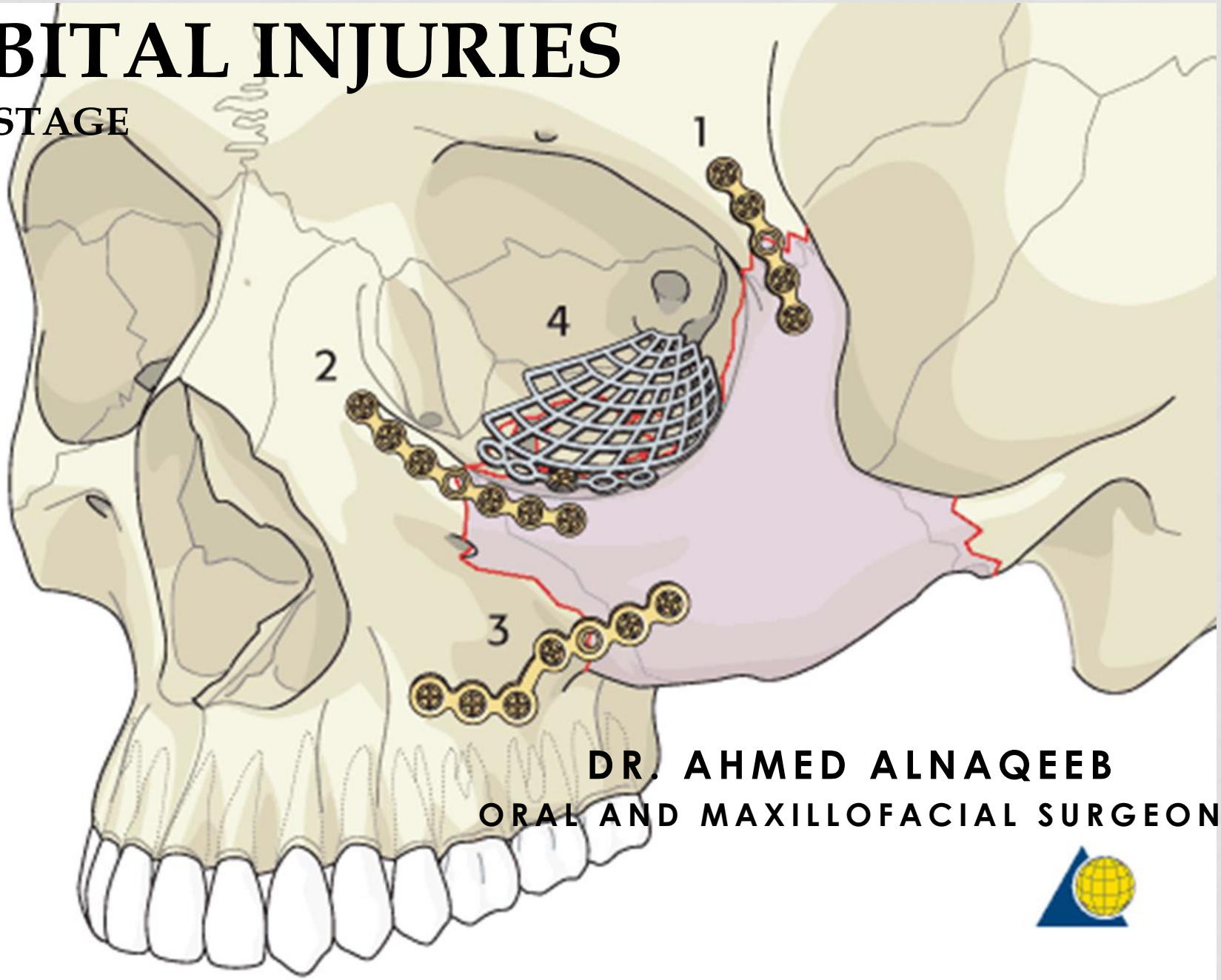
ORBITAL INJURIES

FIFTH STAGE



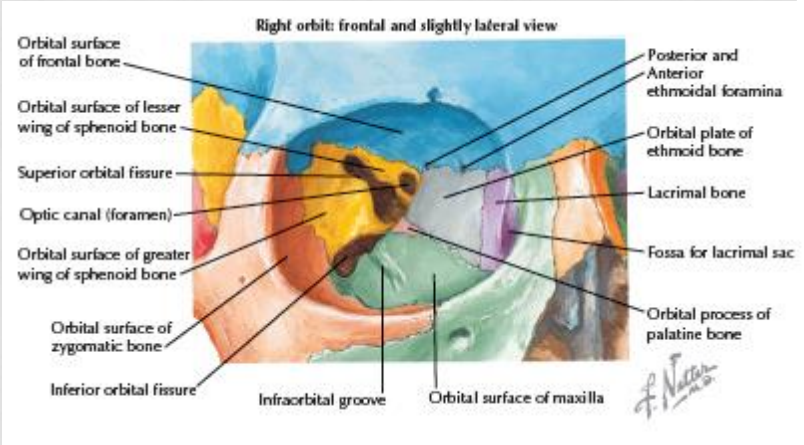
DR. AHMED ALNAQEEB

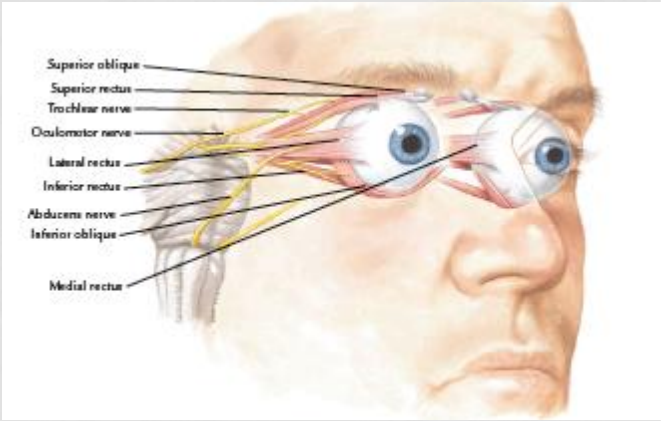
ORAL AND MAXILLOFACIAL SURGEON

SURGICAL ANATOMY

- Fractures of orbital rim
  - Caused by localized severe blow
  - May involve orbital wall.
- Related structures

1. Inferior rim : inf orbital N.
   inf. Oblique M.
2. Superior rim: lacrimal G.
   supraorbital N.
   frontal sinus
3. Lateral rim: lateral canthus lig.
4. Medial rim: medial canthus
   lacrimal apparatus





SURGICAL ANATOMY

- Fracture of orbital wall
- # of roof and lateral wall tend to involve orbital rim
- Isolated # involve floor & medial wall (blowout #)

- Structures involved

1. Floor #: inf. Orbital N.
   inf. Rectus M.
   inf. Oblique M.
2. Medial wall #: lacrimal apparatus
   medial rectus M.
   suspensory lig.

CLINICAL FEATURES

- **Early S. & S.**

1. **Periorbital tiss.**

a. Odema
b. Ecchymosis
c. Surgical emphysema – crackling sensation
need antibiotics

2. **Eyelids**:

a. Laceration
b. Ptosis: due to hemorrhage, odema or neurological

3. **Neurological defect**: anesthesia or parasthesia of supraorbital or supratrochlear or infraorbital N.
4. **Paralysis** of extraocular Ms.- III, IV or VI injuries
5. **Bony orbital rim**: visible or palpable deformity & pain
6. **CSF leak**: related to # of medial W. & cribriform plate
may cause fluctuant medial supratarsal swelling or CSF rhinorrhea

CLINICAL FEATURES

- **Early S. & S.**

7. **Eye:**

a. Oculomotor N. injury
b. Proptrosis- odema, bleeding (esp. retrobulbar hemorrhage)
c. Telecanthus- ICD > 35 mm due to avulsion of medial canthal ligament
d. Subconjunctival h.
e. Loss of visual acuity
f. Loss of pupillary reflexes
   - direct reflex: optic or oculomotor N. damage
   - Consensual reflex: oculomotor N damage
g. Traumatic mydriasis
h. Traumatic miosis
i. Diplopia – odema, muscle entrapement or paresis of EOM
j. Lacrimal apparatus damage or obstruction causing epiphora

