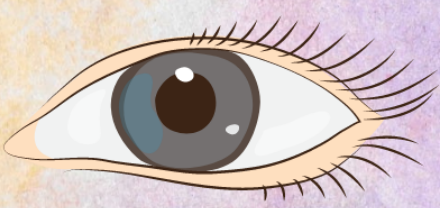
Pupillary Reflex and Its Pathology



Pupillary Reflex Pathway

Light hits the pupil>> photoreceptors>> retinal ganglion cells>> optic nerve (CN II)>> most axons to lateral geniculate nucleus (in the thalamus)>> some axons instead synapse in pretectal nucleus (in midbrain)>> bilateral projections to Edinger-Westphal nuclei (in midbrain)>> parasympathetic fibres with oculomotor nerve (CN III)>> ciliary ganglion>> short ciliary nerves>> sphincter pupillae muscle in iris>> bilateral pupillary constriction.

Holmes-Adie and Argyll Robertson

Holmes-Adie= dilated pupil. Accommodates, but poor/no reaction to light.
Argyll Robertson= constricted, irregular-shaped pupil. Accommodates, but no light response. Diabetes and neurosyphilis can cause.

Horner's Syndrome

Lack of sympathetic supply to head>> constricted pupil at rest, but still reacts to light (further constriction).
Other signs:

- Mild ptosis
- Dry, flushed skin on face (anhidrosis)

Many different causes.

Abnormal Pupil Appearances

No pupillary response (direct or consensual) in blind eye, retinal lesion or optic nerve lesion.

'Pinpoint pupils'- a commonly quoted sign of opioid overdose.

Cocaine can cause pupil dilatation as one of its many potential features.

NB refer to ophthalmology notes for eye pathology (as opposed to neurological pathology) causing abnormal pupil appearance.

Oculomotor Nerve Palsy

May be caused by head injury>> increased intracranial pressure>> uncal herniation>> compress CN III. May also be caused by aneurysm of posterior communicating artery. No direct pupillary response, and consensual response depends on extent of brainstem damage (i.e. whether uni/bilateral).
Other features:

- Dilated pupil
- Ptosis
- Eye in 'down and out' position

Relative Afferent Pupillary Defect

Pupils appear to dilate when light is shone into the affected eye from the unaffected eye (swinging light test). Due to a weaker pupillary reflex compared to unaffected eye- e.g. in retinal detachment or optic neuritis. Optic neuritis may be a presenting sign of Multiple Sclerosis (MS).

Resources Used

https://www.youtube.com/watch?v=699Stgc3-VU
https://www.youtube.com/watch?v=GyKmXMYPbs8
Passmedicine (https://www.passmedicine.com/)

Soton Brain Hub

Soton Brain Hub