COMMUNICATIONS

SCALPEL AND SCISSORS*

A FLANGED INCISION FOR CATARACT EXTRACTION

BY

J. H. DOBREE

St. Bartholomew's Hospital and North Middlesex Hospital, London

THIS incision for cataract combines security with ease of performance. The incision, made in greater part by scalpel, enables a flanged section to be fashioned, and entry by scalpel into the anterior chamber between two or three preplaced sutures is effected easily and without risk of cutting the sutures. Additional security is obtained by sealing the whole length of the incision by a 5-mm. conjunctival flap based on the limbus.

The incision is shown in section in Fig. 1, which also shows its relation to the structures surrounding the filtration angle.

FIG. 1.—Diagram of the classical incision and the suggested new method.

The flange is formed by making three distinct cuts:

- (1) An almost vertical incision dividing the outer two-thirds of the scleral fibres;
- (2) A line of cleavage along the plane of the corneal lamellae;
- (3) A short, almost vertical, cut dividing the inner one-third of the corneal fibres.

The deeper layers of the corneo-sclera are thus cut to form a small flange or flap valve. This prevents gaping of the wound should the pressure in the anterior chamber suddenly rise, for the flange is simply forced towards the cornea and separation of the wound edges is rendered much less likely

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than in the classical form of incision which opens more directly into the anterior chamber.

Method

The steps in the incision are as follows:

(1) *Formation of the Conjunctival Flap* (Fig. A).—The conjunctiva is opened at 12 o'clock, 5 mm. from the limbus, with spring scissors, and the incision is carried straight down to the sclera. The opening is extended medially and laterally to the 3 and 9 o'clock positions, keeping the conjunctival flap 5 mm. in width throughout. The flap is dissected cleanly down to the exact line of the limbus and then it is turned downwards over the cornea.

Tooke's knife is useful in dividing the more adherent subconjunctival tissues. Bleeding points are dealt with by cautery, but the thermal reaction must be kept to a minimum.

(2) *First Cut of Section, Incision of Outer Scleral Fibres* (Fig. B).—The globe is fixed by gripping the tendon of the superior rectus through the conjunctiva, by means of von Mandach's (non-toothed) fixation forceps. The scleral incision is made by scalpel and extends from 3 to 9 o'clock 0.5 mm. from the line of the reflected conjunctiva.* It is important that for this part of the incision the scalpel should be held almost vertical to the globe.

With practice the fibres can be divided in one continuous sweep, but there is no particular merit in this and it can be made both in length and depth in several cuts. It is of the utmost importance, however, that this part of the section should be sufficiently deep; fully two-thirds of the scleral thickness must be incised. The depth can easily be gauged by the degree to which the wound margins can be separated; light pressure on the corneal lip should cause a separation of from 1 to 1.5 mm. of the wound margins.

If bleeding from inside the wound is encountered at this stage it is stopped by applying the cautery to the sclera just behind the oozing point.

(3) *Insertion of Preplaced Corneo-Scleral Sutures* (Fig. C).—Sutures are placed at 11 and 1 o'clock when two are used, and at 10.30, 12 and 1.30 when three are applied. To simplify the drawings the two-suture method has been illustrated.

The globe is fixed by applying corneo-scleral fixation forceps to the *scleral* lip of the wound, just to one side of the proposed line of suture.

The needle, a single-armed Jameson Evans, carrying a Kalt silk suture, is now slid between the cornea and the downturned conjunctival flap. It is not necessary to lift up the conjunctiva, as the needle passes unexpectedly easily between the two epithelial surfaces. When the point of the needle, which can be seen through the conjunctiva, has almost reached the conjunctival reflection (*i.e.* about 1 mm. from the corneal edge of the wound), it is turned downwards into the corneal lamellae to a depth of a little over half the corneal thickness and reappears in the floor of the incision. The needle is then passed across the floor of the gaping wound, care being taken that, in this part of its course, it is actually travelling clear through

* A Gillette Shape D blade will be found excellent for the purpose. A rounded scalpel handle may be preferred by some surgeons to make the curved incision.

the wound and not under the fibres forming the floor. It is then carried on through the scleral lip and turned upward to emerge 1 mm. behind it. A suitable length of silk is then drawn through. As the wound edges separate easily, about 1 mm. of the suture lies exposed on the floor and this is easily picked up, drawn out, and formed into a large loop which is laid sideways clear of the incision (see Fig. C). If three sutures are used, the middle suture is drawn out into a much larger loop and laid outside the lateral loop.

