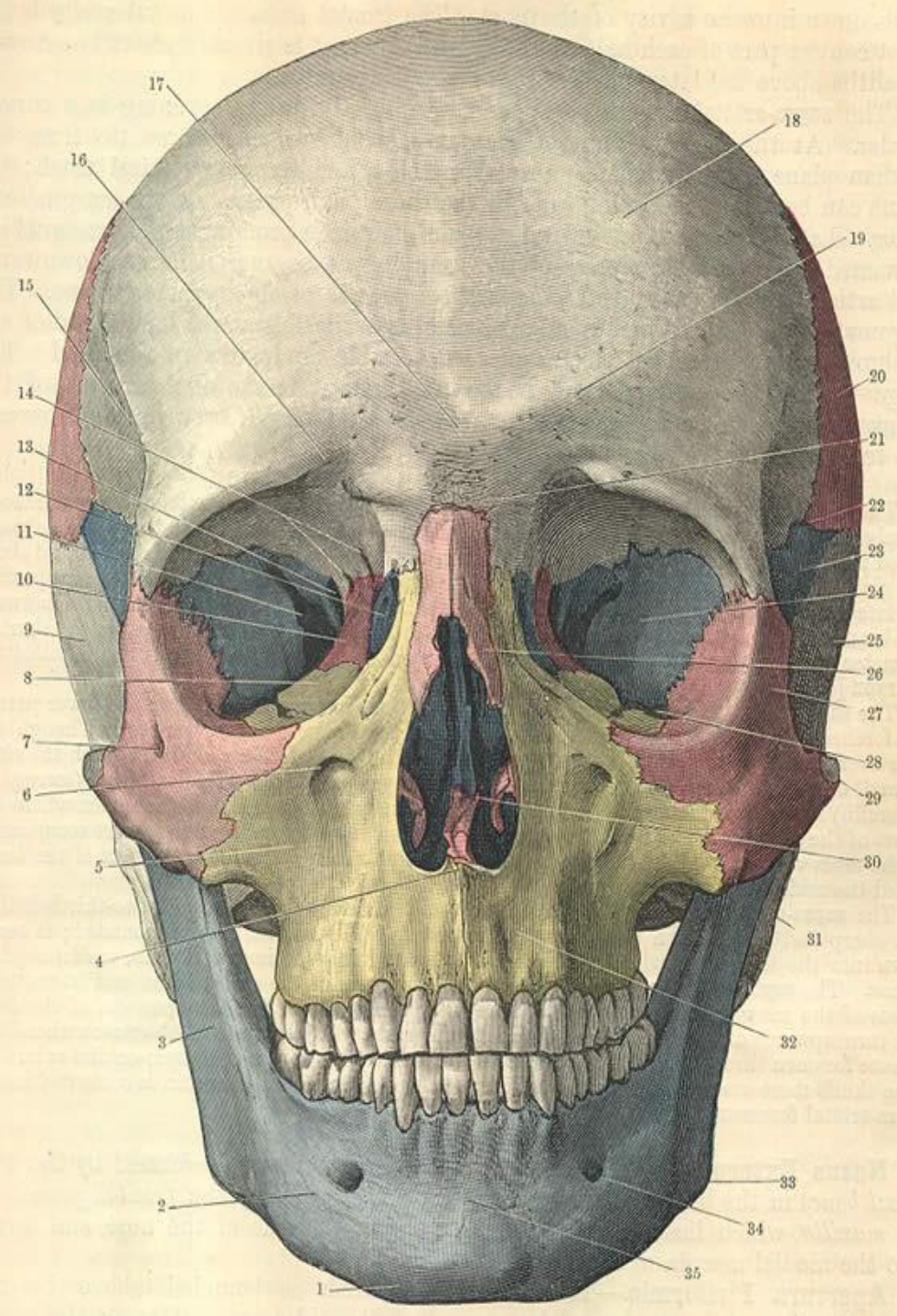


# ORBIT

- ANATOMY
- APPLIED ASPECTS



# INTRODUCTION

- Orbit is the anatomical space bounded:
  - Superiorly – Anterior cranial fossa
  - Medially - Nasal cavity & Ethmoidal air sinuses
  - Inferiorly - Maxillary sinus
  - Laterally - Middle cranial fossa & Temporal fossa

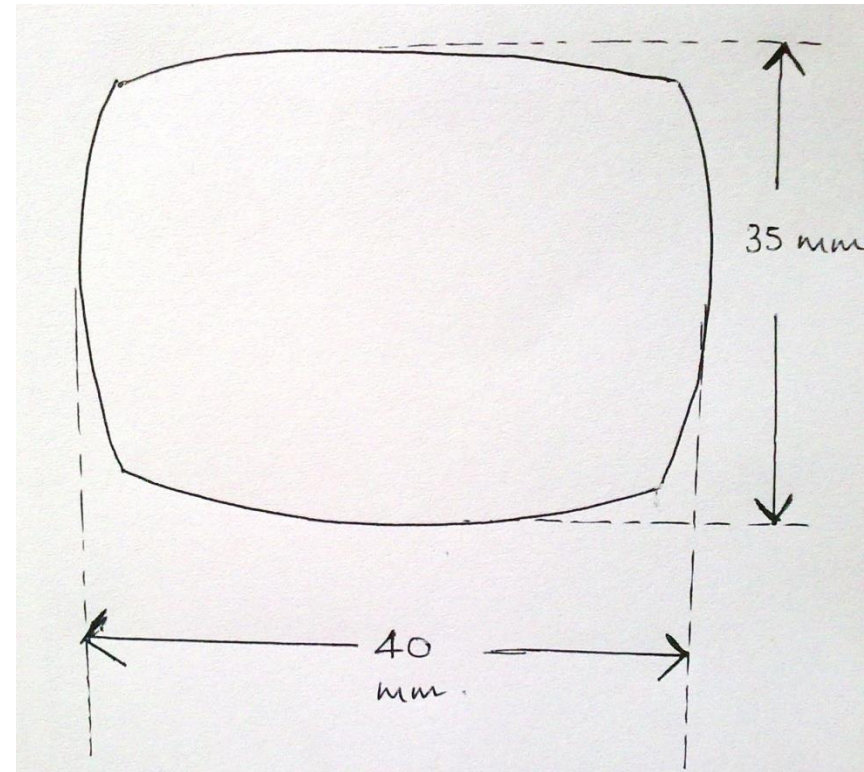
An anatomical model of a human skull, viewed from the front. The word "ANATOMY" is overlaid in large, 3D, red, sans-serif capital letters with a white outline and a slight shadow, positioned diagonally across the center of the image. The skull is light-colored and shows various features like the eye sockets, nasal cavity, and upper jaw area.

**ANATOMY**

# DIMENSIONS

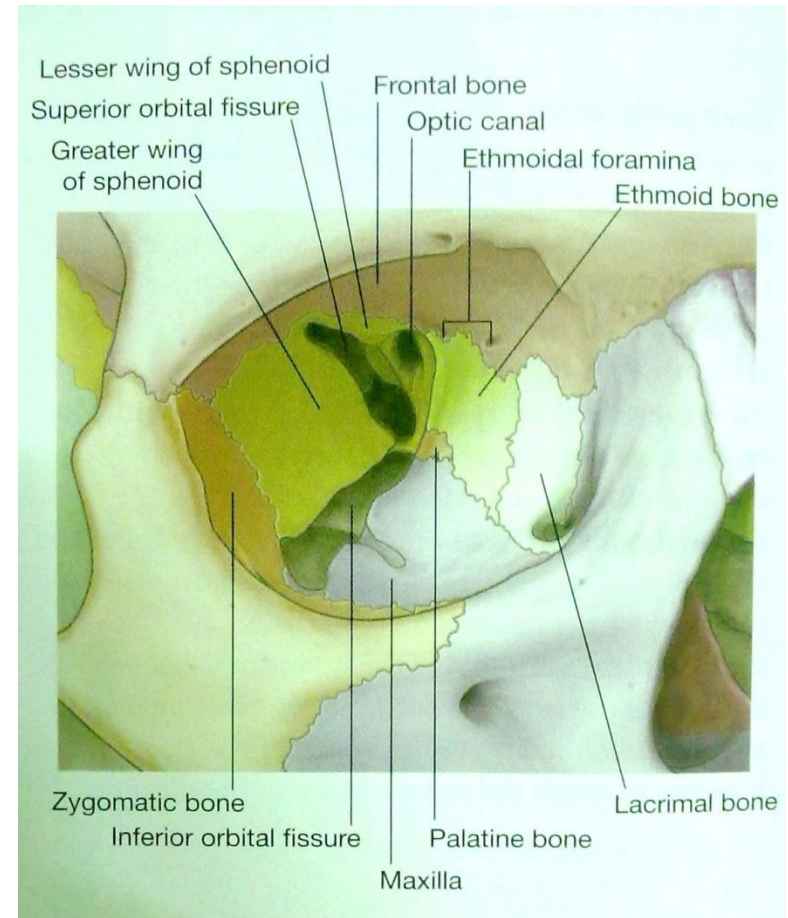
- Quadrilateral pyramid
  - Base - forwards, laterally, downwards
  - Apex - optic foramen
- Volume of orbital cavity  $\approx$  30 cc in adults

