Second Edition

NEUROLOGICAL SURGERY

Volume 2

A Comprehensive Reference Guide to the Diagnosis and Management of Neurosurgical Problems

Edited by

JULIAN R. YOUMANS, M.D., Ph.D.

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NEUROPHTHALMOLOGY

The eye and the structures associated with it are supplied by one half of the cranial nerves. Any careful evaluation of a neurosurgical patient should, therefore, include investigation for the ocular signs of neural damage. Although the ophthalmologist is best prepared to evaluate the eyes, a good examination can be made by anyone willing to spend a few additional minutes. The items needed for the examination are shown in Figure 17–1. With practice in the use of these instruments and in the interpretation of the findings, there are few major diagnostic eye signs that the neurosurgeon could overlook.

No matter how carefully the examination is performed, it is worth little if a detailed history is not included. Although physicians are trained as medical students to take good quality histories, the press of a busy practice may tend to interfere with detailed history-taking. It bears repeating that difficult diagnostic problems are more often solved by additional history than by further laboratory tests. The astute clinician distinguishes himself from the average clinician by taking a better than average history.

HISTORY

The neurosurgical patient is often incapable of giving a concise detailed account of the events that led to his present state of affairs. He may be dysphasic from a dominant hemisphere lesion or obtunded following seizures or a rise in intracranial pressure. One may have to rely on members of the family, friends, or total strangers for some historical clues to the nature of the patient's disorder. This is particularly true in children. One must rely on the parents for information about the patient's growth, development, behavior, and habits. Specific questions should be asked concerning difficulties during the pregnancy, labor, or delivery. The history of skin rash and low-grade fever during the first trimester of the pregnancy may explain retardation, nystagmus, and peculiar retinal pigmentation in an infant as being due to maternal rubella.

Old photographs are an important part of any history. They are especially helpful in those patients who have recently noticed the drooping of one upper eyelid, a small difference in pupil size, or the sudden onset of diplopia. A good look at several old photographs under bright light with a magnifier may save the patient needless hospitalization for evaluation of a congenital ptosis, or anisocoria (unequal pupil size), or an old strabismus. A modest head tilt in an old photograph may be all that is needed to explain the onset of vertical diplopia.

It is not sufficient merely to obtain the history of diplopia. It is equally important to know if it was of sudden onset (vascular) or slow (increased intracranial pressure), transient (myasthenia gravis), or progressive (neoplastic). If it is horizontal and worse at distance, a sixth nerve paresis or internuclear ophthalmoplegia is suggested. If the diplopia is vertical, it is usually worse when looking into the distance with disorders of the vertical rectus muscles and worse at near with disorders of the oblique muscles. It is also helpful to know if the diplopia increases when the patient looks to the right or left, up or down.

The symptomatic correlate of acquired nystagmus is oscillopsia, or the apparent to-and-fro movement of the environment. The patient with vertical oscillopsia may

J. A. McCRARY III

Figure 17–1 Examination materials. *Left to right, top row:* hand light, projector light, Maddox rod-occluder, and direct ophthalmoscope. *Middle row:* ophthalmic solutions. *Bottom row:* near card, opticokinetic tape, occluder patch, and cotton-tipped applicators.

describe it as though the vertical hold of a television picture were out of adjustment. Oscillopsia does not occur in congenital nystagmus.

Transient loss of vision may occur in one or both eyes. Transient obscurations of vision are unilateral or bilateral and generally last 5 to 15 seconds. They are associated with chronic papilledema and are described as brief "gray-outs" or "brown-outs" or occasionally as complete loss of vision in both eyes. There may be hundreds of such episodes per day, but *they always last seconds, not minutes*. Transient ischemic attacks (TIA's) may be unilateral (carotid artery disease) or bilateral (basilar artery disease) and consist of sudden loss of vision, often preceded and followed by a "curtain" or "shade" moving across the visual field. If the carotid circulation is involved, the attacks occur in one visual field (eye), and the "shade" may [illegible] horizontally or vertically, almost always the latter. If the basilar arterial circulation is involved, the attack occurs in both visual fields. Often the lower half is involved more than the upper half, and in both types the attacks last 5 to 15 minutes. Occasional episodes may last up to 20 minutes. If an attack lasts over 20 minutes, there is usually some permanent impairment of visual field function. The major exception is the hemianopia associated with migraine.

