



THE ORBIT



LEARNING OBJECTIVES

1. The **BONES** of the Orbit
2. The **CONTENTS** of the Orbit
3. The **EYELIDS**
4. The **MUSCLES** within the Orbit
5. The **INNERVATION** of the Orbit and its contents
6. **CLINICAL CORRELATION**

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I. BONES OF THE ORBIT



- The orbit is **cone** shaped, with its apex pointing posteriorly.

- It has a **roof, floor, medial wall** and **lateral wall**.

- ROOF: Orbital Plate of the **FRONTAL BONE**

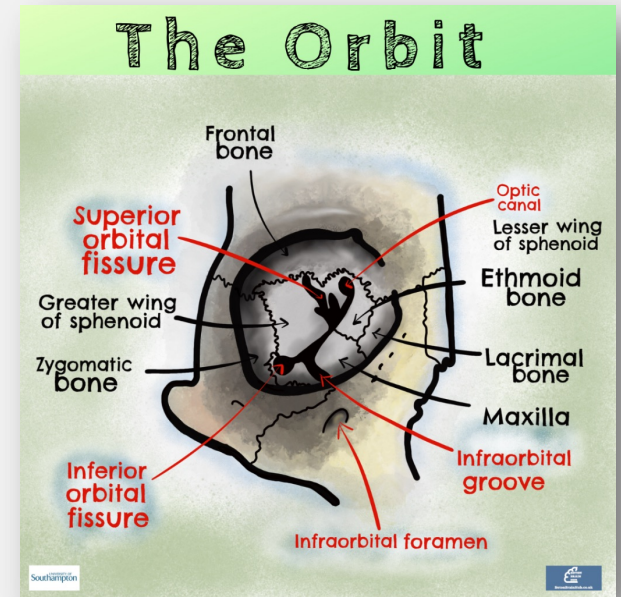
- FLOOR: **MAXILLA** (over the maxillary sinus)

- MEDIAL WALL: **ETHMOID** and **LACRIMAL BONES**

- LATERAL WALL: **GREATER WING OF SPHENOID** and **ZYGOMA**

Thin

Thick



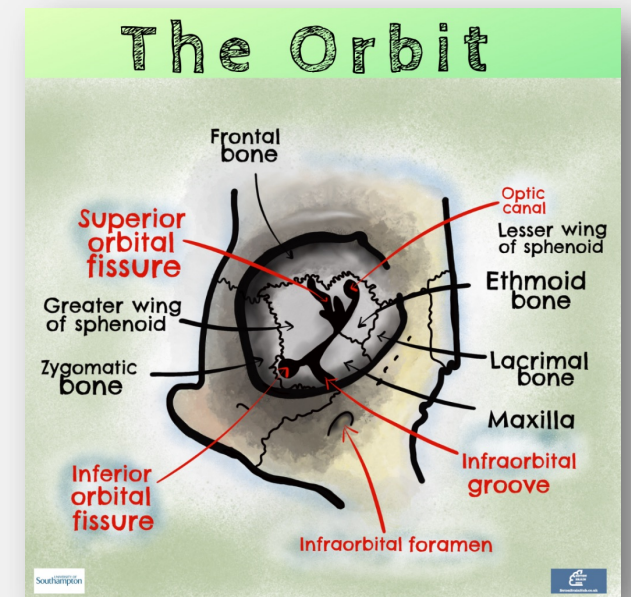
I. BONES OF THE ORBIT

- Be able to identify the **Superior** and **Inferior Orbital Fissures** and the **Optic Canal**

- The Superior Orbital Fissure contains:
 - Cranial Nerves: III, IV, VI and V₁
 - Ophthalmic Vein

- The Inferior Orbital Fissure contains:
 - Cranial Nerve: V₂
 - Sympathetic Nerves
 - Ophthalmic Vein

