



Lids, Lacrimal & Orbit Disorder

[**Color index:** **Important** | Notes: F1 & F2 | Extra] [EDITING FILE](#)

Objectives:

➤ **Orbit:**

- Anatomy and evaluation techniques.
- Orbital trauma.
- Proptosis.

➤ **Lids:**

- Anatomy and evaluation techniques.
- Trauma.
- Lesions.
- Malpositions.

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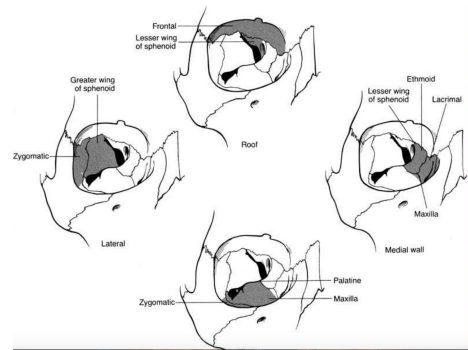
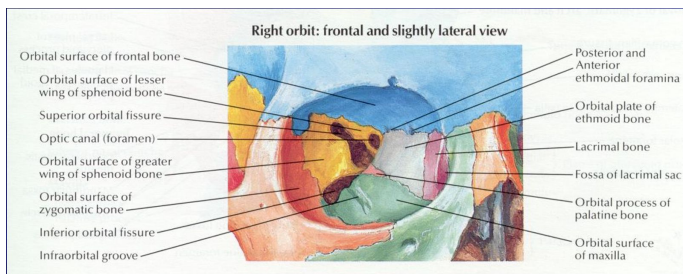
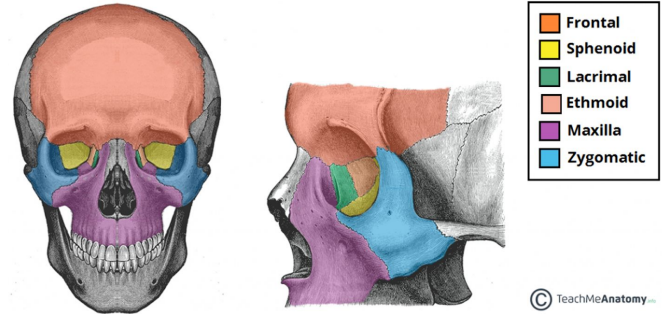
Resources: Slides + Notes + 433 / 435 Team.

F1 Doctor repeated the same notes in BOTH groups. Nothing new

Anatomy of The Orbit

Orbital walls

- **Roof:** **frontal bone**, and **lesser wing** of sphenoid bone
- **Medial wall:** **maxillary bone**, **lacrimal bone**, **ethmoid bone**, and **lesser wing** of sphenoid bone.
- **Lateral wall:** **zygomatic bone** (anterior), and **greater wing** of sphenoid bone (posterior).
- **Floor:** **maxillary bone**, and **zygomatic bone**, and the far back is made from the palatine bone.



EXAM

Q1: Which one of these walls is the thickest/strongest bone ?

The lateral wall; because the eyes are in most danger from the lateral side.

Q2: Which wall is the thinnest?

The medial wall.

Q3: Which bone is the thinnest ?

Ethmoid bone (**0.3 mm**) that is why it is easy to get fractures in facial trauma, and it is also easy for **infections** in the sinus to go to the orbit.

Q4: What other name is there for the ethmoid bone?

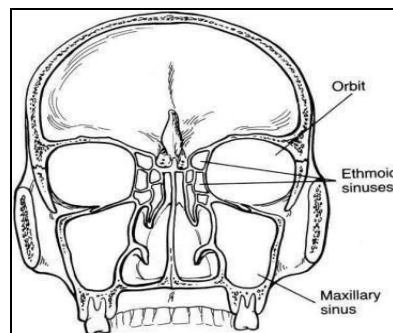
Lamina papyracea (paperlike), because it is the weakest/thinnest bone.

- **The orbit is surrounded by 4 sinuses:**

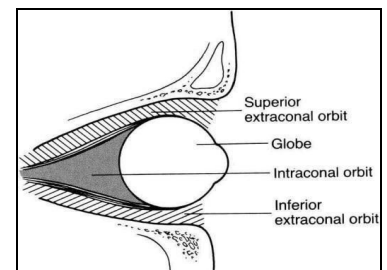
- **Maxillary sinus:** formed at birth.
- **Ethmoidal sinus:** formed at birth.
- **Frontal sinus:** formed at the age of 5 and above.
- **Sphenoid sinus:** formed at the age of 1-2.

* In trauma children are **more prone to orbital roof fractures**, because they don't have frontal sinuses, theoretically due to that frontal sinuses are assumed to have cushioning effect on the orbital roof in trauma.

Sinuses



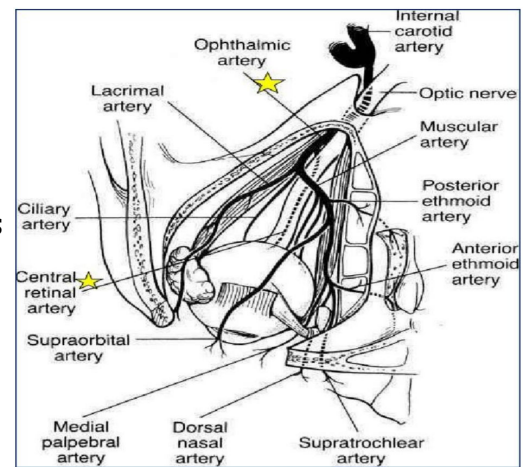
Orbital components



The bony orbit is cone shaped, inlet (anterior) is bigger than the outlet (apex) (posterior).

- **Blood supply**

- The main blood supply is ophthalmic artery, first branch of the internal carotid, supplies the **orbit and the eyeball**, it gets inside the orbit through the optic canal.
- The ophthalmic artery gives so many branches inside the orbit, the most important branch which is the **central retinal artery**, which pass through the optic nerve.
- **Why is the central retinal artery the most important branch?**
 - Because it supplies the retina and if it gets cut, it will lead to total blindness, since it has no collaterals.



- **Annulus of Zinn:**

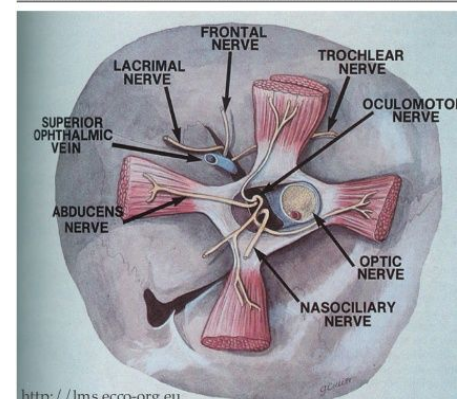
What is it? Annulus of Zinn is a form of condense fibrous tissue, it gives the origin of all the recti muscles (Superior rectus, inferior rectus, medial rectus, lateral rectus).

What are the nerves passe within the annulus of Zinn?

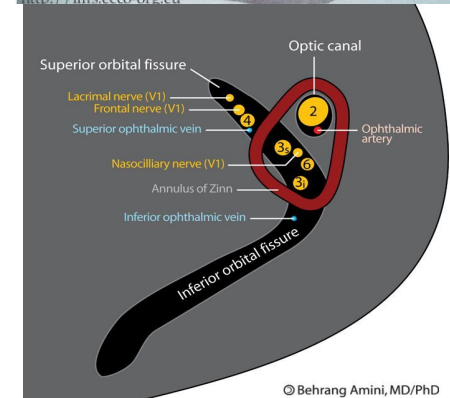
- there is the **optic canal** which has the optic nerve, and the ophthalmic artery.
- **some** of the nerves that pass through **superior orbital fissure** are **inside** the **annulus of Zinn**: superior division of oculomotor, nasociliary, and abducens nerves.
- **To understand why they are passing through the annulus of Zinn?**
 - Because all recti muscles get the nerve supply from their inner surface, and in order for the nerves to do that they need to get inside the annulus of Zinn.

What are the nerves that transmit through the superior orbital fissure BUT passe outside the annulus of Zinn? Lacrimal nerve (first division of ophthalmic), frontal nerve, and trochlear nerve (to remember "LFT").

