Updated lectures for medical students, Mutah university

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Part 1: Orbital anatomy and disease

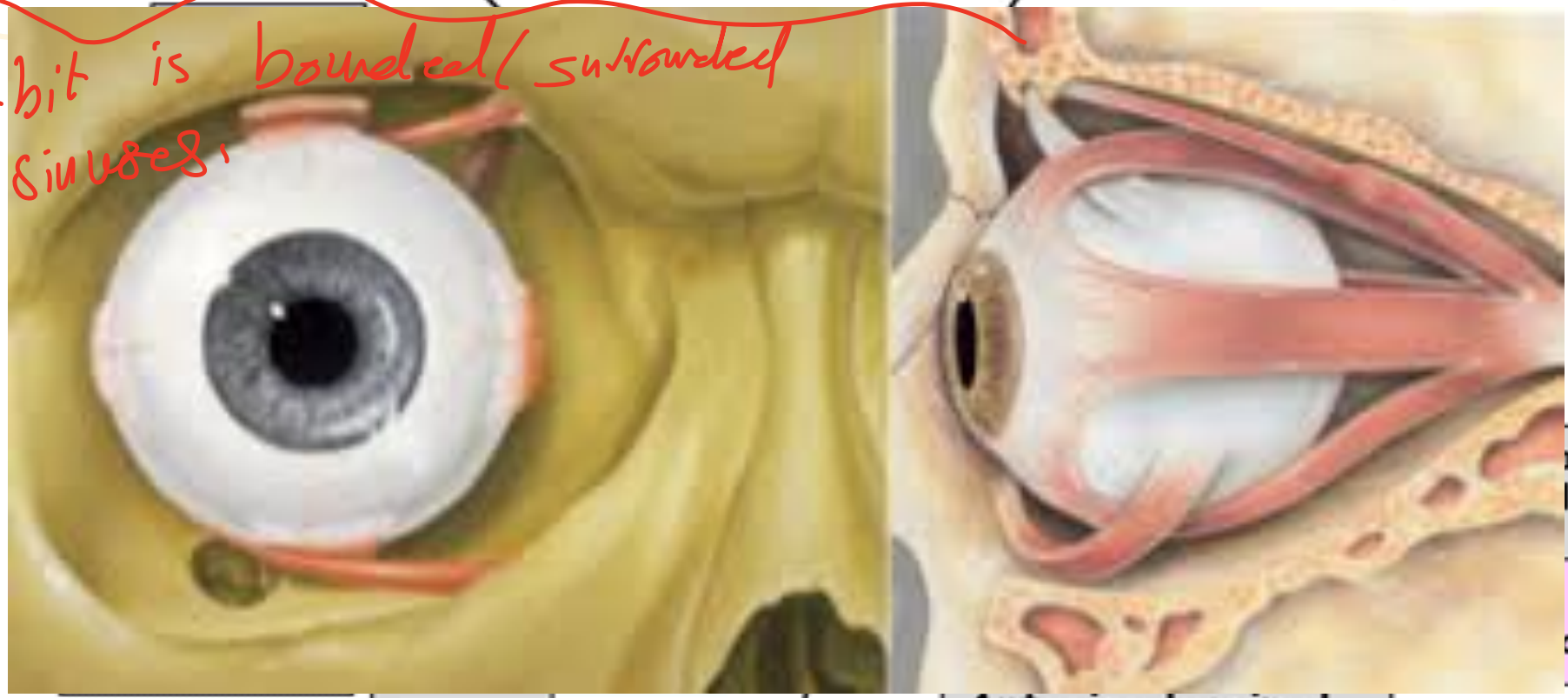
(Doesn't apply to african american/have a shallow

orbit, more than ½ of the eye can be outside :).

EYE - BONES OF RIGHT ORBIT

2/3 of the eye is inside the orbit
1/3 is outside

The orbit is bounded (surrounded by 4 sinuses:
① ② ③ 4



This is a CT scan that shows proptosis

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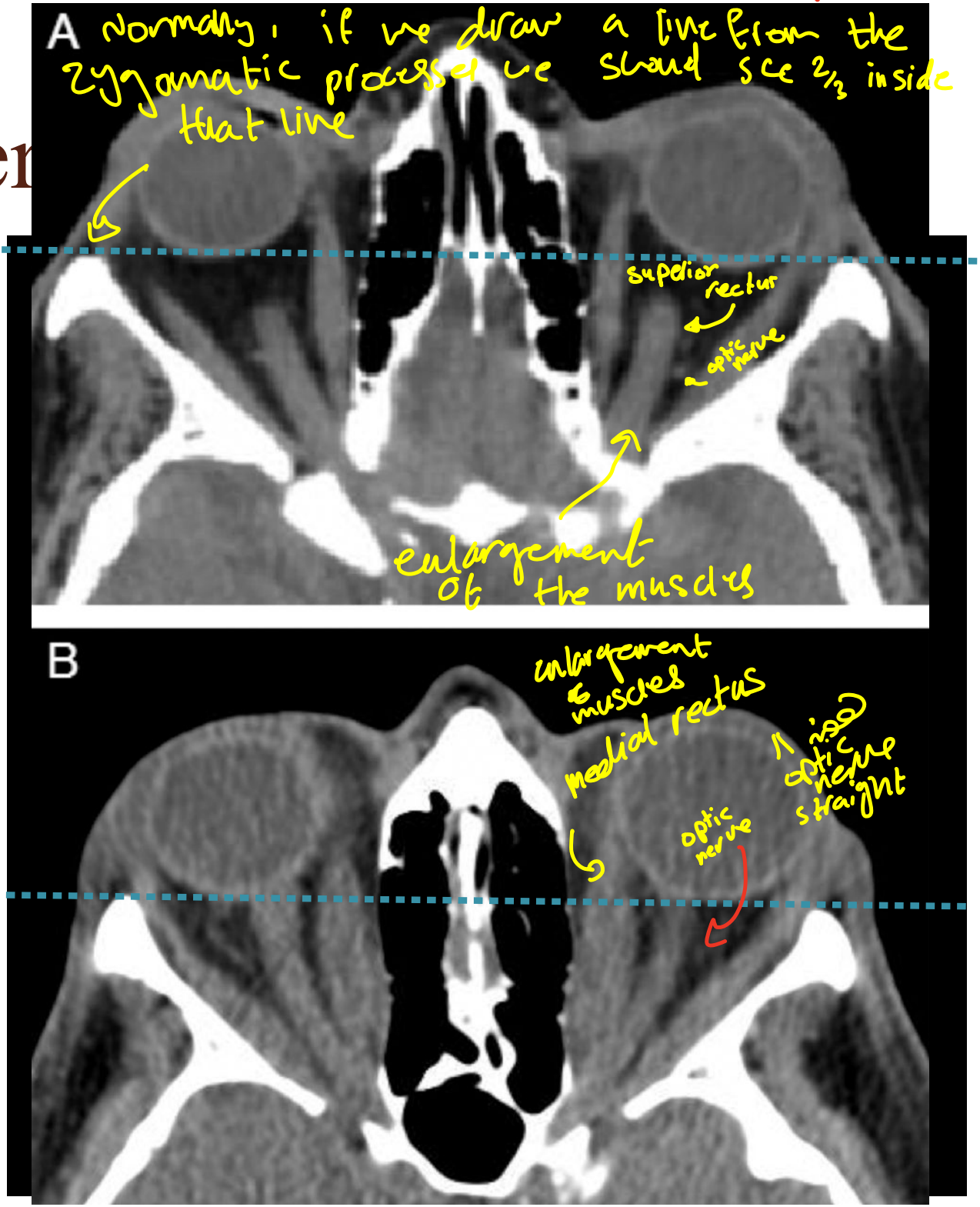
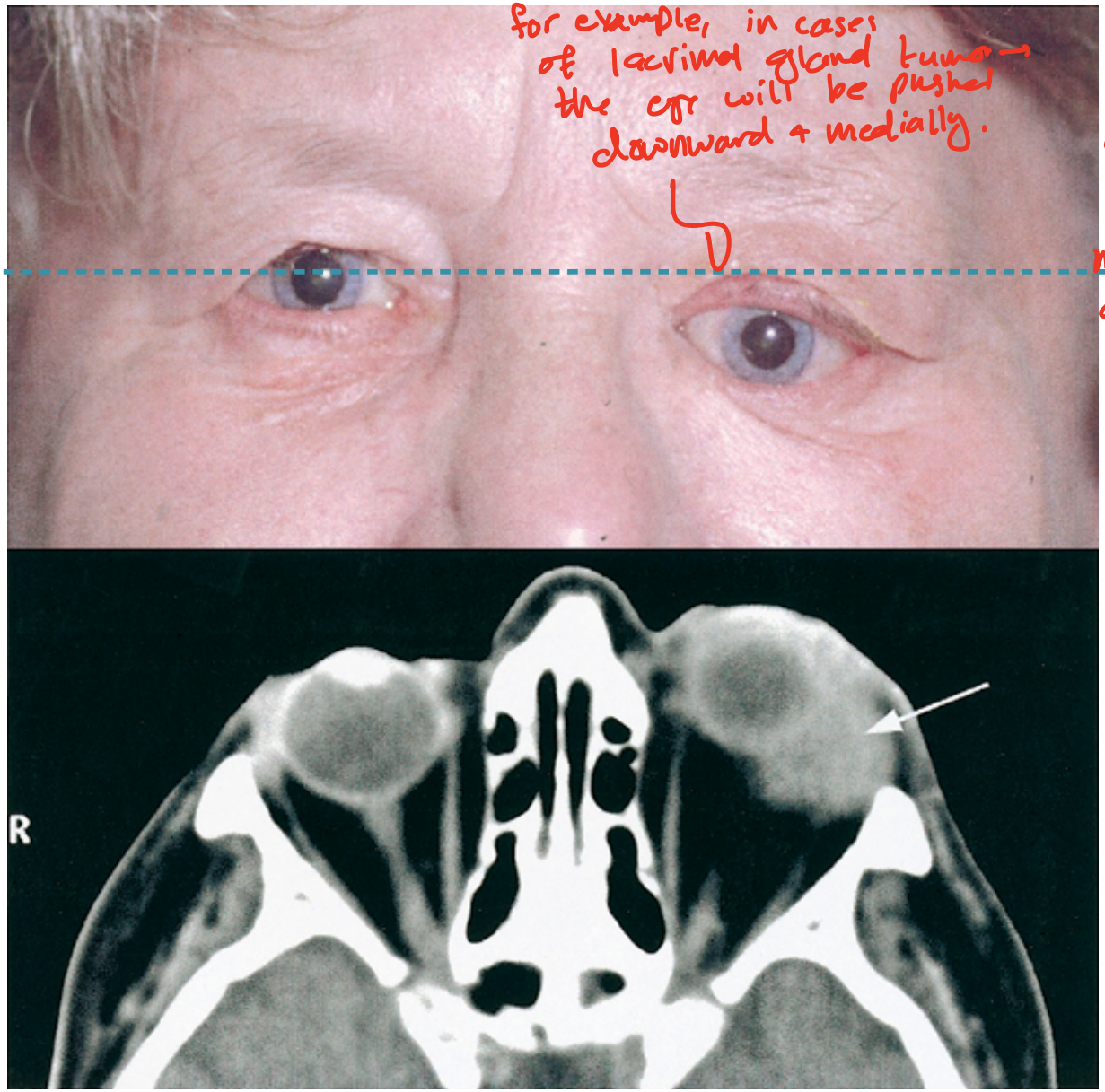
*proptosis: axial protrusion of the eye