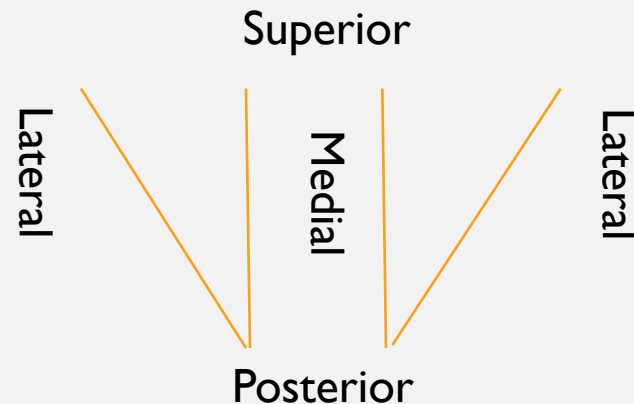
- The Optic Canal Contains:
 - Cranial Nerve: II
 - Ophthalmic Artery



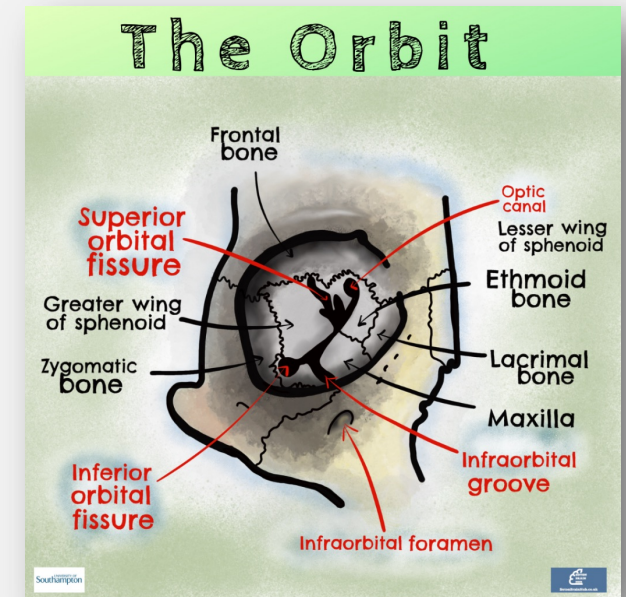
I. BONES OF THE ORBIT

- **LACRIMAL GROOVE:** on the medial surface of the orbit, anterior to the ethmoid bone. It is continuous with the **nasolacrimal canal** inferiorly. The nasolacrimal canal ends in the inferior meatus of the nasal cavity.

- Superior view of the orbits:



Right Eye



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2. CONTENTS OF THE ORBIT

- **Periosteum** (A.K.A Orbital Fascia)
 - This covers the boney surface of the orbit
 - It is continuous, through the optic canal, with the endosteal layer of the **dura**
- **Eyeball**
 - Not covered today
- **Conjunctiva**
 - Covers the surfaces of the eye. Formed by thin **squamous epithelium**.

2. CONTENTS OF THE ORBIT

- The **Muscles** and **Nerves** of the Eyeball
 - Covered in the coming sections of this presentation
- **Blood Vessels**
 - Arterial supply is derived from branches of the **External Carotid Artery** and the **Ophthalmic Artery** (the first branch of the Internal Carotid Artery)
 - Ophthalmic artery gives off the **central artery of the retina**, an end artery
- **Fatty Tissue**
 - All of the contents of the orbit are surrounded by fatty tissue

2. CONTENTS OF THE ORBIT

- **Lacrimal Apparatus** consists of the:

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- **Lacrimal Gland** – in the upper lateral part of the front of the orbit. Secrete tears to moisten and clean the eyeball.
- **Lacrimal Punctum** – medial part of the orbit. Drains tears into the lacrimal sac
- **Lacrimal Sac**
- **Nasolacrimal Duct** – drains into inferior nasal meatus

2. CONTENTS OF THE ORBIT

- Summary of Contents of the Orbit
 1. Periosteum (A.K.A Orbital Fascia)
 2. Eyeball
 3. Muscles of the Eyeball
 4. Nerves of the Eyeball
 5. Blood vessels
 6. Lacrimal Apparatus
 7. Fatty Tissue

