large Central perforation

(i) Small central perforation: → **Leucoma non adherent.** ← الجدول

→ **Corneal fistula.**

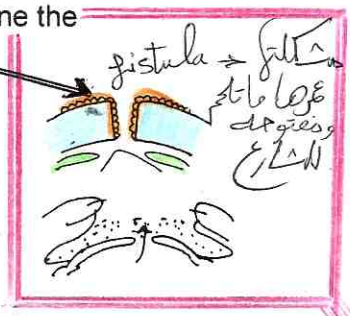
Cornea

Corneal fistula:

Definition: It is epithelialized corneal perforation.

Causes: As the perforation is small & central → can't closed by iris, Fixed keratocytes will form fibrin plug

- If the plug remains (العيان هادي)→ fibrous tissue scar→ **leucoma non adherent.**
- If repeated dislodgement (العيان مش هادي) due to straining or ↑ IOP from PAS→ this delayed healing will give a chance for the epith.(اهوج وارعن)to creep & to line the perforation → **corneal fistula** which will never heal by its own .



Diagnosis:

1- Soft tension " ↓ IOP"
2- Flat AC.
3- **Siedle test:** A drop of Fl. Is instilled & observed Using slit lamp + Cobalt blue filter + gentle pressure → aqueous comes out from the fistula dilutingthe green colour of Fl. **((River green sign))** See atlas page (74)

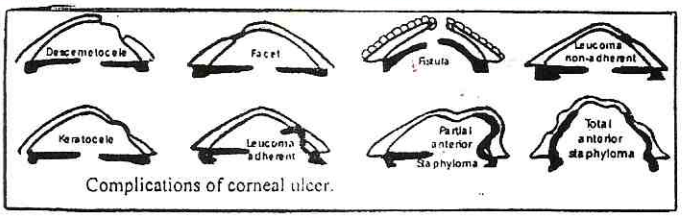
Complications:

1- Infection → endophthalmitis.(U/S)
2- Hypotony → macular edema (BV dilates)
3- Synechia formation : PAS → 2ry glaucoma (only after closure of the fistula)
4- Ant. Polar cataract.(acquired) → Congenital Cataract type
5- The epith may migrate & lines the back of cornea & the angle of AC.

(ii) Large central perforation:

- Infection → endo or panophthalmitis (ممكن تموت العيان) → due to extension of infection
- Expulsive Hge انفجار دموي = rupture of choroidal Vs with expulsion of intra-ocular contents in front of it due to sudden drop of IOP.
- Sublaxation, dislocation & even extrusion of lens & all the IO contents outside the eye.

DD: red eye الجدول المشهور



Complications of corneal ulcer.

Management

GRADDING >> DUCUMNETAION >> HOSPITALIZATION >> SCRAPPING >> TTT >> FOLLOW UP

Cornea

- GRADDING : high risk or low risk ulcer

High risk ulcer: size more than 1.5 ml , central with hypopyon

	Size	Depth	Sclera
Mild	< 2 mm	< 20%	Not affected
Moderate	2-5 mm	20-50 %	Not affected
Severe	> 5 mm	> 50 %	Affected

- HOSPITALIZATION: 1- High risk ulcer 2- Poor compliant pt.

3- Single eyed.

Treatment: (Cornea 5)

1. Loacl
2. General
3. Causal
4. Resistant
5. ttt of complication

1) Local:

1- Atropine sulphate 1% (drops, oint.) t.d.s → usual ttt

*** Action:** (Mydriatic – Cycloplegic):

1- Passive pupillary dilatation → keep the iris away from lens

→prevents post. Synechia formation.

2- ↓ Pain by relieving spasm of sphincter pupillae & ciliary ms.

3- ↓ Vascular permeability & exudation from iris BVs.

*** Duration of action:** 10-12 days.

N.Bs:

- **If pupil resist dilatation:** → give Atropine + Adrenaline + Novo Caine

Give mydricaine " 0.3 cc sub conj." → as the adrenaline is destructed by the alkalinity of tear film.

- Atropine 1%→ passive dilator +
- Adrenaline 1/1000→ active dilator +
- Novocaine 2% →local anaesthetic

→ Don't used as drps only sub Conj. injection

- **For children** → ointment مرهم

for fear of atropine toxicity from systemic absorption from nasal mucosa

(fever , flushing, fits, fast heart)→ give pilocarpine 10 mg IM+

+ cold compresses+ antipyretics

(no antidote for the mydriatic - cycloplegic action)

→ Give drops while doing pressure by finger on the L. sac. مهم

- **If atropine sensitivity** (acute follicular conj & edema & itching)

→ stop atropine & give Hyoscine 1/4 % (hallucination)

or cyclopentolate 1%.+ Local steroids.

Cornea

2- Antibiotics:

Drops or ointment or subconj injection in severe cases

AS - Montherapy Borad spectrum AB : Ciprofloxacin 0.3%

(recently Gatifloxacin & Mofloxacin)

- Dual therapy (Fortified eye drops) : in high risk ulcers.

* Gentamycin (14mg/ml) : cover gram -ve

* Cephazoline or ceftazidime (50 mg /ml): cover gram +ve

- Frequency of drops: every 5 min for the 1st hour
  then hourly around the clock for 48 hour
  then according to the response.

NB. Fortified eye drops is stable for 24 hour at room temperature or 4 days if kept in refrigerator .

NB. Initial ttt is broad spectrum AB & changed to specific AB according to culture & sensitivity if there is resistence. مهمه → to prevent occurance of Perforation

NB. Causes of resistence ?? الزيدات

3- Hot fermentation:

- Relief pain by counter irritant effect.
- V.D. → improve the circulation :bring leucocytes &immunoglobulins.

4- Bandage:

Stop the lid movement ,so

a) To promote healing of corneal epith.

b) Relief pain & photophobia.

Contraindications: if discharge is present in case of conjunctivitis →use dark glasses.

5- Bandage CL.:

افضل من ال bandage العادية → Bandage Contact lens

2) General:

- Bed rest.
- Avoid the straining :Laxative, Antitussives & sedatives → perforation.
- Systemic Antibiotics : indicatins??
  - Oral Ciprofloxacin 750mg twice daily.
  - Tetracycline (healing يساعدال =anticollagenase)
- Vitamins: - Vit. A → important for **epith** healing.
  - Vit C → important for **stromal** healing.

3) Causal:

- Of predisposing factors: As
  - Removal of PTDs - Epilation of Rubbing lashes - Control D.M.
  - Stop use of CL - Stop steroids
- TTT of source of infection: As Blepharitis ,Conjunctivitis (AB)or Dacryocystitis >> Dacryocystectomy لازم تشيلها

N.B: Usual TTT = local + general + Causal.

- Most cases respond to usual TTT & improved but small percent are resistant d.t. → virulent org or Poor immunity.

4) TTT of resistant cases (surgical TTT) : CCPTT

discuss ttt of Resist
discuss surgical ttt

C — Cauterization
C — Conj. flap
P — Paracentesis
T — Trasorraphy
T — Therapeutic keratoplasty

لو لسه ماخفش اما ترقع واما تخيط — غطي - اسحب - اكوي

1- Cauterization: "obsolete"

- **Aim**: to kill the organism directly.
- **Types**: 1) Actual cautery: by red hot Platinum needle → may lead to perforation .
  2) Chemical cautery: 1- Pure carbolic acid → Pyogenic ulcer.
  2- Iodine 7.5% → Dendretic ulcer.
  3- Zinc sulphate 20% → Morax ulcer.
  3) Cryo cautery: at -80 ° c with Dendretic ulcer.

2- Paracentesis:

repeated 2-3 times only to prevent infection

It is puncture of the A.C. and slow evacuation of its content using insulin syringe

* **Value:** 1- ↓ IOP (avoid perforation).
2- Wash out the toxins in the aqueous.
3-New aqueous (rich in antibodies & inflammatory cells) fill the A.C.

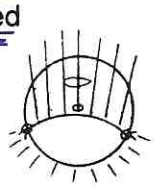
* **Indications:**
1- Descematocele (impending perforation). P.119
2- If 2ry glaucoma developed (not the 1st line of ttt ,done only after failure of medical)

*Other indications: 1- 2ry glaucoma due to Hyphema.
2- ttt of CRAO.
3- Aqueous sample (e.g. intraocular tumors & infections).

4- Conjunctival flap:

See atlas page (60)

* **Principle:** here a flap of the conj. Is dissected & used to cover the ulcer and fixed with sutures to the limbus.



* **Indications:** Descematocele (impending perforation). Perforation.
* **Value:** 1) ↓ the complications of perforation & help the healing of perforation.
2) Mechanical support to the Descematocele (prevent perforation).
3) supplies the resistant ulcer with fibroblasts (from conj. BVs).
* **Fate:** - Retract. or - Remain → pseudo-pterygium.

NB. Recently we use AMG (Amniotic membrane Graft) See atlas page (60)

5- Therapeutic keratoplasty :

- To save the eye from perforation (use any clear or opaque graft = tectonic graft).
- Lamellar or penetrating keratoplasty : according to the depth of the ulcer

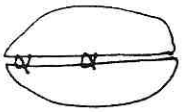
Cornea

6- Temporary tarsorraphy : - Lateral - Median

*** Indication:** 1- Ulcer with lagophthalmos. 2- Neuroparalytic keratitis (median)

5) TTT of complications:

1- Iritis : usual TTT + NSAIDs.



NB. *Never cortisone → perforation (as it retards healing & flare up of infection).*

2- 2ry Glaucoma: Usual ttt + Diamox tab CAI + Timolol eye drops

(If failed → paracentesis).

(If PAS→ External fistulizing op. when the eye becomes quite).

3- Descematocele:

- **Hospitalization** (Bed rest) .
- **Medical ttt:** usual ttt + Diamox tab+ Timolol drops+ Avoid straining.
- **Surgical ttt**: paracentesis, conj. flap, AMG, or therapeutic keratoplasty.

4- Perforation:

- **Hospitalization** (Bed rest) .
- **Medical ttt:** usual ttt. + Avoid straining (no Diamox).
- **Surgical ttt**: **- If small (< 1.5 ml)→** Cyanacrylate adhesive glue.

- If large → Conj. Flap, AMG or Th. Keratoplasty.

(no paracentesis)

5- Fistula: Hospitalization (Bet rest).

Here healing is prevented by epithelium that lines the track, so the epith must be destroyed by **Indirect thermal cautery (cauffage),** then treated as perforation.

- A trace of A.C. must be present by injection of Healon or methyl cellulose into the A.C. which will act as thermal insulator to protect the lens.
- **NB.** All this may be replaced by keratoplasty.

6- Corneal opacities:

(a) Nebula

1-Peripheral

↓↓Of vision is mainly d.t. Irregular astigmatism

So give - **Glasses. or**

- **Hard contact lens** (NOW RGP)

See atlas page (73)

2-Central

Being superficial opacity do

- **lamellar keratoplasty** (photorefractive)
- **PTK**(Photo therapeu keratectomy.)

Cornea

(b) Leucoma non-adherent PKP

- **Seeing Eye**
  - **Peripheral**: Glasses or Hard C.L. (for astigmatism)
  - **Central opacity**: **Penetrating keratoplasty (PKP)** ترقيع — or visual iridectomy
    If the eye not blind , not amblyopic
- **Non Seeing Eye or Amblyopic**
  Cosmetic ttt only:
  1- Colored CL to cover the opacity
  2- Tattooing by Indian ink وشم

See atlas page (76)

(c) Leucoma adherent: measure the IOP

- ± (-) Normal → as leucoma non adherent.
- ↑ (+) (-) High → Glaucoma operation 1st, then as Leuc. non adherent.
  - If blind & painful (due to glaucoma) → Enucleation.
  - If blind & not painful → coloured CL or Tattooing.

NB. Synechiotomy is done during PKP

(d) Ant. Staphyloma:

- **Partial** → Glaucoma operation, PKP (+ Synechiotomy).
- **Total** → Enucleation (as it is blind, painful, & disfiguring eye).
  المريض هو اللي بيطلب

7) Lens complications:

- **i) Ant. Polar cataract:** - Small→ Not TTT.
  - Large → visual iridectomy after mydriatic vision test.
- **ii) Sublaxation or dislocation:** Lens extraction.