Figure 2. Right superior orbital fissure viewed anteriorly



<http://lms.ecco-ors.eu>

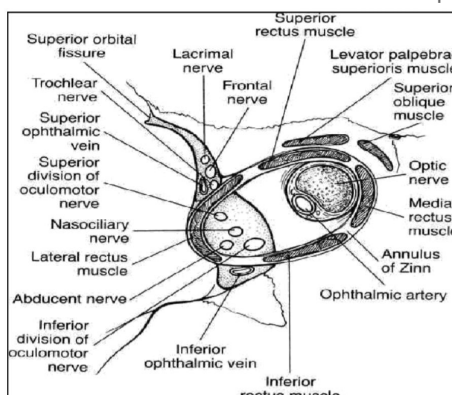


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Extra Pic from the web just for u to imagine

- All the extraocular muscles origin from the orbital Apex except the superior oblique muscle which originates behind the inferior orbital rim, near the nasolacrimal duct.

Pic from the slide i don't like it but i have to put it :o)



- **Nerves function:** not in the slides but the doctor mentioned them
 - **Lacrimal Nerve:** Going to the lacrimal gland.
 - **Abducent:** Supplies the lateral rectus (LR6).
 - **Trochlear:** Supplies the superior oblique muscles (SO4). it is outside the annulus of Zinn just like the superior oblique muscles.
 - **Nasociliary:** Supplies the tip of the nose, ciliary muscles, and the cornea (by the long branch) (hutchinson's Sign: when the tip of the nose has vesicles and involved in herpetic infection, you need to check also for the ciliary muscles, and cornea).
 - **Frontal:** It is a sensory branch from the Trigeminal. its name will change to supraorbital nerve that supplies the entire skull to the back. so a patient with supraorbital nerve injury (or frontal) will complain of numbness in this area.
 - **Oculomotor:** Supply all recti muscles **except 2:** (SO4, LR6).
 - **Superior divisions: supplies the superior rectus and levator palpebrae.**
 - Inferior division: supplies the medial and inferior rectus.

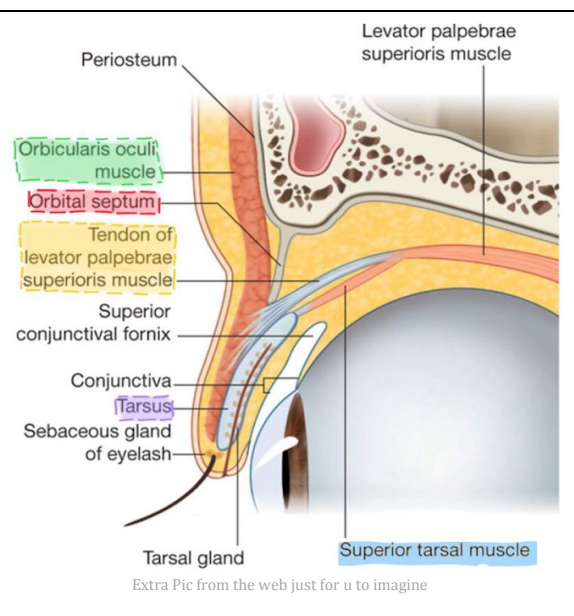
Anatomy of The Eyelids

- **The upper eyelid anatomy:**

From outside:

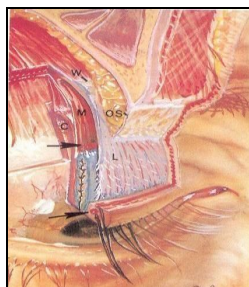
skin → orbicularis muscles (supplied by facial nerve)
 → orbital septum (a dense fibrous tissue) → orbital fat (also called preaponeurotic fat) → levator muscle which will be changed to tendon called levator aponeurosis, will attach to tarsals Muller muscle of conjunctiva.

Tarsal is a condense fibrous tissue that is forming the skeleton of the eyelid, within tarsals are meibomian glands: fat secreting (sebaceous) glands, opens on the lid margin. forming the fatty layer of the tear film around 30 in the upper lid and 20-25 in the lower lid.



- The important thing in the orbital septum (anterior boundary of the orbit).
- Anything behind the orbital septum = orbit = intra orbital, anything anterior to the orbital septum = extra orbital = preseptal.
- **What is the difference between levator muscle and Muller muscle ?**
 - They both elevate the eyelid. however, they differ in the nerve supply & the type of muscles:
 - levator muscle is a skeletal muscle supplied by the oculomotor nerve, and **muller** (AKA superior tarsal muscle) muscle is a smooth muscle supplied by sympathetic nerves.

Pic from the slide i don't like it but i have to put it :o)



Evaluation

• When we get a patient with orbital changes we ask about the 7 P's:

1. **Pain** (most of orbital pathologies are painless)
2. **Progression**
3. **Proptosis** (bulging of the eyes)
4. **Palpation**
5. **Pulsation**
6. **Periorbital changes** (Exophthalmos - thyroid related)
7. **Past medical history**

1. Pain

- Infection
 - **Inflammation (Orbital).**
 - Hemorrhage (Orbital).
 - Malignant lacrimal gland Tumor.
- Other than these is usually painless



2. progression

If progression from minutes to hours:

Patient comes with **proptosis (or any orbital pathology) for minutes or hours, what do we think of?**

- Hemorrhage (due to trauma, spontaneous, post-op).
- Lymphangioma (abnormal lymphatic vessels tend to bleed).
- Varix (upon valsalva) **varix is (malformed and abnormal enlargement of venous blood vessels that tends to bleed and thrombose).**
- Orbital emphysema
- **What is orbital emphysema?**
 - Air around the eye (inside the orbit).
- **How do we get in the orbit?**
 - Sinuses fractures. (the air comes from the sinus)
- **Which sinuses that commonly get fractured?**
 - Ethmoidal, Maxillary bones/sinuses. medial wall is the commonest
- **Why do we worry about orbital emphysema?**
 - Because with orbital fractures, the air will move from the sinuses to the orbit, and the orbital pressure will go very high, and the **air will compress the central retinal artery**, which will lead to retinal ischemia and subsequent loss of vision.
 - So whenever you have a patient in the emergency with orbital fractures or sinus fracture ask him not to blow the nose to prevent the orbital emphysema (so that the pressure won't increase in the sinuses and the air build up around the eye or in the orbit - one way valve mechanism).



If progression from days to weeks: (These are just examples, you do NOT need to memorise them)

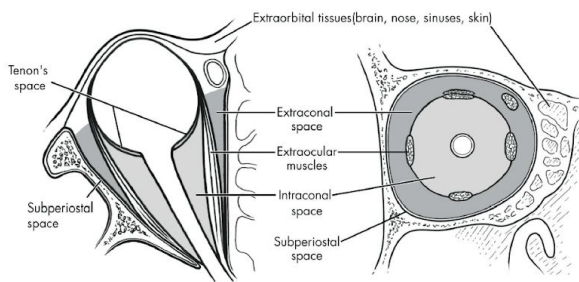
- **Children:** Capillary hemangioma, rhabdomyosarcoma, Retinoblastoma, Neuroblastoma, Leukemia. (malignant tumors in general).
- **Inflammatory disease:** Idiopathic orbital inflammatory disease, thrombophlebitis, thyroid orbitopathy, recurrent inflamed dermoid.
- **Infections:** orbital cellulitis, abscess, cavernous sinus thrombosis.
 - if you have a bilateral proptosis think of infection and inflammation.
- **Trauma, post surgical, hemorrhage:** Orbital hemorrhage, lymphangioma.
- **Malignancy:** Rhabdomyosarcoma, metastasis, granulocytic sarcomas, adenoid cystic carcinoma.
- **Carotid-cavernous (C-C) fistula:** Part of the carotid artery course is to pass through the cavernous sinus. In trauma, the sinus builds up a high blood pressure leading to eye congestion, because the ophthalmic vein drains in the cavernous sinus. Then any blood coming from the eye will be congested.

