ABC of Ophthalmology

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METHODS OF EXAMINATION

Sight testing

Though changes in eyesight are remediable by glasses more often than not, they may herald a change that has nothing to do with refraction but may instead be a precursor of serious handicap. Recording is therefore important.

The sight testing chart should be looked at from 6 metres (20 feet), or from 3 metres if looked at through a mirror. The last complete line that the patient can read completely accurately indicates his acuity in that eye.

Failure to read the top line should only be recorded when the patient has been brought closer to the chart until he can see. His vision may then be recorded as, for example, 4/60 or even less than 6/60. This is still useful vision without glasses, especially if near vision is normal.

Near vision is tested with print of standard type sizes at 25 cm or the distance the patient prefers. Normal vision is N5.

People who cannot read or cannot read Western script may be tested with a matching test, such as the Sheridan-Gardiner. The patient matches with his finger on a card the letter being shown. This test also has the advantage of being portable and so can be used for bedridden patients.

Whatever an eye looks like it is worse off if the visual acuity is affected than if it is not. An eye with symptoms that looks healthy and has good visual acuity should not be dismissed as necessarily normal, but its needs are less urgent than those of an eye with affected acuity.

The patient's own remarks about his sight are about as valuable as any he might make about his pulse. Sight tests should normally be carried out with glasses as the aim is to find out the best the eye is capable of.

Testing colour vision

In rare cases (such as occurs, for example, in multiple sclerosis) acquired defects of colour vision may be diagnostically valuable, though they are usually overshadowed by other visual loss. Because the eye focuses red and blue light differently on the retina, even a minor defect of refraction can produce a variation in colour appreciation which disappears with correct glasses. Any disease, such as diabetes or glaucoma, which affects the cone cells of the retina may change colour values.

True colour blindness is so rare as to be unimportant for the average doctor. Defects in colour vision are, however, more common. Among Europeans about 8 in 100 boys and about 1 in 1000 girls inherit some difficulty in colour appreciation. It is usually well compensated for except in trick conditions. It is useful to expose these defects early, so that children and their teachers may foresee some difficulties. Useful tests are the Ishihara for adults and the Guy's colour vision test for children.

Comparing two eyes for vision and appearance

Equal performance of each eye with glasses for both near and distant vision is normal; unequal vision needs to be accounted for. Comparing one eye with the other is useful not only for acuity but also for: the size of the eye, separation of the lids, colour of conjunctiva and iris, size, shape, and activity of the pupils, and brightness of the cornea.

Most discrepancies can be detected in good light without any instruments, though a torch and magnifying lens are useful.

Pupils: size and speed of reaction

Pupil reactions are commonly missed because differences are often very small, both in size and speed of reaction. Most reactions are exaggerated in the dark so conclusive evidence may be obtained only in a dark room test. The pupil constricts not only in response to light, but also to focus for near vision. Failure to constrict to either light or near vision is an important sign. Any difference between the pupils in size or reaction needs explaining. In the absence of any neurological symptoms the wisest course is to refer to an ophthalmologist.

Eye movements

Eye movements may be tested by asking the patient to follow an object held in the hand, such as a pencil point. Movements should be equally full in both eyes in all directions, though the many people who suffered a squint in childhood might have these movements somewhat modified. The importance of this is minimal in adults unless there are new visual symptoms, the likeliest being double vision.

In testing eye movements the patient should not be asked to perform the impossible feat of looking beyond the normal range of vision: he will produce intermittent fixation of the object, which it is easy to confuse with nystagmus.

Lids

The lids too must be examined. The upper lids in particular must be symmetrical—this can be assessed by comparing the level at which they intersect the cornea. It is sometimes hard to decide whether the lower of the two or the higher is abnormal. Family photographs will help to show whether the difference in aperture is long standing. Normally, not only should the lid level be symmetrical; when the eyes are raised the lids should also move upwards symmetrically. A weakness of one or the other might indicate one of several neurological disorders, the most often missed being myasthenia gravis.