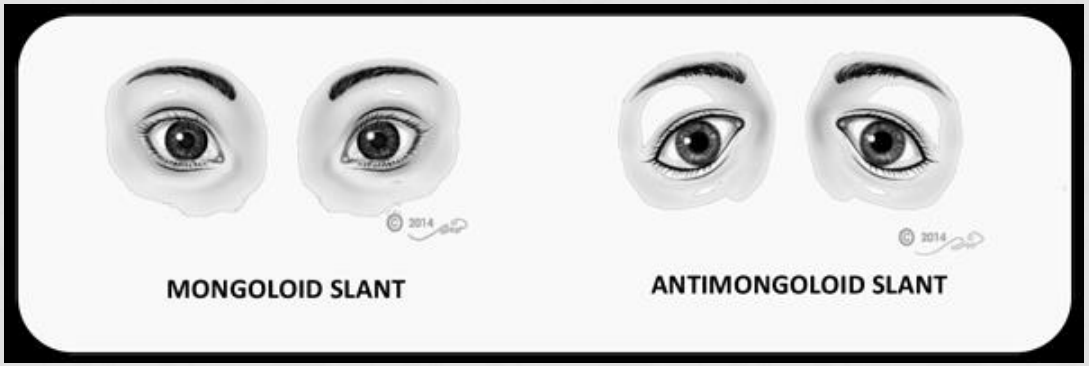
CLINICAL FEATURES

❑ **Late S. & S.**

- Days – weeks
- Related to untreated or poorly treated injuries

1. **Eyelids**

- mongoloid or antimongoloid slant
- With moderate enophthalmus – palpebral fissure widen (staring eye)
- With severe enophthalmus- palpebral fissure narrowed



CLINICAL FEATURES

- **Late S. & S.**

2. **Eye**

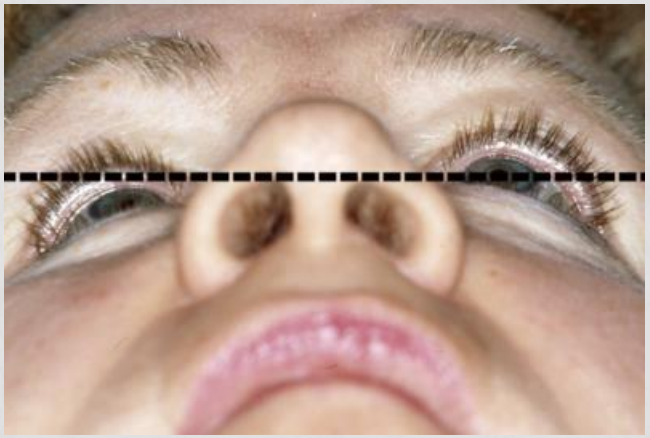
a. Enophthalmus

i. posterior recession of globe (1-4 mm)

b. Drop in ocular level (hypoglobus)

i. Directly related to avulsion of suspensory lig.

ii. Indirectly related to bony displacement (# of F-Z suture)



BLOWOUT FRACTURES

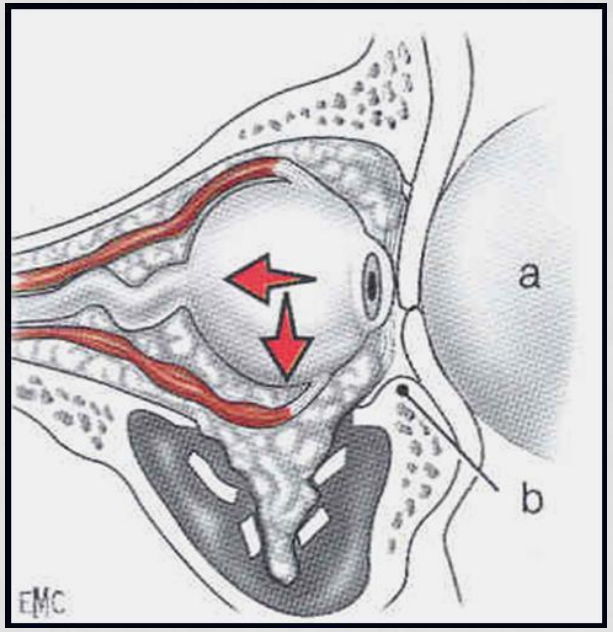
- Definition:# of orbital floor or medial orbital wall with intact orbital rim
- Aetiology

