CHAPTER 60

Eye injuries

60.1 The general method for eye injuries

There is no branch of surgery which the non-specialist is more afraid to enter than ophthalmology. All operations inside a patient's eye are work for an expert, but you should be able to repair most injuries to his lids. If you cannot refer him, you may have to suture his cornea, or his sclera. Even if his eye seems to be hopelessly injured, there is much that you can do to preserve some useful sight in it.

As with the skull, the chest, and the abdomen, there are two main kinds of injury—blunt ones which leave his cornea and his sclera intact, and penetrating ones which go through them.

A blunt injury, such as that from a fist, resembles a head injury. It can cause serious internal lesions, including bleeding, with few external signs.

Penetrating eye injuries are always serious and differ geographically. In rural areas many of them are caused by thorns striking the eyes of people walking in the bush, or by young children pushing things into one another's eyes. Injuries of this kind are difficult to prevent, but you should try to make sure that: (1) goggles are worn by everyone whose work might injure their eyes, and (2) seat belts are always worn in cars.

The purpose of an eye is to see with, so always start by testing (and recording) a patient's visual acuity. An eye injury can be terrifying. If he cannot see, make sure he knows what has hap- pened, understands any treatment you give him, and is told the prognosis for his sight.

An injured eye is always an emergency, but it is not quite so urgent as a ruptured spleen, or an extradural haematoma. After the necessary emergency treatment, you usually have 2 or 3 days in which to refer him. If you do have to operate, make sure you go to the theatre having made the diagnosis and knowing exactly what you are going to do. You will need fine instruments and sutures and a magnifying loupe. These are listed in Section 23.1.

JAMES (8 years) was referred with a swollen eye and a diagnosis of rupture of the globe. His visual acuity was tested and found to be normal. Examination of his upper conjunctival fornix showed a piece of wood. LESSON Always test the visual acuity. In this patient it made the original diagnosis of rupture of the globe impossible.

GENERAL METHOD FOR AN INJURED EYE

For burns of the eye, see Section 58.28. For the basic methods, see Section 23.1.

REFERRAL If you decide to refer a patient with an eye injury, instil antibiotic drops into his eye, fit his eye with a protective shield (23-1), and refer him lying down. If the journey is long, or is likely to be delayed, give him oral chloramphenicol 500 mg initially, followed by 250 mg 6 hourly for 5 days. HISTORY Take as careful a history as you can.

LOCAL ANAESTHESIA FOR EXAMINATION Pain will make a patient keep his injured eye shut. Local anaesthesia will make it easier to examine. Retract his lower lid and instil 2 drops of local anaesthetic. This can be 2% or 4% lignocaine, or decicaine 1%, or tetracaine hydrochloride 1%, or proparacame hydrochloride 0.5%, or cocaine 4% to 10%. You may have to make many instillations before anaesthesia is effective—see A 5.8.

CAUTION! (1) Don't put ointments ito a patient's eye, they will make it difficult to examine later. (2) Topical anaesthetics, dyes, and drugs *must be sterile*. They can readily become infected, especially with *Ps. pyocyaneus*. Tetracaine and fluorescein can be autoclaved repeatedly. (3) Don't give a patient a local anaesthetic to take home—he may injure his anaesthetic cornea, and the drug may delay healing.

THE EXAMINATION OF AN INJURED EYE

Start by examining the visual acuity of both the patient's eyes, his normal one first. Lie him down, examine him in a good light and use whatever means of magnification you have.

If he cannot open his eye himself, gently open his lower lid by pulling down the skin over his zygomatic arch. Instil local anaesthetic. This will probably relieve his pain enough to let him open it himself.

If he is still unable to open his eye, put a Desmarre's retractor gently under his upper lid, and lift it upwards away from the globe. Or, use a retractor made from two bent and sterilized paper clips.

If even this fails, you may have to wait until you anaesthetize him before operating.

CAUTION! Avoid pressure, either by squeezing his eye, or by letting him squeeze his eye with his lid. If his globe is perforated, pressure may squeeze the contents out of it.

SIGNS OF INJURY IN THE EYE

Examine the patient's lids carefully. A tiny laceration may be the opening of a track which penetrates his globe, as in Fig. 60-9. Examine his conjunctiva for haemorrhage, foreign bodies, or tears. Note the depth and clarity of his anterior chamber. Compare the size, shape, and light reaction of his pupils.

If his globe is intact, examine the fornices of his conjunctiva and evert his upper lid, as in Fig. 23-2. Dilate his pupils and examine his fundus with an ophthalmoscope.

Examine his lens, his vitreous, and his retina for signs of haemorrhage, or retinal detatchment.

Examine his cornea and his sclera for wounds and abrasions. Put drops of fluorescein into his conjunctiva. Don't try to feel the tension in his globe, because if you do, you may squeeze out its contents. You will however get some idea of its tension as you examine it.

If there is blood under a patient's conjunctiva, be careful: (1) Even a very small bruise may mark the site where a small foreign body has entered his sclera, as in Fig. 60-9.(2) Haemorrhage at the limbus is itself unimportant. It is only likely to be serious if it extends far posteriorly, when it may indicate a fracture of the base of his skull (62.1).

If his anterior chamber is shallow, he has a penetrating injury of his cornea, which has allowed his aqueous to leak.

If his iris trembles when his eye moves, his lens may have dislocated.

If there is a greyish area in his cornea with swollen margins, his cornea has perforated. In severe cases he may have no anterior chamber, so that his iris touches his cornea.

If a black mass of tissue bulges through the lips of a wound, as in B, Fig. 60-7, his iris or his choroid has prolapsed. If the wound is in his cornea, his pupil will be irregular and drawn towards it as in J, Fig. 60-6.

If his eye feels soft, his globe has probably ruptured. The rupture is nearly always curved, parallel to the limbus, and about 5 mm behind it. Feel the bony borders of his orbit. X–ray his skull and his orbit.