*usually the optic nerve takes an S shaped pattern



coronal displacement of the eye
could be → downwards → { medially / laterally } or upwards → { med. / later.

Terminology: Dystopia



Type II = deposition of IgG + antigen
Type IV = cell mediated

Pathology: Graves disease

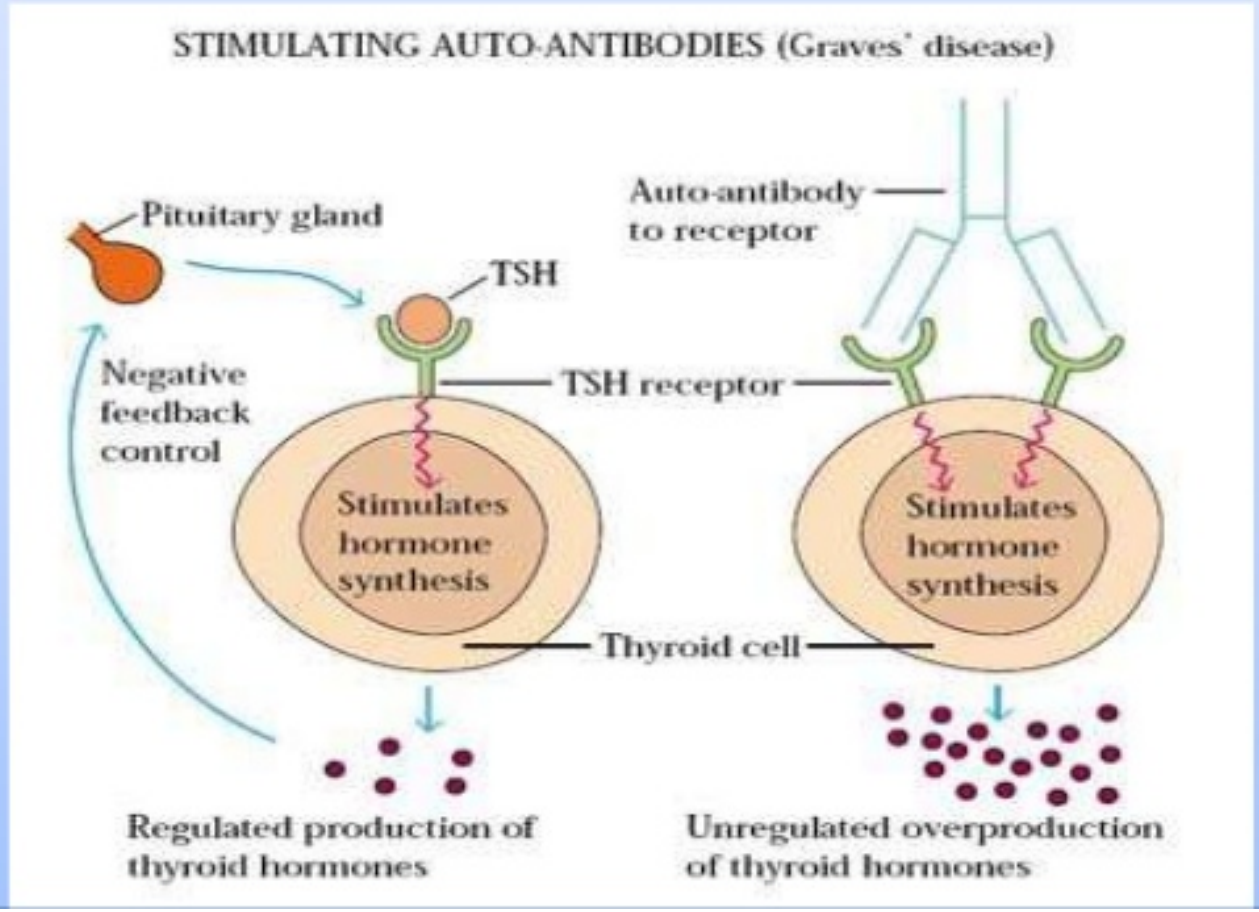
(Type V hypersensitivity) because there's stimulation of endocrine cells
but you can think of it as

GRAVE'S DISEASE

Type II

autoimmune disease
96% cases w/ hyperthyroidism
can come with euthyroidism
3% have hypothyroidism

TSH Antibody mimics action of TSH ⟶ increased T3 & T4.



THYROID EYE DISEASE

Inflammatory phase

1. Soft tissue involvement

- **Periorbital and lid swelling**
- **Conjunctival hyperaemia**
- **Chemosis**
- **Superior limbic keratoconjunctivitis**

Fibrotic phase

2. Eyelid retraction

3. Proptosis

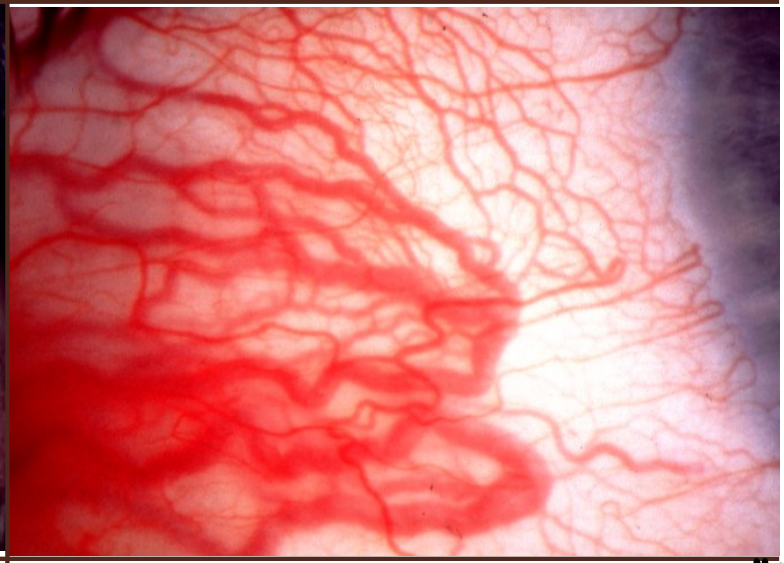
4. Optic neuropathy

5. Restrictive myopathy

Soft tissue involvement

Periorbital and lid swelling

Conjunctival hyperaemia



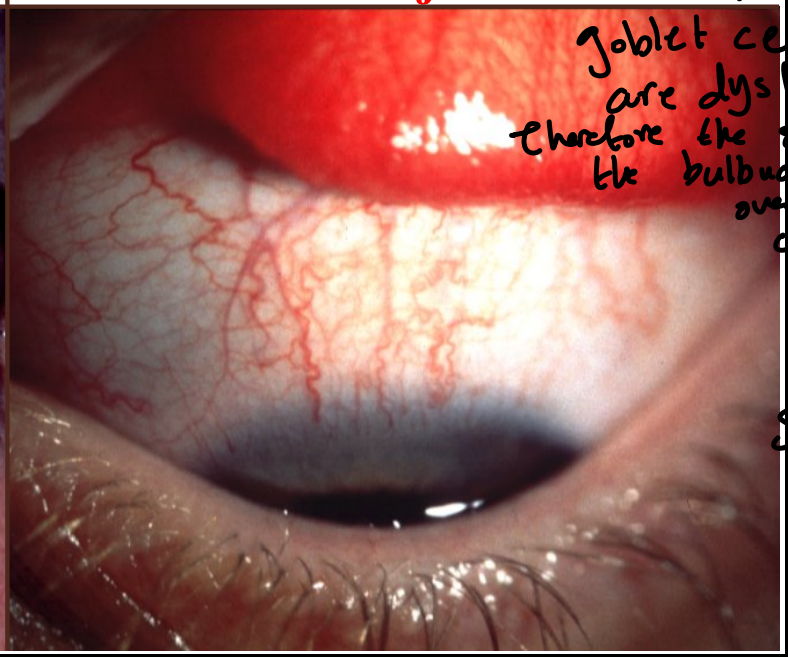
Chemosis

Swelling of the conjunctiva

Superior limbic keratoconjunctivitis

→ usually due to mucin deficiency

Goblet cells are dysfunctional → therefore the sliding of the bulbar conjunctiva over the palpebral conjunctiva is defective.