1. Isolated (pure) blowout #

- Blunt trauma to eye

2. Combined with more extensive #

- Zygoma
- Extension of orbital rim #
- LeFort II & III



CLINICAL FEATURES OF BLOWOUT

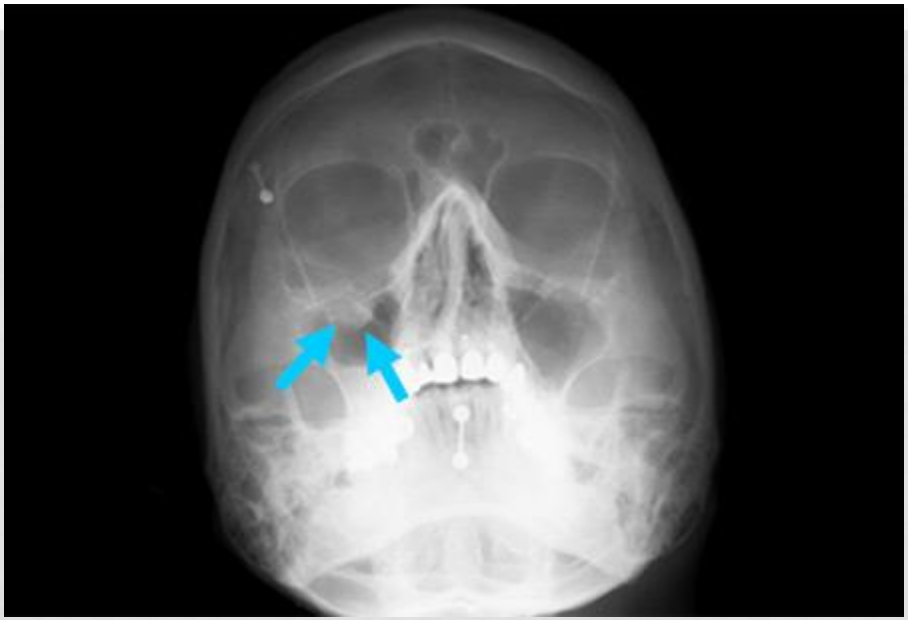
- **Early S.&S.**

1. Periorbital edema & ecchymosis
2. Limited upward rotation with pain
3. Paresthesia of infraorbital N.
4. Proptosis & diplopia