If progression is from months to years (think of benign masses)

- | | |
|----------------------|----------------------|
| Dermoid Cysts | Fibrous histiocytoma |
| Benign mixed tumors | Osteoma |
| Neurogenic tumors | Lipoma |
| Cavernous hemangioma | Glioma |
| Lymphoma | Meningioma |

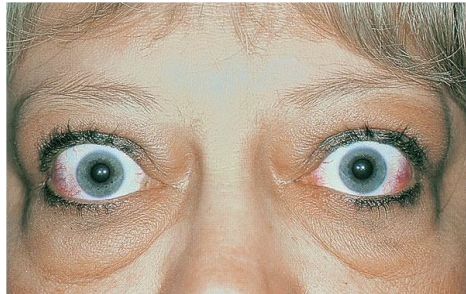
3. Proptosis			
Bilateral		Unilateral	
<ul style="list-style-type: none"> ● seen in inflammatory conditions (typical condition is thyroid eye disease in Grave's) ● immune processes or systemic diseases 		<ul style="list-style-type: none"> ● Primary orbital neoplasms usually unilateral (mass occupying lesion) 	
Causes:			
Inflammatory	Infection	Vascular	Neoplasm
<ul style="list-style-type: none"> ● Thyroid disease (the most common) Note that thyroid disease can cause BOTH bilateral and unilateral ptosis ● Orbital pseudotumor ● Wegener granulomatosis 	<ul style="list-style-type: none"> ● Orbital abscess ● Cellulitis 	<ul style="list-style-type: none"> ● Orbital hemorrhage ● Lymphangioma (sudden) ● C-C fistula ● Orbital varices ● proptosis with valsalva. 	<p>Benign: cavernous hemangioma, lymphangioma</p> <p>Malignant: adenoid cystic carcinoma, lymphoma, glioma</p> <p>Contiguous: sinus, intracranial nasopharynx, skin</p> <p>Metastatic: lymphoma, leukemia, neuroblastoma, Rhabdomyosarcoma</p>

Proptosis can be either: axial, non axial, or pulsatile



Pseudoproptosis

- **Mostly it is a lid retraction without proptosis**
- The opposite to proptosis is **enophthalmos**. تكون العين داخله على جوار، فيحسبون العين السليمة طالعه فسموها سودوبروبتوزز.
 - Most common cause of enophthalmos (sunken of the eyes) is fractures of the medial wall and the floor.
 - The orbital content will herniate inside the sinuses and that will lead to enophthalmos.



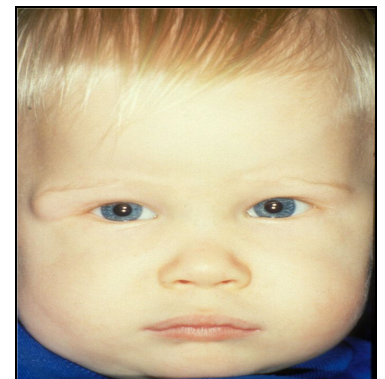
Lid retraction upper eyelid



Endophthalmos left eye

4. Palpation

Dermoid cyst is very common and need to be palpated during Examination. It happens in the suture line during development, this baby was born with it.



5. Pulsation (was skipped)

With bruits

- Cavernous carotid fistula
- Orbital arteriovenous fistula
- Dural arteriovenous (a-v) fistula

Without bruits

- Meningoencephalocele
- Neurofibromatosis
- Orbital roof defect (condition after surgical removal of orbital roof, sphenoid wing dysplasia)



6. Periorbital changes

This patient had a skin tumor that was removed from his cheeks. But it recurred with orbital extension and the eye is pushed up.



Encephalocele

Infections

- Signs for infection or inflammation in the eye: a triad of slight redness, hotness, and tenderness
- There are two types of infections, **Preseptal** cellulitis and **Postseptal** cellulitis
- How to differentiate between them? Both will have their eyelid **swelling** and **redness**, however:

Preseptal Cellulitis (extraorbital)

Postseptal Cellulitis (orbital)

Clinical Picture:

Clinical Picture:

Vision, eye motility, pupils, VF, optic disc are **Within Normal Limit**. And the globe itself is not proptotic, only the eyelid is swollen and red. They are usually healthy, afebrile people with normal vital signs (**patient present with only eyelid swelling, redness and pain, no fever**)

Decreased vision, eye motility problems, and pupils are **usually not normal**, and the globe is proptotic. If they have lid swelling and redness suspect orbital cellulitis. They look sick and may have a fever. **Very serious**



Causes:

Causes:

- Insects bites
- Sinuses or infection in sweat glands or meibomian glands
- trauma/abrasions.

- **90% secondary to sinus disease (most of the time ethmoidal sinusitis), the patient can get it from septic emboli, or trauma or surgeries. (Imp!)**

Complications:

- It has a high risk of preventable morbidity and mortality and serious potential complications, including:
- Brain and Orbital abscess, Cavernous Sinus Thrombosis.

Treatment

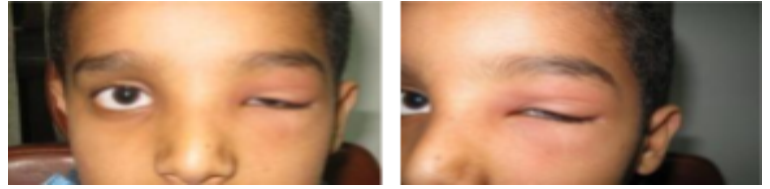
Treatment

Oral antibiotics. and send them home (**outpatient**). (except children under 1 year we admit them because they can't monitor them self properly)

Admission for close observation, give **systemic IV antibiotics** with referral to ENT, consult ID to help with antibiotics selection, and surgery if they have an abscess collection (drainage) or not responding to medical treatment.

Allergic Eyelid Swelling

Allergic swellings are **very common**, mainly due to insect bites.



How to differentiate between allergic swelling and inflammatory swelling (by history) and (by examination)?

History:

- Shorter duration with allergic: develops within hours, the pt usually wakes up with it, whereas preseptal cellulitis takes ~2 days to develop.
- Presence of the trigger
- Previous episodes (recurrence).

Examination:

Triad of eye inflammation:

- **Redness**
- **Hotness**
- **Tenderness**

The triad should be absent in allergic swelling

Treatment: Antihistamine and cold compressors

Capillary Hemangioma

Types of Hemangioma:

Capillary Hemangioma



- usually in children.

Scenario: A 4 months old baby, the family noticed something started on his eye at age of 2 months and decreasing? Dx Capillary hemangioma

- Do we have to treat this pt? yes even tho it will resolve with time, but we have to treat early to preserve vision. Treat the child to prevent amblyopia (lazy eye) picture because his vision is not mature yet.
- (For vision maturation, the eye input should be intact).
- The younger the child the more critical the case.

Cavernous Hemangioma

Usually in adults



Treatment:

1. **Beta blocker (FIRST LINE, most of cases respond very well)** typically propranolol (non-selective) if asthmatic patient, think of selective,
2. If no response: Steroids either Injected into the lesion or systemic.
3. surgery.

Inflammation

1. Graves disease

- **Most common cause of unilateral or bilateral proptosis**
- Graves may occur with any thyroid status (euthyroid, hypothyroid, but commonly with hyperthyroid)
- The eye disease is not controlled by thyroid ablation. **Why?** Because since it is an autoimmune condition, there are thyroid antigens that attract the antibodies. Also, there are similar/simulating antigens around the eye. If we remove the thyroid gland, we are removing the antigens of the thyroid gland, but the antibodies are still circulating around the eye. Hence, they will still attack the eye.

What other parts of the body that may harbor simulating antigens?

Pretibial myxedema, Grave's disease is in 3 places: Eyes, thyroid and pretibial (pretibial myxoedema).

What are the signs of thyroid eye disease?

- Lid lag - Strabismus - Lid retraction - Decrease vision - Lid swelling - Conjunctival injection (chemosis) - Exophthalmos

- **What is the difference between exophthalmos and proptosis?** They are the same thing, but..

Exophthalmos: if the eye protrusion is caused by Grave's disease, so it is specific to Grave's.