LEARNING OBJECTIVES

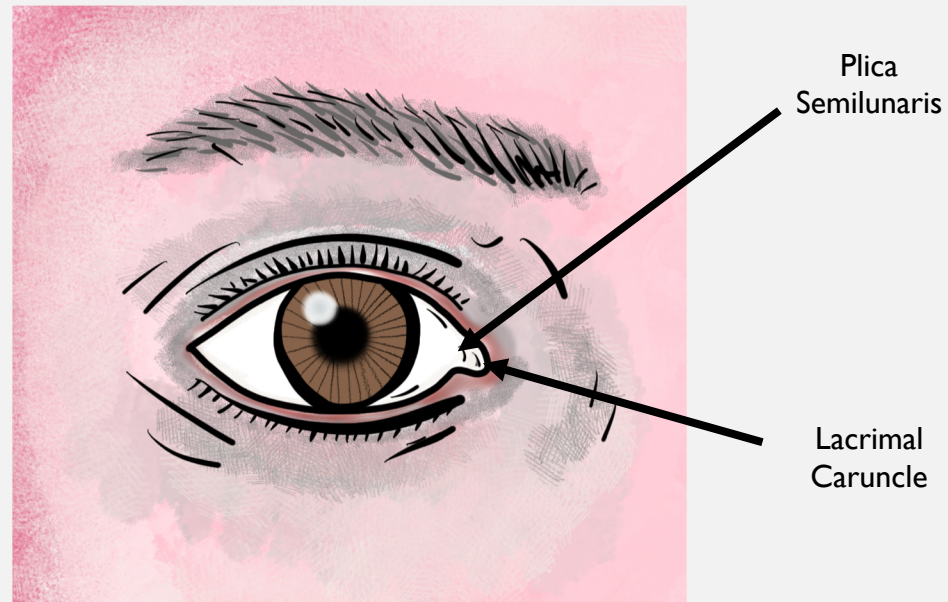
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3. THE EYELIDS

- Between the upper and lower eyelids is the **palpebral fissure**
- The eyelids are formed of **3** layers:
 - **Outer:** Skin. The **Obicularis Oculi** muscle inserts here
 - **Middle:** loose connective tissue
 - Tarsus
 - **Inner:** Conjunctiva
- The eyelids loose connective tissue of the eyelids is the **Tarsus**. These contain the eyelashes and tarsal glands (lubricates the eyelid)

3. THE EYELIDS

- Most medially in the orbit is a red structure called the the **lacrimal caruncle**
 - Immediately lateral to this is the **plica semilunaris**, a vertical fold in the conjunctiva



3. THE EYELIDS

- **Levator Palpebrae Superioris** is a muscle
 - It arises from the apex of the orbit, above the common tendinous ring (more details later)
 - It spreads out as an aponeurosis and attaches to the tarsal plate
 - Function: raise the upper eyelid
 - Innervation: Oculomotor nerve (more details later)

