Trichiasis Surgery for Trachoma
The Bilamellar Tarsal Rotation Procedure

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TRICHIASIS SURGERY FOR TRACHOMA

THE BILAMELLAR TARSAL ROTATION PROCEDURE

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1. INTRODUCTION

1.1 Objectives

(a) To learn to identify patients who require surgery for trichiasis.

(b) To be able to perform successfully the bilamellar ("through and through") tarsal rotation operation to correct trichiasis.

(c) To be able to assess results and manage complications of the bilamellar tarsal rotation procedure.

1.2 Trainees

Trainees are expected to be eye surgeons, general surgeons, physicians with surgical experience, eye care or surgical nurses, or eye care assistants.

1.3 Previous knowledge and experience required

Trainees should have:

(a) previous experience with eye examination;

(b) experience in giving injections;

(c) knowledge of sterile surgical techniques;

(d) previously witnessed eye surgery.

1.4 Expected period of training

Ideally, two weeks should be available to train a group of up to six people. A minimum requirement is two days per person: Day 1 to examine patients and to learn the operation, Day 2 to see patients postoperatively and to review results.
2. **THE ANATOMY OF THE EYE AND THE EYELID (Fig. 1)**

2.1 **The eye**

(a) The CORNEA is the clear window in the front of the eye.

(b) The bulbar CONJUNCTIVA is a thin transparent layer covering the white eyeball.

2.2 **The eyelid**

(a) The SKIN covers the outer surface of the lid.

(b) The orbicularis MUSCLE lies under the skin.

(c) The EYELASHES come from roots 2 mm deep. They emerge from the LID MARGIN, and normally point away from the cornea.

(d) The TARSAL PLATE is a thick, fibrous layer, which lies under the muscle and keeps the lid stiff. It is 1 cm high in the upper lid.

(e) The tarsal CONJUNCTIVA is a shiny transparent layer which covers the inner surface of the eyelid and goes onto the eyeball. It is easily seen on the everted upper lid.

(f) The PUNCTUM is a hole at the medial end of the lid, through which tears drain.

**PRACTICE:** OBSERVE THESE FEATURES IN FELLOW TRAINEES. EVERT THE EYELID TO OBSERVE THE TARSAL CONJUNCTIVA.
Fig. 1. Anatomy of the Eye

- Upper lid margin
- Punctum
- Tarsal plate
- Conjunctiva
- Lower lid margin
- Skin
- Muscle
- Tarsal plate
- Conjunctiva
- Cornea
3. TRACHOMA AND ITS EFFECT ON THE EYE

3.1 Trachoma

TRACHOMA is an infectious disease caused by a bacterium, *Chlamydia trachomatis*. It usually starts in childhood, even as early as the first year of life. The disease is characterized by repeated infection throughout childhood and early adulthood.

3.2 Inflammation

Trachoma produces inflammation of the tarsal conjunctiva and tarsal plate seen on evertting the upper eyelid. Inflammation is characterized by the formation of follicles ("Trachomatous inflammation - Follicular" or "TF") and may be intense enough to thicken the conjunctiva, obscuring the normal pattern of conjunctival blood vessels ("Trachomatous inflammation - Intense" or "TT").

3.3 Trichiasis

The chronic inflammation leads to scarring of the tarsal plate and conjunctiva of the inside of the eyelid ("Trachomatous Scarring" or "TS"). This turns the eyelashes inwards. When the misdirected eyelashes rub on the eyeball, the condition is called TRACHOMATOUS TRICHIASIS, TT (Fig. 2). This is mainly a problem in the upper lid. The purpose of the bilamellar tarsal rotation procedure is to correct this.

3.4 Corneal scarring

The rubbing of the eyelashes on the cornea causes scarring ("Corneal Opacity" or "CO"). This leads to gradual loss of vision and eventually to blindness.
FIG. 2. TRACHOMATOUS TRICHIASIS
4. HISTORY AND EXAMINATION FOR UPPER LID TRICHLASIS

4.1 History

(a) Ask the patient if there is SEVERE DISCOMFORT from eyelashes rubbing the eyeball.

(b) Has the patient EPILATED any eyelashes?

4.2 Examination of the eyelid

(a) Examine the patient indoors or in the shade, because bright sunlight produces shadows that make the edge of the lid difficult to see.

(b) Ask the person to look straight ahead with his eyes open in the normal way.

(c) Use a strong torch, and shine it up on the edge of the lid FROM BELOW.

(d) Look up at the lid FROM BELOW, and examine the edge of the eyelid, where the lashes emerge. A magnifying loupe is helpful to see clearly the trichiasis.

QUESTION: DO THE EYELASHES RUB ON THE CORNEA WHEN THE PATIENT LOOKS STRAIGHT AHEAD?

4.3 Examination of the cornea

Inturned eyelashes which rub on the cornea can cause damage to the corneal surface followed by scarring, which leads to visual loss. Corneal damage may also be present as a result of eyelashes which have now been removed (epilated) by the patient.