8) Expulsive Hge. : Enucleation. استئصال العين

Remove all contents leaving:
-Optic n. -Extra-ocular ms & fat - Lid & Conjunctiva.

9) Endo- or panophthalmitis:

Seeing → Vitrectomy + Intravitreal AB.
Non seeing → Evisceration تفرغ العين See atlas page (89)
(not enucleation → intra cranial infection)

Remove all content leaving:
- Optic N.
- Extra ocular ms & fat
- Lid & Conj.
- Sclera.

enucleation

Enucleation Scissor

Evisceration scoop

Cornea

Keratitis = inflammation of the cornea → ulcerative / non ulcerative

(I) UICERATIVE (Suppurative) : Inflammation involves epith & stroma.

A- Primary: * Infective:

1- Bacterial: e.g. pneumococci → Hypopyon ulcer.

2- Viral: e.g. - HSV → Dendretic ulcer. - HZV → HZ ophthalmicus.

3- Fungal: e.g. Candida → fungal keratitis.

4- Protozoa: e.g. Acanthamoebic keratitis.

*** Non infective:** عمرو دياب = MAAN TML

- **M**ooren's ulcer.
- **A**theromatous ulcer.
- **A**llergic : phlyctenular ,ulcer in spring catarrh.
- **N**euro-paralytic keratitis **(neurotrophic)**
- **T**raumatic ulcer.
- Kerato-**m**alacia.
- Keratitis with **L**agophthalmos.
- **Photophthamia :** في الزيادات
- **Secondary to systemic diseases: RA & SLE**

B- secondary: to conjunctivitis

- MPC.- PC - Membranous conj - Trachoma - Phlyctenular conj.

(II) NON-UICERATIVE (Non-Suppurative) :

Inflammation involves the stroma only & the epith is intact.

1) **Superficial (ant. 1/3 of stroma)** e.g. - Trachoma. - Phlycten. - HSV.

2) **Interstitial (middle 1/3 of stroma)**

e.g. 1) DIFFUSE: - IK of congenital syphilis. - T.B.- Leprosy.

2) LOCALZED: Disciform keratitis.

3) **Deep (post. 1/3 of stroma):** e.g. keratitis profunda عميق : due to HZV.

Primary corneal ulcer

Hypopyon Ulcer

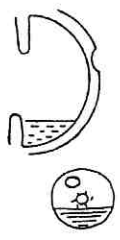
الي الابد See atlas page (63,64)

◊ **Definition**: it is disc shaped ulcer associated with:

1- Severe iridocyclitis.

2- Hypopyon (sterile pus): [Hypo = down & Pyon = pus.

inside A.C.



Cornea

Hypopyon: It is sterile pus (no organisms)

Q شفوي بنهال : ? not sterile امتي

- **Site**: in the bottom of A.C.
- **Origin**: Exudates from the inflammed iris.
- **Nature**: Yellowish & viscid .
- **Composition**: Fibrin + iris pigment+ Polymorphs.

◊ **AE:** - **Predisposing F :** as before, general & local.

- **Organisms**: **1) Typical Hypopyon ulcer:** o Caused by **pneumococci.**

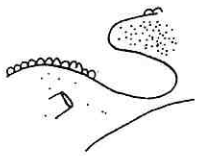
o 80% of cases. o Common in old age.

2) Atypical Hypopyon ulcer:

- o Caused by: other organisms as : morax Liquificans, staph, strept , fungi (Aspergillus fumigatus),HSV & pseudomonas pyocaneous from contaminated Fl. drops.
- o 20% of cases. o Common in children.

- Source of infection:

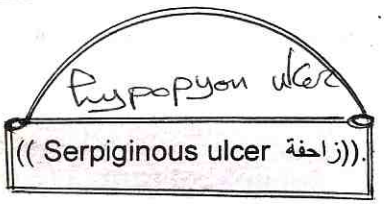
- Dacryocystitis is the most common " due to pneumococci" (also Blepharitis & conjunctivitis).
- Angular blepharoconjunctivits in Morax-axenfeld cases.



Triad : **A**brasion + **P**enumococci + **D**acyrocystitis.

Pathology: as before but:

- The ulcer tends to spread deep towards the center under the corneal surface (Advancing edges ناحية ال)
- The ulcer has 2 edges: advancing & healing edge.



Healing edge	Advancing edge
Towards the limbus	Towards the center
Sloping مزحلق	Undermined مختفي
Epithelialized & vascularized	Not
Little infiltration(as the org. tends to escape from BVs)	Dense infiltrations.

◊ **C/P:** - **Symptoms**: as before (pain, lacrimation... etc) but severer due to very powerful toxins

- **Signs**: (1) as before.

(2) Ulcer: central, disc shaped and serpiginous ulcer.

(3) A.C: Shows → Hypopyon (4) Manifestations of iritis.

Complications:

1) Iriodoyclitis + 2ry glaucoma: due to hypopyon.
2) Descematocele: **Is rare** (due to posterior abscess formation).

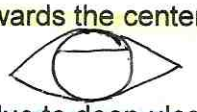
Cornea

3) Fistula: **is rare** due to failure of epithelization at the advancing edge.

4) Perforation: **is common** as:

-The ulcer tends to go deep and towards the center (thin).

- Due to post. Abscess formation.



5) Corneal opacities: usually dense (leucoma) due to deep ulceration.

Posterior abscess: This is cellular infiltration & necrosis which occurs opposite the ulcer just anterior to desc. memb. & might ulcerates Posteriorly (post. ulcer formation)
→ This early destruction of Des. M. → no descematocele.

Prognosis: bad due to - Perforation. - Dense leucoma → ↓ of vision.

D.D:

Typical H. ulcer	Atypical H. Ulcer
1) 80% - old age	1) 20% - young age
2) Pneumococci	2) Other org.....Morax Liquifaciens
3) Serpiginous (Adv. & Healing edge)	3) Spread in all directions
4) Post. abscess	4) No post. Abscess
5) - Descematocele rare - Perforation & complications : common	5) - Descematocele Not rare - Perforation & complications less common

Treatment:

1) **(Usual TTT) Local, General & causal TTT:** as before
   - TTT of dacryocystitis by DACRYoCYCTECTOMY.
   - Give broad spectrum AB. ((Specific AB لية مش بندي د. مجدي موسي))

2) **Specific TTT:**
   - اكوي 1- Cauterization: by * carbolic acid (for pneumo)
     * Zink Sulphate 20% (for Morax).
   - اسحب 2- Paracentesis: If IOP ↑ to evacuate hypopyon.
   - بنسلين 3- Penicillin subconj. Injection. (Now : fortum & Vancomycin)

3) **ttt of complications:** perforation - leucoma - 2ry glaucoma- iridocyclitis.

Dendretic (Herpetic) Ulcer

all usual ttt except hot foment bec. ↑ virus replic.

Definition:

It is superficial, linear, branching ulcer ending in knobs, due to infection of the cornea with (HSV). "Herpes simplex virus" See atlas page (65)

AE:

Cornea

AE HSV is an **epithelio-tropic** virus commonly present in the body mucous membranes e.g. conj. "producing no symptoms = dormanent " , but when the body resistance ↓ , it becomes active, infecting the corneal epith. Cells → vesicles → rupture → ulcer.

Q: why superficial ? as it affects the epith.

Types of HSV: **Type I (above the waist):** responsible for 75% of ocular infection.
Type II(below the waist): Responsible for 25% (Genital type)
>> ophthalmia neonatorum.

(i) 1ry Herpes

- Age: 6 month – 6 yrs
(Not before) due to protection by maternal Antibodies.
- C/P: 1- Mild fever with upper respiratory tract infection + LN enlargement.
2- Lid vesicles, pustules → heal without scar.
3- Follicular conj. (3&4 blepharoconjunctivitis) ⇨ See atlas page (22)
4- Microdendrites of the cornea in a minority of cases (No stromal lesions).

(ii) 2ry (Recurrent infection)

- In adult (15 – 25 yrs)
- The latent virus in the trigeminal (gasserian) ganglion is activated & travels along the 5th n. leading to
1- lid vesicles& edema. 2- Follicular conj. 3- Dendretic ulcer.
4- Stromal lesions. 5- Iritis.

Predisposing factors: (Which activates the virus?)

1) **Fever:** as in pneumonia, influenza.و مشهوره اوي بعد دور ب fever → multiplication of virus
2) **Stress:** as in operations, 1st pregnancy, 1st menstruation.
3) **Immuno-suppressant drugs:** Local or systemic.
4) **Over exposure to U.V. rays** : اكتر في الفلاحين

C/P: - **Symptoms**: as before (but usually not severe due to ***Corneal hyposthesia***)
- This hypoesthesia is due to → Edema surrounding the corneal nerves.
- **Signs**: as before but the cornea shows:

1) Epithelial lesions:

- Superficial punctate keratitis.
- Dendretic ulcer : اوصفها من التعريف
- Amoeboid (Geographic) ulcer: See atlas page (65) usually occur →if steroid are used.
- Trophic ulcer (Keratitis metaherpetica): non infective ulcer at the site of a previous dendretic ulcer due to failure of epithelialization due to corneal hyposthesia .

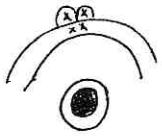
TTT : - Stop toxic drops

Cornea

- Medical : Lubricants (preservative free).
- Surgical: T CL or tarsorraphy.

o Hypothesia: Due to oedema surrounding the sensory corneal nerves.

2) Stromal lesions:



1- Disciform keratitis:

Hypersensitivity reaction to antigen (stroma وهو معدي في ال) →

Ag-Ab reaction → Central disc shaped edema of the stroma.

TTT: - Antiviral (acyclovir) & Steroids not less than 4 weeks

2- Stomal necrotizing keratitis: **(↓immunity)** مهمه >> melting & perforation الوحيد.

✖ Complications:

- 2ry bacterial infection.
- Herpetic(hemorrhagic) iridocyclitis: may show hyphema & iris atrophy

See atlas page 174

- 2 ry Glaucoma: due to hyphema & Trabiculitis
- Trophic ulcer (Keratitis metaherpetica).
- Disciform keratitis & Necrotizing stromal keratitis

مصنوع كمادات ستيرويد

The clinical characteristics of the dendretic ulcer:

1) Dendretic pattern.
2) Recurrent ulcer: no solid immunity (epiheliotropic virus). لايصل للدم
3) Never perforate & never vascularised : being superficial ,
4) Heal without residue 5)Hyposthesia.

✖ TTT:

1) Local TTT:

1. Antiviral drugs: مهمه جدا

- **Mechanism of action**: inhibition of DNA synthesis required for viral reproduction. But also affect the normal cells → toxicity.

Examples: اديني فيتراك

1. IDU (5-iodo-2 deoxy uridine), 0.1% drops / h. (Maximum 10 days for fear of toxicity).
2. Vidarabine(Ara- A) 3 % Oint / 5 times per day.
3. Trifluro –thymidine. 1% Drops / 5 times per day.
4. Acyclovir (zovirax). 3% Oint. / 5 times per day

for 2 weeks

بالجرعات

***Acyclovir (zovirax):**

This antiviral agent is converted into its active form "Acyclovir triphosphate" in the presence of HSV thymidine kinase (i.e., only in the infected cells → specific or non toxic).

2. Debridement: scraping the epithelium which contains virus, after the use of "double stain".

3. Cauterization: By - Iodine 7.5%. - Cryocautery - 80 ° c.

The infected area is identified before cauterization by "double stain"

NB. Double stain: - Flourescine 2% (for base of ulcer) → green.
- Rose Bengal 1% (for the edge of the ulcer & vesicle) → Red.

4. Therapeutic keratoplasty: for resistant cases.

- To prevent recurrence in the graft >> oral acyclovir 800 mg/day for at least one year post operative

5. Steroids: are contraindicated but can be used cautiously under antiviral cover in - Disciform keratitis.- Iritis. - Trabiculitis .

