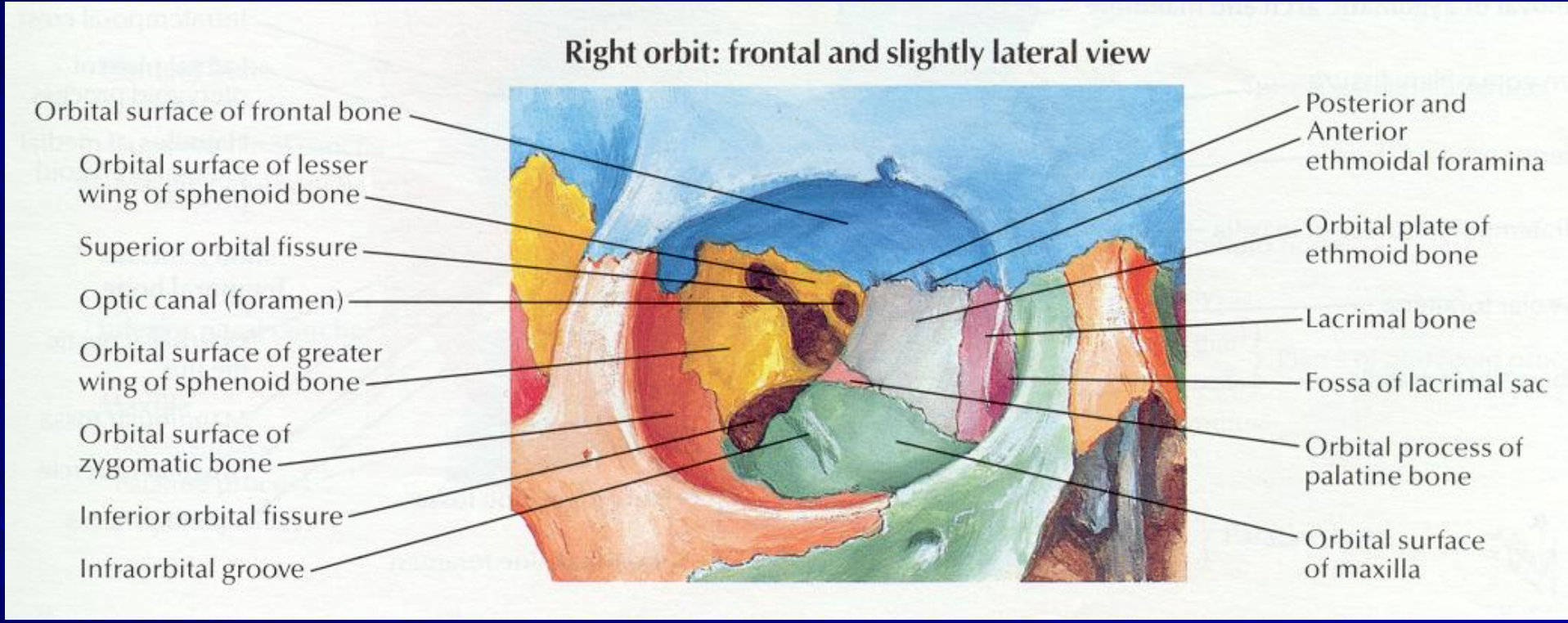
Orbit and Oculoplastics

Adel Alsuhaibani, MD

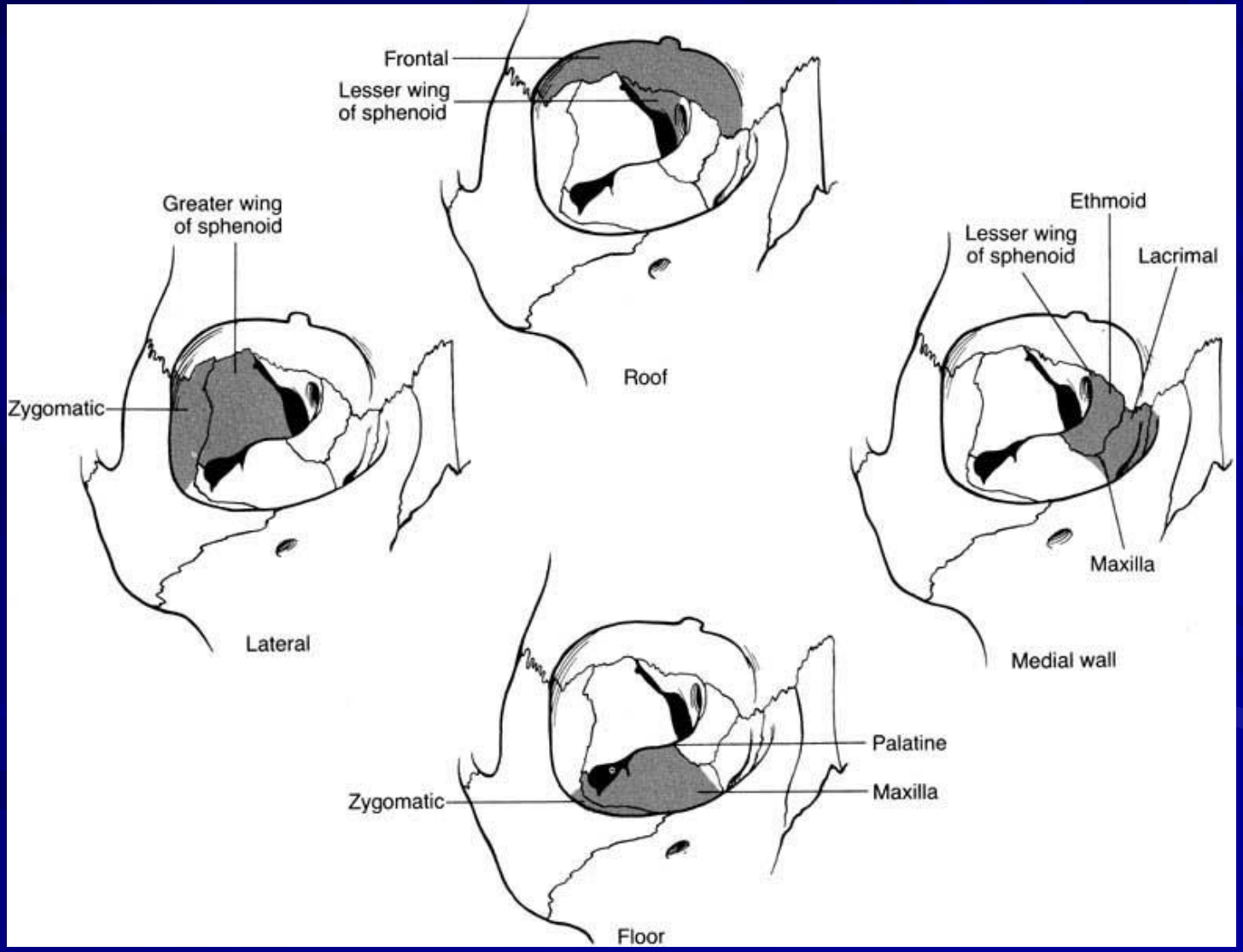
Goals and objectives

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

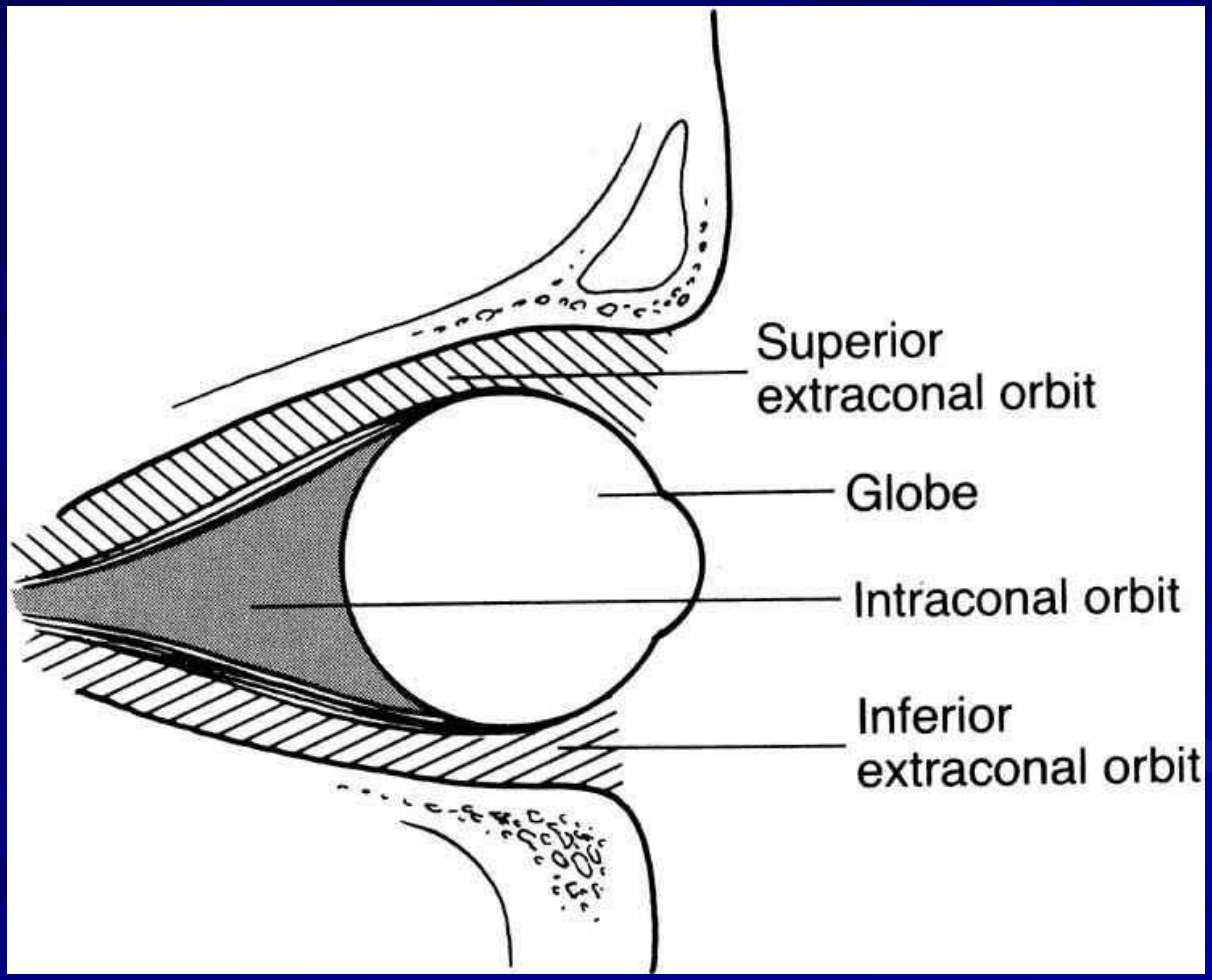
Anatomy


Right orbit: frontal and slightly lateral view
Orbital surface of frontal bone
Orbital surface of lesser wing of sphenoid bone
Superior orbital fissure
Optic canal (foramen)
Orbital surface of greater wing of sphenoid bone
Orbital surface of zygomatic bone
Inferior orbital fissure
Infraorbital groove
Posterior and Anterior ethmoidal foramina
Orbital plate of ethmoid bone
Lacrimal bone
Fossa of lacrimal sac
Orbital process of palatine bone
Orbital surface of maxilla

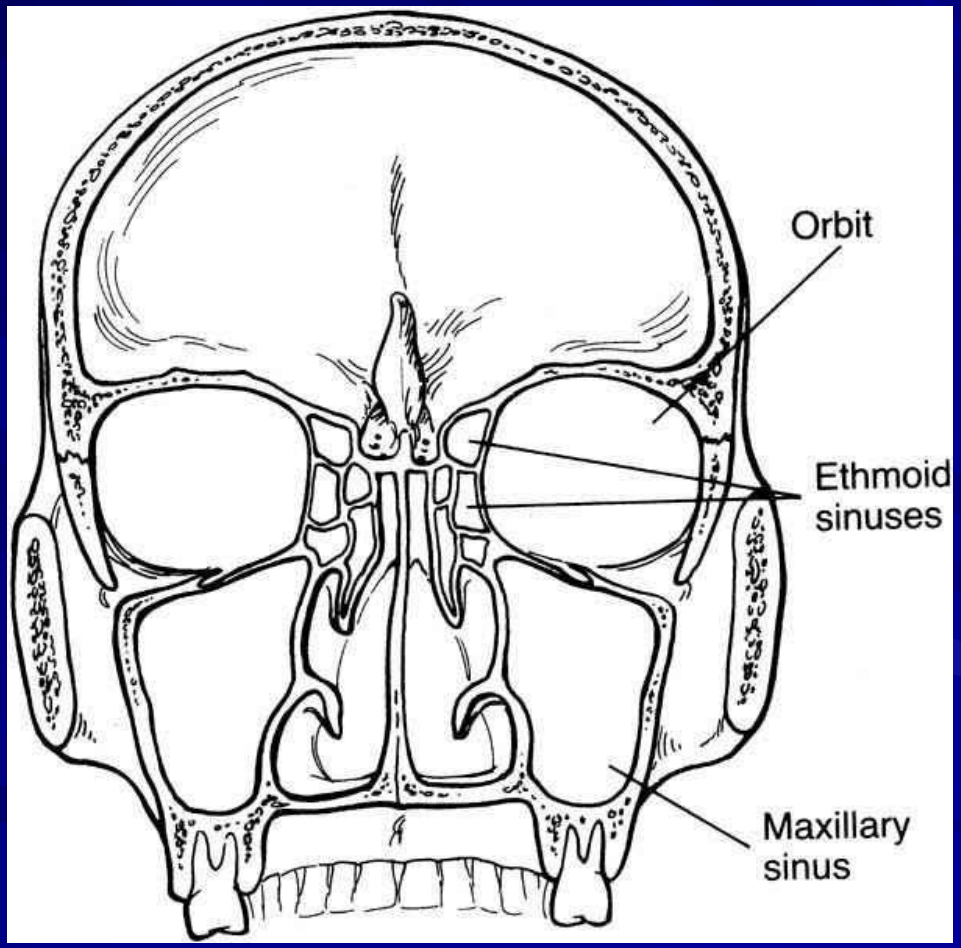
Bones


Frontal
Lesser wing of sphenoid
Roof
Greater wing of sphenoid
Zygomatic
Lateral
Ethmoid
Lesser wing of sphenoid
Lacrimal
Maxilla
Medial wall
Palatine
Zygomatic
Maxilla
Floor

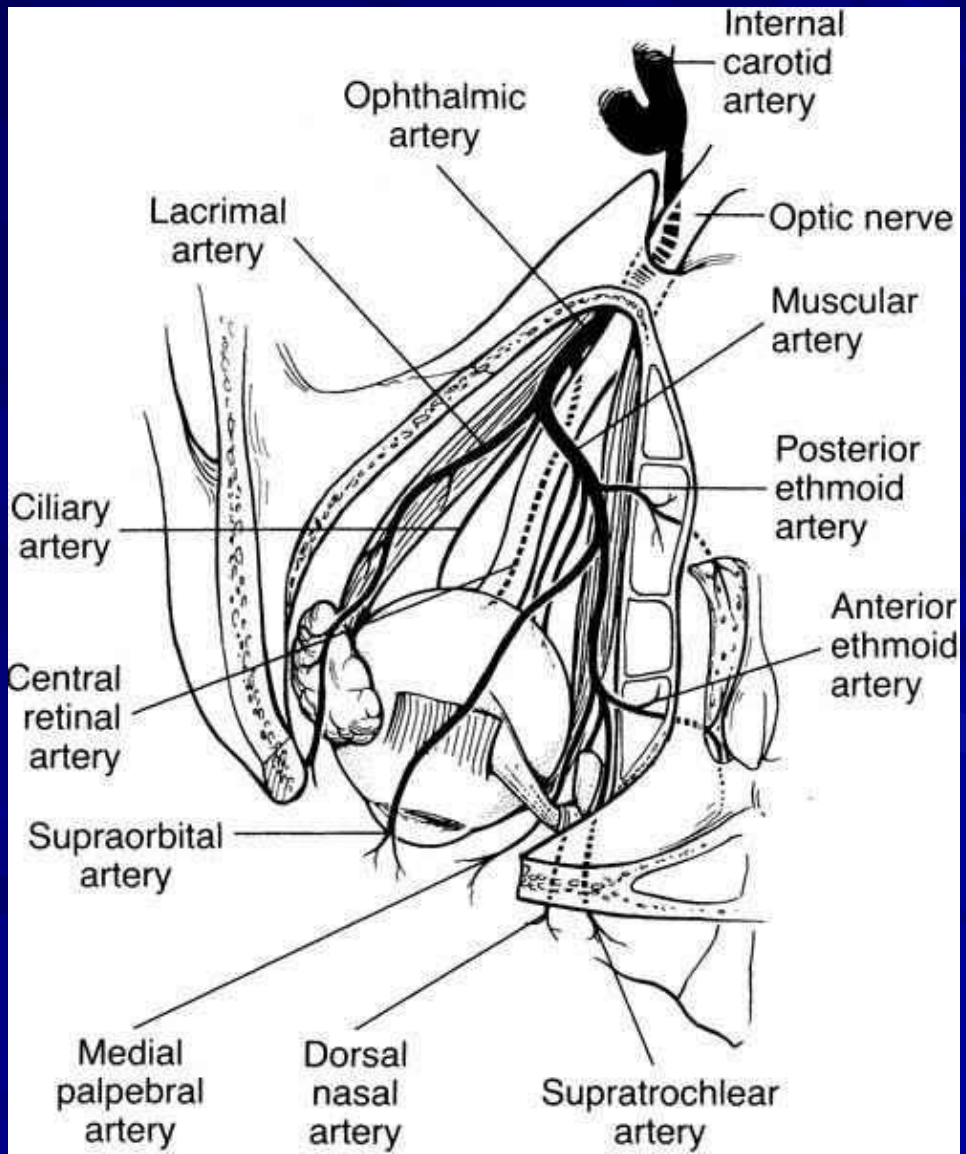
Orbital Compartments



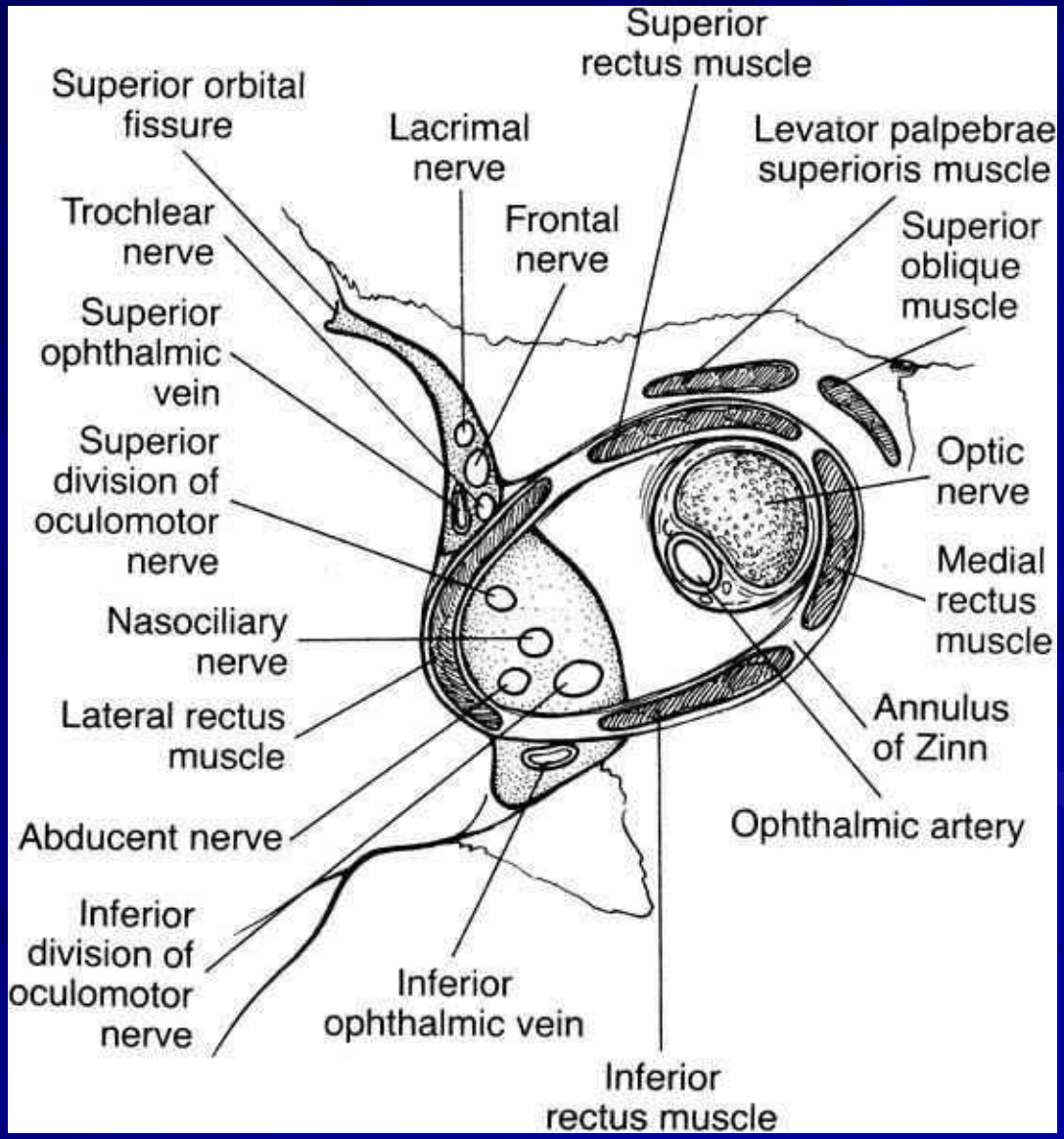
Sinuses



Blood Supply



Annulus of Zinn



Evaluation

- 7 P's
  - Pain
  - Proptosis
  - Progression
  - Palpation
  - Pulsation
  - Periorbital changes
  - Past medical history