Proptosis: more general term (e.g. tumor causing proptosis of the eye)

- **How we get visual loss in a patient with grave's disease?**

One cause is the enlargement of the extraocular muscles (which is suggestive of Grave's disease) which will lead to compression of the optic nerve, sometimes causing diplopia and strabismus

Other cause is like the patient in the picture, because he can not close his eyes the cornea will be dry so they will lose vision because the cornea isn't clear and sometimes they may get corneal infection (exposure keratopathy)

- **Why do the muscles enlarge in Grave's?**

Due to the deposition of glycosaminoglycans

- **Which extraocular muscles are typically affected by Grave's?**

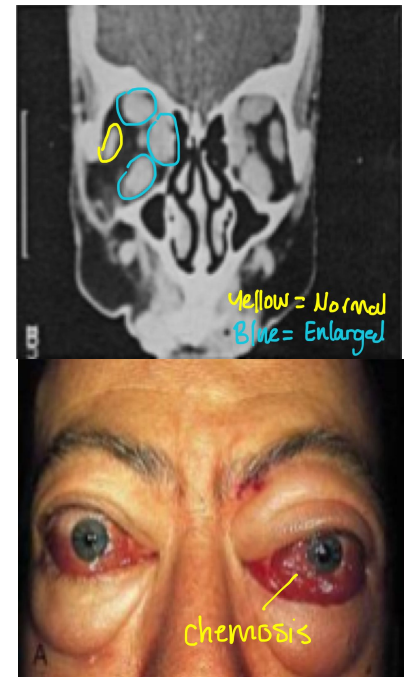
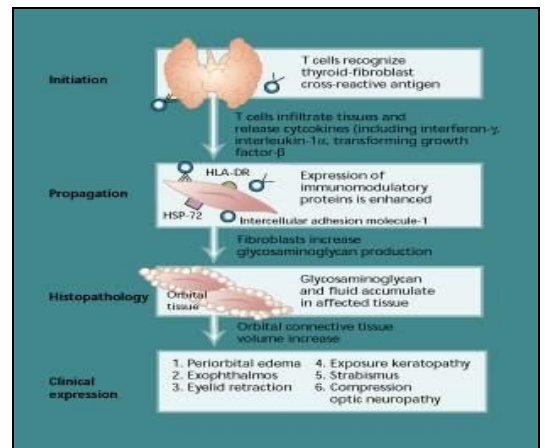
Inferior and medial recti are most commonly involves

- **Why do I care about thyroid eye disease as an ophthalmologist? why do I need to treat it?** Because of these 4 complications:

1. Exposure keratopathy (Dry cornea); because the eye is bulging and not closing well.
2. Strabismus; because of enlarged extraocular muscle
3. Compressive optic neuropathy. (because the optic nerve is compressed from the large extraocular muscle)
4. Cosmetic

Treatment options(depends in the condition):

1. Steroids
2. Radiation if steroids aren't effective
3. Optic nerve decompression now the surgery can be urgent (done regardless of the stage of disease) or inurgent¹ where it's carried out during the inactive stage (main indications are strabismus and for cosmetic purposes)



¹ You're right, it a made up word.

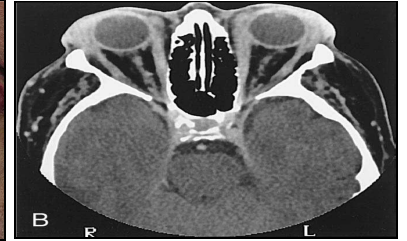
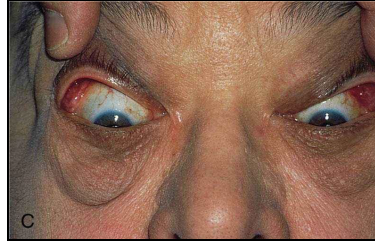
The doctor didn't focus in the following he just said any type of inflammation can cause orbital pathology.

2. Idiopathic Orbital Inflammation

- Orbital pseudotumor²
- Myositis
- Prompt response to steroids
- OU or systemic → think vasculitis (*except in kids)

3. Sarcoidosis

- **Lacrimal gland** (sarcoid infiltration) followed by **extraocular muscle involvement**.
- ~20% of those with ophthalmic sarcoid disease have ocular or lacrimal involvement, presenting as ptosis, proptosis or ophthalmoplegia.



Bilateral enlargement of the lacrimal glands

4. Vasculitis

- GCA (giant cell arteritis) - PAN(polyarteritis nodosa) - SLE - Wegener's granulomatosis

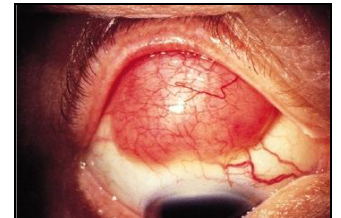
5. Lymphoproliferative disorders

1. Lymphoid hyperplasia and lymphoma:

- 20% of all orbital mass lesions
- salmon patch appearance
- molds to orbital structures
- 17% bilateral
- 50% arise in lacrimal fossa



infiltrative mass in the right lateral extraconal orbit



2. Plasma cell tumors

3. Histiocytic disorders: macrophage based d/o

is an excessive number of histiocytes (tissue macrophages), that can lead to organ damage and tumor formation

² AKA nonspecific orbital inflammation AKA idiopathic orbital inflammation, it is the most common cause of painful orbital mass in adults.

Rhabdomyosarcoma (***)IMPORTANT(***)

- Very imp to keep in mind when making a diagnosis
- **Most common primary orbital malignancy of childhood**
- Average age: 7-8 years, but can happen in any age.
- Sudden onset and **rapid** evolution of **unilateral proptosis** (within days!)
- 90% survival rate (IF DIAGNOSED EARLY)
- It's not very common, but it is life threatening.
- So, whenever you have a child with sudden onset of unilateral proptosis and progressing quickly take it **seriously!** There is high chance that it is Rhabdomyosarcoma until proven otherwise (or leukemia)
- **Tx:** it is a medical emergency, refer to get **chemotherapy** and **radiation** the response is very good.
- 2nd pic was taken 1 year after presentation (1st pic is at time of presentation).
- Note that it is a **PAINLESS** condition
- Very rapidly progressing



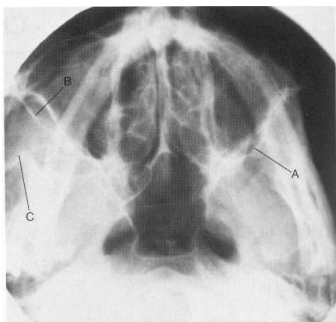
Imaging options:

- Plain films
- CT scan
- MRI
- Ultrasound

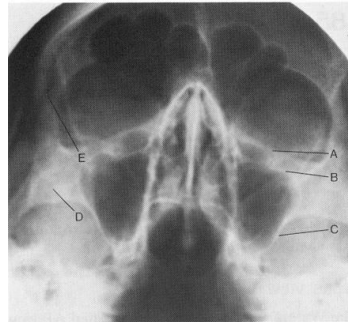
Plain film

Quick - Rule out foreign bodies - **Infrequently used**

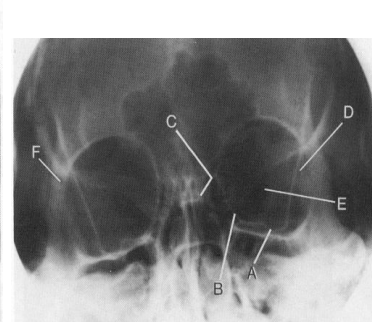
Regarding the x ray images below the doctor said: I don't know how to read them because we don't use x ray



Base view






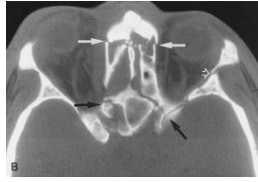

Waters' view



Caldwell's view

CT		
Strengths:	Weakness:	Protocols:
<ul style="list-style-type: none"> ● spatial resolution ● bone: fracture, destruction, calcification ● quick: emergencies trauma ● cheaper 	<ul style="list-style-type: none"> ● radiation: 1-2 cGy. there is a question about radiation and risk of malignancy during childhood exposure so it's good to avoid CT in children ● soft tissue definition ● contrast iodinated: avoid it in case of allergy ● may need MRI anyway(not cheaper) 	<ul style="list-style-type: none"> ● axial and coronal ● +/--contrast

Examples

 <p>enlarged multiple recti muscles. Grave's disease.</p>	 <p>Enlarged recti muscles, suggestive of Grave's disease</p>	 <p>Unilateral enlargement of rectus muscle. Could be Lymphoma (bc it's unilateral.. It's not grave's)</p>	 <p>CT scan can show you the fractures also, as you can see here are multiple fractures. So, it a good tool to screen for fractures</p>	 <p>Axial cut. There is an orbital mass behind the eyeball, this can be a differential but most likely it is cavernous hemangioma</p>
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Ultrasound (Orbital Echography)

It's **good for the eyeball** but behind the eyeball is not that accurate. The resultation is not high as CT or MRI , i didn't rely in US b

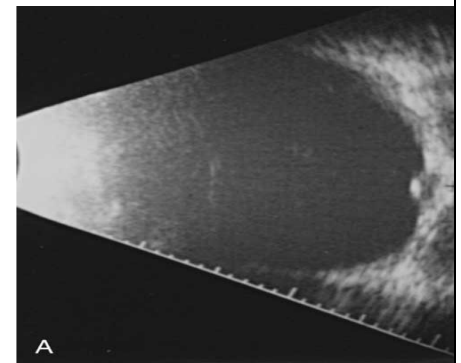
We use it from time to time especially for anterior orbital masses