If you can see the edge of his lens with an ophthalmoscope, and he has some visual impairment, the suspensory ligament of his lens is partly ruptured. If it is also tipped the pressure in his eye may rise. If this happens, give him acetazolamide and refer him.

If his lens is completely dislocated, you may see it lying in his anterior chamber, or at the bottom of his vitreous. He will also have a severe visual impairment. There may be no immediate reaction. But an inflammatory response and a secondary rise in pressure are common. Give him acetazolamide and refer him. His lens may need removing.

If he has severe proptosis, goto Section 62.1. He has a retrobulbar haematoma.

If his eye is hopelessly injured, don't consider enucleating it, unless he is unaware of any sensation of light whatever, when you shine a strong li ght into it. This light must be strong, because it may have to shine through the clot in his eye. If he has any perception of even a strong light, a suprising amount of vision may have returned 6 months later.

ANAESTHESIA Remember that the patient's stomach may be full. Any rise in the pressure in his globe maymake the injury worse. You can use ketamine. If his eyes move about, give him a little more. Be sure to premedicate him.

Don't use a retrobulbar block, because if it happens to bleed and his globe is ruptured, the clot may force the contents of his eye out of the wound.

THE FURTHER MANAGEMENT OF AN INJURED EYE

Read on for 'black eye' (60.2), injuries of a patient's eyelids canaliculae and conjunctiva (60.3), injuries of his cornea and sclera (60.4), injuries of his iris (60.5), penetrating injuries (60.6), blunt injuries of his globe (60.7), bleeding into an injured eye (60.8), foreign bodies (60.9), and endophthalmitis (60.10).

YOU MUST HAVE A BRIGHT LIGHT AND GOOD MAGNIFICATION

60.2 Haematoma of the eyelid ('black eye')

A black eye is the result of a blow by a blunt object. By itself it is not serious. But: (1) it may be part of a head injury (63.1), or a maxillofacial injury (62.1). (2) The patient's globe may have ruptured. This may be difficult to diagnose if there is much swelling, so anaesthetize him and use eyelid retractors. If his globe has not been injured, no treatment is necessary. If it has been injured, goto Section 60.7. Mild ptosis (drooping of the lid) is common after a black eye. If it lasts more than a month, refer him.

60.3 Injuries of the eyelids, canaliculi, and conjunctiva

Injuries to a patient's eyelids are common, and can be serious because of the danger to his eyes under them, either immediately, or later if scar tissue distorts his lids and exposes his cornea. The injury can involve part of the thickness of a

SUTURING THE EYELIDS

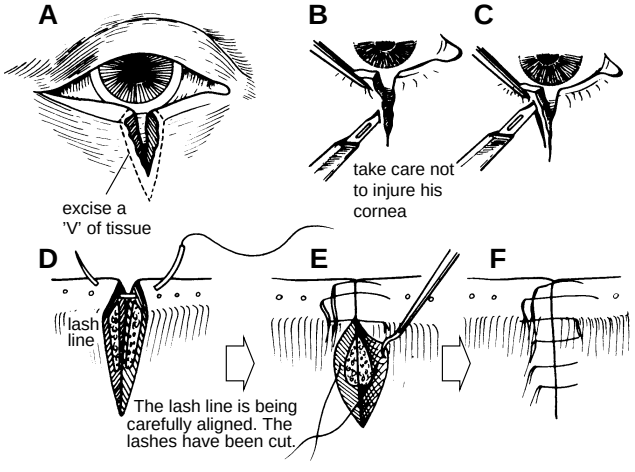

Fig. 60.1: *SUTURING THE EYELIDS. Little tissue has been lost in this injury, so that bringing the edges of the patient's lids together is not too difficult. A, B, and C, show the steps in making a clean edge to the wound. Take care not to injure his cornea with the tip of your scalpel. Partly after Hill with kind permission.*

lid, or its whole thickness, including its tarsal plate, sometimes with tissue loss.

When you repair a torn eyelid, start by putting a suture in the lash line immediately behind the patient's eyelashes. If you align his lash line correctly, it will align the other structures. *The secret of success is multiple small sutures and accurate repair*. The common mistake is to use large instruments and coarse sutures.

INJURIES OF THE EYELIDS

This extends the general method for an injured eye in Section. 60.1. Examine the patient's eye to see exactly what structures are involved. Make sure his globe has not been injured.

If he has a severe injury to his lids, refer him if you can.

Toilet his injured lids. Don't remove any skin, unless it is obviously dead or detached. Infection is unusual, so you can always close his wound by immediate primary suture. Use fine instruments, and 6/0 silk or monofilament on his skin. If the edges of the wound are irregular, try to fit them together with great care.

CAUTION! Take great care to keep his lid against his globe, and don't allow it to become inverted or everted.

If the edge of the patient's eyelid is intact, you can treat his injury in the same way as any other skin laceration.

If the injury has involved the whole thickness of his lid, approximate the tarsal plate, the muscle layer and then the skin. Disregard his conjunctiva. It is stuck to his tarsal plate, and if you align this, it will align itself.

If the wound gapes, it will do so because the fibres of his orbicularis muscle have been cut. Use 5/0 buried catgut to gyring the edges of the muscle together, before you suture the skin.

If he has lost some of the skin on his eyelid, graft it. Use split skin, and hold the graft in place by the tieover method (57-8).

If less than a quarter of the margin of a lid is involved, as in Fig. 60-1 and B, and C, Fig. 60-2, freshen the lacerated edges by making incisions perpendicular to the skin margins through the full height of the tarsus to excise an 'I' of tissue. Close the patient's tarsus with interrupted catgut sutures. Align the lid margin with 7/0 silk sutures, one in the posterior margin through the orifices of his meibomian glands, and another in the anterior margin through the lash line. Allow the sutures to remain 5 mm long and tie them over his skin to prevent them abrading his cornea.

CAUTION! Bring the edge of his lids together accurately by aligning the lash line. If you repair them with their edges notched, part of his cornea may not be covered, so that it will dry out and ulcerate.

