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INTERNATIONAL CONGRESS OF THE
EGYPTIAN OPHTHALMOLOGICAL SOCIETY
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Orbital Fracture

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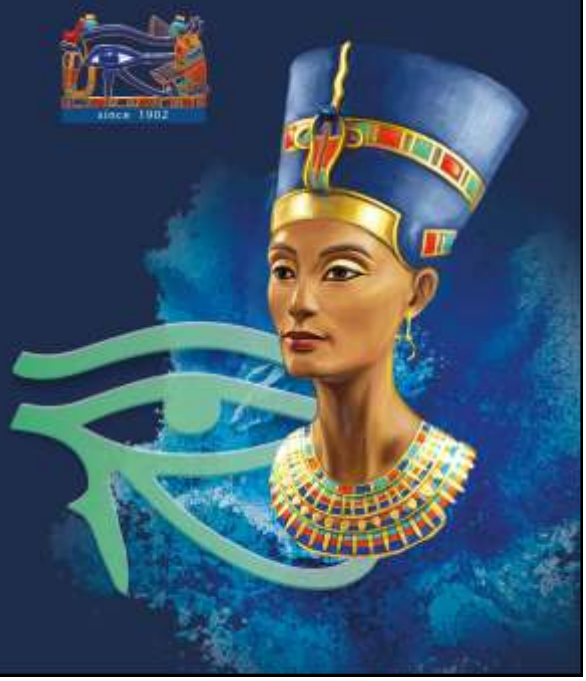
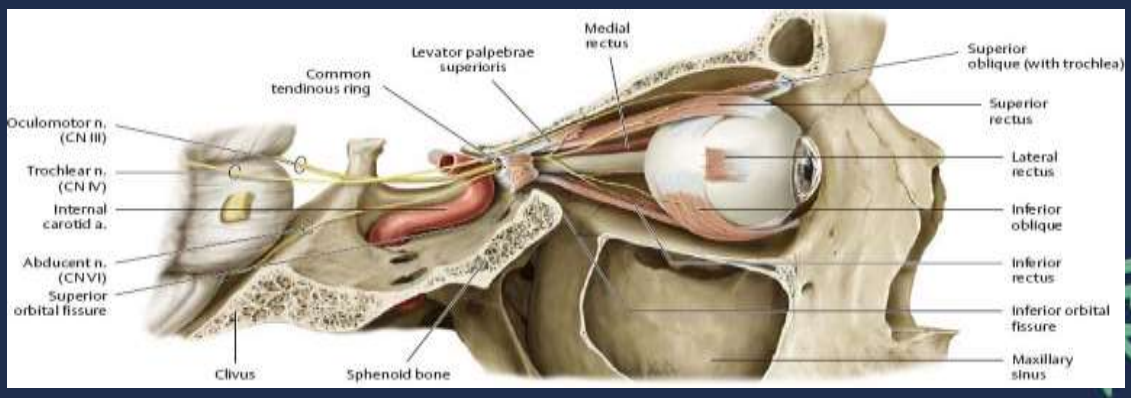


Definition:

The orbit

It is a skeletal **cavity** situated within the skull.
It provides mechanical protection for the eye and soft tissue structures related to it.



ANATOMY :

- **BONY STRUCTURE** : (SEVEN BONES)

Many Friendly Zebras Enjoy Lazy Summer Picnics

1-MAXILLA

2- FRONTAL BONE

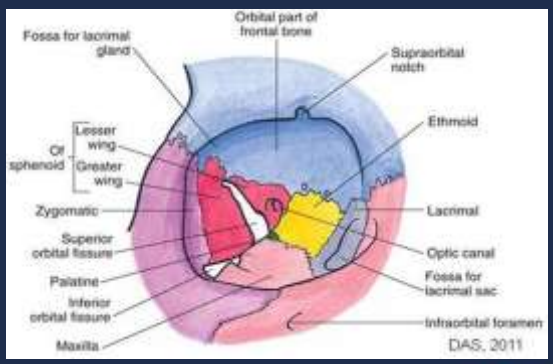
3-ZYGOMATIC BONE

4-ETHMOID BONE

5- LACRIMAL BONE

6-SPHENOID BONE

7- PALATINE WALL



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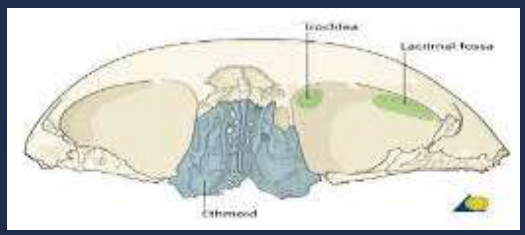
Orbital Roof



Concave. Formed by the orbital plate of the frontal bone and to a small extent by the lesser wing of the sphenoid posteriorly.

