THE TECHNIQUE OF ADVANCEMENT AND OF TENDON LENGTHENING IN STRABISMUS OPERATIONS*

BY

W. B. INGLIS POLLOCK, F.R.F.P.S.

GLASGOW

DURING the last 11 years I have been employing for my strabismus operation, a slight modification of the usual advancement operation and also of Mr. Bishop Harman's tendon-lengthening technique. For cleanliness the eyebrows are shaved and the eyelashes cut short, while the surrounding skin is covered right up to the palpebral opening by sterilized towels and gauze, and I wear sterilized indiarubber gloves. In performing the advancement operation, I use only two silk sutures to advance the muscle. These I do not now ligature to the muscle; they only hold it with a modified clove-hitch. One of the two stitches is made to pass through the other one at the centre of the muscle to prevent the tendon splitting in two.

The drawing of the hitch may be difficult to understand, but the proceeding is roughly this:—The first needle *A* is entered

FIG. 1.

FIG. 2.

from above the tendon is passed behind it, care being taken to include all the deeper fibres of the muscle or tendon, and is brought out in the middle of the tendon as far back as is necessary. It comes through the conjunctiva at the posterior margin of the opening in the conjunctiva. A similar stitch *B* is inserted from below the tendon, and brought up slightly above the first stitch

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which has not yet been hitched. The first needle *A* is again placed in the needle holder and held by the right hand. With the left hand, the terminal end of the stitch *T* is raised, which is kept taut. The needle is then passed behind the terminal *T* portion from below, is carried above it and inserted in front of it to take about one-third of the tendon from the surface and to come out on the under surface just a little in front of the terminal portion of the stitch. The stitch is again tightened, and the two ends are laid down on the piece of clean gauze which has been placed round the palpebral opening.

The lower stitch *B* is taken and the needle *B* put into the needle holder and held in the right hand, but the lower end of the stitch *T*₂ is lifted by the left hand and held firmly. The needle is passed behind and below the terminal portion, and again inserted into the tendon muscle, one-third from the edge and just in front of the terminal portion of the stitch, the needle being brought out to *B*₁ below the tendon. The stitch is then tightened and laid down below the eye. The needle holder is now laid aside, and the two stitches, the higher and lower including their terminal portions, are taken up in the left hand, while the right hand with a pair of scissors cuts the rectus muscle in front of the two stitches.

The usual procedure is then adopted. The eyeball is steadied by holding the tendinous insertion in the muscle with a strong pair of forceps, and the first needle *A* is entered into the episcleral tissue near the cornea. The lower stitch *B* is inserted in a similar manner. The assistant with a pair of hooks draws the upper stitch upwards and the lower stitch downwards, and the insertion of the portion of the tendon attached to the eye is excised. When the two stitches are tightened—one above and one below the muscle—the tendon is advanced from one-eighth to three-eighths of an inch, allowing for the amount which has been cut off as well as for its advancement to its new insertion.

As the original insertion of the stitches includes both the anterior and the posterior margin of the opening in the conjunctiva, it is obvious that when the stitch is drawn tight, the muscle is advanced and the opening in the conjunctiva is closed. The advantage of this procedure is that when the House Surgeon or Sister removes the stitch, one cut above the conjunctiva is sufficient and the whole stitch comes out without any cut being needed at the edge of the tendon under the conjunctiva.

A Modification of Mr. Bishop Harman's Operation

During the last 11 years I have also been employing for my strabismus operations a modification of Mr. Bishop Harman's tendon-lengthening, when it is required as an addition to the usual

advancement operation of the opposing muscle. In his well-known operation, he exposes the tendon to be lengthened, and places a small plate under the muscle on which millimetres represent an approximate angle of rotation of the eyeball. The tendon is then divided on each side of the plate on the superior side, while the inferior cut is made on the plate. The conjunctiva is closed by sutures.

In my modification, the necessity for sutures is done away with because the entire procedure is done subconjunctivally. An opening is made through the conjunctiva above the superior margin of the affected tendon. A strabismus hook is next inserted and brought out below the tendon, where a second opening is made in the conjunctiva slightly behind the place where the hook is pointing. A second strabismus hook is inserted under the tendon so that its point appears above the tendon. The two hooks are then separated about 10 to 15 mm. The assistant holds the anterior hook while I keep the posterior one, and I place the strabismus scissors behind the posterior hook to give a peripheral cut at the vertical margin to at least half the tendon. The scissors are then moved and placed in front of the anterior hook, and a second vertical cut is made on the upper margin to at least half the tendon. The scissors are introduced at the lower margin of the tendon and a cut on the inferior surface between the two superior cuts is made. The inferior cut has to be lengthened or shortened according to the desired amount of rotation of the eyeball. In this operation a bandage to prevent haemorrhage is necessary, but no conjunctival stitches are required.

For advancement operations the conjunctiva must be free from bacteria, and when it is difficult to obtain absolute cleanliness, I sometimes do a tendon-lengthening operation on one or both internal recti for convergent squint; and the same for one external rectus in divergent squint. If more is required I wait until the conjunctiva is absolutely clean before advancing the opposing muscle, because an infected stitch means a slipped muscle and a worse strabismus than before operation.

Summary

During the last 11 years, I have been using a clove-hitch to attach the stitch to the rectus muscle for advancement operations. Two stitches are employed. The advantage of this procedure is that the only knot for each stitch is outside the conjunctiva. The muscle does not require to be exposed for removal of the stitch because one cut brings the entire stitch out.

In tendon-lengthening, I employ two hooks slipped through small openings in the conjunctiva—one above the tendon and the other below. The two hooks are then separated by 10 to 15 mm. Two cuts are placed at one side of the tendon—one in front of

the anterior hook and one behind the posterior. The intervening cut on the opposite side of the tendon is done between the two hooks; this proceeding, being subconjunctival, does not require sutures, and the dressing is only applied for 24 hours to arrest haemorrhage.

A NEW STRABISMUS FORCEPS

BY

G. HANDELSMAN

SENIOR HOUSE SURGEON, ROYAL EYE HOSPITAL

It is well known that in operations for advancement Prince's forceps have been used for many years to hold the muscle involved. In my opinion these forceps do not permit of that light ease of adjustment which is desirable, nor are they easily manipulated.