If between a quarter and a third of either lid margin has been lost, make a small incision just lateral to the patient's eye, as in D, and E, Fig. 60-2. Divide the upper or lower bifurcation (depending on which lid is being repaired) of the Y–shaped outer canthal ligament in Fig. 60-3 which anchors his eyelids to his orbit. If you don't divide this Y-shaped ligament when you need to, there will be too much pull medially on the lachrymal apparatus. Don't divide the main stem of this ligament, or a severe deformity will result.

Before you can move an eyelid across, you will have to split it and undermine the shaded areas in Figs. 60-2 and 60-3. Hold the patient's injured eyelid with forceps, and incise it in the lash line for 3 mm with a scalpel. Then split it by inserting scissors and spreading them. This will give you the right plane of dissection without injuring his tarsus or his orbicularis muscle. Moving his lower eyelid across will leave a fold of skin in his upper eyelid which you will have to excise and suture.

CAUTION! Don't try to move the medial part of his lid, or you will interfere with the drainage of tears through his

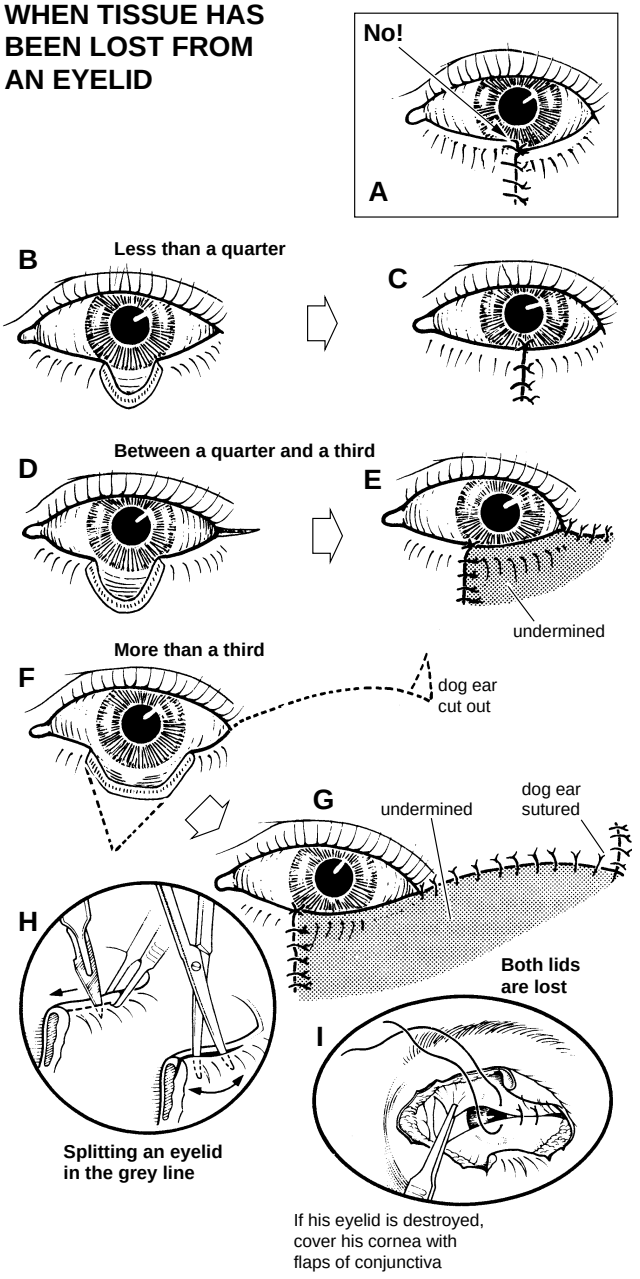

Fig. 60.2: *WHEN TISSUE HAS BEEN LOST FROM AN EYELID. A, don't notch the edge of the patient's lid. B, and C, if less than a third has been lost, close the wound directly. D, and E, if between a quarter and a third has been lost, make a lateral relaxation incision, and divide his lateral canthal ligament, as in the next figure. F, and G, if more than a third has been lost, you will have to make a long relaxing incision, and undermine the tissues of his cheek. H, incising the lower eyelid in the lash line, and in front of the tarsus. 1, if there is not enough eyelid left to cover a patient's cornea, cover it with flaps of his conjunctiva. Partly after Mustarde, with kind permission.*

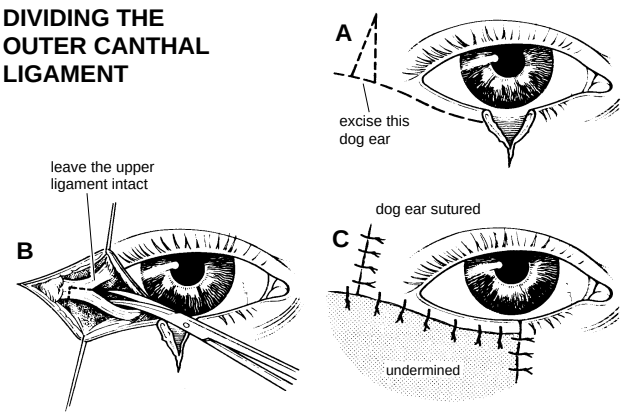

Fig. 60.3: DIVIDING THE OUTER CANTHAL LIGAMENT. A, Make the incision several millimetres below the lash margin. B, find the lateral canthal tendon and divide it. C, undermine the skin flap and repair the defect. After Peyman, Sanders, and Goldberg.