It separates the orbital cavity from the ACF and the frontal lobe of the brain.

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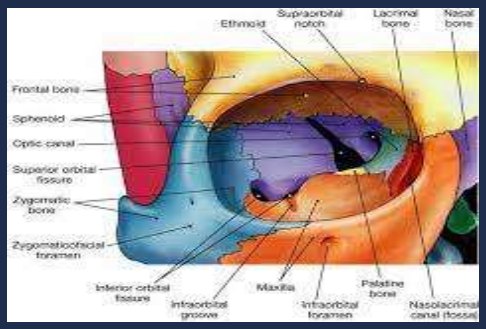
Orbital Floor

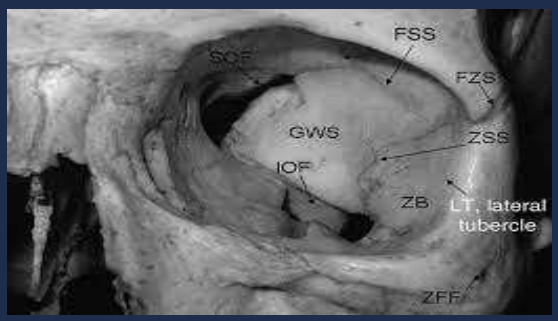
Thin. Formed by the orbital plate of the maxilla, the orbital surface of the zygomatic bone and the small orbital process of the palatine bone.

The orbital plate of maxilla separates the floor from the maxillary sinus.

Running forward from the IOF is the infraorbital groove and about the midpoint of the floor it becomes the infraorbital canal, which opens onto the face at the infraorbital foramen.



Lateral Wall



Thickest wall.

Anterior 1/3 is formed by the zygomatic bone and separates the orbit from the temporal fossa.

Posterior 2/3 is formed by the greater wing of the sphenoid and separates the orbit from the temporal lobe of the brain in the MCF.

Medial Wall

Very thin

Four bones form the medial wall from anterior to posterior are:

1. The frontal process of the maxilla
2. The lacrimal bone
3. The orbital plate of the ethmoid: largest, rectangular and separates orbit and ethmoid sinuses.
4. A small part of the body of the sphenoid.

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Incidence

- Orbital fractures are a common mid facial trauma, the incidence being inferior only to injuries of nasal bones
- 40 % of all fractures of the facial skeleton
- In children, orbital fractures account for 23 % of all facial traumas, following only mandibular fractures (34 %) in terms of the rate of incidence

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Incidence

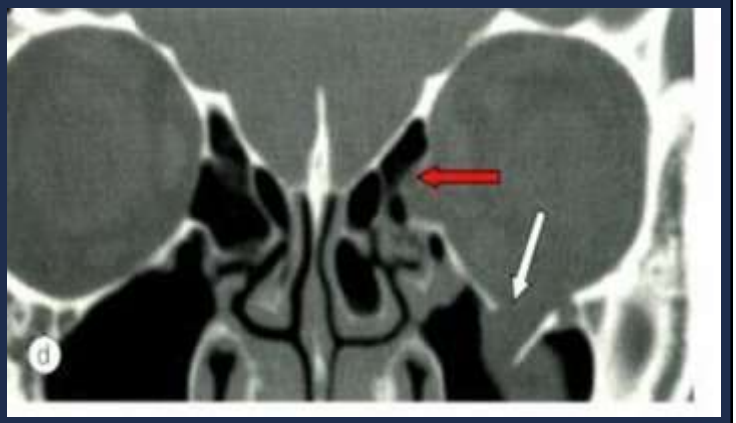
- Men constitute three-quarters of all the injured individuals
- Isolated orbital fractures are observed in ~35–40 % of cases, while 30–33 % of injured patients have two walls damaged. Fractures of three or all four orbital walls are found in 15–20 % and 5–10 % of patients, respectively

Types

- Fracture limited to internal skeleton (Blow out Fracture : The most commonly encountered and Blow in fracture)
- Fracture involving orbital rim (Rim Fracture)
- Fracture associated with other facial injuries (Compound Fracture)
- Orbital apex fracture (with early affection of optic canal and SOF)

