Lids, Lacrimal, and Orbital Disorders

Objectives

- **Orbit:**
  - Anatomy and evaluation techniques
  - Orbital trauma
  - Proptosis
- **Lids:**
  - Anatomy and evaluation techniques
  - Trauma
  - Lesions
  - Malpositions

[Color index: Important | Notes | Extra]

Resources: Slides + 433team + Notes
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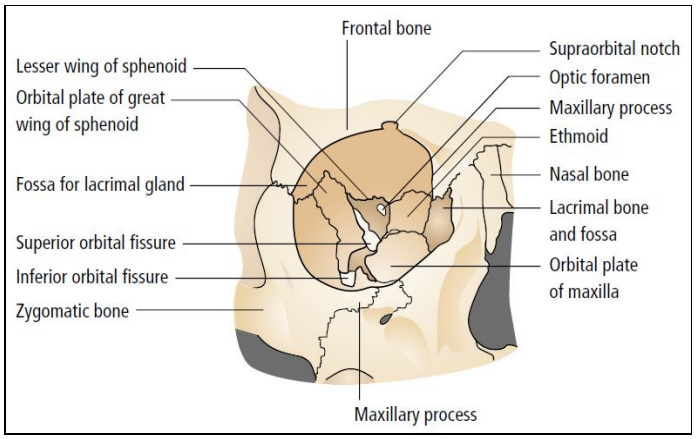
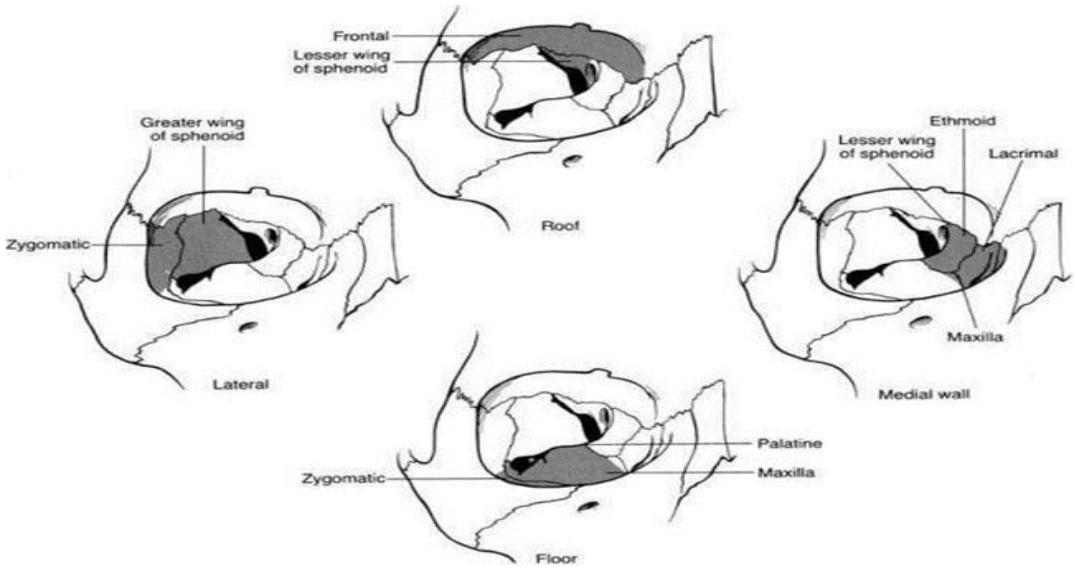
Anatomy

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



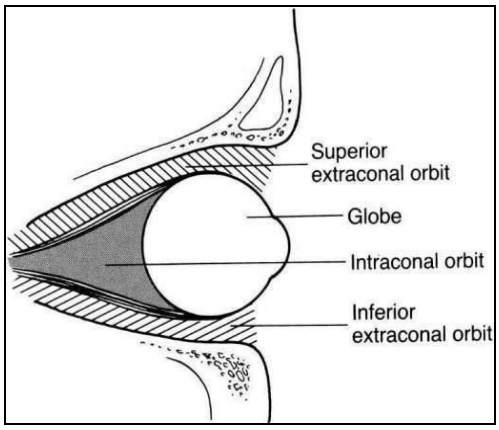


1. Which one of these walls is the **thickest/strongest** bone ?
   - The **lateral wall**; because the eyes are in most danger from the lateral side.
2. which wall is the **thinnest**?
   - The **medial** wall.
3. Which bone is the **thinnest** ?
   - **Ethmoid** bone (0.3 mm) that is why it is easy to get fractures in facial trauma, and it is also easy for The infections in the sinus to go to the orbit.
4. What other name is there for the ethmoid bone?
   - **lamina papyracea** (paperlike), because it is the weakest/thinnest bone.

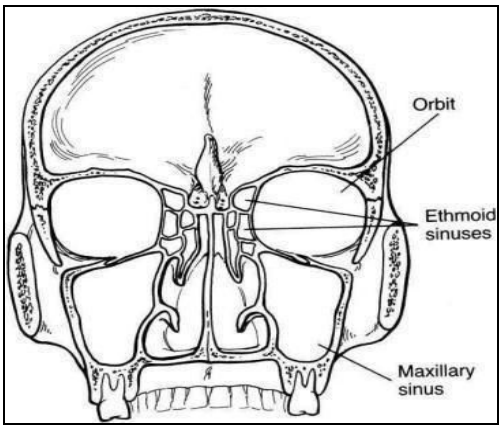
- The orbit is surrounded by **4** sinuses:
  - **Maxillary** sinus (formed at birth).
  - **Ethmoidal** sinus (formed at birth).
  - **Frontal** sinus (formed at the age of 5 and above).
  - **Sphenoid** sinus (formed at the age of 1-2).