Migraine is the most common cause for transient homonymous hemianopia; an attack may affect the visual field for more than 20 minutes without permanent damage. These hemianopias may occur without headache, nausea, emesis, scintillating scotomas, or any of the other usual stigmata of migraine (migraine equivalent). Migraine may affect the vascular supply of a single eye, rather than of the hemisphere, in which case a unilateral visual field disturb-

TABLE 17–1 DISEASES OF THE CENTRAL NERVOUS SYSTEM WITH PHOTOPHOBIA AS A RELATED COMPLAINT

Migraine
Subarachnoid hemorrhage
Aura preceding seizure or in the postictal state
Mass lesion
Arachnoiditis (viral, bacterial, chemical)
Postconcussion state
Encephalitis
Acromegaly
Trigeminal neuralgia

ance is found. Migraine is worsened by the use of oral contraceptives in young women. In menopausal women, estrogens can reactivate migraine. Many of the patients who develop vascular complications while using contraceptive medications have a previous history of migraine.

Photophobia is not uncommon in the history of neurosurgical patients. The causes for discomfort or headache brought on by exposure to light of even moderate intensity are many. Photophobia is most often related to primary ocular disease, such as glaucoma or uveitis, but it may be found in diseases of the central nervous system (Table 17–1).

Less than 5 per cent of all headache is due to disorders of the eye primarily. Certainly errors of refraction, ocular muscle imbalance, and glaucoma can cause discomfort about the eyes (asthenopia) or headache. Headache so related is usually noted later in the day, with increased use of the eyes, and is often frontal. The simple question regarding the relationship of headache to increased use of the eyes may help in deciding whether there may be an ocular cause for the headache.

Three common causes for frequent changes in glasses prescription are: glaucoma, cataract, and diabetes mellitus. Any patient who complains of variation in visual acuity from day to day or hour to hour should have a formal three-hour glucose tolerance test. Intraocular pressure should be measured.

The past history and family history must also be carefully reviewed. The patient presenting a history of blepharospasm may also have a history of previous encephalitis several years before. One would thus be attured to a possible diagnosis of postencephalitic Parkinson's disease with blepharospasm as one of its features. A careful review of the patient's medications should always be included. It is wise not to ask what drugs the patient is taking, but instead to ask what medications are used. Some patients equate drugs with narcotics, to the exclusion of all other medications. The family history should include specific details concerning the ages of the patient's parents, and the cause of their death, if they are deceased. Also, it is helpful to know how many siblings were produced, how many are living, their medical histories (if pertinent), how many are deceased, and the exact causes of death. Other details of the medical and ocular history in close relatives may be important.

VISUAL ACUITY DETERMINATION

Accurate determination of the visual acuity is the foundation upon which the entire eye examination rests. Only the best vision for each eye should be recorded. Ideally, the eye that is not being tested should be completely occluded. Some type of patch is required for children. A black occluder with an elastic band works well and is inexpensive. When testing vision in a patient with glasses, a cleansing tissue may be placed between the lens and the closed eyelid. The best test of visual acuity consists in measurement at distance and near, if a distance (20-foot) Snellen chart is available. This should include the vision with and without glasses. The addition of a pinhole before the tested eye with poor vision will generally increase its visual acuity if the cause for decreased vision is refractive. It will reduce the acuity if the decrease in vision is due to opacities of the media (cornea, lens, vitreous) or a central scotoma. The patient should be encouraged to demonstrate the best possible acuity. Many times better visual acuity can be recorded if the examiner allows sufficient time for the patient to find the best head position and encourages an occasional guess.