Blow out fracture

- Outwardly displaced fracture of the orbital rim or wall
- Resulting in increased orbital volume.
- May be associated with enophthalmos



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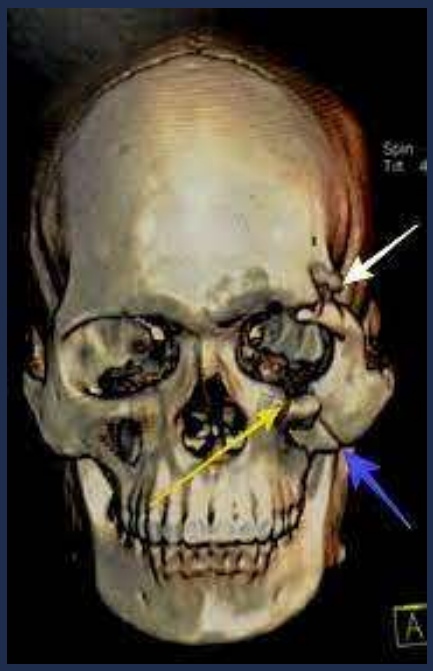
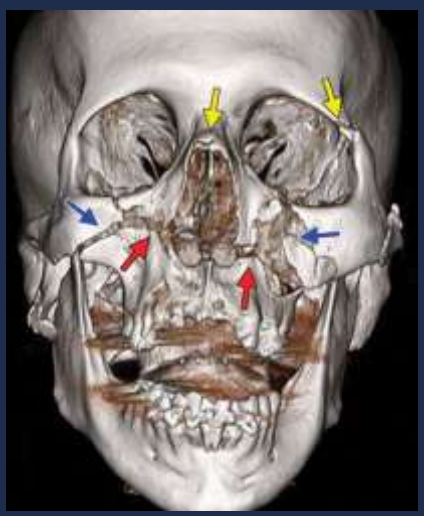
Blow in fracture

- Inwardly displaced fracture of the orbital rim or wall
- Resulting in decreased orbital volume.
- May be associated with proptosis

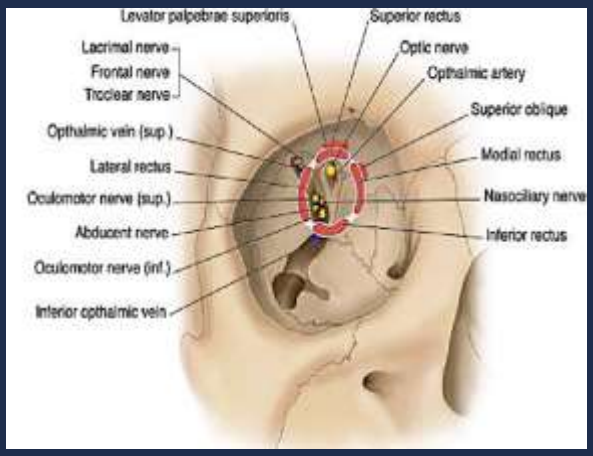
Rim fracture

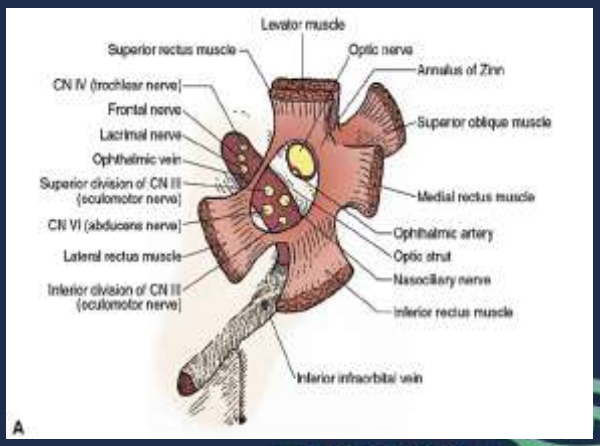


Compound fracture



Orbital apex fracture





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Subtypes of Blow out fracture

- Open door (large, significantly displaced, comminuted)
- Trap door (small, linear, hinged, minimally displaced)