Pain

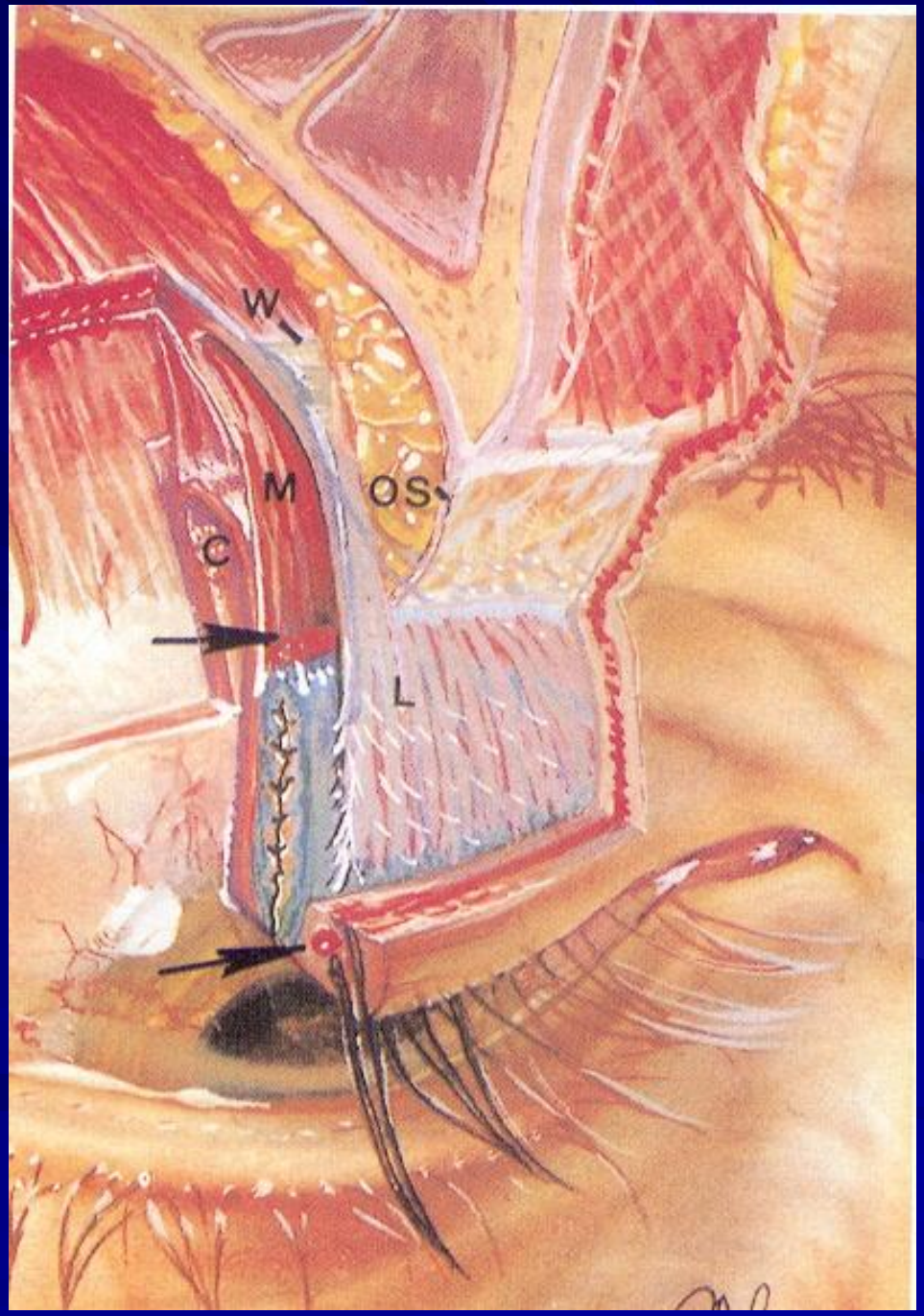
- Infection
- Inflammation
- Hemorrhage
- Malignant Lacrimal Gland Tumor

Progression
Minutes to Hours

- Hemorrhage
- Lymphangioma
- Varix (upon valsalva)

Progression
Days to Weeks

- Children: capillary hemangioma, rhabdomyosarcoma, retinoblastoma, neuroblastoma, leukemia
- Inflammatory disease: idiopathic orbital inflammatory disease, thrombophlebitis, thyroid orbitopathy, recurrent inflamed dermoid
- Infection: 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


W
M
C
OS
L

Infection

- Preseptal Cellulitis
  - Vision, motility, pupils, VF, disc are WNL
  - globe itself is not proptotic
- Orbital Cellulitis
  - 90% secondary to sinus disease
  - high risk of morbidity and mortality
    - orbital abscess
    - brain abscess
    - cavernous sinus thrombosis

Allergic Eyelid Swelling

Progression
Months to Years

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

Proptosis

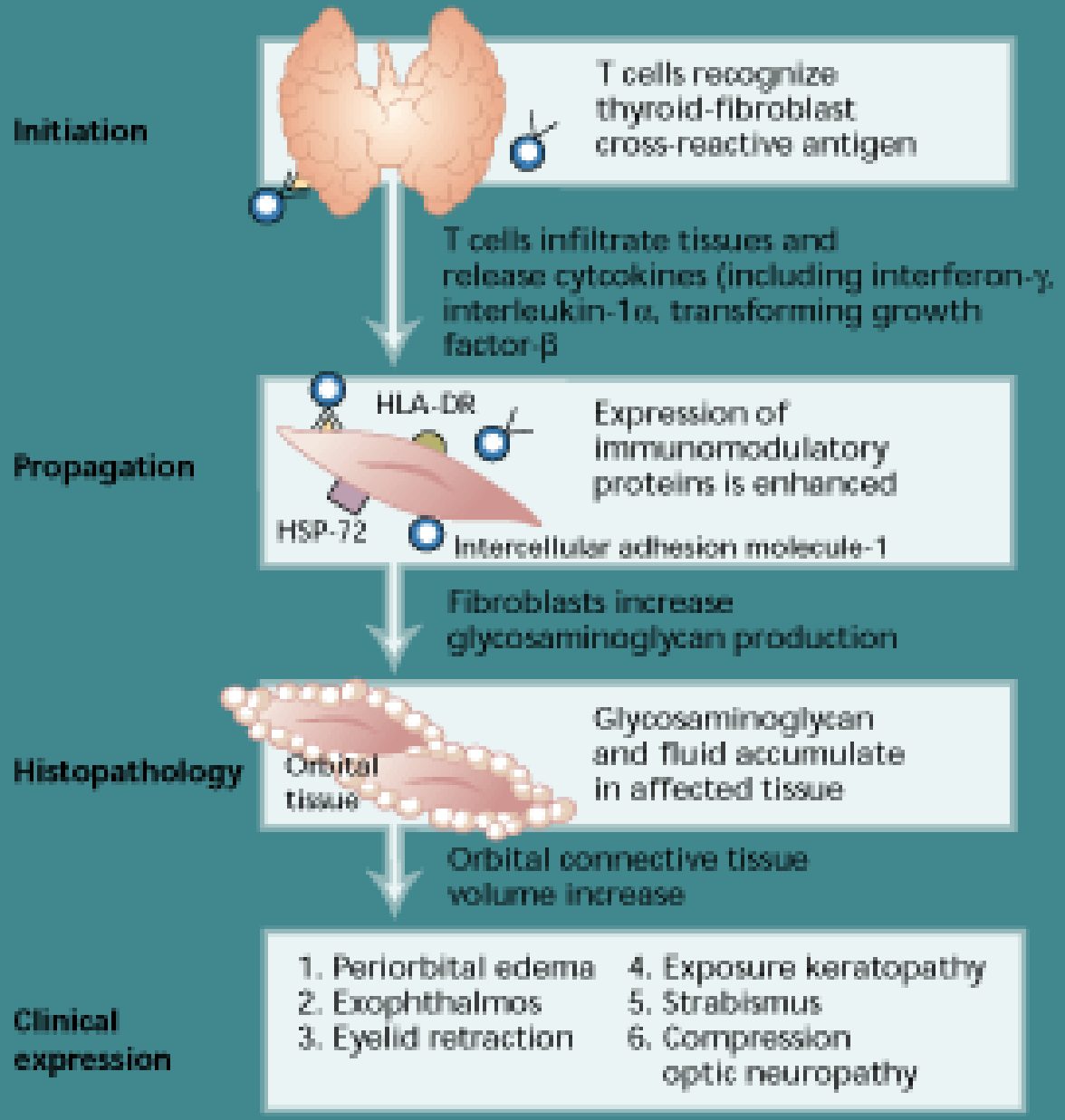
- Primary orbital neoplasms usually unilateral
- Bilateral proptosis seen in inflammatory, immune processes or systemic diseases

Proptosis

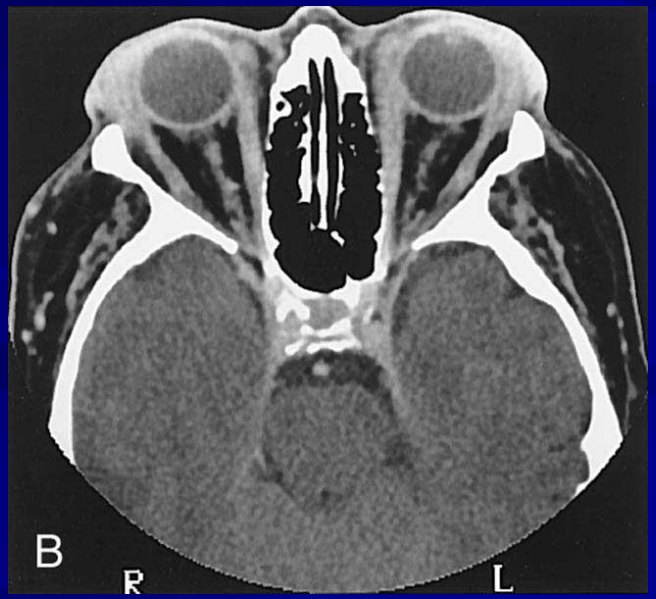
- Inflammatory
  - Thyroid disease – most common cause
  - Orbital pseudotumor
  - Wegener granulomatosis
- Infection (orbital abscess, cellulitis)
- Vascular
  - Orbital hemorrhage
  - Lymphangioma (sudden)
  - C-C fistula
  - Orbital varices-proptosis with Valsalva
- Tumor
  - Benign: cavernous hemangioma, lymphangioma
  - Malignant: adenoid cystic carcinoma, lymphoma, glioma
  - Contiguous: sinus, intracranial nasopharynx, skin
  - Metastatic - lymphoma, leukemia, neuroblastoma
  - Rhabdomyosarcoma

Inflammation

- Graves disease
  - Most common cause of unilateral or bilateral proptosis
  - May occur with any thyroid status
  - Eye disease not controlled by thyroid ablation
  - Treatment options
    - steroids
    - radiation
    - optic nerve decompression


Initiation
T cells recognize thyroid-fibroblast cross-reactive antigen
T cells infiltrate tissues and release cytokines (including interferon-γ, interleukin-1α, transforming growth factor-β
Propagation
HLA-DR
Expression of immunomodulatory proteins is enhanced
HSP-72
Intercellular adhesion molecule-1
Fibroblasts increase glycosaminoglycan production
Histopathology
Orbital tissue
Glycosaminoglycan and fluid accumulate in affected tissue
Orbital connective tissue volume increase
Clinical expression
1. Periorbital edema
2. Exophthalmos
3. Eyelid retraction
4. Exposure keratopathy
5. Strabismus
6. Compression optic neuropathy

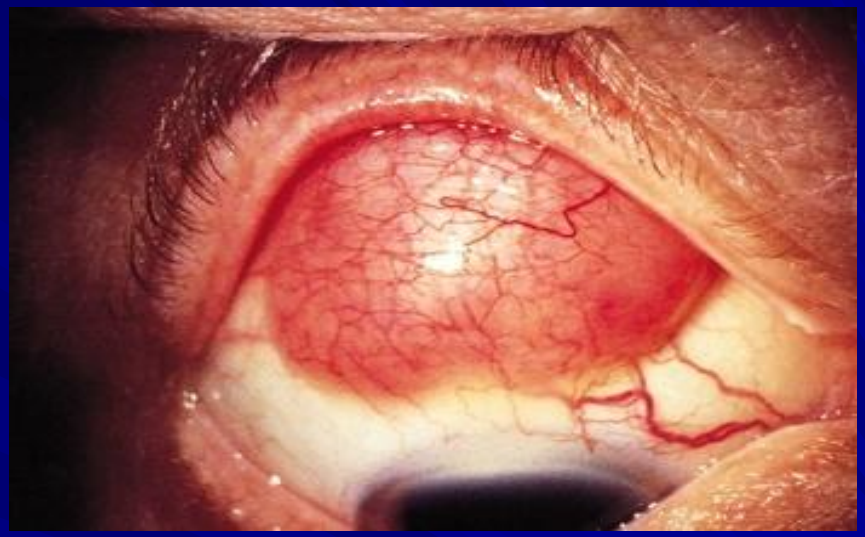
Inflammation



- Idiopathic orbital inflammation
  - orbital pseudotumor
  - myositis
  - prompt response to steroids
  - OU or systemic→think vasculitis (*except in kids)
- Sarcoidosis
  - lacrimal gland
- Vasculitis
  - GCA, PAN, SLE, Wegener's granulomatosis

Lymphoproliferative Disorders

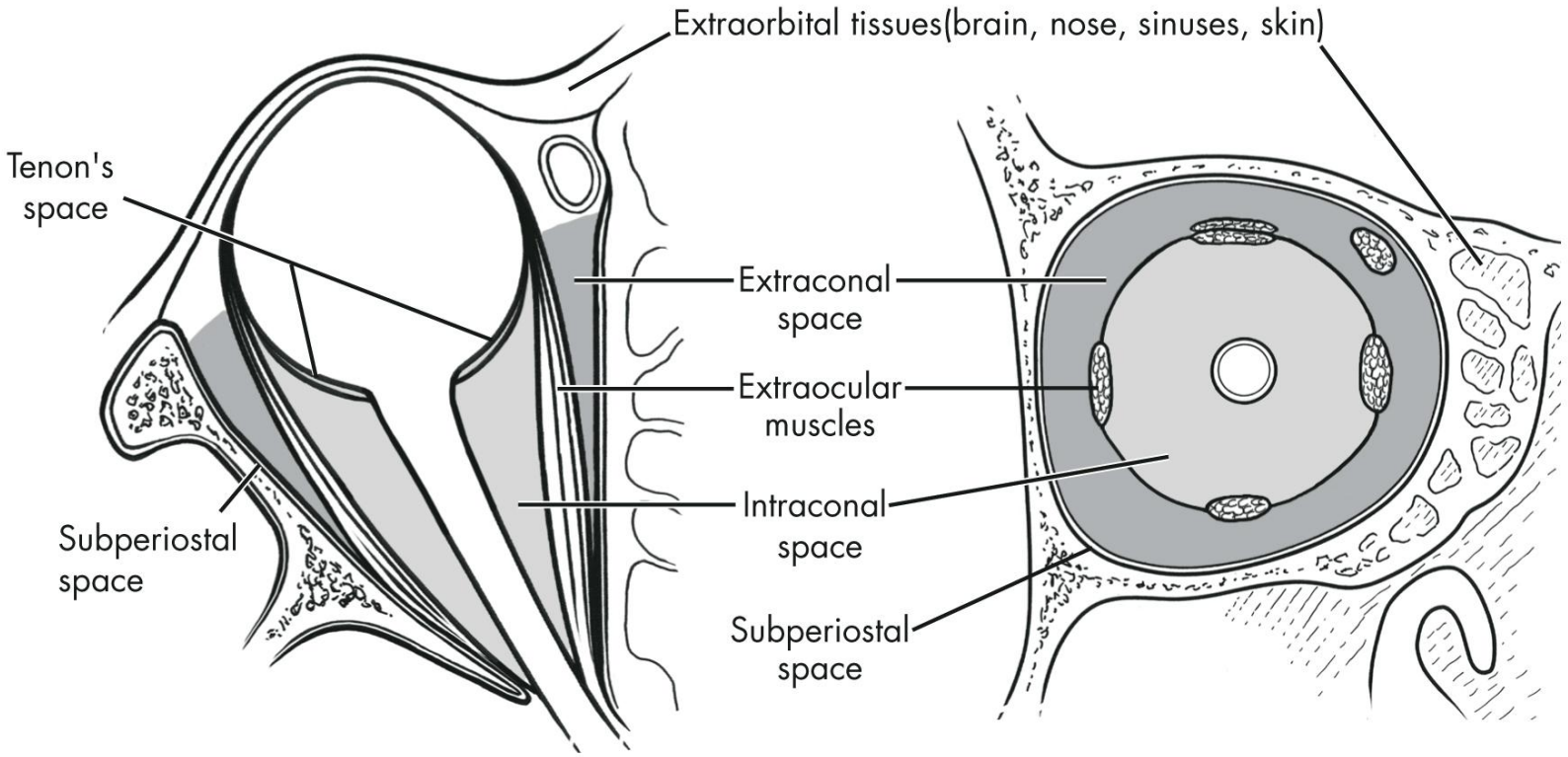
- Lymphoid hyperplasia and lymphoma
  - 20% of all orbital mass lesions
  - salmon patch appearance
  - molds to orbital structures
  - 50% arise in lacrimal fossa
  - 17% bilateral
- Plasma cell tumors
- Histiocytic disorders
  - macrophage based d/o

