ORBIT AND EYE

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AIMS

• Define the boundaries, content, and function of the bony orbit
• Know the foramina of the bony orbit
• Describe the anatomy of the eyelids
• Describe the anatomy of the lacrimal apparatus
• Know the anatomy of the eyeball
• Understand the roles of the refractive structures and media of the eyeball
• Outline the key extraocular muscles
• Know the vascular supply of the eye
• Outline the innervation of the eye
Orbit & Eye

- Bony orbit
  - Cavity containing and protecting eyeball, muscles & neurovasculature
  - Opening is protected by the eyelid.
  - Supports, protects and maximizes the functions of the eye
  - Pyramidal shape with apex directed posteriorly and base anteriorly
• **Boundaries**
  
  o **Roof**
    • Orbital plate frontal bone
    • Lesser wing sphenoid
  
  o **Floor**
    • Orbital plate of maxilla
    • Some contributions from zygomatic and palatine bones
    • Contains inferior orbital fissure
- **Medial wall**
  - Orbital plate of ethmoid bone
  - Some contributions from frontal, lacrimal, and sphenoid bones
  - Lacrimal fossa for lacrimal sac
- **Lateral wall**
  - Frontal process of zygomatic bone
  - Greater wing of sphenoid
○ **Apex**
  - Lesser wing of sphenoid
  - Contains optic canal medial to **superior orbital fissure**
• **Eyelids**
  - Protect the eye from injury and excessive light and keep the corneas moist.
  - **Palpebral fissure.**
  - Covered by thin skin externally and palpebral conjunctive internally
    - Palpebral conjunctive continuous with bulbar conjunctive of eyeball
    - conjunctival fornices
  - Strengthened by **tarsal plates**
    - Tarsal glands embedded in plates
    - Produce a lipid secretion
      - Lubricates eye
- **Medial palpebral ligaments**
  - Attach tarsal plates to medial margin of orbit
  - Orbicularis oculi attaches to this ligament

- **Lateral palpebral ligaments** - attach tarsal plates to lateral margin of orbit
• Eyelashes
• Ciliary glands
  o Muscles of the eyelids
    ✓ Orbicularis oculi
    ✓ Levator palpebrae superioris
• **Lacrimal apparatus**
  
  o **Functions**
    - Secretes tears, antibacterial
    - Lubricates eye and eyelid
  
  o **Consists of**
    - Lacrimal glands
    - Lacrimal ducts
    - Lacrimal canaliculi
    - Nasolacrimal ducts
• Lacrimal gland
  o Lies in fossa for lacrimal gland in superolateral orbit
  o Consists of two parts:
    • Larger orbital
    • Smaller palpebral
    • Divided by levator palpebrae superioris
• **Lacrimal gland**
  - secretomotor fibers from CN VII
  - (parasympathetic)
  - Lacrimal canaliculi
    - Drain tears from lacrimal lake at medial angle of eye
    - Drain to lacrimal sac
  - Lacrimal sac drains to nasal cavity via **nasolacrimal duct**
• nasolacrimal duct
• **Eyeball**
  
  o Surrounded by fascial sheath (Tenon's capsule)