-It is not very good for deep orbital tissue, **but we use it for the eyeball**

-to measure the length of the eyeball prior cataract surgery to estimate the power of the artificial lens that is to be implanted into the eye

Features:

- Dynamic
- Less expensive
- +/--Availability variable



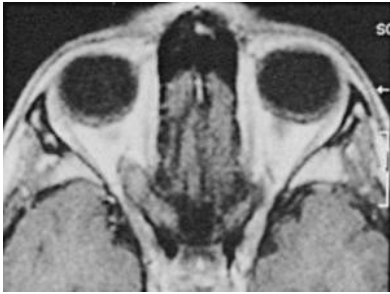
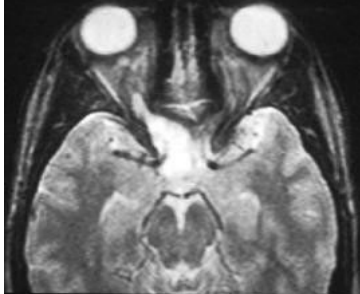

This is an ultrasound showing an orbital cyst behind the eyeball

MRI

- We use it when we are sure that we're dealing with soft tissue lesion (especially: orbital apex, optic nerve or cavernous sinus)

How to differentiate between T1 & T2 image?

- **Fluids appear dark in T1, and white in T2.** "I like to ask my students about this"
- The eye is filled with fluid like, so if the eyes are white -> T2, and if the eyes are black -> T1
- T1 typically done with contrast (so whenever you see vessels with contrast in the image)

Strengths:	Weakness:	Protocols:
<ul style="list-style-type: none"> - Tissue - T1: Anatomy - T2: Physiology - No Radiation 	<ul style="list-style-type: none"> - Magnetic pacemakers, surgical clips - Claustrophobia 	<ul style="list-style-type: none"> • Axial/coronal/sagittal • Gadolinium contrast <ul style="list-style-type: none"> ○ non-iodinated ○ allergies RARE • Orbital lesions • fat suppression We can do something called fat suppression which makes the fat black. bc the orbit is full of fat. This is helpful for finding pathologies.
Examples		
		
T1	T2	T1

Facial trauma and fractures

Facial Trauma:

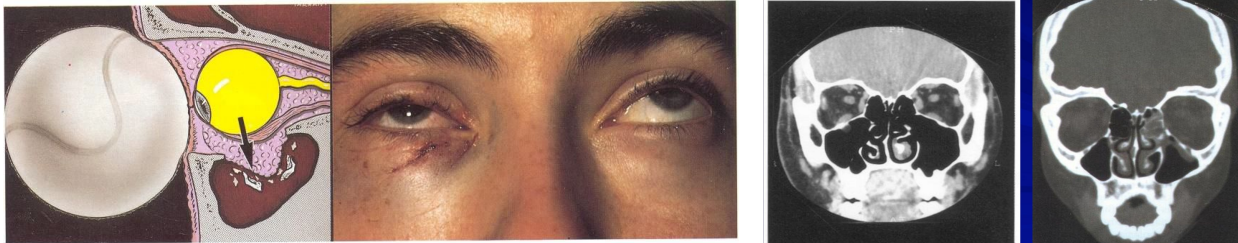
- **Midfacial fractures**
- **Zygomaxillary Complex (ZMC) fracture**
- **Wall and floor fractures:**
 - medial wall: lamina papyracea
 - **orbital floor: blow out vs rim involvement**
 - lateral wall and orbital roof: less common
- **Optic canal fractures:** traumatic optic neuropathy

Orbital fracture is a big topic focus only on orbital floor fracture and entrapment

Orbital Floor Fracture with entrapment ***IMPORTANT***

- Orbital floor fracture, also known as “blowout” fracture of the orbit.
- **Trapdoor Fracture**= fracture of the floor of the orbit + muscle entrapment
 - It's Very common with direct trauma to the eye, it's really **common among children** to have a **minimum** fracture with muscle entrapment without external signs, so it is really important if you got a child with Hx of trauma to check for eye motility (painful sometimes).
 - So whenever you have a patient with orbital trauma, you need to look at the eyes motility to rule out this condition.
 - **why is it common in children?** because their bones are softer so they'd open up and close like flap, creating a trapdoor and trapping the inferior rectus
 - The traction of extraocular muscles or compression of the nerves may lead to a **parasympathetic response** (oculocardiac response) manifesting as bradycardia, hypotension and possibly syncope.

Case: This is child had a fracture to the right eye, (you can see there is no much swelling and ecchymosis) and the patient is trying to look up in both eye, but he can't look up by the right eye, because when you look at CT there is a fracture in the orbital floor and the inferior rectus muscle is entrapped.



Rx: We need to operate him urgently, because if the muscle is kept entrapped for a long time, it will lead to ischemia and fibrosis, end up with permanent double vision



Lacrimal Disorders

Structure and Function:

Anatomy:

The lacrimal gland is approximately 2cm long. It can be divided into two main parts:

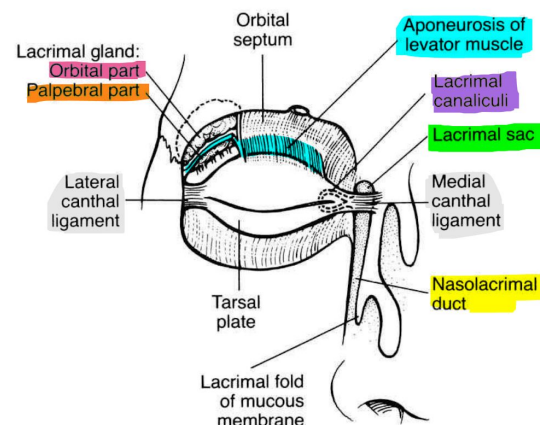
Orbital: larger and sits on the lateral margin of levator palpebrae

Palpebral: smaller and located along the inner surface of the eyelid

The two lobes are separated by **levator aponeurosis**, which is the tendon for levator muscle

Physiology:

from the **palpebral lobe** there is small ductioles secreting the tears to lubricate the eye, these ductioles open into the superior fornix, the tears will lubricate the cornea, and then will be drained through the lacrimal drainage system, starting with the lower punctum which is a small round opening and upper punctum, and from there, there are small ducts called canaliculi (canaliculus), the upper and lower canaliculi will meet to form **common canaliculus**, then it will go inside the **lacrimal sac**, then from the lacrimal sac the **nasolacrimal duct** will take the tears to the inferior meatus.



****You can see in the picture medial canthal ligament** (cover the lacrimal sac), and **lateral canthal ligament** 2 important structures to stabilize the eyelid to the medial & lateral wall.

Congenital Lacrimal Duct Obstruction(common problem):

What is it?

- Normally the canalization of the nasolacrimal duct should be completed at birth. However, some children will have a delay of the canalization of the duct: Congenital nasolacrimal duct obstruction



Where does the obstruction occur?

- At the distal part of nasolacrimal duct: **valve of Hasner**.

What is the clinical presentation?

- **Typical presentation is tearing with discharge.**

Why do they have tearing?

- The tears cannot pass through the lacrimal drainage system because of the obstruction, there is a membrane obstructing the system not allowing it to drain.



Why do they have discharge?

1. The tears stagnate in the area of obstruction, which gives a good medium for infections. So they present with discharge and infection. (see 2nd pic)
2. The lacrimal sac is lined by mucus secreting cells, similar to the mucus secreting cells in the nasal mucosa. So in these children, it will drain back to the eye.

How to differentiate by clinical presentation?

- If a child comes with tearing and discharge, we think of **congenital nasolacrimal duct obstruction**.
- **IMPORTANT:** If a child comes only with tearing, we think of: congenital abscess – **congenital glaucoma** – eyelashes irritation, Foreign body (anything that irritates the eye)

What happens if we do not treat them?

- Acute infection (Acute dacryocystitis) → Abscess → orbital cellulitis
- Other thing is if you keep the eye watery in a child, the vision will not develop normally (possibility of Amblyopia)
- Patients who have nasolacrimal duct obstruction that is not treated may develop **dacryocystitis**. **Dacryocystitis** is an infection of the lacrimal sac, secondary to obstruction of the nasolacrimal duct at the junction of lacrimal sac. It causes pain, redness, and swelling over the inner aspect of the lower eyelid and epiphora (excessive watering of the eye).