If facilities do not allow the distance vision to be tested, the near card (reduced Snellen) should be used. The ideal near card should have letters, numbers, and sentences. A dysphasic patient may be capable of identifying numbers but not letters, letters but not numbers, or both letters and

numbers when shown in an isolated manner, but be unable to read them accurately as used in sentences. The patient should be asked to move the card into the best reading position. An alert observer can detect a visual field defect by watching the position of the near card. A card held slightly off center often means that a central scotoma is present. The card held in the nasal field of each eye suggests chiasmal disease with a bitemporal hemianopia. Similarly, other positions may be the clues to a homonymous hemianopia or an altitudinal visual field loss. In patients over the age of 50, the acuity at near will be reduced simply because of the effects of presbyopia. The patient will tend to hold the card at an excessively long reading distance. The near vision should be tested with the patient's glasses in place. Presbyopia is the most common cause of visual complaints concerning near visual tasks in patients over the age of 40. Repeat testing of vision should be done in light similar to that used for the initial test. A near card held far from one eye and near to the other may imply: (1) anisometropia (unequal refractive error between the two eyes), (2) accommodative weakness in one eye—the card would be held further away than usual—suggesting impairment of cranial nerve III, or (3) increased depth of accommodation—common with Horner's syndrome—in which the card would be held closer than usual.

It may not be possible to test vision with the near card in some patients, especially if they are dysphasic, and one may have to rely on finger counting techniques in order to assess vision. The extended fingers are about the equivalent of the letters or numbers on the Snellen distance chart that should be visible to the normal eye at 200 feet. In the ophthalmologist's office, the patient who can just see these letters at 20 feet is given a vision of 20/200. A patient who must walk to within 5 feet of the letters before recognizing them is given a vision of 5/200. Using his fingers alone, the examiner can obtain a good estimate of the patient's vision by having him count the number of fingers presented at increasing distances from the bedside until the patient no longer responds correctly. In the dysphasic patient, one may have to communicate with sign language until he understands that he should hold up the same number of fingers as the examiner for a correct response. This can be time-consuming but really worth the effort; however, even this may be impossible, and the examiner may have to be content with a very gross estimate of visual acuity made by evaluating the patient's response to moving targets, such as a pen or hand light, his response to opticokinetic targets, or finally the pupillary response to light.

A special problem is encountered in testing the vision in children. The average visual acuity of children with increasing age is as follows:

Birth	10/400 (or 5/200)
1 year	20/200
2 years	20/40
3 years	20/30
4 years	20/25
5 years	20/20

It is possible to determine whether or not vision is present *even in the newborn infant* with the use of opticokinetic targets and pupillary responses to light. One should be able to elicit some ocular movement by using an opticokinetic tape. The child must be fully awake and not crying. The opticokinetic tape will produce responses in patients who have 5/200 or better visual acuity. A normal child will be able to fix and follow a hand light or another rather large target by the age of 3 months. Formal testing of visual acuity is not usually possible before the age of 3 years. The child must be learning some verbal skills. Sometime between the ages of 3 and 4 years, most children are capable of learning to play the "E game." They are asked to point one finger in the direction of the "legs" on the E. This can be taught at home by the parents, using a letter E cut from a piece of cardboard. When the parents have not been successful in teaching a child of 5 or 6 years to play the game, three possible causes of their failure are mental retardation, a parietal lobe lesion, and poor vision. After the age of 9 years, most children will be able to respond accurately to the adult vision test. In very young children, it is often best to test them with both eyes open initially, and later to test each eye individually.

EXTERNAL EXAMINATION

General inspection is important in the external examination. The subtle flattening of the nasolabial fold on one side of the face

may be the clue to a central facial paralysis. Acne rosacea of the facial skin may point to chronic alcoholism as the cause for tremor and ataxia. It may also explain a sudden loss of vision from nutritional amblyopia. Careful attention to the color, quality, and texture of the skin is of great importance.

