Neurophthalmology

pupillary reactions

ocular motor nerve palsy

The Pupil

Afferent pupillary conduction defects

A total afferent defect (TAPD, amaurotic pupil) is caused by a complete optic nerve lesion and is characterized by the following

1. (The involved eye is completely blind (i.e. no light perception.
2. Both pupils are equal.

3.When the affected eye is stimulated neither pupil reacts but when the normal eye is . stimulated both pupils react normally

4. The near reflex is normal in both eyes.

A relative afferent defect (RAPD, Marcus Gunn pupil) is caused by an incomplete optic nerve lesion or severe retinal disease

'The difference between the pupillary reactions is enhanced by the 'swinging-flashlight test

Argyll Robertson pupil

is caused by neurosyphilis and is characterized by the following

.Involvement is usually bilateral but asymmetrical

The pupils are small and irregular

The light reflex is absent or very sluggish

The near reflex is normal (light near dissociation)

The pupils are very difficult to dilate

Holmes-Adie pupil

The Holmes Adie (tonic) pupil is caused by denervation of the postganglionic supply to the sphincter pupillae and the ciliary muscle which may follow a viral illness

It is unilateral in 80%

It typically affects healthy young adults and may be associated with diminished tendon reflexes

The affected pupil is large and regular

The light reflex is absent or very slow

Constriction to near is very slow and tonic and is associated with vermiform movements of .the iris; redilatation is also very slow

Accommodation is slow

Pharmacological testing

pilocarpine 0.125% weak concentration is instilled into both eyes . Normal pupil will not . constrict but the abnormal pupil will constrict due to denervation hypersensitivity

some pupils in diabetic patients may also show this response & very occasionally also . occures in normal individuals

Oculosympathetic palsy (Horner's syndrome)

:Causes of disruption of the sympathetic pathways include

Central causes

1,brain-stem disease as vascular disease,tumour or demylination (1)

2,syringomyelia (2)

3. spinal cord tumours (3)

Preganglionic

,Pancoast's tumour of the lung (1)

,carotid and aortic aneurysms (2)

lesions in the neck (e.g. malignant cervical lymph nodes, trauma or surgery) (3)

Postganglionic

1.cluster headaches,Nasopharyngeal tumour ,Otitis media ,Cavernous sinus mass ,internal carotid artery disease

2. congenital and 3.idiopathic

Clinical features are the following

The lesion is usually unilateral

Mild ptosis as a result of weakness of Müller's muscle

Miosis resulting from the unapposed action of the sphincter pupillae

The pupillary reactions are normal to light and near

Reduced ipsilateral sweating, but only if the lesion is below the superior cervical ganglion

Heterochromia (irides of different colour) is occasionally present if the lesion is congenital

The pupil is slow to dilate

Pharmacological testing

Instil 4% cocaine into both eyes

. Normal pupil will dilate but Horner pupil will not

Third nerve disease

The nuclear complex of the third (oculomotor) nerve is situated in the mid-brain at the level of the superior colliculus, inferior to the sylvian aqueduct

Pupillomotor fibres: the location of these parasympathetic fibres in the trunk of the third nerve is clinically very important. Between the brain stem and the cavernous sinus, the pupillary fibres are located superficially in the superior median part of the nerve. They derive their blood supply from the pial blood vessels, whereas the main trunk of the third nerve is supplied by the vasa nervorum. The presence or absence of pupillary involvement is of great .importance because it frequently differentiates a so-called 'surgical' from a 'medical' lesion

Surgical lesions such as aneurysms, trauma ,tumour and uncal herniation characteristically involve the pupil by compressing pial blood vessels and the superficially located pupillary fibers

Medical lesions caused by H T & D M usually spare the pupil because the microangiopathy involves the vasa nervorum cuasing neural infarction of the main trunk of the nerve but .sparing the superficial pupillary fibers

Clinical features of third nerve palsy

Causes of isolated third nerve palsy

Idiopathic: about 25% have no known cause

Vascular disease such as hypertension and diabetes are the most common causes of a pupil-.sparing third nerve palsy

Diabetic 3rd Nerve palsy often ass. With periorbital pain as in aneurysmal 3rd nerve palsy

.Trauma is also a common cause

An aneurysm at the junction of the posterior communicating artery with the internal carotid is a very important cause of an isolated painful third nerve palsy with involvement of the .pupil

Miscellaneous uncommon causes include tumours, vasculitis associated with collagen vascular disorders and syphilis

Fourth nerve disease

:The fourth (trochlear) nerve differs from other cranial nerves as follows

.It is the only cranial nerve to emerge from the dorsal aspect of the brain

It is the only crossed cranial nerve; this means that the fourth nerve nucleus innervates the .contralateral superior oblique muscle

.It is very long and slender nerve

Clinical features of fourth nerve palsy

Hyperdeviation (involved eye is higher)as a result of weakness of the superior oblique muscle. This is more obvious when the head is tilted to the ipsilateral shoulder

Excyclotorsion which is compensated for by a head tilt to the opposite shoulder

Limited depression in adduction

Diplopia which is vertical and worse on looking down. In order to avoid diplopia, the patient may adopt an abnormal head posture with a downward head tilt and a face turn to the opposite side

Causes of isolated fourth nerve palsy

.Congenital lesions are frequent, although symptoms may not develop until adult life

.Trauma frequently causes bilateral fourth nerve palsies

.Vascular lesions are common but aneurysms and tumours are rare

Sixth nerve disease

The nucleus of the sixth (abducens) nerve lies in the midpoint of the pons closely related to .the fasciculus of the 7th nerve

An isolated 6th nerve palsy is therefore never nuclear in origin. (nuclear 6th N palsy is associated with ipsilateral facial nerve palsy)

Clinical features of sixth nerve palsy

Defective abduction is caused by weakness of the lateral rectus with normal adduction

In the primary position, there is a convergent strabismus as a result of the unopposed action .of the medial rectus

Horizontal diplopia is worse in the field of action of the paralysed muscle and least away from its field of action

Causes of Palsy

An acoustic neuroma (1st symptom is hearing loss & 1st sign is diminished corneal sensitivity

nasopharyngeal tumour

Raised intracranial pressure associated with post.fossa tumours or BICH may cause .downward displacement of the brain stem ,stretching the 6th nerve

Basal skull fracture