REFRESHER COURSE FOR GENERAL PRACTITIONERS

COMMON CAUSES OF CURABLE BLINDNESS

BY

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On peut dire sans paradoxe que selon toute vraisemblance si les hommes étaient condamnés à vivre cent cinquante ans, ils seraient tous aveugles.—P. BAILLIART, 1950.

Bailliar's statement is a reminder that some half of those blind enough to require subsidy or support in a modern industrial community are not, and never have been, susceptible to treatment. Even those who are treatable respond during a limited period only, so that for the sake of the community, as well as for the sake of the individual, diagnosis should be made early and treatment should be adequate. Space limits this article to a consideration of the commonest treatable causes of blindness in Great Britain—namely, trauma, iritis, acquired glaucoma, cataract, and myopia.

Trauma

Blindness from trauma is as spectacular as it is unnecessary, and, though the actual incidence of binocular traumatic blindness in England is relatively low, it provides an important field for prophylactic ophthalmology. Industrial blindness is largely monocular, patients losing the sight of one eye being 10 times as numerous as those who lose the sight of both. But only half the cases of traumatic blindness are industrial. Children are particularly prone to trauma, and, although many penetrating wounds are from unlikely and unforeseeable causes, in at least two fields precautions are possible. For instance, any child who sets off a firework by himself should wear "anti-gas" or similar goggles. Accidents from air-guns are also preventable; at least seven times in the past two years I have wished that air-guns could be sold with a large red "L" on the butt, to be planned off only when a boy is certified by a responsible person as understanding the ordinary routine of handling a gun. Motor accidents, too, play their part in causing traumatic blindness, usually by producing optic atrophy from basal fracture. A crash helmet might be "required wear" for motor-cyclists in this country; in Belgium they seem to have become *de rigueur* as a matter of fashion.

In the industrial field the value of goggles remains relatively unrecognized. It is true that goggles are not always comfortable to wear, but there is no doubt that where their use can be enforced by precept or example the incidence of industrial eye injuries drops to practically nothing. In industry 63% of eye injuries are due to abrasive particles; these require careful removal, as they tend to combine chemically with the surface of the cornea, just as they do with the back of a pair of glasses. If the particle is carefully removed, with the surrounding "rust ring," with a cataract needle under cocaine and in good illumination, most of these injuries heal fairly rapidly, although it is advisable to insert a mydriatic and to keep a daily watch until the eye is healed. If the injury is slight, homatropine 2% should be used for mydriasis rather than atropine, as the latter leaves vision blurred for 10 days. If infiltration occurs round the abrasion the case is best referred to a specialist, as this may foretell a hypopyon.

Six out of every 1,000 miners employed have eye injuries annually, mostly small corneal ulcers due to a foreign body which becomes loose and disappears by the time the

eyes are examined. The use of 30% sulphacetamide drops in all cases of eye injury in pits has in some areas halved the average time lost from work.

Injuries from chisel particles comprise some 13% of all injuries and are very much more serious than those due to abrasives. A particle which flies off and is sharp-edged may penetrate into the interior of or right through the eye. If a patient states that he was striking a metallic object or a stone with a hammer or a chisel and that a fragment struck his eye, unless that fragment is visible on the surface, he should be sent to hospital to be radiographed. The entry wound of many such particles is invisible except on careful ophthalmic examination. Such particles are of magnetic steel, and, with the aid of an electro-magnet, can as a rule be removed. Unfortunately, however, the damage done to the lens often leads to a cataract, and though this can be removed in young people by linear extraction the eye will not focus until corrected by a strong lens. The wearing of such a lens produces diplopia in most people. A contact lens (where tolerated) may allow binocular vision, but the introduction of a small plastic lens between the lens capsule and iris, a technique described last year by Harold Ridley, may, if tolerated indefinitely, open up new possibilities. The longest period recorded so far is two years, and the technique has until now been used by only a few surgeons. In many cases fibrous tissue formed as a sequel to the transit of the particle through the vitreous leads to an untreatable retinal detachment.

Corneal burns are not uncommon from molten metal, acids, or alkalis. Molten metal should be removed so far as possible at the first-aid station, but no attempt should be made to neutralize acids or alkalis chemically. The best immediate treatment is to put the face under a running tap or in a basin or bucket of water with both eyes open in an attempt to wash out as much of the chemical as possible. Of all corneal opacities the chemical burn responds worst to corneal grafting.