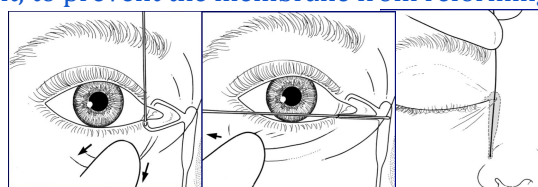
What are the findings on Examination?

- **In adults:** we pass a cannula all the way to the lacrimal sac, and then we inject the fluid, and to check for nasolacrimal duct patency.
- **In children:** We put a fluorescein dye (orange dye) then wait for 5 minutes. The dye should disappear from the eye (if the lacrimal system is intact). However, if there was an obstruction, the dye will stagnate inside the eye. (it won't help to differentiate between nasolacrimal duct obstruction or canalicular obstruction.)



What is the treatment?

1. Usually we ask the family to wait until the age of 1 year and to do **massage for the lacrimal sac**. Ask the mother to **frequently** (with every feeding for example) put her finger under the medial canthal ligament and push, this will compress the lacrimal sac because the lacrimal sac is behind the medial canthal sac, and when the pressure increases in the lacrimal sac, hopefully it will rupture the membrane.
2. **If it didn't improve up to 1 year: we recommend probing:** A small probe is introduced through the upper or lower punctum based on the place of obstruction and is advanced to the lacrimal drainage system, until it resolves the obstruction. Sometimes we put a stent, to prevent the membrane from reforming we keep it for 2 to 6 months, and remove it in the clinic.



We don't do this procedure to adult it's useless b/c the obstruction in adult is due to adhesion and fibrosis unlike children where the obstruction due to imperforation of membrane

Eyelid Disorders

Eyelid Trauma:

Types: Blunt, sharp/penetrating

Classification:

- if one or all of the following involved in an eyelids trauma call ophthalmology (lid margin, canthal, canaliculi) whenever you have eyelid trauma u need to look at 3 things ((lid margin, canthal, canaliculi)

Treatment:

- **If the lid margin is spared (not involved):**
 - Skin and orbicularis only injured → skin sutures **no need to suture the muscle just suture the skin.**
 - FAT protrusion = septum violated, **DO NOT suture the orbital septum.** There is a very high chance to have open globe injury either corneal laceration or scleral laceration, so careful exam should be done to these pt.
- **If the Lid margin involves:** it will have an abnormal alignment, important to be repaired by an ophthalmologist
what happens if the eyelids are not aligned together nicely? Every time the patient blink that will cause corneal irritation therefore will need suturing.
- **If the Canthals involve:** that means the eyelid is **unstable** so we “call ophthalmology”: because the canthals are important to stabilize the eyelid, they attach the eyelid to medial wall and lateral wall (repair the tendon)
- **If the Canalicula involves:** if it’s involved we need to repair it because the patient will end up with tearing, “call ophthalmology”



Lid laceration with canalicular involvement

Blepharitis:

What is it? Chronic inflammation around the roots of the eyelashes.

Clinical findings? scales around the lashes, redness and irritation in the eye

Etiology? Commonly caused by Staph, but can be caused by others like Streptococcus species.

Treatment? topical antibiotics and eyelid hygiene.

NOTE: The main problem is: very difficult to eradicate, chance of future recurrence, need to be treated again (you should tell that to the patient it’s a chronic condition there’s no magic treatment for it)



Herpes Zoster Ophthalmicus:

What is it? AKA shingles, is a viral disease characterized by a painful skin rash in one or more dermatome distributions of the 5th cranial nerve, shared by the eye and orbit.



NOTE: If the patient is elderly, it’s okay because it happen in elderly.

But if the patient is young, you have to investigate for immunodeficiency because Herpes Zoster Ophthalmicus uncommon in adult.

Treatment? oral antiviral agents.



Lid lesions:

Sty	Chalazion (very common)
<p>What is it? Acute inflammation around the <u>root of eyelashes</u>, either from sweat glands or sebaceous glands.</p> <p>Clinical findings? Presents with abscess or pus collection (pointing pus is a characteristic of sty) Mainly anterior around the eyelashes</p> <p>Treatment: warm compressors with topical antibiotics, but it can improve by itself</p> 	<p>What is it? Granulomatous inflammatory lesion caused by obstruction of meibomian glands, which leading to accumulation of the sebaceous secretion from the meibomian glands.</p> <p>Clinical findings? It will begin with swelling and redness with time it will be like a small nodule Mainly posterior</p> <p>Treatment: We give topical antibiotics + warm compresses it may resolve by itself. But if it does not improve after 1 month, we drain it (surgical removal)</p> 

Xanthelasma

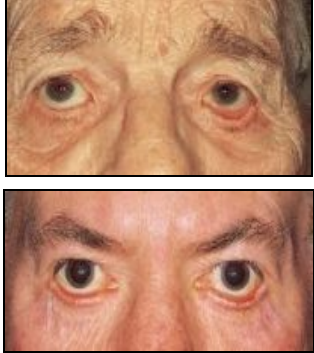
50% will have abnormal lipid profile, so you need to screen for hyperlipidemia

Treatment:

First we need to treat lipid abnormalities if there is any
If it is not improving we need to do surgery to excise it



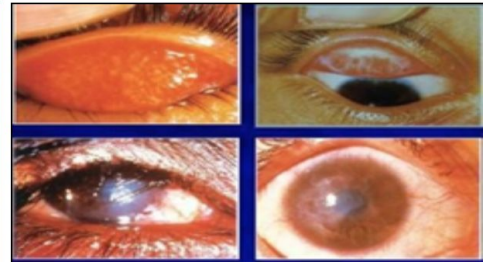
Lid malpositions:

A. Ectropion	B. Intropian	C. Blepharoptosis	D. Retraction
A. Ectropion: outward turning of lid margin			
<p>Types:</p> <ul style="list-style-type: none"> ■ Congenital ■ Involuntal: Aging is the most common cause of it The eyelid is sagging away from the eye, because of the laxity of the eyelid tendon ■ Paralytic: in case of patients with facial palsy ■ Cicatricial (scarring): like the second picture, the patient has scleroderma, this patient has a problem with his skin so we call it cicatricial ectropion because of scarring or contraction in the skin ■ Mechanical 			

B. Entropion: Inversion of lid margin towards the eye

Types of Entropion:

- 1- Cicatrical (scarring): (most common type in KSA, which is secondary to old trachoma, seen among elderly, we don't see active trachoma now)
- 2- Involutional: related to **aging** and eyelid laxity
- 3- Congenital
- 4- Acute septic



► Cicatricial entropion and trachom:

- **Most common cause of Cicatricial entropion.**
- **What is the causative organism of Trachoma?** Chlamydia Trachomatis (bacteria), it has no cell wall, so it lives inside the cell like viruses.
- **What is the stain for Chlamydia Trachomatis?** Giemsa stain
- **How does trachoma cause entropion?** typically trachoma presents during early childhood with redness and discharge (pic1), if it is not treated it will lead to scarring of the conjunctiva and that will shorten the tarsus/tarsal plates (pic2), so the lid margin will be directed towards the eye, if not treated will lead to corneal opacity



1

2

Nowadays we don't see the 1st pic because trachoma has been eradicated from our country, we just see the sequelae of trachoma (pic2)

Treatment:

- **If acute/active infection** it is a bacteria that we treat it with tetracycline, azithromycin, clarithromycin, so it respond with C2 antibiotics
- **Later stages:** surgery, then if the corneal scar is too advanced we may do **keratoplasty**, or corneal transplant

Trichiasis:

One single eyelash or two are misdirected toward the eye, the rest are ok.

Typically caused by trauma, but it can be caused by other causes like infections ...etc.