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

Orbital components

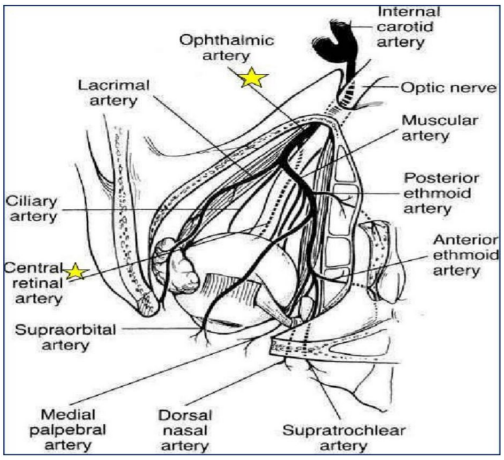


Sinuses



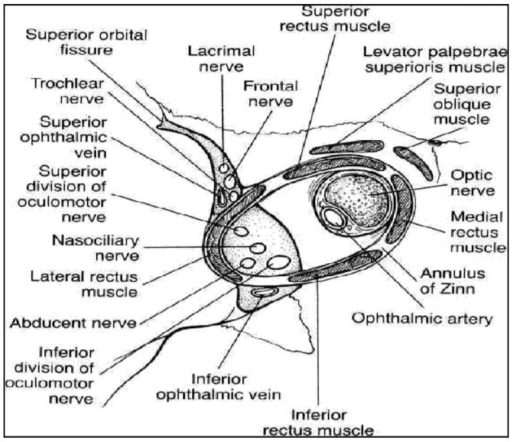
Blood Supply

- What is the main blood supply to the orbit, and the eyeball?
  - The ophthalmic artery, first branch of the internal carotid, supplies the orbit, it gets inside the orbit through the optic canal.
- The ophthalmic artery gives so many branches inside the orbit, including 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, because it has no collaterals.



Annulus of Zinn

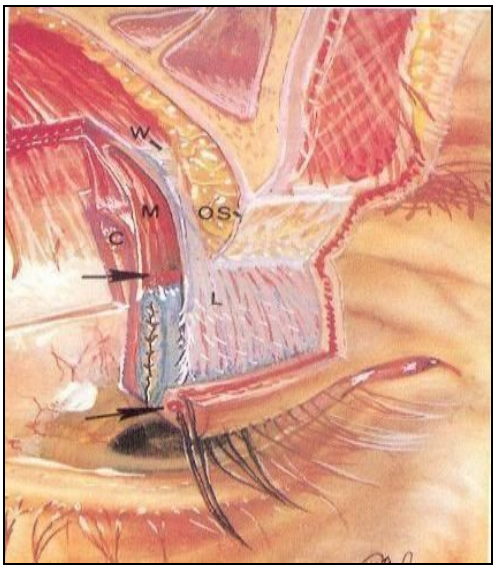
- Annulus of Zinn is a form of condense fibrous tissue, it gives the origin of all the recti muscles. (Superior rectus, inferior rectus, medial rectus, lateral rectus).
- Within the annulus of Zinn, there is the optic canal which has the optic nerve, and the ophthalmic artery.
- some of the nerves that pass through superior orbital fissure are inside the annulus of Zinn, and some of them are outside, explained below:
  - Outside annulus of Zinn, the superior orbital fissure transmits mane nerves:
    - Lacrimal nerve, frontal nerve, and trochlear nerve (to remember "LFT").
    - The frontal nerve supplies sends fibers all the way to the vertex of the scalp and provides sensory innervation to the forehead, upper eyelid, and anterior scalp.
  - Inside annulus of Zinn, the superior orbital fissure also has some nerves that passes through it:
    - 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.
- All the extraocular muscles origin from the orbital Apex except the anterior oblique muscle which originates behind the inferior orbital rim, near the nasolacrimal duct.



Nerves function

- **Lacrimal**: 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 nerve. 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.

Eyelid Anatomy



➢ The **upper** eyelid.
  - From outside: skin orbicularis muscles (supplied by facial nerve) orbital septum (a dense fibrous tissue) orbital fat (also called pe aponeurotic fact) levator muscle which will be changed to tendon called levator aponeurosis, will attach to tarsals Muller muscle of conjunctiva.

➢ The important thing in the orbital septum (anterior boundary of the orbit).

➢ Anything behind the orbital septum = orbit = intra orbital, anything posterior 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.

➢ 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.

Evaluation

- **When we get a patient with orbital changes we ask about the 7 P's:**
  1. **Pain**
  2. **Progression**
  3. **Proptosis** (bulging of the eyes)
  4. **Palpation**
  5. **Pulsation**
  6. **Periorbital changes** (Exophthalmos - thyroid related)
  7. **Preorbital changes**

➢ Don't spend a lot of time on (4,5,6- Doctor didn't talk much about them)

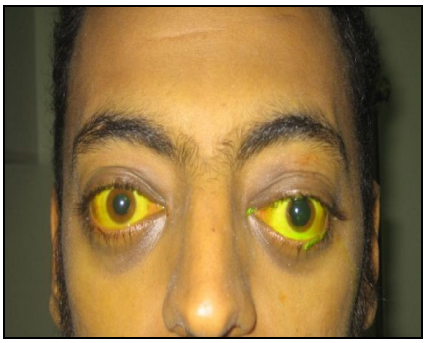
1. Pain

- **Infection**
- **Inflammation (Orbital).**
- **Hemorrhage (Orbital).**
- **Malignant lacrimal gland Tumor.**

2. Progression

➢ **Progression could be:**
- Minutes to hours.
- Days to weeks.
- Months to years.

➢ 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).