Iritis

The differential diagnosis of iritis from glaucoma is a classical ophthalmic problem, and, while some cases are clear-cut, others may present difficulties to the most expert. An inflamed eye with a clear cornea, unstained by fluorescein, and a muddy iris indicates iritis. If the cornea shows a generalized haze the probabilities are in favour of interstitial keratitis in a young person, and of primary or iritic glaucoma in the middle-aged. The pupil is the most reliable guide in these cases, in glaucoma being semi-dilated and vertically oval, and in iritis (unless atropine has been used) smaller than that in the normal eye and irregular in shape (Fig. 1). The presence of posterior keratic precipitates is not always a reliable distinction, for though they are always present in iritis they can also occur to a

FIG. 1.—(a) Glaucoma pupil: semi-dilated and oval, cornea hazy. (b) Normal pupil. (c) Iritic pupil: contracted and crenated.

lesser extent in primary glaucoma. In cases of doubt the patient should be sent to an expert, but if this is not possible he should be treated temporarily for glaucoma.

Obvious iritis, even if accompanied by secondary glaucoma, should be treated initially as iritis. Here the chief difficulty is to find the cause. The happy certainty of our grandfathers that iritis was largely syphilitic and could be cured by inunctions, of our fathers that it arose from septic foci and could be treated by extraction of teeth or drainage of sinuses, or of our Continental colleagues that it is tuberculous and should be treated by tuberculin has been replaced by a degree of therapeutic nihilism. Tests should be carried out to exclude these possible causes, but in most cases they will be found to be negative. A certain number of cases have been attributed to sarcoidosis, and these benefit from the controlled administration of calciferol by mouth.

In general, the treatment of iritis consists in covering the eye, applying heat by spoon bathing (for 10 minutes three times a day) or short-wave diathermy, and giving 1% atropine sulphate eye ointment once or oftener a day to keep the pupil dilated. When synechiae are marked the injection of "mydracain" (a mixture of atropine, cocaine, and adrenaline) subconjunctivally may be effective. Cortisone drops (5 mg. per ml.) four-hourly are the most recent effective measure. A similar effect is probably obtained indirectly by the more severe measure of pyretotherapy (intravenous injection of 1 ml. of T.A.B. vaccine diluted to 25 million organisms per ml., to be followed in 72 hours by a further 2 ml.).

Where possible the use of atropine and rest of the eyes should be continued for two to three weeks after the eye has become "white," though dark glasses may replace the eyepad. If after the attack has subsided the pupil is completely bound down, the iris bulging forward, or the tension raised, iridectomy is indicated.

Congestive (Narrow-angle) Glaucoma

In all cases of migraine or neuralgia the eyes must be examined, as traditionally acute glaucoma is associated with acute supra-orbital pain and vomiting. These symptoms are not always present, however, and the main diagnostic feature in a patient over 40 is a history of rainbow rings round lights and blurred vision when tired. The acute attack is usually, though not invariably, a more severe version of previous minor attacks. It should not be forgotten that the "halo" appears colourless to some patients. The cornea is usually small, hazy, and surrounded by ciliary injection; the anterior chamber is shallow. The pupil is semi-dilated and oval: this is the most important diagnostic feature. Traditionally the eye feels harder than normal, but as the "tactus eruditus," if it exists, is probably possessed by few people, it is better to rely on visual rather than tactile signs. Berens, of New York, has recently produced a cheap plastic tonometer for the general practitioner's use, but this is not yet available in Great Britain.

If pain is a feature of the case, morphine $\frac{1}{4}$ gr. (16 mg.) should be given, and 0.5% eserine drops in oil inserted half-hourly in the eye. If in two to three hours the pupil is not contracted and the cornea is still hazy, the patient should be sent to an ophthalmologist, as iridectomy will probably be necessary. This difficult operation has been greatly simplified by what is known as the *ab externo* technique, in which a cut with a knife of the Gillette D type is gradually made through the sclera behind the limbus until the iris prolapses. A large iridectomy is then performed. The prognosis of this operation is good, 90% of the cases being cured.

In some cases a severe crisis never occurs. The patient has a series of minor attacks with haloes and dimness of vision which produce a gradual cupping of the optic nerve and diminution of the visual field as in chronic non-congestive glaucoma. The cornea is clear and smaller than normal, the pupil reaction to light is sluggish, and the tension is

raised during the attacks, though it may be normal between them. Pilocarpine 0.5% drops may control the attacks as indicated by the disappearance of the halo, but if attacks recur at intervals of a month or two the tension is best measured by tonometer and operation should be considered. In these more chronic cases the effect of basal iridectomy can be reinforced by cutting away the anterior lip of the scleral incision with punch forceps (irido-corneo-sclerectomy). The prognosis is not so good as in the acute type.