Seen in 10% of graves — seen in other diseases related to

Lid

dry eyes.

Signs of graves disease

M.C.C of proptosis

*M.C sign of graves disease: eyelid retraction
affected muscle: levator palpebre / M.C RECTUS muscle

CT scan finding in Graves disease

Due to the healing of inflammation

Fibrous deposition of the muscle

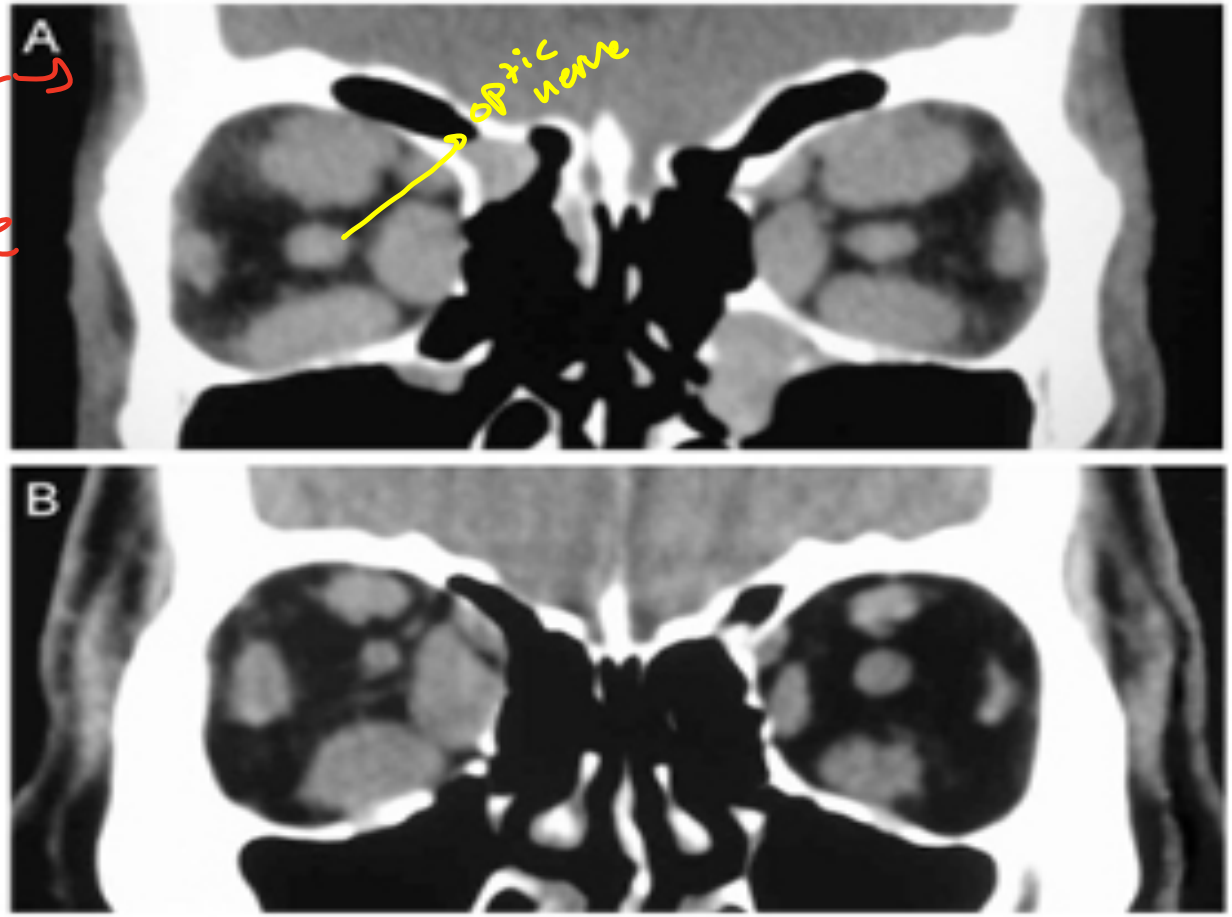


Figure 1 - Coronal CT scans from two patients with Graves' orbitopathy. **A)** Patient with symmetric enlargement of the extraocular muscles in both orbits. **B)** Patient with asymmetric involvement of the extraocular muscles.

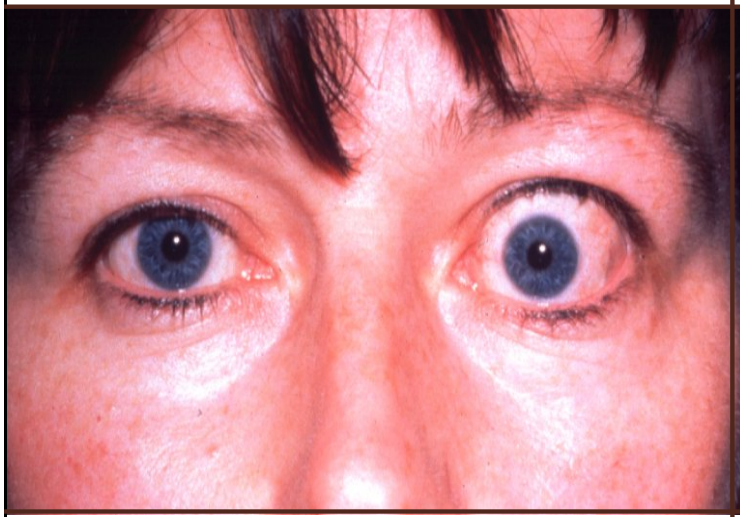
The eyelid should cover the upper 1/3 of the cornea

Signs of eyelid retraction

Occurs in about 50%

- Bilateral lid retraction
- No associated proptosis

- Bilateral lid retraction
- Bilateral proptosis (von graefe's sign)



- Unilateral lid retraction
- Unilateral proptosis

- Lid lag in downgaze

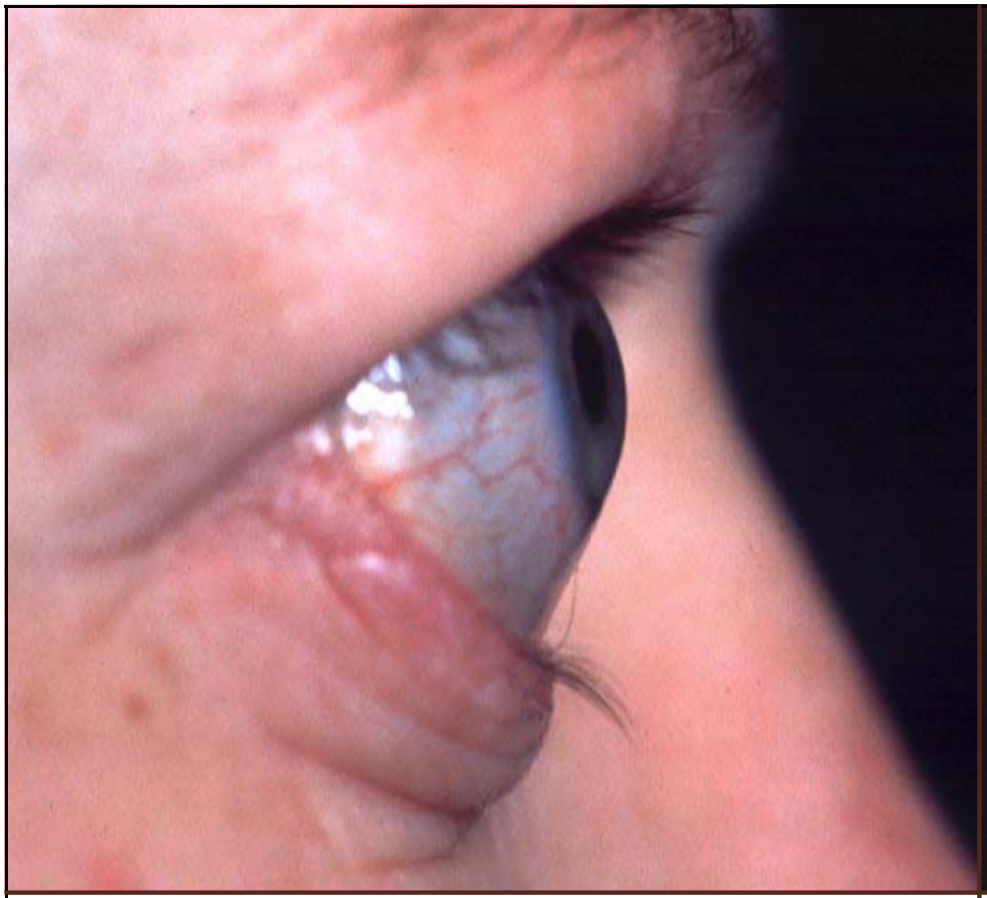
Nuclear medicine options.

Not influenced by the treatment of hyperth.