Symmetry: determining the abnormal eye

Symmetry of the two eyes depends not only on the equal function of the upper lid but also on the prominence of the globe. It is often difficult to determine which is the abnormal eye.

A small eye accompanied by a small pupil is a well recognised abnormality (Homer's syndrome), requiring investigation. Any eye that is becoming more prominent demands the exclusion of thyroid disease before considering disorders in the orbit that may be causing protrusion or deviation.

The distance in depth between the centre of the cornea and the plane of the iris should be identical in each eye. It is a serious sign if it is less in one eye than in the other, raising the possibility of glaucoma or a predisposition to glaucoma.

A shallow anterior chamber on both sides is difficult to assess because there is no standard of comparison, but when it is extremely pronounced the possibility of glaucoma needs careful consideration. The anterior chamber tends to become shallower from youth to age. Women also tend to have a deeper anterior chamber than men, so extreme shallowness tends to be a more important feature in women.

Examining the inner eye

No reliable information about the eye behind the iris can be gained without an ophthalmoscope, except in people with well-advanced cataracts, when the pupil will be grey or white.

The ophthalmoscope consists of a series of lenses graded so that all the different planes of the eye can be examined from front to back. Too often it is regarded merely as an instrument for looking at the retina. Routine examination should begin using the high + lenses and end with the lens (theoretically 0, but seldom so in practice) that brings the retina into focus. If this routine is not followed opacities in the lens and vitreous may be missed.

Since the long-sighted eye is a small eye and the myopic a large one, the retina is focused sooner in a long-sighted eye. Also more of the retina of a long-sighted eye can be seen without moving the ophthalmoscope than that of a myopic eye. Any degree of astigmatism will prevent accurate focusing of the retina and optic nerve, and possibly lead to a false diagnosis since blurring of the nerve head is a sign of its being swollen. All these effects can be neutralised by viewing the interior of the eye through the patient's glasses. Dilating the pupil with Mydrilate 0.5% (cyclopentolate) with or without phenylephrine 10% helps to reduce any light reflections and increases the field. Immediately after examination the dilating drops should be neutralised with a constricting agent such as pilocarpine 2% or eserine (physostigmine) 0.25%. Known glaucomatous eyes should be left to the expert, as dilatation could be risky.

The examiner should stand alongside the patient and be as close to the patient's eye as possible. The examiner uses his right eye to examine the patient's right eye and his left to examine the patient's left. The patient should be asked to pretend to fix on a suitable object across the room.

Through the eye

In a normal eye there is generally a featureless red glow until the retina is reached. Opacities in the cornea or lens show up as dark streaks or spots when the ophthalmoscope is focused at the appropriate depth and may be dense enough to prevent any view of the retina. Alternatively, some cataracts appear as a general haze or cloudiness.

The vitreous is normally completely transparent but it is relatively common for black threads or floating opacities of all shapes to be seen. To the patient these appear as floating marks when he views a light surface.

Any difficulty in seeing a clear picture of the retina may indicate serious intraocular disease and needs full investigation.

If there is no red reflex and a black pupil the probable cause is severe intraocular haemorrhage. Apart from trauma the commonest causes of haemorrhage are diabetes, arteriosclerosis, or hypertension.

Retinal haemorrhage: a threat to vision

Any retinal haemorrhages are not only important because they are a threat to vision but also because they may indicate systemic disease such as hypertension, diabetes, anaemia, renal diseases, etc. Again a comparison between one retina and the other is often useful, and it is therefore good practice to dilate both pupils, even if the patient has symptoms in only one eye. The differential diagnosis of retinal abnormalities is difficult but any unusual picture needs investigation. Retinal haemorrhages vary in shape and size according to their cause, the vessel from which bleeding occurs, and the layer of the retina they are positioned in. They range from the pinpoint haemorrhage seen in some diabetics to the obvious chaotic patterns produced by thrombosis. All are potentially dangerous to life or sight and need an ophthalmological assessment as well as medical investigation.