- Rim:
  - Horizontally  $\approx 40$  mm
  - Vertically  $\approx 35$  mm
- Interorbital width
  - $\approx 25$  mm
- Extraorbital width
  - $\approx 100$  mm
- Depth
  - Medially  $\approx 42$  mm
  - Laterally  $\approx 50$  mm



# COMPOSED OF:

- 7 Bones:
  - Ethmoid
  - Frontal
  - Lacrimal
  - Maxillary
  - Palatine
  - Sphenoid
  - Zygomatic



Right orbit

A close-up photograph of a human skull, showing the eye sockets and nasal cavity. The skull is a light tan color with some darker, shadowed areas. Overlaid on the skull is the word "BOUNDARIES" in a large, bold, 3D font. The letters are red with a silver, metallic-looking outline and a slight shadow, giving them a three-dimensional appearance as if they are floating above or attached to the skull. The text is oriented diagonally across the frame, from the lower left towards the upper right.

**BOUNDARIES**

# 4 WALLS

ROOF

FLOOR

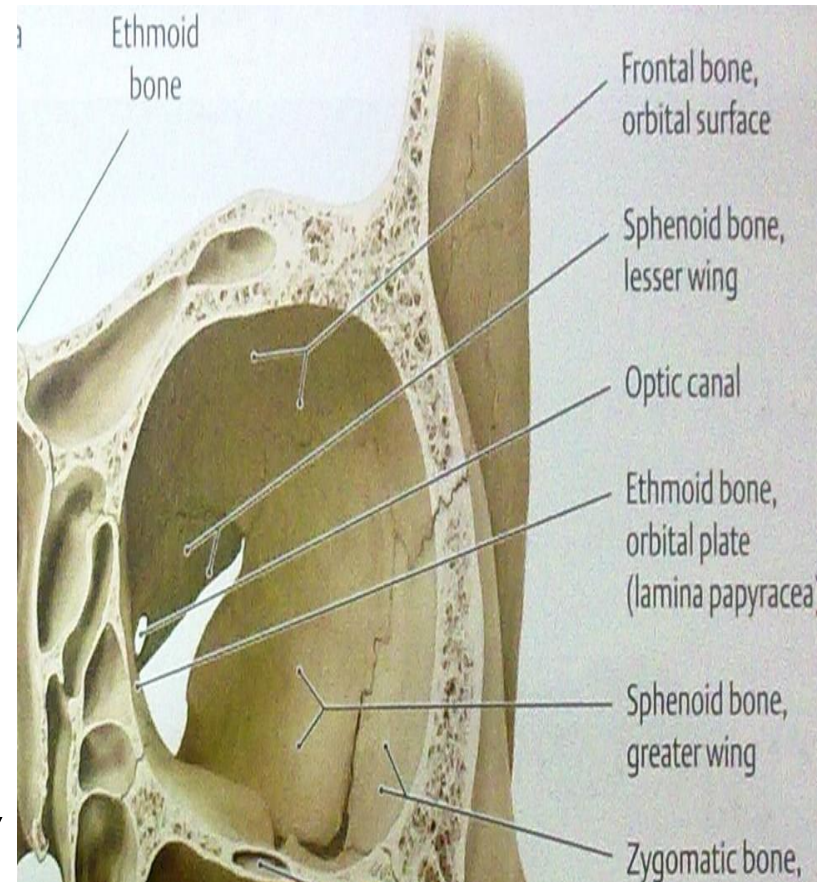
MEDIAL  
WALL

LATERAL  
WALL



# ROOF

- Underlies Frontal sinus and Anterior cranial fossa
- Formed by-
  - 1. Frontal bone (Orbital plate)
  - 2. Lesser wing of Sphenoid
- Triangular
- Faces downwards, and slightly forwards



Left orbit

- Concave anteriorly, almost flat posteriorly
- The anterior concavity is greatest about 1.5 cm from the orbital margin & corresponds to the equator of the globe.
- Thin, translucent and fragile (except the lesser wing of the sphenoid)

# LANDMARKS

- I. FOSSA FOR THE LACRIMAL GLAND-
  - LOCATION:
    - behind the zygomatic process of the frontal bone
  - CONTENTS:
    - lacrimal gland
    - some orbital fat

## 2. TROCHLEAR FOSSA (FOVEA)

### ➤ LOCATION:

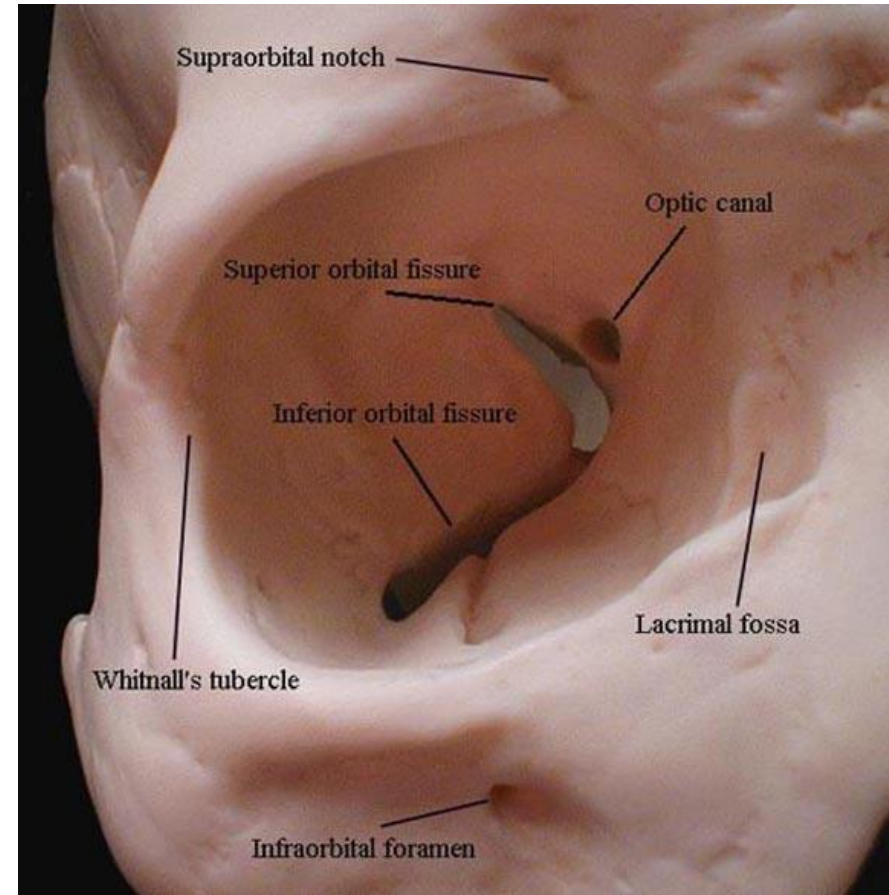
- 4 mm from the orbital margin

### ➤ CONTENTS:

- insertion of tendinous pulley of Superior Oblique
  - sometimes ( $\approx 10\%$ ) surmounted by a spicule of bone (*Spina trochlearis*)
  - Extremely rarely trochlea completely ossified ➡ cracks easily
- ### ➤ SURFACE ANATOMY:
- Palpable just within the supero-medial angle