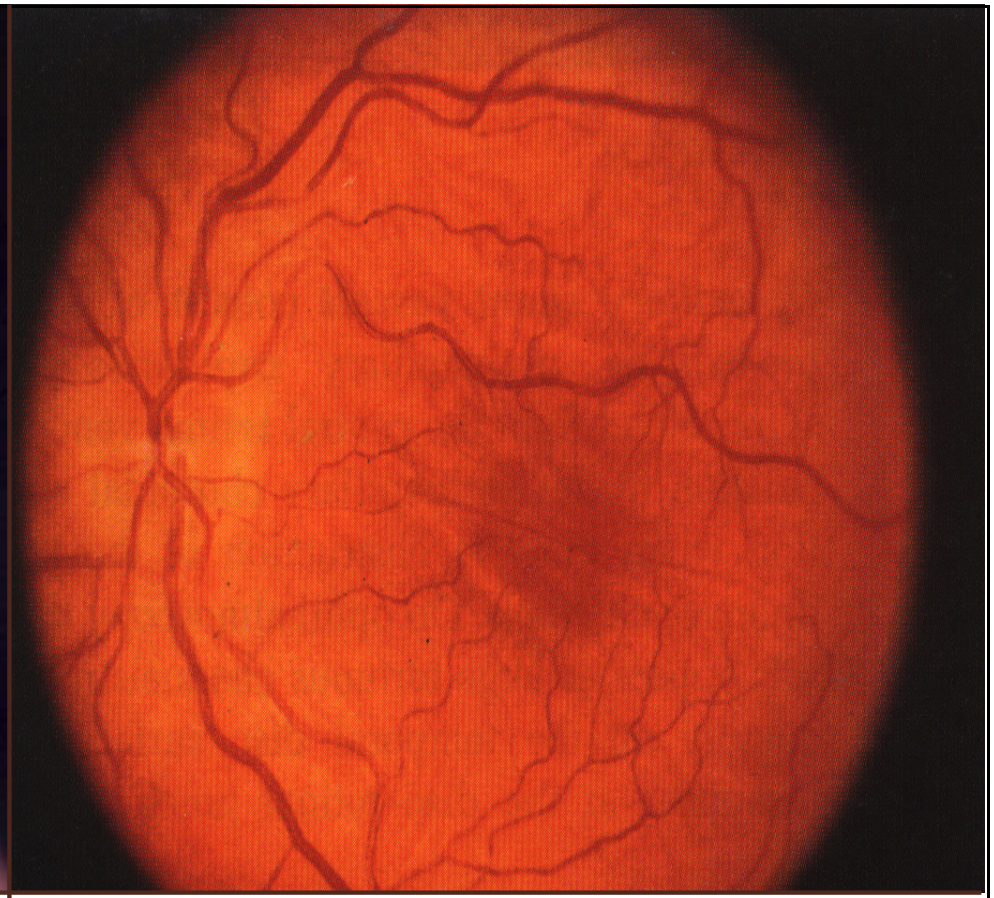
Proptosis

urged to use a course of steroids before radiothyroidectomy to stabilize the patient. Bec. things will get bad (proptosis gets worse)

- Occurs in about 30%
- Uninfluenced by treatment of hyperthyroidism



Axial and permanent in about 70%



May be associated with choroidal folds

Treatment options

- Systemic steroids
- Radiotherapy
- Surgical decompression

Optic neuropathy

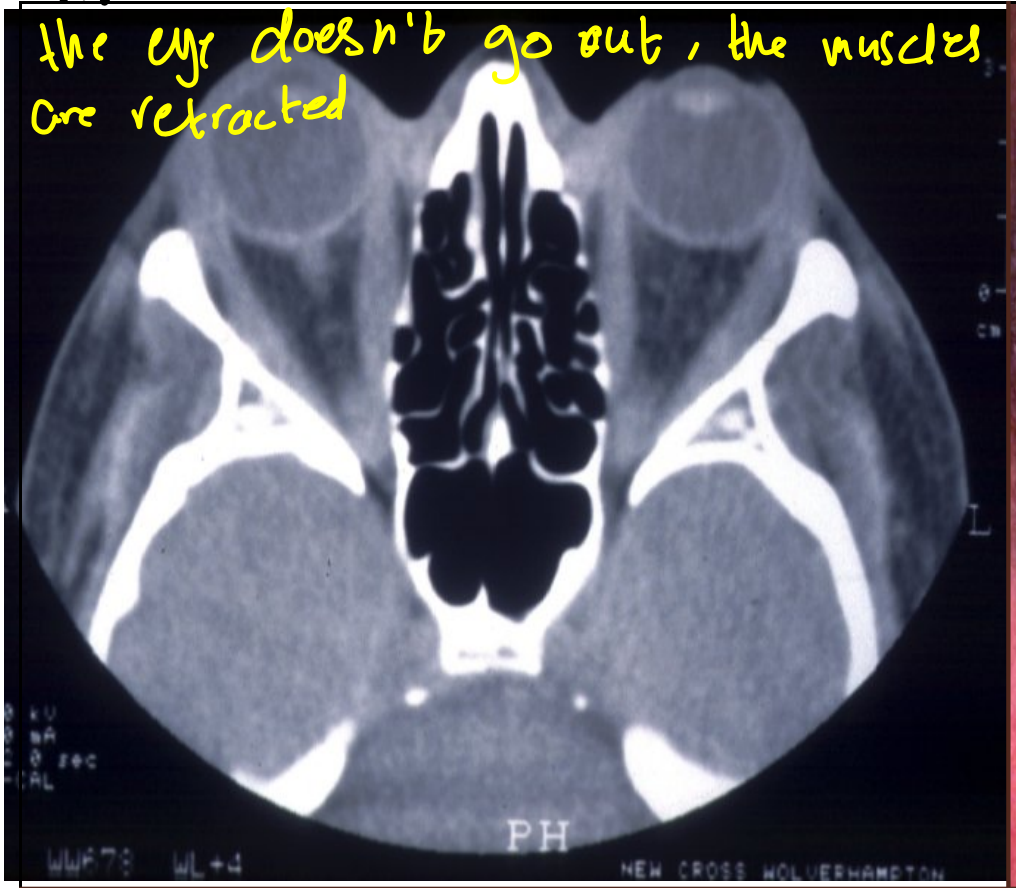
- Occurs in about 5%
- Early defective colour vision
- Usually normal disc appearance

⇒ sudden drop of vision within days.

⇒ proptosis: minimal

why? Due to to the long duration of graves disease their muscles are fibrotic + inelastic

seen in elderly pts.



Caused by optic nerve compression at orbital apex by enlarged recti

Often occurs in absence of significant proptosis

⇒ we give it early in the disease so pts avoid eye surgery (decompressions).

⇒ monoclonal antibodies for thyroid eye problems.

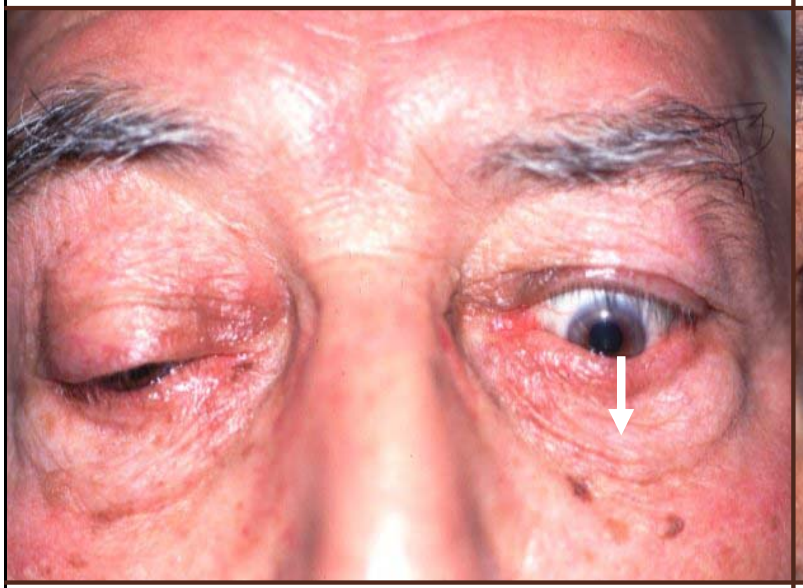
Teprotumumab

Restrictive myopathy

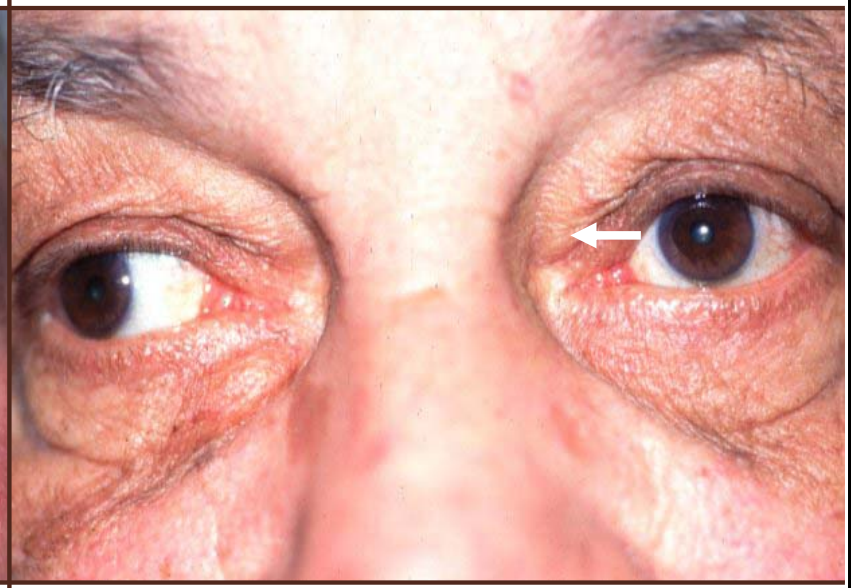
- Occurs in about 40%
- Due to fibrotic contracture of SR