QUESTION: IS THERE ANY CORNEAL DAMAGE FROM INTURNED EYELASHES (INCLUDING EPILATED ONES)?
4.4 Examination for defective lid closure (Fig. 3)

If the eyelid does not close properly, either because of trachoma scarring or because of previous surgery, a more complicated operation than tarsal rotation will be needed. Defective lid closure is present if the eyelids do not meet completely when the eyes are gently closed, as if going to sleep: the white of the eye will still be seen. THESE PATIENTS NEED REFERRAL TO AN OPHTHALMOLOGIST, whether they have trichiasis or not.

QUESTION: IS THERE DEFECTIVE LID CLOSURE?

Fig. 3. Defective lid closure
5. INDICATIONS FOR EYELID SURGERY

Not all patients require an operation. If there are just one or two eyelashes (either laterally or medially) rubbing on the conjunctiva, particularly in old people, and there are no corneal complications, REPEATED EPILATION may be sufficient to reduce discomfort and prevent complications. The patient must be instructed to return should epilation prove difficult or unsuccessful.

5.1 Definite indications for eyelid surgery are:

(a) one or more eyelashes which turn in and scratch the cornea when the patient looks straight ahead;

(b) evidence of corneal damage from trichiasis;

(c) severe discomfort from trichiasis.

5.2 Contraindications to performing tarsal rotation surgery in the community

(a) Defective lid closure.

(b) Childhood. Children need surgery in hospital, possibly with a general anaesthetic.

(c) Poor general health (see 6.1 and 6.2).
6. **FITNESS OF PATIENT FOR SURGERY**

THE PROCEDURE MUST NOT CAUSE ANY RISK TO THE GENERAL HEALTH OF THE PATIENT. Before considering surgery, the patient must be questioned and examined for general fitness.

6.1 **History**

(a) Ask the patient if he or she has any SHORTNESS OF BREATH or difficulty in lying flat for 30 minutes. These symptoms may indicate evidence of HEART FAILURE.

(b) Ask the patient if he or she suffers from DIABETES ("sugar") or HIGH BLOOD PRESSURE.

(c) Very rarely, a person may be ALLERGIC to local anaesthetic, or have a BLEEDING DISORDER. Ask the patient if he or she has experienced any problems with injections of local anaesthetic or with bleeding.

IF HEART FAILURE, DIABETES, HYPERTENSION, ALLERGICAL SENSITIVITY TO LOCAL ANAESTHETIC, OR A BLEEDING ABNORMALITY EXISTS, THE OPERATION SHOULD NOT BE DONE IN A COMMUNITY CLINIC. Refer the patient to a doctor for management of the condition and to consider whether the operation can be performed under medical supervision in hospital.

6.2 **Examination**

(a) Does the patient have difficulty in cooperating and following instructions?

(b) Does the patient have a chronic cough or shortness of breath?

(c) Is the pulse irregular or very fast (above 90/minute)?

(d) Is the blood pressure very high (systolic above 170 mmHg or diastolic above 110 mmHg)?

IF YOU THINK THE PATIENT CANNOT COOPERATE AND FOLLOW INSTRUCTIONS DURING SURGERY, OR IS NOT PHYSICALLY FIT, DO NOT OPERATE IN THE COMMUNITY CLINIC. REFER THE PATIENT TO A DOCTOR IN HOSPITAL FOR EVALUATION AND MANAGEMENT.

PRACTICE: QUESTION AND EXAMINE FELLOW TRAINEES.
7. FACILITIES, SURGICAL MATERIALS AND STERILIZATION

7.1 Facilities required

The operating room should be:

(a) CLOSE TO WHERE PATIENTS LIVE to avoid the expense and inconvenience of travel, and to retain a familiar environment;

(b) CLEAN (free from dust);

(c) LARGE ENOUGH to allow the patient to lie down and the surgeon to work;

(d) WELL-LIT, using a focused light powered either by mains electricity or by a battery.

If no suitable room is available within the community, the operation can be performed outside, provided the area is quiet and reasonably clean. Surgery may be performed by daylight, if necessary, but this is less satisfactory.

7.2 Surgical materials

(a) Instruments and sutures required:

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
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<tr>
<td>1</td>
<td>Large metal bowl or plastic bucket</td>
</tr>
<tr>
<td>2</td>
<td>Kidney dishes</td>
</tr>
<tr>
<td>1</td>
<td>Galley pot</td>
</tr>
<tr>
<td>1</td>
<td>Container for sterile water</td>
</tr>
<tr>
<td>1</td>
<td>Scalpel holder for No. 15 blades</td>
</tr>
<tr>
<td>1</td>
<td>Packet No. 15 blades</td>
</tr>
<tr>
<td>1</td>
<td>Needle holder (without catch)</td>
</tr>
<tr>
<td>1</td>
<td>Toothed forceps</td>
</tr>
<tr>
<td>2</td>
<td>Scissors (straight with blunt ends)</td>
</tr>
<tr>
<td>2</td>
<td>Small haemostats (&quot;mosquitos&quot;)</td>
</tr>
<tr>
<td>6</td>
<td>Cutting eyed needles for 4/0 silk suturing of eyelid</td>
</tr>
<tr>
<td>1</td>
<td>4/0 silk 90-metre reel (sufficient for 200 operations)</td>
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Note. Three double-armed atraumatic 4/0 silk sutures may be used instead of separate needles and silk.