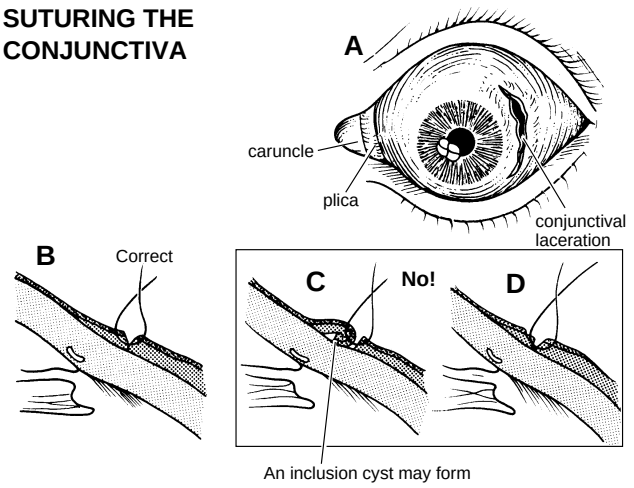

Fig. 60.4: SUTURING THE CONJUNCTIVA. Don't suture small lacerations. A, preserve the caruncle and the plica if you can. B, a correctly placed suture. C, if the conjunctiva is folded over like this, an inclusion cyst may develop. D, this suture will allow Tenon's capsule to herniate into the wound. After Peyman, with kind permission.

lachrymal apparatus.

If more than a third of a patient's eyelid is lost, refer him. If you cannot refer him make a longer relaxation incision, as in F, and G, Fig. 60-2.

If a deep horizontal laceration of the patient's upper lid divides his levator palpabrae muscle, or its attachment to his tarsal plate, try to suture it. This filmy muscle is hard to find in the bloody mess of an acute injury. If you fail to suture it, ptosis will follow.

If you cannot cover his cornea by any of these methods, do a tarsorrhaphy. The simplest way of doing this is to 'raw' the edges of his lids, and suture them with fine silk, as in Fig. 58-23.

If there is not enough of his eyelids left to do a tarsorrhaphy, grasp his conjunctiva at the upper fornix, with forceps, pass a suture through it, bring it down, and pass it through a similar fold from his lower fornix, in the same vertical line. Use several interrupted sutures to bring a double thickness of conjunctiva across his globe, as in I, Fig. 60-2.

If he presents late when his lid is greatly swollen, toilet his wound, excise the minimum amount of tissue, give him antibiotics, and repair his lid when the swelling has subsided.

INJURIES OF THE CANALICULI

If his upper canaliculus is injured, ignore it. It only drains 10% of his tears.

If his lower lid has been lacerated medial to the punctum, search for the divided cut ends of his inferior canaliculus. It needs microsurgical repair by an expert, so refer him.

If you cannot refer him, take a fine polyethylene or silastic catheter or a monofilament suture, pass this through the punctum, out through the wound and across his divided canaliculus and into his lachrymal sac just below the attachment of his medial canthal ligament to his nasal bones. Suture the wound and leave the monofilament suture in place for a week.

CAUTION! If you don't repair his lower canaliculus, his tears will flow continually.

INJURIES OF THE CONJUNCTIVA

Most conjunctival lacerations will heal without suturing.

If a laceration is extensive, expose the patient's eye with lid sutures (23-2). Dissect his conjunctiva away from his globe and search it for a perforating wound. If you find one, go to the next Section. Gently probe the wound and extend it if necessary. Suture his conjunctiva with continuous sutures of 5/0 silk or plain catgut. Silk sutures are more comfortable, but you will have to remove them later. Catgut will be absorbed.

CAUTION! (1) Sometimes a major injury is hidden under a small conjunctival wound, so probe it carefully. (2) Don't probe around inside a patient's eye. Only probe to see if his sclera has been perforated.

60.4 Injuries of the cornea and sclera

The common corneal injuries are abrasions and lacerations. The danger of an abrasion is that it may become infected, so that a corneal ulcer forms, followed perhaps by endophthalmitis. A corneal laceration is the most difficult eye injury that you may have to treat.

If a laceration goes right through a patient's cornea so that his aqueous escapes, his iris may move up against its posterior surface, or prolapse outside it (J, 60-6). If a laceration is small, and its edges are not separated, you may not need to suture it. A clean wound of the cornea heals rapidly, especially if only the epithelium is injured. If a wound goes deeper than this, a scar always forms.

INJURIES OF THE CORNEA AND SCLERA

CORNEAL ABRASIONS

This extends the general method for an eye injury in Section 60.1.

The patient's eye is red and watery and his lids tightly closed. He may have ciliary injection, but his visual acuity is normal. After looking at his eye carefully, you can find no

TWO CORNEAL INJURIES

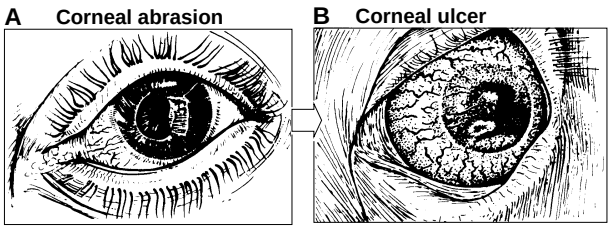

Fig. 60.5: TWO CORNEAL LESIONS. A, a corneal abrasion. B, a corneal ulcer. If you are not careful, an ulcer can follow an abrasion.

foreign bodies on the surface of his cornea, or underneath his upper lid. Instead, you see an abrasion, which you may only find after you have stained it with fluorescein.

If an abrasion is clean, and is only visible after staining with fluorescein, and there are no signs of infection, instil chloramphenicol eye drops and shield the patient's eye (23.1). Check it daily, and instil chloramphenicol, until it no longer stains with fluorescein.

If his cornea becomes cloudy, it is infected. He now has a corneal ulcer so see below.

CAUTION! To prevent infection, always instil chloramphenicol eye drops after any corneal abrasion and shield the eye.

CORNEAL ULCERS

There is a hazy white spot on the patient's cornea; it may be hollowed out, and there may be a yellowish area, or pus in his anterior chamber. His eye is painful, photobic and red with ciliary injection.

If possible, send a pus swab from the ulcer for bacteriological and fungal examination.

Instil atropine drops, topical broad spectrum antibiotic drops (neomycin, bacitracin, or chloramphenicol) and inject subconjunctival chloramphenicol or gentamycin 500 mg once or twice daily for several days (23.1).

CORNEAL LACERATIONS

If a corneal laceration is less than 1 mm, the patient's anterior chamber is normally deep, and there is no iris in the wound, don't suture it.