- **What is orbital emphysema?**
  - Air around the eye (inside the orbit).
- **How do we get air around the eye?**
  - Sinuses fractures.
- **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 pr 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 only examples, no need to remember 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.
- **Trauma, post surgical, hemorrhage**: Orbital hemorrhage, lymphangioma.
- **Malignancy**: Rhabdomyosarcoma, metastatic tumors, 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 will be building up a high blood pressure leading to congestion of the eye, 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**

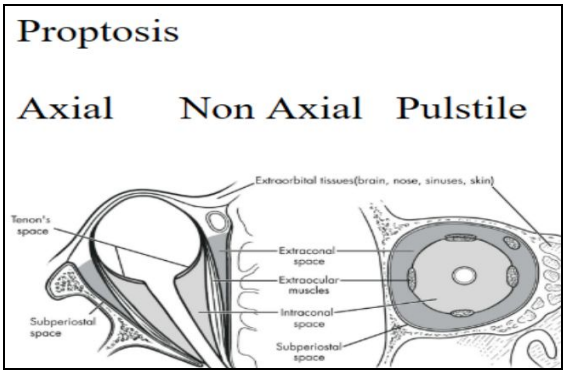
Dermoid Cysts	Fibrous histiocytoma
Benign mixed tumors	Osteoma
Neurogenic tumors	Lipoma
Cavernous hemangioma	Glioma
Lymphoma	Meningioma

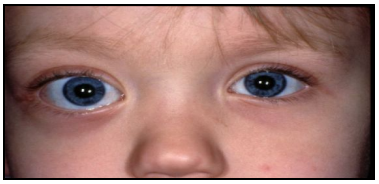
3. Proptosis (plugging/bulging of the eye)

Causes

Inflammatory	Infection	Vascular	Neoplasm
• **Thyroid disease** (the most common) • Orbital pseudotumor • Wegener granulomatosis • Note that thyroid disease is the most common cause of BOTH bilateral and unilateral ptosis	• Orbital abscess • Cellulitis	• Orbital hemorrhage • Lymphangioma (sudden) • C-C fistula • Orbital varices • proptosis with valsalva.	**Benign:** cavernous hemangioma, lymphangioma **Malignant:** adenoid cystic carcinoma, lymphoma, glioma **Contiguous:** sinus, intracranial nasopharynx, skin Metastatic -lymphoma, leukemia, neuroblastoma Rhabdomyosarcoma

Unilateral	Bilateral
• Primary orbital neoplasms usually unilateral • (mass occupying lesion)	• seen in inflammatory conditions (typical condition is thyroid eye disease in Grave's) • immune processes or systemic diseases





4. Palpation (wasn't mentioned)

Dermoid cyst is very common and need to be palpated during examination

5. Pulsation (wasn't mentioned)

Clinical Correlations:

With bruits	Without bruit
- **Cavernous carotid fistula** - **Orbital arteriovenous fistula** - **Dural arteriovenous(a-v) fistula**	- **Meningoencephalocele** - **Neurofibromatosis** - **Orbital roof defect (condition after surgical removal of orbital roof, sphenoid wing dysplasia)**

6. Preorbital changes (wasn't mentioned)

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

7. Past medical history

We'll go over some eye pathologies:

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** but:

Preseptal Cellulitis (extraorbital infection)

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

Causes

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

Treatment

Oral antibiotics. and send them home (**outpatient**). (expect children under 1 year we admitted them because they can't monitor them self properly)
Treat properly else can develop orbital abscess, brain abscess, cavernous sinus thrombosis and can die.

Orbital Cellulitis (intraorbital infection)

Clinical picture

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

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

Complications

Why we worry about orbital cellulitis more than preseptal cellulitis? And how to prevent the complications?

- Because there is a high risk of morbidity and mortality and serious potential complications, including:
- Orbital abscess
- Brain abscess
- Cavernous Sinus Thrombosis
- Death

Could be prevented by early diagnosis and prober management

Treatment

They need to be **admitted** for close observation and they should have **systemic IV antibiotics,** referral to ENT, consult ID to help with antibiotics selection, and surgery if they have an abscess collection (drainage if … details below) 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	Examination
• Shorter duration with allergic • Known to be allergic to certain allergen • Previous episodes (recurrence). • The patient usually wakes up with it. • whereas preseptal cellulitis takes ~2 days to develop	Check for the triad of eye inflammation: • **Redness** • **Hotness** • **Tenderness** **The triad should be absent in allergic swelling**

Treatment

Antihistamine and cold compressors

Capillary Hemangioma

Scenario

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



Capillary Hemangioma	Cavernous Hemangioma
• usually in children. • Main indication of treatment is to preserve vision. Treat the child in the left picture to prevent amblyopia (lazy eye) like the right 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 is and the more important the treatment is.	In adults usually

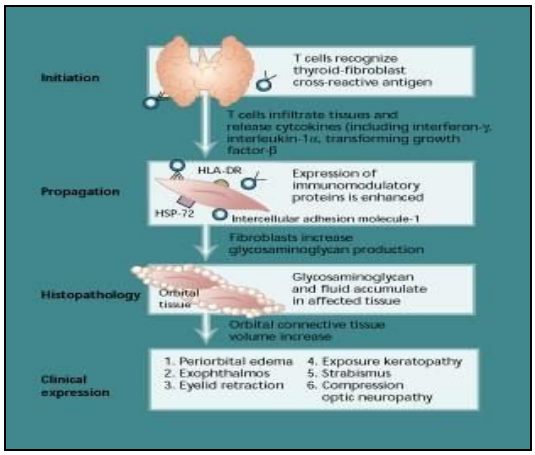
Treatment

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

Inflammation

1- Grave's disease

– **Most common cause of unilateral or bilateral proptosis**
– 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?**

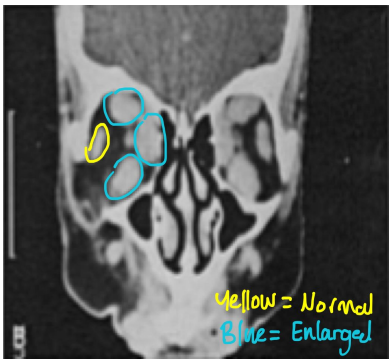
Exophthalmos: if the eye protrusion is caused by Grave's disease so it is specific to Grave's
Proptosis: more general term (e.g. tumor causing proptosis of the eye)

- **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
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

- **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

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 inurgent[1] where it's carried out during the inactive stage (main indications are strabismus and for cosmetic purposes)

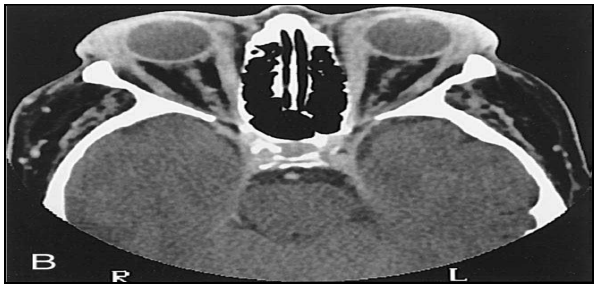
[1] You're right, it a made up word.

