CHAPTER 10

EVISCERATION, ENUCLEATION AND EXENTERATION

This chapter describes three operations that either remove the contents of the eye (evisceration), the eye itself (enucleation) or the whole orbital contents (exenteration). Each operation has specific indications which are important to understand. In many cultures the removal of an eye, even if blind, is resisted. If an eye is very painful or grossly disfigured an operation will be accepted more readily. However, if the eye looks normal the patient or their family may be very reluctant to accept its removal. Therefore tact, compassion and patience are needed when recommending these operations.

ENUCLEATION AND EVISCERATION

There are several reasons why either of these destructive operations may be necessary:

1. **Malignant tumours in the eye.** In the case of a malignant tumour or suspected malignant tumour the eye should be removed by enucleation and not evisceration. There are two important intraocular tumours, retinoblastoma and melanoma and for both of them the basic treatment is enucleation.

   Retinoblastoma is a relatively common tumour in early childhood. At first the growth is confined to the eye. Enucleation must be carried out at this stage and will probably save the child's life. It is vital not to delay or postpone surgery. If a child under 6 has a blind eye and the possibility of a tumour cannot be ruled out, it is best to remove the eye. Always examine the other eye very carefully under anaesthetic as well. It may contain an early retinoblastoma which could be treatable and still save the eye.

   Retinoblastoma spreads along the optic nerve to the brain. It also spreads by metastasis to other parts of the body and will break through the sclera into the orbit. Once proptosis has occurred the disease is almost always fatal within a short time unless the patient has access to advanced radiotherapy and chemotherapy treatment. Most people consider there is no point in heroic or mutilating surgery for a child who will shortly die.

   Melanoma of the choroid is the most common primary intraocular tumour in adults. It is however rare in blacks. As well as enlarging within the eye, the tumour will sometimes metastasize through the blood stream to the liver.

Rarely it may pass directly through the eye into the orbit. Removing an eye with melanoma may not prevent distant metastases from occurring. If a suspected melanoma is found in an eye which still has sight, it is better not to remove the eye but refer the patient to an expert. However most people would advise enucleation for an eye which is blind and may contain an intraocular tumour.

Secondary tumours of the choroid may occur as metastases from a primary elsewhere. These are often multiple, the primary site is usually the breast, the prostate or the lung, and surgery does not have any part to play in their management and treatment.

In centres where advanced methods of treatment are available it is possible to save an eye with early retinoblastoma or melanoma which still has vision. The tumour can be treated with chemotherapy, local irradiation or possibly photocoagulation or cryotherapy. A small melanoma can be excised and the eye preserved.

2. **Blind, painful eyes.** The patient may request the removal of the eye for relief of pain. If possible try to identify the cause as this may affect the management. For instance, if the cause is a possible intraocular tumour, enucleation and not evisceration should be performed. If the patient is very anxious for the eye not to be removed it may be possible to relieve the pain with a retrobulbar injection of phenol or alcohol. These selectively destroy the fine nerve fibres which carry pain sensation.

   Technique of retrobulbar injection:
   Retrobulbar phenol. A local anaesthetic is not required, because the phenol itself acts a local anaesthetic Give a slow retrobulbar injection of 2 ml. of 5% phenol. The injection may be repeated after a few days.

   Retrobulbar alcohol is often used rather than phenol. However the injection can be very painful and so a local anaesthetic retrobulbar nerve block must be given first. Give a 1 ml. retrobulbar injection of local anaesthetic, and then 1-2ml. of 50% alcohol through the same needle. Therefore phenol is preferable to alcohol.

3. **Very unsightly eyes such as staphyloma.** The patient may request removal for cosmetic reasons with the insertion of an artificial eye.

4. **A severe intraocular infection (endophthalmitis).** Removal of an eye for infection should only be carried out if the infection has failed to respond to a full course of antibiotic treatment and there is no doubt at all that the eye is totally blind.

5. **Following a penetrating injury** (see page 304).

Evisceration or Enucleation?