If the normal curve of the patient's cornea is maintained and the edges of the wound are close together, you can probably leave his laceration unsutured.

If the normal curve of his cornea is not maintained, so that his cornea is angled or tented, suture it. If you don't, and the laceration is central, he will have a severe refractive error.

If his anterior chamber is shallow or his iris has prolapsed into his corneal wound, remove the prolapsed iris and suture his cornea, as described below.

If a small amount of corneal stroma has been lost from the edge of the wound, repair it by inserting a tight horizontal mattress suture.

SUTURE If you can refer a patient to an expert within 2 days of his injury, do so.

If you have to suture his cornea yourself, use sutures of 7/0 or 8/0 atraumatic silk, or monofilament. You will find this

SUTURING THE CORNEA AND SCLERA

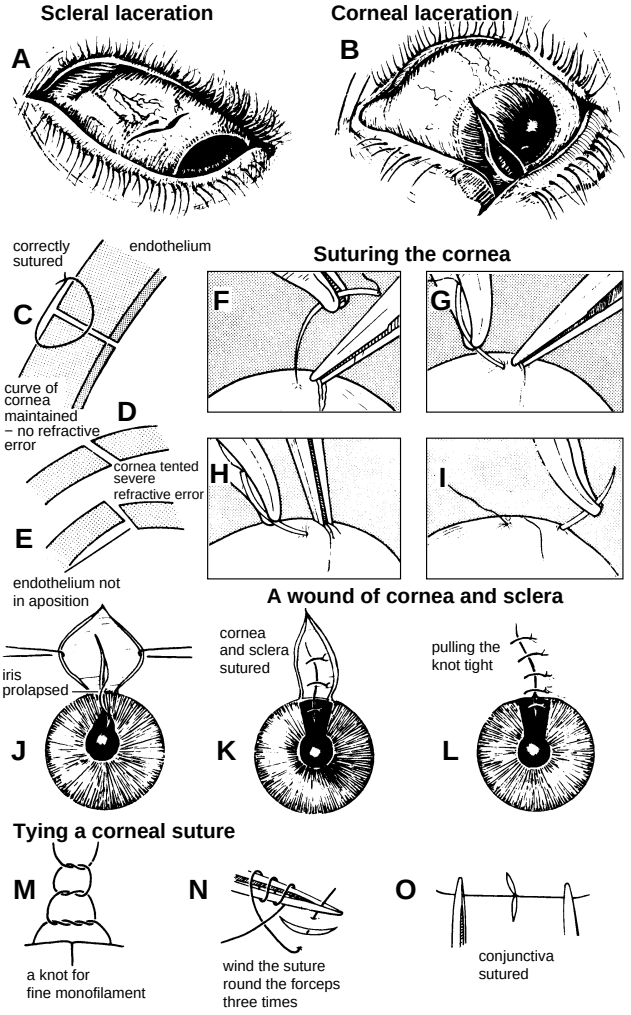

Fig. 60.6: SUTURING THE CORNEA AND SCLERA. A, a laceration of the patient's sclera. B, a laceration of his cornea and his eyelid. C, try to make the suture cross his cornea in its posterior third. It is only about 1 mm thick, so this will not be easy. If the normal curve of his cornea is maintained (D), there is less need to suture it than when it is deformed or tented (E). The cut edges of the endothelium on the posterior surface of his cornea should be in contact. F, the needle entering at 90° to his cornea. G, the needle about to cross the wound. H, entering the other side of the wound. I, pulling out the needle.
J, this patient's conjunctiva retracted to show a wound of his cornea and sclera with prolapse of his iris. K, his prolapsed iris has been excised, and his cornea and sclera have been sutured. L, his cornea has been closed over the wound.
M, a knot for tying 9/0 mofilament. N, wind the suture three times round the forceps. O, pulling the suture tight. Partly after Galbraith, with kind permission.

difficult task easier if you use interrupted sutures. Experts always use continuous ones. One length of atraumatic suture material will be enough for the whole injury.

CAUTION! Don't suture the cornea with catgut because the wound will take 6 weeks to heal, and by that time the catgut will have dissolved.

Use a small curved cutting needle. Grasp it at its mid point, so that the convexity of the jaws of the needle holder is towards the tip of the needle. This will give you more control over it.

CAUTION! Aim to bring the cut edges of the endothelium

on the posterior surface of the cornea together, without actually going through it. The way to do this is to pass the needle across the wound in its posterior third. The whole thickness of the cornea is only about 1 mm, so that this will not be easy. If your sutures are too superficial they will pull out; if they are too deep, they will enter the anterior chamber and damage the endothelium on the back of the cornea. You will need a steady hand, so support your wrist on the patient's forehead, or on a sandbag underneath the drapes beside his head. Or, support your wrist on your assistant's fist.

Hold the edge of the wound (not the whole thickness of the cornea) obliquely with fine toothed forceps, so that one blade enters the wound as in G, Fig. 60-6.

While you are holding the edge of the wound undistorted with forceps, insert the needle at almost 90° into the cornea 1.5 mm from the edge of the wound. As the needle goes through it, let the needle holder follow its curve. Aim the needle to enter the wound in the posterior one third of the cornea. It should then pass across the wound to the matching opposite edge, and come out at 90° to the cornea.

If the wound is vertical, bring the stitch out 0.5 mm from its edge. If it is oblique, bring it out 1 mm from the wound edge.

Pull the suture material through the wound, until only about 1 cm remains. Tie the suture in three throws by winding the monofilament round the needle holder or the suture tying forceps. Use three turns for the first throw, then one, and then another one, (M, and N, 60-6).

CAUTION! Don't pass sutures through a patient's iris. If you find that a suture has gone through his iris, remove it.

Use the first throw to bring the tissues together without any tension. Leave a tiny loop between the first and second throws to make sure that no undesirable tension is transmitted to the first throw. Pull the third throw down and hold it down so that it can mould into a knot.