### 3. SUPRAORBITAL NOTCH:

- **LOCATION:**
  - ≈ 15 mm lateral to the superomedial angle
- **TRANSMITS:**
  - Supraorbital nerve
  - Supraorbital vessels
- **SURFACE ANATOMY:**
  - At the junction of lateral 2/3<sup>rd</sup> and medial 1/3<sup>rd</sup>
  - About two finger breadth from the medial plane



Right orbit

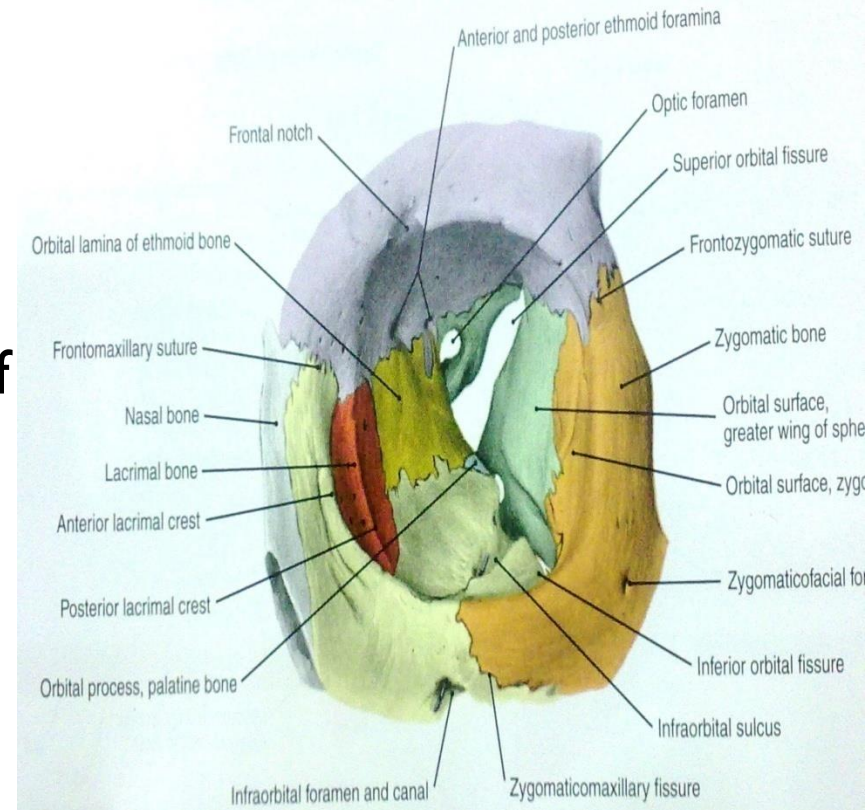
## 4. OPTIC FORAMEN:

### ➤ LOCATION:

- Lies medial to superior orbital fissure
- at the apex
- Present in the lesser wing of sphenoid

### ➤ TRANSMITS:

- Optic nerve with its meninges
- Ophthalmic artery



Left orbit

# CLINICAL SIGNIFICANCE

Thin and fragile

```
graph TD; A[Thin and fragile] --> B[Easily fractured by direct violence (penetrating orbital injuries)]; B --> C[Frontal lobe injury];
```

Easily fractured by direct violence  
(penetrating orbital injuries)

Frontal lobe injury

- Reinforced

- Laterally- greater wing of sphenoid
- Anteriorly- superior orbital margin

So, fractures tend to pass towards medial side



At junction of the roof and medial wall, the suture line lies in proximity to cribriform plate of ethmoid



rupture of dura mater

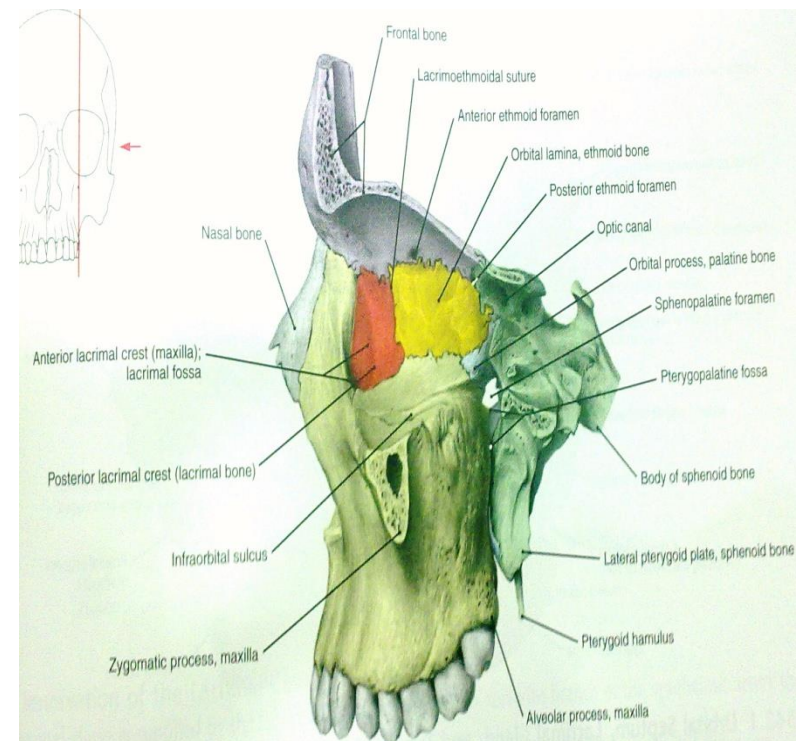


CSF escapes into orbit/nose/both



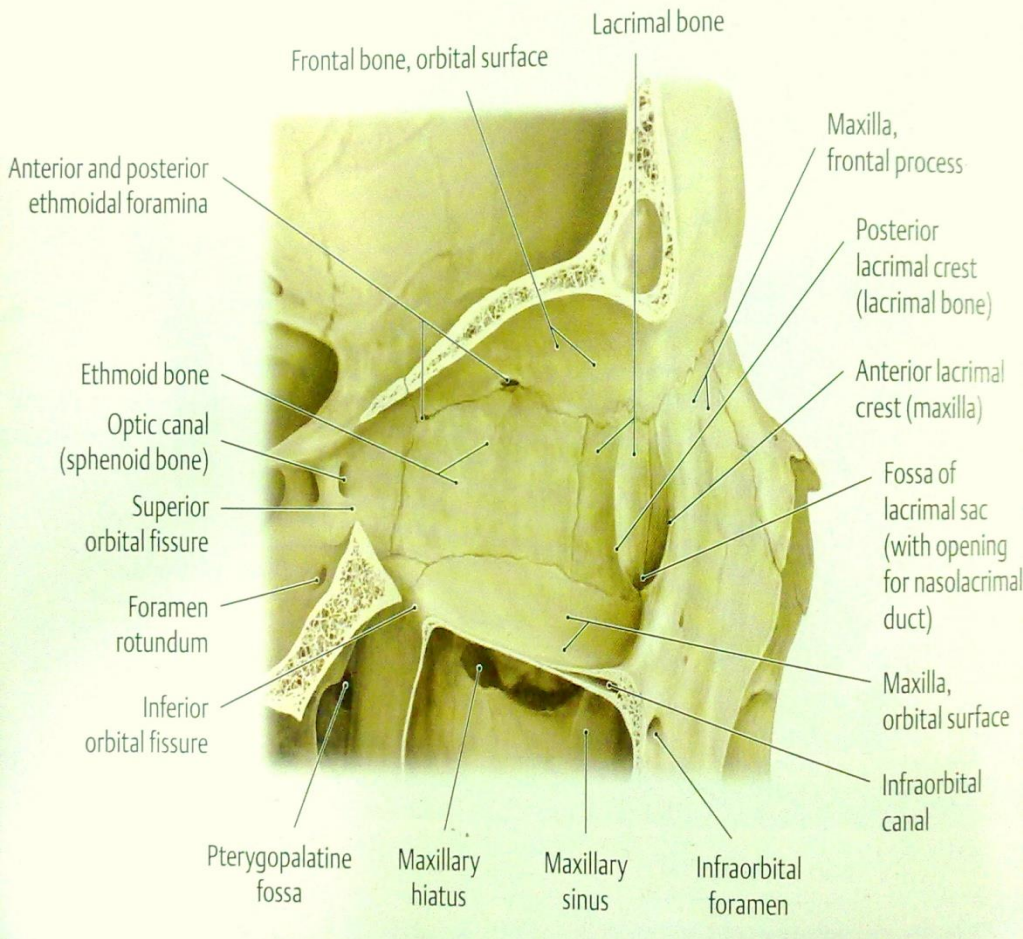
# MEDIAL WALL

- Thinnest orbital wall
- Formed (Antero-posteriorly)
  - 1. Frontal process of Maxilla
  - 2. Lacrimal bone
  - 3. Orbital plate of Ethmoid
  - 4. Body of the sphenoid
- Almost parallel to each other