2- Idiopathic Orbital Inflammation

- **Orbital pseudotumor**[2]
- **Prompt response to steroids**
- **Myositis**
- **OU or systemic –> think vasculitis (*except in kids)**

3- Sarcoidosis

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



4- Vasculitis

-GCA, PAN, SLE

-Wegener's granulomatosis

Lymphoproliferative Disorders

(M group doctor said it's not imp, F group only mentioned the #1 types)

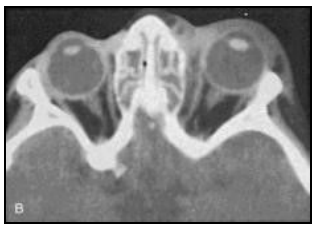
1. Lymphoid hyperplasia and lymphoma

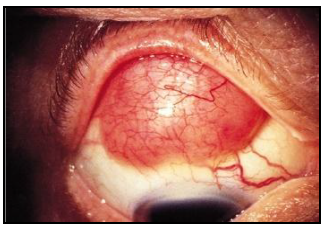
–20% of all orbital mass lesions
–molds to orbital structures
–50% arise in lacrimal fossa
– salmon patch appearance
– 17% bilateral

2. Plasma cell tumors

3. Histiocytic disorders

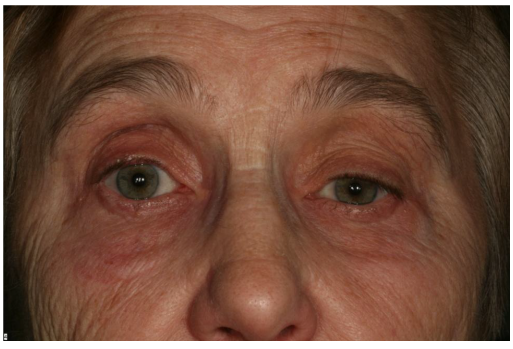
– macrophage based d/o





Pseudoproptosis

- **Most common cause of pseudoproptosis is lid retraction**
- Another cause of proptosis is when you have the opposite of proptosis and we call it **enophthalmos**.
- Most common cause of enophthalmos (sunken of the eyes) is trauma/Fractures.
- The orbital content will herniate inside the sinuses and that will lead to enophthalmos.



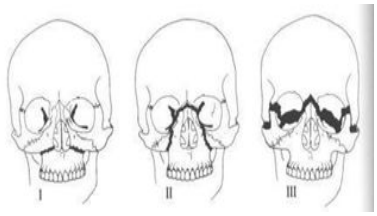
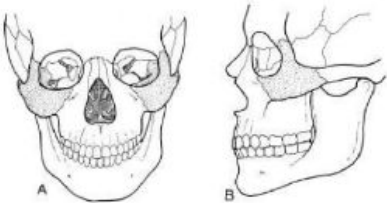
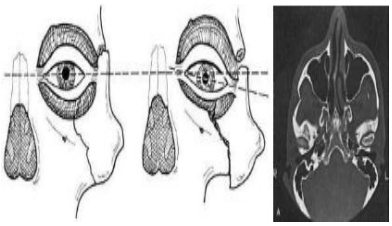
[2] AKA nonspecific orbital inflammation AKA idiopathic orbital inflammation, it is the most common cause of painful orbital mass in adults.

Rhabdomyosarcoma

- **Most common primary orbital malignancy of childhood**
- Average age: 7-8 years, but can happen in more than 8, and even adults.
- Sudden onset and **rapid** evolution of unilateral proptosis
- 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

Facial trauma and fractures

Midfacial fractures	ZMC fracture	Wall and floor fractures	Optic canal fractures
		–medial wall-lamina papyracea –orbital floor- blow out vs rim involvement –lateral wall and orbital roof-less	–traumatic optic neuropathy

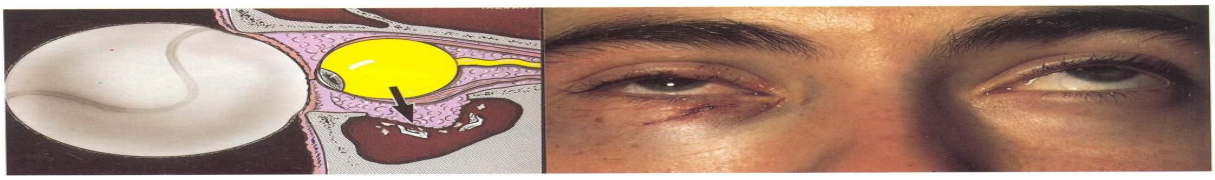
LeForte Fracture	Zygoma	ZMC Fractures
		

Floor Fractures

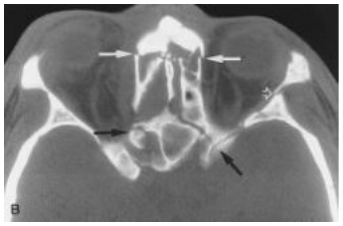
"He can't look up and will have double vision."

Trapdoor orbital fracture	Blow out fracture
Very common with direct trauma to the eye, it's really common among children to have a 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) , because some of them may have limitations and if you should not miss in examination **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	**A** fracture of the walls or floor of the orbit. Some of the tissue will get inside and get entrapped (becoming a trapdoor). It is common among **children** (the trapdoor). So whenever you have a patient with orbital trauma, you need to look at the eyes motility and make sure the eye is not ruptured, to rule out this condition. Now this traction of extraocular muscles or compression of the may may lead to a **parasympathetic response** (occulocardiac response) manifesting as bradycardie, hypotension and possibly syncope.