Pull one side of the suture, as it emerges from the cornea so that the knot just enters the needle track. This will make the patient more comfortable while his eye heals. Instil atropine drops.

CAUTION! Don't try to reconstitute his anterior chamber by injecting air or saline. This is a highly skilled task, and you are likely to do more harm than good.

SCLERAL LACERATIONS

Suture a patient's sclera in the same way as his cornea, but use 4/0 or 5/0 sutures of atraumatic silk or monofilament. Cover the sutures in his sclera by repairing the conjunctiva over them with fine silk (6 to 8/0), as in L, Fig. 60-6. Leave the scleral sutures in place, but remove those in his conjunctiva.

If vitreous prolapses through a wound in the sclera, excise it. Dip a swab into the wound and lift the vitreous away. If a strand of vitreous is pulled from the wound, cut it off with scissors. The proximal end of the strand will retract into the patient's eye. Repeat this until you have removed all the vitreous that has escaped from his globe. If some still oozes out or sits on the wound, aspirate it using a wide bore needle. Then suture the sclera as described above.

CAUTION! Don't allow vitreous to remain trapped at the edges of the wound, because the complication rate increases, and wound healing will be poor.

POSTOPERATIVE CARE FOR CORNEAL AND SCLERAL LACERATIONS

Instil atropine, pad and bandage the patient's eye.

If the wound is near the edge of the patient's cornea, remove the sutures at 2 weeks.

If the wound is more central in his cornea, leave the sutures in for 2 months if his eye is comfortable and quiet. To remove them, lie him flat, instil local anaesthetic and insert a speculum. Using good magnification, pull the superficial arm of the suture to the surface with a fine hook, and cut it with the tip of a No.11 scalpel blade. If necessary, make a fine hook by tapping a 6 mm needle on a metal surface so that its tip becomes burred.

60.5 Injuries of the iris

A patient's iris can be torn, or detached from his ciliary body, or it can herniate through a wound in his cornea or sclera. He usually has a hyphaema and other eye injuries also. Sometimes, his lens is dislocated at the same time. and you may be able to see his vitreous herniating into his anterior chamber. If his iris or ciliary body remain prolapsed in his wound, it will greatly increase the risk of infection and sympathetic ophthalmitis (60.10).

INJURIES OF THE IRIS

This extends the general method for an eye injury in Section 60.1.

If a patient's iris has prolapsed through a corneal wound, as in J, Fig. 60-6, less than 24 hours ago, and it is clean, put it back in his eye with an iris spatula. Try to separate his iris from the rest of the wound, to prevent the formation of anterior synechiae (adhesions). This is difficult. Excision as described below is simple, and may be wiser.

If his iris is obviously damaged or contaminated, excise it. Grasp it with fine toothed forceps, draw it a little further out of the wound, and cut it with spring scissors flush with his cornea. Stroke the wound, so that the cut edges of his iris retract back. Or, gently push them back with an iris spatula. Provided there is no blood in his anterior chamber, instil atropine 1% twice daily—the atropine must be sterile.

If the cut edge of his iris bleeds, put a drop of 1/1000 adrenaline into his conjunctiva. It will control bleeding and dilate his pupil.

POSTOPERATIVELY shield the patient's eye for three days, or until pain stops. If light disturbs him, pad both his eyes.

60.6 Penetrating injuries of the globe

The anterior part of a patient's globe is most at risk. His lens may be injured, and there may be a foreign body in his globe (60.9). Try to diagnose and treat him within 24 hours; delay worsens the prognosis for his sight. You may see the injury, and if it is in his cornea, it may be plugged by iris. It may be small, so look carefully. All you may see is a tiny hole in his iris and an opacity in his lens. Provided you are sure that there is no foreign body, suture any lacerations by the methods in Section 60.4

60.7 Blunt injuries of the globe

A blow to a patient's eye can:

(1) Burst his globe parallel to and just behind his limbus. When this happens,'you will see black uveal tissue prolapsing through it, as in B, Fig. 60-7. The conjunctiva over it may or may not be torn.

(2) Burst his globe near his optic nerve. You may see this injury with an ophthalmoscope, but there is nothing you can do, and useful vision is unlikely to return.

(3) Tear his choroid and his retina without bursting his sclera. Again, the common sites are near the optic disc, and peripherally near the limbus, where the retina is inserted into the ciliary body. You can only see the central third of a patient's fundus with an ophthalmoscope, so you will see tears near his optic disc, but not peripheral ones. To begin with, blood in his vitreous may obscure a central tear, but when this has cleared you will see it as a semicircular slit in his retina exposing the white of his sclera, as in A, Fig. 60-7. Keep him in bed until the blood has cleared. A retinal tear never heals and is almost always followed by detatchment of his retina from his choroid, perhaps years later. No repair is possible.

(4) Detatch his retina without tearing his choroid. The detatched part of the retina is grey, instead of its normal red colour, and the vessels over it are dark, almost black.

BLUNT INJURIES OF THE GLOBE

This extends the general method for an eye injury in Section 60.1.

If a patient's eye is so hopelessly injured that any useful sight is impossible, you may need to enucleate it (60.1).

If his globe is less severely injured, expose his scleral wound by making an opening through his conjunctiva parallel to it. Divide Tenon's capsule, and clean its lips.

Gently replace any undamaged prolapsed uveal tissue with a blunt spatula. Excise any damaged tissue and remove any prolapsed vitreous. Close his sclera with interrupted sutures as in Section 60.4, then suture his conjunctiva.

CAUTION! Don't try injecting air into his eye to restore its intraocular pressure.

Give him a course of subconjunctival antibiotics (23.1).

If you suspect that a patient has a retinal injury, observe him for 3 months, and tell him to report back immediately if he notices shadows, black spots, or flashes of light in his field of vision. They indicate actual or impending detatchment of his retina. A detatched retina is grey, instead of its normal red colour, and the vessels over it are dark, almost black. Provided his macula is not involved, his retina can be repaired. Refer him with his eye properly padded as soon as you can—the sooner his retinal detatchment is repaired, the better his prognosis.