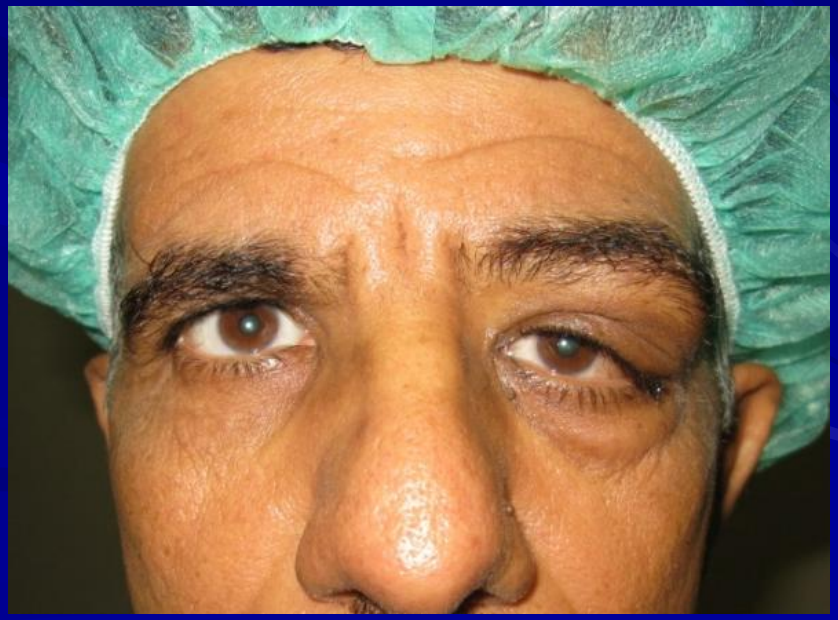


Proptosis

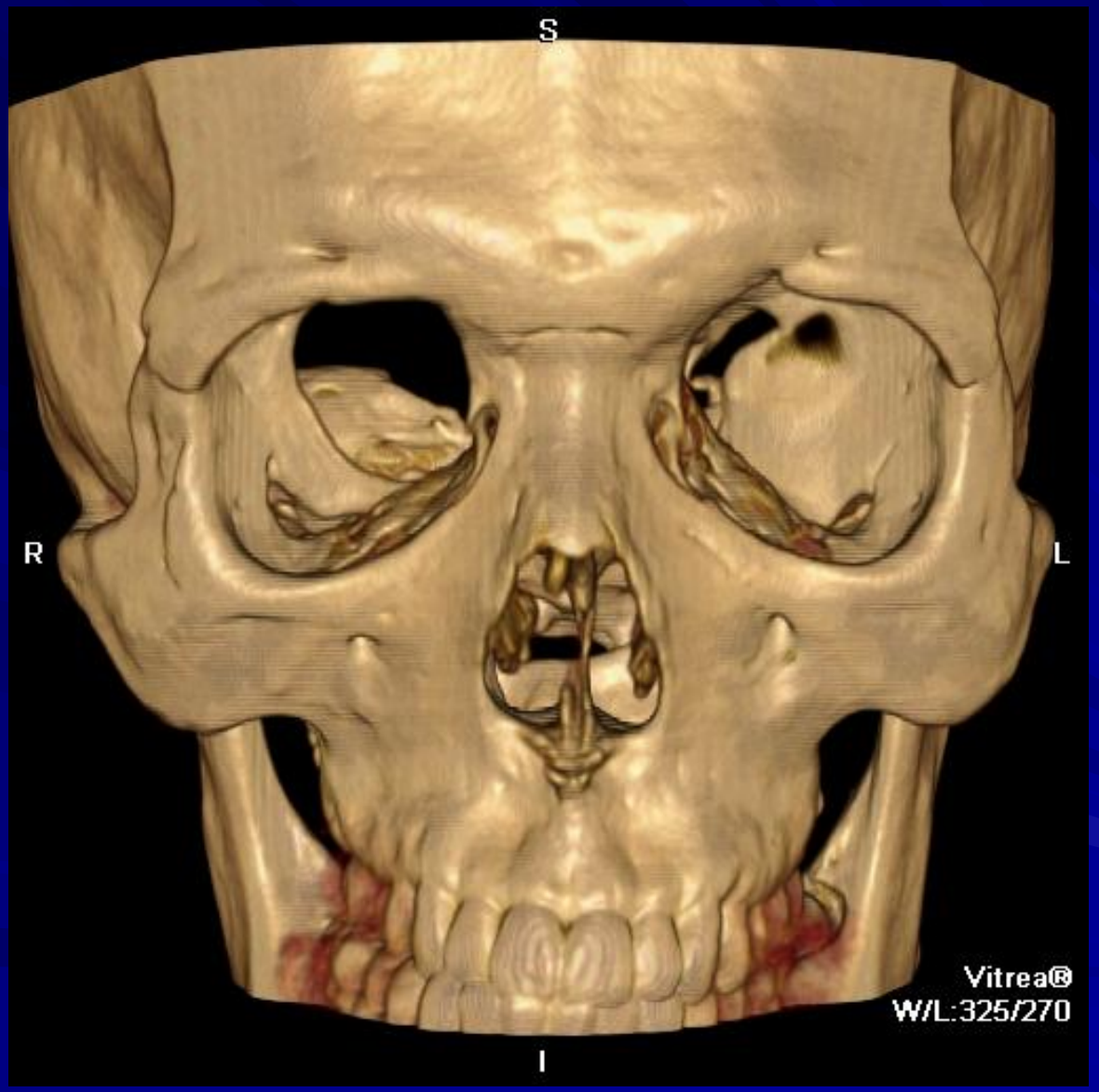
- Axial
- Non- axial
- Pulsital

Proptosis


Extraorbital tissues(brain, nose, sinuses, skin)
Tenon's space
Extraconal space
Extraocular muscles
Intraconal space
Subperiostal space
Subperiostal space

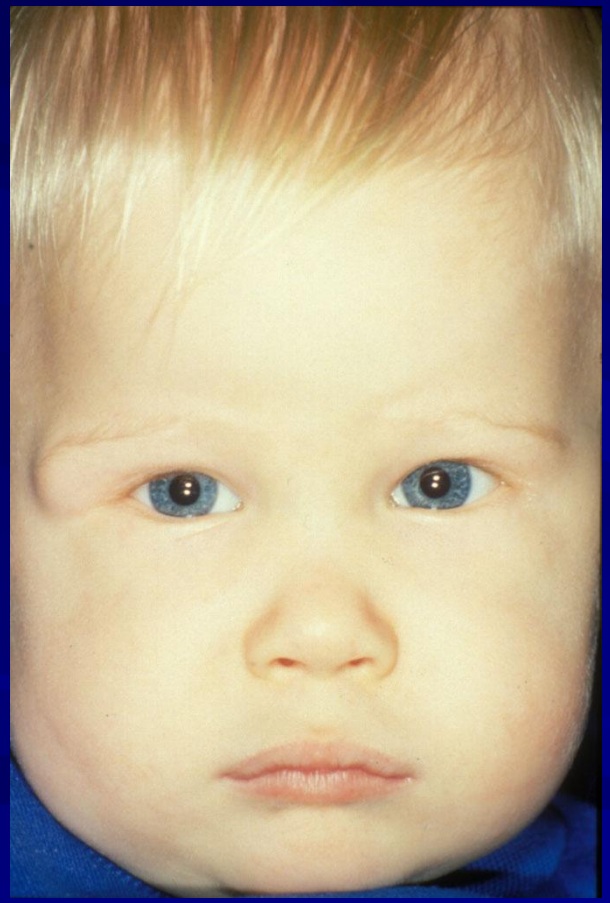


- Wilford.mpg


S
R
L
I
Vitrea®
W/L:325/270

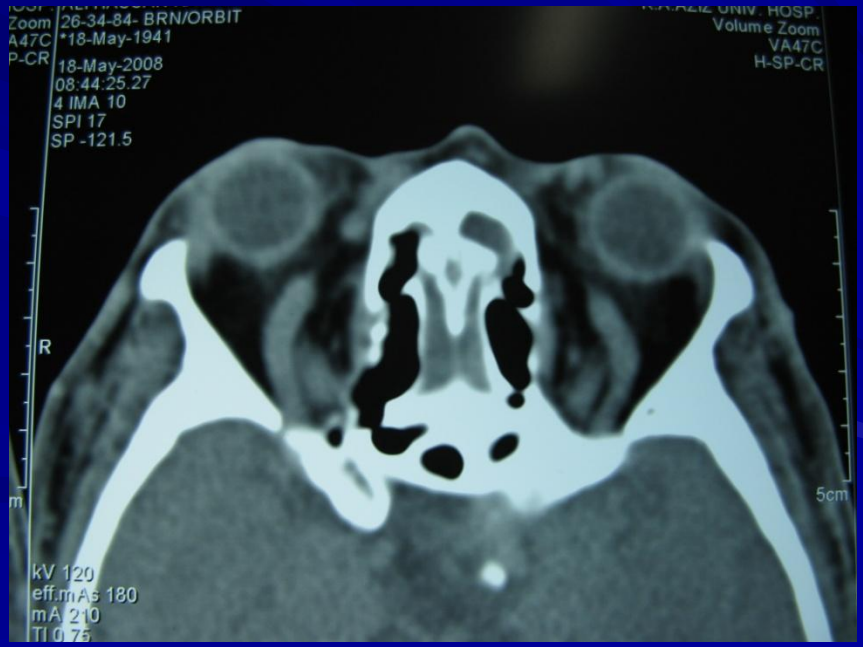
Pseudoproptosis

Palpation

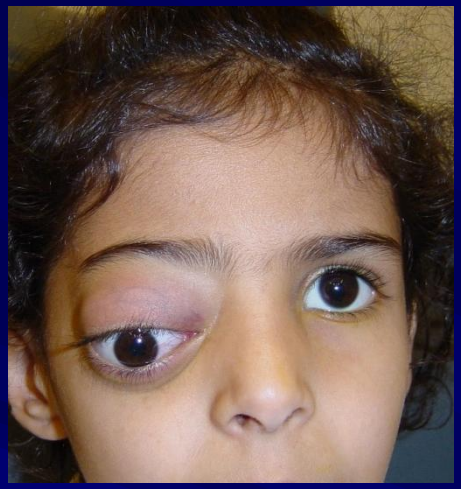


Pulsation

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


Zoom
A47C
P-CR
26-34-84- BRN/ORBIT
*18-May-1941
18-May-2008
08:44:25.27
4 IMA 10
SPI 17
SP -121.5
Volume Zoom
VA47C
H-SP-CR
R
5cm
kV 120
eff.mAs 180
mA 210

Periorbital Changes



Rhabdomyosarcoma

- Most common primary orbital malginancy of childhood
- Average age: 7-8
- Sudden onset and rapid evolution of unilateral proptosis
- 90% survival

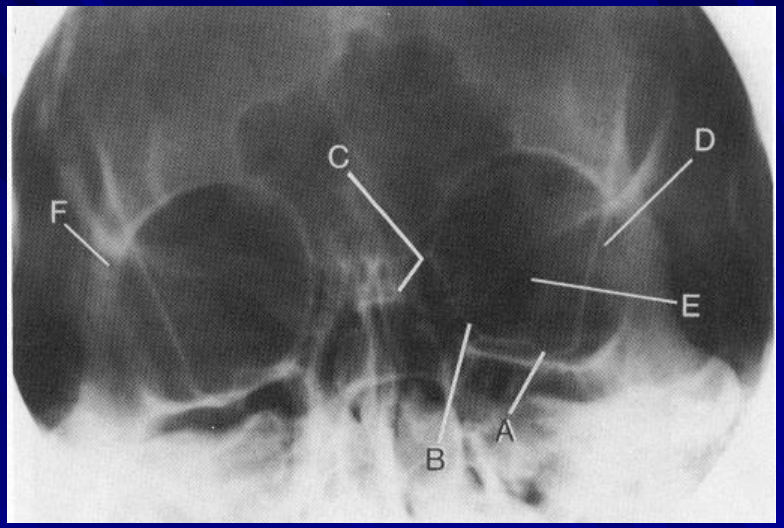
Past Medical History

Imaging options

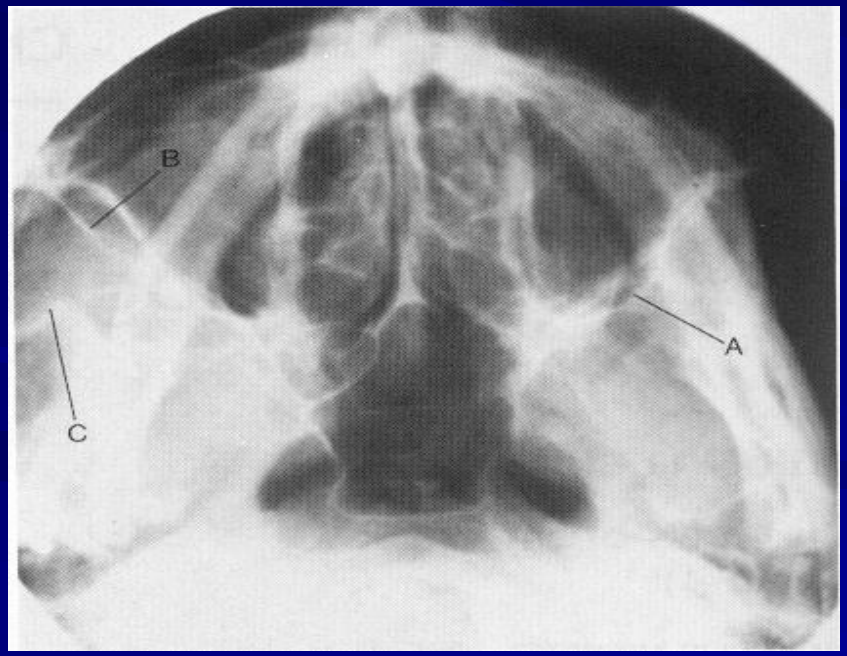
- Plain films
- CT scan
- MRI
- Ultrasound

Plain films

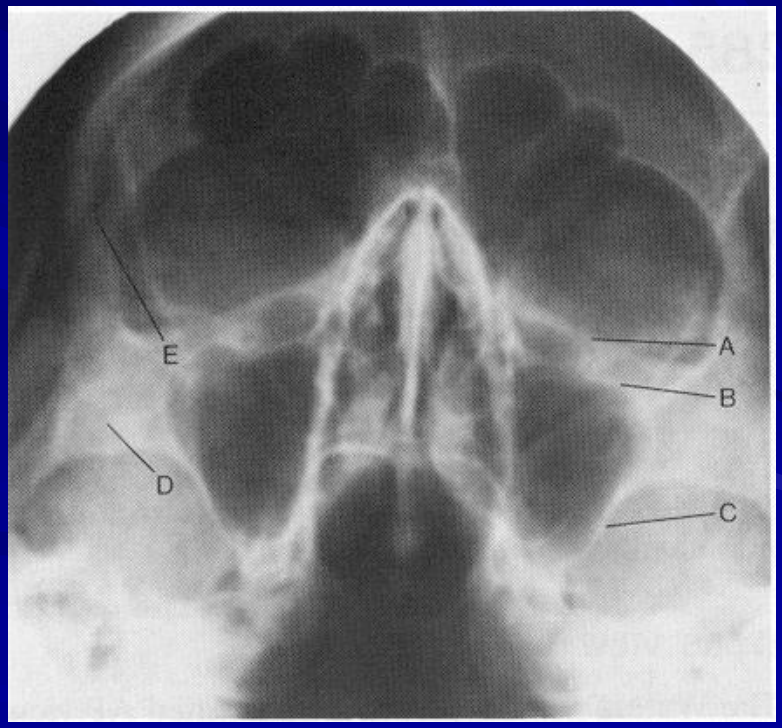
- Quick
- R/o foreign bodies
- Infrequently used



Caldwell's view



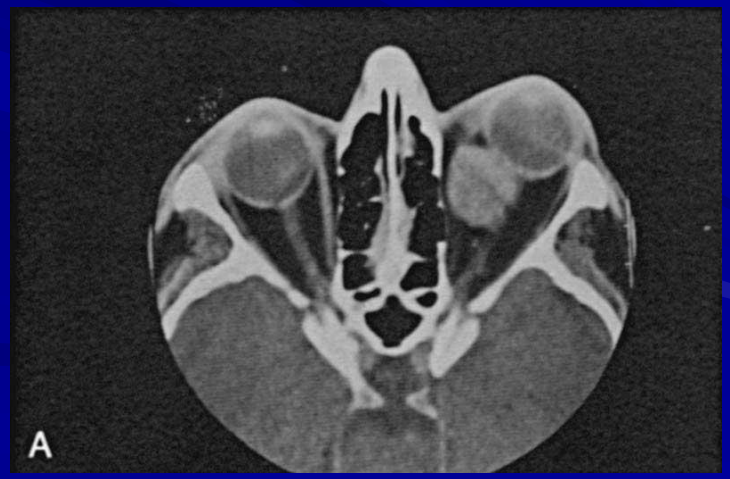
Base view



Waters' view

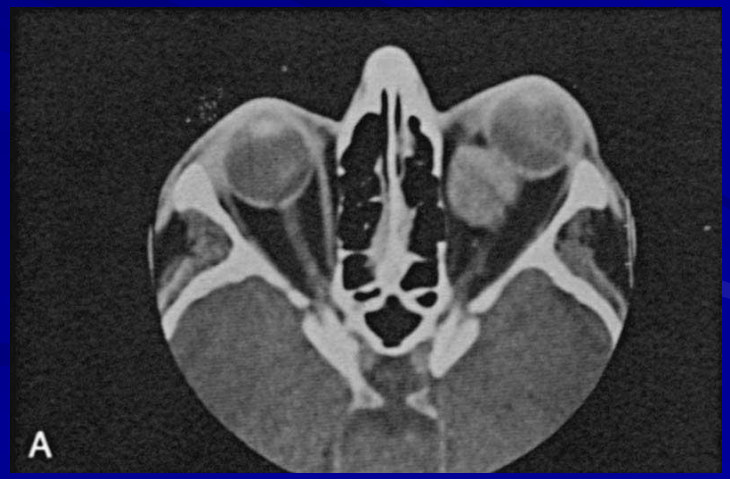
CT Scan

- Strengths
  - spatial resolution
  - bone
    - fractures
    - bone destruction
    - calcification
  - quick- emergencies
    - trauma
  - cheaper

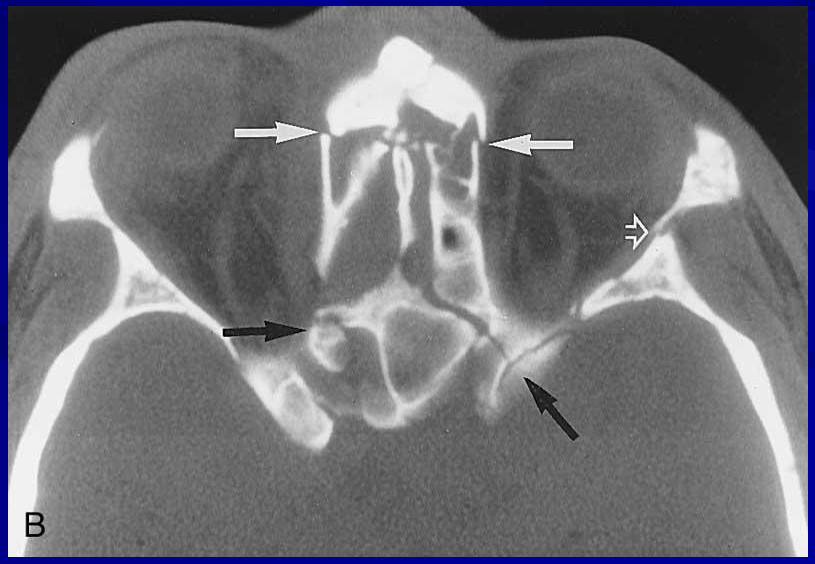


CT Scan

- Weakness
  - radiation: 1-2 cGy
  - soft tissue definition
  - contrast iodinated
    - allergy
  - may need MRI anyway
    - (not cheaper)
- Protocols
  - axial and coronal
  - +/- contrast



Describe the study



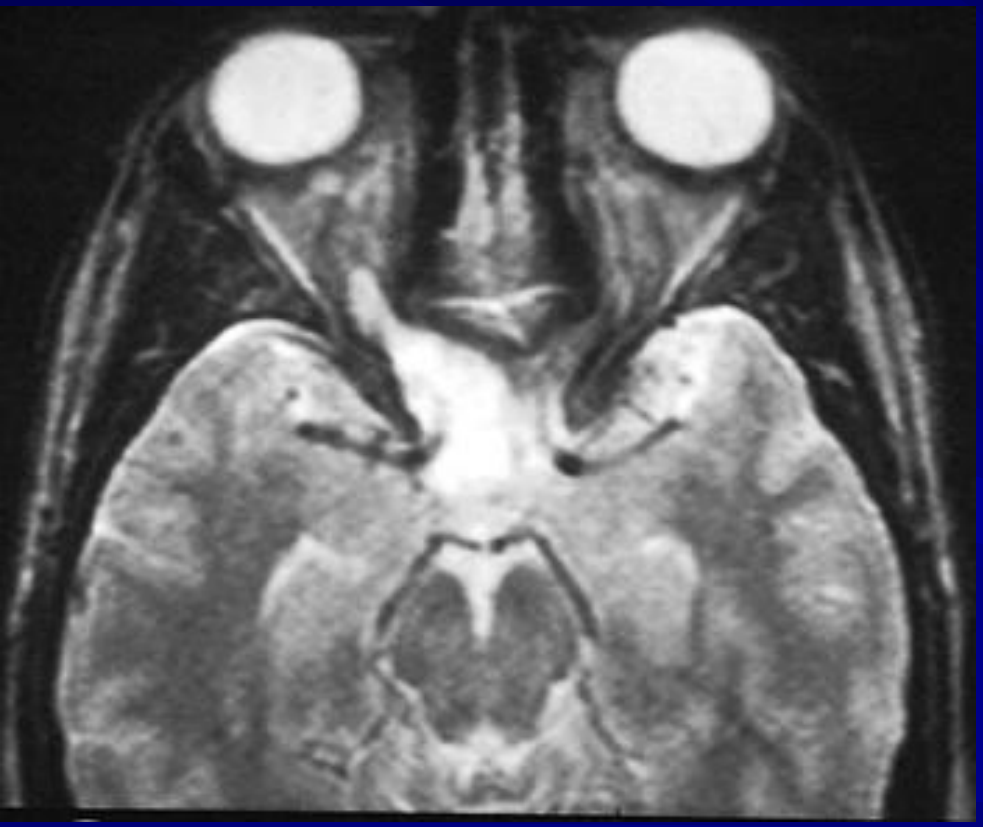
MRI

- Strengths
  - Tissue
    - T1→anatomy
    - T2→pathology
  - No radiation
- Weaknesses
  - magnetic
    - pacemakers, surgical clips
  - claustrophobia

MRI

- Protocols
  - Axial/coronal/sagittal
  - Gadolinium contrast
    - non-iodinated
    - allergies RARE
  - orbital lesions
    - fat suppression

Name the study



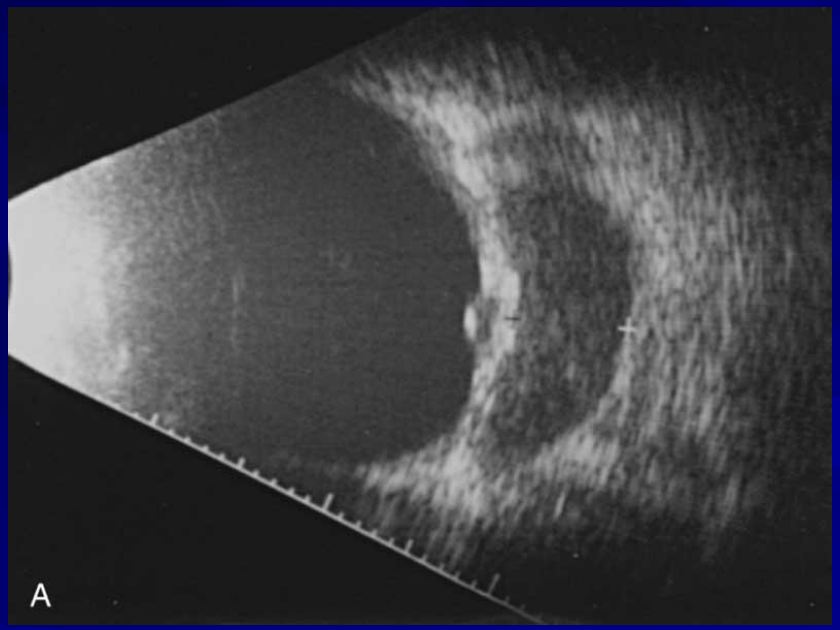
T1 or T2?