Operating loupes, x2 magnification, are of great assistance if available.

*Total cost: From US$ 25 to US$ 250 approximately.*
Consumables and disposables required:

**Tetracycline 1% eye ointment**

**Amethocaine eye drops** (or similar topical anaesthetic)

**Lignocaine 2% (or 1%) local anaesthetic** (this can be with or without adrenaline)

**Glutaraldehyde 2% solution** (for disinfecting instruments)

**Sterile distilled water** or normal saline

**Polyvidone iodine 10% skin preparation**

**21G disposable needles**

**5-ml disposable syringes**

**Surgical gloves** - appropriate size

**Gauze**

**Zinc strapping** 1/2 inch

**A sterile drape**, approximately 1 metre by 1 metre in size, with a central hole approximately 10 cm by 10 cm, made of linen or sterilized paper. If this is not available, the inner paper containing the sterile gloves may be used.
7.3 Sterilization of instruments

Because of the risk of disease transmission, in particular that of HIV, it is essential that instruments be sterilized or at least receive high-level disinfection before each operation. SURGERY MUST NOT BE PERFORMED IF THE INSTRUMENTS CANNOT BE PREPARED IN ONE OF THE WAYS DESCRIBED BELOW.

Sterilization is defined as the destruction of all viruses, bacteria and spores. High-level disinfection is defined as the destruction of all viruses and bacteria, but spores may survive if initially present in large numbers.

(a) Sterilization by steam

Steam sterilization is performed under pressure for at least 15 minutes after the load reaches a temperature of 121 degrees Centigrade (250 degrees Fahrenheit), at a pressure of 1 atmosphere above atmospheric pressure (101 kPa, 15 lb/sq.in.) and after water vapour saturation.

(b) Sterilization by dry heat

Sterilization in an electric or gas oven is achieved after two hours at 170 degrees Centigrade (340 degrees Fahrenheit), allowing additional time prior to this for the load to equilibrate at that temperature.

(c) High-level disinfection by boiling

The instruments are boiled in water, for AT LEAST 20 MINUTES.

(d) High-level disinfection by soaking in glutaraldehyde

Glutaraldehyde is obtained as a 2% aqueous solution to which a powder or liquid buffer (supplied with it) is added to render the solution active. Once activated, the solution should not be kept for more than two weeks. Instruments should be thoroughly cleaned before soaking, to remove clotted blood or tissue. They are then completely immersed for AT LEAST 30 MINUTES. After soaking, the instruments are only handled with sterile gloves, towels, or forceps. They are rinsed with sterile saline or water before use. This technique is not acceptable for the needles and syringes used for injection, which must therefore be disposable.
8. PREPARATION

8.1 Preoperative preparation

(a) EXPLAIN to the patient what the operation is for and ask him or her to sign, or to mark appropriately, a consent form.

(b) WASH the patient's face with soap and clean, boiled water, especially the eyelids, forehead, temples, cheeks and nose.

(c) Ask the patient to LIE DOWN on the operating table.

(d) EXPLAIN further that:

   (i) he or she should lie quietly on the couch during the procedure;

   (ii) he or she should not feel pain during the operation and, if there is pain, he or she should tell the person operating;

   (iii) clean towels will cover the face and chest so the operation is clean;

   (iv) he or she must not move the towels or try to touch the eye or the surgeon.

PRACTISE THESE TECHNIQUES ON FELLOW TRAINEES.

8.2 Applying the local anaesthetic drops

The anaesthetic drops used are AMETHOCaine EYE DROPS (or similar topical anaesthetic). Ask the patient to look up. Put one drop in the eye, wait one minute, put in a second drop, wait another minute, and put in a third drop (Fig. 4). The dropper should not touch the eye.
FIG. 4. APPLYING A LOCAL ANAESTHETIC DROP
8.3 **Sterile preparation** (using glutaraldehyde for instruments)

The instruments, the surgeon’s (and assistant’s) hands and the patient’s skin must be prepared.

(a) **COMPLETELY IMMERSE** the two kidney dishes, all instruments and sutures in 2% glutaraldehyde in the large bowl for 30 minutes prior to use. The 4/0 silk can be cut into 18-inch lengths and placed in the solution. The same solution may be used all day.