If he develops a traumatic cataract after a blunt injury, his lens may need to be removed. An eye with no lens may however be a greater problem than an eye with a cataract.

60.8 Bleeding into an injured eye

Bleeding from a patient's iris into his anterior chamber (hyphaema) is common, and can occur immediately after the injury, or not for some hours or days. It can be mild, or it can fill his anterior chamber with blood. The blood may clot and obscure his anterior chamber completely, or it may occasionally form a fluid level as in C, and D, Fig. 60-7. The tear in his iris (which may be obscured by blood) can be partial or complete.

The patient complains of poor vision after a blunt injury. When you examine him, you may see: (1) Only a diffuse reddish haze in his anterior chamber. (2) A settled layer of blood. (3) His anterior chamber so full of blood that you can see nothing behind it. His eye may feel abnormally hard or soft.

Fortunately, bleeding into the anterior chamber usually stops spontaneously, but in 20% of cases it starts again during the following week. If it does start again, it is likely to be more severe than after the original injury. A hyphaema is not an acute emergency, so that you usually have a week in which to see if it is going to absorb, and in which to refer the patient. Meanwhile, give him acetazolamide to keep the pressure is his globe low, and reduce the chance of secondary glaucoma, which is the major complication. Operating on a hyphaema is an expert task and results are often not good.

There is little you or anyone else can do for bleeding into the vitreous of the posterior chamber, so pad both the patient's eyes and put him to bed.

BLEEDING INTO THE EYE

This extends the general method for an eye injury in Section 60.1

If the patient is a reliable adult with minimal hyphaema,

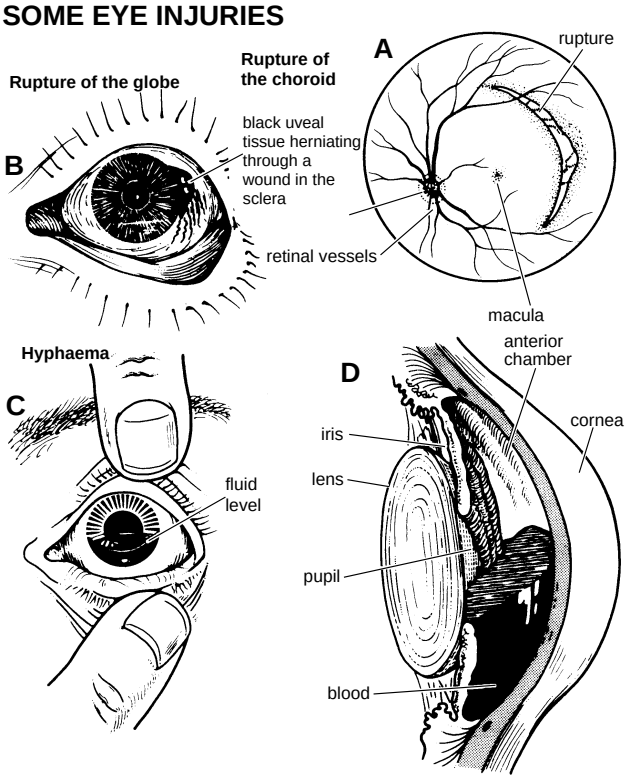

Fig. 60.7: SOME BLUNT EYE INJURIES. A, a blow to the patient's eye has ruptured his choroid and exposed the white of his sclera. B, his globe has burst just behind his limbus. His iris and ciliary body have prolapsed through the tear and lie under his conjunctiva. C, and D, show a hyphaema; an obvious fluid level like this is unusual.

ask him to rest quietly at home.

If his hyphaema is more than minimal, admit him, and put him to bed with his trunk raised at 30°. This will lower the venous pressure in his head and thus his intraocular pressure. If you can see through his pupil, examine his fundus for vitreous haemorrhage and other damage.

Sedate him. Pad both his eyes. Give him acetazolamide 250 mg 6 hourly. Don't give him any eye drops. Ask him to avoid moving his head, and especially to avoid bending down. Monitor the tension in his globe carefully. The blood usually absorbs in a few days; if it does, you can discharge him.

If bleeding starts again, keep him in bed for a further week from the time of the bleed. If he has a massive further bleed causing an almost black hyphaema, and making his eye hard and his cornea oedematous, the blood in his eye needs evacuating urgently.

If the blood does not absorb in a week, refer him.

If the tension in his globe rises, he may be developing secondary glaucoma. Control it with acetazolamide 500 mg initially, and 250 mg 6 hourly. If he does not improve after two days, refer him because he may need paracentesis of his anterior chamber.

60.9 Foreign bodies in the eye

Foreign bodies are often missed, because nobody looks for them. They can be embedded in a patient's cornea, or lodged in his upper conjunctival fornix, so that they can only be seen when his eye is everted. Always instil some anaesthetic drops into his eye before you try to remove them. The risk with any foreign body is that the eye will become infected.

Fortunately, most foreign bodies don't go deeper than the conjunctiva or sclera. The commonest one to go right inside the eye is a piece of steel that breaks off a cold chisel when the patient hammers it. When this happens, he may have a stained area in his cornea, a tiny hole in his iris, and signs of an early cataract. He may also have been misdiagnosed as conjunctivitis. His history, and the fact that his eye remains red and watery should however make you suspicious. *If a patient has a painful eye and he has been doing anything which might have caused a foreign body to enter it, assume that he has a foreign body in his eye until you have proved that he has not.*

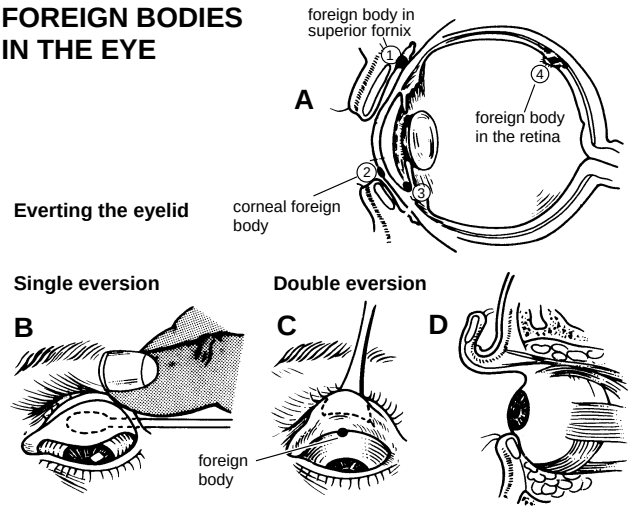

Fig. 60.8: FOREIGN BODIES. A, common sites for foreign bodies. (1) The conjunctival fornix. (2) The cornea. Foreign bodies here usually lie within the fissure formed by the lids. (3) The anterior chamber. (4) The retina. B, single eversion of the lid. C, and D, double eversion. After Peyman, with kind permission.