Left orbit

# LANDMARKS



Right orbit

- **LACRIMAL FOSSA:**
  - **Formed by:**
    - frontal process of maxilla
    - lacrimal bone
  - **Boundaries:**
    - Anterior- anterior lacrimal crest
    - Posterior- posterior lacrimal crest

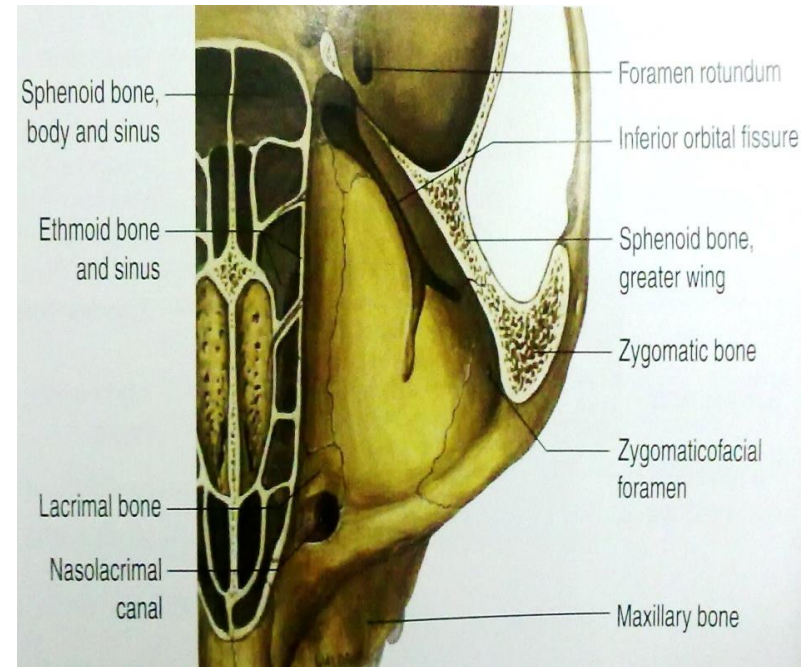
- Dimensions-
  - Length  $\approx$  14 mm
  - Depth  $\approx$  5 mm
  - Continuous below with bony nasolacrimal canal
  
- Content-
  - Lacrimal sac

- ANTERIOR LACRIMAL CREST\*-
  - upward continuation of the inferior orbital margin
  - Ill defined above but well marked below
  - Surface anatomy-
    - Palpable along the medial orbital margin (anteriorly)
  
- POSTERIOR LACRIMAL CREST\*-
  - downward extension of the superior orbital margin
  - Surface anatomy-
    - Palpable along the medial orbital margin, posterior to the lacrimal fossa

*\*significant landmarks in lacrimal sac surgery*

# FLOOR

- Shortest orbital wall
- Roughly triangular
- Formed by-
  - Orbital plate of maxilla (major)
  - Orbital surface of Zygomatic bone (anterolateral)
  - Orbital plate of Palatine bone



Right orbit

- Bordered laterally by inferior orbital fissure and medially by maxilloethmoidal suture
- Overlies maxillary sinus

# LANDMARKS



Infraorbital  
groove

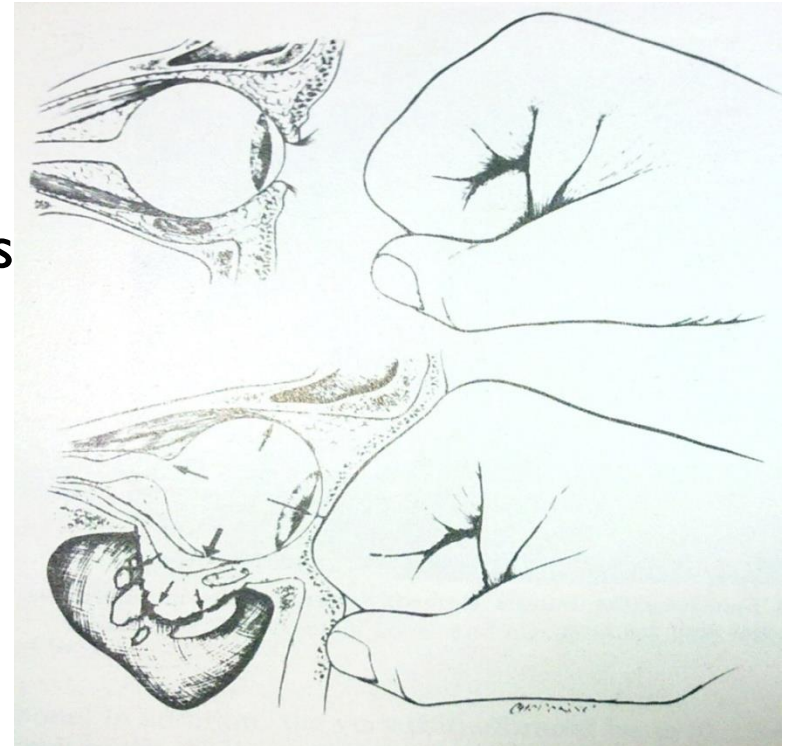
Infraorbital  
canal

Infraorbital  
foramen

- $\approx 4$  mm inferior to the inferior orbital margin
- Transmits
  - Infraorbital nerve
  - Infraorbital vessels

# CLINICAL SIGNIFICANCE

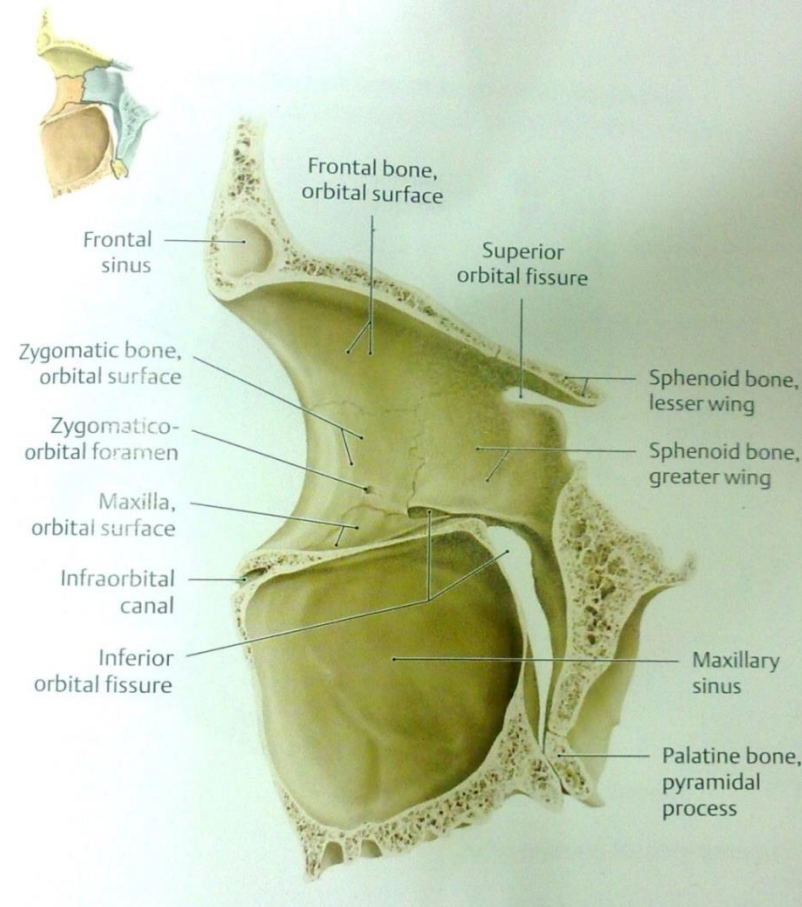
- BLOW OUT FRACTURES:
  - Fractures of the orbital floor
  - Infraorbital nerves and vessels are almost invariably involved
  - Patient presents with
    - *Diplopia*
    - *Restricted movements(upgaze)*
    - *Paresthesia*
    - *Enophthalmos*