This is patient had trauma to the right eye, and the patient is trying to look up, but he can't, because there is a fracture in the orbital floor and the inferior rectus muscle is entrapped, so the eye can't go up



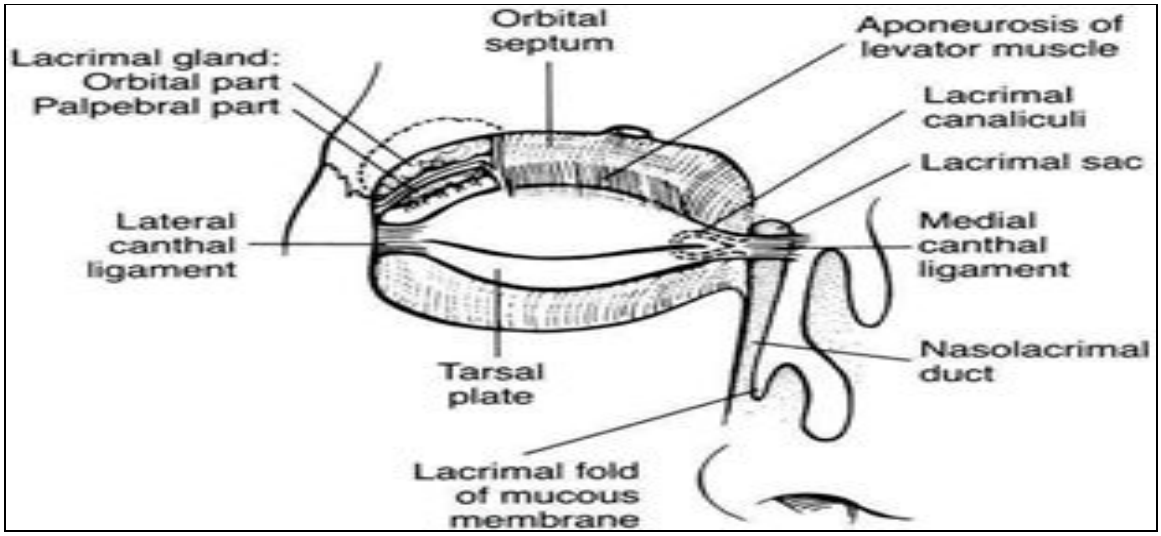
We need to operate on him as soon as possible (urgent surgery)
because if the muscle is kept entrapped for a long time, it will lead to ischemia and fibrosis, which will be affected on the long term.
What happens if it's left untreated? permanent double vision

Find the fracture	Optic canal
 	May be with or without displaced bony fragments  

Lacrimal

The lacrimal gland which is the main lacrimal gland, we have orbital lobe which is outside and the inner lobe which is towards the eyewall, and the two lobes are separated by levator aponeurosis, which is the tendon for levator muscle, then from the palpebral lobe there is small ductioles secreting the tears to lubricate the eye, these ductioles opens in the superior fornix, the tears will lubricate the cornea, and then will be drained through the lacrimal drainage system, starts 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 and 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

Anterior superior lateral part of the orbit, has two parts: orbital and palpebral part.



What are the tendons that hold the eyelid to the bone?

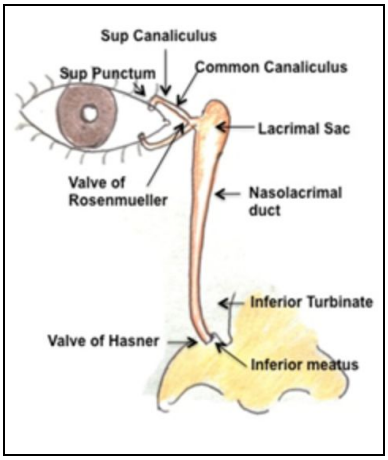
- Medial and lateral canthal tendons
- Note that the medial canthal lies just anterior to the lacrimal sac

What is the course of tears?

From the lacrimal glands → upper and lower punctum → lacrimal canaliculi → nasolacrimal duct → inferior meatus

Congenital nasolacrimal duct obstruction (common)

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
(They present with tearing and discharge).



Where does the obstruction occur?

At the level of the valve of Hasner (distal)

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 will come and stagnate in the area of obstruction, which will give a good medium for infections.So they will present with discharge and infection.
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**.
- If a child comes only with tearing, we think of:

congenital abscess – congenital glaucoma – eyelashes irritation (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).

Examples

The child: You can clearly see discharge.

The old man: Fluid stagnation in nasolacrimal duct due to improper canalization, this stagnation causes it to be a good medium for infection

How to examine the nasolacrimal ducts?

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).

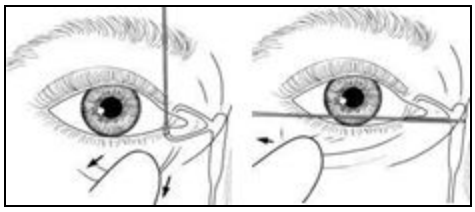
However, if there was an obstruction, the dye will stagnate inside the eye.

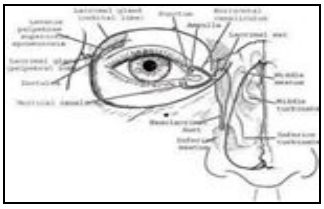
(it won't help to differentiate between nasolacrimal duct obstruction or canalicular obstruction.)

How to treat it?

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 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.

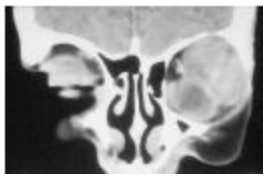




Lacrimal Gland Masses (not explained)

- 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 excavartion	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

Eyelids

1. Anatomy (Mentioned above)	2. Trauma	3. Lid lesions	4. Lid malpositions

2. Eyelid trauma:

Types: Blunt, sharp/penetrating
Classification: if one or all of the following involved in an eyelids trauma call ophthalmology (lid margin, canthal, canalicula)

A. Lid margin

Involved: 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.

Spared (not involved):
Skin and orbicularis only → skin sutures.
FAT protrusion = septum violated.
There is a very high chance the orbit has been injured.
DO NOT suture the orbital septum.