6. Prophylaxis: oral acyclovir 800 mg /day will decrease the rate of recurrent attacks per year.

Herpes zoster ophthalmicus

AE: Varicella (chicken pox) HZ virus which is Neurotropic virus (travels along nerve distribution) → vesicles → ulcers.

Incidence : - Old age & AIDS (↓ immunity)
- unilateral = dermatomal (respect the mid line) See atlas page (23)

Clinical picture:

- **Symptoms of acute systemic disease:**

Fever + pain & redness in area of distribution→ after 3-4 days vesicles appear (dermatomal) → ulcers & crusts →heal by depigmented scars in 3 weeks.

- **Signs**: It depends on the affected nerve:

1) Frontal nerve: vesicles on the forehead & upper lid >> lid scarring (entropion)

2) Naso-ciliary nerve :

- **Cornea:** 1) Pseudo-dendretic ulceration = without knobs)
2) Neurotropic keratitis : due to anaesthesia (due to destruction of nerves by virus)
3) Nummular keratitis: granular deposits (TTT: topical steroids)
4) Disciform keratitis.
5) Deep keratitis " keratitis profunda
- **Uveal tract:** * Ant. uveitis (+2ry glaucoma) → patches of iris atrophy .
- **Nose:** vesicles at the tip" Hutchinoson's sing = early sign of affection of nasociliary nerve. ابتدي علاج القرنيه فوراً

3) Optic nerve: → Op. neuritis.

Cornea

4) ***3- 4 & 6 nerves:*** → Paralytic squint.

5) ***7th nerve:*** → Paralytic ectropion.

6) ***Scleritis & episclertits >> scleral atrophy& staphyloma***

7) ***Retina : ARN***

TTT: - Usual ttt : if corneal ulceration occurs.

- Specific ttt :

1-Acyclovir : - Systemic : early in the acute systemic disese : 800mg /day/ 7 days

((Systemic acyclovir also decrease the incidence of post- herpetic neuralgia that may lead to suicide))

- Local

2-Analgesics for pain.

3-Antibiotics: To prevent 2ry bact. Infection.

4- Skin lesion: Calamine lotion & AB powder.

5- Keratitis & iridocyclitis : Local steroids & atropine.

D.D:

	H.S.V	H.Z.V
1) Virus	Epitheliotropic	Neurotropic
2) PPfs	Fever-stress	Non
3) Ulcer	Usually dendretic	- Not dendretic - Dendretic but without knobs
4) Sensitivity	Diminished (hyposthesia)	Absent (Anaesthesia)
5)Level	Superficial	Deeper layers
6) Recurrence	Common	Not (solid immunity)
7) pain	No proceeding neuralgia	proceeding neuralgia

Fungal keratitis

(Mycotic ulcer)

See atlas page (~~8~~) 63

AE: * Filamentous fungi: Aspergillus.

* Yeast : Candida spp.

PFS:

1) Trauma by vegetable contaminated material or organic material like wood (العيان يقولك اتخبطت بعود حطب), so common in agricultural area.

2) Immuno compromised patients(steroids)

3) Unhygienic CL wearer.

Cornea

Clinical features:

- **Symptoms:** low.
- **Signs:**

1) Elevated ulcer with feathery stromal reaction, surrounded by immune ring :
   → So the lesion appears large
   (stromal infiltration > epithelial defect < مهم جدا د.سامح الشوربجي)
2) Satellite lesions .
3) The rest of the cornea is bad (infiltration).
4) Hypopyon with convex border (pyramidal = coagulated=cheesy).
5) It will heal with dense leucoma with solitary BV. See atlas page (71)

Diagnosis: **1-History :** اتخبطت بعود خس يا حج

2-Examination: morphology.

3-Isolation of the organism : - Stained with → Giemsa stain or Silver stain.
- Culture on Saboraud's agar.

Treatment: (bad prognosis) **Usual ttt +**

1) Scraping of cornea to ↓ fungal load & ↑ penetration of antifungal agent
(as the anti fungal has poor penetration)
2) Antifungal drugs : 1- Local : as Natamycin 5% for several weeks
AmphotericinB for several weeks
هذه القطرات غير موجوده في السوق بنتصرف ازاي؟
2- Systemic: May be needed in severe cases.
e.g. Itraconzloe (Sporanix)100 mg daly /21 day.
3) Therapeutic keratoplasty: May be needed in resistant cases.

Acanthamoebic keratitis

Acanthamoeba sp. free living protozoa found in air, soil, fresh or brackish water (like swimming pole),

Predisposition : - CL wearer who use tap water to clean the CL.
- Corneal abrasion followed by contamination.

Clinical features:

- Sever pain d.t. perineural infiltration (out of proportion to clinical signs) with blurre vision.
- Epith pseudodendrites → Ring abscess. See atlas page (63)
  → Slowly progressive stromal opacification.

Diagnosis: - Staining : Calocflour white .
- Culture on : Non nutrient agar seeded with E. coli.

Treatment: (bad prognosis)

1) **Local Amoebicides:** As Brolene 0.1%, neomycin & chlorhexidine.

2) **Local Steroids**: May be used to ↓ inflammation but with low dose.

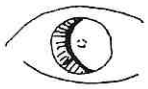
3) **Pain control**: oral NSAID.

4) **Therapeutic keratoplasty:** for residual scarring .

Primary non-infective corneal ulcers

(1) Mooren's ulcer = Rodent ulcer of cornea

See atlas page (66) شكل ال hypopyonولكن ابطيء



♦ **Definition:** Chronic slowly progressive serpigenous ulcer of unknown AE (May be degenerative condition , vasculitis of limbal BVs or autoimmune).

♦ **C/P:** Serpignous ulcer (Starts at limbus, creeps to the centre of cornea).

With crescentic (هلالي) advancing edge.

2ry bacterial infection→ perforation.

♦ **TTT: Usual ttt +**

- Cauterization by carbolic acid.
- Conj. falp or AMG
- Th. Keratoplasty → may recur in the graft.
- B- Irradiation.
- Immunosuppressant drugs (cortisone)
- NOW : Excision of the perilimbal conjunctiva (which produce collagenses)

(2) Atheromatous ulcer

It occurs in old degenerated leucoma (Hyaline degeneration →↑size →elevate the epith →Ulceration).

C/P: Once infection occurs this ulcer will undergo perforation, due to little vitality of the scar (BVs or inflammatory cells can't reach).

TTT: Usual ttt + - Th. Keratoplasty if seeing eye.

- Enucleation if non seeing eye. (as perforation is common).

(3) Neuroparalytic keratitis (neurotrophic)

Definition: corneal ulcer d.t. loss of corneal sensation

AE: * Lesions in 5th nerve As:

- HZV
- Trauma (fracture base of the skull)
- Radical ttt of Trigiminal neuralgia
- After retro bulbar injection of alcohol in absolute glaucoma.
- DM
- Lesions in trigeminal ganglion : intracranial tumours.

C/P: - Symptoms: Pain is absent d.t loss of corneal sensation, also lacrimation photophobia , blepharospasm are absent.

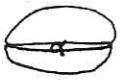
(Only ↓ of vision as it is central ulcer.)

- **Signs**: Loss of luster then epith. desquamation → Large central ulcer.

Perforation is common(as there is no pain, it is a silent ucler)

TTT: usual TTT + TTT of the cause +

Median tarsorraphy or TCL until sensation recover.



(4) Traumatic ulcer

AE: Corneal trauma by: - F.B. - Rubbing lash. -PTDs

→ Abrasion

TTT: Remove the cause + Usual ttt (Atropine not used → زغللة لمدة 10يوم)

Use cyclopentolate it's of shorter duration of action

(5) Kerato-malacia

♦ **Definition**: Bilateral acute suppurative keratitis (in marasmic infant)

Due to - Acute Vit A deficiency & - Depressed immunity.

♦ C/P: 1-Loss of luster of conj. & Cornea. (due to epithelial desquamation).

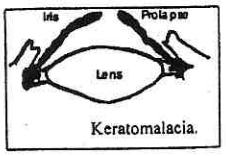
2- Xerosis :(ممكن تتكلم عنه).

3- Yellow dots of necrosis → corneal melting → perforation.

4- Panophthalmitis (inspite of all these conditions the eye remains quite

No inf. Sings " no ciliary injection")

♦ **Complications**: 1) Perforation. 2) Death from malnutrition.



♦ **TTT:** Bad prognosis.

1- Usual ttt.

2- Vit. A (systemic 250 000 IU/day & topical) .

3- Improvement of general health.

(6) Keratitis with lagophthalmos (Exposure keratitis)

Definition: Corneal ulceration occurs due to defective closure of the lids

→ leads to improper wetting of the cornea & dryness.

Etiology: causes of lagophthalmos قول

C/P: Ulcer in lower 1/3 of cornea which is expose during sleep d.t Bell's phenomenon. (Rolling upward of eye during sleep or lid closure to protect cornea).

NB * Explanation of Bell's phenomenon? The connection between

- 7th n→ orbicularis ms. & 3rd n→ SR ms

* if the Bell's phenomenon is absent → the ulcer will be central.

Cornea

TTT: usual TTT + TTT of the cause +

- **Mild exposure**: - In the day → Methyl cellulose 0.5% several times/day.
  - At night → Vit A ointment to block the opened palpebral fissure.
- **Severe exposure** : Tarsorraphy.

I.K of congenital syphilis

Definition: Non-suppurative inflammation of corneal stroma associated with uveitis.

AE: Due to Ag-Ab reaction treponema pallidum toxin (not organism).

C/P: - **Symptoms:** as corneal ulceration. due to toxins.

- **Course: (1)Progressive stage (2 weeks):** cornea show infiltration & Vascularization → Salmon pink patches.

  (2)Florid stage (2 months): Show marked symptoms & signs.

  (3)Regressive stage (2 years): ↓ the infiltration but the Vascularization not.

Diagnosis: 1) Hutchinson's triad (I.K. , deafness, Hutchinson's teeth).

2) Other signs of congenital $ as depressed nasal bridge= saddle nose.

3) + ve Wassermann's reaction.

4) Enlarged cervical LNs.

Complications: 1) Iridocyclitis. 2) 2ry glaucoma. 3) Corneal opacities.

Treatment: **1- local:** Cortisone+ Atropine (↓ iritis).

2- General: Cortisone + penicillin.

3- Penetrating Keratoplasty: May be needed (for residual opacities).

Ectatic conditions

- **Inflammatory**
  - keratectasia
  - Ant staphyloma
- **Non-Inflammatory**
  - Keratoconus
  - Keratoglobus

A - Inflammatory

(1) Keratectasia: See atlas page (70)

♦**Definition**: It is corneal ectasia without iris incarceration.

♦**AE:** Due to weak corneal scar which cannot withstand the IOP.

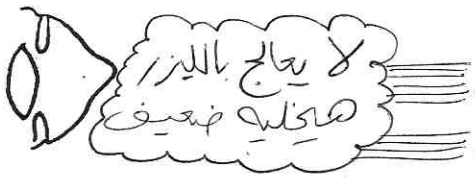
♦**Types:** 1) K. exculero: Weakening of cornea following healing of corneal ulcer.

2) K. Expano: Weakening of cornea following interstitial keratitis.

(2) Anterior (corneal) Staphyloma: See atlas page (70)

Ectatic weak corneal scar in which part of the iris is incarcerated

(glaucoma is common with ant. Staphyloma).



- **Definition:** It is non-inflammatory conical ectasia of the central part of the cornea due to congenital stromal weakness See atlas page (66,67)

- **Incidence:**

1) Age: presenting around puberty. With slowly progressive course then tends to stop after few years due to physiological cross-linking in old age مهم جدا

2) Sex : More in females (C.T. ضعيف)

3) Association: spring catarrh.الرمد الربيعي , RP.

4) Bilateral.

- **C/P:**

- Symptoms: 1)Gradual progressive painless ↓ of vision (مهم جدا العيان كل شويه يغير النظاره)

d.t.: - Curvature & axial myopia.

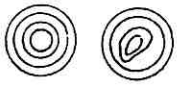
- Irregular astigmatism

- Central corneal opacity (due to rupture of Bowman's membrane).