(b) **SCRUB THE HANDS** (both the surgeon’s and the assistant’s if present) with soap and water for 5 minutes, then **WASH** with 10% polyvidone iodine (or alternative skin antiseptic solution) and **RINSE** with sterile water.

(c) **PUT ON STERILE GLOVES** (both surgeon and assistant). Because of the risk of HIV transmission, GLOVES MUST BE WORN.

(d) **REMOVE THE KIDNEY DISHES**, pouring the glutaraldehyde back into the large bowl, rinse with sterile saline or boiled water, and shake out surplus. Fill one with sterile saline or water.

(e) **RINSE THE INSTRUMENTS**, after removing from the glutaraldehyde, by placing them in the sterile kidney dish containing sterile normal saline or recently boiled water. Fresh sterile saline or water must be used for each operation. Remove individually to dry.

(f) **DRY THE INSTRUMENTS** with sterile gauze, and place in the second sterile kidney dish. These instruments are ready for use, and this kidney dish is placed by the patient.

(g) **CLEAN THE PATIENT’S FACE**. Polyvidone iodine 10% or similar skin preparation is poured into the galleys pot. A gauze soaked in the solution is used to clean thoroughly the patient’s closed eyelids and surrounding area.
9. **SURGICAL PROCEDURE** (left eye, upper lid)

9.1 **Injecting local anaesthetic**

The anaesthetic usually used for injection is **LIGNOCAINE 2%** (lidocaine).

(a) **KEEP THE LIGNOCAINE IN THE BOTTLE STERILE:**

   (i) CLEAN the rubber stopper of the bottle with a sterile swab soaked in antiseptic, e.g. polyvidone iodine 10%.

   (ii) **USE A NEW STERILE NEEDLE AND SYRINGE** to draw up lignocaine. If you need to draw up more, even for the same patient, use another new needle and syringe.

   (iii) If separate ampoules are used, open a fresh ampoule for each patient.

(b) **DRAW UP 3 ml.** (NEVER USE MORE THAN 5 ml for each eyelid operation.)

(c) **INJECT THE LIGNOCAINE INTO THE UPPER LID:**

   (i) Stand beside the patient (*Fig. 5*). CHECK that this is the eye that requires surgery and on which the patient has consented to have surgery.

---

*Fig. 5. INJECTING THE ANAESTHETIC*
(ii) Ask the patient to look down.

(iii) Draw the lid laterally with your fingers.

(iv) Insert the needle IN THE PLANE OF THE UPPER EYELID, about 3 mm above the lid edge, beyond the lateral limit of the lid (Fig. 6).

(v) Slide the needle through the tissues, injecting 2 ml of local anaesthetic as you proceed, in a curve IN THE PLANE OF THE LID, about 3 mm above the lid margin, across to the medial end of the lid. The needle will lie OVER the tarsal plate, and should slide easily as you inject in front of the needle.

(vi) Massage the lignocaine into the eyelid for one minute with a swab and gentle finger pressure.

(vii) Wait three minutes until the lignocaine has taken effect, then test by pinching the skin of the lid with forceps. The patient should feel no pain, though he or she may feel movement.

(viii) If pain is felt, inject the remaining 1 ml of lignocaine.

(ix) Usually 3 ml is sufficient. Never inject more than 5 ml in any one operation.

REMEMBER TO ASK ABOUT ALLERGY TO LOCAL ANAESTHETIC BEFORE INJECTING.
DO NOT INJECT MORE THAN 5 ml FOR EACH EYELID.
DO NOT INJECT INTO THE EYEBALL.

FIG. 6. INJECTION OF LOCAL ANAESTHETIC
**Bilamellar tarsal rotation operation (9.2-9.6)**

In the bilamellar tarsal rotation operation the eyelid is fixed, incised through all layers parallel to the lid margin, and resutured so that the lid margin is rotated outwards and the eyelashes are no longer in contact with the cornea.

An assistant (to hand the instruments) and a set of x2 magnifying loupes (for better visibility) simplify the operation but are not absolutely necessary.

The operation is performed seated at the head of the patient (Fig. 7). A sterile drape is placed over the face, revealing the eye through the central opening. The surgeon’s wrists may be steadied on the forehead during surgery.

**FIG. 7.** POSITION OF SURGEON AND PATIENT  
(Drape and instruments not shown)
9.2 **Fixing the eyelid** *(Fig. 8)*

(a) Place a haemostat at the medial end of the upper lid, just lateral to the upper lacrimal punctum, and close with moderate pressure. It should extend 5 mm in from the lid margin.

(b) Place another haemostat at the lateral end of the upper lid, angled outwards, also extending 5 mm in from the lid margin. If the haemostats extend much beyond 5 mm from the lid margin it will be difficult to evert the lid.

(c) Confirm that the lid can be everted without difficulty. Do not force eversion or the lid may tear. Reposition haemostats if eversion is not easy.

(d) The haemostats should not be left closed on the lid for more than 15 minutes, as they interrupt the blood flow to the lid.