Lid Laceration with Canalicular Involvement

B. Canthals

when it is involved that means the eyelid is unstable so we call ophthalmology: they attach the eyes to the bones (repair the tendon)

C. Canalicula

if it is involved we need to repair it because the patient will have tearing

Blepharitis	Herpes Zoster Ophthalmicus
Chronic inflammation around the roots of the eyelashes. **Clinical findings:** scales around the lashes, redness and irritation in the eye Commonly caused by Staph, but can be caused by others like Streptococcus species. **Treatment:** topical antibiotics and eyelid hygiene. The main problem is: very difficult to eradicate, chance of future recurrence, need to be treated again	If it happens in young patients; you need to screen him for immunocompromisation In elderly it may happen with immunocompetent It is less common in our area. **Treatment:** oral antiviral agents.
	

3. lids lesions		
Sty	**Chalazion (very common)**	**Xanthelasma**
Acute inflammation around the eye lashes, either from sweat glands or sebaceous glands. Presents with abscess or pus collection **Treatment**: warm compressors with topical antibiotics. (We give topical antibiotics + worm compressors but it can improve by itself.) 	Granulomatous inflammatory lesion caused by obstruction of meibomian glands, which leading to accumulation of the sebaceous secretion from the meibomian glands.) It will begin with swelling and redness it with time it will be like a small nodule **Treatment**: We give topical antibiotics + worm compressors it may resolve by itself. But if it does not improve after 1 month, we drain it (surgical removal) 	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 

4. Lid malpositions

A. Ectropion	B. Intropian	C. Blepharoptosis	D. Retraction

A. Ectropion: is outward turning of lid margin

Types:
– Congenital
– Involutional
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. Intropian: is inversion of the lid margin towards the eye

(Most common cause is Trachoma)
What's the causative organism of trachoma?
Chlamydia Trachomatis (bacteria), its main difference than other types of bacteria is that 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?
Usually this is an active infection acquired during childhood. If it is not treating properly it will cause conjunctival scarring. Whenever the conjunctiva is short, it will pull the lid margin toward the eye. It used to be an endemic infection, but now we rarely see it.

Types of Intropian			
Cicatricial (most common type in our country, which is secondary to old trachoma, we see commonly among elderly, we don't see active trachoma now) (typically trachoma presents during early childhood with redness and discharge, if it is not treated it will lead to scarring of the conjunctiva and that will shorten the tarsus/tarsal plates, so the lid margin will be directed towards the eye, if not treated will lead to	**Involutional** (related to aging, and eyelid laxity)	**Congenital**	**Acute-spastic**

corneal opacity)(2 pics from left)

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, can happen with patient using contact lens)
neurogenic (from the 3rd nerve)
mechanical (a mass in the eyelid)
traumatic (trauma to the muscle)
-Evaluation

A) Myogenic

Congenital
–Dysgenesis of levator
Acquired
–Localized or diffuse disease
–Muscular dystrophy
–CPEO
–MG
–Oculopharyngeal dystrophy

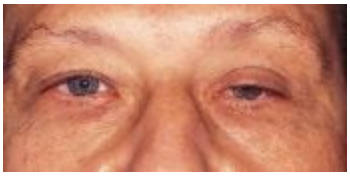
Generally, in children, whenever the eyelid is blocking the eye, we need to do surgery to prevent amblyopia.
In adults, we just fix it because patients want to see from both eyes, but it will not cause amblyopia

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 neck problems.

B) Aponeurotic

-Most common form of ptosis
(The muscle is normal but the tendon is stretched, usually happens with aging.)

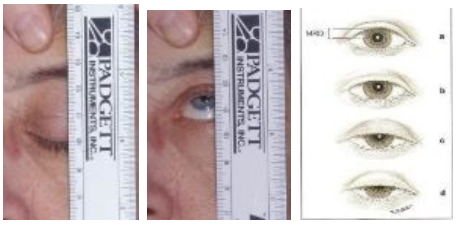
-High lid crease with normal levator function



3) Neurogenic

Acquired and congenital forms
Acquired:
– 3rd nerve palsy **
– Horner syndrome
– Myasthenia gravis

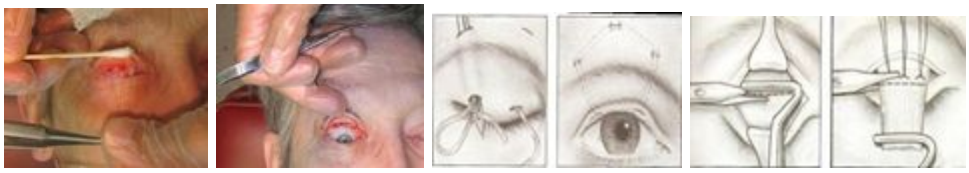
Levator Function
(this is the way we evaluate the muscle)
We ask the patient to look all the way down, and then we measure how much they go up. Normally it should be 15 cm and above, like in this picture.



Treatment:

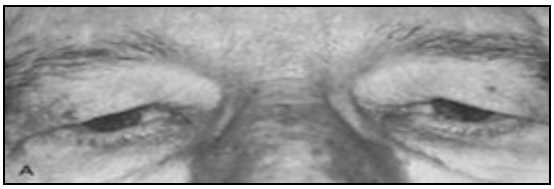
- Mild ptosis, good levator function: Mullerectomy
- Any ptosis, reasonable levator function: Levator resection
- Severe ptosis, poor levator function: Frontalis suspension

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.



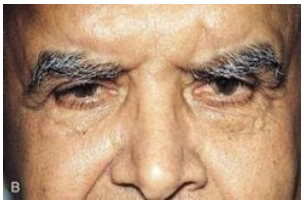
Before surgery

After surgery

What is the most common cause of unilateral brow ptosis?
Facial nerve palsy, because it supplies the frontalis muscle, and frontalis is the muscle the is raising the eyebrow

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

Abnormal eyelid movements

1) Blepharospasm	2) Hemifacial spasm	3) 7th nerve palsy

1) Blepharospasm:

- Involuntary tonic, spasmodic contraction of orbicularis
- Dermatochalasis-rubbing
- Brow ptosis-frontalis spasm
- Blepharoptosis-levator dehiscence
- Ectropion/entropion
- Dry eye

Suddenly and without control, the eye is closed like this,we don't know the cause.

