Practical Points of Diagnosis and Treatment in Surgery and the Specialities.

EVERYDAY EYE INJURIES.

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INJURIES of the eye, in varying degrees of severity, are so frequently met with in general practice, and, no matter how trifling the initial lesion, the final result may be so disastrous that too great stress cannot be laid on the importance of treating the case carefully from the outset.

One's armamentarium is of the greatest importance; half the difficulty in dealing with minor injuries is removed when one is enabled to see the lesion clearly. If the eye be painful, cocaine it, then look at it, and direct the patient to open the other eye, not the injured one. For the examination one requires a loupe, preferably a binocular one, a good light and a condensing lens, and the appreciation of the condition is further facilitated by the use of fluorescein which stains all abraded epithelium a brilliant green.

Require- ments.

When a small foreign body finds its way into the conjunctival sac, a reflex flow of tears immediately results, and, if the body does not adhere to any part, it is washed in

Foreign Bodies.

the direction of the flow, floats in the lacus lacrymalis, and finally is expressed with the tears on to the cheek in the ordinary process of nictitation. The degree of reaction bears no relation to the amount of damage done; it consists in the main of pain and watering, and depends on the nature of the irritant, chemical or mechanical, on the point hit, and on the position at which the body lodges. The degree of penetration will vary with the hardness and size of the body and the rate at which it was travelling. If the body causes much irritation, the patient involuntarily rubs his eye and this unfortunately tends to embed it in the conjunctiva or cornea, and here it is apt to remain until it is removed artificially or desquamates in a small superficial slough which forms round it. If it is found on the palpebral conjunctiva over the tarsus it is easily picked off with a blunt spud; this is the commonest place to find a body which has stuck in the eye as a result of rubbing and it is easily detected upon everting the lid. The nearer the edge of the lid the more sensitive the conjunctiva. A foreign body lodging on the cornea causes pain chiefly by virtue of the fact that the inner surface of the lid will be scratched with every movement of the eye, provided that the point of adherence is above the level of the closed palpebral fissure. A body adherent to the inside of the upper lid, close to the margin, will cause as much or more reaction owing to scratching of the cornea caused in a similar way. These, therefore, will be points which ought to be most carefully searched for a body causing severe irritation. A foreign body of considerable size may lodge in the upper fornix; in this position, however, it seldom adheres and may be removed by passing a probe along the fold without fully everting the lid. The simplest way to examine the fornix is to tell the patient to look down, draw the skin of the lid well up

over the margin of the orbit and then direct him to look up ; in this manner, with a good light, the fornix may be very satisfactorily explored ; if this is insufficient, double eversion will be necessary. Many cases are on record of large foreign bodies lodging in the upper fornix for some days ; they cause a mucopurulent discharge from the eye which is apt to be treated as a conjunctival affection and naturally does not respond to the treatment provided for such a condition.

An eyelash dislodged by the injury is commonly found in the conjunctival sac, usually in the lower fornix. It may find its way into the canaliculus and be found with

one end protruding from the punctum ; a solitary inverted eyelash rubbing on the cornea may simulate a foreign body and avoid detection for some time. I once removed a lash which had been embedded in the upper tarsus for six weeks ; one end just protruded and by constantly scratching the cornea it had produced the greatest distress. I have also removed an eyelash from the anterior chamber into which it had been driven by the force of a blow.

Workers in all forms of engineering shops frequently receive what they term a fire in the eye—this may be metallic or emery off the wheel ; in either case the foreign matter is at a very high temperature and so rendered sterile. If removed quickly and dexterously no appreciable damage results, but it is only too common for the man to seek aid from someone quite incompetent to remove it, with the result that his cornea is seriously abraded and the patient comes for treatment with a distinctly complicated injury.

The sterility of the conjunctival sac in health is uncertain ; one frequently gets a report from a bacteriologist that it is so and I am inclined to believe that he is right.

There is a substance termed lysozyme secreted in the tears which has the power of lysing a suspension of organisms in a test tube ; further, its presence in small amount inhibits the growth of organisms on media in a way which our various disinfectants utterly fail to do. It is reasonable, therefore, to infer that in health the conjunctival sac is moderately sterile. However, should there be any stimulus to the excessive secretion of tears, the lysozyme content of the flow rapidly diminishes so that the tears from an eye which has been watering for days in a futile attempt to wash out a foreign body are practically free from lysozyme and organisms are free to grow and infect any abraded area of the cornea. There is one condition in which the conjunctiva is never sterile and that is when a lachrymal mucocele exists ; the organism present in nearly all cases is the pneumococcus, and so such patients are liable to get a serpiginous or hypopyon ulcer following the slightest corneal abrasion. It is, however, noteworthy that these patients seldom suffer from a pneumococcal conjunctivitis. The practice among some workmen of applying saliva to a comrade's eye after removing a foreign body is particularly poisonous, as syphilis may be transmitted.