  o **Three layers**
    
    ✓ Outer fibrous = sclera and cornea
    ✓ Middle vascular = choroid, ciliary body and iris
    ✓ Inner pigmented and nervous = retina
- **Fibrous coat**
  - Sclera = opaque part of fibrous coat
    - Covers posterior five sixths of eyeball
    - To the corneoscleral jxn
    - Pierced posteriorly by optic nerve
  - Cornea
    - Transparent part of fibrous coat
- **Middle vascular layer**
  - Choroid
    - Outer pigmented layer
    - Inner vascular layer
    - Lies between sclera and retina
  - Ciliary body
    - Connects choroid with iris
    - Contains smooth muscle that alters the shape of lens
  - Iris
    - Pigmented diaphragm with central aperture: the pupil
    - Radial fibers of the dilator pupillae open the pupil
    - Circular fibers of the sphincter pupillae close the pupil
- **Inner (retinal) layer**
  - Consists of three parts
  1. Optic part
     - Receives light
  2. Ciliary
  3. Iridial parts
  - Fundus
    - **Optic disc** contains no photoreceptors = "blind spot"
  - Macula lutea
    - **Fovea centralis** = area of most acute vision
- **Vasculature of retina**
  - Central artery of retina from ophthalmic artery
  - Retinal veins drain to central vein of retina
• Aqueous chamber (aqueous humor)
  o Anterior chamber
  o Posterior chamber
• Vitreous chamber
• **Lens**
  o Transparent, enclosed in capsule
  o Shape changed by ciliary muscles via suspensory ligaments attached around periphery
  o Convexity varies to adjust for focus on near or far objects
Muscles of the orbit

- **Intrinsic (intraocular) muscles**
  - Ciliary muscle
  - Constrictor pupillae of iris
  - Dilator pupillae of iris
Extrinsic (extraocular) muscles

- Six muscles
- Four arise from **common tendineus** ring
  - Lateral and medial rectus (2)
    - Lie in same horizontal plane
    - Rotate eyeball laterally and medially, respectively
  - Superior and inferior rectus (2)
    - Lie in same vertical plane
    - Pull eyeball superiorly and inferiorly, respectively
- Inferior oblique
  - Works with superior rectus
  - Pulls eyeball superiorly and laterally
- Superior oblique
  - Works with inferior rectus
  - Pulls eyeball inferiorly and laterally
• **Extra ocular muscles**
  
  o Lateral rectus – *abducent nerve (VI)*
  
  o Superior oblique-*trochlear nerve (IV)*

  o Occulomotor nerve (III)
**Extraocular muscles**

<table>
<thead>
<tr>
<th>Origin</th>
<th>Insertion</th>
<th>Action (see Fig. 35.3) *</th>
<th>Innervation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common tendinous ring</td>
<td>Sclera of the eye</td>
<td>Vertical axis (red) Elevates</td>
<td>Oculomotor n. (CN III), superior br.</td>
</tr>
<tr>
<td>(common annular tendon)</td>
<td></td>
<td>Horizontal axis (black) Adducts</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anteroposterior axis (blue) Rotates medially</td>
<td></td>
</tr>
<tr>
<td>Sphenoid bone*</td>
<td></td>
<td></td>
<td>Oculomotor n. (CN III), inferior br.</td>
</tr>
<tr>
<td>Medial orbital margin</td>
<td></td>
<td></td>
<td>Abducent n. (CN VI)</td>
</tr>
</tbody>
</table>

*Note: The action table refers to Fig. 35.3.*

*The superior oblique muscle originates from the sphenoid bone and inserts into the sclera of the eye. Its action is to elevate and adduct the eye, rotate it medially, and is innervated by the oculomotor nerve (CN III), superior branch.*
• Arteries
  o Ophthalmic artery (main supply)
    • Enters orbit through optic canal
    • Lateral to optic nerve
  o Infraorbital artery from maxillary
  o Branches of ophthalmic artery
    • Supraorbital
    • Supratrochlear
    • Lacrimal
    • Dorsal nasal
    • Ethmoidal-anterior and posterior
    • Central artery of the retina
• **Venous drainage**
  o **Superior ophthalmic vein**
    • Formed by union of supraorbital and angular vein of face
    • Drains to cavernous sinus
  o **Inferior ophthalmic vein**
    • Forms in floor of orbit
    • Drains to cavernous sinus

• *Communicates with pterygoid plexus of veins through inferior orbital fissure*
• **Innervation:**
  - Optic nerve
  - Ophthalmic nerve
  - Trochlea nerve
  - Abducent nerve
  - Oculomotor nerve
  - Short ciliary nerve
Summary

• Understand the orbit and its contents
• Testing of extraocular muscles
• **Cataract**
• Glaucoma
• Intracranial pressure
THANK YOU