---

**Fig. 8. Lid fixation**
9.3 Incising the eyelid

(a) INCISE THE SKIN AND MUSCLE (Fig. 9):

(i) Hold the haemostats downwards so that the eyelid does not move.

(ii) Incise the skin and muscle parallel to the lid margin and 3 mm ABOVE IT, the entire distance between the haemostats. The blade is held at right angles to the skin, and enters to a depth just superficial to the tarsal plate. REMEMBER THAT THE EYEBALL IS BELOW THE LID AND MUST NOT BE DAMAGED.

FIG. 9. INCISING THE SKIN AND MUSCLE
(b) **INCISE THE CONJUNCTIVA AND TARSAL PLATE (Fig. 10):**

(i) **EVERT** the eyelid.

(ii) **INCISE** the conjunctiva and tarsal plate, through its full thickness, parallel to the lid margin and 3 mm ABOVE IT, the entire distance between the haemostats.

**FIG. 10. INCISING CONJUNCTIVA AND TARSAL PLATE**
(c) **Unite the incisions (Fig. 11):**

(i) Elevate the lid with the haemostats.

(ii) Insert the points of the closed scissors into the incision in the conjunctiva-tarsal plate, through remaining intact muscle, and out through the skin-muscle incision.

(iii) Open the scissors while still held across the lid: the blunt aspect of the blades will spread apart intact muscle. Repeat along the incision if necessary until it is a full thickness hole.

(iv) Remove the haemostats. Stop the bleeding by firm pressure with a sterile swab for one minute. **THE LID MAY BLEED PROFUSELY. PRESSURE WITH A SWAB WILL USUALLY CONTROL THE BLEEDING.**

---

**Fig. 11. Uniting the incisions**
(d) Complete the incision medially and laterally (Fig. 12):

(i) Open the incision by grasping and elevating the skin of the lid margin, near where you intend to cut, with toothed forceps.

(ii) Using the scissors, completely divide the medial and lateral edges of the tarsal plate (the portion formerly held in the haemostats), still cutting PARALLEL to the lid margin. Do not cut much beyond the edge of the tarsal plate medially as the marginal artery may be cut and bleed.

THE EYELID SHOULD NOW BE DIVIDED THROUGH ITS ENTIRE THICKNESS, 3 mm FROM AND PARALLEL TO THE LID MARGIN, REMAINING CONNECTED AT BOTH ENDS.

The 3-mm lid margin portion is referred to as the DISTAL fragment, the remaining portion as the PROXIMAL fragment.

FIG. 12. COMPLETING THE INCISION WITH SCISSORS
9.4 Suturing the eyelid

The purpose of the sutures is to re-attach the distal fragment in an outwardly rotated position, so that the eyelashes no longer rub on the cornea. This is achieved by anchoring sutures on the conjunctival surface of the proximal fragment, and running them over the distal tarsal plate to exit through the skin near the eyelashes, thus drawing the lash margin outwards and upwards.

4/0 silk is suitable for suturing. The sutures need a needle on both ends. The sterile needles will need to be threaded onto the suture unless double-armed sutures are available. Three sutures, that is six needles, are used.

(a) Placing sutures in the proximal fragment:

(i) Prepare the needle holder: MOUNT THE NEEDLE TO POINT TOWARDS YOU.

(ii) Draw back the skin of the PROXIMAL portion of the eyelid with your finger, and grasp the cut edge of the tarsal plate with toothed forceps. The edge can then be everted to insert the sutures. Observe the PINK CONJUNCTIVA on the inner surface of the eyelid. If blood obstructs the view, swab this surface.

(iii) Pass the first needle and its associated suture through a 1-mm bite of tarsal conjunctiva and 1/4 of the thickness of the tarsal plate, near the middle of the eyelid (Fig. 13). Note that the needle emerges from the cut edge of the tarsal plate.

**Fig. 13. Proximal fragment: first suture, first needle**
(iv) Pass the second needle, at the other end of the same suture, through the conjunctiva and tarsal plate in the same way, so that the suture is symmetrically placed at the centre of the eyelid \textit{(Fig. 14)}.

\textbf{Fig. 14. PROXIMAL FRAGMENT: FIRST SUTURE, SECOND NEEDLE}

(v) Place a haemostat on the two strands of suture. This clip can be drawn upwards to display clearly and fix firmly the cut edge for the subsequent sutures.

(vi) Pass double-armed sutures in an identical manner on either side of the first. They must reach the medial and lateral ends of the incision \textit{(Figs 15 and 16)}. Otherwise trichiasis will return at either side.
Fig. 15. Proximal fragment: third suture, first needle

Fig. 16. Proximal sutures completed
(b) Placing the sutures in the distal fragment:

(i) Look down at the skin surface of the eyelid's distal fragment (bearing the eyelashes).

(ii) Remove the clip from the middle suture and mount one needle in the needle holder. Mount the needle to point away from you.