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.
- Before diagnosing this condition, we have to rule out any eye irritation problems, like foreign body or lashes inside the eye or dryness. We need to treat all of this first.
- If the patient still has the same problem à we label it as blepharospasm.
- It can happen in both eyes or in one eye, if in one eye we call it hemifacial spasm.

2) Hemifacial spasm:

We need to order MRI in these patients to rule out 7th nerve compression

o Intermittent contractions of the entire side of face

o Present during sleep

o Compression of 7th nerve at the level of the brain stem

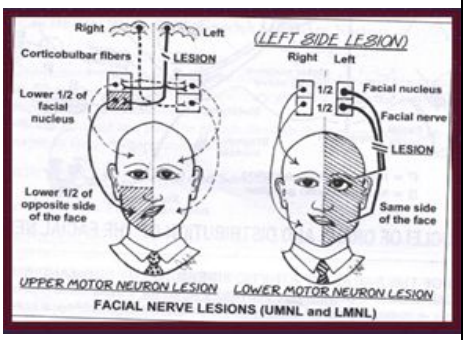
o MRI evaluation

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:

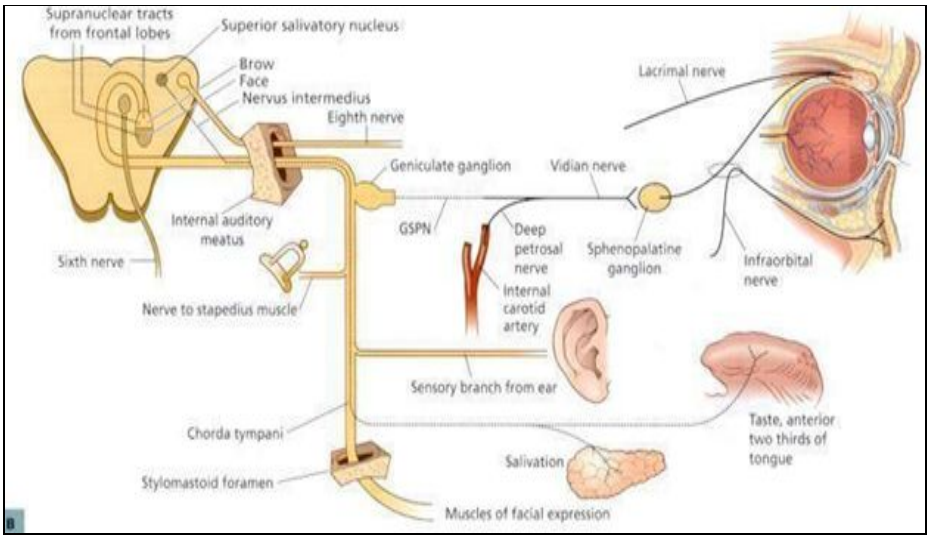
Location of lesion: Supranuclear, brain stem, peripheral
Cause of paralysis: – Bell's – Infection – Infarct – Demyelination – Neoplasm – Trauma – Miscellaneous.

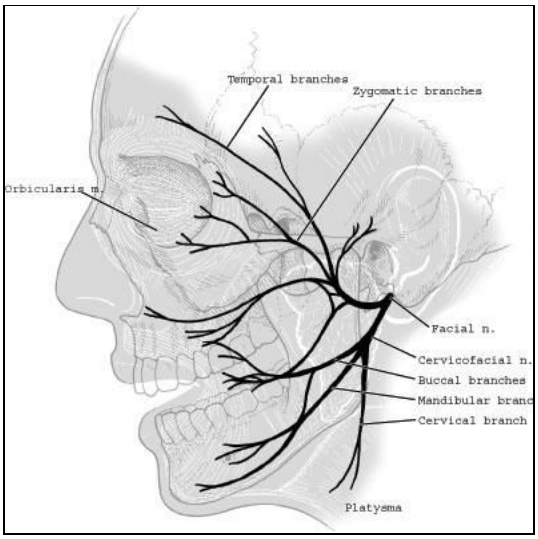
In ophthalmology we see UMNL or LMNL patients?
UMNL: forehead is spared à 7th nerve palsy
LMNL: all the side is affected
So, we see LMNL
See the illustration to understand better (not in the lecture)



How do these patients present? 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 (because the eye cannot close well, so they cannot pump the tear from the eye to the nose.)
- Exposure keratitis (because the eye cannot close well) so we need to lubricate the eyes

Course of the 7th 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 release of acetylcholine
- Onset 3 days
- Peak effect 1-2 weeks Duration 6-12 weeks

Uses

1) Blepharospasm

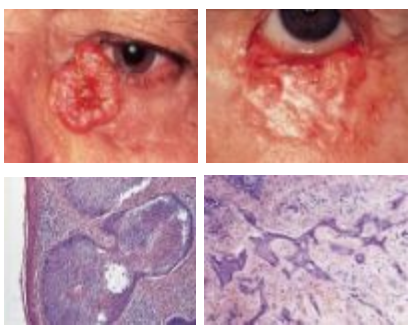
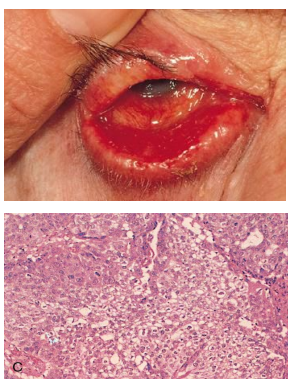
2) Strabismus