Elevation defect - most common

Abduction defect - less common



Depression defect - uncommon



Adduction defect - rare

Can be surgically called adjustable sutures

Orbital vascular disease

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VASCULAR ORBITAL DISORDERS

1. Orbital venous anomalies (varices)

- Isolated orbital varices
- Combined orbital and external varices

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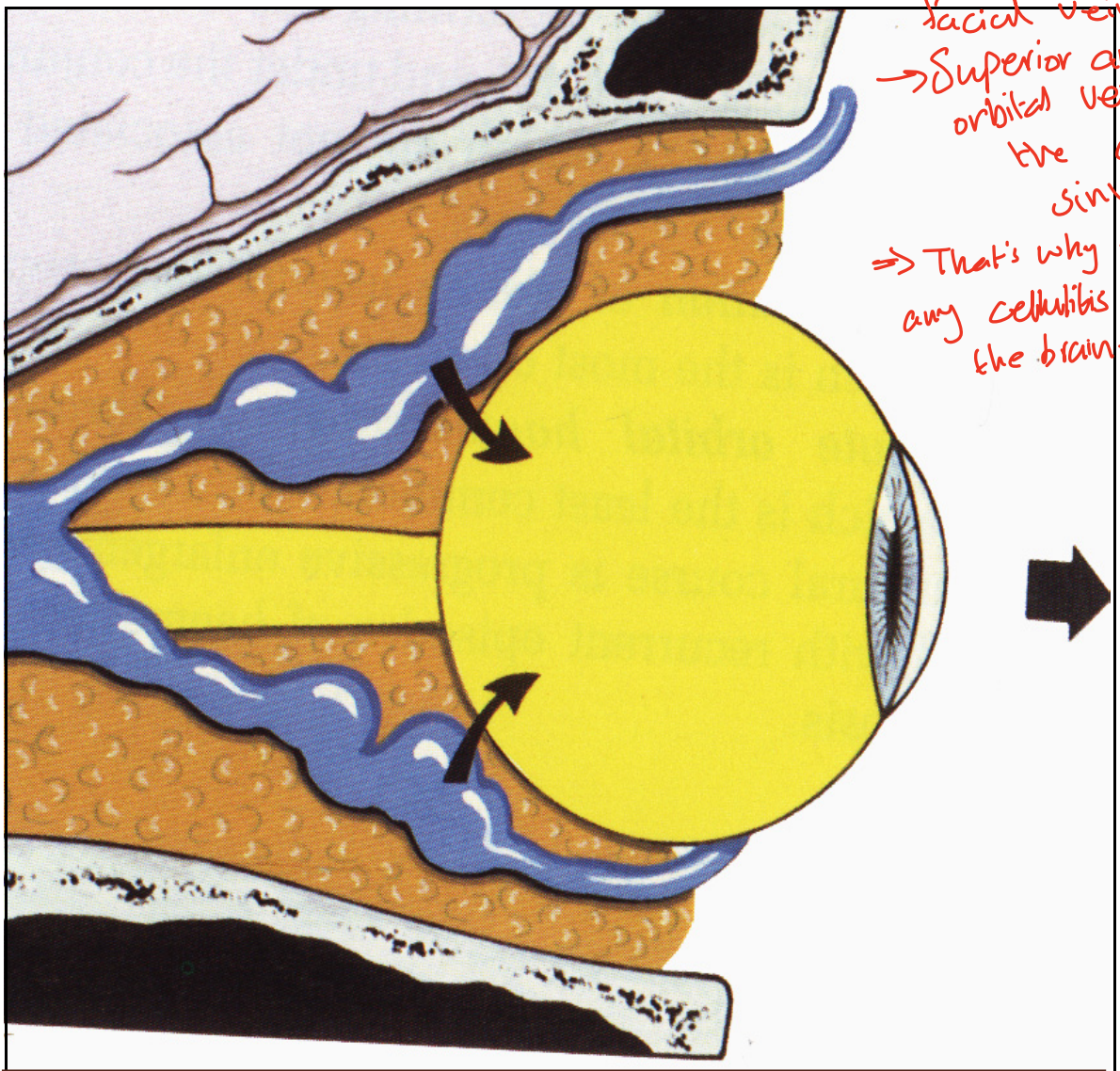
2. Carotid-cavernous fistula

- Direct
- Indirect

Orbital venous anomalies (varices)

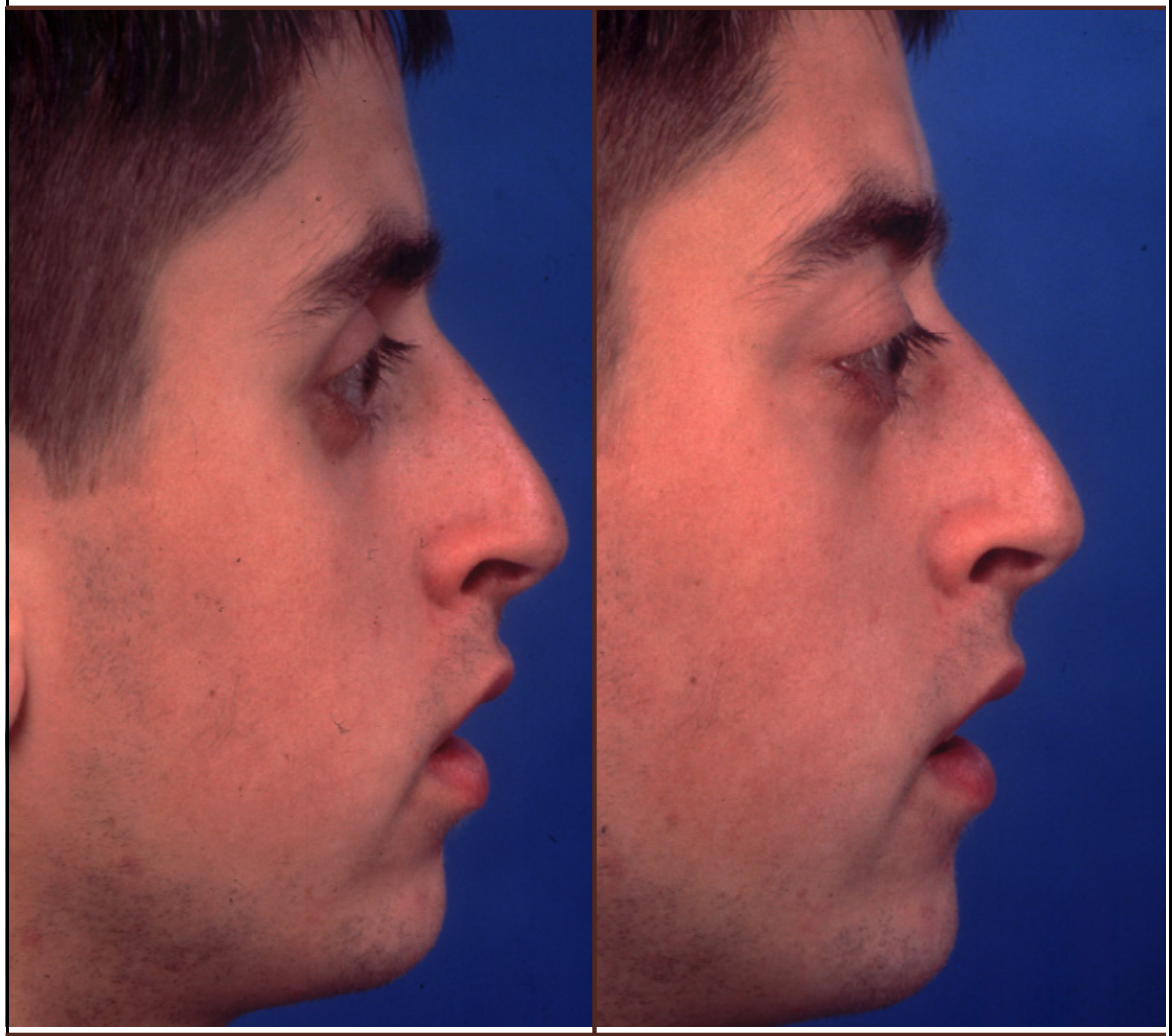


facial veins →
→ Superior and inferior orbital veins drain into the cavernous sinus
⇒ That's why we have to treat any cellulitis before it gets to the brain.