Enucleation must be performed for a suspected intraocular tumour and also when removing a traumatised eye to prevent sympathetic ophthalmitis. Evisceration and not enucleation is generally recommended for endophthalmitis. The reason is that enucleation may risk spreading the infection along the ophthalmic veins into the cavernous sinus or along the cerebrospinal fluid into the meninges. For all other

cases the eye may either be enucleated or eviscerated. The advantage of enucleation is that the socket heals much quicker and without pain. Following evisceration there is more post-operative pain and swelling of the conjunctiva. The sclera contracts to a fibrous mass in the floor of the socket with the extraocular muscles attached to it. Therefore the socket is not so empty and the floor of the socket moves better. An artificial eye therefore looks more natural after evisceration.

EVISCERATION

Principle:

The removal of the contents of the eye leaving only the scleral shell.

Method:

1. The operation can be performed under local anaesthetic using a retrobulbar block. If the tissues are inflamed more anaesthetic than usual will be required. It is advisable to give some additional systemic analgesia and sedation as well e.g. Pethidine 100 mg i.m. If facilities for general anaesthesia are available a general anaesthetic is probably better in cases of endophthalmitis.

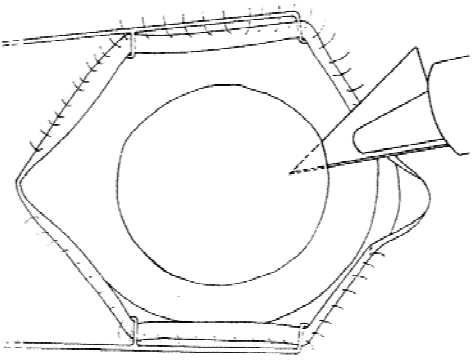

Fig. 10.1 Evisceration. A stab incision with a scapel at the limbus.

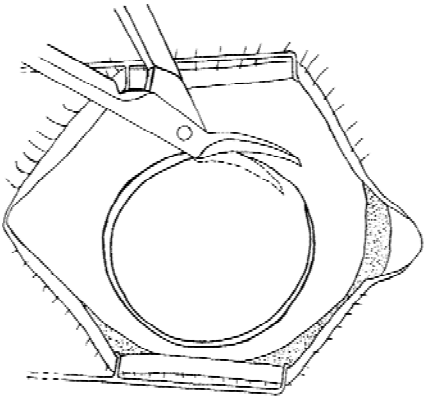

Fig. 10.2 Evisceration. Excising the cornea with scissors.

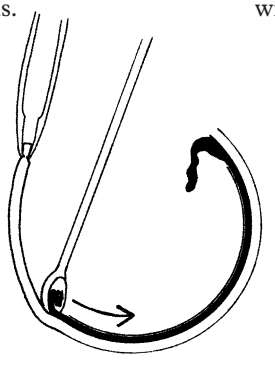

Fig. 10.3 Evisceration. Using a curette to remove all the ocular contents. Try to separate the choroid gently from the sclera.

2. A speculum is inserted to part the lids.
3. Using a scalpel a stab incision is made through the limbus (fig. 10.1). The cornea is then removed with scissors (fig. 10.2).
4. The contents of the eye are removed with a sharp curette or spoon (fig. 10.3). A fair amount of bleeding is common. It is extremely important to make sure that all the black choroid is removed leaving bare white sclera. If any choroidal tissue is left there is a risk of sympathetic ophthalmitis occurring later. Cleaning the scleral cavity with a swab soaked in 5% phenol helps to lessen post-operative pain.
5. The sclera can be left open to drain. This is advisable in endophthalmitis, but otherwise the sclera can be closed with catgut, and the conjunctiva closed over it as another layer.
6. Antibiotic ointment is applied under a double pad and a firm bandage.

Post-operative care:

- The socket is usually left for 2 days before inspection. There is often considerable swelling of the conjunctiva which may protrude between the eyelids. This will settle after some days.
- Antibiotic ointment is applied regularly and the patient can be discharged if feeling well.
- Once the swelling and inflammation has settled an artificial eye can be inserted.