Axial/coronal/sagittal ?

Contrast ?

Lesion ?

Orbital Echography

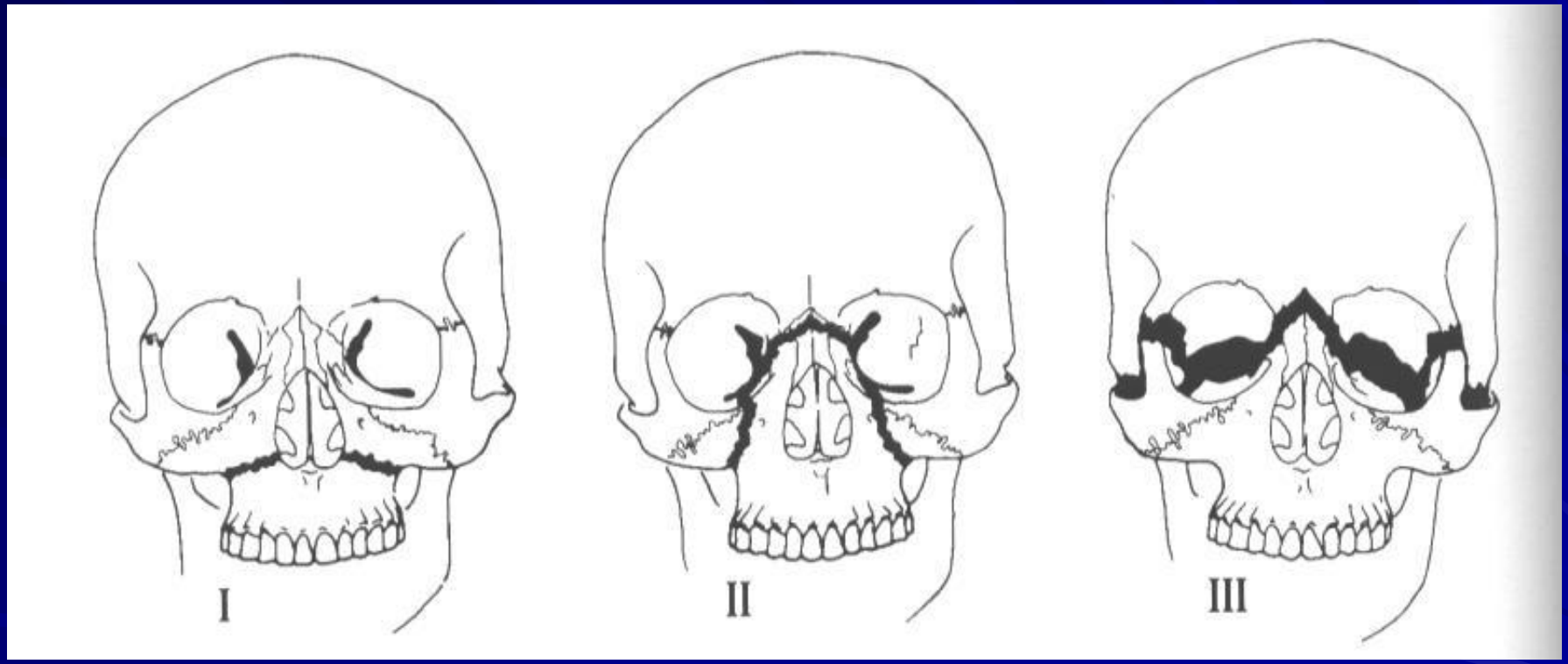


- Dynamic
- Less expensive +/-
- Availability variable

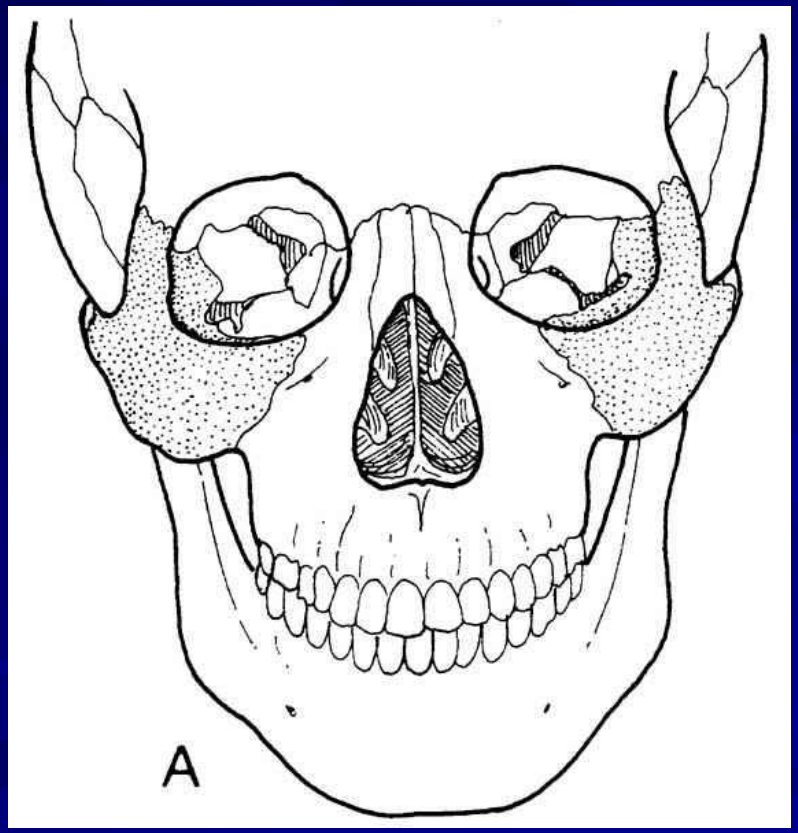
Facial trauma and fractures

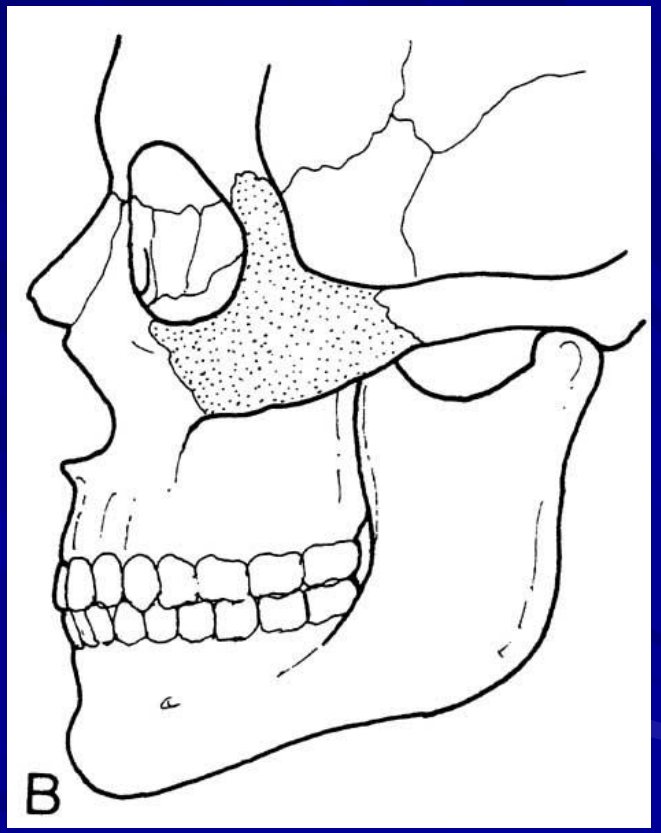
- Midfacial fractures
- ZMC fracture
- Wall and floor fractures
  - medial wall- lamina papyracea
  - orbital floor- blow out vs rim involvement
  - lateral wall and orbital roof- less common
- Optic canal fractures
  - traumatic optic neuropathy

