Trochlear nerve

- Fourth cranial nerve
- Supplies the superior oblique muscle
- Functional component:
  - Somatic efferent
  - General somatic afferent
• Nucleus is situated in the ventromedial part of central grey matter of mid brain at the level of inferior colliculus

• Trochlear nerve emerges from superior medullary velum just below the inferior colliculus
• Nerve winds around the superior cerebellar peduncle and the cerebral peduncle just above the pons
• Passes between superior cerebellar & posterior cerebral arteries to appear lateral to cerebral peduncle
• Nerve enters cavernous sinus by piercing the posterior corner of its roof
• Runs forwards in the lateral wall of cavernous sinus between the oculomotor and ophthalmic nerves
• In the anterior part it crosses over the third nerve
• Enters the orbit through the lateral part of superior orbital fissure
• In the orbit, it passes medially above the origin of Levator palpebrae superioris.
• Ends by supplying the superior oblique muscle through its orbital surface.
Applied anatomy

- Damage results in Diplopia on looking downwards.
- Vision is single as long as eyes look above the horizontal plane.
Abducent Nerve

- **6^{th} cranial nerve**
- Supplies the lateral Rectus muscle
- Functional component:
  - Somatic efferent
  - General somatic afferent
• Nucleus is situated in the lower part of the pons in the floor of the fourth ventricle, deep to facial colliculus
• Nerve is attached to the lower border of the pons, just opposite the upper end of the pyramid
• The nerve then runs upwards, forwards and laterally through the cisterna pontis to reach the cavernous sinus by piercing the posterior wall at a point lateral to the dorsum sellae and superior to apex of petrous temporal
• Passes beneath the petrosphenoid ligament and bend sharply forwards
• Enters the orbit through middle part of superior orbital fissure
• In the orbit nerve end by supplying the lateral Rectus from its ocular surface

• Applied anatomy: paralysis results in medial or convergent squint and Diplopia
Branches of ophthalmic nerve

- Lacrimal nerve: smallest of three terminal branches of ophthalmic nerve
- Enters the orbit through lateral part of superior orbital fissure
- Runs along the upper border of lateral Rectus along with the lacrimal artery
• Anteriorly receives a communication from zygomaticotemporal nerve
• Passes deep to lacrimal gland
• Ends in the lateral part of upper eyelid
• Supplies lacrimal gland, the conjunctiva & lateral part of upper eyelid
Frontal nerve

- Largest of the three branches of ophthalmic nerve
- Begins in the lateral part of cavernous sinus
• Enters the orbit through superior orbital fissure
• Runs forwards on the superior surface of LPS
• In the middle of orbit it divides into supra orbital and supra Trochlear nerve
Nasociliary nerve

- One of the terminal branches of ophthalmic nerve
- begins in the lateral wall of cavernous sinus
• Enters the orbit through superior orbital fissure between the two divisions of the oculomotor nerve
• Crosses above the optic nerve from lateral to medial side and runs along the medial wall of the orbit between the superior oblique and medial Rectus

• ends at anterior ethamoidal foramina by dividing in to infra trochlear and anterior ethamoidal nerve
Branches of nasociliary nerve

- A communicating branch to ciliary ganglion
- Two or three long ciliary nerve
- The posterior ethamoidal nerve
- Infra Trochlear nerve
- Anterior ethamoidal nerves
Infraorbital nerve

- Continuation of maxillary nerve
- Enters the orbit through inferior orbital
- Runs forward on the floor of the orbit in the infra orbital groove then in the infra orbital canal
- Emerges on the face through infra orbital foramen
• Terminates by dividing into palpebral, nasal, and labial branches
• Accompanied by infraorbital branch of maxillary artery and vein
branches

- Middle superior alveolar
- Anterior superior alveolar
- Palpebral, nasal & labial branch
Ciliary ganglion

- Lies between the optic nerve and lateral rectus
- Receives three roots
- Motor or parasympathetic
- Sympathetic
- Sensory
- **Parasympathetic root:** Fibers arise from edinger westphal nucleus
- **Travel through trunk of 3rd nerve**
- **Enter the nerve to inferior oblique from which a branch to ciliary ganglion is given**
- **Cells of the ganglion give origin to post ganglion fibers**
- **PG fibers pass through short ciliary nerves to sphincter pupillae & ciliaris**
• Sympathetic root:
• Branch from internal carotid plexus, contains postganglionic fibers from superior cervical ganglion
• Pass out of ganglion without relay in to short ciliary nerves
• Supply blood vessels of eyeball
• May supply dilator pupillae
• Sensory root:
  • From Nasociliary nerve
  • Contains sensory fibers from the eyeball
  • Fibers pass through ganglion without relay
  • Branches: 8-10 short ciliary nerves which pierce the sclera at the entrance of optic nerve. These contain all the three type of fiber from ganglion
Lacrimal apparatus

- Structures connected with the drainage of the lacrimal fluid. Made of following parts: Lacrimal glands & its ducts
- Conjunctival sac
- Lacrimal puncta & L canaliculi
- Lacrimal sac
- Nasolacrimal duct
Lacrimal gland

- Serous gland
- Situated in lacrimal fossa & partly on the upper eyelid
- Small accessory lacrimal glands are found in Conjunctival fornices
• J shaped muscle, indented by LPS into orbital & palpebral part
• 10-12 duct of this gland open in superior Conjunctival fornix
• Ducts of orbital part pass through palpebral part
Conjunctival sac

- Potential space between palpebral and lacrimal conjunctiva
- Palpebral conjunctiva is thick opaque & adherent to tarsal plate
- Bulbar conjunctiva is thick transparent & loosely attached to eyeball
Lacrimal puncta & canalliculi

- Is in each eye lid at the summit of lacrimal papilla, lacrimal punctum is found
- Lacrimal Canaliculi start from punctum
- 10 cm long
- Has a vertical & horizontal part
- Open close to each other in lacrimal sac behind the medial palpebral ligament
Lacrimal sac

- 12 x 5 mm in size
- Situated in the lacrimal groove behind the medial palpebral ligament
- Upper end is blind
- Lower end continuous with nasolacrimal duct
Nasolacrimal duct

- Membranous passpge, 18 mm long
- Begins at the lower end of lacrimal sac
- Runs downwards, backwards & laterally
- Opens into inferior meatus of nose
- Valve of Hasner at the lower end of duct
Applied anatomy

- Inflammation of lacrimal sac is called dacryocystitis

- Congenital absence or noncanalisation of nasolacrimal duct result in excessive lacrimation
Ophthalmic artery

- Branch of intracerebral part of ICA
- Runs in the optic canal inferolateral to optic nerve
- In orbit crosses optic nerve from above
Branches

- Central artery
- Lacrimal artery
  - Recurrent meningeal
  - Zygomatic
- Posterior ciliary's branches
- Supraorbital branch
- Posterior ethamoidal artery
- Anterior ethamoidal artery
- Supratrochlear artery
- Medial palpebral
- Dorsal nasal