To detect a foreign body on the cornea, place the patient in a good light, instil a drop of 2 per cent. cocaine, and, standing behind the patient, whose head must be supported, examine by oblique focal illumination with the aid of a lens

and a corneal loupe. The body will appear as a black speck focussed at a point somewhere *in front* of the iris—this should be noted, as a small mole on the iris has been mistaken for a foreign body on the cornea, and attempts have been made to remove it ; if difficulty is experienced in locating the body, a drop of

fluorescein should be instilled as a small area of staining round the body will aid greatly in its detection.

To remove it, if one is not thoroughly accustomed to the procedure, a blunt spud should be used ; endeavour to introduce the spud immediately behind the body and lift it off on the end of the instrument ; if one is more experienced, a

Removal. Bowman's needle or the point of a Beer's knife may be used ; the knife possesses the advantage of being less flexible than the needle. Only occasionally is a magnet of any value. If a particle of metal has adhered for more than twenty-four hours, it will be surrounded by a fine, whitish ring of infiltrated epithelium ; it is then easily removed, part of the softened tissue coming away with it ; should a rust-stained bed be found to underlie it, this also should be removed.

Abrasions of the cornea may be caused by very trifling accidents and sometimes follow operation when a general anæsthetic has been administered. Fluorescein again is very useful in showing their presence and the exact extent of the area

Abrasions. involved ; should this drug not be at hand, the presence of an abrasion may be found by causing the patient to face a window and looking at the reflex of the window on the cornea ; on telling the patient to look in various directions, the outline of the window will be seen to be distorted immediately it is reflected from the abraded surface. By way of treatment, cold should be applied until the pain has subsided, when a pad and bandage will suffice.

Burns and scalds of the conjunctiva and cornea are liable to be very serious in their result and prognosis must be particularly guarded. The pain is always very severe

shortly after the injury, the conjunctiva is found to be chemosed, the

Burns. lids hyperæmic and there is usually some blepharospasm with profuse lachrymation ; on the second day the cornea is hazy and the limits of the burn on conjunctiva or cornea are clearly defined, the hyperæmia around being most intense ; the lids assume a brownish colour. Burns on the conjunctiva tend to run a long course and the tendency to cicatricial contraction is correspondingly increased.

There is great danger of symblepharon, particularly if both the bulbar and palpebral conjunctiva are involved, and even more so if the loose conjunctiva of the upper fornix is destroyed. Burns of the cornea are apt to perforate early, and if they become septic are almost certain to do so ; complete disorganization of the eye is often the unavoidable sequel ; if perforation is avoided the cornea will yield and an ectatic condition result.

Symblepharon is to be particularly guarded against, but at the best it can only be minimized, not prevented ; adhesions should be broken down as they form ; mechanical devices for keeping the surfaces apart are not, as a rule, of great service. The above applies to serious burns, the consequences of minor ones being correspondingly less severe, with the exception of lime. The general treatment of burns is carried out on the same lines no matter what the cause may be ; the eye should be washed out with saline, cocaine and castor or olive oil instilled and iced compresses applied.

Chemicals, such as lysol, entering the eye will cause severe irritation, sometimes an extensive eschar on the conjunctiva and, less often, involve the cornea itself. Acids and alkalis will cause similar damage and, if seen early enough, should be

Chemicals. treated by irrigation with a weak solution of the opposite sign. In the absence of a specific, most minor chemical injuries and burnings may be satisfactorily treated by very thorough irrigation with normal saline followed by cold

and an alkaline lotion, such as sod. bicarb. gr. xii, liq. hamamelidis ʒi, and glyc. ʒss, aq. to ʒi, to be used frequently.

If lime has entered the eye and the patient is seen early enough, the eye should be washed out with 10 per cent. neutral tartrate of ammonium and then treated with lard or saturated solution of sugar ; in any case, it is most essential that every particle of the lime be picked out ; molten metal should, of course, be carefully removed. Lime burns are apt to be the most disastrous ; at times, molten metal causes less damage than might be anticipated owing to the water of the tears entering into the spheroidal state. Morphia should always be given in bad cases ; the pain is so severe that an analgesic is imperative, and the sleep which follows is of great value in the treatment of the condition.

In all injuries of the cornea, atropine should be used, as inflammation of the iris is a frequent complication and synechiæ are more easily prevented than cured. Lead lotion is to be avoided at all costs. I once saw an old gentleman who had had the burning end of his cigar accidentally turned into his eye by his grandchild ; lead lotion had been applied and the whole cornea was white, like china—it remained so.