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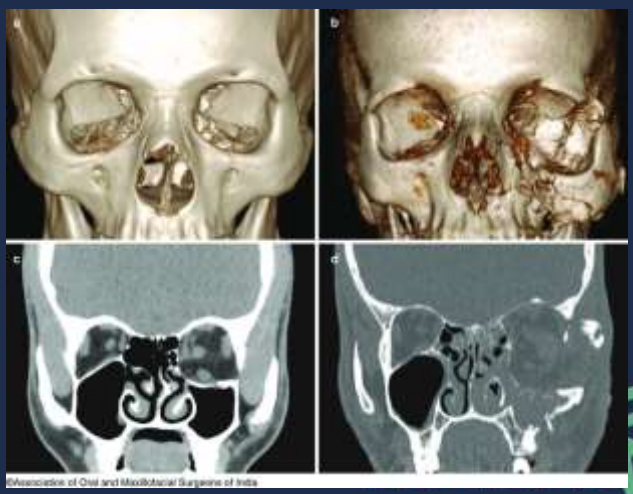
Subtypes of Blow out fracture

- Pure
- Impure (associated with rim defect)



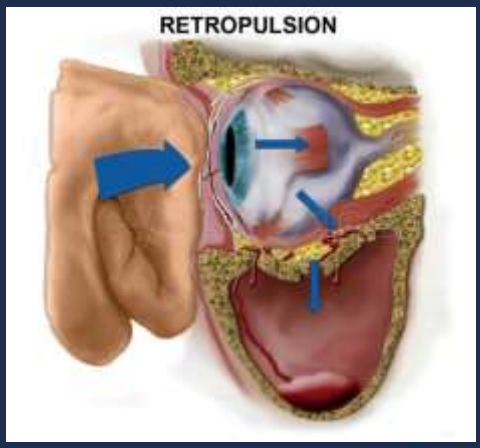
White trap door fracture (WEBOF)

- Usually overlooked
- Muscle entrapment with no significant peri-ocular signs
- More in children (green stick fracture)
- Risk of oculo-cardiac reflex
- Risk of muscle necrosis

Theories of blow out fracture

1. Hydraulic theory (direct)

Sudden increase of intra-orbital pressure due to backwards displacement



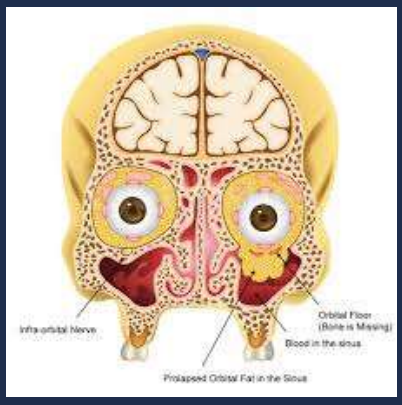
Theories of blow out fracture

2. Buckling (indirect)

Orbital rim buckles and transmit external forces to walls

Effects of blow out fracture

1. Fat herniation



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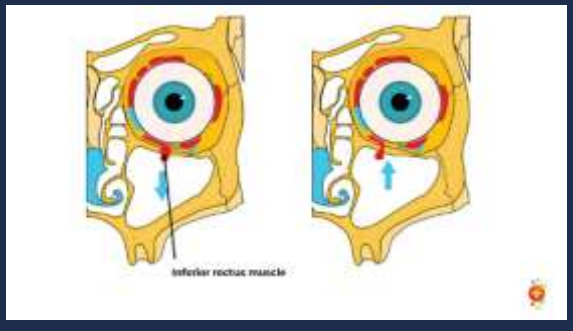
Effects of blow out fracture

2. Muscle entrapment



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Effects of blow out fracture

3. Infra-orbital paresthesia

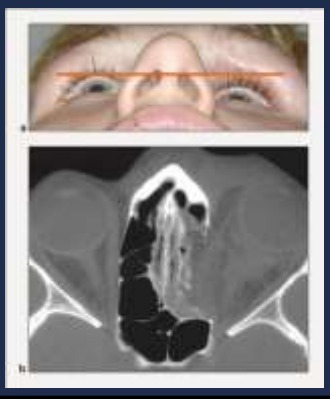
- The lower lid
- The skin of the cheek
- The upper lip
- The lateral aspect of the nose
- The ipsilateral upper teeth

Clinical features (early)

- Peri ocular edema
- Peri orbital ecchymosis
- Sub conjunctival hge
- Infra orbital paresthesia
- Limited ocular motility
- Orbital emphysema
- Ptosis
- Epistaxis
- Oculo cardiac reflex

Clinical features (late)

