Lesson Plan

- Extraocular Muscles.
  - Origin
  - Insertion
  - Actions

- Movements of Eyeball.

- Oculomotor Nerve & its Applied Aspects.

- Ciliary Ganglion.
Extraocular Muscles

- 7 voluntary muscles.
- 2 groups:
  - Muscle moving the upper eyelid [1 muscle].
  - Muscles moving the eyeball [6 muscles].

**Muscle moving the upper eyelid**-
- Levator palpebrae superioris.

**Muscles moving the eyeball**-
- 4 recti muscles.
- 2 oblique muscles.

**Recti muscles**-
- Superior rectus.
- Inferior rectus.
- Medial rectus.
- Lateral rectus.

**Oblique muscles**-
- Superior oblique.
- Inferior oblique.
Recti Muscles- Origin

- All recti muscles arise from corresponding margin of tendinous ring of Zinn.

Tendinous Ring of Zinn-
- It encloses the optic canal and middle part of superior orbital fissure.

Attachments-
Medially- Apex of orbit.
Laterally- Tubercle of Zinn.
Tubercle of Zinn
Tendinous Ring of Zinn
Recti Muscles- Insertion

- All recti muscles are inserted into sclera, posterior to the limbus and in front of equator of eyeball.
**RECTI MUSCLES - Insertion**

- Inserted into sclera
- **In front of equator**
- Distance from cornea
  - MR = 5.5mm
  - IR = 6.5mm
  - LR = 6.9mm
  - SR = 7.7mm
Superior Oblique Muscle - Origin

- Body of sphenoid (superomediaal to optic canal).
Superior Oblique Muscle - Insertion

- Into the sclera, behind the equator in posterosuperior lateral quadrant of eyeball.

- Tendon passes through a fibrocartilaginous pulley.

- Pulley is attached to the trochlear notch in the anteromedial part of roof of orbit.
(b) Superior view of the right eye

- Trochlea
- Superior oblique muscle
- Superior oblique tendon
- Superior rectus muscle
- Axis at center of eye
- Inferior rectus muscle
- Medial rectus muscle
- Lateral rectus muscle
- Common tendinous ring
Superior oblique muscle
Inferior Oblique Muscle - Origin

- From anteromedial angle of floor of orbit.
Inferior Oblique Muscle - Insertion

- Into the sclera, behind the equator in posterosuperior lateral quadrant of eyeball, below and posterior to the insertion of superior oblique.
Movements of Eyeball & their Axes

**Abduction** (away from nose) lateral rectus muscle CN VI

**Adduction** (toward nose) medial rectus muscle CN III

**Elevation**
- superior rectus and inferior oblique muscles CN III

**Depression**
- inferior rectus CN III and superior oblique muscles CN IV

Figure III–7 Right eye movements around the “X,” “Y,” and “Z” axes (movements driven by cranial nerve III are highlighted in pink).
Actions of Superior Rectus

- **Primary action**: Elevation.
- **Secondary action**: Intorsion (superiors are intortors)
- **Tertiary action**: Adduction (recti are adductors)
Actions of Inferior Rectus

• Primary action - Depression.
• Secondary action - Extorsion (*inferiors are extortors*)
• Tertiary action - Adduction.

*Action of the oculomotor muscles when the eye is at rest*
Actions of Inferior Oblique

- **Primary action** - Extorsion (inferiors are extortors)
- **Secondary action** - Elevation.
- **Tertiary action** - Abduction (obliqi are abductors)
Actions of Superior Oblique

- **Primary action** - Intorsion (*superiors are intortors*).
- **Secondary action** - Depression.
- **Tertiary action** - Abduction (*obliqi are abductors*).
Actions of Medial Rectus

- Adduction.
Actions of Lateral Rectus

- Abduction.
Levator Palpebrae Superioris (LPS) - Origin

- From undersurface of **lesser wing of sphenoid** at the apex of the orbit.
Levator Palpebrae Superioris (LPS) - Insertion

- Muscle divides into 3 lamellae:

**Upper lamella-**
- Consists of skeletal muscle fibers.
- Penetrates the orbital septum.
- Passes through the fibers of orbicularis oculi.
- Inserts into the skin of upper eyelid.
Levator Palpebrae Superioris (LPS) – Insertion contd...

**Intermediate lamella-**

- Consists of smooth muscle fibers (*Superior tarsal muscle*).
- Inserts on to upper border of superior tarsal plate.
Levator palpebrae superioris

Superior tarsal plate
Levator Palpebrae Superioris (LPS) – Insertion contd…

Lower lamella-
• Inserts on to superior fornix of conjunctiva.
Levator Palpebrae Superioris (LPS) – Action

• Elevation of upper eyelid.

Expression created by the levator palpebrae superioris
Oculomotor Nerve

- Two divisions of oculomotor nerve enter the orbit through superior orbital fissure, within the common tendinous ring.

**Superior division**
- Runs forwards above the optic nerve.

**Supplies:**
- Superior rectus.
- Levator palpebrae superioris.

**Inferior division**
- Passes below the optic nerve.

**Supplies:**
- Medial rectus.
- Inferior rectus.
- Inferior oblique.
Applied Anatomy

Complete division of Oculomotor Nerve-

- Ptosis (drooping of the eyelid)
- Normal eye alignment
- Lateral squint
Ciliary Ganglion

- It is a peripheral parasympathetic ganglion.

**Location**
- Near the apex of the orbit, between the optic nerve and lateral rectus muscle.

**Connections**

- **Topographically**
  - To the Nasociliary nerve.

- **Functionally**
  - To the Oculomotor nerve.
Roots of Ciliary Ganglion

- 3 roots:
  - Motor (parasympathetic)
  - Sensory
  - Sympathetic.
Motor (parasympathetic) Root

- Derived from Nerve to Inferior Oblique.
- Contain preganglionic parasympathetic fibers from Edinger-Westphal nucleus.
- These fibers relay in ciliary ganglion.
Motor (parasympathetic) Root contd...

- Postganglionic parasympathetic fibers pass through short ciliary nerves.
- Postganglionic parasympathetic fibers supply:
  - Sphincter pupillae muscle.
  - Ciliaris muscle.
Sensory Root

- Derived from Nasociliary nerve.
- Contain fibers for pain, touch and temperature from eyeball.
- These fibers pass through the ciliary ganglion without relay.
Sympathetic Root

- Derived from sympathetic plexus around Internal Carotid Artery.
- Contain postganglionic sympathetic fibers from superior cervical sympathetic ganglion.
- These fibers pass through the ciliary ganglion without relay.
- These fibers pass through the short ciliary nerves to supply:
  - Dilator pupillae muscle.
  - Blood vessels of eyeball.
Branches of Ciliary Ganglion

- 8-10 short ciliary nerves.
- These nerves contain fibers from all the three roots.
- Run forwards above and below the optic nerve.
- Pierce the sclera around the attachment of optic nerve.
- Now pass forwards in suprachoroid lamina.