Blows on the eye are liable to lead to a variety of results, and it is inadvisable to state that a black eye, no matter how inflicted, will be recovered from without injury to sight. The iris may be torn from its attachment, this condition being called iridodialysis ; muscular fibres of the sphincter of the iris may be injured resulting in a traumatic mydriasis ; hæmorrhage may occur from the iris with an immediate smoky appearance of the aqueous and subsequent hyphæma ; the lens may be dislocated forwards or backwards, or it may be subluxated, part only of its attachment having been severed, in which case, the iris, having lost its support, becomes tremulous, a condition termed iridodonesis ; the anterior chamber may be unequal in depth owing to tilting of the lens ; the lens capsule may be ruptured and without any such disturbance of its position a traumatic cataract may follow and it should be noted that such a condition may not show itself for six months or more after the accident ; hæmorrhage into the vitreous may take place, or a subhyaloid hæmorrhage producing the characteristic semicircular collection of blood ; retinal hæmorrhages may follow or commotio retinæ at the macula, producing serious disturbance of vision, may be found. I have seen this in three cases of children who had been hit in the eye by bullets from an air-gun ; rupture of the choroid is not uncommon, and detachment of the retina, particularly in myopic eyes, may also take place. Hæmorrhage may occur into the orbit with resulting exophthalmos ; bones may be broken with escape of air from a sinus and emphysema ; on one occasion I saw a black eye complicated by fracture of the malar bone.

In all cases of injury it is a good plan to apply iced compresses. This is comforting to the patient and tends to limit hæmorrhage ; it is also antiseptic. Atropine is unnecessary unless there is some special indication, and its instillation tends to increase any separation of divided fibres of the iris sphincter when this muscle has been injured. The importance of a guarded prognosis is very great as the possible complications which I have detailed indicate. Rupture of the globe may result from direct violence and would undoubtedly be a much more common occurrence if the eye were not so eminently

well protected by the bony margins of the orbit ; such an injury is more likely to be caused by a small missile than by a large one, by a golf ball rather than by a cricket ball. In such cases the lens may escape through the aperture and be found under the conjunctiva.

Should the history be that of a fragment entering the eye in an engineering shop and nothing be found, the possibility of a penetrating injury should be borne in mind as a minute fragment travelling at high speed may enter the eye and leave remarkably small traces behind. An X-ray will then be of value.

Penetrating Injury.

If the body was not infinitesimal in size, penetration will produce an opening sufficient to lower the tension of the eye to a degree which will be readily appreciable to the finger. In all forms of penetrating injury the wound is naturally immediately at the point where the missile impinged on the eye ; lacerated wounds usually occur in the vicinity of the limbus where the ocular tunic is somewhat weaker than elsewhere. When the eye has been perforated or opened by a sharp instrument which has not itself entered the eye, certain features will be found varying somewhat with the site of the injury—if in front of its attachment, the iris prolapses into the wound and prevents the further escape of the contents of the eyeball and if left in this position infection is liable to follow its track and an extensive uveitis be produced leading to the destruction of the eye. Infection may be carried into the globe by the foreign body which caused the perforation, particularly if that body remains inside ; in fact, the wound must be regarded as a septic one, but, fortunately, the eye has remarkable powers of overcoming bacteria so introduced granted they are not in great numbers or of great virulence. Such sepsis, when established, may cause a slow local or general uveitis going on for several months or an acute suppurative panophthalmitis which destroys the eye in a few days ; with this must be considered sympathetic ophthalmia of the other eye. Should the wound be over the ciliary body this, like the iris, will prolapse into the wound ; if the perforation is behind its limits some tags of uvea may be evident, but there is no prolapse of the choroid, in which case the vitreous escapes, but, unless the wound be large, only to a very small extent. Further injury will, of course, take place in the eye according to the tract taken by the body. As regards treatment, extraction of the foreign body is of the utmost importance, particularly if it is metallic and, fortunately, this is greatly simplified by the Haab or ring magnet, together with accurate localization by X-rays and the Sweet scheme or some modification of it ; if efforts to extract it fail, the patient must be carefully watched for signs of sympathetic ophthalmia in the other eye. The onset of any sign of this condition indicates the removal of the injured eye. It may be here mentioned that a white blood count should be done early and repeated and any change noted. The retention of a metallic foreign body in the eye may be followed by siderosis ; this is indicated by a change of colour in the iris of the affected eye. Prolapse of the iris is shown most distinctly by the pupil being displaced towards the site of the prolapse ; if the aperture be small, the iris may merely lie against the back of the cornea ; if slightly larger, a small button of iris may protrude through the hole ; if a linear wound, the iris is usually torn and lies between the lips of the wound.