- **Congenital enlargements of pre-existing venous channels**
- **Usually unilateral**
- **May bleed or become thrombosed**

Isolated orbital varices

Intermittent proptosis

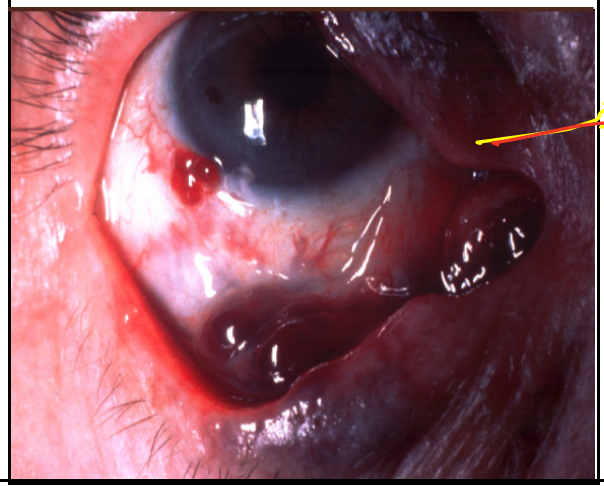


Non-pulsatile, without a bruit	Precipitated or accentuated by Valsalva manoeuvre

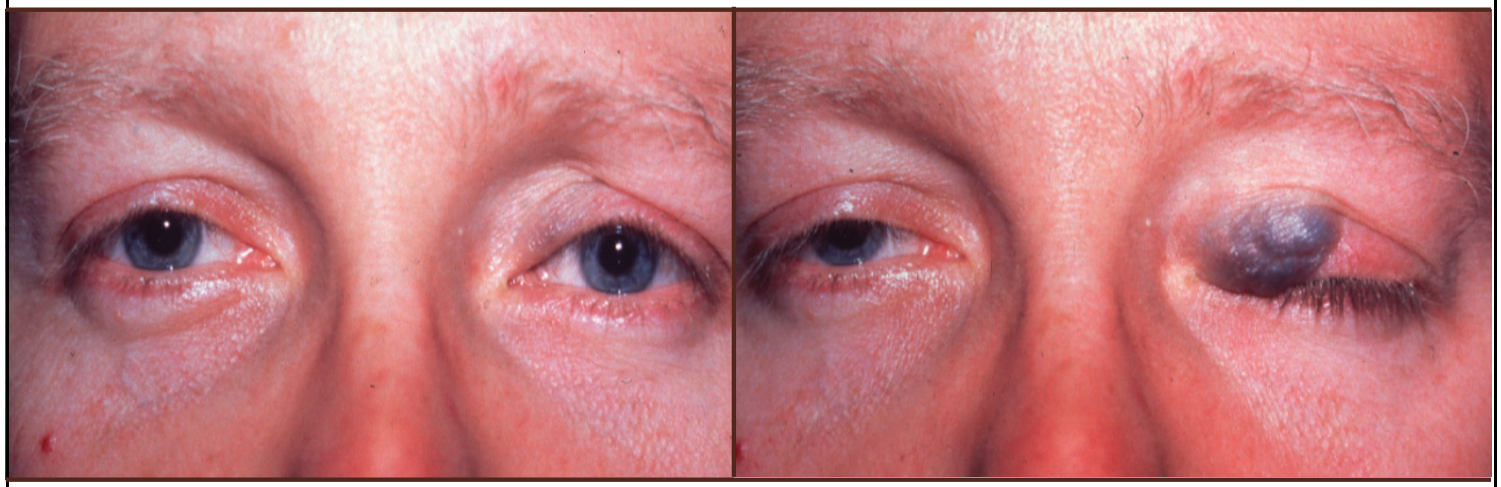
Combined orbital and external varices

Sudden emergence of a painful mass in the lower lid
⇒ usually happens after an increase in intra-abdominal pressure e.g. Valsalva manuever, shouting —.

Conjunctival varices



Eyelid varices

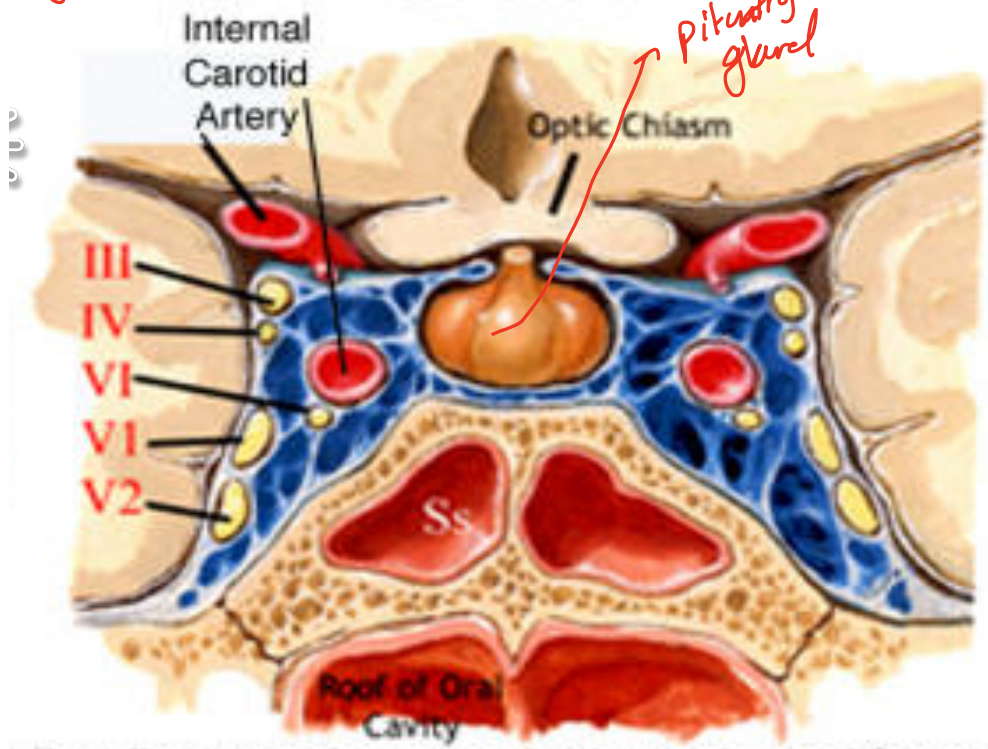


Precipitated or accentuated by Valsalva manoeuvre

ıs anatomy

ı and sinuses are intact on the left side.
ght, the dura has been removed revealing
minal ganglion.

negative pressure in venous side and contains nerves – ICA has a high pressure, any rupture will result in compression on the nerves.



ellow line crossing over the hypophyseal fossa
ıtes the plane of section of th image above. It
s the cavernous sinus and its contents.

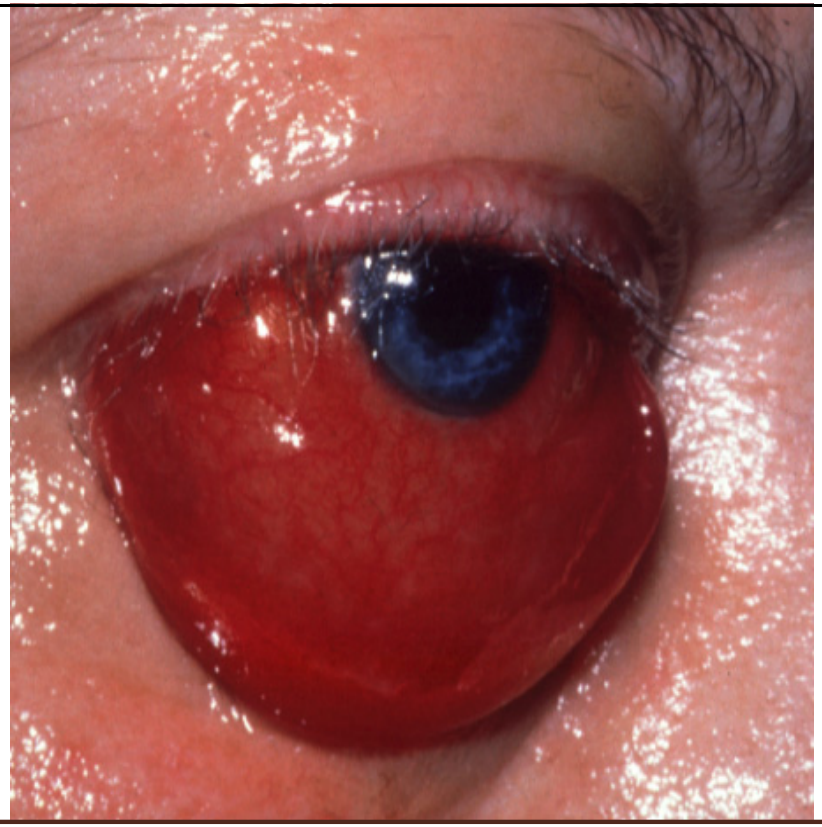
Direct carotid-cavernous fistula

- **Defect in intracavernous part of internal carotid**
- **Rapid flow shunt**

Rupture of the ICA into the cavernous sinus — usually delayed

Causes

- **Head trauma - most common**
- **Spontaneous rupture - in hypertensive females**



- **Ptosis, chemosis and conjunctival injection**
- **Ophthalmoplegia**
- **Raised intraocular pressure**