LeForte Fractures

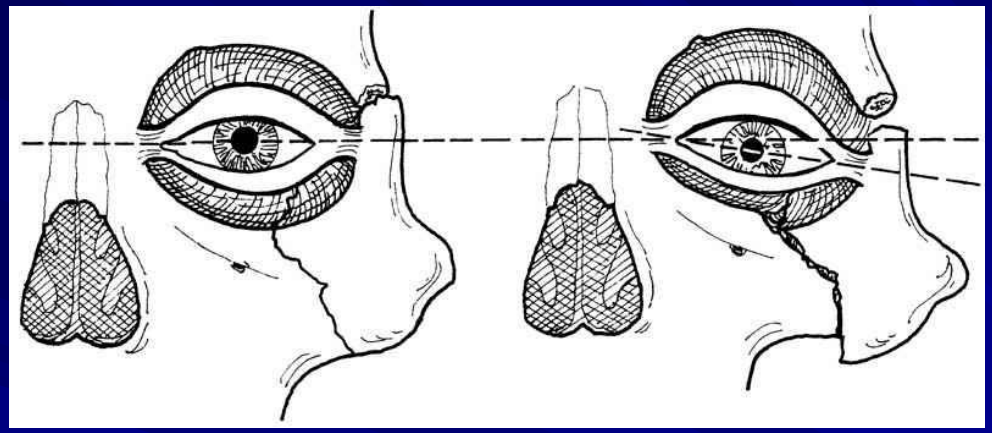


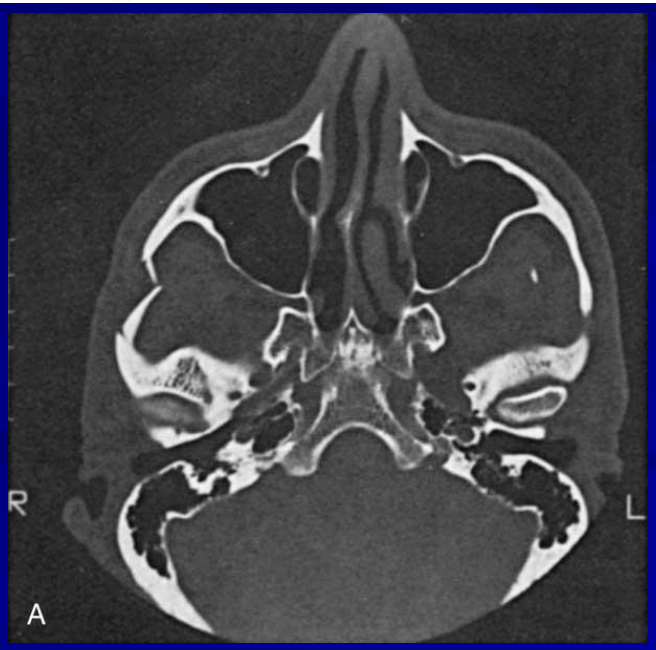
Zygoma



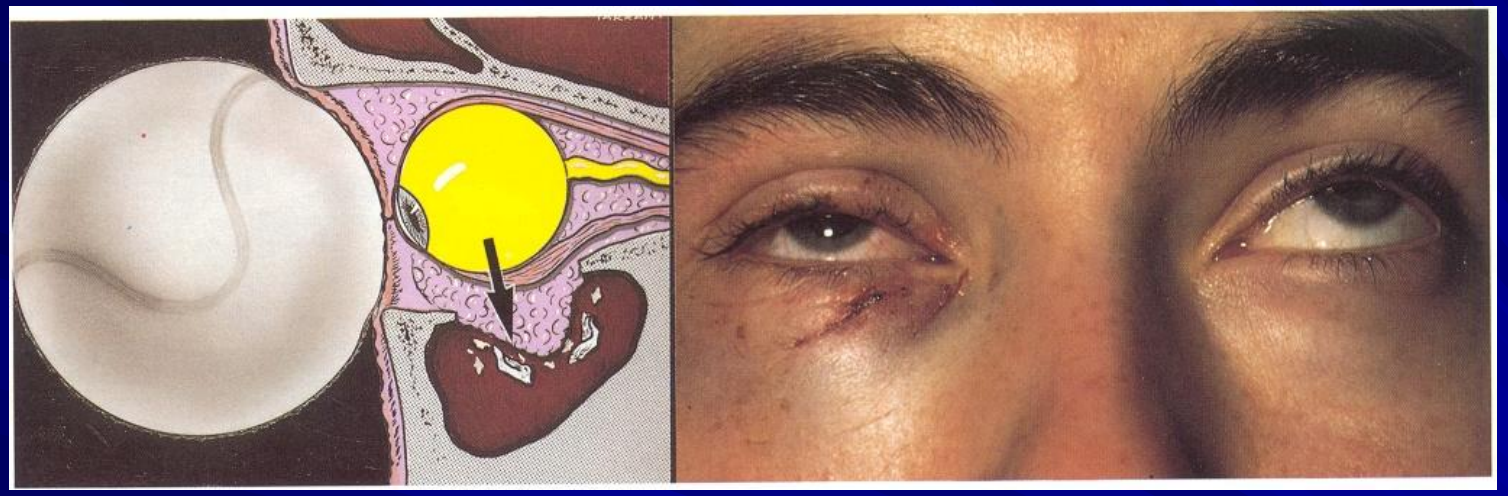


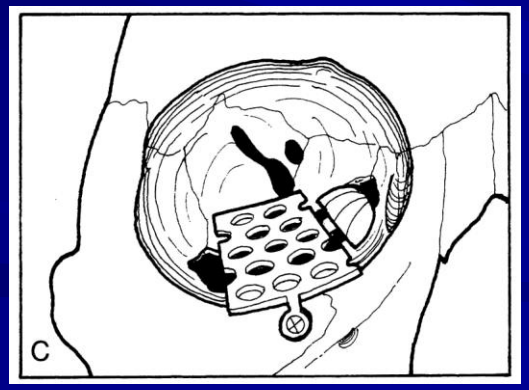
ZMC Fractures



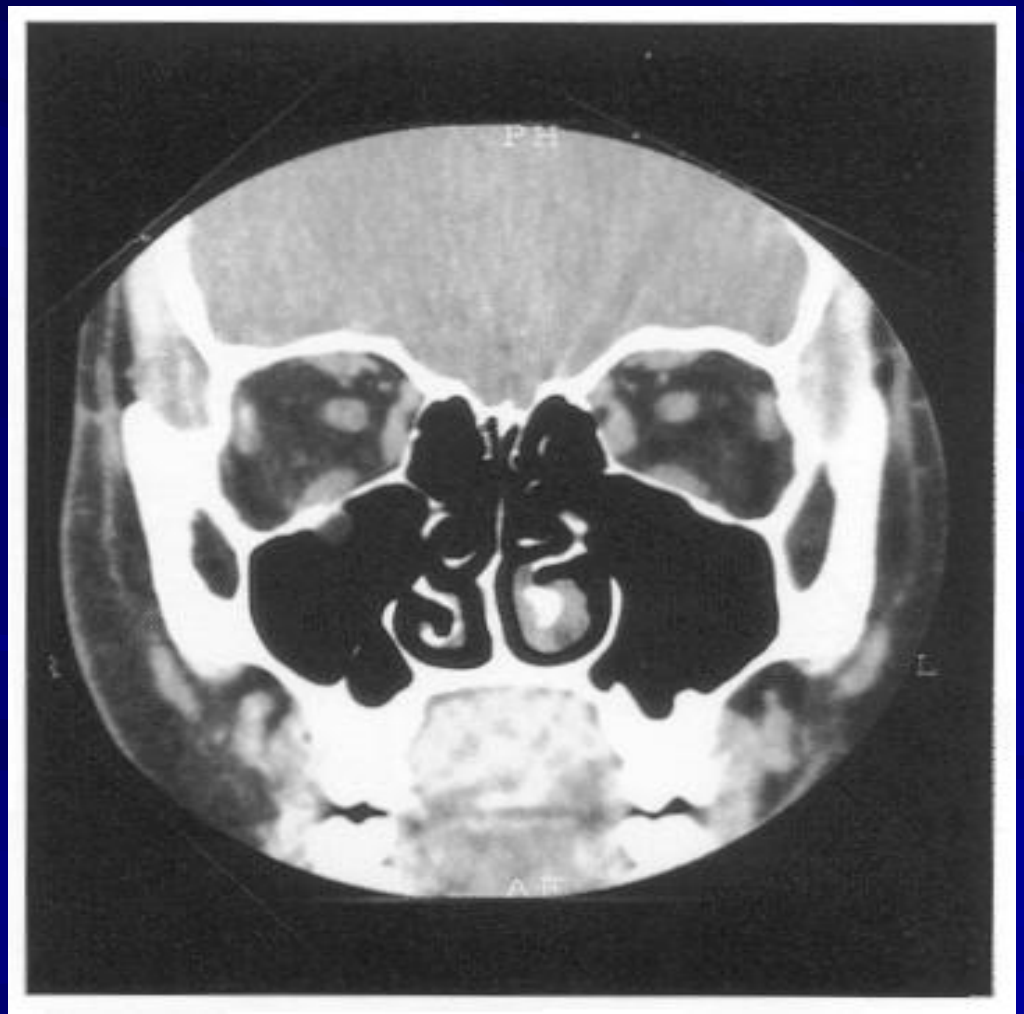


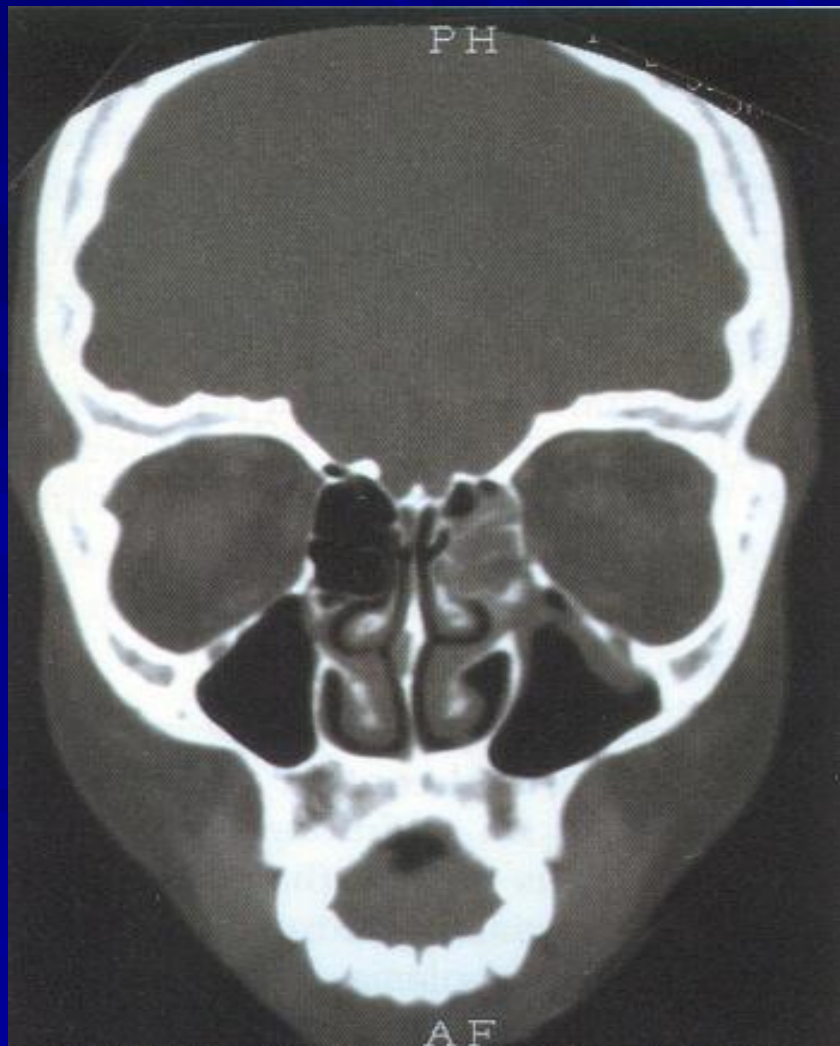
Floor Fractures



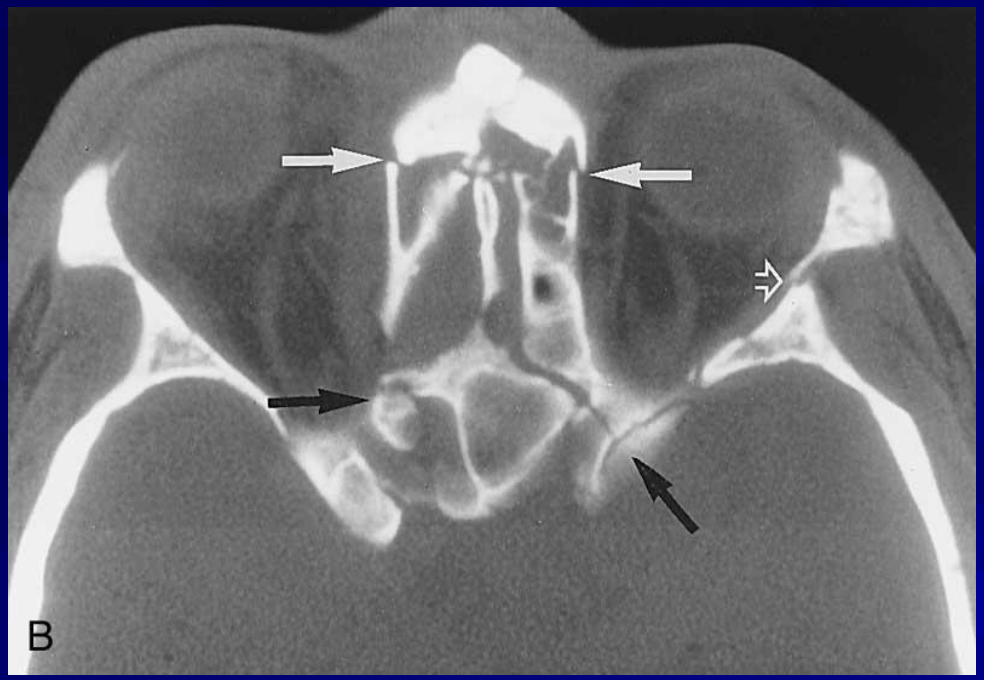


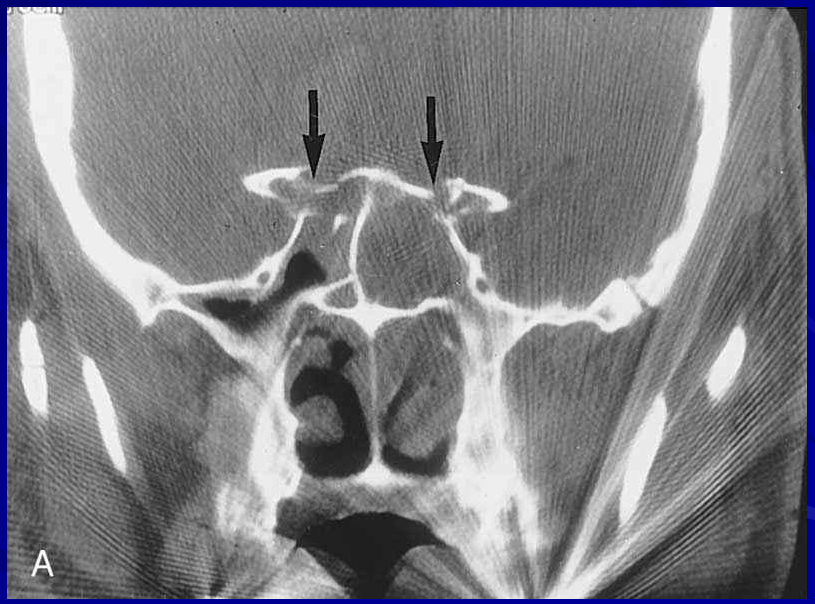
Find the fracture





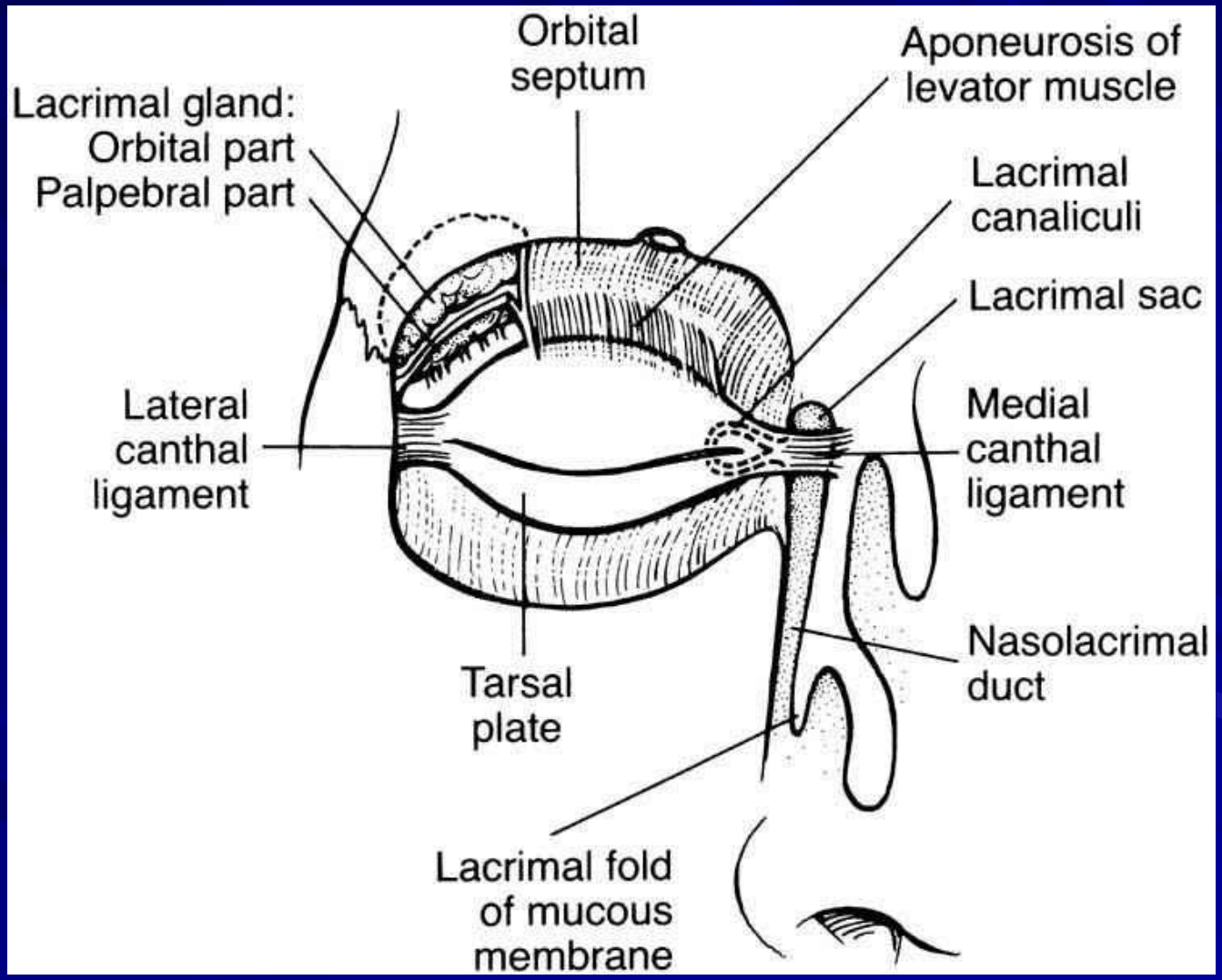
Optic Canal

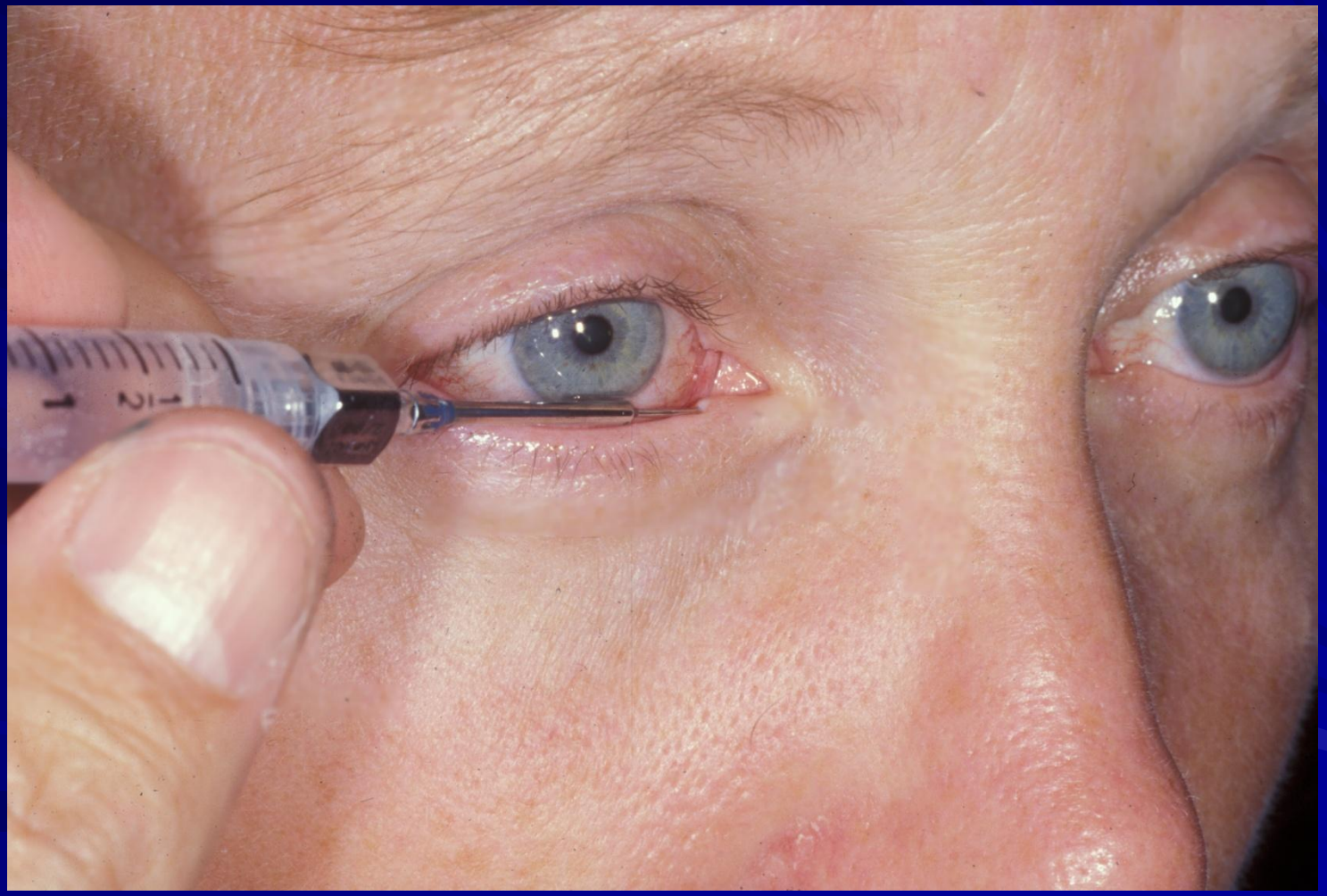


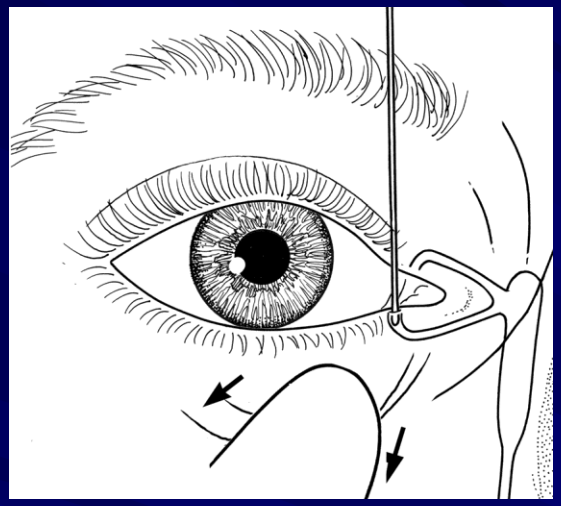


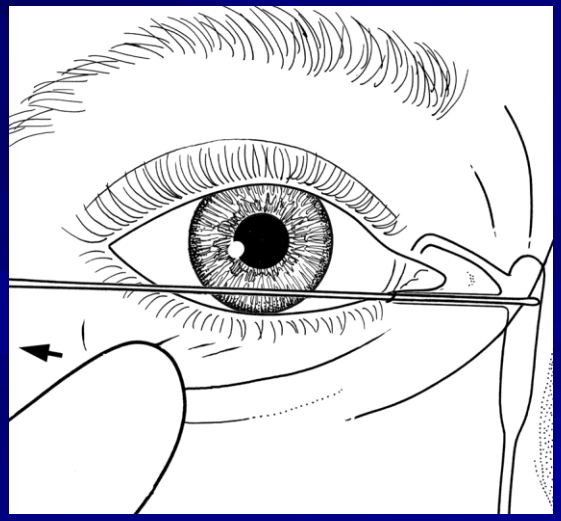
May be with or without displaced bony fragments

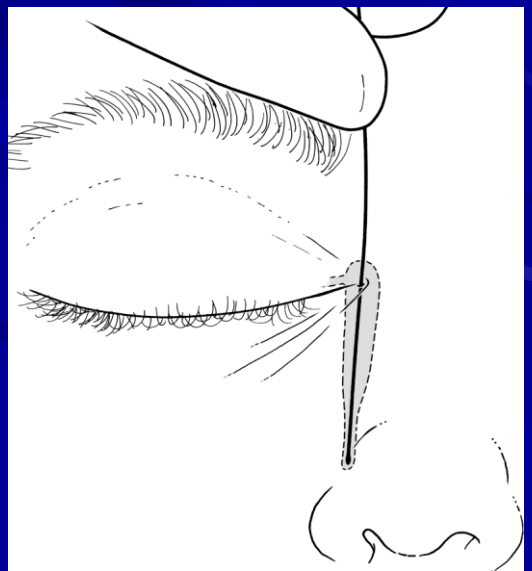
Lacrimal

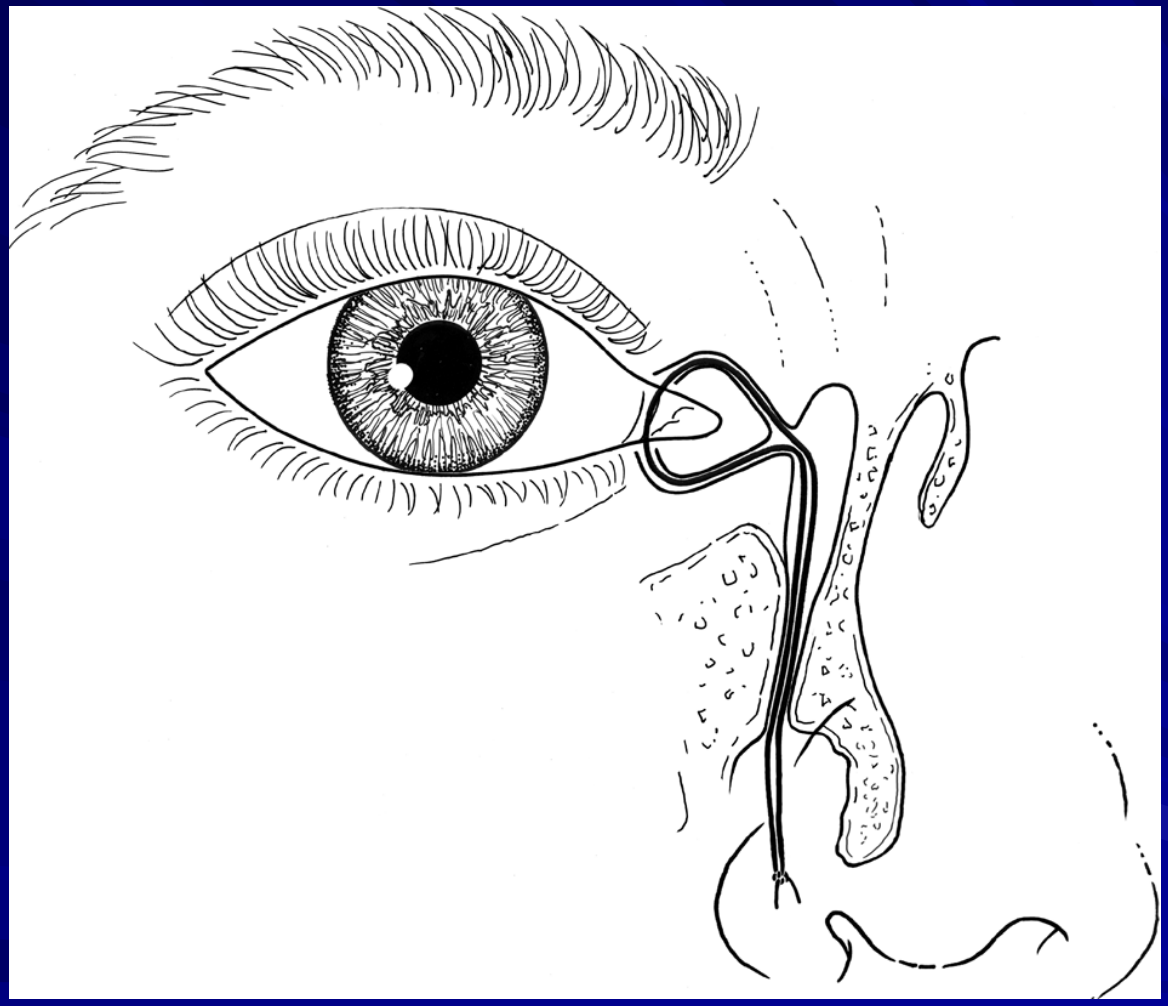

Orbital septum
Aponeurosis of levator muscle
Lacrimal gland:
Orbital part
Palpebral part
Lacrimal canaliculi
Lacrimal sac
Lateral canthal ligament
Medial canthal ligament
Nasolacrimal duct
Tarsal plate
Lacrimal fold of mucous membrane