Non-congestive (Wide-angle) Glaucoma

This condition is difficult both to diagnose and to treat. Externally the eye may look normal; the anterior chamber may be deep and its angle wide, though the pupil reaction may be sluggish to light. The patient complains of little except difficulty in reading, and the presbyopic patient who requires his reading-glasses changed more than once every two years should always be suspected of this condition; his optic disks should be examined to see if they are pale or "cupped." The clearest indication of "cupping" is that the vessels appear to stop short at the edge instead of running to the centre of the disk and are crowded to the nasal side. If there is any doubt, a careful examination of the visual field by an ophthalmologist and tonometry in the early morning after imbibition of fluid are required.

Once the diagnosis is made 1% pilocarpine drops are instilled once or oftener a day to keep the tension below 25 mm. Hg, and the patient is advised to lead as unexciting and regular a life as possible, avoiding spirits and coffee. Reading and cinema-going are permissible so long as the eyes do not feel strained or blurred. Progress is checked by testing the visual fields at intervals of one, two, or three months with a perimeter, and, if the field is contracting, a safety valve is produced by turning down a conjunctival flap and trephining a 2-mm. hole through the limbus—a small piece of iris invariably prolapses and is excised. In some patients, particularly the aged with traces of cataract, the disease may live up to its sobriquet, "the thief in the night," and contract the field to 10 degrees before it is detected. If the expectation of life is short this diminished visual field may be retained by pilocarpine or eserine drops, even if the tension remains above normal. A good life expectancy indicates operation, iridencleisis being preferred. However, no matter what operation is employed, 40% of eyes with wide-angle glaucoma get worse, some in spite of a normal tension and others because of the development of nuclear cataract.

Congenital Cataract

Congenital cataract may occur in one or both eyes and may range from a pattern of fine dots in the lens nucleus, allowing moderate vision, to completely opaque lenses. It may be familial, associated with the ridged teeth of defective calcium metabolism, or related to maternal rubella. No general agreement has been reached on the value of giving convalescent serum to pregnant women exposed to rubella, or on whether pregnancy should be terminated if the mother contracts the disease in the first four months.

Any baby after the first 12 weeks of life who pays scant attention to bright objects, or who has squint or nystagmus, should be examined ophthalmoscopically after administering 1% atropine sulphate eye ointment daily for a few days, when the pictures shown in Fig. 2, may be seen. If cataract is complete in both eyes operation is indicated as soon

FIG. 2.—(a) Congenital lamellar cataract. (b) "Bicycle-spoke" cataract, causing polyopia. (c) Nuclear cataract, causing "old sight." The areas shown white appear black against a red background when the eye is examined with an ophthalmoscope.

as the child is weaned. If the vision is good enough to allow the child to get about, operation should be deferred to the age of 2½ years, when surgical results are better. "Needling" has now been superseded by "linear extraction," in which most of the lens is removed by passing a keratome through the limbus into the lens itself and removing or expressing as much lens matter as possible by irrigation. Glaucoma or retinal detachment not infrequently supervenes in early adult life, so that one eye only is treated in this way, the other being kept in reserve. In 56% of congenitally cataractous eyes other obvious defects are present and the visual prognosis is poor. Even when apparently normal the central vision may remain poor after a successful operation owing to a (postulated) retinal dysplasia.

Acquired Cataract

Most of these cases are of senile—that is, unknown—origin. Cataract may be suspected when a patient of 45 or over complains (in addition to the usual reading difficulty) of monocular diplopia with bright objects, visual failure in the distance, or photophobia for which there is no external cause. In sexagenarians these symptoms may actually be accompanied by "old sight"—that is, ability to read without spectacles. With the ophthalmoscope the cataract can be seen as dark "bicycle spokes" or as a central haze against the red background (Fig. 2). In such cases ophthalmological examination is essential while a clear view can be obtained of the fundus to exclude glaucoma and macular degeneration. Later, when the cataract progresses, the fundus becomes invisible and its functional value uncertain until after operation.