2) Rapid ↓ of vision may occur: d.t. rupture of descement's membrane → corneal edema (Acute hydrops) See atlas page (67)

3) Apparent pulsation of objects الرفاعي:due to pulsation of the thin cone with arterial pulse.

- Sings:



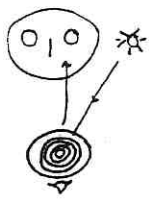
1) Early cases: are diagnosed by:

1. **Placcido disc (keratoscope)** : shows irregular circles at the center. See atlas page (77)

2. **RETINOSCOPY:** Show spinning (scissor) reflex متداخل:Central part move against mirror .

3. **Keratometry..** See atlas page (75) measures the curvature of the cornea.

4. **Corneal topography.** بالكمبيوتر See atlas page (67)



2) Late cases:

1- The center of the cornea is thin, cone shaped & resembling a drop of water (Lower &nasal).

2- The cone is best seen on:

a) Profile view. See atlas page (66)

b) Looking downward → Angulation of lower lid (Munson's sign). See atlas page (66,67)

3- Slit-lamp examination: shows details..

a) Apex of the cone:

- Below and nasal to the center of the cone.
- Early: Clear and later shows opacity See atlas page (67)

(d.t rupture of Bowman's & Descement's membrane).

b) Base: shows → Fleisher ring. See atlas page (67)

(Brown ring due to haemosiderin deposition in the epithelium)

c) Prominent corneal nerves. مهمه See atlas page (68)

d) Deep AC .

e) Vogt striae مهمه: vertical stress lines .

4- Oil droplet sign مهمه: Using direct ophthalmoscope at a distance 1 feet.

See atlas page (68)

D.D: From keratoglobus: which is congenital uniform enlargement of the anterior segment (cornea & A.C.) of the eye. See atlas page (69)

	Keratoconus	Keratoglobus
Onset	Puberty, female ♀	At birth , male ♂
Course	Progressive متقدم	Stationary ثابت
Cornea	Cone+ opacity +Fleisher ring	↑ Diameter & curvature (but clear)
Refraction	Irregular astigmatism+ myopia	Myopia
ttt	Hard C.L or keratoplasty	Glasses (or soft C.L.)

Treatment: ممنوع يتعالج بالليزر لو عليه ضغط

1) Hard CL or RGP rigid gas permeable CL: For irregular astigmatism.

(its problem is intolerance)

Intracorneal rings

(2) Intracorneal rings مهمه جدا: - intacs - Ferrara -kera (أنواع)

* intrastromal corneal ring segments See atlas page (68)

* ↓ progression of keratoconus so it delay the use of corneal transplantation

(3) Cross linking مهم جدا:

* **Steps:** 1- Remove the epith 2- Riboflavin drops 3- U.V. rays
* **Action:** ↑ integrity of stroma → ↓ progression of keratoconus.

4) Keratoplasty: when.

1- Hard C.L doesn't improve vision or not tolerated. (optical K).

2- Opacity at the apex of the cone. بدأت تظهر (visual K).

زمان → PKP.

دلوقتي → Deep anterior lamellar keratoplasty. DALK. مهمه

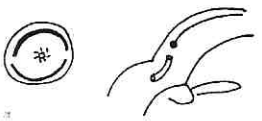
NB. LASIK in keratoconus is contraindicated → LASIK will increase the progression of keratoconus.(خطر)

Q what is posterior keratoconus ? See atlas page (68)

Degenerations of the cornea

Arcus senilis:

See atlas page (60)



Definition:

It is bilateral annular infiltration of the corneal periphery by lipoid material, in old aged people.

C/P:

- **Symptoms**: Nil (doesn't affect vision)
  (lipoid material ,no contractile nature so no astigmatism)
- **Signs**: White ring (or 2 arcs up & down) 1-2 mm breadth separated from the limbus by a clear zone → ***Lucid interval of vogt.***

D.D.: 1) From Annular pannus See atlas page (60)→ by the presence of lucid interval of vogt.
2) From corneal opacity following bulbar spring catarrh
→ by the presence of lucid interval of vogt.

Treatment: No ttt.

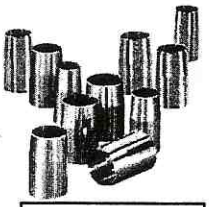
N.B: Arcus senilis is an aging process, but if seen in young
→ Arcus Juvenilis (which may indicate hypercholesterolemia)
(lipid profile ← ابعته للباطنه)

Operations

Keratoplasty See atlas page (72)

(Corneal grafting or corneal transplantation)

Definition: Removal of the diseased part of the cornea & replacing it by a clear donor's graft (from a cadaver) using trephine.



Trephines

Indications:

a) **Visual:** As in corneal opacities.
b) **Optical:** As in keratoconus & irregular astigmatism.
c) **Therapeutic:** as in resistant ulcer, corneal perforation.
d) **Structural:** as with recurrent pterygium operation(to restore corneal structure.)

Contraindications:

1) Uncontrolled glaucoma → rejection.
2) Dry eye. 3) Corneal anaesthesia. 4) Deep Vascularization.

Complications:

- Operative: lens injury (during PKP) ,vitreous loss, hge.
- Post-operative: graft rejection (Ag-Ab) reaction , infection (endophthamitis), Recurrence of the original disease in the graft.

Types: مهم جدا

(1) Lamellar : See atlas page (73)

- ***Anterior lamellar:***
  - *** Superficial → SLAK (superficial lamellar ant. K.) :** Partial thickness excision of the epith &stroma leaving the deep stroma & descement& endothelium.
  - *** Deep → DALK (Big air bubble technique) :** All opaque cornea is removed at the level of the descemnet membrane provided that the endoth. Is healthy
- ***Posterior lamellar (endothelial keratoplasty):*** e.g. DLEK. DSEK.

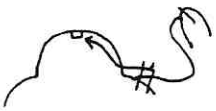
(2) Penetrating (PKP) : full thickness grafting. See atlas page (72)

Suturing technique: 1) Continuous. 2) Interrupted.

NB. Any superficial vascularization should be treated before keratoplasty :

1- Periotomy: a strip of the limbal conj, is excised .

2- Actual cautery or B-irradiation : to obliterate BVs.



Congenital Anomalies

*** Microcornea:** See atlas page (69)

The adult corneal diameter is 10 mm or less with shallow A.C.&hypermetropia but other dimensions are normal.

*** Megalocornea**: Bilateral, non progressive enlargement of cornea (corneal diameter 13 mm or more). Deep AC & high myopia

*** Cornea plana**: See atlas page (68) ↓ in corneal curvature (25-35 D).

→ Hypermetropia with shallow A.C. & predisposed to ACG.

*** Sclerocornea**: opacification & vascularization of the cornea :

- Mild : restricted to the periphery makes the cornea appears small.
- Severe : take the entire cornea.

*** Posterior KC**: increase in curvature of the post. corneal surface , with normal ant. Surface.

◊ Corneal edema

Causes: (1) Keratitis.

(2) Acute glaucoma , buphthalmos.

(3) Intraocular operations with endothelial damage.

(4) Corneal trauma. (5) Fuch's dystrophy

Clinical picture: (1) Epithelium: 1) Early: loss of luster.

2) Late: Vesicles and bullae (bullous keratopathy).

(2) Stroma: Haziness and increase in thickness.

Treatment: (1) Treat the cause. (2) Therapeutic (bandage) contact lens.

(3) Hypertonic saline solution 5% topically.

(4) Penetrating keratoplasty: if the above lines of treatment are not effective.

(5) Air current السشوار.

◊ Classification of corneal ulcer according to the site:

Marginal corneal ulcers?

(1) 2ry to MPC ,PC, Trachoma, phlyctenular conjunctivitis

(2) Mooren's ulcer. (3)2ry to systemic disease e.g. RA & SLE بنها

(4)Marginal ulcer (catarrha)

Central corneal ulcers?

1)Bacteria e.g. hypopyon ulcer. 2) 2ry to PC.

3)Viral ulcer. 4)Fungal.

5) Neuroparalytic keratitis. 6) Kerato-malacia. 7)Atheromatous ulcer.

◊ What are the causes of impaired corneal sensitivity?

1) Acute and absolute glaucoma.
2) Herpes simplex and zoster.
3) Neuroparalytic keratitis. 4)Corneal oedema.

◊ Band shaped keratopathy

الرفاعي

Definition: Band shaped horizontal opacity across the middle third of the cornea due to hyaline and calcareous degeneration. See atlas page (62)

Etiology: **1)Secondary:** degenerated blind eye (as a sequelae of iridocyclitis, absolute glaucoma or ocular trauma).

2)Primary: unknown cause.

Clinical picture:

(1) Symptoms: Corneal irritative symptoms (due to hyaline degeneration and calcium deposits).

(2) Singns: Band shaped horizontal opacity across the middle third of thecornea.

Treatment: (1) Secondary type: Enculeation of degenerated (atrophic) blind eye.

(2) Primary type:

1) Scraping of the opacity; or 2) Lamellar keratoplasty.

3) PTK (EXcimer laser)

◈ Uses of beta irradiation are:

1. After pterygium operations.
2. Resistant cases of spring catarrh.
3. Vascularized corneal scars (before or after keratoplasty operation).
4. Mooren's ulcer.

◈ Resistant corneal ulcers?

1- Wrong diagnosis: you treat the ulcer as bacterial while it is fungal.

2- Improper antibiotic: insufficient dose.

3- persistence of PPF.

4- Recurrent epithelial erosion

5- Alkali burn : coagulation of perilimbal BVs (no nutrition)

6- Drugs toxicity : - Benzalconium chloride (Preservative بتاع القطرات)

7- Autoimmune ulcers : - Mooren's ulcer - PUK

TTT : 1) Autologus serum (قطرة تحضير من الدم =مهمه)

2) Vit A & C. 3)Small doses of UVR

◈ Ulcers can be treated with cortisone??

(1) Allergic ulcers e.g catarrhal ulcer.

(2) Phlyctenular ulcer.

(3) Fascicular ulcer.

(4) Ulcer with spring catarrh.

(5) Mooren's ulcer

(6) Dendretic ulcer complicated with disciform keratits :give steroids after healing of the epithelial defect & under cover of antiviral drugs.

(7) parasitic : if there is stromal lesion , in absence of epth. Defect.

(8) Kerato-uveitis.

NB, no steroids in fungal.

◈ CORNEAL DYSTORPHIES

atlas page (62,63)

- **Definition:** bilateral , progressive, genetically determined , non-inflammatory opacifying disorder.
- **Types: 1) Epithelial:** Cogan, map-dot, finger print.

2) Bowman's dystrophy

3) Stromal dystrophies:

Clinical types:

1) **Nodular (granular) dystrophy:** - Superficial white spots in the axial region.
   - Hyaline deg.
   - Stain: mansson trichrome.

2) **Lattice dystrophy:** - Superficial, branching in the axial region
   - Amyloid degeneration .
   - Stain: Congo-red.

3) **Macular dystrophy:** - Full thickness small spots in the axial region .
   - Mucoid degeneration .
   - Stain: Alcan blue.

Marline – monro – actively - get – her – men – from – Luce - Angluce- city

Treatment: 1) Lamellar keratoplasty: For nodular and lattice dystrophies.
2) Penetrating keratoplasty: for macular dystrophy.

4) Endothelial dystrophy of Fuch's: مهم

- **Definition**: Endothelial degeneration → corneal oedema.
- **Clinical picture:** 1) Early corneal oedema with vesicles
  2) Late :opaque insensitive cornea.
- **Treatment**: - Penetrating keratoplasty (زمان). - DLEK.

Investigations for the cornea

1) **Pachymetry:** Measures corneal thickness See atlas page (76)
   If increased >> edema >> endothelial disorder .

2) **Specular microscopy:** Photography of corneal endothelium (number, size, shape).
   See atlas page (75)
   Some light is reflected specularly (like a mirrior), this peculiar light is captured by photomicroscope & form an image.