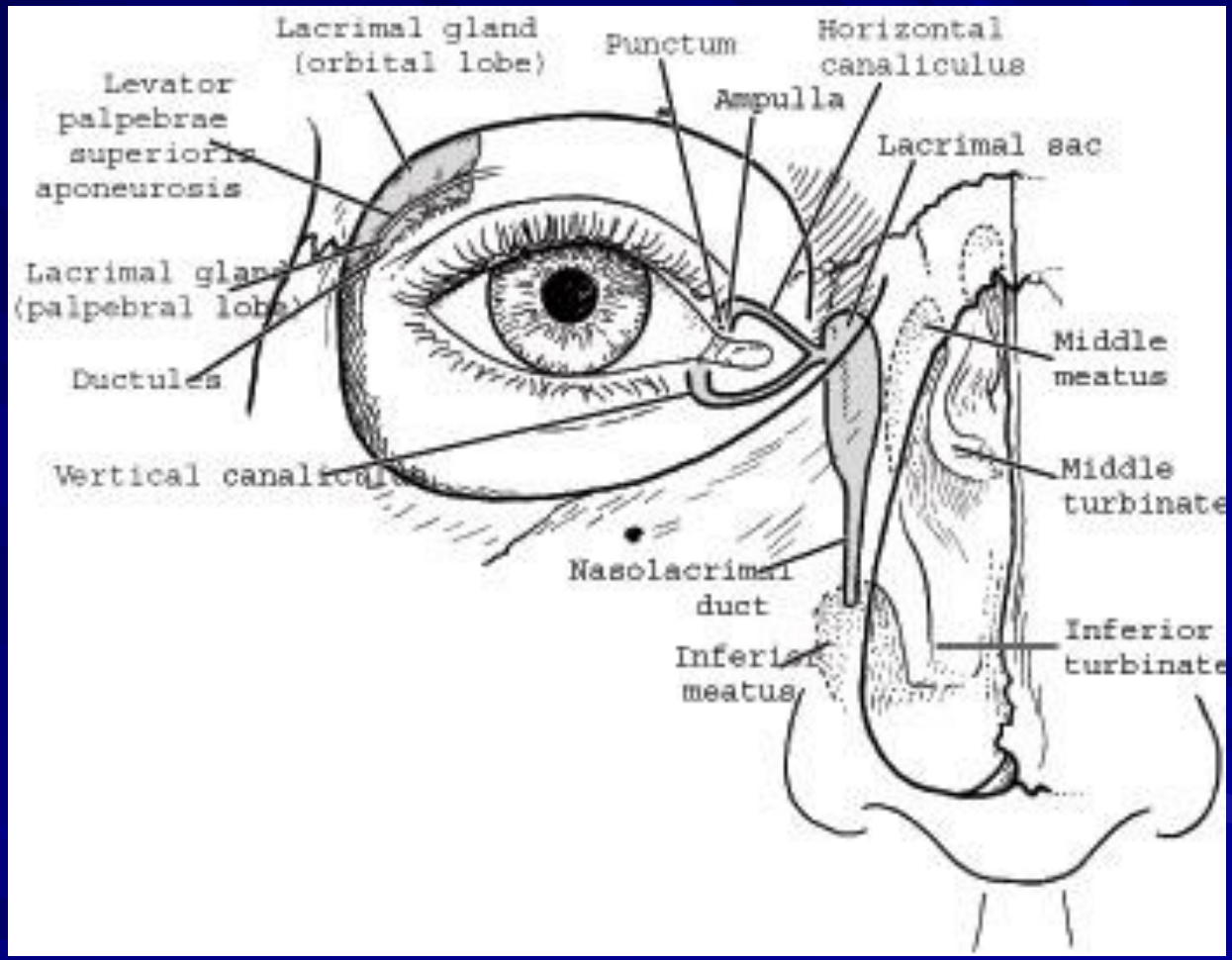






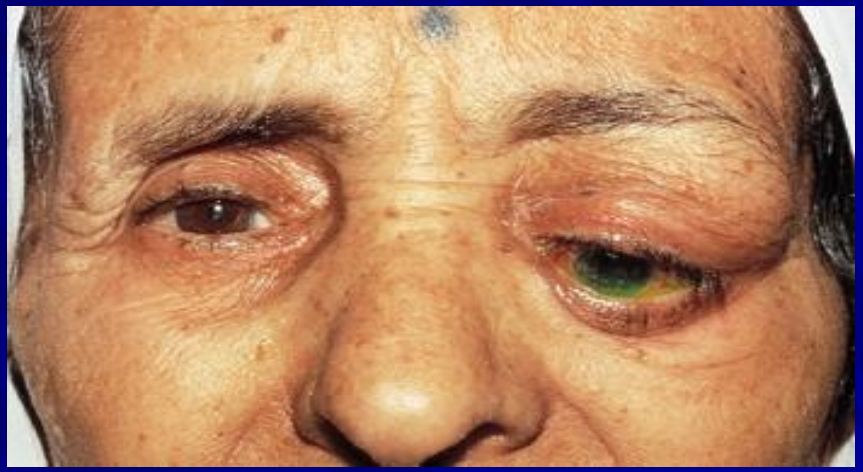


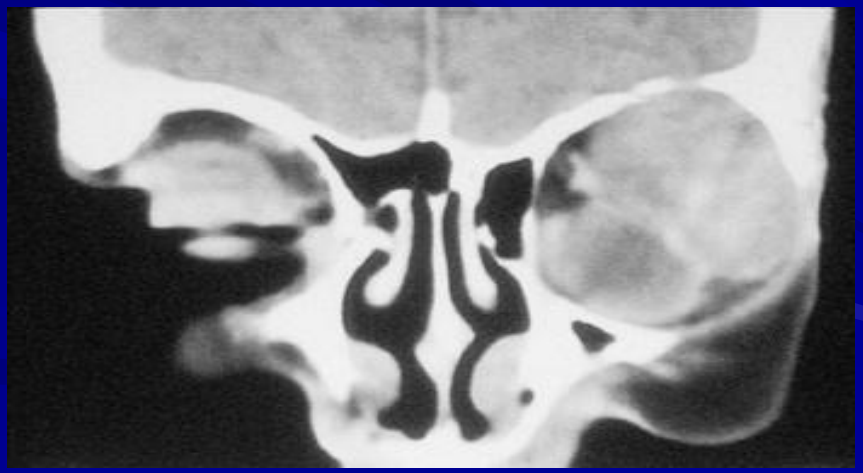



Lacrimal gland
(orbital lobe)
Punctum
Horizontal
canaliculus
Levator
palpebrae
superioris
aponeurosis
Ampulla
Lacrimal sac
Lacrimal gland
(palpebral lobe)
Ductules
Middle
meatus
Middle
turbinate
Vertical canaliculus
Nasolacrimal
duct
Inferior
turbinate
Inferior
meatus

Lacrimal Gland Masses

- Inflammatory
  - Sarcoidosis
  - Orbital Pseudotumor
  - Vasculitis
- Non-inflammatory
  - Lymphoproliferative
  - Epithelial neoplasms





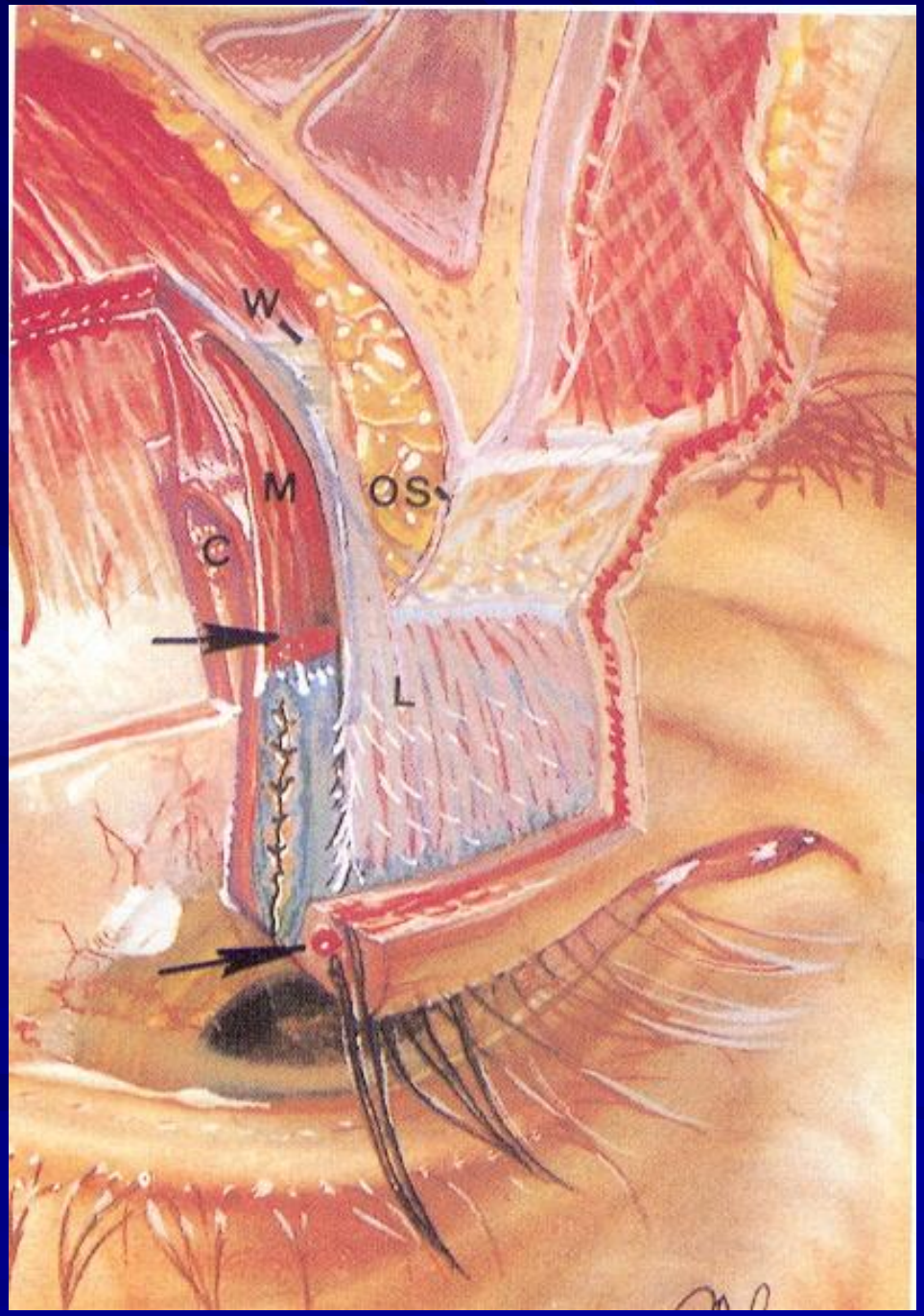
Pleomorphic adenoma

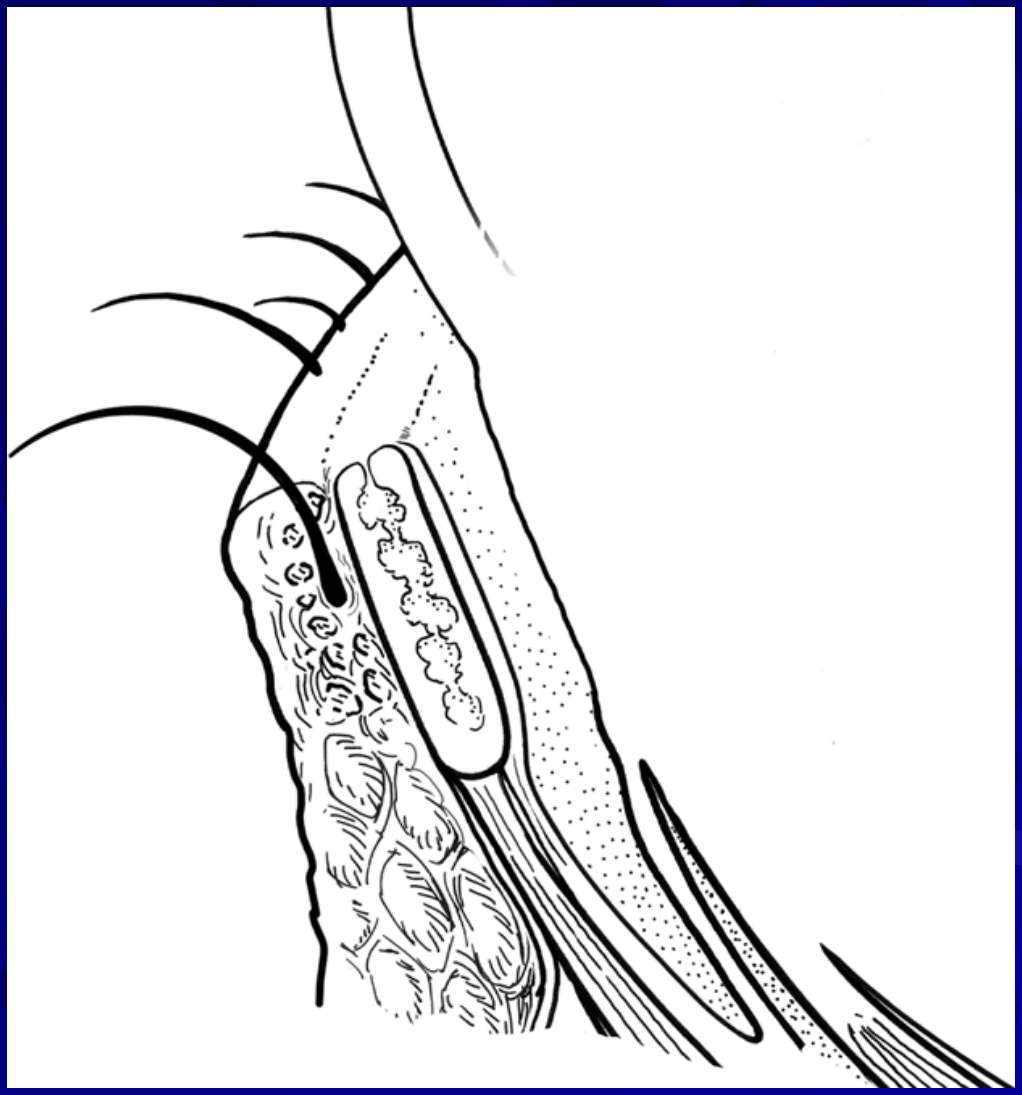
Lacrimal gland fossa lesions

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 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

- Anatomy
- Trauma
- Lid lesions
- Lid malpositions


W
M
C
OS
L

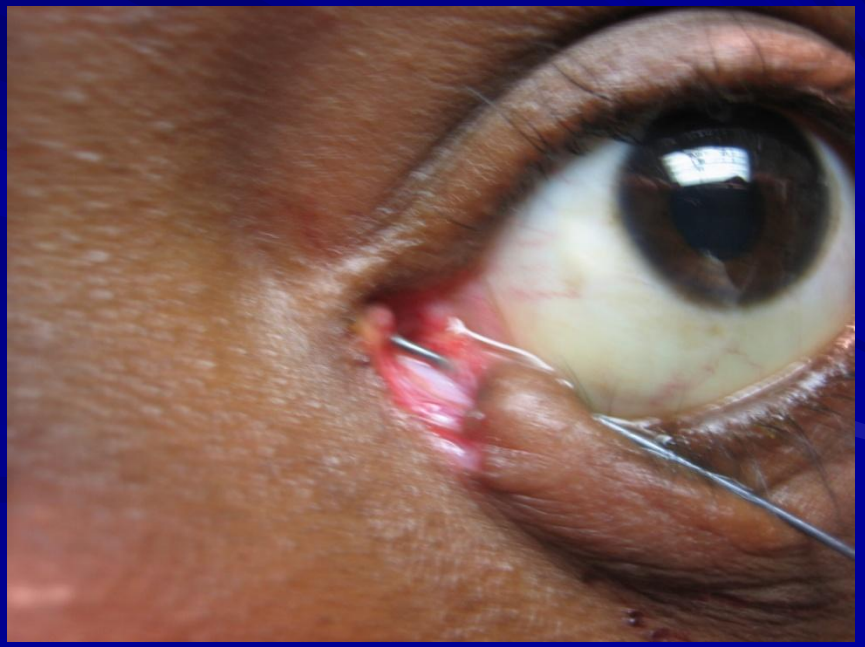


Eyelid Trauma

- Types
  - Blunt
  - Sharp/penetrating
- classification
  - lid margin
    - not involved
    - involved*
  - canthal involved*
  - canalicula involved*

*call ophthalmology

Lid Laceration with Canalicular Involvement



Lid margin spared

- Skin and orbicularis only→skin sutures
- FAT protrusion= septum violated
  - DO NOT suture the orbital septum

Blepharitis

Herpes Zoster Ophthalmicus

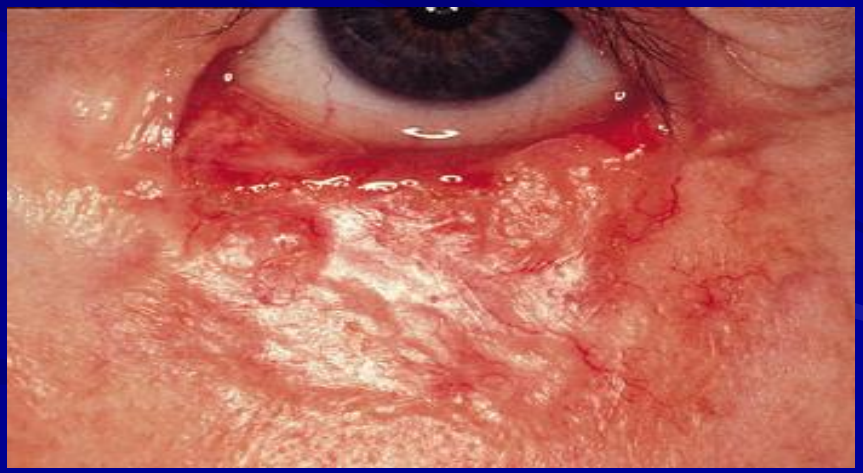
Lid Lesions

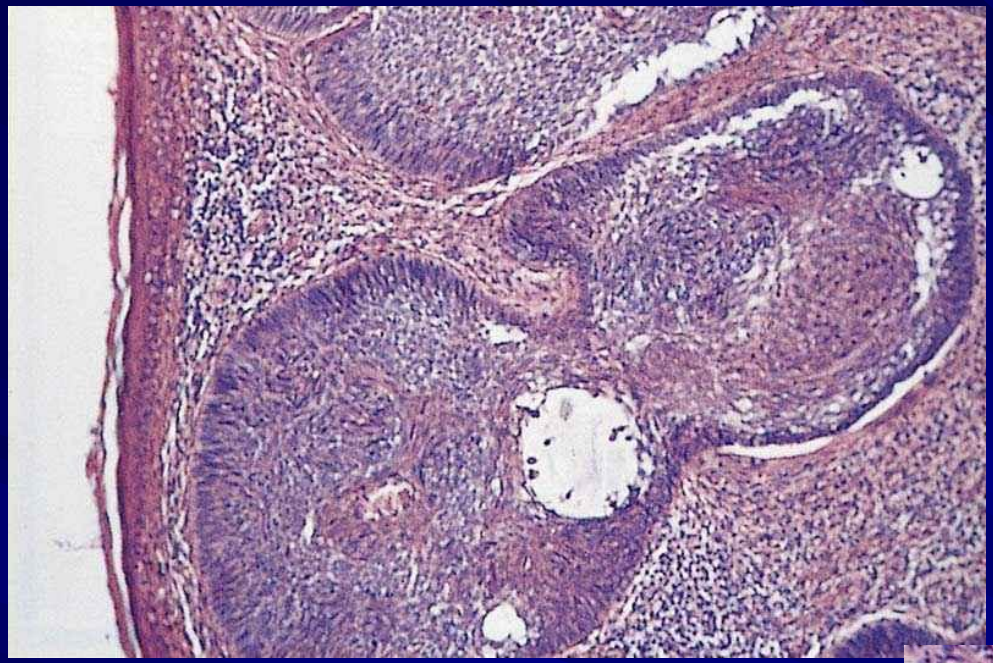
- Sty
- Chalazion

Xantholasma

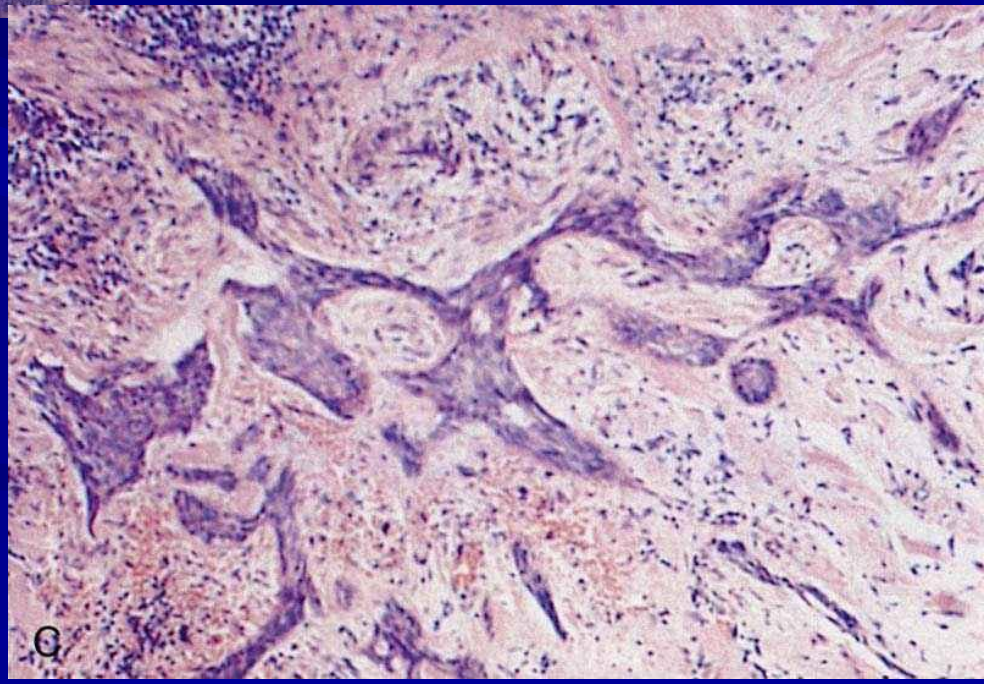
Basal Cell

- 90-95% of malignant eyelid tumors
- Lower lid and medial canthal areas
- Nodular and morpheaform types
- Medial canthal lesions can be problematic
- 3% mortality