# LATERAL WALL

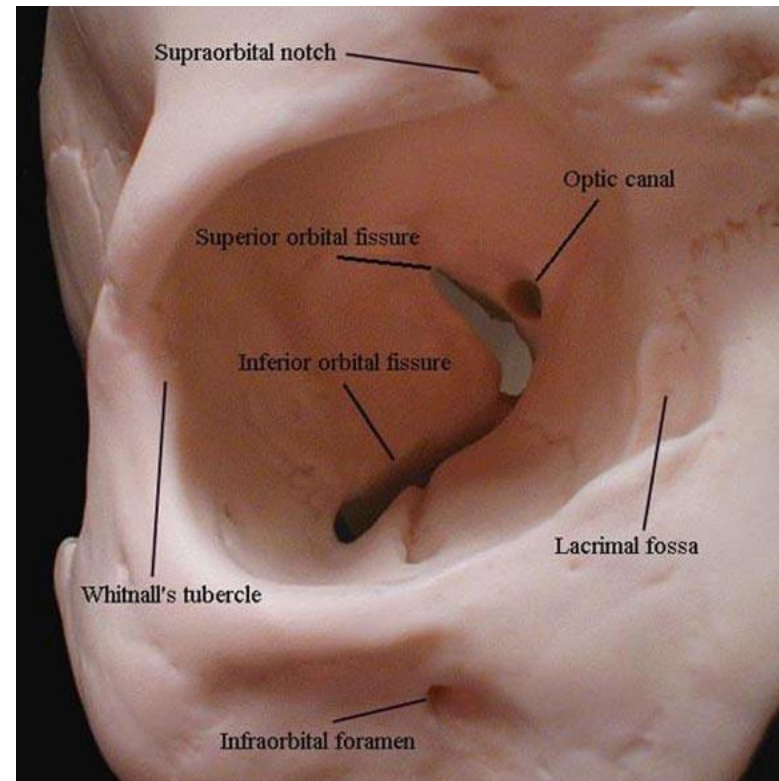
- Formed by-
  - 1. Zygomatic bone
  - 2. Greater wing of sphenoid
- Thickest orbital wall
- Separates orbit from-
  - Middle cranial fossa
  - Temporal fossa
- At an angle of about  $90^\circ$  with each other



Right orbit

# LANDMARKS

- LATERAL ORBITAL TUBERCLE OF WHITNALL:
  - 4-5 mm behind the lateral orbital rim
  - 11 mm inferior to the frontozygomatic suture line



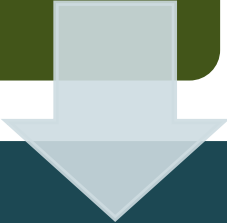
Right orbit

- Gives attachment to:
  - Check ligament of lateral rectus
  - Lockwood's ligament
  - Lateral canthal tendon
  - The aponeurosis of the levator palpebrae superioris
  - Orbital septum
  - Lacrimal fascia

# CLINICAL SIGNIFICANCE

- Lateral wall protects only the posterior half of the eyeball, hence palpation of retrobulbar tumours is easier.
- Frontal process of zygoma & zygomatic process of frontal bone protect the globe from lateral trauma- known as *facial buttress area*.
- Just behind the facial buttress area, is the zygomaticosphenoid suture, which is the preferred site for lateral orbitotomy.

Anteriorly, superior margin of inferior Orbital fissure joins suture between zygomatic and greater wing of sphenoid (line of relative weakness)



extends to frontozygomatic suture



Frequently involved in zygomatic bone fracture

An anatomical model of the human skull, specifically the orbital region. The image shows the bony structure of the eye socket, including the orbital rim and the orbital floor. The text "ORBITAL MARGINS" is overlaid in a 3D, red, sans-serif font, slanted across the center of the image. The background is a light, warm-toned color, possibly representing the surrounding soft tissue or the model's base.

# ORBITAL MARGINS

# SUPERIOR ORBITAL MARGIN

- formed by- Frontal bone
- concave downwards, convex forwards
- sharp in lateral  $2/3^{\text{rd}}$ , rounded in medial  $1/3^{\text{rd}}$ 
  - at the junction- *supraorbital notch* (sometimes *foramen*)\*
- \**Site for nerve block.*

# INFERIOR ORBITAL MARGIN:

- Formed by-
  - Zygomatic
  - Maxilla
- *suture between the two is sometimes marked by a tubercle- felt 4-5 mm above the infraorbital foramen*

## ❖ SURFACE ANATOMY:

- Palpable as a sharp ridge, beyond which the finger can pass into the orbit



# MEDIAL ORBITAL MARGIN:

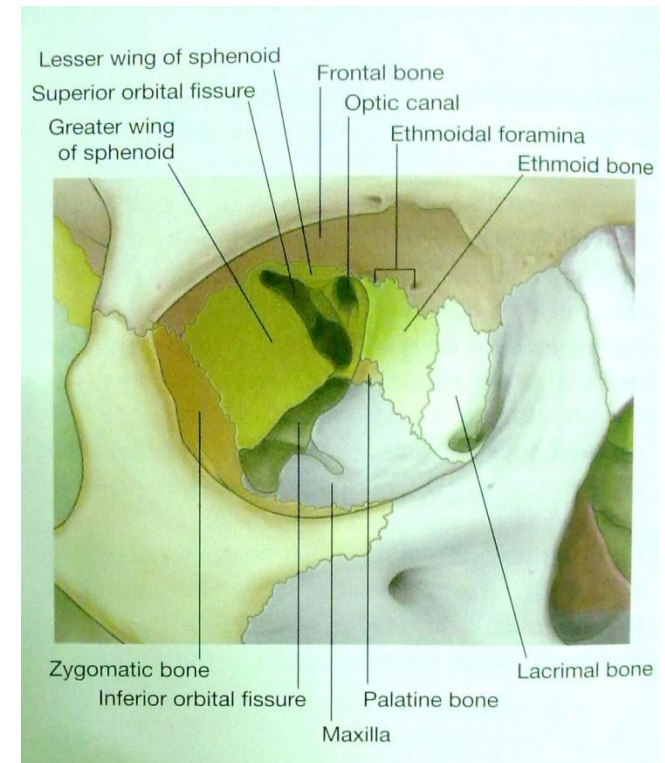
- Formed by
  - Frontal process of maxilla (anterior lacrimal crest)
  - Lacrimal bone (posterior lacrimal crest)

An anatomical model of the skull base, showing the internal table of the sphenoid bone. The image is a close-up, showing the various foramina and fissures. The text "FISSURES AND FORAMINA" is overlaid in a 3D, red, sans-serif font, slanted diagonally across the center of the image. The background is a light tan color, representing the bone.