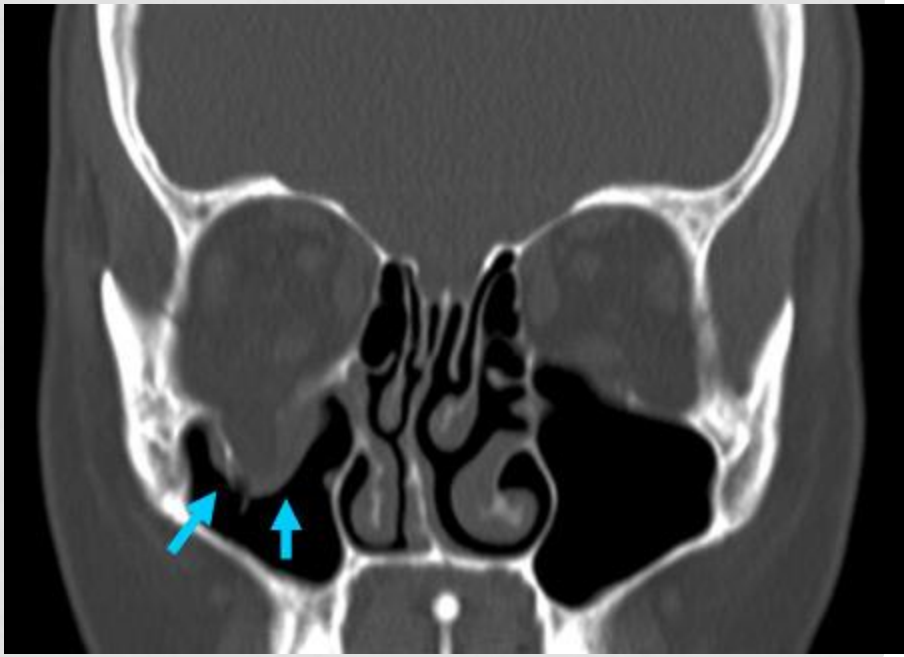
- **late S&S (10 days or more)**

1. Restricted upward movement with pain
2. Diplopia
3. Hypoglobus
4. Enophthalmus
5. Narrowing of palpebral fissure
6. Deepening of supratarsal fold

RADIOGRAPHS



hanging drop opacity



INVESTIGATION

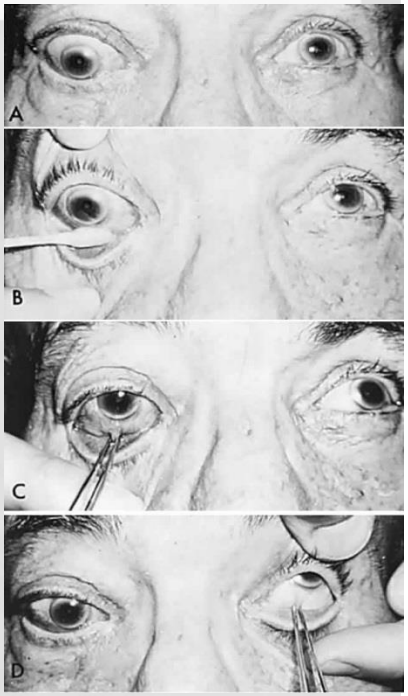
Forced duction test

- Resistance to free movement indicate mechanical trapping:

1. Orbital fat herniation
2. Muscle entrapment
3. Adhesion

Retraction test

- Posterior movement of globe when antagonist muscle is unable to " pay out rope" so that the axis of rotation is transferred to restriction or adhesion site



TREATMENT OF ORBITAL FLOOR #S

- **Surgical indications**

1. +ve forced duction test
2. Diplopia
3. Restricted movement
4. Pain with eye movement
5. CT evidence of blowout # with muscle entrapement

- **Preoperative considerations**

1. Check visual acuity
2. Wait until edema subside

TREATMENT OF ORBITAL FLOOR #S

Objective

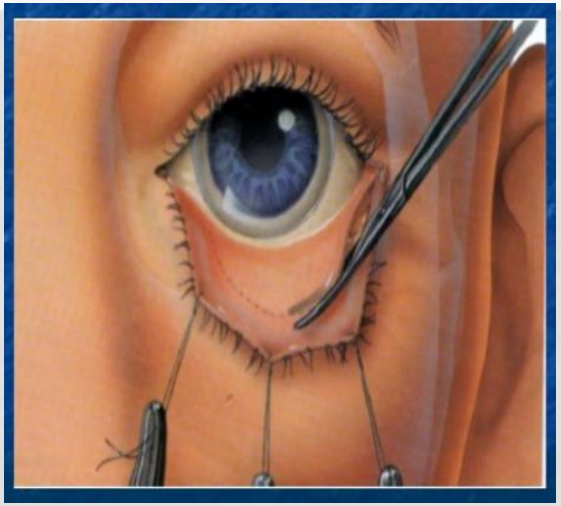
1. Repositioning of displaced orbital tissue
2. Restoration of orbital floor
3. Reduction & fixation of causative #
4. Free globe movement

Surgical procedures

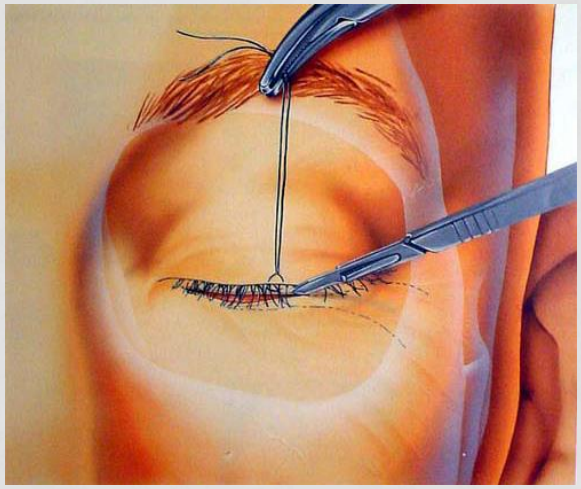
1. Orbital floor grafting
2. Antral support:
3. Combined: increase risk of infection