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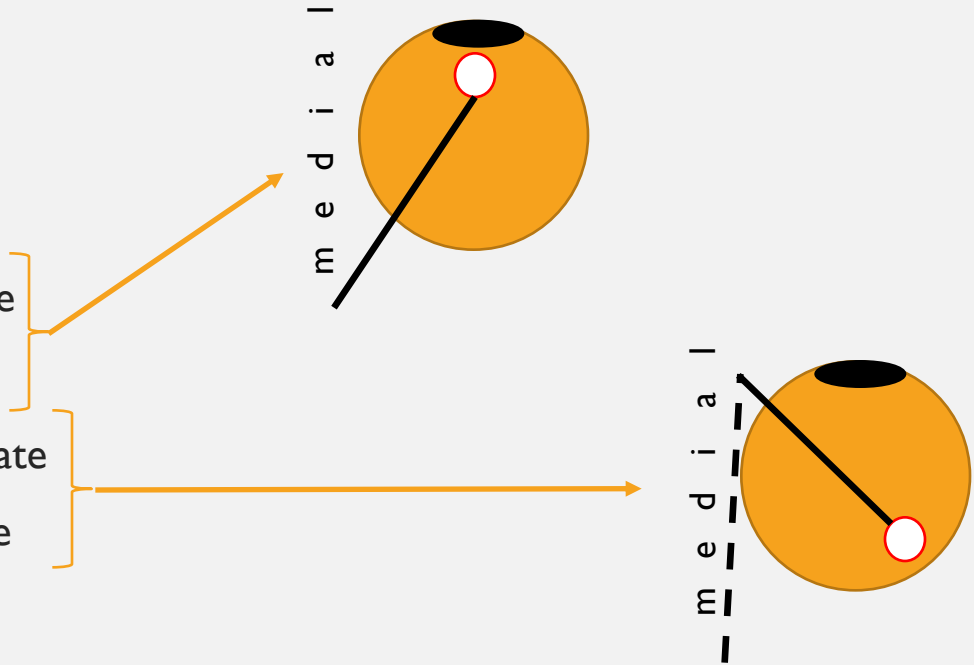
4. MUSCLES WITHIN THE ORBIT

- Within the orbit, there are **Intra-ocular** and **Extra-ocular** muscles
 - Intra-ocular muscles are **within** the eyeball (ciliary body, sphincter pupillae, dilator pupillae)
 - Extra-ocular muscles are **outside** of the eyeball
- There are **6** extra-ocular muscles:
 - Medial Rectus
 - Lateral Rectus
 - Superior Rectus
 - Inferior Rectus
 - Superior Oblique
 - Inferior Oblique
- All 4 recti muscles attach to the **sclera** and originate at the **common tendinous ring** at the apex of the orbit

4. MUSCLES WITHIN THE ORBIT

- Movements of the Extra-ocular muscles

- Medial Rectus: adduct
- Lateral Rectus: abduct
- Superior Rectus: elevate, adduct, medially rotate
- Inferior Rectus: depress, adduct, laterally rotate
- Superior Oblique: abduct, depress, medially rotate
- Inferior Oblique: abduct, elevate, laterally rotate



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5. INNERVATION OF THE ORBIT

- **Optic Nerve**
 - Optic tracts meet at the optic chiasm (superior to the pituitary), then pass through the optic canal
- **Trochlear Nerve**
 - Supplies only the **superior oblique** muscle only
 - The only cranial nerve to emerge posteriorly from the brainstem, and passes through the cavernous sinus and superior orbital fissure
- **Abducent Nerve**
 - Supplies the **lateral rectus** muscles only
 - Passes through the cavernous sinus and superior orbital fissure