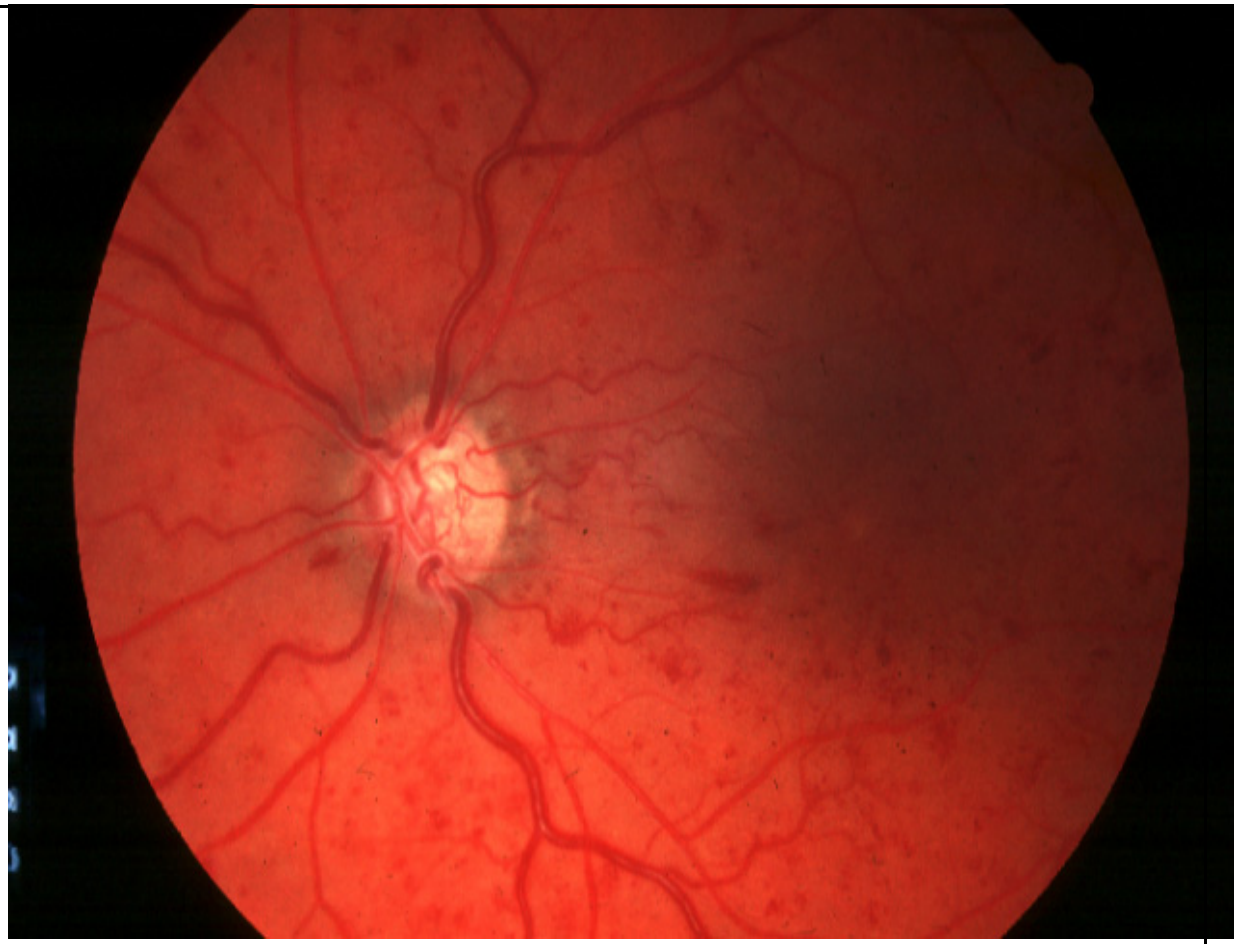
→ The eye will be frozen due to compression on 3rd 4th and 6th nerve.

its [illegible]

Visual acuity is preserved until late stages →

Direct carotid-cavernous fistula

- Pulsatile proptosis with bruit and thrill
- Abolished by ipsilateral carotid compression

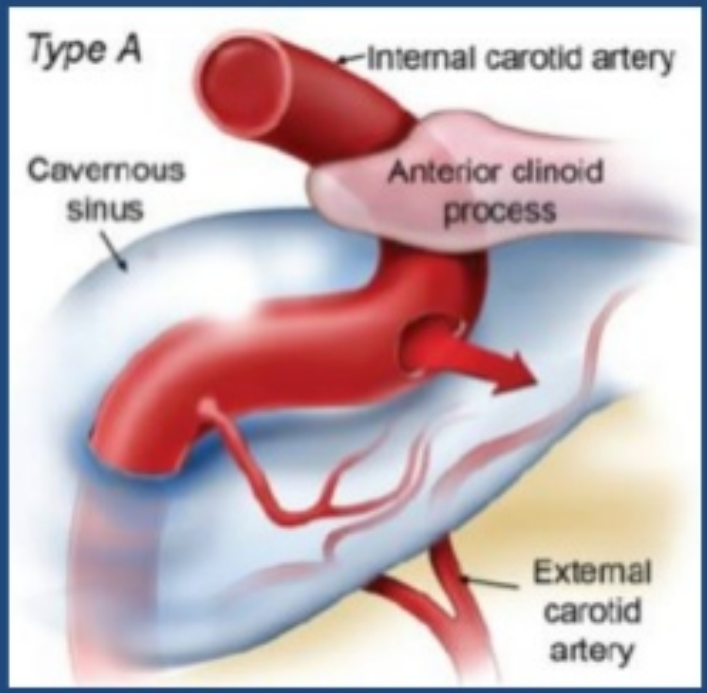


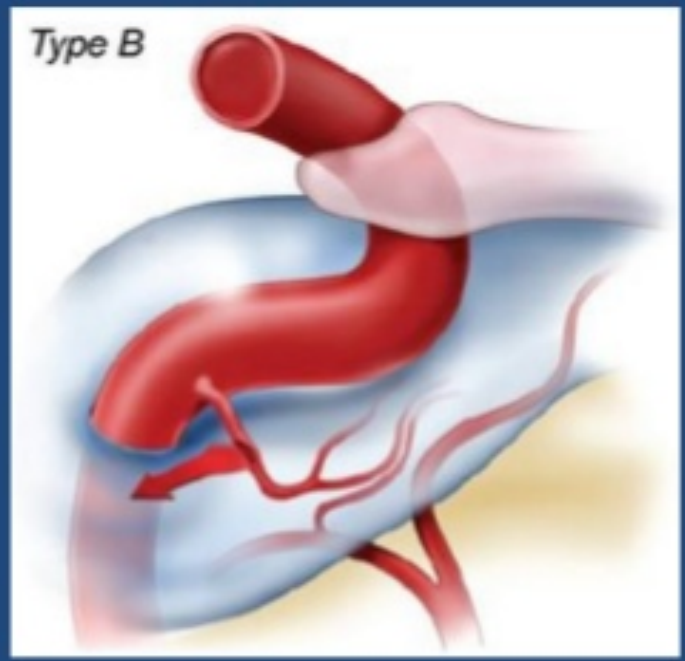
- Retinal venous congestion and haemorrhages

TYPES

due to slow rising in cavernous sinus pressure won't present as the direct fistula symptoms & signs.
→ Asymptomatic, tortous veins, ↑ IOP.

- Type A
  - Between the intracavernous internal carotid artery and cavernous sinus
- Type B
  - Between meningeal branches of the internal carotid artery and cavernous sinus





(Barrow DL, Spector RH, Braun IF, Landman JA, Tindall SC, Tindall GT: Classification and treatment of spontaneous carotid-cavernous sinus fistulas. **J Neurosurg 62**:248–256, 1985)

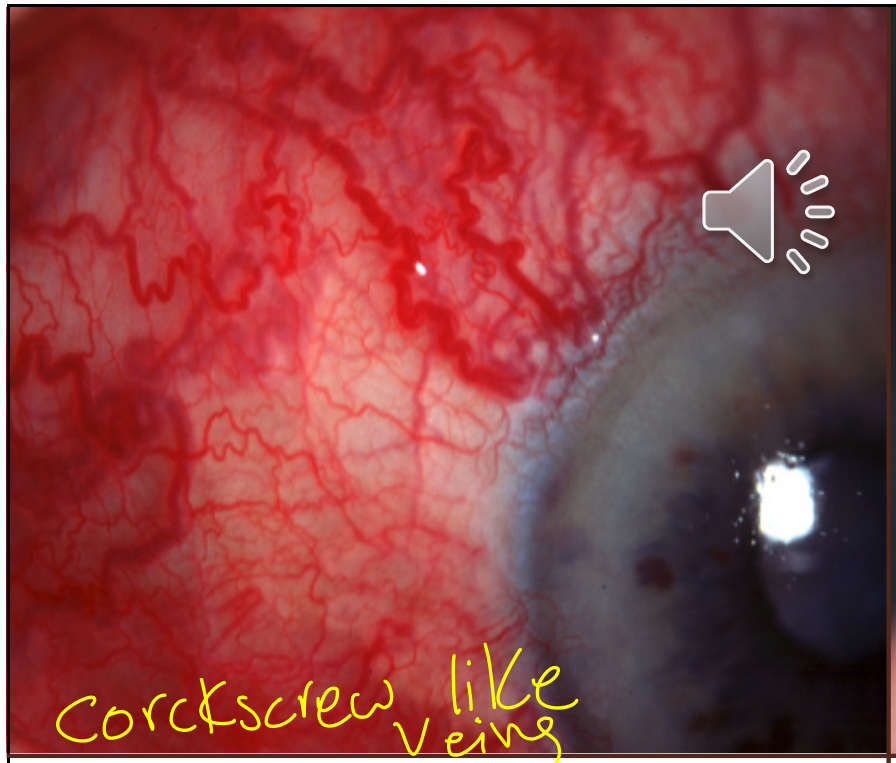
Indirect carotid-cavernous fistula(dural shunt)

- **Indirect communication between meningeal branches of internal or external carotids and cavernous sinus, Slow flow shunt**

Causes

- **Congenital malformations**
- **Spontaneous rupture**

The problem is with production of aqeous rather than filtration.
⇒ won't respond to usual drugs.
we use ⇒ Dorzolamide (carbonic anhydrase inhibitor)



- **Dilated episcleral vessels**
- **Raised intraocular pressure with wide pulsation**