(iii) Grasp the skin of the distal fragment of eyelid (the strip of eyelid margin).

(iv) Pass the needle through the muscle layer on the front surface of the tarsal plate to emerge through the skin about 1 mm above the eyelashes (Fig. 17). The entry point should correspond with the site of the suture in the proximal eyelid fragment.

Fig. 17. Distal fragment: first suture
(v) Repeat this with a second needle on the same suture, again matching the entry point with the exit on the proximal fragment. Clip the two ends of the suture together again.

(vi) Repeat this with the two other sutures on the medial and lateral sides (Fig. 18).

**Fig. 18. Distal sutures completed**
(c) **TYING THE SUTURES:**

(i) **TIE THE CENTRAL SUTURE** with three single knots. Then tie the other two sutures in the same way. They should be tied **FIRMLY ENOUGH TO PRODUCE A SLIGHT OVERCORRECTION.**

(ii) Cut the sutures 3 mm above the knot (*Fig. 19*). This is long enough to permit ready removal, without being so long as to irritate the eye.

(d) **SKIN SUTURES:**

These sutures need only have a needle at one end. Two or three sutures are placed to close the skin, passing into the skin 1 mm from the cut edge, across the wound, and emerging from the skin again 1 mm from the other cut edge. They are tied without tension and cut.

**THE FINAL RESULT SHOULD SHOW AN EYELID WITH A SLIGHT OVERCORRECTION.** **THE EYELASHES SHOULD POINT WELL AWAY FROM THE EYE** **ALL ALONG THE EDGE OF THE EYELID** (*Fig. 19*).

**PRACTISE CLOSING CLAMP, MOUNTING NEEDLE IN NEEDLE HOLDER, TYING KNOTS**

---

**FIG. 19. ALL SUTURES TIED**
9.5 Possible surgical difficulties

(a) Bleeding:

If bleeding cannot be controlled by pressure with a gauze swab, the MARGINAL ARTERY, which runs along the lid margin, may have been severed. This usually occurs medially, and blood will be seen springing from a single source. Locate this source, clip a haemostat onto it, and tie a suture just below the haemostat to close the artery. Otherwise, undersew the area with a suture.

(b) Division of the eyelid margin:

This is most unlikely with careful surgery but, should it occur, the cut portions of the distal fragment must be sutured together. Place one suture in the lid margin, so that its edges match exactly. Tie the suture without tension, with three single knots. Place one or two separate sutures on the outer surface of the tarsal plate. If the skin has also been divided, it may be sutured with one or two separate sutures. If the repair is satisfactory, proceed with the operation. If not, refer the patient to an ophthalmologist at once.

(c) Overcorrection:

If the lid margin is grossly everted, remove the skin and tarsal plate sutures and repeat the suturing. This time, tie the sutures with less tension to give the proper results, a mild degree of overcorrection.

(d) Undercorrection:

If the eyelashes still touch or nearly touch the cornea, remove the tarsal plate sutures and repeat the suturing. Tie the sutures with more tension to produce a mild degree of overcorrection.

9.6 Applying the antibiotic and dressing

(a) Apply tetracycline ointment into conjunctival sac and onto the wound.

(b) Pad the eye. A bandage may also be used.

(c) Give two 500-mg tablets of acetaminophen (paracetamol) for pain. The patient may take eight further tablets home, and take two every six hours if required.

(d) The patient is advised to stay quietly at home for one or two days.

9.7 Cleaning and resterilizing the instruments

(a) After the operation has been performed, the instruments are cleaned with water and detergent to remove any blood.

(b) The clean instruments are then replaced in the 2% glutaraldehyde solution if they are to be reused the same day. If the surgery is finished for the day, the instruments are stored dry.
10. POSTOPERATIVE CARE

Day 1: CHECK THE WOUND

(a) Remove the pad and clean the eye with gauze and saline. The eyelid may be swollen.

(b) Apply tetracycline ointment between the lower lid and the eyeball. Show the patient how this is done, so that he or she can apply ointment three times daily for seven days at home.

Day 8: REMOVE THE SUTURES

(a) Clean the eye with gauze and saline.

(b) Remove the skin sutures and the tarsal rotation sutures. They are removed by cutting one loop only and drawing outwards on the knot.
11. RESULTS

Complete success is defined as NO EYELASHES RUBBING ON THE EYEBALL (in the absence of epilation or further surgery), WITH NO COMPLICATIONS.

If a few inturning lashes at the medial or lateral edge of the eyelid persist despite surgery, they may be managed by epilation.

If any lashes continue to rub on the cornea, if there is still sufficient trichiasis to cause severe discomfort, or if there is renewed corneal damage from persistent misdirected eyelashes which have been epilated, further surgery is required. REFER THE PATIENT TO AN OPHTHALMOLOGIST for further surgery.