3) **Keratometry:** Measures curvature of the axial 2-3 mm. Of corneal surface. See atlas page (75)

4) **Corneal topography:** color coded map of corneal surface & measures diopteric power & the axis of different corneal meridians.
   See atlas page (67)
   - **Indication:** diagnosis of irregular astigmatism & early keratoconus
   - **Scales:** - Steep curvatures → orange & red.
     - Flat curvature → Violet & blue.

Sclera

Anatomy See atlas page (78)

A- It is the posterior 5/6 of the outer coat of the eye.

B- It is formed of:

1- Tenon's capsule (كيس حول العين لسهوله الحركه) which send extension aroud the ms.

2- Episclera : loose highly vascular CT.

3- Stroma : collagen bundles (irregular & not packed→ opaque sclera) +Elastic fibers.

4- Lamina fusca : - Delicate layer of collagen tissue.

- Light brown (melanocytes).
- Separated from choroid by supra-choroidal space.

C- Apertures:

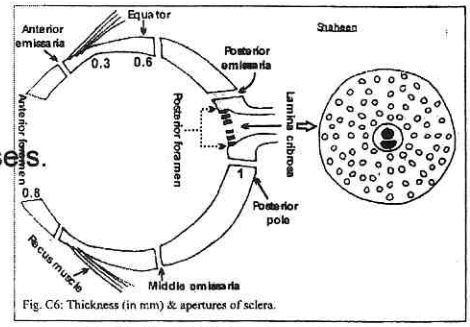


Fig. C6: Thickness (in mm) & apertures of sclera.

1) *Posterior:*

- Around the optic N.
- Transmit 2 long & short (6- 20) ciliary nerves & ciliary vessels.

2) *Middle*: - 4mm behind the equator.
- transmit vortex veins.

3) *Anterior*: - At the insertion of recti.
- Transmit anterior ciliary vessels & nerves.

4) *Lamina cribrosa* : it's the site of passage of optic nerve fibers through the sclera (weakest part of sclera), in the center it transmit the CRA & CRV.

5) *Optic nerve* : 2.5 ml medial to post. pole

NB. Vortex veins: - 2 superior → superior ophth. veins.
- 2 inferior → inferior ophth. veins.

Inflammation See atlas page (79)

- Types:

- **Superficial → episcleritis** (inflamm. Of CT over the sclera).
- **Deep → Scleritis** - Ant. Nodular scleritis.
- Post. Diffuse scleritis.

- Etiology :

- Part of collagen disease (SLE الزنبه, gout النقرص, Rheumatoid arthritis)
- Allergy to endogenous toxins (Ag- AB reaction): TB& streptococcal toxins.
- Infective.

Sclera

- **C/P :**

- **Episcleritis:** may be nodular or diffuse

- **Scleritis:** - **Nodular scleritis.** → deep & fixed to sclera

- **Diffuse scleritis.**→ limitation of ocular motility + Diplopia + proptosis.

- **Necrotizing scleritis.**→ necrosis → thinning → staphyloma.

- **Complications:** - Uveitis - CME - 2ry glaucoma -cataract - Staphyloma

- **U/S:** T sign. See atlas page (78)

- **DD :** Nodular episcleritis from phlycten. جدول مهم

- **TTT :** 1) ttt of the cause.

2) Steroids: local- systemic. 3) Immunosupressives.

Blue sclera

See atlas page (81)

شفوى

Causes: **(1) Physiological:** as in infant & children.

(2) Pathological: 1- Buphtalmos (congenital glaucoma).

2- High myopia.

3- Over scleral Staphyloma.

4- Osteogensis imperfecta: blue sclera, deafness keratoconus & fragile bone.

5- Marfan syndrome.

6- Ehler-Danlos syndrome مهم: blue sclera – ectopia lentis – keratoconus – skin hyperelasticity – joints hyperextensibility

In all these cases, the sclera is thin & transparent showing the underlying uvea (choroidal veins).

Staphyloma

♦ **Definition:** It is pulging of the outer coat of the eye (cornea or sclera) which is lined by the uveal tissue.

♦ **Etiology**:

(1) Weak outer coat of the eye d.t. ocular disease:

(a) Corneal diseases: e.g.

Large corneal perforation → iris prolapse. the iris soon covered by fibrin → fibrous tissue, The weak scar (large defect) cannot withstand the IOP due to closure of the angle by the iris) → **ectasia**

(b) Scleral diseases: e.g., high axial myopia, scleritis, after cryotherapy , malignancy eroding the sclera,

(2) IOP e.g., absolute glaucoma.

♦ **Types:**

1-Corneal (anterior Staphyloma) : See atlas page (80)

- **Partial**: conical pulging of big corneal scar+ iris incarceration.
- **Total** : if **total** cornea slough →**total** iris prolapse → covered by exudate→ pseudo cornea→ hemispherical pulging.

- **D.D**: Form Keratectasia (see cornea جدول)
- **TTT**: see the cornea: - partial → .....
  - Total →.....

2- Scleral: See atlas page (80,81)

Types:

(1)Intercalary: at the limbus , lined by the root of iris & part of CB.

- The limbus is weak due to presence of spaces of fontana

(2)Ciliary: just behind the limbus, lined by ciliary body.

- This area is weak due to presence of openings of ant. ciliary vesseles

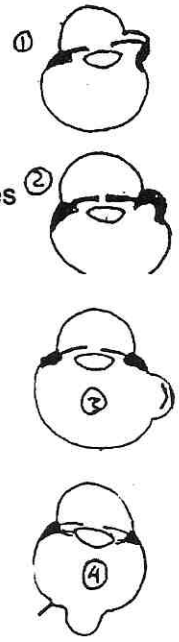
(3) Equatorial: at the equator, lined by the choroid.

- The equator is weak due to presence of openings of vortex veins.

(4) Posterior Staphyloma:

- At the posterior pole, lined by the **atrophic** choroid.
- Occurs only in "high myopia ".
- It is the only staphyloma with normal IOP مهم
- Seen by ophthalmoscope. or U.S.

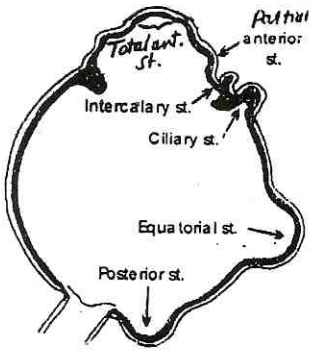
(5) Ring Staphyloma: surround the cornea.



♦ **Complications:** Rupture ,RD.

♦ **TTT**: - Treatment of the cause (scleritis, glaucoma.)

- Large Staphyloma+ Blind painful eye→ انت عارف
- Small → scleral graft.

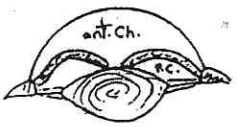


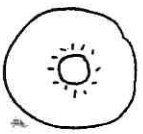
Uveal Tract

* It is the intermediate coat of the eye ball.
* It consists of: * Iris & C.B → anterior uvea.
  * Choroid → posterior uvea.

Anatomy

Iris



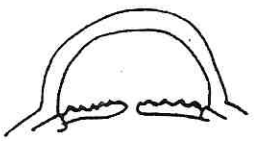


Gross

- It is the anterior part of uveal tract.
- It is a pigmented circular diaphragm perforated in its centre or slightly nasal = (pupil).
- It divides the space between the cornea & the lens into A.Ch & P.Ch.
- It has 2 borders & 2 surfaces.

Borders: **(1) Pupillary border:** is the free border.

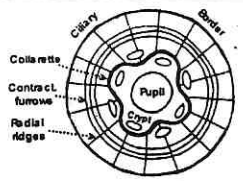
(2) Ciliary border: attached to the middle of ant. surface of C.B.



Surfaces: (1) Posterior surface: smooth & darkly pigmented.

(2) Anterior surface: shows fine irregularities "iris pattern" بصمة العين

Iris pattern بصمة العين



* **Fine irregularities on the anterior surface of the iris.**
* **Include: 1- Elevations:**
  - (i) Collarette: irregular (zigzag) circle near the pupil , 1.5 mm from pupil.
  - (ii) Radial striations: corresponding to the stromal BVs .

2- Depressions:

- (i) Iris crypts: dark depression near the Collarette & ciliary border, responsible for part of aqueous drainage.
- (ii) Circular furrows : folding of the iris where pupil dilates.

Colour

(i) At birth often blue or light gray ,(melanocytes not developed yet).

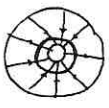
(ii) The final permanent colour is reached by the age of 1 year.

(The colour depends on the amount of pigment in the stroma) .

Minute anatomy:

(1) Endothelium - One layer of flat, hexagonal cells .

- Absent over the crypts.



Uveal tract

- Continous with corneal endothelium on the back of the cornea.

(2) Anterior limiting layer: Condensation of the superficial layer of stroma.

(3) Stroma: C.T. containing: BVs., Nerves, pigment cells & iris muscles.

Iris muscles: **(i) Sphincter pupillae:**

A circular band (1 mm broad) which run around the pupil.

(ii) Dilator pupillae

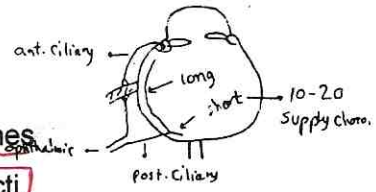
A radially arranged muscles, which run from the CB. Border → pupil

(4) Pigmented epithelium:

- Continuous with C.B. epithelium.
- 2 layers: * **Anterior layer** → Flat, contains few melanin.
  → Continous with the outer pigmented CB epith.
  * **Posterior layer** → Cubical& columnar, densely pigmented.
  → Continous with the inner non-pigmented CB epith.

NB. There is a potential space between these 2 layers → can be filled with fluid → iris cyst.

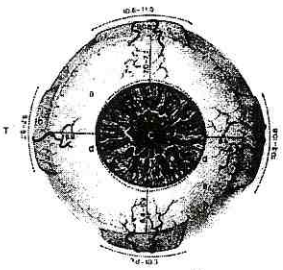
Blood supply:



(1) Arterial:

(CAI)

* From the circulus arteriosus iridis major which is formed from branches of :
  - The ant. Ciliary arteries 7 (from the muscular arteries of recti muscles, 2 from each recti but 1 from LR ms).
  & - The 2 long posterior ciliary arteries .



Post. Ciliary arteries arise from the ophthalmic artery :

1) **10 – 20 short ciliary arteries :** pierce the sclera around the optic n. to supply the post. Part of the choroids.
2) **2 long post. Ciliary arteries :** pierce the sclera on the sides of the optic n. → pass forward in the suprachoroidal space to join the ant. Ciliary inside the CB→ CAI major

* The branches from the major circle pass radially in the iris stroma, till they reach the papillary border where they anastomose to form the CAI minor around pupil & opposite the Collarette.

(2)Venous: The veins of the iris drain into the 4 vortex veins → ophthalmic V.→cavernous sinus .

Nerve supply:

1-Sensory: 2 long ciliary nerves (from the naso-ciliary nerve).

2-Motor: - Sympathetic to dilator ms.

Hypothalamus→ brain stem→ cilio spinal center of budge in the spinal cord C8 &T2→ superior cervical ganglion→ sympathetic plexus around the internal carotid a.→ join the ophthalmic division of tirg. N. → nasociliary n. (traverse the ciliary ganglion without relay)→long & short ciliary nerves → dilator ms & muller ms

- Parasympathetic to constrictor ms (from 3rd nerve) :

EWN →3rd n. → ciliary ganglion → short ciliary nerves 6-10 :

Pierce the sclera around the optic n. → run in the supra choroidal space →plexus inside CB → Constrictor & ciliary ms " parasympathetic"

(The motor fibers reach the iris via **6-10 short ciliary nerves**)

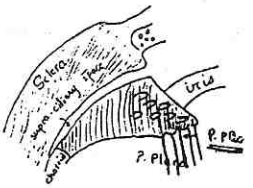
Function:

-Function of the pupil (seep later).

-Iris crypts → drainage.