SURGICAL APPROACH TO ORBITAL FLOOR

A. Transconjunctival
- Invisible scar
- Limited access
- Risk of fat herniation



B. Blepharoplasty (subciliary)
- Excellent exposure
- Risk of ectropion



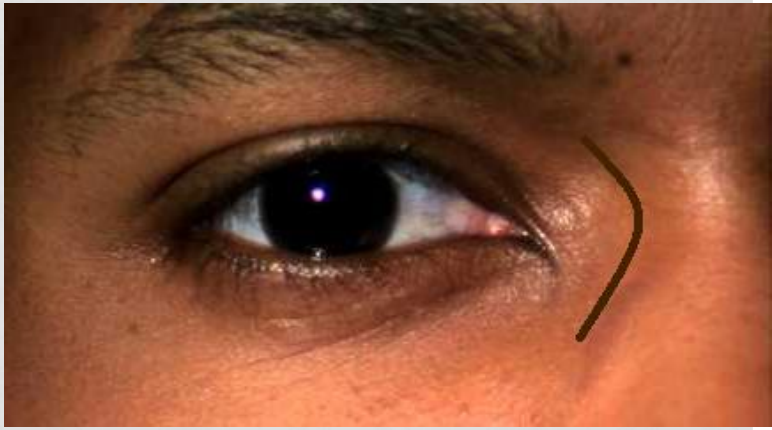
SURGICAL APPROACH TO ORBITAL FLOOR

C. subtarsal incision

- Good exposure

D. Naso-orbital incision

- Good access to medial wall



ORBITAL FLOOR GRAFTS

- **Aim of grafting**

1. Repair orbital floor
2. Inert surface will not form adhesion
3. Restore orbital contour & volume
4. Support globe

- **Ideal implants**

1. Biocompatible, nonallergic, can be sterilized
2. Strong, rigid and adaptable
3. Easy to anchor into position
4. Should unite to bone or become encapsulated by fibrous tissue

ORBITAL FLOOR GRAFTS

- **Autograft**
- **Donor sites**

1. Antral wall
2. Septal cartilage
3. calvarias
4. Illiac crest
5. Split rib
6. Cartilage : rib or ear

- **Disadvantage**

1. Additional surgical site
2. Correct placement can be difficult

ORBITAL FLOOR GRAFTS

❑ Allograft

1. **Processed bovine bone-** framework eventually replaced by bone
2. **Lyophilized dura mater**: now rarely used
3. **Zenoderm**

❑ Alloplastic grafts

1. Inert foreign body
2. Become encapsulated by fibrous tissue
3. Lie passively in place after inserted in subperiosteal plane

ANTRAL PACKING

- **Indication**
1. Small floor defect
2. Comminuted floor # still attached to periosteum
3. Where prolapsed soft tissue can be replaced into orbit
4. No adhesion restricting ocular motility

- **Limitation**
1. Infection
2. Poor control of orbital floor

- **Approach :**caldwell-luc

- **Material**
1. Ribbon gauze
2. Antral ballon


Give Me A Break!

POSTOPERATIVE CONSIDERATIONS

1. Ophthalmoscopic examination
2. Pupil reflexes
3. Antibiotic drops- chloramphenicol 0.5 or 1 %
4. Eye and periorbital tissue left uncovered to avoid direct trauma
5. Sutured removal after 5 days
6. Firm clinical union in 3 weeks in case of associated fractures

COMPLICATIONS OF ORBITAL FRACTURES

1. **Retrobulbar hemorrhage**

- Due to orbital trauma or surgical intervention

❑ **Mechanism**

- Bleeding behind eye- bleeding inside muscle cone from ciliary arteries ⟶ venous congestion & odema around anterior head of optic nerve(anterior ischemic optic neuropathy) ⟶ blindness
- Retrobulbar hemorrhage may cause compression of central retinal artery causing blindness