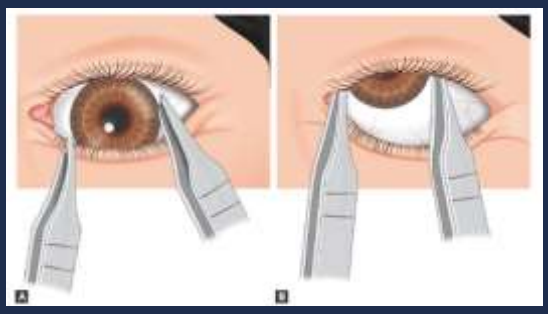
- Diplopia
- Enophtalmos
- Hypo Globus: Downward displacement of eyeball



Ocular damage

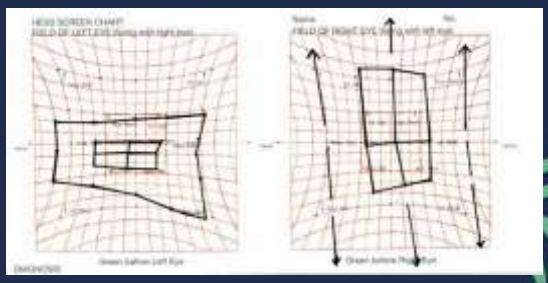
- Globe rupture
- Hyphema
- Angle recession
- Traumatic cataract
- Vitreous hemorrhage
- Commotio retinae
- Retinal tears, detachment, dialysis
- Optic nerve injury

Special tests



- Forced duction test

Positive = restriction



- Hess screen

assessing and monitoring of diplopia

Investigations

- CT scan (Gold standard)

- X ray

Waters' View (X ray Occipito mental view)
Hanging drop signs

- MRI

EOM course

Optic nerve affection

CT axial, sagittal, coronal, 3D

- Extent of the fracture
- Prolapsed orbital tissue
- Extraocular muscles
- Optic nerve compression
- Hematoma

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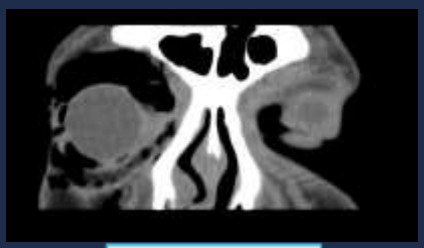
CT findings

- Wall disruption
- Sinus opacification
- Asymmetry
- Tear drop sign
- Emphysema



Black Eyebrow Sign

Initial management

- Ice packs
- Head elevation
- Systemic antibiotic
- Systemic anti inflammatory
- Systemic steroids?
- No nose blowing
- Nasal decongestant

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Indication for surgery

When not surgically repaired, most blowout fractures heal spontaneously without significant consequence.

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Early intervention

- Persistent oculo cardiac reflex
- Early enophthalmos or hypoglobus with facial asymmetry
- White trap door fracture
- ON compression

Delayed intervention (7-14 days)

✓If there is enophthalmos greater than 2 mm.

✓Double vision on primary or inferior gaze.

✓ Entrapment of extra ocular muscles.

✓ Fracture involves greater than 50% of the orbital floor

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Goals of surgery

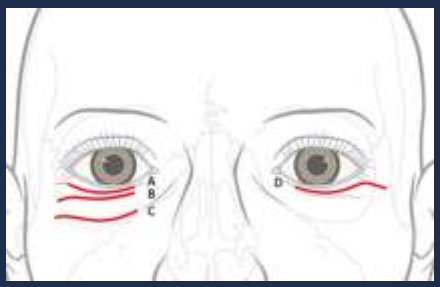
- Restore normal extraocular muscle movements
- Replace orbital contents into the orbit
- Restore normal orbit volume

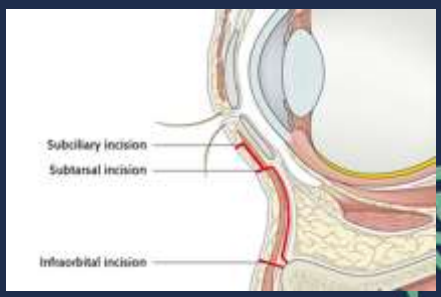
Surgical approaches

1. Trans cutaneous
2. Trans conjunctuval
3. Endoscopic

Transcutaneous approach

- Sub ciliary (**A,** lower blepharoplasty).
- Sub tarsal (**B,** lower or mid eyelid).
- Intra orbital (**C**, inferior orbital rim) . (not be used)
- The sub ciliary approach can be extended laterally to gain access to the lateral orbital rim (**D**).