As the disease process continues, trichiasis may recur a year or more later in an eye which has had successful surgery. The patient may then have a second bilamellar tarsal rotation operation on the eyelid in question, performed in the community.

This procedure is also suitable for lower lid trichiasis, which will occasionally be seen. If trichiasis is present in both the upper and the lower lids, the upper lid should be operated upon first, and an interval of two weeks allowed before surgery to the lower lid.

PRACTICE: APPLY OINTMENTS AND PAD AND BANDAGE TO FELLOW TRAINEES.
12. COMPLICATIONS

12.1 Immediate postoperative (0-48 hours)

(a) **Renewed bleeding:**

This can always be controlled by firm pressure with the heel of the hand, through the dressing, onto the eye. The patient and relatives should be told to do this if bleeding occurs at home. If the bleeding is mild, the community worker can apply a firm pad and pressure and visit again. If it is severe or persistent, refer to a doctor.

(b) **Local infection:**

If pus is seen on the wound, remove any involved sutures and clean with gauze and boiled water three times daily.

(c) **Cellulitis:**

If there is pain, spreading redness, fever and raised pulse: **Give antibiotics,** for example PENICILLIN, BY MOUTH AND REFER TO A DOCTOR URGENTLY. HOSPITAL ADMISSION MAY BE NEEDED.

(d) **Excessive rotation of the tarsus:**

The distal strip of eyelid margin may be so rotated that it has turned right up (Fig. 20). The cause may be:

(i) **Too big a distal fragment,** that is, an incision much more than 3 mm from the lid margin;

(ii) excessive tension on the tarsal rotation sutures;

(iii) the sutures emerging within the lashes instead of above them.

If the eyelids do not close properly when the patient tries to close them gently, as if in sleep (as in Fig. 3), or the cosmetic appearance is very distressing, **remove the sutures and massage the upper lid downwards.** If this does not correct the problem, refer the patient to an ophthalmologist for a second operation to correct the excessive rotation. **Defective lid closure is a serious condition.**
12.2 **Later** (after 48 hours)

(a) **Granuloma formation:**

This looks like a red lump on the conjunctiva over the wound. It can be excised with a scalpel or scissors after applying anaesthetic drops. Remove any remaining suture at the site.

(b) **Necrosis of the eyelid margin:**

This is a defect in the central eyelid margin, the result of poor blood supply caused by too narrow a distal fragment. It will gradually heal without any treatment.
13. SUMMARY OF IMPORTANT POINTS

13.1 **Operate on the correct eye** - the one for which surgery is indicated, and on which the patient has consented to have surgery.

13.2 **Local anaesthetic**

Ask about allergy.

Do not inject into the eyeball.

13.3 **Haemostat application**

Advance 5 mm in from the eyelid margin.

If eversion is not easy, reposition the haemostats or the eyelid may tear.

Avoid pressure on the eyeball when everting lid.

Avoid damage to the upper punctum and canaliculus.

Do not leave haemostats on the lid for more than 15 minutes.

13.4 **Scalpel use**

Incise 3 mm from the eyelid margin.

**DO NOT DAMAGE THE EYEBALL.**

Do not cut through the eyelid margin.

13.5 **Use of scissors**

**DO NOT DAMAGE THE EYEBALL.**

Do not cut through the eyelid margin.

Do not cut much beyond the end of the tarsal plate medially, as the marginal artery will bleed.
13.6 **Sutures**

DO NOT DAMAGE THE EYEBALL WITH THE NEEDLE.

Do not leave a needle in the conjunctival sac.

Place the sutures symmetrically, so that lid eversion is regular.

Be sure that the medial and lateral edges of the tarsal plate are included in the sutures, to avoid recurrence of trichiasis at these sites.

Tie sufficiently tight to cause a SLIGHT OVERCORRECTION, as scarring will reverse the procedure a little.
TRAINING AND EVALUATION

TRAINING

In the CLASSROOM, each trainee should:

(a) attend lectures explaining the procedure and answer questions ensuring that he or she has adequate knowledge of all relevant points;
(b) practise taking a history from, and examining, fellow trainees;
(c) practise the sterilization procedures with instruments and gloves;
(d) practise opening and closing haemostats and needle holders, and tying knots.

In the CLINICAL SETTING, each trainee should:

(a) observe the examination of patients' eyelids, and examine the eyelids themselves with a trainer;
(b) observe the complete tarsal rotation procedure, including instrument preparation, skin cleansing, surgery and subsequent dressings being performed. Ideally, only two students at a time will be present during the procedure;
(c) perform the complete procedure, including preparation, sterilization of instruments, and surgery, with the trainer's active advice and assistance on at least four occasions, including surgery to right and left eyes;
(d) perform postoperative dressings at Day 1;
(e) perform removal of sutures at Day 8.