ENUCLEATION

Principle:

The removal of the whole intact eye by cutting the six extraocular muscles and transecting the optic nerve.

Method:

1. The operation can usually be performed fairly easily under local anaesthetic with a retrobulbar block. For children general anaesthetic is obviously necessary.
2. A speculum is inserted.
3. Using forceps and scissors an incision in the conjunctiva is made right round the limbus to separate the conjunctiva from the cornea.
4. Using scissors the conjunctiva is separated from the globe in the four quadrants between the insertions of the extraocular muscles (fig. 10.4). This is an easy dissection but must be carried out back to the equator of the eye.
5. Use a muscle hook (strabismus hook) to catch each of the four rectus muscles in turn. Pass the hook back under the conjunctiva between the rectus muscles and then twist it so that the tip passes under the muscle and catches it (fig. 10.5). Each muscle should be divided about 1–2 mm from the globe. It

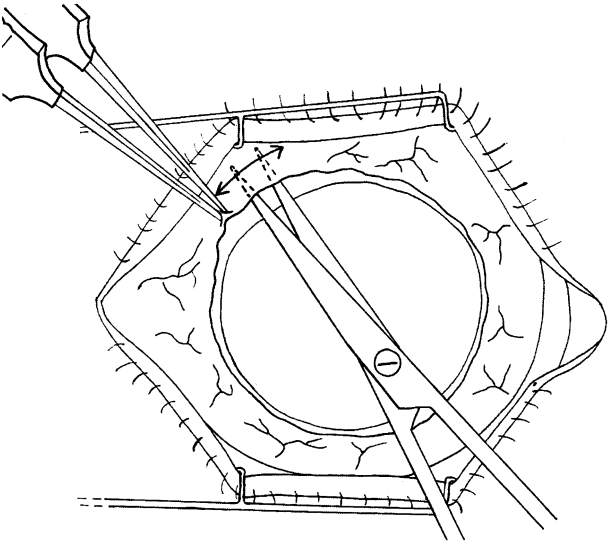

Fig. 10.4 Enucleation. Separating the conjunctiva from the globe back to the equator of the eye using scissors.

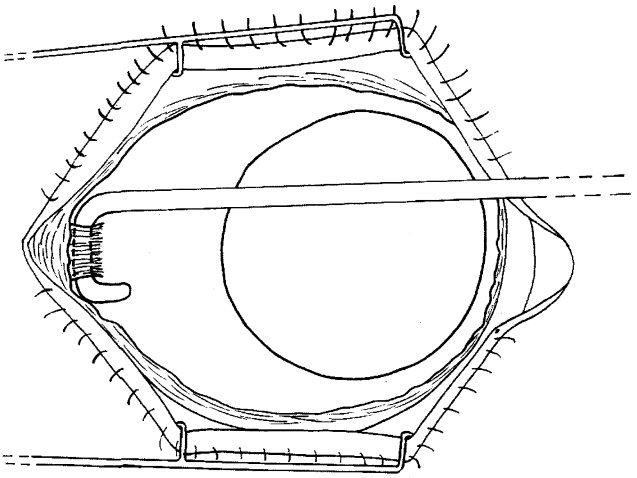

Fig. 10.5 Enucleation. Catching the rectus muscle with a strabismus hook.

may be helpful to use an artery forceps or a strong stitch to grasp the attachment of each muscle to the eye.

6. Heavy scissors are now passed round the eye either nasally or temporally until the optic nerve is felt as a tight cord against the scissors (fig. 10.6). The blades are opened and the nerve is cut. When the operation is being performed because of a suspected retinoblastoma, it is very important to cut the optic nerve as far back in the orbit as possible. This is done by strong traction on the