**FISSURES AND  
FORAMINA**

# OPTIC CANAL

- Leads from the middle cranial fossa to the apex of the orbit
- Orbital opening- vertically oval
- In the middle- circular ( $\approx 5\text{mm}$ )
- Intracranial- horizontally oval
- Length  $\approx 8\text{-}12\text{ mm}$ 
  - Attained at 4-5 years of age
- Boundaries-
  - Medially- Body of the sphenoid
  - Laterally- Lesser wing of the sphenoid



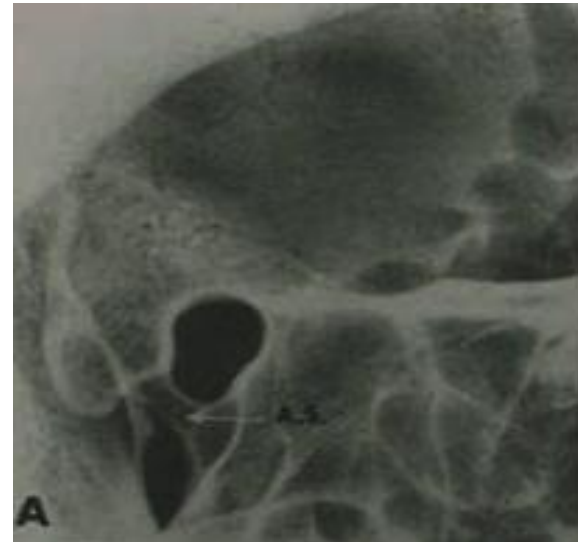
Right orbit

# CLINICAL SIGNIFICANCE

- Optic nerve glioma or Meningioma may lead to unilateral enlargement of Optic canal



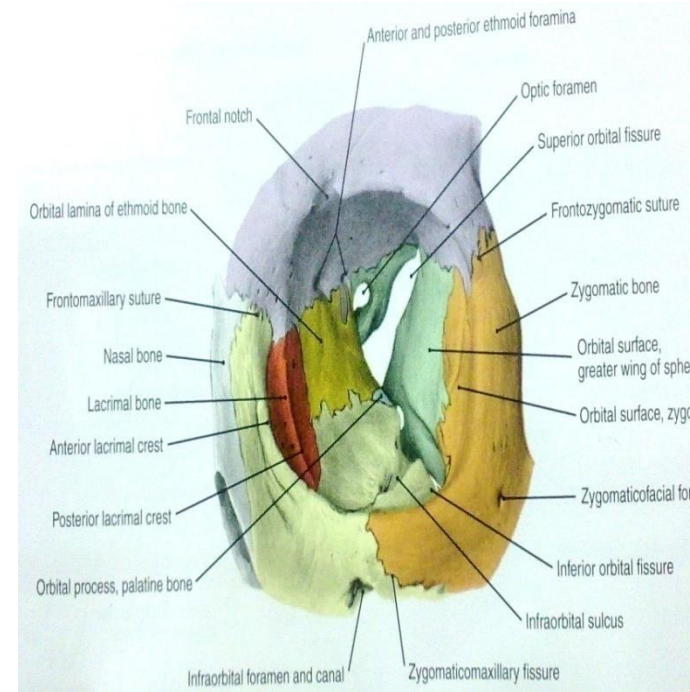
CT-Scan showing lesion in Left optic nerve



Strut view of Optic Canal (Normal)

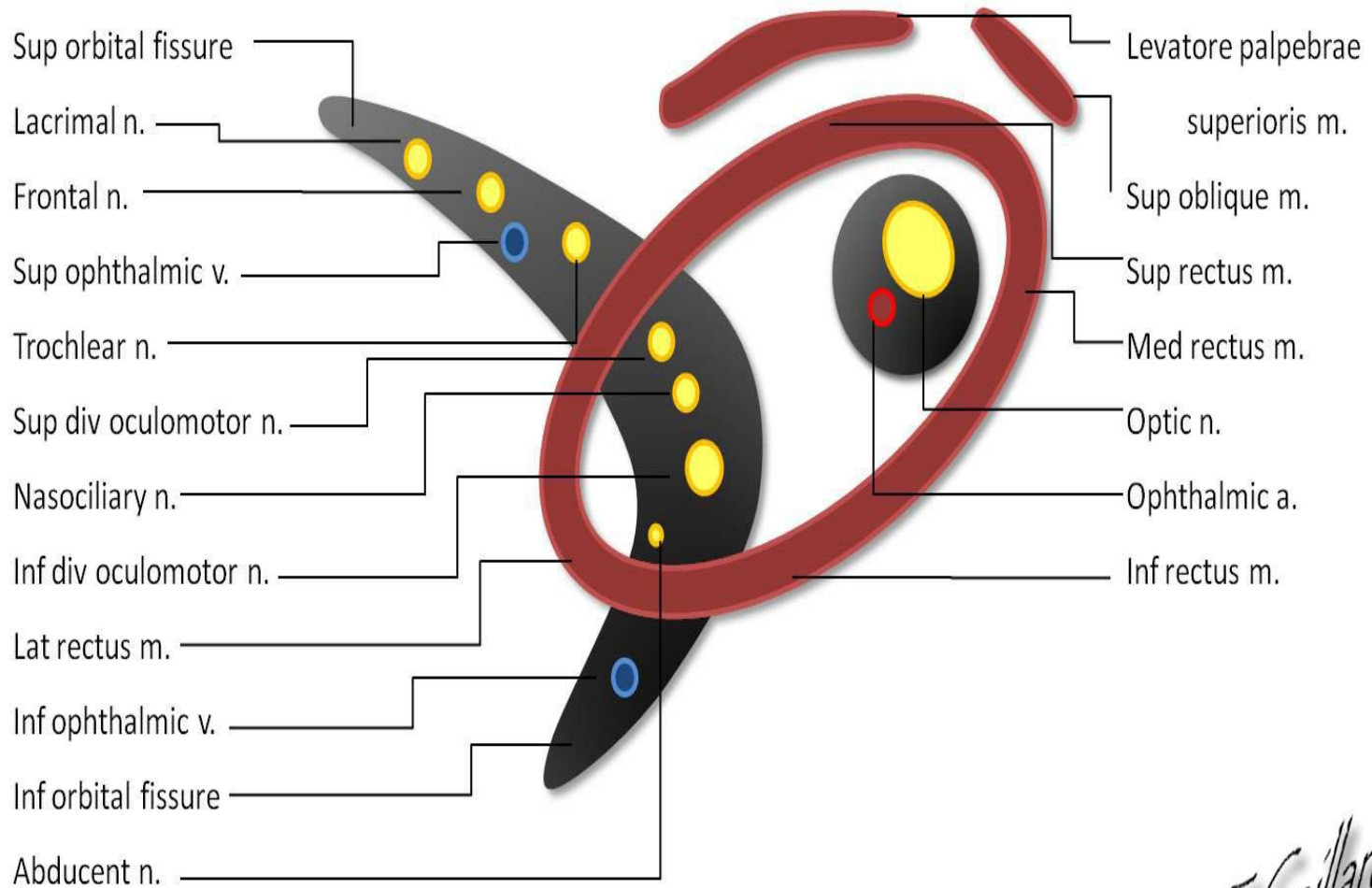
# SUPERIOR ORBITAL FISSURE

- Also known as Sphenoidal fissure
- Lateral to the optic foramen at the orbital apex
- comma-shaped gap between the roof and the lateral wall
- Bounded by- Lesser and greater wings of the sphenoid



Left orbit

# SUPERIOR ORBITAL FISSURE



Right superior orbital fissure

*FGaillard  
2007*

- 22 mm long
- Largest communication between the orbit and the middle cranial fossa
- Its tip lies 30-40 mm from the frontozygomatic suture

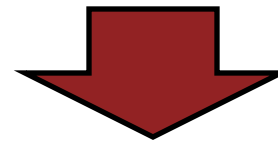
# LANDMARK

- Annulus of Zinn
  - Spans both superior orbital fissure & the optic canal
  - Gives origin to the four recti muscles



## CLINICAL SIGNIFANCE

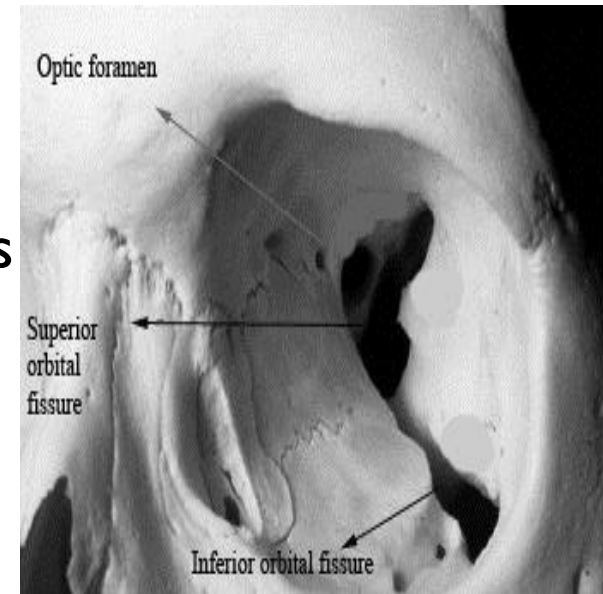
- Inflammation of the superior orbital fissure and apex may result in a multitude of signs including ophthalmoplegia and venous outflow obstruction