It is of the greatest importance that, in passing the needles, the direction should be in each case along the line of a radius of the cornea; if this is not done the wound edges will tend to buckle when the sutures are tied.

It will be found that, in passing the inner suture of the left eye, it is easier to hold the needle-holder in the left hand.

(4) *Cutting the Corneal Flange, Splitting the Corneal Lamellae* (Fig. 2).—No fixation of the globe is required apart from traction on the conjunctival flap which is grasped on its raw surface about 2 mm. from its edge by Moorfields (non-toothed) forceps. As the flap is drawn downwards the corneo-scleral incision opens widely, and this keeps the exposed ends of the sutures well clear of the scalpel.

The cornea is now simply split along the plane of its lamellae so that the superficial two-thirds of the corneal thickness, carrying the sutures, is undercut by 1 to 1.5 mm. This is done along the whole extent of the wound with the exception of the extreme ends.

For this part of the incision the scalpel is held with the blade at an angle of 45° to the vertical, and the separation of the corneal lamellae is effected in very much the same way as in dissecting a lamellar corneal graft.

FIG. 2.—Formation of flange, second step. Splitting the corneal lamellae.

(5) *Incision into the Anterior Chamber* (Figs D and E).—This part of the incision completes the flange by dividing the inner one-third of the corneo-scleral fibres.

The downward traction on the conjunctiva is maintained so that the wound is made to gape widely. The line of the incision is well anterior in the floor of the wound under the corneal lip. The actual entry into the anterior chamber is in

the central part of the incision and is made by a bold downward sweep of the scalpel which should cause an opening 5 to 6 mm. in extent (Fig. D). The aqueous escapes but the iris falls away from the knife edge and there is no danger of wounding it. The incision into the anterior chamber is now extended on either side with the scalpel until it has been carried past the line of sutures. The final 2 mm. or so of the corneo-scleral section is cut with scissors.*

* Rycroft's serrated corneo-scleral curved scissors is ideal for the purpose.

The scalpel should be held with the handle almost vertical for this part of the incision or further splitting of the cornea, rather than entry into the anterior chamber, will result. Once the anterior chamber has been opened, traction on the conjunctiva should be made forward rather than downward. This opens the wound and facilitates the lateral extension by scalpel and scissors.

If this scalpel part of the incision is kept well anterior in the floor of the wound, a flange of about 1.5 mm. in width will be formed along the whole extent of the wound with the exception of the extreme ends.

IRIDOTOMY.—The procedures necessary to remove the cataract are not affected by the incision, with the exception of the performance of an iridotomy.

As the flange extends rather further into the anterior chamber than in the classical incision, an opening in the iris tends to be a little nearer the pupil unless care is taken. A very simple manoeuvre ensures that an iridotomy is well placed and actually lies above the line of entry into the anterior chamber. This is done as follows:

The corneal lip is raised on the upper surface of the blades of a de Weckers scissors, and the iris is grasped by forceps just above the pupil margin at 12 o'clock and pulled downwards over the lens. This stretches out the iris root and raises up a small vertical fold. The de Weckers scissors is now turned so that the points are pointing downwards, and the fold is snipped just below the flange. When the iris is released its root retracts so that the iridotomy or iridotomies lie well above the line of the wound.

(6) *Closure of the Wound* (Fig. F).—The *scleral* end of one of the sutures (the central one in the three-suture method) still carrying its needle, is drawn through until the loop is straightened out. The conjunctival flap is then raised and the needle passed through from raw to epithelial surface about 1 mm. above the limbus (see side picture, Fig. F). The two ends of the thread should now be separated by an interval of about 2 mm. and tied with a surgical knot. The remaining suture or sutures are tied in the same way.

Care must be taken not to pull the sutures too tightly; the aim is simply to maintain the wound edges in apposition while healing takes place.

When the preplaced corneo-scleral sutures have been secured there is little danger of the patient extruding intra-ocular contents and, particularly if there has been some complication during the extraction such as rupture of the capsule, it is an excellent procedure again to turn down the flap over the cornea, and carefully to inspect the wound, removing any capsule or soft lens which may subsequently delay healing.

Finally the conjunctival flap is sutured back in place by three interrupted Kalt silk sutures.