Transcutaneous approach

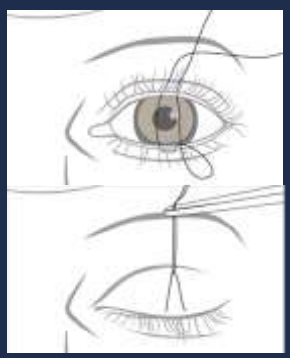
- Temporary tarsorraphy is recommended to help protect the cornea

Advantages

- Better in cases of severe lid edema
- Better exposure

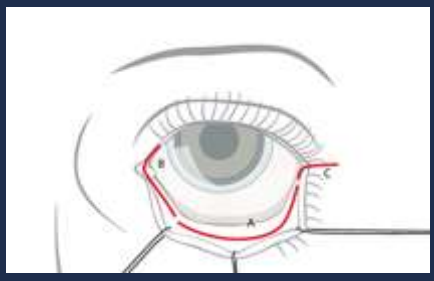
Disadvantages

- Visible scar
- vertical scar contraction with an ectropion



Trans conjunctival approach

- A) Transconjunctival (inferior fornix using a retroseptal or preseptal route).
- B) Transcaruncular (medial transconjunctival).
- C) Transconjunctival with lateral skin extension
- (lateral canthotomy/"swinging eyelid").
- D) Combination of inferior (A) and medial (B) transconjunctival.
- E) C-shaped incision (i.e., Combination of inferior (A) and medial transconjunctival (B) plus lateral skin extension (C)).



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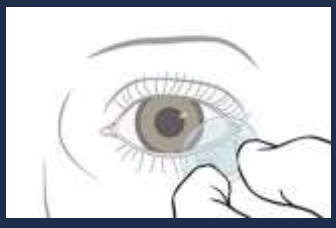
Trans conjunctival approach

Advantages

- Excellent cosmesis
- No skin or muscle dissection
- Rapid
- Less risk of ectropion



Disadvantages

- Limited field especially medially
- Learning curve

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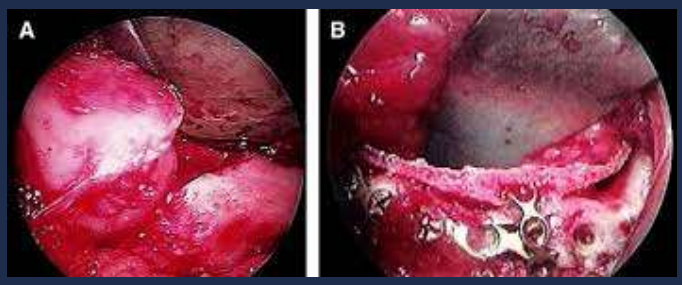
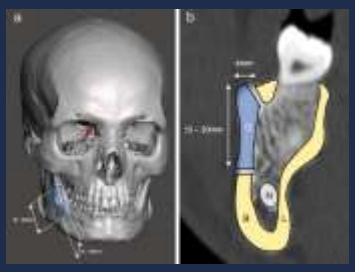
Endoscopic approach

- Learning curve
- Special instruments



Types of orbital implant



1. Bone graft

- Cheap, smooth, biocopmatible, stable, radio opaque, variable thickness

- Donor site, contour changes with bone remodeling, difficult to shape, less orbital drainage

Types of orbital implant

2. Cartilage graft

- Cheap, smooth, compatible. Minimal donor morbidity
- Weak, not radio opaque

Types of orbital implant

3. Titanium mesh

- Stable, biocompatible, radio opaque, easy contouring, no donor site, tissue interaction, better drainage
- Expensive, sharp, tissue tethering

Types of orbital implant

4. Porous polyethylene sheet

- Smooth, biocompatible, easy contouring, tissue interaction
- Expensive, not radio opaque, less rigid, less orbital drainage

Types of orbital implant

5. Composite of porous polyethylene and titanium

- More rigid, radio opaque, less tissue tethering
- Less orbital drainage

Types of orbital implant

6. Resorbable sheets

- Mesh plate of polyglycolic and polylactic acid (Lactosorb).
- Bio comaptible, resorbable
- Expensive, long term stability??

Types of orbital implant

7. Customized orbital implant

- Designed according to other orbit
- Smooth, bio compatible, no contouring, radio opaque
- Expesnive, takes time

Complications of surgery

- Bleeding
- Infection, orbital cellulitis
- Globe or Optic nerve injury
- Persistent limitation of motility and diplopia
- Infra orbital paresthesia
- Globe malposition (eno, hypo)
- Lid malposition (retraction, ectropion)
- Implant infection, migration or extrusion

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THANK YOU

See you next year

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