MIGHT HE HAVE A FOREIGN BODY INSIDE HIS EYE?

FOREIGN BODIES IN THE EYE

This extends the general method for an eye injury in Section 60.1. Look for an entry wound in: (1) the patient's lids, (2) his sclera, or (3) his cornea. Stain his cornea. Feel the tension in his globe. Examine his anterior chamber for a hyphema, and his iris for a tear. Look for the foreign body with an ophthalmoscope.

CAUTION! The entry wound in his cornea may be a very small one indeed. Look for a tiny haemorrhage.

CONJUNCTIVAL FOREIGN BODIES

If a patient complains that something has got into his eye, you will probably find it in his upper or lower conjunctival fornix, usually the upper one. Search both, and evert his upper lid, as in B, Fig. 60-8. You will probably find the foreign body about 3 mm from the margin of his lid, about half way along, where it is most concave. Brush the foreign body away with a cotton wool swab on a match stick. Don't be content with only finding one; expect to find several more.

If he complains of a foreign body but you cannot see it, be sure to instil fluorescein. You may see an abrasion, a laceration, or a foreign body.

If the foreign body is embedded in his conjunctiva, instil a few drops of local anaesthetic, pick it up with forceps and snip it out with the overlying conjunctiva.

If fragments of spectacle glass have gone into his eye, remove them with forceps, and sweep them out of his fornices with a cotton wool swab on a match stick.

CAUTION! Always examine a patient's cornea carefully, and stain it with fluorescein, even if you find a foreign body in his conjunctiva.

CORNEAL FOREIGN BODIES

The patient's eye is painful, red, tearful, and photophobic. You will need great care, a steady hand, 5% cocaine, or 4% or 2% lignocaine, good magnification, and a strong light. The sun is ideal. Stain his cornea with fluorescein, hold his eye open, and examine his cornea.

If you can see a corneal foreign body, wipe it away with a swab or moist cotton tipped applicator.

If the foreign body is firmly attached to his cornea, put the tip of a sterile disposable hypodermic needle under it, and lift it out of its small pit in his cornea.

CAUTION! (1) Don't damage the surrounding normal cornea. (2) The cornea is thin (1 mm) and tough, so don't push the foreign body through it into his anterior chamber. (3) Use a fine sharp needle, not a corneal spud.

If fluorescein shows vertical corneal stains, a foreign body has stuck to the deep surface of the patient's upper

A PENETRATING EYE INJURY

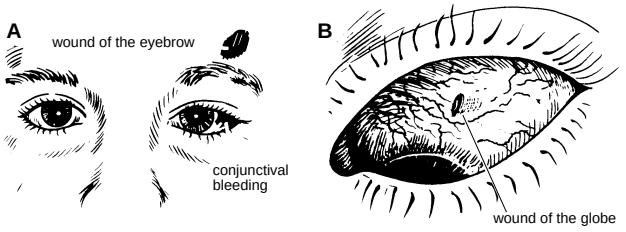

Fig. 60.9: *A PENETRATING INJURY OF THE GLOBE. This patient has a penetrating injury well above his eye. The bleeding into his conjunctiva should however make you suspcicious. Only when he looks downwards and inwards (B) do you see the injury of his globe. After Goldberg and Tessler.*

lid, and is scratching his cornea. Evert his upper lid, and remove the foreign body by rubbing it with a swab.

If an iron containing foreign body has remained in the cornea for any length of time, a ring of rust forms. You must remove the foreign body, but if you cannot easily lift out the rust ring, leave it.

CAUTION! Whenever there is or has been a foreign body in a patient's eye, instil antibiotic drops, and pad it.

POSTOPERATIVELY On the following day, stain the patient's cornea with fluorescein.

If there is any area of staining and his eye looks irritated, dilate his pupil with 1% atropine and bandage his eye.

INTRAOCULAR FOREIGN BODIES Take lateral double exposure X-rays of the patient's orbit with his eye in two positions, looking up and down. If the foreign body changes its position in these two views, it is probably inside his eye. If it is a metallic foreign body, refer him for its removal. This highly specialized procedure is beyond the competence even of most ophthalmic surgeons. If it is a small splinter of sand or glass, leave it.

ORBITAL FOREIGN BODIES If possible, leave them.

60.10 Endophthalmitis after an injury

This takes two forms, the first is very common and the second very rare.

(1) Bacteria can invade a patient's eye through even a minor injury, which is one of the reasons why these injuries should be treated so carefully.

(2) An immune reaction (sympathetic opthalmia) can involve his normal eye 4 to 8 weeks after the original injury. When this happens, it becomes sensitive to light, red (with ciliary injection), and painful; its near vision is transiently blurred. Don't remove his injured eye; it may in the end have better vision than his other one. Give him steroids.

BACTERIAL ENDOPTHALMITIS This extends the general method for an eye injury in Section 60.1. If: (1) a patient's cornea is cloudy, or (2) there is an abscess in it, or (3) there is pus in his anterior chamber, start a course of subconjunctival chloramphenicol or gentamicin (23.1). If possible, culture his conjunctiva. Instil drops of atropine 1% into his conjunctiva. If you treat him energetically, you may save his sight.