5. INNERVATION OF THE ORBIT

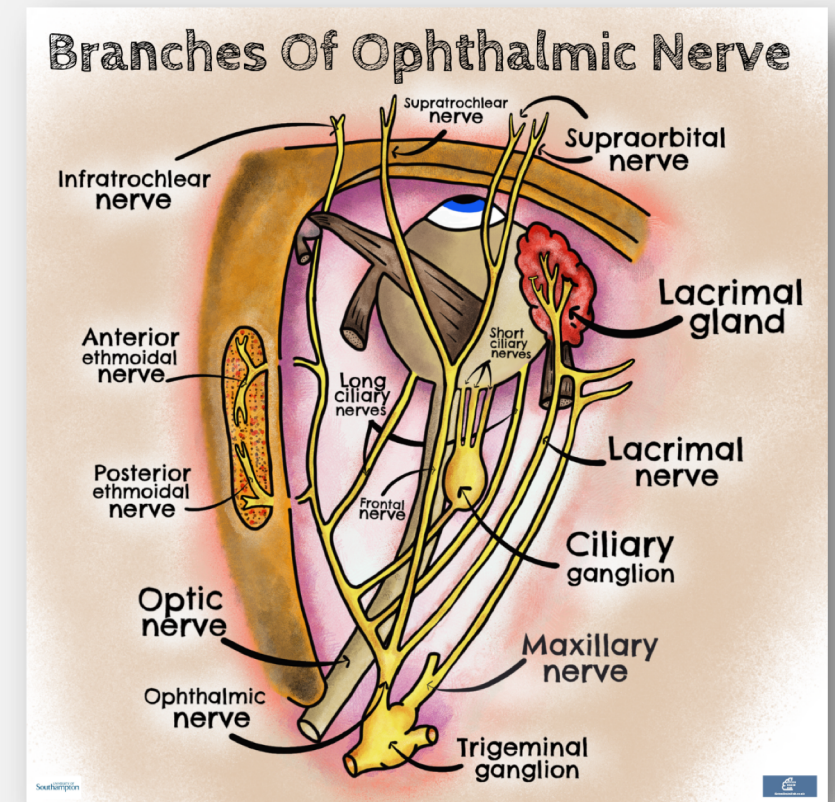
- **Oculomotor Nerve**
 - Innervate 4/6 extra-ocular muscles (superior, inferior + medial recti, superior oblique)
 - Also innervates levator palpebrae superioris
 - Passes through the **cavernous sinus** and **superior orbital fissure**
 - Contains **parasympathetic** supply to the iris, summarised below

| Nucleus | Pre-Ganglionic Axon | Ganglion | Post-Ganglionic Axon | Supply |
|------------------|---------------------|------------------|----------------------|--------------------|
| Edinger-Westphal | Oculomotor Nerve | Ciliary Ganglion | Short Ciliary Nerves | Sphincter Pupillae |

5. INNERVATION OF THE ORBIT

- **Ophthalmic Nerve**

- V₁, Superior branch of the trigeminal nerve
- Purely sensory, supplying the eyeball, lacrimal gland, conjunctiva, forehead and part of the nasal mucosa
- 3 branches: frontal, lacrimal and nasociliary
 - **Frontal:** Sensory to forehead and scalp
 - **Lacrimal:** postganglionic parasympathetic to lacrimal gland from pterygopalatine ganglion, sensation to the eyelid and conjunctiva
 - **Nasociliary:** sensory to ethmoidal air sinuses, conjunctiva and part of the nose. Also gives off short ciliary nerves

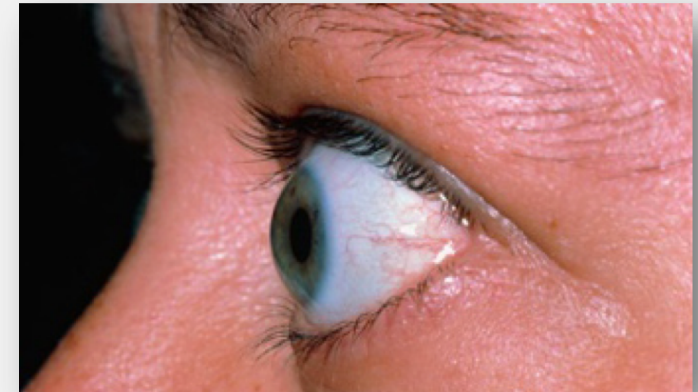


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6. CLINICAL CORRELATION

- **Enophthalmos** – sunken-eye appearance. Causes include anorexia and cachexia
- **Exophthalmos** – protruding eyes. Causes include Graves Disease (associated with hyperthyroidism)
- The conjunctiva is very vascular
 - An especially red conjunctiva may suggest infection (**conjunctivitis**)
 - An especially pale conjunctiva may suggest **anaemia**



6. CLINICAL CORRELATION

- Weakness of any extra-ocular muscle may cause **diplopia** (double vision)
- **Oculomotor Nerve Palsy** can be due to an aneurysm of the posterior communicating artery
- **Abducent Nerve Palsy** can be due to blood vessels/tumours, and by traction if ICP rises and pushes the brainstem caudally