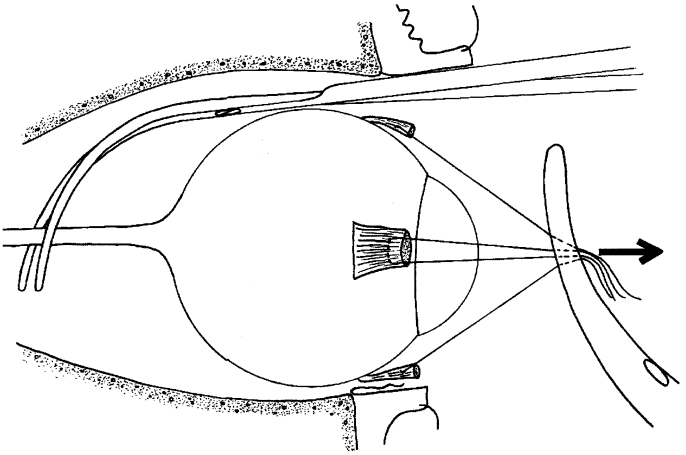

Fig. 10.6 Enucleation. Dividing the optic nerve with heavy curved scissors. Traction on the rectus muscles makes it easier to cut the nerve near the apex of the orbit.

insertions of the four extra-ocular muscles with artery forceps or sutures so as to pull the eye forwards and stretch the optic nerve. There is usually profuse bleeding at this stage.

7. The eye can now be prolapsed forwards from the orbit and the remaining oblique muscles and attachments divided. The socket is packed with gauze swabs and pressure applied for 5 minutes. On removing the swabs the bleeding should have almost stopped.
8. Ideally the wound should be closed in 2 layers, first the Tenon's capsule and then the conjunctiva, using continuous or interrupted absorbable sutures. Antibiotic ointment and a firm pad and bandage are applied.

Post-operative care:

- The socket should be examined on the second post-operative day.
- If well the patient can then be discharged with instructions to apply antibiotic ointment.
- An artificial eye can usually be inserted fairly soon as the socket heals quickly.

Cosmetic Implants

If a plastic implant is left in the orbit after evisceration or enucleation, the final cosmetic result is much better. The artificial eye will be thinner and smaller, it will fit much better, it will not sag in the socket, and it will move much better when the other eye moves.

After evisceration a small plastic ball can be placed in the scleral cavity, and then the sclera and the conjunctiva carefully closed in 2 layers. After enucleation a similar plastic ball can be placed in the orbit, and the ends of the four rectus

muscles sewn to each other in front of the implant. (There are more sophisticated implants to which the extraocular muscles can actually be attached.) The Tenon's capsule and conjunctiva is then carefully closed in two layers.

Implants are not advised if the eye has been removed for a suspected tumour or for severe endophthalmitis.

EXENTERATION

Principle:

The entire orbital contents down to the bone are removed. This is often covered with a skin graft. Exenteration is a mutilating operation and the only indication is in the treatment of some malignant tumours in the orbit.

A brief description of how to manage orbital disease will help to explain the indications for exenteration. Orbital diseases are nearly always difficult to manage.

- The diagnosis is usually difficult. There are many different types of tumour, benign or malignant as well as inflammatory masses and cysts which can occur in the orbit.
- Deciding the correct type of treatment is usually difficult.
- Operations on the orbit are usually difficult to carry out.

The following is a very simplified outline of the management of orbital lesions.

Symptoms	*Cause*	*Treatment*
Gradual proptosis or a slowly growing orbital mass	Benign tumour or cyst	Either leave untreated or excise completely. This is usually done through a lateral orbitotomy removing the bone of the lateral orbital wall
Fairly rapid proptosis often with some pain or inflammation	Chronic inflammation Pseudo tumour or malignant tumour	Biopsy. Systemic steroids for pseudotumour. Exenteration, chemotherapy or radiotherapy for malignant tumour.
Very rapid proptosis with fever and malaise.	Acute orbital cellulitis.	Systematic antibiotics.

Remember thyroid eye disease is also a common cause of proptosis. An orbital biopsy may be performed through the eyelid or the conjunctiva. Inflammatory lesions are usually treated with steroids. Malignant tumours may be exenterated or treated with chemotherapy.