The eyelids should next be considered. The width of the lid fissures (maximum diameter between the edges of the upper and lower lids) should be measured or estimated. The average width of the lid fissure is 11 mm in the adult. A range of 8 to 12 mm is certainly within the limits of normal. The upper lid margin usually lies at or just about 1 mm below the upper limbus (junction of the cornea and sclera). In small children, especially under the age of 2 years, the upper lid usually rests at the upper limbus. The lower lid margin is usually at the limbus in children and adults. Knowing these simple landmarks, one can estimate very accurately whether the fissures are abnormally wide or narrow.

The fissures may be abnormally wide owing to extreme concentration, fear, sympathomimetic drugs, thyroid eye disease, or the pathological lid retraction seen with lesions of the posterior commisure (Collier's sign). Thyroid eye disease with its lid retraction and lid lag is usually easy to diagnose. Collier's sign is one of the very important external ocular findings in mesencephalic disease. Whereas the lid retraction of thyroid disease is often bilateral but asymmetrical, the lid retraction in Collier's sign is generally quite symmetrical unless there is a superimposed Horner's syndrome or involvement of the nucleus of the third cranial nerve that is causing ptosis. Another common cause of unilateral widening of the lid fissure is a peripheral palsy of nerve VII. Supranuclear damage to the facial nerve complex causes paralysis of the lower side of the face, sparing the upper face, contralateral to the lesion. The lids are little involved except for some slight weakness of closure. The eyelids are little affected compared to the peripheral seventh nerve palsy because of the bilateral representation of the upper face in the supranuclear pathways. A handy clinical guide to the level of a lesion in the stem is: (1) a lesion above the nucleus of nerve VII causes a contralateral paralysis of the *central* face, arm, and leg; (2) the lesion at the level of the nucleus of nerve VII causes an *ipsilateral peripheral* facial palsy and *contralateral* hemiparesis; and (3) with one below the nucleus a contralateral hemiparesis occurs that spares the face. The lid fissure is widened not only by the weakness of closure of the upper lid and unopposed force of the levator, but also from the slight sagging downward of the lower lid (lagophthalmos). Because exposure of the cornea to drying and foreign bodies invites corneal ulcer formation, the eye should be kept moist with artificial tear solutions (Liquifilm, Isoptotears) or ointments (Lacri-lube). If it is not desirable to use these measures, the eyelids may be closed with tape or a minor surgical procedure, the lateral tarsorrhaphy (Fig. 17–2). Either of these protects the cornea. The tarsorrhaphy can be released at any time.

Narrowing of the lid fissure (ptosis) may

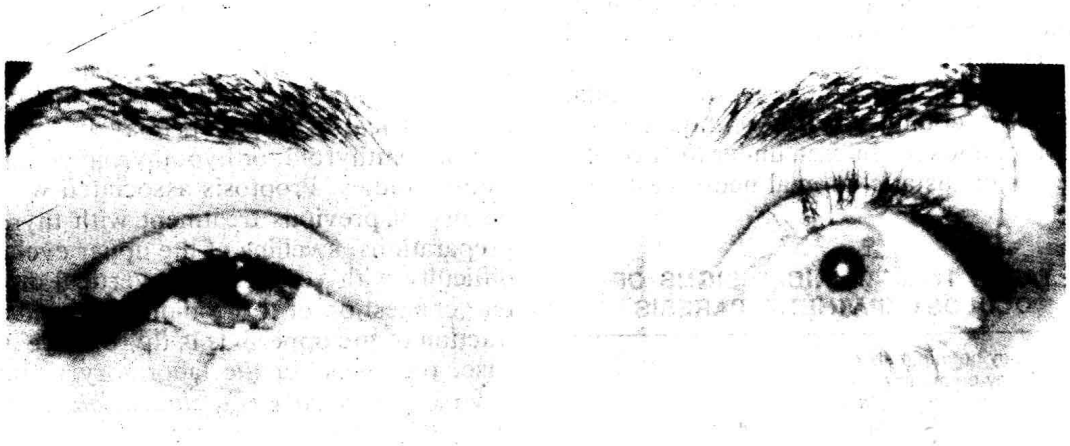

Figure 17–2 Right lateral tarsorrhaphy for exposure keratitis from facial palsy in postoperative angle tumor case.