If the whole lid margin is turning toward the eye, we call it: **entropion**


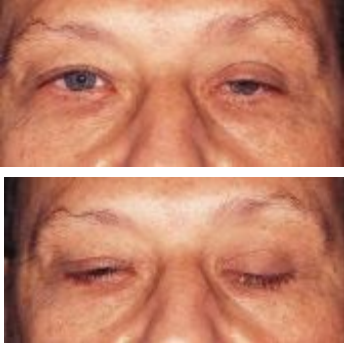




C. Blepharoptosis: is drooping or inferior displacement of the upper lid

Classification:

Congenital vs acquired

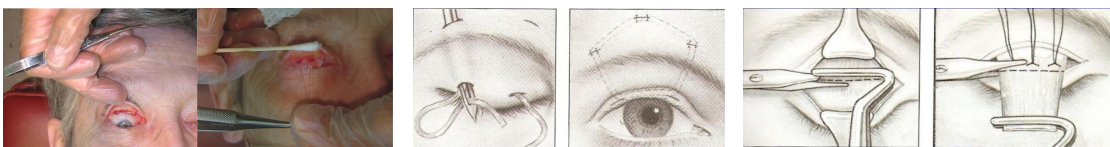
- Myogenic (like abnormal levator muscle)
- aponeurotic (the tendon is stretched repeatedly, can happen with patient using contact lens)
- neurogenic (from the 3rd nerve, horner syndrome)
- mechanical (a mass in the eyelid)
- traumatic (trauma to the muscle levator)

Myogenic	Aponeurotic	Neurogenic
<p>Causes: Congenital:Dysgenesis of levator. Acquired: -Localized or diffuse disease -Muscular dystrophy -CPEO “Chronic progressive external ophthalmoplegia” -Myasthenia Gravis -Oculopharyngeal dystrophy</p> <p>Generally, <u>in children</u>, whenever the eyelid is blocking the eye, we need to do surgery to prevent amblyopia. <u>In adults</u>, we just fix it because patients want to see from both eyes, but it will not cause amblyopia</p>  <p>This child has right congenital ptosis. He is lifting his chin up so he can see from both eyes. We can't leave him like this; we need to do surgery because he may develop amblyopia and also neck problems.</p>	<p>-Most common form of ptosis (The muscle is normal but the tendon is stretched, usually secondary to aging + contact lens wear, because they stretch their lids, repeated stretching to the eyelid)</p> <p>-High lid crease with normal levator function</p> 	<p>Acquired and congenital forms</p> <ul style="list-style-type: none"> • Acquired causes: <ul style="list-style-type: none"> - 3rd nerve palsy** - Horner syndrome - Myasthenia gravis  <p>Evaluation: Levator Function (this is the way we evaluate the muscle) We ask the patient to look all the way down, and then we measure how much they go up. Normally it should be 15 cm and above, like in this picture.</p> 

Treatment:

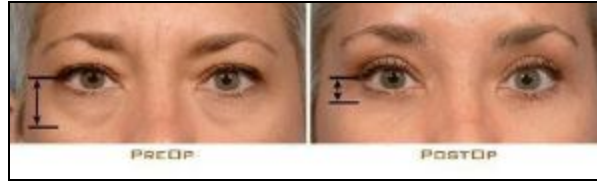
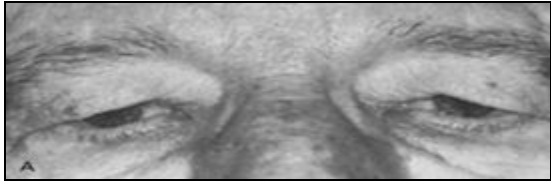
- Mild ptosis, good levator function: Mullerectomy
- Any ptosis, reasonable levator function: Levator resection
- Severe ptosis, poor levator function: Frontalis suspension

Mullerectomy:



Dermatochalasis:

- Pseudoptosis: excessive skin in the eyelid. But the eyelid position is normal
- This is a very common condition; we usually do surgery for it.
- The procedure's name is **Blepharoplasty** and it is a very common cosmetic procedure.



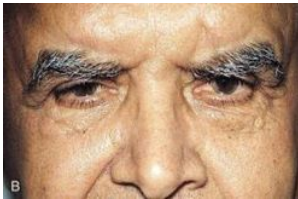
Before surgery →

After surgery →



Brow ptosis

This patient has a normal eyelid position. But he has bilateral brow ptosis. Usually related to aging



Brow ptosis

Unilateral right brow ptosis, lid opening is ok, with normal lid margins.. It's usually a normal facial asymmetry, but another imp cause is facial nerve injury, bc it supplies the frontalis muscle that elevates the eyebrow.



Abnormal eyelid movements:

1) Blepharospasm

2) Hemifacial spasm

3) 7th nerve palsy

1) Blepharospasm:

What is it? Involuntary tonic, spasmodic contraction of orbicularis. If it's both eyes we call it blepharospasm, if one eye it's hemifacial spasm

Cause: Most of the time we don't know the cause but you should First you rule out:

- Dermatochalasis-rubbing
- Brow ptosis-frontalis spasm
- Blepharoptosis-levator dehiscence
- Ectropion/entropion
- Dry eye
- Foreign body

Treatment:

- To relieve the spasm we inject **Botox** around the eye in most of the patients, and this will decrease the tone of the muscles, reinjection is required. Small minority of patients don't respond to Botox, surgery is required to excise part of the orbicularis muscle.



2) Hemifacial spasm:

- **What is it?** Intermittent contractions of the entire side of face
- Present during sleep
- Compression of 7th nerve at the level of the brain stem
- We need to order MRI in these patients **to rule out 7th nerve compression**

There is a common normal condition called myokymia: when only one eyelid is twitching. It is normal, and it does not indicate any pathological process.

If it involved both (Upper and lower eyelids), you need to think of hemifacial spasm.

3) 7th Nerve palsy

Location of lesion:

- Supranuclear, brain stem, peripheral

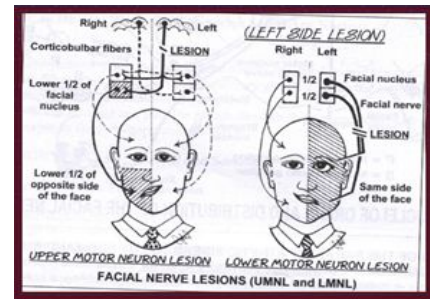
Cause of paralysis:

- Bell's – Infection – Infarct – Demyelination – Neoplasm – Trauma – Miscellaneous.

In ophthalmology we see UMNL or LMNL patients?

- UMNL: forehead is spared
- LMNL: all the side is affected
- So, we only see LMNL

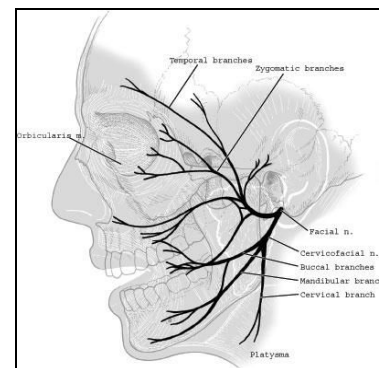
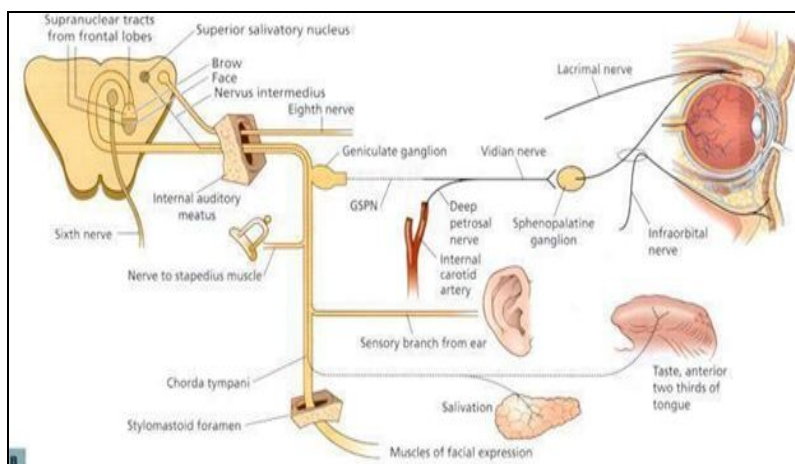
See the illustration to understand better (not in the lecture)



What are the ophthalmic manifestations of facial nerve palsy?

- **Lagophthalmos** (Inability to close the eye) (because orbicularis muscle gets paralyzed because its supplied by the facial nerve)
- **Ectropion** (dropping of the eyelids)
- **Brow ptosis** (because the facial nerve supplies the frontalis muscle)
- **Tearing** (when the eye cannot close well: there will be reflex tearing, and also when we cannot blink the tears won't pump from the eye to the nose)
- **Exposure keratopathy** (corneal damage b/c of dryness) (because the eye cannot close well) so we need to lubricate the eyes

The course of 7th cranial nerve



Treatment of 7th nerve palsy with ophthalmic manifestations?