It will be noted that no surgical assistant is required at any stage of the procedure.

Post-operative Treatment

The corneo-scleral sutures are removed after 10 days. The conjunctival sutures often cut out spontaneously, but any remaining are removed at the same time.

The operated eye only is bandaged and the patient is told to keep the other closed for 12 hrs. A restless patient is allowed up in 24 hrs, but normally 48 hrs rest in bed is given.

Results

This incision with scalpel and scissors has been used in 120 consecutive extractions. The most important modification adopted as the series proceeded was that the flange, originally made only in the middle 5 mm. or so of the incision, was later extended as far to the ends of the section as possible. The three-suture method was used in four cases where exceptional difficulty was expected during the immediate post-operative period, as, for example, in an operation on a certified mental patient.

Complications which could be attributed to faulty wound closure were as follows:

(1) *Iris Prolapse*.—Two cases—one on the second day and one on the 21st. The second was a case of cataract in a dislocated lens done by the three-suture method. Both patients did well after excision of the prolapse and re-suturing.

(2) *Hyphaema*.—There were three cases of recurrent hyphaema which prolonged the usual convalescence of 12 to 14 days by 1, 2, and 3 weeks respectively. After spontaneous absorption of blood there were no residual ill effects on the eyes. There were also several smaller hyphaemata which absorbed by the tenth post-operative day and did not delay convalescence.

(3) *Rupture of Wound*.—This occurred in one case on the 21st post-operative day, a week after discharge from hospital. The patient was a diabetic and the rupture, accompanied by a large vitreous haemorrhage and massive uveal prolapse, occurred during a paroxysm of coughing. The prolapse was excised and the wound re-sutured, but 6 weeks later exactly the same thing happened again. After a second re-suture the globe was preserved, but all sight was lost.

(4) *Separation of the Wound*.—This occurred in three cases, one caused by the root of the iris becoming adherent to the section, one by incarceration of the lens capsule, and the third by vitreous which oozed between the lips of the wound. The sections were well sealed by the conjunctival flap and were not interfered with. All healed firmly. The resultant astigmatism in the first case was 6D, with a visual acuity of 6/18, in the second an astigmatism of 4D, with a visual acuity of 6/12, and in the last an astigmatism of 3D with a visual acuity of 6/9 +.

There were no other complications of wound closure, such as fistula, failure to reform the anterior chamber, epithelial invasion, or secondary glaucoma.

This is far from being a satisfactory series from a surgical point of view, but the technique was experimental in the first half of the series in which the majority of complications occurred. The most important lessons learnt were the correct formation of the flange and the need to keep the direction of the sutures exactly radial in direction and not to tie them too tightly.

The material was not ideal; there were 26 patients (21.6 per cent.) aged 80 or over, twelve (10 per cent.) who were suffering from diabetes, and four (3.3 per cent.) who were certified mental patients.

Discussion

An important principle in the making of surgical wounds is to contrive that successive layers are opened in such a way that the lines of incision do not underline one another directly. The method described adheres to this tenet (see side picture of completed section, Fig. F).

The security of wound closure obtained by this technique depends on the corneal flange and the conjunctival flap and, to a lesser extent, on the tension of the sutures. In fact, the latter act mainly in the role of bridles, or stays, keeping the wound edges in apposition during the initial stages of healing. Dunnington (1955) points out that the tissues in the immediate vicinity of a corneo-scleral suture become devitalised and may become necrotic if the suture is tied too tightly. He states that the number of sutures used should be no greater than necessary to maintain apposition. It is felt that two preplaced corneo-scleral sutures give adequate security in the general run of cases, but that the three-suture method has advantages where the main concern is the possibility of exceptional strain on the wound in the first 3 days or so after operation.

A great virtue of the method is its ease of performance. Since the wound opens out as the incision is deepened, there is little danger of cutting the pre-placed sutures.

The scalpel, with the modern hollow-ground blade, gives a consistently good cut and, moreover, has a familiarity in its handling from the outset, which is very different from the prolonged discipline demanded by the von Graefe knife, or even by the keratome.

Summary

A technique of making a flanged corneo-scleral cataract section using scalpel and scissors is described.

The results of a preliminary series of 120 cases are given.

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REFERENCE

DUNNINGTON, J. H. (1955). *Trans. ophthal. Soc. U.K.*, **75**, 137.