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

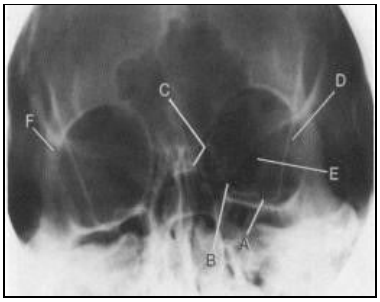
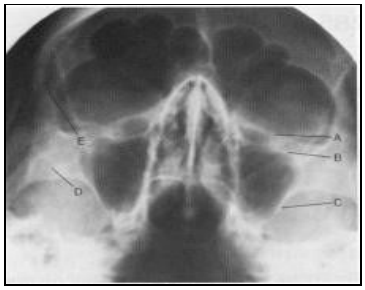
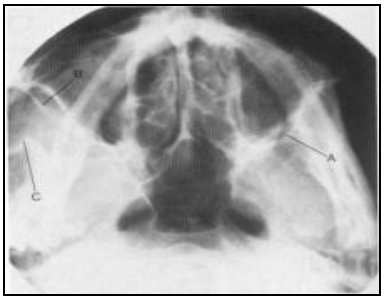
Not explained

Basal cell carcinoma	Squamous cell	Sebaceous adenocarcinoma
-90-95% of malignant eyelid tumors. -Lower lid and medial canthal areas. -Nodular and morpheaform types. -Medial canthal lesions can be problematic. -3% mortality	-40x less common than BCC. -More aggressive, (perineural invasion). -Most arise from pre-existing lesions. -Variable presentation	- Highly malignant. -2x more common in upper lid. -Multicentric. -Separate upper and lower lid lesions in 6-8%. -Pagetoid spread
 Nodular Morpheaform		

Imaging options	
Plain films	**CT scan**
MRI	**Ultrasound**

Plain films

Normally we don't do it, unless there is a suspicion of **foreign body**
Quick scanning to rule out foreign bodies, and Infrequently used

Caldwell's view	Waters' view	Base view
		

CT scan

(Most of the time we take it because it is good as it shows us the bone and soft tissue. If we want to see the details of the soft tissues we order MRI "Now we think ten times before ordering a CT scan for a child, unless he really needs it due to radiation") CT is good for fractures and calcifications

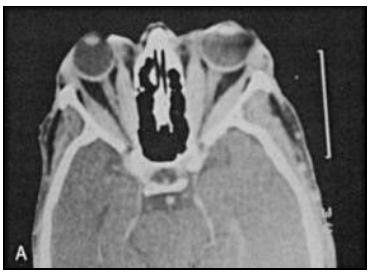
Strengths	Weakness	Protocols

• spatial resolution
• bone
  ○ **fractures**
  ○ bone destruction
  ○ calcification
• quick-emergencies
• trauma
• cheaper
	• radiation: 1-2 cGy
	• soft tissue definition
	• contrast iodinated - allergy
	• may need MRI anyway
	• (not cheaper)
		• axial and coronal
		• +/- contrast

Examples

enlarged multiple recti muscles. Grave's disease.

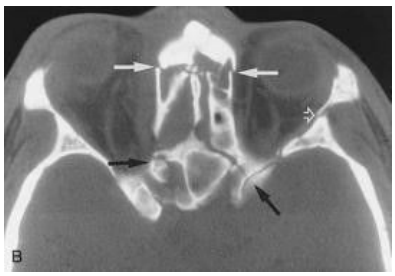
Enlarged recti muscles, suggestive of Grave's disease



Unilateral enlargement of rectus muscle. Could be Lymphoma

Axial cut.

There is an orbital mass behind the eyeball, this can be a differential but most likely it is cavernous hemangioma



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

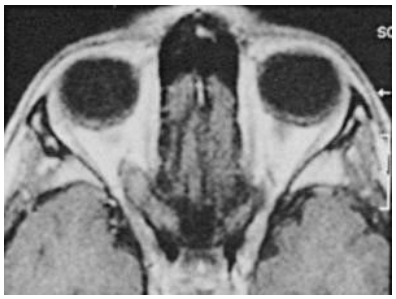
MRI

- We use it when we are sure that we're dealing with soft tissue lesion. (e.g. optic nerve or cavernous sinus)
- **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
- Contrast should be with T1 (in the blood vessels) typically done with contrast

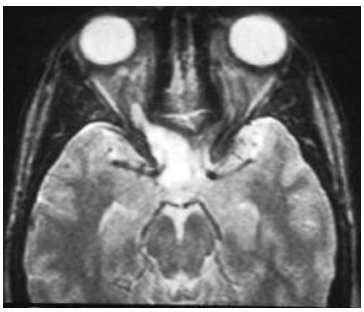
Strengths	Weakness	Protocols

- Tissue
  - **T1: Anatomy**
  - **T2: Physiology**
- No Radiation
	- Magnetic pacemakers, surgical clips
	- Claustrophobia
		● Axial/coronal/sagittal
		● Gadolinium contrast
		  ○ non-iodinated
		  ○ allergies RARE
		● Orbital lesions
		● fat suppression

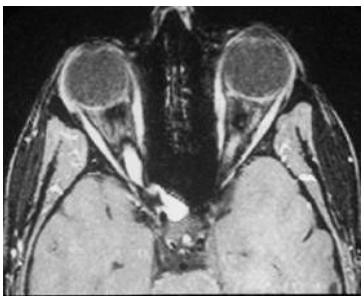
Examples



T2



T2



T1

Ultrasound (Orbital Echography)

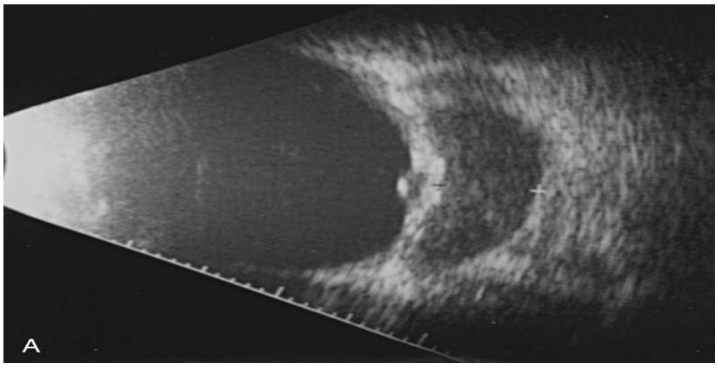
We use it from time to time especially for anterior orbital masses

-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