There is no agreed medical treatment of cataract, and, as the problem approximates to unboiling a hard-boiled egg, this is not surprising. Nevertheless, provided that glycosuria and focal sepsis are excluded or treated, that adequate glasses are provided, that care is exercised in not reading when the eyes are tired, and that physical trauma is avoided—a jarring fall may mature a cataract—the changes in vision are usually slow, and most cataracts take 10 to 15 years to reach a point where extraction is required. That is to say, most never require operation.

Should a patient be told that he has a cataract? In some cases the patient's temperament makes this unwise, but in general, and provided the diagnosis is accompanied by adequate explanation, it is better to tell anyone complaining of increasing or persistent visual defect. Ultimately the search for the elusive "correct" glasses will end by the patient becoming aware of his trouble and believing it to be worse than it is.

Cataract extraction is performed under local analgesia. It was confined at one time to those cases in which the lens was "ripe"—that is, as opaque as "sunlight" soap—because autolysis of the translucent lens material remaining after extraction of the cataract by the extracapsular method (Fig. 3a) caused iritis. Of recent years greater risks have been taken with cataracts confined to the nucleus in patients over the age of 60, but post-operative iritis still occurs in 13% of cases. With the more recent and more difficult intracapsular operation, in which the lens is removed

in its capsule (Fig. 3b), the incidence of iritis is much lower, and the only criterion of ripeness in a physically and mentally fit patient is whether he has enough sight to carry on his business or, if retired, to read. It seems strange to find an eminently operable condition like cataract high on the list of the causes of blindness, but severe diabetes, hypertension, chronic bronchitis, or disabilities of temperament may render patients poor operative risks.

Myopia

Most of the blindness in myopia occurs from macular degeneration due to high myopia in late middle age. The patient usually complains of a dark central spot that remains fixed (not floating) at the centre of the sight, which indicates the final stages of macular degeneration. Whether the effects of such malignant myopia are of purely genetic origin and uncontrollable, or whether the wearing of the correct glasses, an education with a minimum of reading, and the administration of calcium by mouth exercise any influence in youth is uncertain. Most ophthalmologists adhere to these principles in the early treatment of such cases.

One form of blindness usually associated with myopia and susceptible to surgical treatment is detachment of the retina. The patient generally has moderate myopia and complains of floating black specks, flashes, or areas of light on moving the eye in the dark and, if the detachment is in the upper half of the retina, a defect in the lower visual field. Any patient who develops a spontaneous vitreous haemorrhage without obvious systemic cause should also be suspected of a detachment. A combination of any two of the above symptoms, particularly after a blow to the eye or head, requires a careful examination under homatropine mydriasis. If the grey area indicative of a detachment is found, the patient, unless obviously hopeless, is admitted to hospital as a surgical emergency and is nursed recumbent with both eyes bandaged to localize the tear (or tears) at the site of the initial detachment. If the detachment diminishes in size the prognosis is improved.

In 1929 Gonin showed that if a thermocautery is pushed through the sclera at the site of the tear the subretinal fluid leaves the eye and the resultant choroiditis round the site of the cautery puncture produces adhesion between the retina and choroid. In this way he was able to cure some 29% of all detachments. To-day by using electro-diathermy in a similar way we cure 43%. It is possible to carry classification further than this: in some young people with slight myopia and a small easily localized tear some 90% are cured, while large detachments in the aged with high myopia and large or multiple tears are almost incurable. It is essential that all detachments be treated as early as possible, for if they reach the macula the ultimate central vision is greatly reduced even if the retina is ultimately replaced. Detachments in aphakic eyes have a poor prognosis with the diathermy operation, but the more recent procedure of posterior sclerectomy, in which a strip of sclera 24 by 4 mm. is removed from behind the muscle insertion and underneath the area of greatest detachment, is proving effective in some otherwise hopeless cases.

Next Refresher Course Article.—"Frequency of Micturition," by Mr. H. P. Winsbury-White.

FIG. 3.—(a) Extracapsular extraction: capsule and cortex remain. (b) Extracapsular extraction: capsule must be needled. (c) Intracapsular extraction: entire lens removed. (d) Intracapsular extraction: clear pupil.

In future all Social Security (health service) prescriptions obtained from chemists in New Zealand will carry an extra red label with the words "Keep all medicines out of reach of children." This is an attempt to reduce the number of deaths and illnesses among children who accidentally get hold of medicines. An original article in the *Journal* on ferrous sulphate poisoning in children recently (1951, 2, 1112) advocated various ways of lessening this risk in Britain, and suggestions were made in subsequent letters showing that doctors are well aware of the danger, but so far no official action has been taken in this country.