Many malignant tumours of the orbit spread quite early to other parts of the body. If metastatic spread has occurred exenteration will not save the patient's life. However exenteration may completely cure some tumours like a conjunctival carcinoma or an advanced basal cell carcinoma of the skin. Also the patient may have a hideous fungating smelly mass in the orbit and to remove it may make the last few months of the patient's life very much more pleasant.

Before performing a mutilating operation like an exenteration the surgeon should be as certain as possible of the diagnosis, and the patient should be adequately counselled. It is important not to confuse the marked proptosis that may occur with some cases of endophthalmitis or pseudotumour(an inflammatory condition of the orbit) with proptosis from a tumour.

Method:

1. The operation must be performed under some sort of general anaesthesia, preferably with endotracheal intubation.

2. A firm incision is made right down to the bone along the line of the orbital rim (fig. 10.7). There will be considerable bleeding and this may be lessened by injecting very dilute adrenaline into the tissues just before operation. Firm pressure on the wound edge also controls this bleeding. The bleeding points are secured with artery forceps and then either ligated or diathermied.

3. The periostium is incised right round the orbital rim so that the dissection is now on bare bone. The periosteum is then stripped and separated from the bone passing back towards the orbital apex (fig. 10.8). The periosteum is very closely attached to the bone at the rim of the orbit, and it is hard to separate it from the bone, but further back in the orbit it is quite easy to separate the periosteum from the bone right back to the apex of the orbit. Particular care is needed over the medial orbital wall which is thin. The dissection is completed as far back as possible to the apex of the orbit. The tissues at the orbital apex are then divided using heavy curved scissors or a scalpel blade. There will be very profuse bleeding at this stage and it is best to control this with firm pressure for 5 minutes or more. If bleeding still persists pressure with a hot pack may control it. If possible hot packs should be avoided as they cause thrombosis of the small vessels within the bone and will delay healing.

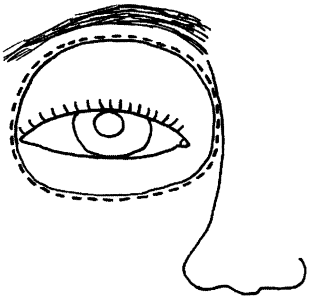

Fig. 10.7 Exenteration. The skin incision is at the edge of the bony orbital rim.

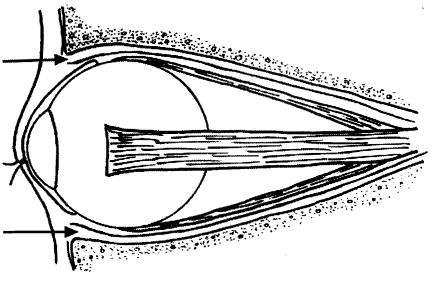

Fig. 10.8 Exenteration. To show the plane of the dissection between the orbital bone and the periosteum.

4. The orbit may be left packed and a delayed skin graft performed, or it may be left to granulate and skin will gradually cover it from the edge. If the haemostasis is very good a split skin graft can be applied at the time of surgery. It is better to use a mesh graft with holes in it or a few small patches of skin as this allows drainage and is more likely to "take". The graft is applied over a damp pack which is pushed into the orbit. Vaseline gauze is best avoided as it prevents serous exudate draining into the pack. The edges of the graft may be stitched to the skin at the orbital rim. The graft will usually take even though it is applied directly to bone and if areas do fail they will re-epithelialise quite quickly.
5. *Modified exenteration.* In some cases it may be possible to preserve one or both of the eyelids. Alternatively some of the eyelid skin may be preserved and turned inwards to help cover the bare bone of the orbit.

Post-operative care:

- Analgesia and a course of systemic antibiotics are required.
- The orbit is usually left for about 10 days until the pack is removed. This must be done with great care so as not to pull off any skin graft which is present and not to provoke bleeding from granulation tissue. If possible it is best to leave the donor site covered up for 10 days as well.
- Secondary skin grafting may be applied if necessary.
- The patient should be provided with a patch and taught how to remove keratin which will accumulate in the socket.