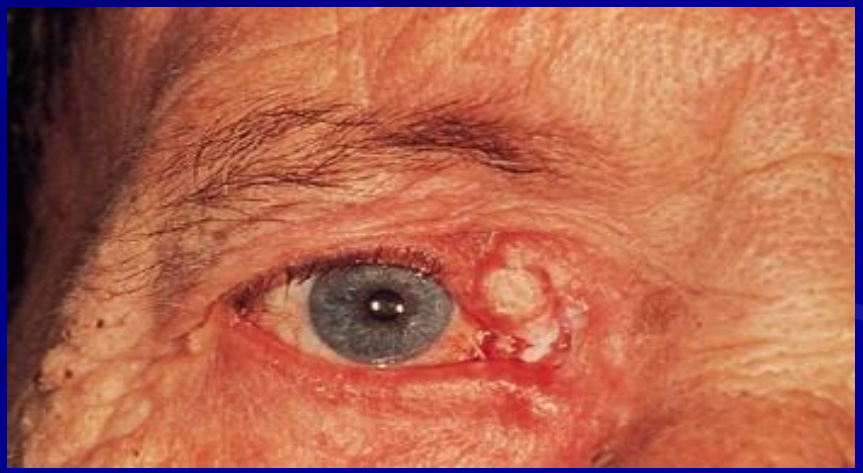
Nodular



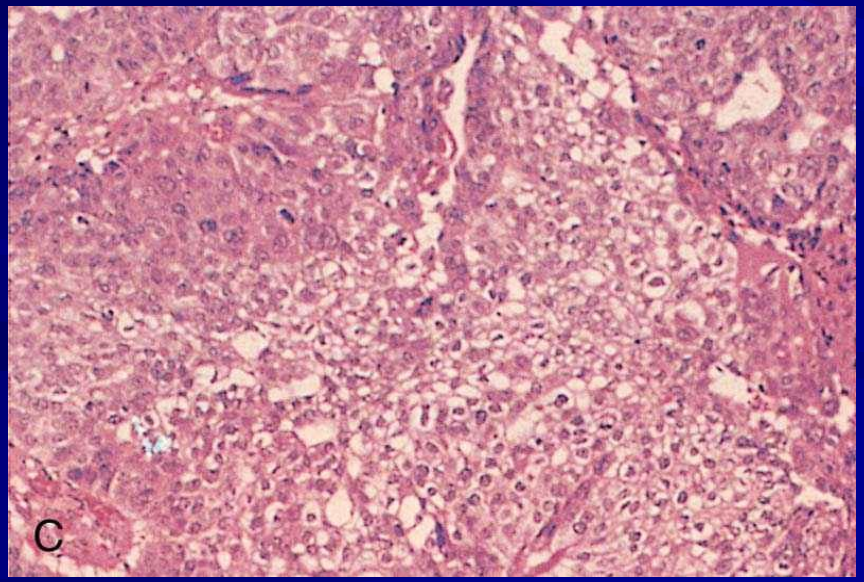
Morpheaform

Squamous Cell

- 40x less common than BCC
- More aggressive
  - perineural invasion
- Most arise from pre-existing lesions
- Variable presentation



Sebaceous adenocarcinoma



- Highly malignant
- 2x more common in upper lid
- Multicentric
- Separate upper and lower lid lesions in 6-8%
- Pagetoid spread

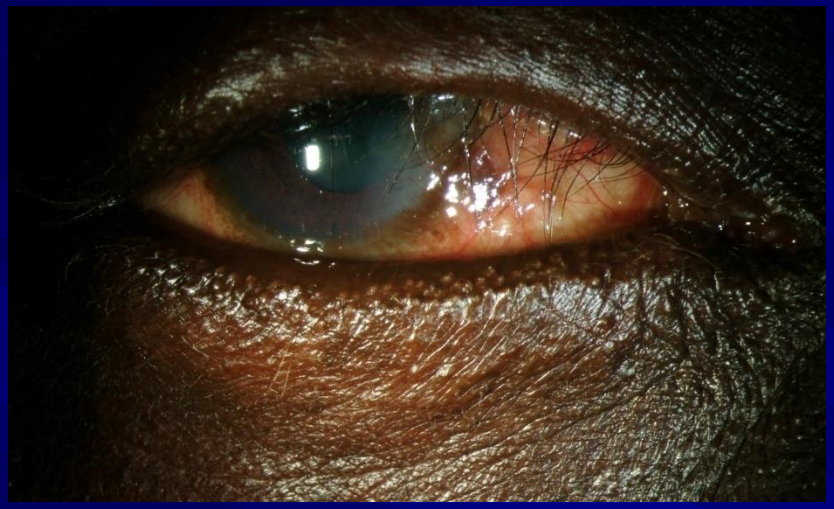
Eyelid Malpositions

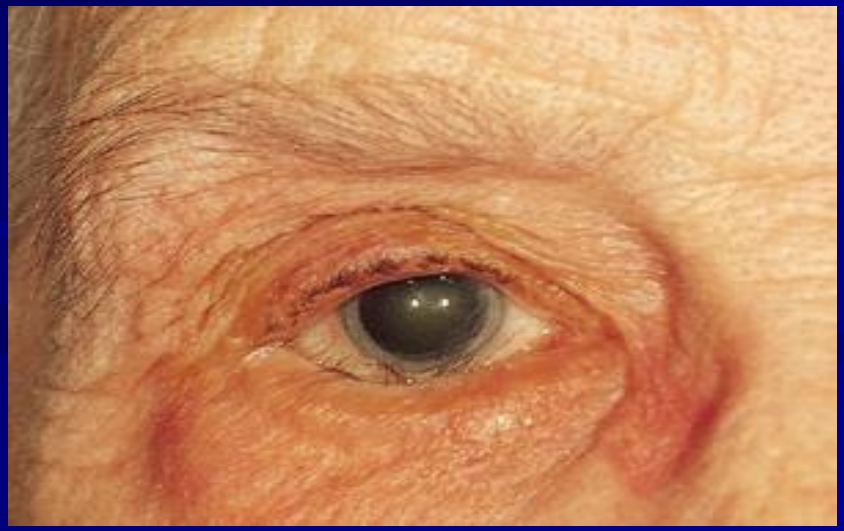
- Ectropion
- Entropion
- Blepharoptosis
- Retraction

Ectropion

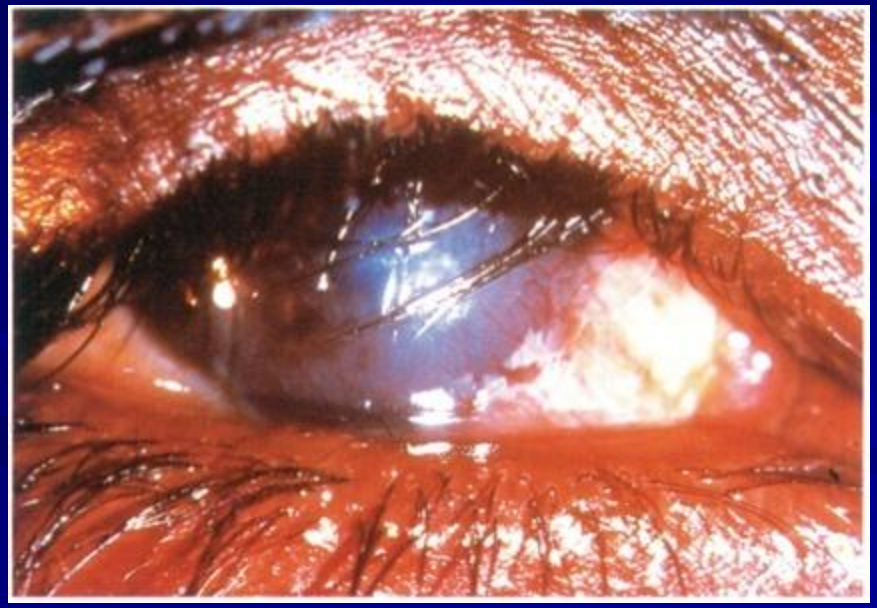
- Outward turning of lid margin
- Types:
  - Congenital
  - Involutional
  - Paralytic
  - Cicatricial
  - Mechanical

Entropion

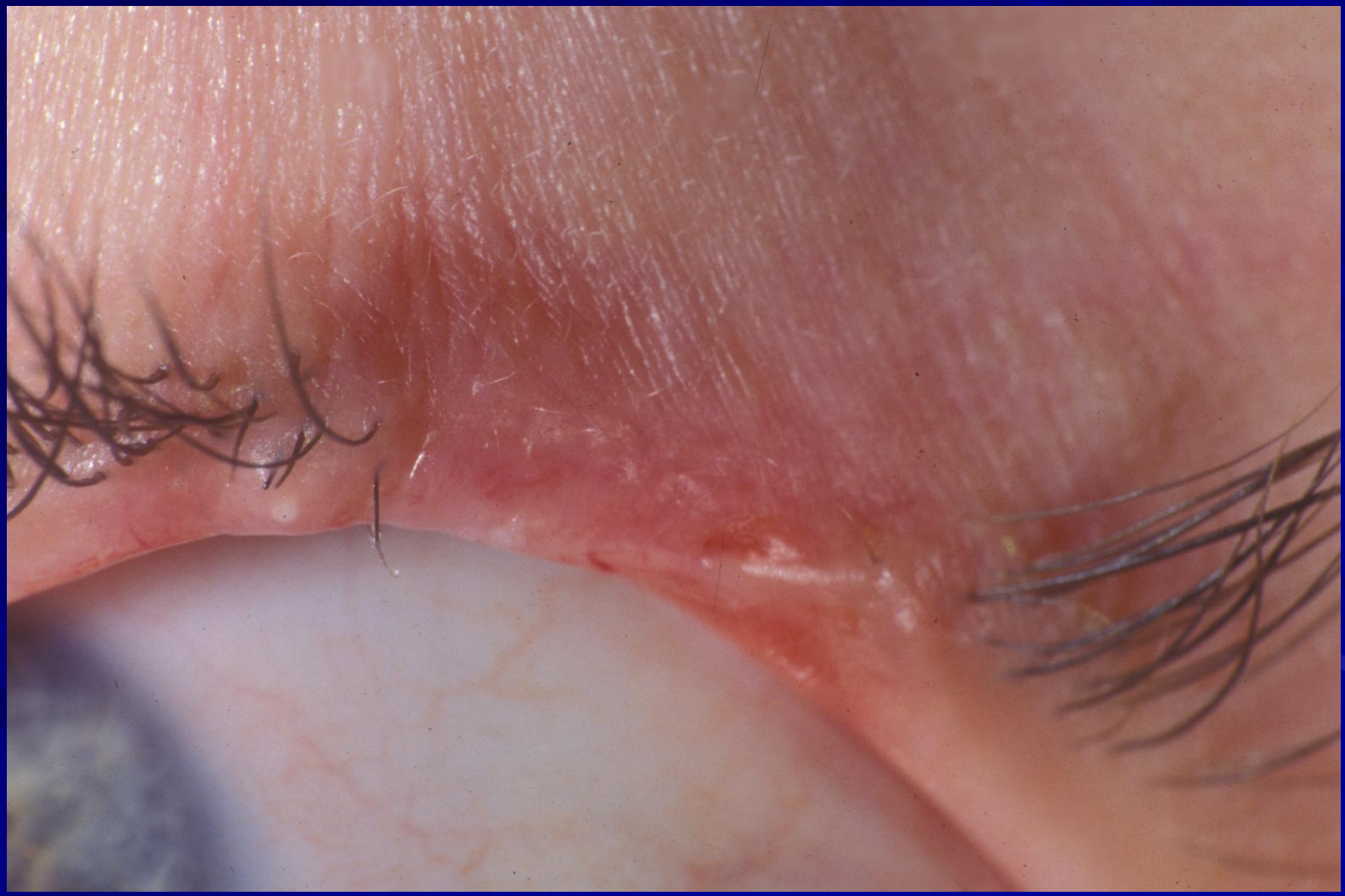




- Inversion of the lid margin
- Types:
  - Cicatricial
  - Involutional
  - Congenital
  - Acute-spastic



Trichiasis



Blepharoptosis

- Drooping or inferior displacement of the upper lid
- Classification:
  - Congenital vs acquired
  - Myogenic, aponeurotic, neurogenic, mechanical, or traumatic
- Evaluation

Myogenic ptosis

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

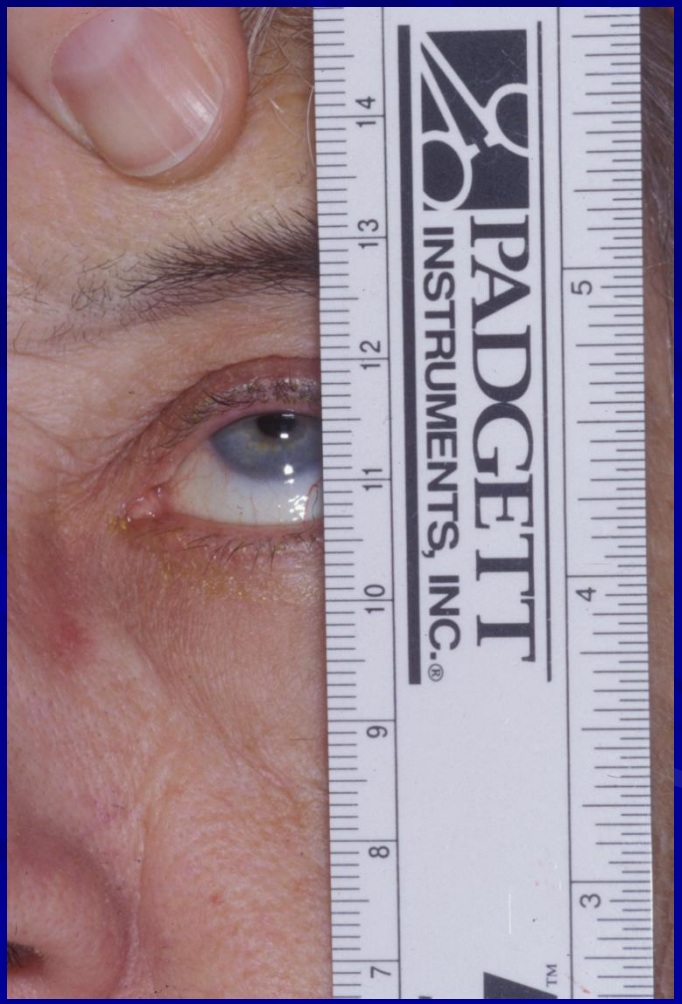
Aponeurotic

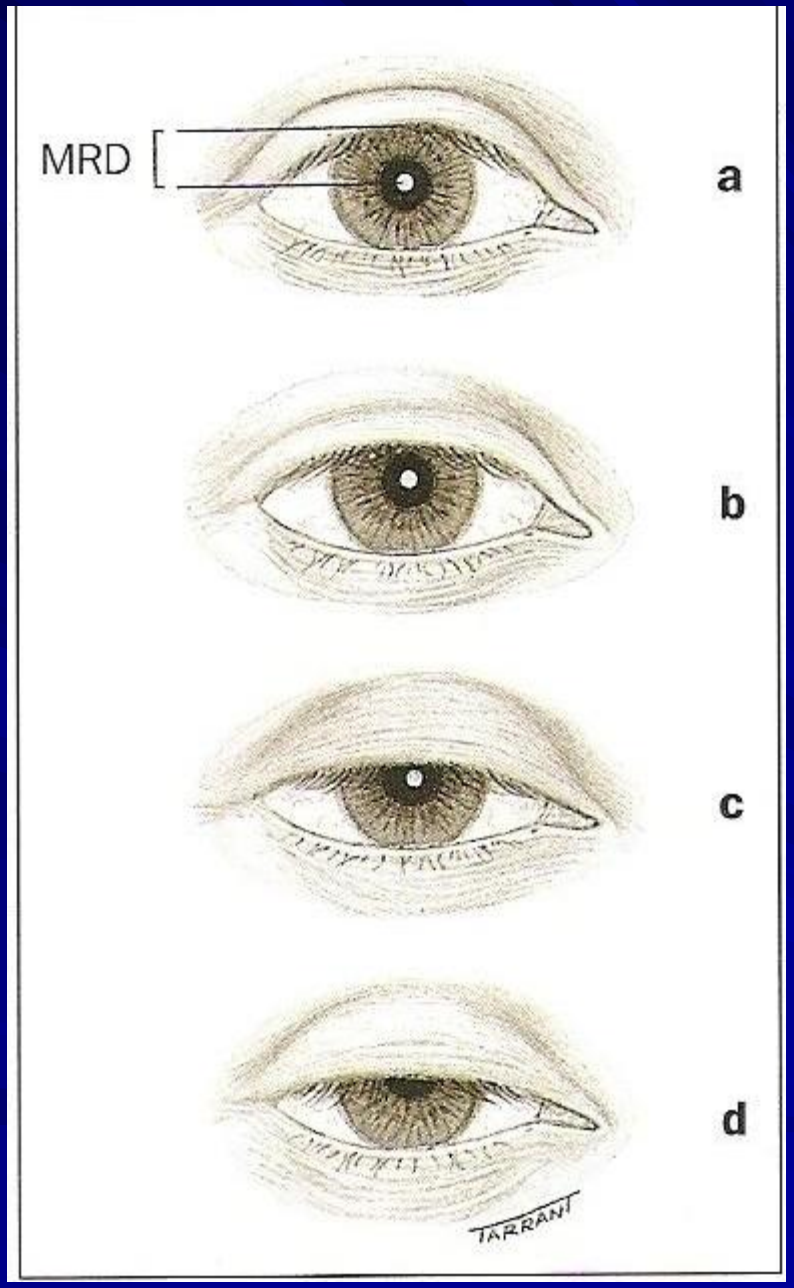
- Most common form of ptosis
- High lid crease with normal levator function