EVALUATION

At the end of the course, each trainee should be observed and examined by the trainer in the following:

(a) Assessing several patients, some with and some without eyelashes rubbing on the conjunctiva and/or cornea, to decide whether they require surgery or not.
(b) Performing a complete tarsal rotation procedure, including all components from the initial introduction to the patient, through instrument preparation and surgery to the first postoperative dressing.

The trainee should also be able to discuss the possible complications and their management.
CORRECTION OF LID SHORTENING
DUE TO OTHER CAUSES THAN TARSAL ROTATION SURGERY

If lid shortening is present, some of the conjunctiva or cornea will remain visible on gentle lid closure, as in sleep (Fig. 21).

**Fig. 21. Defective Lid Closure**
Defective lid closure as shown in Fig. 21 may result from former trichiasis surgery other than the bilamellar tarsal rotation operation, or from the scarring process of trachoma. Lid shortening from these causes is corrected by a TARSAL ADVANCE AND ROTATION (TRABUT-TYPE PROCEDURE), WITH DIVISION OF THE TARSAL INSERTION OF LEVATOR. The appearance of defective lid closure from a poor result in the bilamellar tarsal rotation operation is quite different (see Appendix III), and is corrected differently.

**TARSAL ADVANCE AND ROTATION, WITH DIVISION OF THE TARSAL INSERTION OF LEVATOR**

(a) The eyelid is everted with two haemostats, revealing the conjunctival surface.

(b) The tarsal plate is incised 3 mm from its edge, parallel to the lid margin. Medially, 1 mm lateral to the lachrymal punctum the incision is taken at a right angle through the marginal tarsal plate. Laterally, the incision ends by dividing the marginal tarsal plate horizontally at the lateral canthus (Fig. 22). The skin is NOT incised.

(c) Blunt dissection with scissors between orbicularis and the DISTAL tarsal fragment is performed. This permits outward rotation of the DISTAL fragment through 180 degrees, hinged along the lid margin (Fig. 23).

(d) The tarsal plate of the PROXIMAL fragment is now separated from the skin-muscle layer by blunt dissection with scissors, from the incision to the superior fornix (Fig. 24).

(e) Grasp the PROXIMAL tarsal fragment with forceps, and attempt to draw it downwards. If it can be drawn down far enough to cover the lower lid margin without marked tension, thelevator fibres do not need to be divided. If not, the levator can be partly disrupted by mild blunt dissection with scissors (Fig. 25). If this is still insufficient to draw the proximal fragment downwards to cover the lower lid margin, divide the levator fibres from the upper border of the tarsal plate. This is done by opening an aperture in these fibres with the scissors, and dividing the fibres medially and laterally (Fig. 26). The proximal tarsal fragment should now descend to cover the lower lid margin.

(f) Pass three double-ended mattress sutures from the upper fornix superior to the tarsal plate, through the anterior lamella, to emerge slightly below the skin crease. Tie these to advance the proximal fragment by 3 mm (Figs 26 and 27).

(g) Reposition the distal tarsal fragment by rotating through 180 degrees, and secure it by four horizontal mattress sutures to the proximal tarsus. This forms a new lid margin from both incised ends of tarsal plate (Figs 26 and 27).
APPENDIX III
(FOR OPHTHALMOLOGISTS)

REVISION OF TARSAL ROTATION OPERATION

Excessive rotation of the distal fragment of tarsal plate can occur with the bilamellar tarsal rotation operation, and presents a distinctive appearance (Fig. 28). The distal tarsal plate fragment turns upwards to lie over to the proximal fragment, and a distinct rim of pink conjunctiva is apparent as the distal part of the lid, instead of skin.

THE ROTATION IS CONSIDERED EXCESSIVE IF LID CLOSURE IS NO LONGER COMPLETE. If the eyes do not close properly, the cornea can be damaged. Discomfort and poor appearance may also cause concern.

Fig. 28. Excessive rotation of tarsus
Appendix III

(a) Sterile technique, skin preparation and anaesthesia are the same as for the original procedure.

(b) Apply the haemostats to the lid as before.

(c) Separate the tissues at the site of the former incision, using forceps and scissors. It may be necessary to re-incise the tarsal plate with scalpel and scissors as before, if healing is complete. A separate rim of eyelid margin, attached at both ends, should result.

(d) Insert the three double-armed sutures through 1 mm of conjunctiva and 1/4 of the thickness of the tarsal plate of the DISTAL EYELID FRAGMENT (the eyelid margin) (Fig. 29).

(e) Then pass the three sutures through the muscle layer (between tarsal plate and skin) of the PROXIMAL PORTION OF EYELID (near the eyebrow). They should emerge through the skin 3 mm above the cut edge (Fig. 30).

(f) Tie under moderate tension to provide INWARD ROTATION of the amount required to restore the lid to normal. Place skin sutures.
APPENDIX IV

REFERENCES

Ballen, P. H. A simple procedure for the relief of trichiasis and entropion of the upper lid. *Arch. Ophthalmol.*, 72, 239-240, 1964