*TOLOSA HUNT SYNDROME*

# INFERIOR ORBITAL FISSURE

- Also known as sphenomaxillary fissure
- Between floor and the lateral wall
- Bounded by-
  - Medially- Maxilla and orbital process of palatine
  - Laterally- Greater wing of the sphenoid
  - Anterior aspect- closed by Zygomatic bone

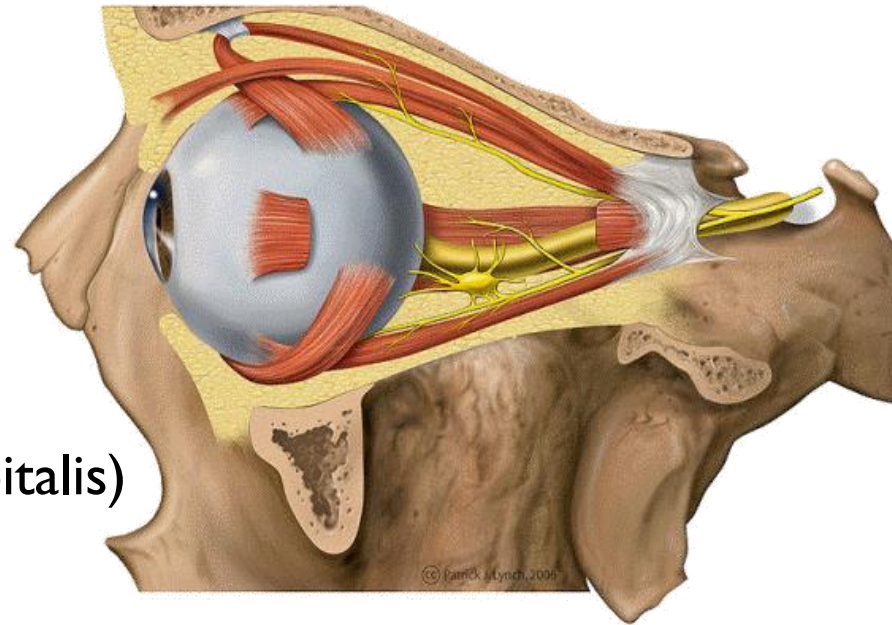


Left orbit

- Transmits-
  - Venous drainage from the inferior part of the orbit to the pterygoid plexus
  - neural branches from the pterygopalatine ganglion
  - the zygomatic nerve
  - the infraorbital nerve
- Closed in the living by the periorbita & the Muller's muscle
- Serves as the posterior limit of surgical subperiosteal dissection along the orbital floor

# CONTENTS OF THE ORBIT

- Eye ball
- Muscles
  - 4 Recti
  - 2 obliques
  - Levator palpebrae superioris
  - Muller's muscle (Musculus orbitalis)
- Nerves
  - Sensory- branches of V'th Nerve
  - Motor- III'rd, IV'th & VI'th Nerve
  - Autonomic- Nerves to the Lacrimal gland
  - Ciliary ganglion



Left orbit

- Vessels

- Arteries-

- Internal carotid system- branches of ophthalmic artery
- External carotid system- a branch of internal maxillary artery

- Veins-

- Superior ophthalmic vein
- Inferior ophthalmic vein

- Lymphatics-

- none

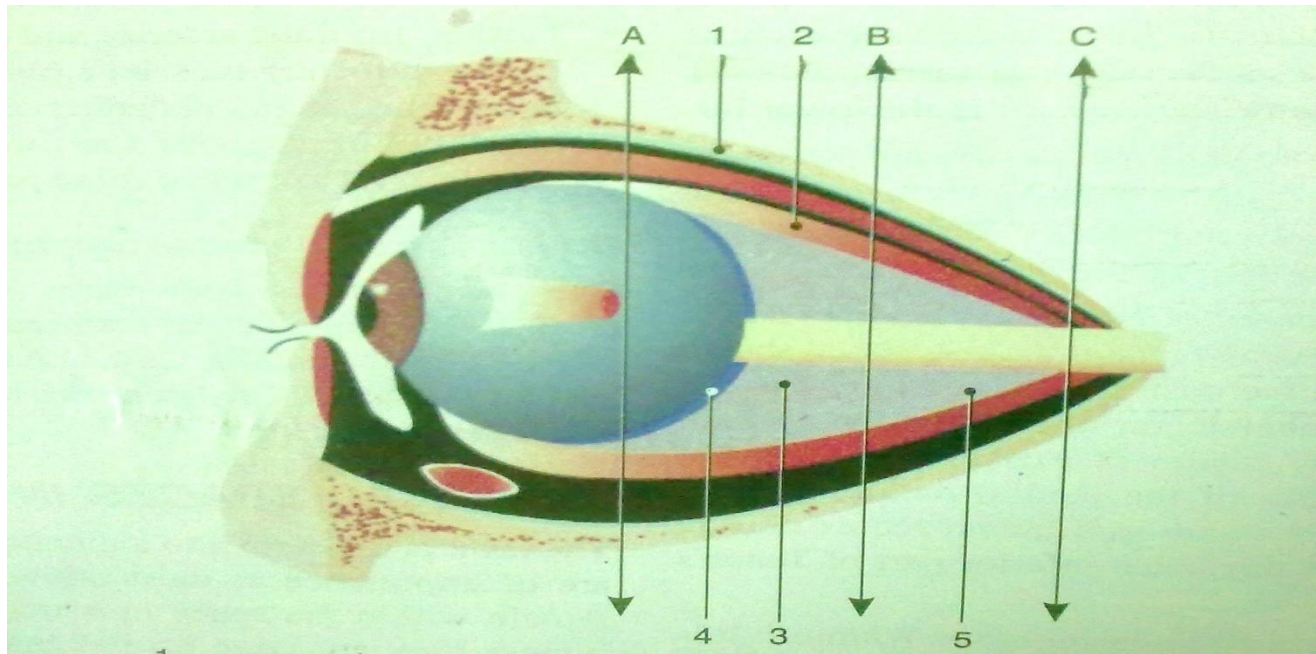
- Lacrimal gland

- Lacrimal sac

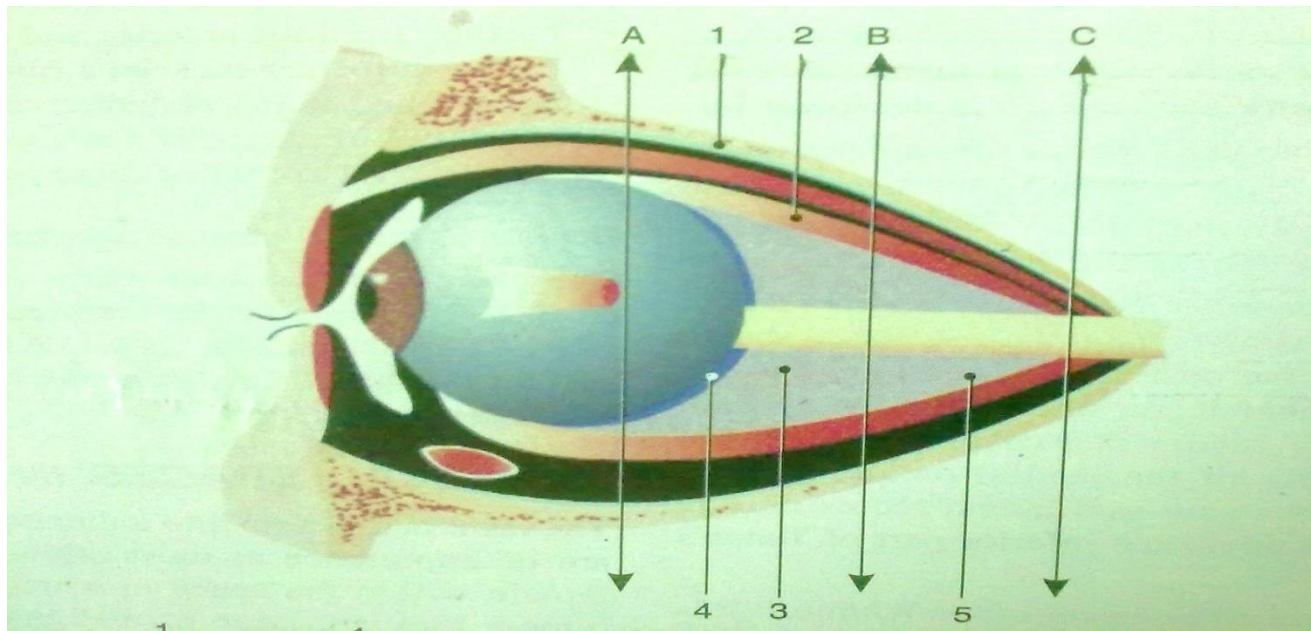
- Orbital fat, reticular tissue & orbital fascia