- **Occasional ophthalmoplegia and mild proptosis**

Orbital infection

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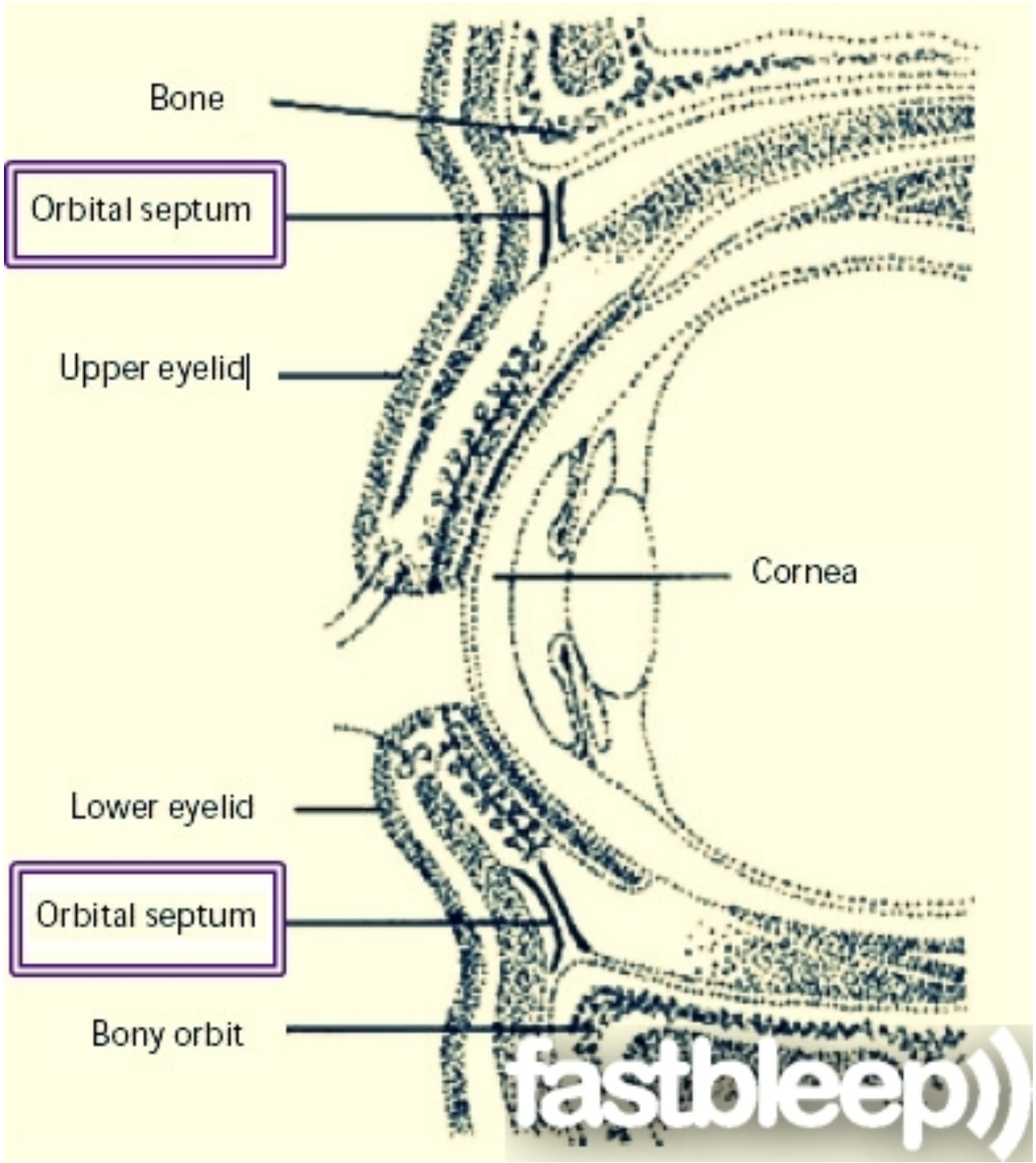
ORBITAL INFECTIONS AND INFLAMMATIONS

1. Orbital cellulitis
2. Idiopathic orbital inflammatory disease (IOID)
3. Dacryoadenitis
4. Orbital myositis


Bone
Orbital septum
Upper eyelid
Cornea
Lower eyelid
Orbital septum
Bony orbit

Orbital cellulitis

- Infection behind orbital septum
- Usually secondary to ethmoiditis

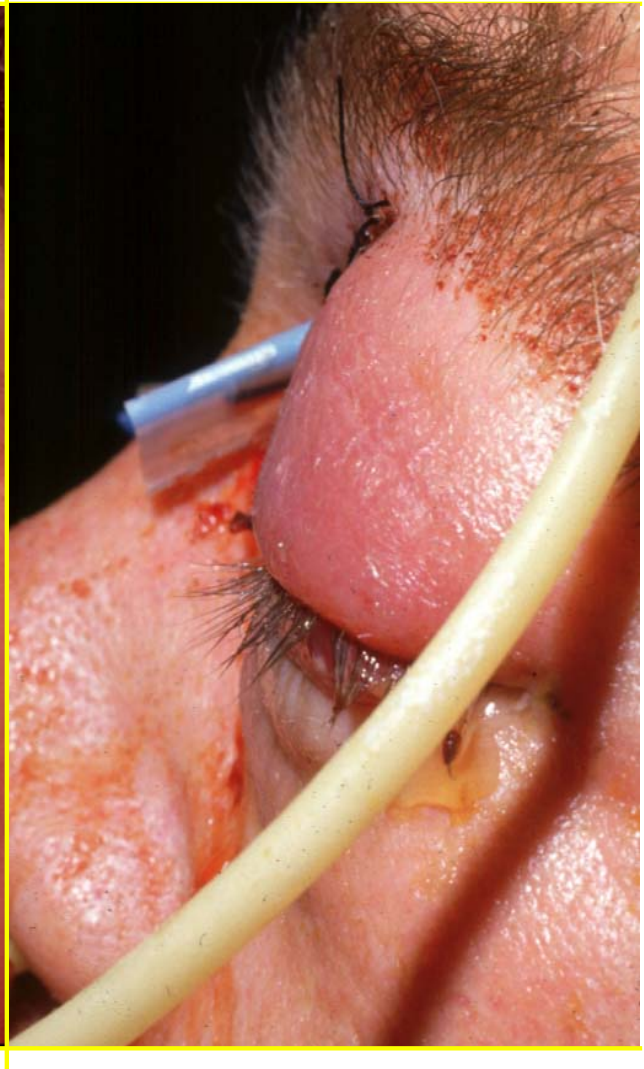
- Presentation - severe malaise, fever and orbital signs

Signs

- Severe eyelid oedema and redness
- Proptosis - most frequently lateral and down
- Painful ophthalmoplegia
- Optic nerve dysfunction if advanced

Complications of orbital cellulitis

- Raised intraocular pressure
- Retinal vasculature occlusion
- Optic neuropathy

Orbital	Intracrania
	
• Orbital or subperiosteal abscess	• Meningitis, brain abscess • Cavernous sinus thrombosis

Management of orbital

Pre-treatment

Post-treatment

1. Hospital admission

2. Systemic antibiotic therapy

3. Monitoring of optic nerve function

4. Indications for surgery

- Resistance to antibodies
- Orbital or subperiosteal abscess
- Optic neuropathy

Idiopathic orbital inflammatory disease (IOID)

- Non-neoplastic, non-infectious orbital lesion (pseudotumour)
- Involves any or all soft-tissue components
- Presentation - 20 to 50 years with abrupt painful onset

- Usually unilateral
- Periorbital swelling and chemosis
- Proptosis
- Ophthalmoplegia

Clinical course and treatment of IOID

1. Early spontaneous remission without sequelae

   Treatment - nil

2. Prolonged intermittent activity with eventual remission

   Treatment options - steroids, radiotherapy or cytotoxics

3. Severe prolonged activity causing a 'frozen orbit'

Left involvement resulting in ophthalmoplegia and ptosis

Dacryoadenitis

- Occurs in 25% of patients with IOID
- Usually affects otherwise healthy individuals - no treatment required

- Presentation - acute discomfort over lacrimal gland

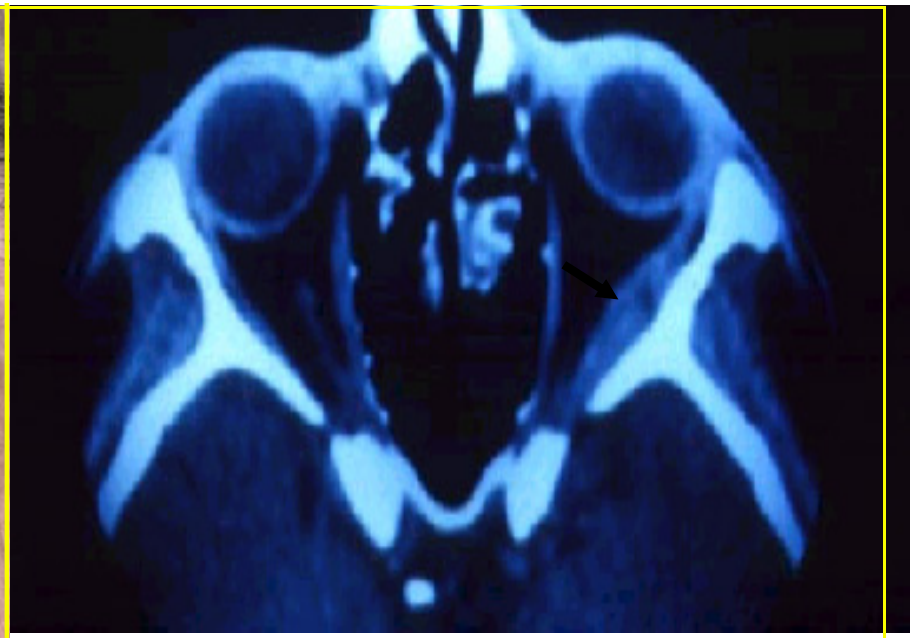
- Oedema of lateral aspect of upper lid
- Mild downward and inward globe displacement

- Injection and tenderness of palpebral lobe of lacrimal gland
- Reduction in tear secretion

Orbital myositis

- Subtype of IOID
- Involvement of one or more extraocular muscles
- Clinical course is usually short - treat with NSAIDs
- Presentation - sudden onset of pain on ocular movement

- Underaction of left lateral rectus
- Worsening of pain on attempted left gaze



- CT shows fusiform enlargement of left lateral rectus