As haemorrhages absorb they often leave white patches resembling exudate. Leakage of serum from the vascular bed also produces fluffy or discrete white areas dotted throughout the retina or in only one area. Where these are newly observed they require investigation just as much as haemorrhages, as they often indicate systemic disease. None of these necessarily produce easily detectable visual loss reported by the patient.

Optic nerve heads: precise boundaries and central cup

The optic nerve heads should have precise boundaries; neither should be paler than the other; and each should have a definite central cup. If the cup is not visible and the edges of the disc are blurred expert opinion is needed to exclude swelling caused by serious retro-ocular conditions.

A newly observed difference in pallor between the two eyes is more certainly an indication of the early stages of serious disease, especially in the absence of any history that may account for the difference. Equal pallor in both eyes is hard to evaluate, but if it is at all pronounced then further investigation is needed. Neurological signs elsewhere may be found, and even a small visual loss either of field or of acuity should be searched for.

The normal cup has sloping sides and rounded edges. By contrast, a glaucomatous cup has sharp edges; in advanced cases the side of the cup extends behind the plane of the edge, so that the edge hides the blood vessels as they loop over and reappear further down in the nerve head. Hence in glaucoma a portion of the vessels cannot be seen, whereas in normal discs there is no such break in visibility as the vessels traverse the nerve head. Whatever the state of visual acuity, cupping of this nature, even in only one segment of the disc, warrants full scale investigation for glaucoma.

Swelling of the nerve head, featured by blurring of the disc margin, may indicate a serious disorder of cardiovascular or intracranial origin.

The position of retinal lesions is described by taking the optic nerve as the centre of a clock and measuring the distance from the disc as disc diameters. Thus a lesion may be 2 disc diameters from the disc at 3 o'clock. The closer a lesion is to the posterior pole of the eye the greater the immediate effect on vision may be. Even minute disturbances around the macula can affect near vision only, mainly because of the great concentration here of cone receptors, which are responsible for transmitting detailed impulses through the optic nerve.

Ophthalmoscopic investigation can be supplemented in cases where there is no visible lesion but some visual defect by dye injections and electrical tests.

The blood supply to this area often fails in old age. This accounts for the inability of some old people to read, though their distance vision is less severely affected. Close examination of the macula in these cases will often show abnormal fine or coarse pigment stippling. The visual handicap is often out of all proportion to the minute changes seen in the retina.

Visual fields: central defects affect acuity

No examination of the eye is complete without assessing the visual fields. Some quite puzzling visual complaints become explicable when field defects are discovered. Most elderly people who have half their visual field obliterated (hemianopia) do not complain of this: they may mention only difficulty in reading or in mobility because of bumping into objects.

Unfortunately, testing the visual fields is not easy and in children up to the age of 10 even with instruments is often not more than a probable estimate. The minute telescopic central field of the glaucomatous is often described by a sufferer as "difficulty in getting about." Gross defects may be detected simply by the examiner stretching out his arms and asking the patient to fix on his nose. The examiner then moves the fingers of his hands. Any inaccuracy in the patient's response to these movements indicates some field loss in the temporal fields. If the patient then closes one eye any field defects in the nasal field of the other eye can be determined by comparison either with the examiner's own or with the fellow eye. The upper and lower fields can be investigated in a similar way. Disturbance of the central field is usually accompanied by some loss of acuity. This does not occur when the peripheral field is contracted.

There are many types of field defect, but the finer ones have to be detected by instruments. Nevertheless, the results are still largely determined by the patient's subjective responses and these are often inaccurate. Possibly the most useful aid in the consulting room is the small book of Amsler charts. These enable small but diagnostic defects of the central field to be detected quickly and often accurately.

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