# SURGICAL SPACES

- SUBPERIOSTEAL SPACE:
  - Between orbital bones and the periorbita
  - Limited anteriorly by strong adhesions of periorbita to the orbital rim



- PERIPHERAL ORBITAL SPACE (ORBITAL SPACE)
  - Bounded:
    - peripherally by periorbita
    - internally by the four recti with their intermuscular septa
    - anteriorly by the septum orbitale
    - Posteriorly, it merges with the central space

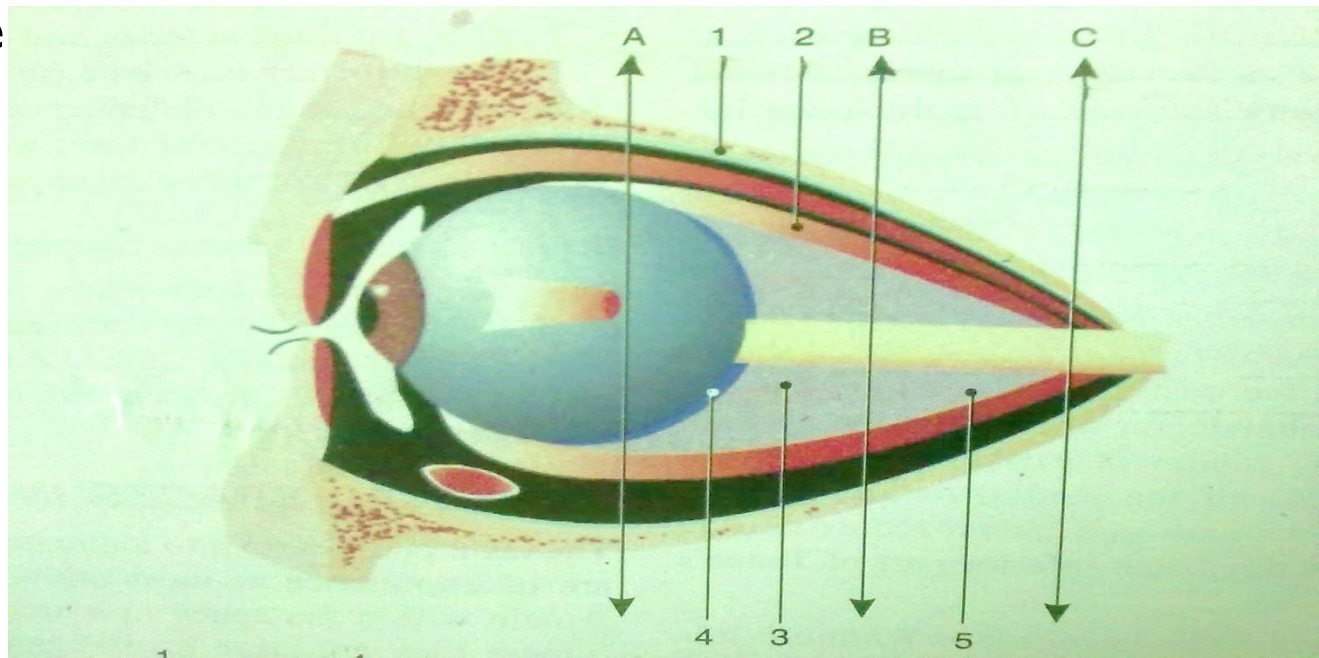


- CONTENTS:
  
- Peripheral orbital fat
- Muscles
  - Superior oblique
  - Inferior oblique
  - Levator palpebrae superioris
- Nerves
  - Lacrimal
  - Frontal
  - Trochlear
  - Anterior ethmoidal
  - Posterior ethmoidal
- Veins
  - Superior ophthalmic
  - Inferior ophthalmic
- Lacrimal gland
- Lacrimal sac



- CENTRAL SPACE

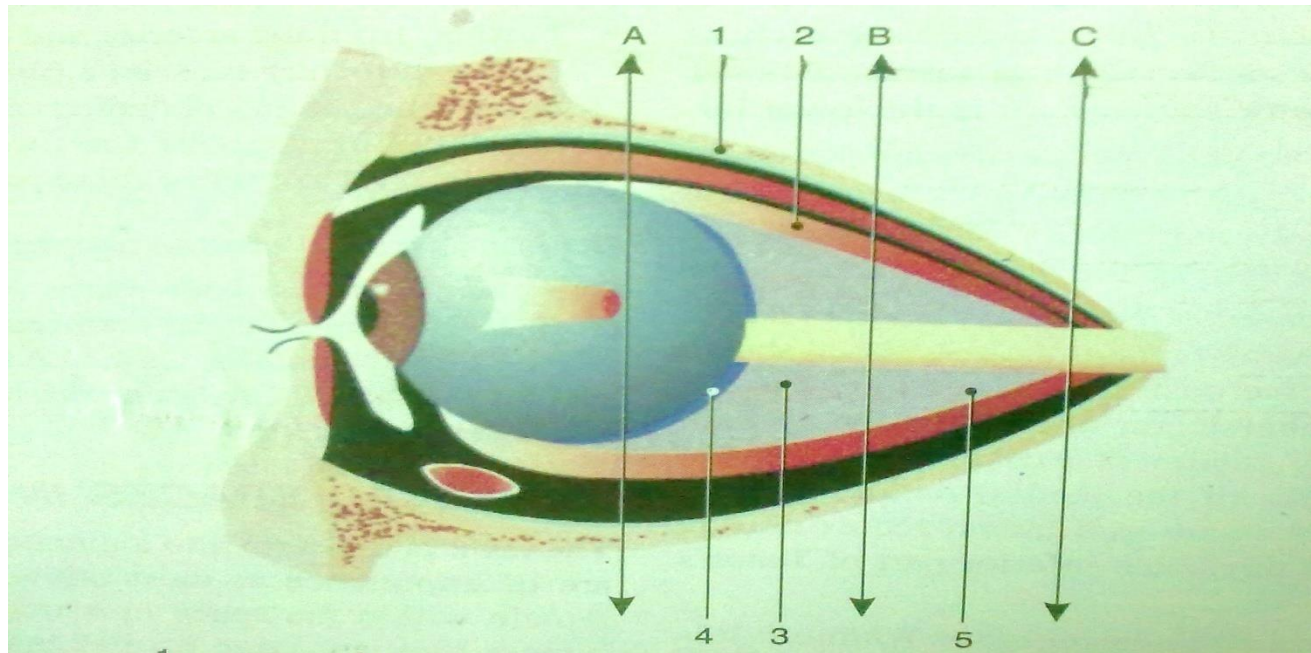
- Also known as muscular cone or retrobulbar space
- Bounded:
  - Anteriorly by Tenon's capsule
  - Peripherally by four recti with their intermuscular septa
  - In the posterior part, continuous with the peripheral orbital space



- CONTENTS:
  
- Central orbital fat
- Nerves
  - Optic nerve (with its meninges)
  - Oculomotor
    - Superior and inferior divisions
  - Abducent
  - Nasociliary
  - Ciliary ganglion
- Vessels
  - Ophthalmic artery
  - Superior ophthalmic vein

- SUBTENON'S SPACE\*

- Between the sclera and the Tenon's capsule
- *\*Pus collected in this space is drained by incision of Tenon's capsule through the conjunctiva*
- *\*Site for drug instillation*





THANK YOU ALL