❑ **S&S**

1. Visual deterioration or blindness
2. Ophthalmoplegia
3. Proptosis
4. Tense globe
5. Chemosis & ecchymosis
6. Dilated pupil
7. Pain
8. Loss of direct reflex
9. Retention of consensual reflex

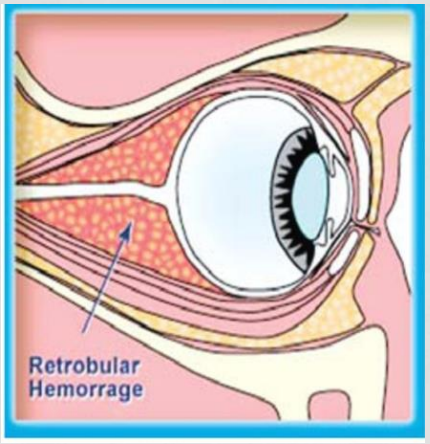
COMPLICATIONS OF ORBITAL FRACTURES

- **Treatment of RBH**
- **Medical** : decrease IOP

1. Acetazolamide (Diamox) 500 mg i.v.
2. Large dose of i.v. steroids(dexamethasone 3-4 mg/kg)
3. Dehydration with mannitol 200 ml i.v.
4. Papaverine 40 mg i.v.

- **Surgical** decompression of orbit

1. Infraorbital incision
2. Lateral canthatomy



COMPLICATIONS OF ORBITAL FRACTURES

2. **Superior orbital fissure syndrome**

- Damage to structures pass through superior orbital fissure
- **S&S**
  1. Proptosis & subconjunctival hemorrhage
  2. Periorbital odema
  3. Dilated pupil
  4. Direct reflex absent
  5. Consensual reflex present
  6. Loss of accommodation
  7. Sensory loss of cornea and forehead

- **Imaging**: evidence or reduction in size of SOF
- **Treatment**
  - Wait & see policy
  - Great care if treating # zygoma

COMPLICATIONS OF ORBITAL FRACTURES

3. **Orbital apex syndrome**

- Combination of superior orbital fissure syndrome with damage to optic nerve
- Anterior ischemic optic neuropathy
- **S&S**

  As for SOFS with loss of vision
- **Treatment**
  - No treatment if the eye is blind
  - Progressive loss of vision indicate surgical decompression of optic canal

COMPLICATIONS OF ORBITAL FRACTURES

4. **Carotid- cavernous fistula**

- Rare
- Carotid artery tear within cavernous sinus
- **S&S**
  1. Pulsating exophthalmus
  2. Subconjunctival hemorrhage
  3. Ophthalmoplegia
  4. Dilated pupil
  5. Reduced vision

- **Treatment**
- Surgical closure of fistula or embolization

COMPLICATIONS OF ORBITAL FRACTURES

5. **Traumatic enophthalmus**
   - Posterior recession of globe following trauma.
   - Late complication

❖ **Causes**
   - Increase orbital size (blowout #)
   - Fat herniation into sinus
   - Fat fibrosis and atrophy

❖ **S&S**
   1. Pseudoptosis-deepening of supratarsal crease- narrowing of palpebral fissure
   2. Diplopia
   3. Infraorbital paresthesia

❖ **Treatment**
   - Aim to prevent its development
   - Early treatment minimize it
   - Late enophthalmus difficult to correct

REFERENCES:

- Peterson, Larry J. Peterson's principles of oral and maxillofacial surgery. Vol. 1. PMPH-USA, 2012.
- Hupp, James R., Myron R. Tucker, and Edward Ellis. Contemporary Oral and Maxillofacial Surgery-E-Book. Elsevier Health Sciences, 2013.
- Andersson, Lars, Karl-Erik Kahnberg, and M. Anthony Pogrel, eds. Oral and maxillofacial surgery. John Wiley & Sons, 2012.
- APA Dimitroulis, George, and Brian Avery. Maxillofacial injuries: a synopsis of basic principles, diagnosis and management. Butterworth-Heinemann Medical.


Thank
You