The ciliary body

Gross:



- It is the intermediate part of the uveal tract.
- It extends from the iris to the choroid.
- **Shape:** triangular in antero-posterior section:

(1) **Base (ant. surface):** with the iris attached to its middle.

(2) **Outer surface:** separated from the sclera by supra ciliary space.

(3) **Inner surface:** - Gives origin to the zonules.

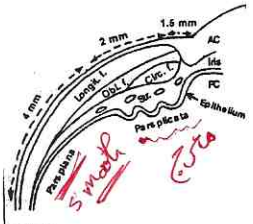
- Divided into 2 parts → Pars plicata (ant. 1/3 = 2ml) :

Show 70-80 ciliary processes

→ Pars plana (post.2/3 = 4ml):

Smooth & end at the ora serrarta.

(4) Apex : → Choroid.



Minute:

(1) Ciliary epithelium: continuous with iris epith.

2 layers: - **Outer:** → pigmented &flat (forward continuation of RPE).

- **Inner:** →non-pigmented & cubical (represent sensory retina)

Both drived form the 2 layers of the optic cup.

(2)Ciliary processes: 75 plications, for aqueous formation (from the non- pigmented epith.)

Each process is formed of a wide capillary covered by 2 layers of ciliary epithelium.

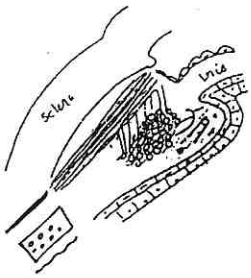
(3) Ciliary muscles: 3 parts:

Uveal tract

(i) **Longitudinal** (outermost) extends form scleral spur to the suprachoroidal lamina.

(ii) Circular (inner ant.) forms a ring around the ciliary processes.

(iii) Oblique: connects (i) & (ii).



(4)Stroma: C.T containing Bl V., Nerves & pigment cells.

NB. Ora serrata :

- It's the termination of the retina(dark serrated line).
- Present at the junction of CB & choroids.
- At the ora serrata the retina is firmly adherent to the vitrous & the choroid.
- ↓ of number of rods & cones.

Blood supply

As the iris .

Nerve supply

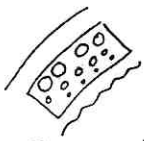
1) Sensory: 2 long ciliary nerves.

2) Motor : parasympathetic fibers to the ciliary ms (via the 3rd nerve).

Function:

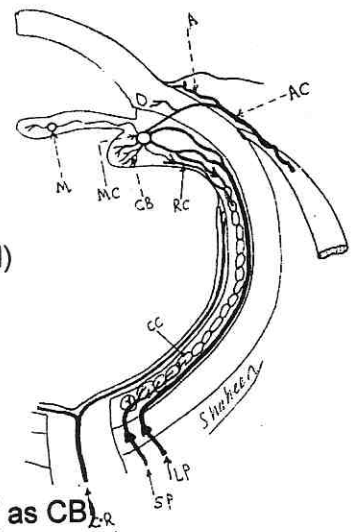
1. **Ciliary processes** → aq. Formation (from non-pigmented ciliary epith.)
2. **Ciliary muscles** → Circular fibers → accommodation.
   →Longitudinal. F. → aq. Drainage (by traction on scleral Spur).

Choroid



- It is the posterior part of uveal tract (from the orra s. to the optic nerve)
- It consists of the following layers:
  1. Suprachoroidal lamina.
  2. Vascular layer: (stroma)
     - (i) Outer: large vessels.
     - (ii) Middle: Small vessels.
     - (iii) Inner: chorio-capillaries(fenestrated)

     Also the stroma contains melanocytes.
  3. Bruch's membrane (firmly adherent to the retina).



AC = anterior ciliary, A = anterior conjunctival, LP = long posterior ciliary, SP = short posterior ciliary, CR = central retinal, CC = choriocapillaris, RC = recurrent ciliary, MC = major circle, M = minor circle, CB = ciliary branches.
Fig. 11.3 : The arterial supply of the eye

Blood supply:

1) Arterial - **Ant. Part:** from recurrent ciliary arterie, from CAIM (as CB).

- **Post. Part:** from short posterior ciliary a.

2) Venous : 4 vortex viens >> ophthalmic

Nerve supply:

Long & short ciliary nerves. (But the choroid has no **pain** nerve ending so choroiditis in not painful مهمه).

Function:

Nutrition to the outer retinal layers.

Uveitis

Ant.
Intermed.
Post.
Pan

It is inflammation of the uveal tract + affection of adjacent structure as the retina & vitreous.

CLASSFFICATION: د حمدي الكومي

I- Clinical classification :

1) Acute : - Sudden symptomatic onset.
- Persistent for 6 weeks or less .

2) Chronic: - Gradual , asymptomatic onset.
- Persistent for months or years .

3) Subacute: in-between chronic & acute.

4) Recurrent.

II- Etiological classification :

1) Infectious :

(1) Exogenous infection: Trauma: Blunt , surgical trauma
following penetrating trauma

(2) Endogenous : carried by blood stream

i- Bacteria: Strept, Staph., TB, $. Gonorrhea, leprosy

ii- Virus: HSV, HZC, CMV,HIV & Measles.

iii- Protozoa : Toxoplasmosis, anklystoma.

vi – Fungi: as Candida, Actinomyces.

2) Non-infectious :

1- ***Associted with arthritis*** : Reiter syndrome, ankylosing spondulitis, CJA.

2- ***Non infective systemic diseases*** : Sarcodosis , Behcet syndrome, VKHS, sympathetic ophthalmitis, DM, Gout.

3- ***2ry to ocular diseases***:

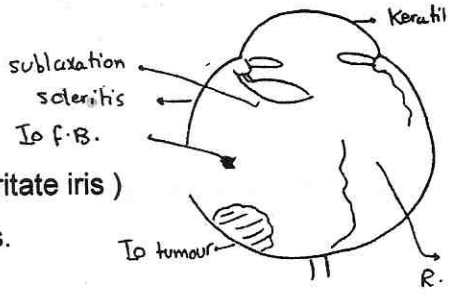
(1) Keratitis. (2) Scleritis.

(3) R.D.→ lactic acid

(4) Subluxation & Dislocation,(mechanically irritate iris)

(5) IOFB.(if chemically active) (6) IO tumours.

(7) Lens induced phaco toxic (allergic):



due to rupture of lens capsule

releasing lens proteins(Ag.) → hypersensitivity .

4- *Idiopatheic* .

5- *Drugs:* Cidofovir.

NB. Masquarade syndrome: Retinoplastoma, MM, leukemia >> give C/P like chronic uveitis

Autoimmune syndromes:

1- Behcet's syndrome: (بهجت)

Local: Bilateral, recurrent iridocyclitis. Retinal vasculitis.

General: Oral ulcers (aphthous) & genital ulcers.

2- Vogt-koyangi-Harada syndrome:

* Local: bilateral recurrent iridocyclitis.

Exudative choroiditis → Exudative RD.

(رغم وجود الانفصال الشبكي ف العلاج ميديكال د. حمدي الكومي)

* General: Deafness, Vitilligo (البهاق), Alopecia & Poliosis (white lashes& eye brows). See atlas page (21,22)

TTT. Medical ttt of iridocyclitis.

3- Fuch's heterochromic iridocyclitis;

Unilat. Recurrent iridocyclitis, in young females with heterochromia.

(Inflammation in the less pigmented eye) .

4- Sympathetic ophthalmitis.

III- Anatomical classification :

1) Ant. Uveitis : inflmmation of iris & ant part of CB (pars plicata).
2) Intermediate uveitis (pars planitis) : inflammtion of pars plana & periphery of choroid & retina.
3) Post. Uveitis: inflammtion of the choroid + retina, vasculitis or vitritis.
4) Pan-uveitis: inflamamtion of all the uveal tract :e.g. endo or panophthalimitis .

IV- Pathological classification :

1) Granulomatous : TB, Syphilis, usually associated with iris nodules & mutton fatb KPs

See atlas page (97)

2) Non- granulomatous: a.Purulent : PMN cells

b.Exudative: Mononuclear cells +

- Fibrin ++++ → Plastic uveitis.
- Fibrin + → Seours Uveitis.

(Ant. Uveitis) Irido- cyclitis

It is inflammation of the iris & ant part of CB (pars plicata). (blood supply واحد).

Clinical Picture:

Symptoms:

(1) pain: * due to → (1) irritation of iris **sensory** nerves by toxins.

(2) Spasm of iris & C.B. (3) 2 ry glaucoma.

* Pain here is characterized by :

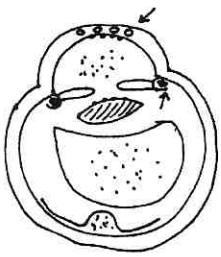
(i) Being neuralgic (dull-aching) = diffuse pain

(ii) More at night (stagnation of toxins at night due to venous stasis → ↓aqueous drain

(iii) Referred to the eyebrow along the distribution of 5th n.

(2) Photophobia (light → miosis →↑spasm →↑pain).

(3) Lacrimation. **(4) Blepharospasm.**



(5) Rapid painful ↓ of vision: due to:

(i) Early: 1. Cornea: Hazy (edema) as glaucoma& toxins →destruction of endothelium) & Kps. Keratic precipitates

2. A.C & Vitreous: Turbid (exudates & inflamm. cells).

3. Lens: Pigment deposits on ant. Capsule.

4. Spasm of ciliary ms (accommosation)→ transient myopia (1-2D).

5. Macula: Cystoid macular oedema (toxins & prostaglandin diffusion to it → VD = toxic maculopathy).

6. Papillitis.

(ii) Late: due to compilcations e.g.

- Cataract (due to diffusion of toxins into the lens)
- Glaucoma. - Cyclitic & pupillary membranes .

Signs:

(1) Lid: oedema .

(2) Conj.: Ciliary injection (RED EYE), chemosis

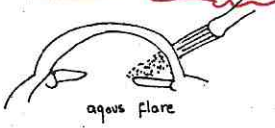
NB. the eye may be white in chronic cases.

(3)Cornea: → Hazy (edema).

→ Keratic precipitates (kps): See atlas page (97,98)

- Inflammatory cells (from dilated iris & CB vessels) .
- Deposited on the corneal post. Surface (convection current تيارات الحمل)
- Shape: triangular in middle & inferior zone (due to gravity).

(4) A.C: 1- Aqueous flare (plasmoid aq.) & cells: due to reflection of light of slit lamp by the particles(cells, ptns) suspended in the AC. شعاع الشمس وهو داخل من الشباك See atlas page (98)



NB. Aqueous flare indicates active iridocyclitis.

2- Hypopyon (in severe cases). See atlas page (64)

NB. What is pseudo- hypopyon ? د. حمدي الكومي

NB. What is malignant hypopyon?

NB. What is inverted hypopyon?

3- Hyphema: (Haemorrhagic iritis) as in

-Trauma. - Viral (HSV) - D.M → ↑ fragility of BV & robeosis iridis.

- TB & Gout& Gonococci.

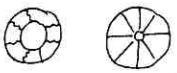
(5) Iris: 1 - Muddy مطين (loss of pattern) due to accumulation of oedema in the stroma & exudates on the surface of iris.

2- Altered iris colour due to iris atrophy (heterochromia) See atlas page (101)

3- Granuloma or nodules on the surface of the iris. مهمه

4- Robeosis : in long stnding cases. See atlas page (100)

(6) Pupil: (i) Early: constricted& sluggish reaction



(a) Congested iris vessels → straight.

(b) Irritation of iris ms (but the sphincter ms is stronger).

(ii) Late: irregular (due to Synechia formation).

(7) Lens: pigment deposits on ant. Capsule.

(8) Refraction: spasm of ciliary ms → transient Myopia.

(9) Vitreous: - Hazy (inflammatory exudates poured from C.B).

- Snow balls in the ant. part of the vitreous. مهم

(10) Tension: * Acute phase: low IOP (cyclitis → ↓aqueous formation) then ↑ IOP due to plasmoid aqueous.

* Chronic phase: increased (Synechia formation) .

* Steroids used during the ttt. مهمه

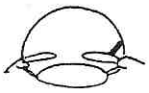
(11) Macula: CME.