Usually we lubricate the cornea to prevent infection, so **conservative treatment with lubrication**

If it persists up to months there is surgical options like: tightening of the lower eyelid, we may put a gold weight to make the eyelid to blink, we may do brow ptosis surgery...etc.

So different procedures depending on the patient's findings

Botox in ophthalmology

We use it to treat blepharospasm and hemifacial spasm. Also, we use it to treat strabismus. When they treated the patients of blepharospasm with Botox they observed that the wrinkles in the glabella and in the frontal lines are gone, so from that came the cosmetic use of the Botox

Botulinum toxin:

- Clostridium botulinum
- Neurotoxin types A,B,C1,D,E,F,G
- Botox = Botulinum Toxin A (**it's the most common type we use**)
- Blocks the cholinergic nerve terminals, thereby decreasing release of acetylcholine
- Onset 3 days
- Peak effect 1-2 weeks Duration 6-12 weeks

Uses

1) Blepharospasm

The treatment of option



2) Strabismus

We inject the lateral rectus muscle to be weak. So, the eye will be straight. Temporary



3) Glabella Botox



4) Botox for Crow's-Feet



Conclusion

- Knowing the anatomy helps to understand different pathological process, **this is true for any medical speciality.**
- Early diagnosis and proper management of **orbital cellulitis** save patients vision and lives. **so early diagnosis of orbital cellulitis is really vital**
- **aponeurotic ptosis** is the most common cause of ptosis
- **Thyroid eye disease** is an autoimmune diseases and it's consider the most common cause of proptosis either unilateral or bilateral
- **Unilateral recent proptosis in a child should be taken seriously**
- **Congenital nasolacrimal duct obstruction** commonly caused by membranous obstruction and typically present with tearing and discharge since birth
- **Chalizen** is a common condition results from blockage of melbonum gland and present as discrete swelling in the eyelid
- **Severe congenital ptosis** needs to be corrected as early as possible to prevent amblyopia especially when the ptosis blocks the pulpi if not it consider cosmetic and corrected by elective procedure any time
- Proper treatment of **exposure keratopathy** in pt with facial nerve palsy is critical to prevent corneal ulceration and scarring

Cases

Case 1: an 9 y/o child brought to ER with history of recent unilateral proptosis, when the ER oncall asked the family about hx of trauma, they said we don't know we just noticed the eye bulging, however when the doctor asked the child he said yes i had trauma in my left eye.



CT: shows mass in the left eye
Dx: rhabdomyosarcoma

التروما الي يقول عنها الولد ماسببت فر اكنشر ولا لها دخل بالموضوع, فيا اما انه يكذب او انه الاصابه الي جته كانت خفيفه, المهم انك ما تعتمدين على كلام الطفل بلحاله فلازم ترجحين any recent unilateral proptosis in! وتسوين احتياطانك your index of suspicion a child is tumor until proven otherwise

Case 2: 11 y/o boy presented with pain and redness in the right eye for 3 days duration.



On examination: The right eye is deviated and pushed, some swelling

CT: subperiosteal abscess + ethmoidal sinusitis (normally the sinus is black but here the right one is opacified)

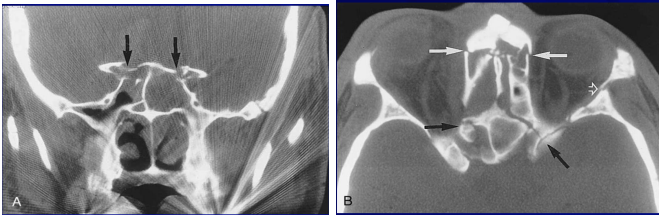
Dx: orbital cellulitis, it's not preseptal because there's ptosis
Rx: IV antibiotics admission, consult ENT and ID group. if no improvement with antibiotics → do surgical drainage

INFORMATION SKIPPED BY THE DOCTOR

Some information found in the old slides, the doctor didn't explain them, and he said focus only in what i explained.

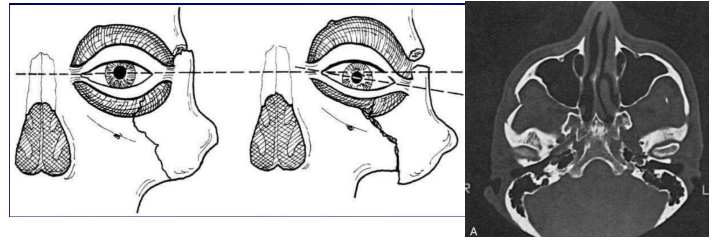
Other Facial Fractures

Optic Canal Fracture:

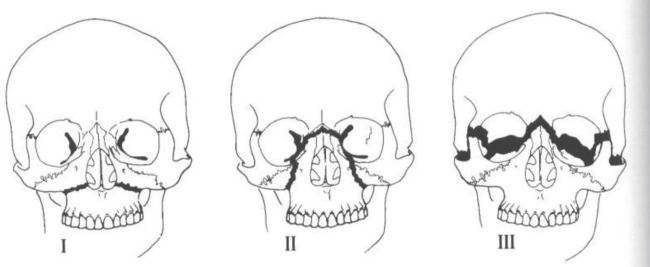


May be with or without displaced bony fragments

Zygomaxillary Complex (ZMC) fracture

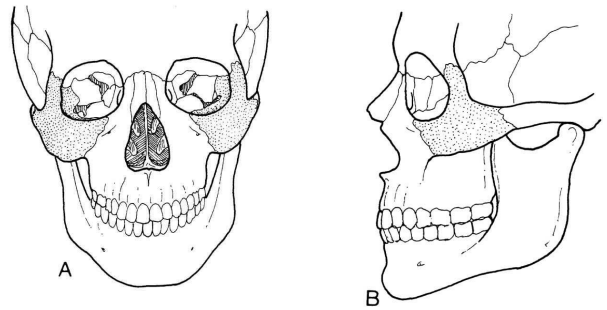


LeForte fracture



Class 1: transverse maxillary
Class 2: pyramid
Class 3: craniofacial disjunction

Zygoma



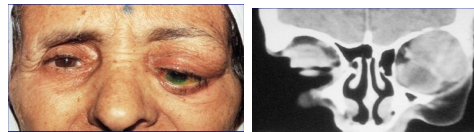
Lacrimal Gland Masses:

Inflammatory

- Sarcoidosis
- Orbital Pseudotumor
- Vasculitis

Non-inflammatory

- Lymphoproliferative
- Epithelial neoplasms

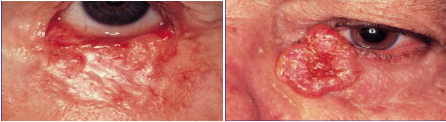
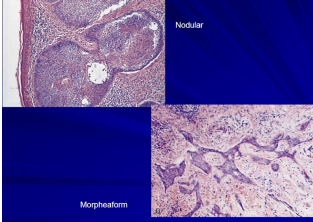



Pleomorphic adenoma

Lacrimal gland fossa lesions

Orbital pseudotumor	duration days to chronic	painful- yes	Ultrasound reflectivity: low	CT: localized or diffuse, molds to bone and globe	Management: systemic steroids, XRT
lymphoma	months	no	low	homogenous, oblong, molds to globe/bone	XRT, CTX (systemic disease)
pleomorphic adenoma (benign mixed tumor)	often > 1 year	no	medium to high, regular internal structure	well circumscribed, globular, possible bony expansion or excavation	complete excision with capsule without biopsy
Adenoid cystic carcinoma, malignant epithelial tumors	< 1 year	yes (perineural invasion)	medium to high, irregular internal structure	round to oval mass with bony erosion	incisional biopsy, await permanent sections, exenteration

Eyelid Tumors:

Basal Cell Carcinoma	Squamous cell	Sebaceous Adenocarcinoma
<ul style="list-style-type: none">● 90-95% of malignant eyelid tumors● Lower lid and medial canthal areas● Nodular and morpheiform types● Medial canthal lesions can be problematic● 3% mortality  	<p>40 times less common than BCC More aggressive, associated with perineural invasion. Most arise from pre-existing lesions It has variable presentations</p> 	<ul style="list-style-type: none">● Highly malignant● 2x more common in the upper lid● Multicentric● Separate upper and lower lid lesions in 6-8%● Pagetoid spread 