Neurogenic

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

Levator Function

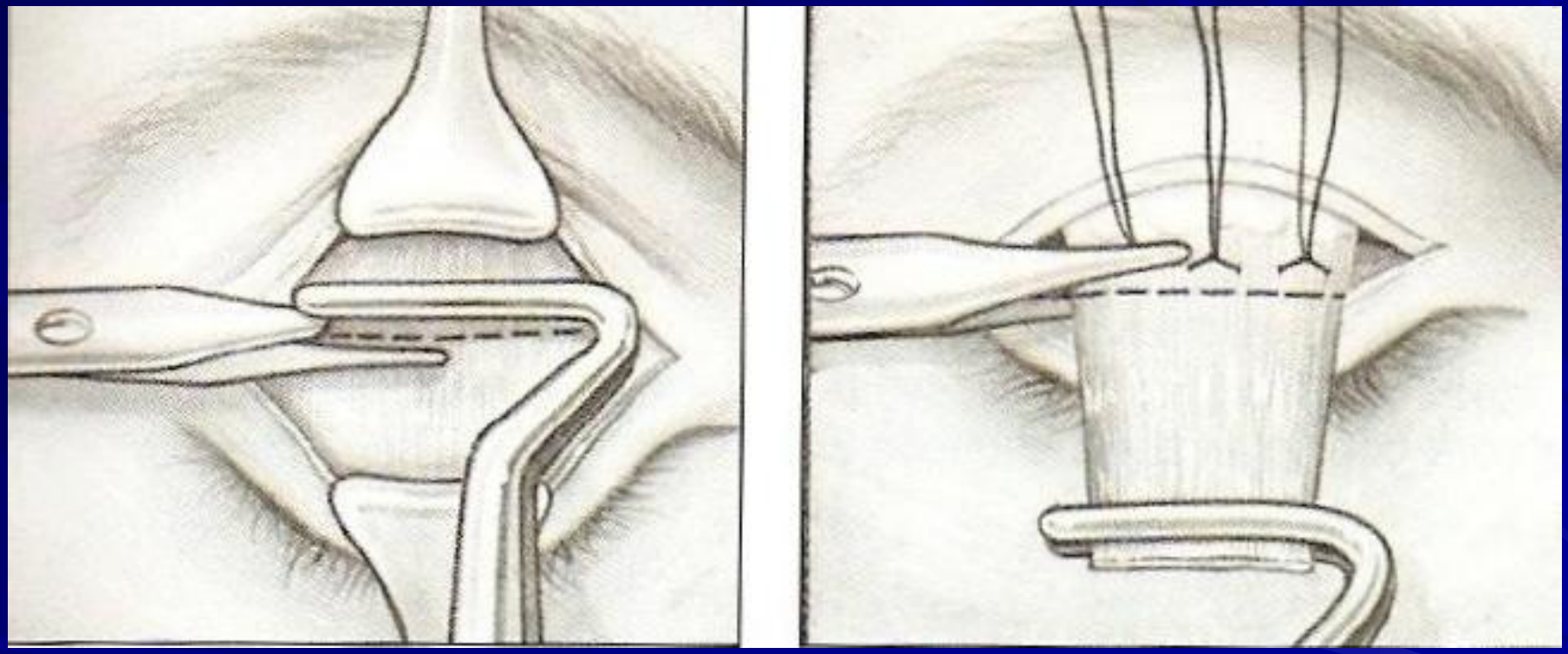


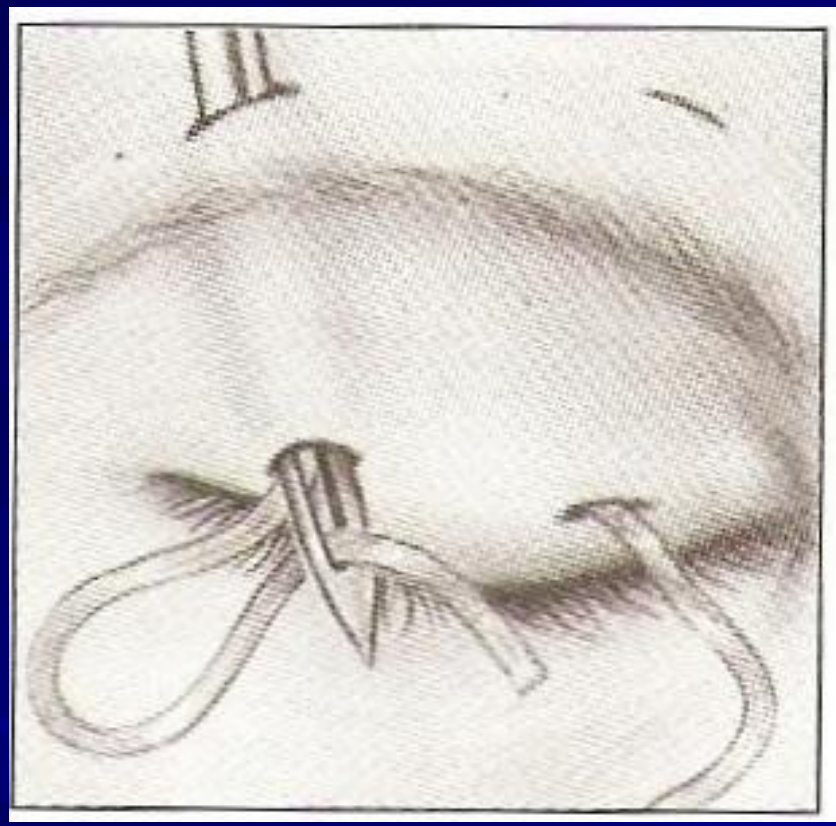

MRD
a
b
c
d
TARRANT

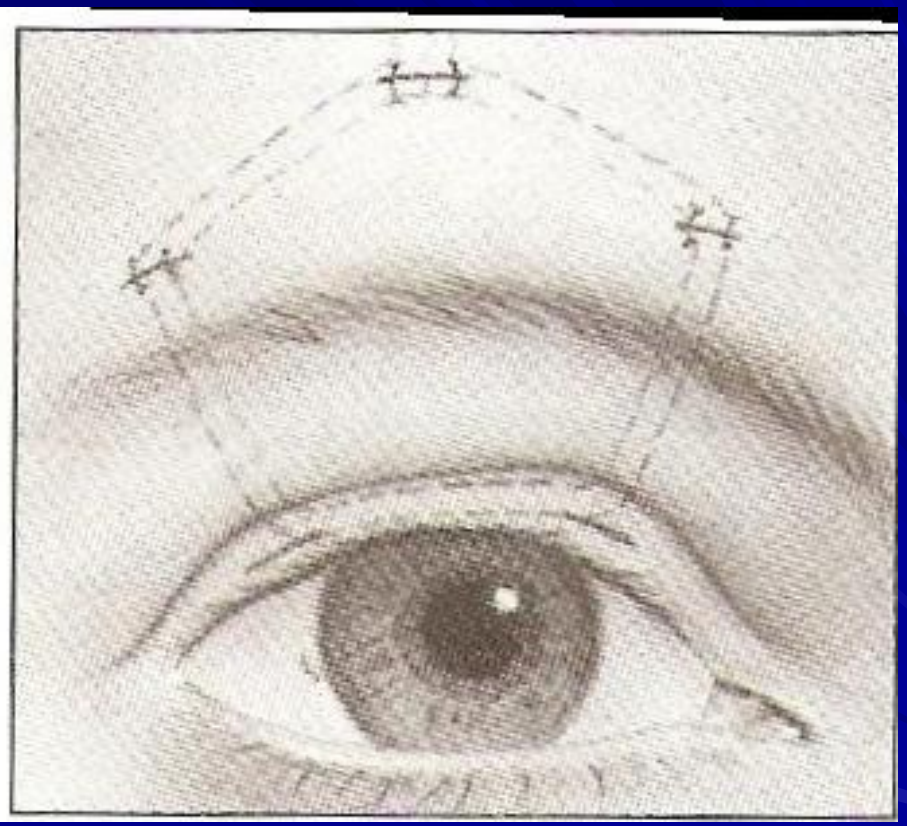
Treatment

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

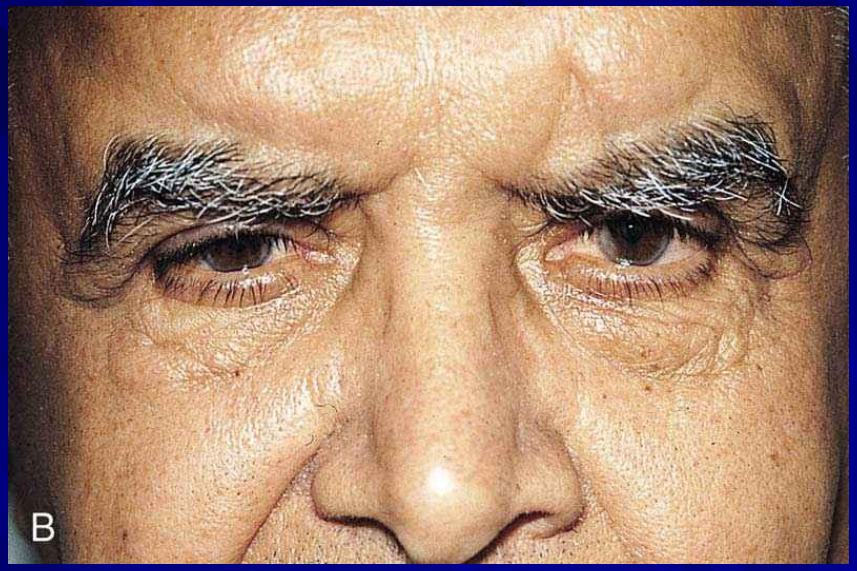
Mullerectomy







Dermatochalasis



Brow ptosis

Dermatochalasis

Dermatochalasis

Abnormal Eyelid Movements

- Blepharospasm
- Hemifacial spasm
- 7th nerve palsy

Blepharospasm

- Involuntary tonic, spasmodic contraction of orbicularis
- dermatochalasis- rubbing
- brow ptosis- frontalis spasm
- blepharoptosis- levator dehiscence
- ectropion/entropion
- dry eye

Hemifacial Spasm

- Intermittent contractions of the entire side of face
- Present during sleep
- Compression of 7th nerve at the level of the brain stem
- MRI evaluation

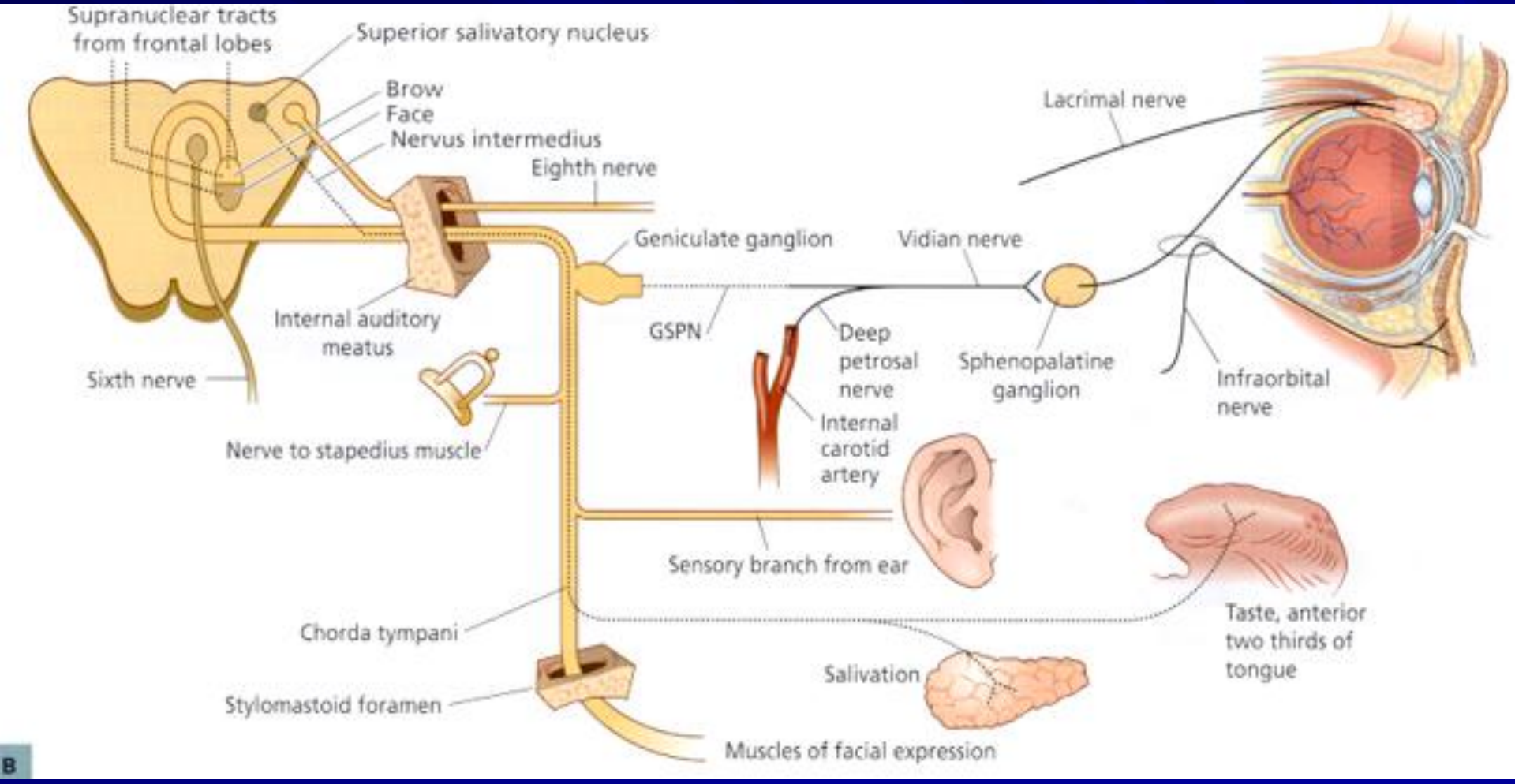
Hemifacial Spasm

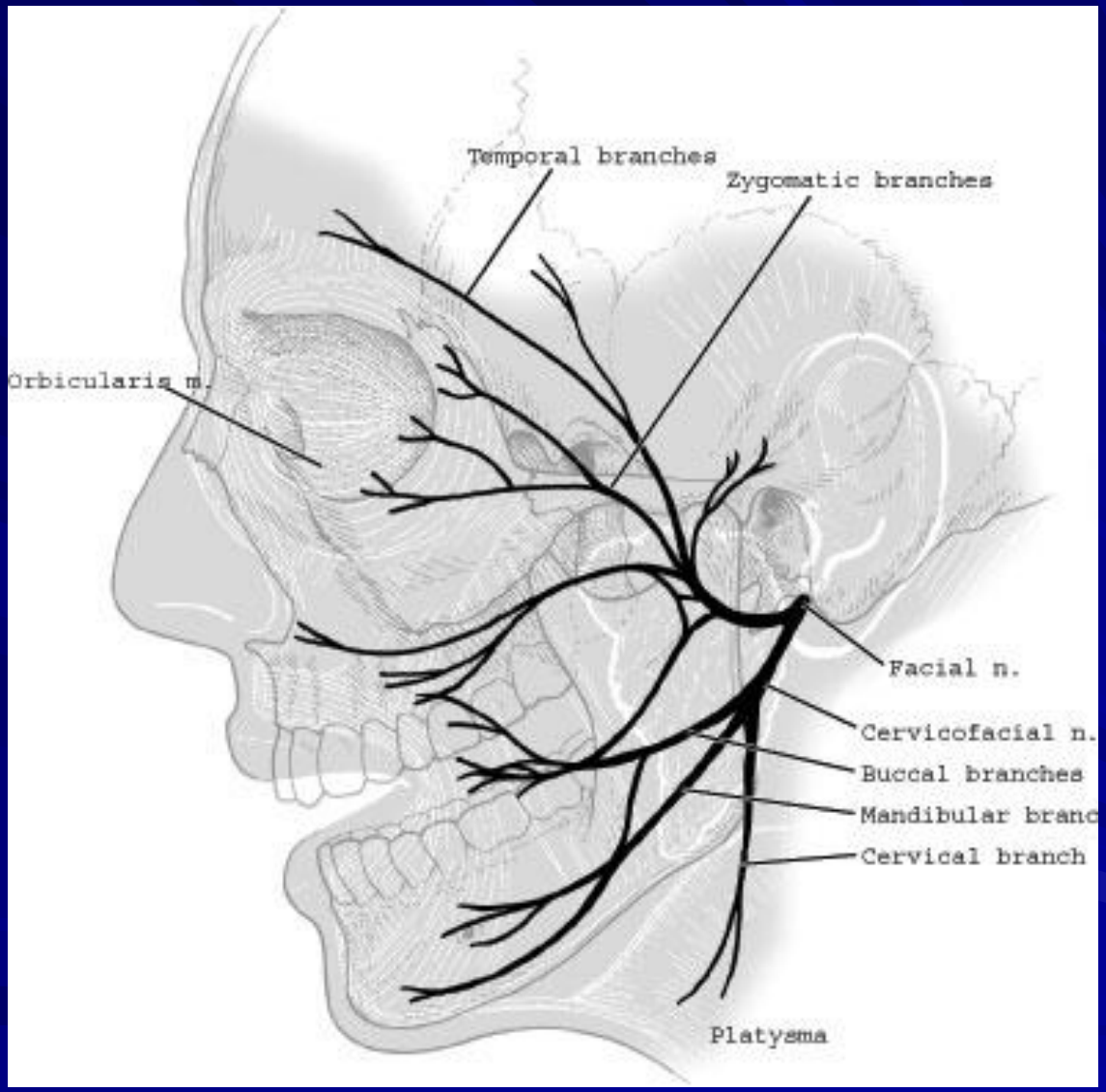
- Intermittent contractions of the entire side of face
- Present during sleep
- Compression of 7th nerve at the level of the brain stem
- MRI evaluation

7th nerve palsy

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

Course of the 7th Nerve

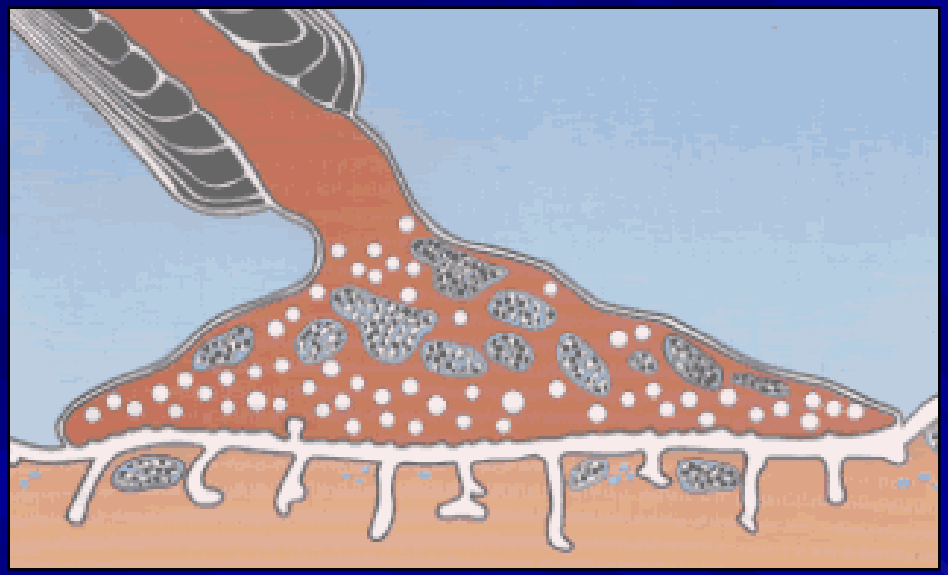



Temporal branches
Zygomatic branches
Orbicularis m.
Facial n.
Cervicofacial n.
Buccal branches
Mandibular branc
Cervical branch
Platysma

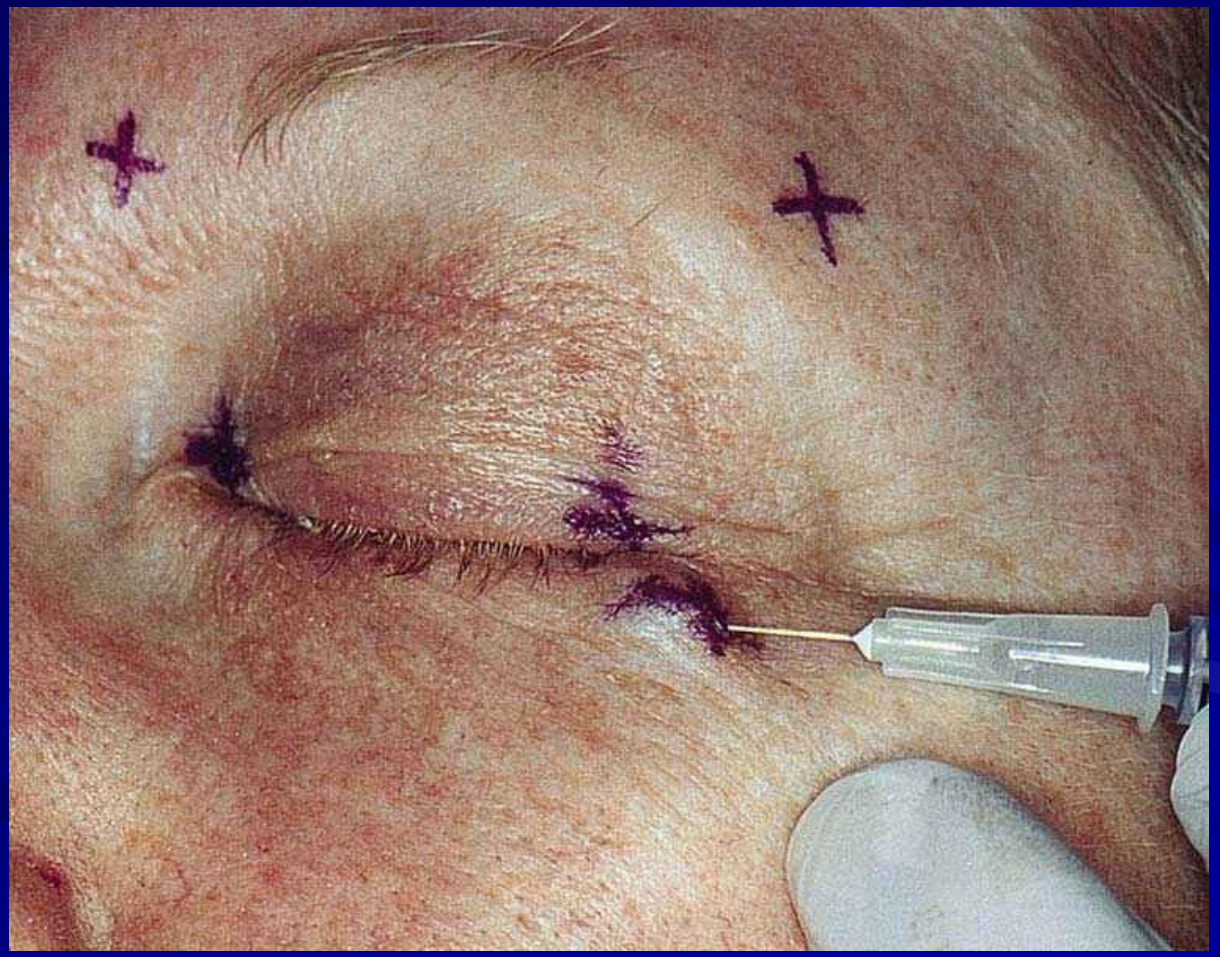
Botox in Ophthalmology

Botulinum Toxin

- Clostridium botulinum
- Neurotoxin types A,B,C1,D,E,F,G
- Botox = Botulinum Toxin A
- Blocks the release of acetylcholine
- Onset 3 days
- Peak effect 1-2 weeks
- Duration 6-12 weeks



Blepharospasm



Strabismus

Glabellar Botox

Botox for Crow's-Feet

Thank you for your time and attention