NB. The severity of iridocyclitis can be graded according to the number of inflammatory cells in the AC (using the slit lamp)

Grade - no inflammatory cells → grade 0

- Up to 10 → grade +.
- 10 – 20 → grade ++.
- 20 – 30 → grade +++.
- Too numerous to be count → grade ++++.

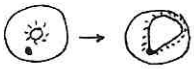
Complications



Discuss chronic iridocyclitis?

1. Synechia formation:

(a) Peripheral anterior Synechia (PAS) : adhesion between the periphery of the cornea & periphery of the iris → secondary glaucoma.

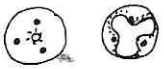


(b) Posterior Synechia: Adhesion between the iris & the lens capsule.

(i)Localized: on mydriasis → pear shaped (1 point)

or festooned pupil (more than 1 point). ♣

See atlas page (91)



* **No 2ry glaucoma.**

(ii) Ring Synechia: (Seclusio-pupillae يعني ايه) adhesion between the whole papillary border & lens capsule → iris bombe.

→→ * **2ry glaucoma** due to - Pupillary block . - Angle block.

NB. Seclusion it means isolation or separation.

(iii) Blocked pupil: (Occlusio-pupillae): As ring + organized exudates in the pupil → papillary membrane. →→ * **2ry glaucoma.**

DD from ring Synechia : here the lens not seen.

(iv) Total post. Synechia: Adhesion between the whole post. Surface of the iris & lens,

→→ * **2ry glaucoma** due to PC block.

Q مهم: How to differentiate clinically between ring & total post.synechia?

- In both the pupil will not dilate with atropine
- Ring Synechia → AC shallow
- Total post. Synechia → AC deep.

2- 2ry Glaucoma:

(i) Acute iritis: due to trabeculitis , plasmoid aq., Hypopyon& Hyphema → Open angle G.

(ii) Chronic iritis: due to Synechia formation (Ring S.& PAS)→Closed angle G.

(iii) Steroids used during the ttt → Open angle G. مهم

3- Complicated cataract: See atlas page (91)

Due to : inflammation (toxins),impaired nutrition of the len & may be prolonged use of steroid.

Shape: → Early: posterior cortical with polychromatic luster.

→ Late: chalky white.

4- Cyclitic membrane:

* It is organized exudates (from Cyclitis) Collecting in the retro-lental space

* C/P: Leuco-coria.

Uveal tract

* Contraction of this membrane → Tractional R.D.

& → Fibrosis of CB processes or C.B. detachments → ↓ aq. F → Hypotony (atrophia bulbi).
→ Tearing of the zonules → Sublaxation.

5- Endophthalmitis & Panophthalmitis. In infective iridocyclitis.

6- Atrophia bulbi due to CB detachment.

7- Papillitis & neuro-retinitis.

8- CME مهمه جدا Cystoid macular edema

due to diffusion of inflammatory mediators to the macula.

- Clinically → Honey Comb appearance. لها صوره جميله
  → loss of foveal depression.
- FA → Flower Petal appearance: due to accumulations of the dye within the microcystic spaces in the radially arranged henel layer of the macula.

See atlas page (140)

- OCT: hyporeflective spaces + macular thickening See atlas page (148)
- Complications : CME may lead to → foveal cyst → rupture → lamellar macular hole.مهمه
- TTT: steroids + systemic CAI

How to differentiate lamellar from full thickness macular hole? شفوي مهم

9- Complications of log-standing uveitis: ⇒ Vasogenic factor

(i) Rubeosis iridis : chronic inflammation → ischemia → new vessel formation → hyphema → Glaucoma (ii) NVG Neo vascular Glaucoma

(iii) Band shaped keratopathy .

Atrophia bulbi: See atlas page (84)

It is shrunken organized globe.

Causes: (destruction of CB) APCDE

(1) Atrophic stage of glaucoma. (2) Perforating trauma of CB.

(3) Cyclitis (iridocyclitis) →cyclitic membrane →CB detachment.

(4) Detachment (R.D)→ iridocyclitis. (5) Endophthalmitis & Panophthalmitis.

Clinical picture:

(1) Soft (due to ↓ aq. Formation).

(2) Shrunken & Quadrangular (pressure by the 4 recti).

(3) No. P.L. (4)Cataractous lens.

ttt: **Enucleation if blind painful eye**

Phthisis Bulbi: See atlas page (84)

it is shrunken disorganized globe. = no organs

Due to Endophthalmitis & Panophthalmitis.→ heal by intra-ocular fibrosis &calcifications.

Differential diagnosis:

From other causes of **RED eye** مهم جدا:

Most common causes:

(1) Acute conjunctivitis. (2) Corneal ulcer .

(3) Acute iritis. (4) Acute congestive glaucoma.

Other causes

(1) Endophthalmitis. (2) Panophthalmitis.

(3) Orbital cellulitis. (4) Cav sinus thrombosis.

(5) Episcleritis. (6) Scleritis.

(7) Photophthalmia. (8) Subconj Hge.

(9) FB (10) Asthenopia

Symptoms	Acute conjunctivitis	Corneal ulcer	Acute iridocyclitis	Acute congestive glaucoma
pain	Discomfort	Stitching	Dull aching	brusting
Vision	Normal	Decreased	Decreased	Marked ↓
Discharge	Muco-pur	(Lacrimation)	Watery	Watery
General	Absent	Little	Little	Marked (vomiting)
Signs				
1. Lid	Oedema (++++)	Oedema (+)	Oedema (+)	Oedema (+)
2. Conj	Cong injection	Ciliary injection	Ciliary injection	Ciliary congestion
3. Cornea	Normal	Ulcer (+ ve fl)	Hazy + Kps	Hazy (Oedema)
4. A.C	Normal	Muddy	Muddy	Iris bombe
5. Pupil	**Normal (RRR)**	**Normal or constricted**	**Constricted**	**Semidilated vertically oval**
7. IOP	Tn	Tn or T+	T++	T+++
8. Fundus	Normal	Normal	vitreous Haze	Not seen

Investigations:

(1) History: Trauma , D.M. T.B ,$.

(2) General exam: for specific iridocyclitis (TB , $) .

(3) Radiological : X –ray : - chest (T.B, Sarcoidosis).

- Joint, Hands & feet: for arthritis.

CT scan: sinus.

(4) Laboratory: **Urine:** Pus, sugar. **Blood:** Wasserman, ELISA.

Skin: Tuberclin.

(5)Immunological tests - HLA: for Behcet, VKH syndrome,
- ANA: for arthritis.

6) Tissue sampling: - Conjunctival biopsy.
- AC or vitreous aspirate: for cytology & PCR.

Treatment :

I- Non-specific ttt: لأي حالة

A) Local ttt:

*** Topical** قطرة او مرهم: in ant. uveitis

(1)Atropine 1%: every 3 hours until the pupil dilates and then 3 times /day (see corneal ulcer) كمل من شبتر القرنيه

(2)Corticosteroids: * Dexamethasone hydroxyl.
*** Prednisolone acetate.**
(both of high intraocular penetration power)

- **Action:** (1) Anti-inflammatory. (2) Anti-allergic.
(3) Prevent Cyclitic membrane& Synechia formation
(By inhibiting of fibroblastic activity)
(4) Decrease the release of destructive leucocytic enzymes.
- **Frequently:** frequent during acute stage (every 5 min to hour), then tapers gradually.
- **Side effects on prolonged use:** (1) Secondary glaucoma (OA) .
(2) Complicated cataract.
(3) Reactivation of dormant Organisms (HSV).
(4) Delayed wound healing.

د.عبد الباسط - local steroids→ glaucoma. - Systemic steroids→ cataract.

(3) NSAID : e.g. Voltarene eye drops

(4) Host fomentation: use dry hot f. not wet fomentation (see corneal ulcer)

(5) Dark Glasses: for photophobia

*** Injection of steroids** حقن: in severe resistant cases or intermediate or posterior uveitis مهم

- Subconjuctival.
- Ant. Sub-tenon : for ant uveitis
- Post. Sub-tenon: for post. uveitis
- Retrobulbar. - Intra-vitreal.

B) systemic ttt:

1- Systemic steroid oral or injection:

- **Indication:** in severe cases.
- **Dose:** 1 mg/ kg/day.
- **Contraindications:** *Relative:* I- Infective cases. ii- diabetic patients.
  iii- Cardiac & renal patients& hypertensive
  iv- Peptic ulcer patients.
  Absolute: TB→ miliary TB.

2- Systemic antibiotics: In infective cases.

3- NSAI drugs oral : if steroids are contraindicated.

4- Analgesics.

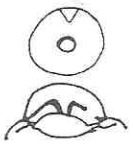
5- Immuno-suppressive agents: e.g. cyclosporine injection in steroid resistant cases (Syndromes).

II - Specific ttt: Acoording to the cause:

e.g., → Control of D.M

→ Treatment of syphilis , TB or Toxoplsma

III – TTT of complications:



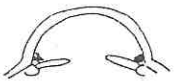
(1) 2 ry Glaucoma if due to

(i) Acute iritis: Give - Cortisone-atropine(for iritis).

- Cidamex -BB - Mannitol (for glaucoma).

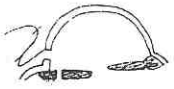
" CI in inflammatory glaucoma Pilocarpine ممنوع ال "

- Paracentesis (if medical ttt failed).



(ii) Chronic iritis:

1. Ring Synechia → do peripheral Iridectomy (urgent before development of PAS).
2. PAS → do external fistulizing operation (trabeculectomy)
   To make a fistula between AC & subtenons space.



3. Total posterior Synechia: if the projection is good (retina سليمة) do sector iridectomy + Cataract extraction.

(2) Complicated cataract: ttt of iritis→ after 6 months later, do cataract operation (under umbrella of steroids) .

(3) CME:* Intravitreal injection of trimethelone acetenoid

* Systemic CAI

(3) Endo & pan- Ophthalmitis: (evisceration)see orbit.

Pars planitis مهمه

Def.: it is inflammation of pars plana + the periphery of the retina & choroid

Symptoms & signs : - As before but there is no ciliary injection, KPs,
, pulpillary changes or aq. Flare

+

- Vitroues floaters due to presence of snow balls
- Exudate deposited on pars plana & periphery of the retin → called "Snow banking"
- Defective vision : due to papillitis, cyclitic membrane or **CME**
- Sever vitiritis that u can't examine the fundus.

Post. Uveitis (Choroiditis)

Choroiditis may be:

(1) Exudative. ***(2) Granulomatous.*** ***(3) Suppurative .***

1- Exudative:

- **Definition**: it is non-specific choroiditis with much exudation.
- **Etiology**: Allergy to endogenous toxins(TB, strept,Toxin of Ankylostoma).

- **Clinical picture:**

Symptoms:

(1) Meta morphopsia, micropsia, macropsia (due to distortion of photo- receptors).

(2) Photopsia (due to irritation of photoreceptors by inflammation).

" اللي يلمسها تنور"

(3) Scotoma (+ve & later –ve) : island of blindness surrounded by normal field due to pressure atrophy on the retina.

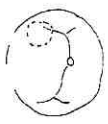
{1,2,3 retinal symptoms appears if the macula is affected}

(4) Musca volitans (floaters).

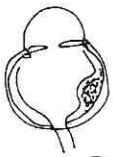
(5) Painless ↓Of vision (due to vitreous haze & central retinal Affection) .

Signs:

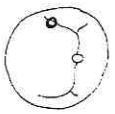
1- Active focus



- Yellow, elevated.
- Ill-defined .
- Vitreous haze.



2- Healed focus



- White , not elevated
(surrounded by pigmented spots)
- Well-defined.
- Vitreous → clear.

- **Types:** **1) Local :** peripheral or central **2) Diffuse.**

3) Disseminated (multiple).

- **Complications:**

1) Complicated cataract . 2) Papillitis & optic neuritis.

3) Permanent field defect. 4) Exudative RD (as HARADA) اكتبه هنا

5) Macular destruction.

6) Vasculitis (sheathing of BVs) → CRAO , CRVO & vitreous hges.

e.g. Behcet disease & SLE.

