

# CHAPTER 11 - DIPLOPIA

## TYPES OF DIPLOPIA

### A few clinical points.

#### 1. Diplopia in all directions:

This is usually due to a brain stem lesion, mostly at the level of the medial longitudinal bundle. In that case, ataxic nystagmus often occurs as well (see Ch.10).

#### 2. Diplopia in one specific direction:

Test for diplopia by moving the finger across the eyes and up and down laterally in the form of an H. When you do this, you are looking only at one particular muscle in each eye at a time. For example a left 6th nerve lesion will produce double vision on looking to the left. Nausea can accompany attempts to look towards the side of the lateral rectus palsy (see also below).

Of course, double vision on looking to the left could be due to a medial rectus muscle palsy on the right and although this would be unusual (medial rectus palsy is usually part of a wider third nerve lesion), we must learn how to separate the two. In this respect, the important rule is that when the patient is looking in the direction at which separation of the images in the right and left eye is maximal, then the more peripheral of the two images is the false one, i.e. the false image comes from the affected eye. You can determine which is which by covering each eye alternatively and asking the patient to tell you when the outer image disappears.

Superior Oblique Paralysis (Fourth Nerve) can cause extremely subtle diplopia, which is most marked when the affected eye tries to follow the finger medially and downwards. The problem is manifest to the patient when looking in this position, for example when reading a newspaper on the lap or papers on a desk. It may also cause him to misjudge steps on walking downstairs. The slight external rotation of the eye which occurs in the straight-ahead position with superior oblique muscle paralysis causes the patient to compensate unconsciously for this by tilting his head to one side, giving him a slightly "quizzical look".

#### Third Nerve Lesion

A complete third nerve lesion does not usually cause diplopia, partly because the eyelid ptosis on the affected side prevents double vision. Moreover, the patient may be totally unaware that the eye is closed unless he misjudges the distance of some object. Even when the eyelid of the involved eye is passively lifted, diplopia may still not be a complaint, because the affected eye is fully deviated

outwards and downwards by the unopposed action of both the lateral rectus and superior oblique muscles on that side, and this causes such separation of images that the false image is usually disregarded by the brain. Depending on the anatomical site involved, the pupil may also be dilated in patients with 3rd nerve palsy.

## **ANATOMICAL DIAGNOSIS**

The nerve or muscle involved can be diagnosed by the manoeuvres suggested above, particularly having the patient follow your finger through an H pathway, determining the position of maximal separation of images, and which image is false.

Having decided whether you are dealing with a third, fourth or sixth nerve lesion (or perhaps a muscular lesion) your next task in your hierarchic approach to anatomical diagnosis is to determine its site of involvement. This can be anywhere from the nuclear region right through the cavernous sinus to the eye and you will usually be able to diagnose the precise site by the neurological company the nerve lesion keeps, e.g. sixth as well as third nerve involvement in cavernous sinus aneurysm.

## **CLINICAL PATHOLOGICAL DIAGNOSIS**

As usual this is given to us by the mode of onset and progression of the symptoms and associated signs. Remember in this respect that sudden onset mononeuropathies can involve the cranial nerves and of course are seen particularly in nerve ischaemia e.g. that associated with diabetes mellitus and polyarteritis nodosa.

## **FUNCTIONAL DIAGNOSIS**

Again we use this to obtain our precise anatomical diagnosis. Look particularly for other evidence of brain stem lesions, or other cranial nerve involvement outside the hind-brain.

## **AETIOLOGICAL DIAGNOSIS**

This is helped to some extent by anatomico-aetiological diagnostic overlap, i.e. different nerves tend to be involved in different conditions. Thus, diabetes can involve any of the three cranial oculomotor nerves (3,4,6) and this is not uncommonly seen as a mononeuritis early in the course of diabetes,

reversible on treatment. Less common causes are arteriosclerosis, polyarteritis, and meningovascular syphilis.

In the case of a sole third nerve palsy, the state of the pupil provides important diagnostic information (i.e. extent of anatomical involvement of the third nerve overlaps with the 'Why?' category help determine the background aetiology). Where a third nerve palsy is due to a surgical lesion, i.e. a compressive lesion outside the brain stem, the pupil is almost invariably fixed and dilated. If, however, the pupil is found to be completely spared, and reacts normally to light, it is likely to have a 'medical' cause (diabetes, polyarteritis). It is due to the fact that the fibres concerned with pupillary constriction run on the outside of the third nerve, and tend to be spared in the common medical (vascular ischaemia) because the outside of the nerve tends to be the last to lose its blood supply. 'Surgical' or compression lesions obviously attack the peripheral fibres first. The importance of separating the two types of aetiologico-anatomical cause, surgical vs. medical, is obvious.

One serious medical cause of (painless) extra-ocular nerve palsy in elderly patients is cranial arteritis. Think of this in any elderly patient who presents even with only headache and malaise, because this is an eminently treatable condition (steroids) and moreover if untreated, may go on to involve the ophthalmic artery and cause irreversible ischaemic blindness. Feel the cranial arteries including the temporal, facial and occipital arteries for any tenderness or lack of pulsation, and if in the slightest doubt, do an ESR and biopsy any tender artery.

In terms of 'surgical' causes, internal carotid artery aneurysm within the cavernous sinus is an important cause of third (and sixth) nerve palsy.

Myasthenia gravis may also cause ocular paresis and ptosis (worse as the day goes by). This emphasises again the principle of first approaching any of the diagnostic categories, particularly the Anatomical one, at the broadest level, in this case determining whether you are dealing with a muscular or a nervous lesion right from the start.

**Problem Solving Exercise:** Not available for this chapter