7) Vitiritis , so u can not examine the fundus.

8) Retinitis (chorioretinitis).

9) If suppurative → endo. & panophthalmitis.

- **Treatment :** as iritis.

2- Granulomatous: Here → an actual granuloma is formed (tubercle TB or gumma $).

3- Suppurative: (1) Endophthalmitis. (2) Panophthalmitis (see orbit).

	Ant. Uveitis (iridocyclitis)	Post. Uveitis (choroiditis)
- Pain	Painful	Painless
- V/A	Markedly affected	Not markedly affected (except if the central area is affected)
- 2ry glaucoma	Present	Absent
- ttt	Atropine is essential	Steroids are important than atropine

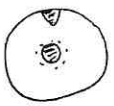
Iridectomy

Definition

It is removal of a part of the iris

Types

1- Peripheral: See atlas page (93,94)



- **Site:** Near the ciliary border (not reaching the pupil),
  at the upper limbus(12 O'clock)→to be covered by lid→no Diplopia
- **Indications:**
  1-Closed angle glaucoma (see glaucoma).
  2- as a step in → Ext. Fist. Op.(to prevent closure of the fistula by iris root)
  → Cataract extraction ICCE
  (to prevent papillary block glaucoma by vitreous herniation).
  3- Ring synechia.

2- Sector (key hole): - **Site:** From the ciliary border to the pupil

See atlas page (94) (12 O'clock)

Uveal tract

- **Indications**: 1) as a step in → Ext. fist. Op.
  → Cataract ext.
  2) Total post. Synechia.

3- Wide basal. See atlas page (95)

4- Visual: See atlas page (95)

- **Site:** At the pupil (not reaching the ciliary border)
- **Indication:** central corneal or lenticular opacities (provided that vision improves after mydriasis).

- **Site of choice is** **(1)** Down: not covered by lid.
  (2) In : for convergence.
  (3) Small: ↓ dazzling الزغلله.

5- Miscellaneous indications (Bizarre):

- Any → site, size & shape.
- Indications (1) Neglected (after 24 hours) post-traumatic iris prolapsed.
  (2) F.B. in the iris.
  (3) Tumours or cyst of the iris.

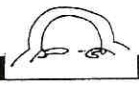
D.D. of iridectomy

(1) Congenital coloboma : See atlas page (96)
- No history of op. - Lower part. - Collarette is intact.

(2) Iridodialaysis : See atlas page (95) trauma→ separation of the iris from CB + D shaped pupil.

(3) Melanoma of iris (appears as dark mass, with distorted pupil). See atlas page (100)

(4) Retro-flexion.



NB. Japanese iridectomy مهمه جدا:**m**Iridectomy at 6 O'clock despite being at 12 O'clock to be not closed by the floating silicon oil (inverted hypopyon) : in case of vitrectomy

See atlas page (94)

Endophthalmitis

Endophthalmitis is a purulent inflammation confined to the intraocular structures, but the outer coat of the eye (cornea, sclera) and Tenon's capsule are free.

◊ **Classification:**

1- Acute postoperative endophthalmitis: is the most common entity. It may be infectious, (2ry to bacteria) or sterile by chemicals e.g., powder from gloves ,retained FB.

2- Delayed postoperative endophthalmitis: 2ry to bacteria (P. acne), fungi, & In patients with external fistulizing procedures.

3 -Traumatic, as in penetrating injuries if antibiotics were not started early.

4- Endogenous (Metastatic) endophthalmitis as in immuno-compromised pts.

◊ **Etiologic agent**:

1- Bacterial: Gram + ve : staph epidermidis, Staph aureus.

Grame –ve (Pseudomonas, proteus, Escherichia coli).

2- Fungal: Candida, Aspergillus.

◊ **Clinical picture:**

***Symptoms**: GENERAL : FAHM

LOCAL: 1- Pain. 2- Hyperemia. 3- ↓ Of vision (up to NoPL).

***Signs:** 1- Lid edema. 2- Conjunctiva: Ciliary injection &chemosis.

3- Corneal edema (destruction of endothelium)+ Kps

4- A.Ch. : Hypopyon

5- Vitreous : yellow reflex(Amarotic cat's eye) 6- ↑ IOP.

To differentiate between bacterial and fungal endophthalmitis, the following criteria should be considered.

1) Bacterial:

i- Sudden onset (1-7 days postoperatively) rapid progression.

ii- Severe: pain, redness & lid edema.

iii- Rapid loss of vision. iv- Hypopyon and glaucoma.

2) Fungal:

i- Delayed onset (8-14 days or more). ii- Less: pain, redness and edema.

iii- Good light perception in early cases.

iv- Transient hypopyon with localized grayish white condensations in the vitreous (snowballs).

3) Sterile: i- May look like bacterial or fungal infection.

ii- Foreign body (sponge filaments, powder) may be seen inside the eye.

◊ **Complications:** 1- panophthalmitis. 2- Atrophia bulbi.

◊ **Management of bacterial endophthalmitis:**

1- Hospitalization.

2- Vitreous aspiration for smears (Gram and Giemsa), cult, and sensitivity.

3- Anterior chamber paracentesis for smears ,culture and sensitivity.

4- Antibiotics:

a) Intravitreal:

i- 1mg of vancomycin (to cover gram + ve organism), plus.

ii- 2 mg of ceftazidime or 0.4 mg of amikacin (for gram-ve).

b) Subconjunctival: i- 25 mg of vancomycin.

ii- 100 mg of ceftazidime or 20 mg of amikacin.

c) Topical (drops): i- Vancomycin: 50 mg/ml .

ii- Ceftazidime: 50 mg/ ml or fortified Gentamycin drops 15 mg/ml.

d) Systemic: i- Amikacin 14 mg/ kg i.v. or i.m every 8 hours for 5 days.

ii- Ciprofloxacin 500 mg every 12 hours for 5 days.

5- Steroids: may be added At least 24 hours after Starting intensive antibiotic therapy (not given if fungi is suspected)

6- Vitrectomy: is done in severe cases not responding to other measures.

7- Evisceration: late cases .

N.B: in fungal endophthalmitis: use Amphotericin B local & systemically.

Panophthalmitis

- **Definition**: As endophthalmitis but including outer coat (cornea& sclera) , Tenon's capsule & soft orbital tissues.
- **A/E:** As endophthalmitis.

N.B: Endogenous infection usually → endophthalmitis as organism is attenuated by circulating Abs BUT **exogenous** infection usually → panophthalmitis d.t. large number of virulent organisms.

- **Clinical picture:** as endophthalmitis

  + Extra-ocular manifestations due to affection of sclera & tenon's capsule:

    1) Proptosis 2) Limitation of ocular movement. See atlas page (84)

  + Signs of affection of cornea: ring abscess .

- **Complications:** 1) Atrophia bulbi (pus may burst through cornea).

  2) Spread of infection:

  a) Orbital cellulites.

  b) Cavernous sinus thrombosis. c) Meningitis.

- **D.D:** Endophthalmitis, cavernous sinus thrombosis & orbital cellulitis.
- **TTT:** Evisceration.

N. B1: Sympathetic Ophthalmitis not occur as all uveal pigment is destroyed by suppuration .

N.B 2: Enucleation is contraindicated as infection can spread to the meninges along subarachnoid space around optic nerve which is cut in this operation.

Uveal tract

♦ CONGENITAL ANOMALIES

(1) Albinism: is a deficient melanin pigment in the iris leading to:

1- Reddish iris. See atlas page (99)

2) Nystagmus (due to loss of central fixation).

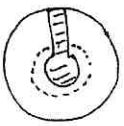
(2) Anirdia: See atlas page (96)

is a bilateral absence of the iris which is never complete as there is a narrow rim of iris tissue which usually blocks the angle of the anterior chamber with secondary glaucoma.

TTT: Aniridia ring or iris prostheses

This pt. should have abdominal US at regular interval . ليه؟؟؟

(3) Coloboma of the uveal tract: See atlas page (96)



- **Definition**: Partial deficiency (defect) of the iris, ciliary body or choroids.
- **Cause**: Defective closure of the foetal cleft.
- **Clinically**: 1) Dating since birth and is bilateral.
  2) Usually in the lower part of the iris alone or with coloboma of the ciliary body and choroids
  3) The collarette is intact.
- **DD:** Sector iridectomy (history of operation, usually unilateral, at any part of the iris (12 O'clock) and the collarette is not intact).

(4) Persistent papillary Membrane: See atlas page (99)

- **Definition and causes**: persistence of part of the anterior vascular sheath of the lens after birth.
- **Clinically**: Fine strands of iris tissue extends from the collarette to the anterior surface of the lens.
- **DD:** Posterior synechia (is not attached to the collarette).

(5) Heterochromia iridum: part or sector of iris has different color. See atlas page (98,99)

(6) Heterochromia irides: each iris has different color See atlas page (98)

♦ What are the good prognostic signs of controlled iridocyclitis?

(1) Full mydriasis.

(2) No aqueous flare, KPs ,ciliary injection or muddy iris.

♦ What are the basic features of cyclitis?

(1) Marked symptoms, tenderness, ciliary injection and KPs.

(2) Marked posterior synechia and cyclitic membrane.

Uveal tract زيادات

♦ **What are the basic features of acute iridocyclitis?**

(1) Ciliary injection.
(2) KPs.
(3) Aqueous flare.
(4) Muddy iris with loss of its pattern. (5) Miosis.

♦ **What are the causes of anioscoria (unequal size of pupils)?** تحريري رعب

See atlas page (96)

i- More in the dark : - Horner's syndrome. - Acute iridocyclitis - Miotics.

ii- More in the light: - Acute glaucoma. - Mydriatics. - Adie's pupil (tonic pupil) .
- 3rd nerve palsy. -Trauma. - Siderosis.

♦ **What are the causes of tremulous iris (iridodonesis)?**

(1) Aphakia
(2) Hypermature cataract.
(3) Congenital glaucoma.
(4) Lens displacement.

♦ **What are the causes of iris nodule?**

1- Benign melanoma. 2-Tuberculoma.
3-Foreign body. 4-Cyst. 5-Malignant melanoma.

♦ **What are the causes of aniridia (absence of the iris)?**

(1) Congenital (not complete as a narrow rim of iris is present → angle block
(2) Traumatic. (3)Operative.

♦ KERATIC PRECIPITATES (KPS)

Definition: Deposition of leucocytes and other cells on the back of the cornea in uveitis.

Causes: (I) Iridocyclitis.(2)Choroiditis (rare).

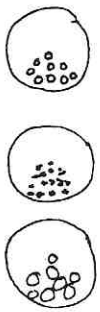
Types: See atlas page (97)

(1) *Recent KPs:* 1) Unpigmented. 2) Have a rounded edge.

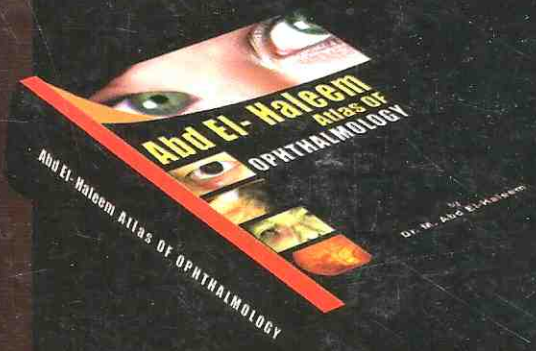
(2) *Old Kps:* 1) Pigmented. 2) Have a crenated edge (glass appearance).

(3) *Mutton fat Kps*: شكل دهن المعيز

→ in granulomatous uveitis
yellow rounded



- Ophthalmologic Summary..... Mohammad Abd El Haleem gives some splendid Topics and examples...His range of reference is impressively wide. He conveys large amounts of detail with a pleasant urgency.
- A comprehensive, up-to-date viewpoint on diverse cases and issues related to ophthalmology.
- Highly recommended for students, faculty and professional doctors.
- Provocative and diverse, this Summary explores the anxious relationships between different similar and dissimilar medical cases.
- Useful friendly format for examinations.



LOTUS VISION