THE FLOSS SILK LATTICE POSTERIOR REPAIR OPERATION FOR DIRECT INGUINAL HERNIA

BY

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This posterior reconstruction operation is not new, nor is it original in any of its essential features. It is in many respects similar to the Gallie method (Gallie and LeMesurier, 1924)—except that here silk is used instead of fascia lata and the pattern of the darn is different—and to the darn-and-staylace procedure which was first recommended and practised with such success by Sampson Handley (1918). In recent years the silk lattice repair has been sponsored by Ogilvie (1937), myself (Maingot, 1940), and others. Since 1934 it has been the method of choice at the Southend General Hospital for all cases of direct inguinal hernia, and we have also employed it for many cases of large oblique inguinal hernia in which the margins of the internal ring and the posterior wall of the inguinal canal have been unduly stretched and the muscles somewhat atrophied.

The final results of this operation when skilfully performed in the manner about to be described have proved so gratifying that they have been almost too good to be true. We have preferred floss silk to other suture material, such as chromic catgut or Pearsall's No. 4 Chinese twist silk. Floss silk is stronger than strips of fascia lata; it remains, of course, unabsorbed in the structures in which it is buried, but it produces no tissue reaction, and eventually becomes incorporated in fibrous tissue. Each strand is composed of many gossamer-like fibrils loosely bound together, and it is not a difficult matter for the fibroblasts to work their way between the fibres and to permeate the new scaffolding with strong white fibrous tissue. The floss silk which we used for our first series of cases was prepared specially for us by Messrs. Arnold and Sons. This was boiled for four hours, and a strand some twenty inches in length was then twisted around a glass rod which was immersed in a hermetically sealed glass tube containing absolute alcohol. Just before use the silk was removed from the tube, dipped into warm normal saline solution, and then thoroughly rinsed in doubly distilled water to rid it of all traces of alcohol. Since the outbreak of the war, however, we have been content merely to boil the strands of silk for some two to four hours before use and then keep them in sterile containers filled with distilled water. We have not immersed the boiled silk in paraffin, glycerin, or other chemical solution before use, as we believe that the employment of these would predispose to tissue reaction, with the outpouring of serum—a most undesirable contingency.

In the conduct of this operation we insist upon the most scrupulous asepsis, haemostasis, gentleness, and tidiness.

Technique of the Operation

The usual incision is a straight one placed parallel to the inguinal ligament and about half an inch above it, and extending from one inch lateral to the internal ring to a point overlying the centre of the external ring. This incision gives direct access to the structures of the inguinal canal, but as it cuts across the lines of stress it sometimes leaves an ugly stretched scar which may be keloid. A more transverse incision, placed in the natural crease in this region, to be preferred. This starts an inch or so

below the anterior superior iliac spine and extends inwards, crossing the inguinal ligament at the junction of the middle and inner thirds, passing to within an inch of the midline, and terminating one and a half inches above the symphysis pubis.

The incision is deepened and the superficial femoral vessels are identified, clipped, divided, and then ligatured with No. 000 plain catgut, after which the subcutaneous tissues are separated down to the shiny aponeurosis. "Tetra" cloths are affixed to the skin margins to isolate the field of operation completely. The upper skin flap is picked up with a pair of toothed dissecting forceps and dissected first upwards to expose a wide area of the aponeurosis and then in a lateral direction for two inches beyond the internal ring. The lower flap is cautiously freed in order to display the inguinal ligament and the attachment of this ligament to the pubic spine.

The external ring should be freely displayed, after which an incision one-half to one inch long is made in the aponeurosis in line with the pillars and an inch or so from the point where they diverge. This incision is lengthened laterally for two inches or so, while medially it cuts across the stretched fibres of the aponeurosis and the lacing transverse bands of the intercolumnar fascia.

The upper leaf of the aponeurosis of the external oblique muscle is clipped with artery forceps and retracted upwards and inwards in order to free it from the underlying cremaster muscle and the arching fibres of the internal oblique muscle and to display the outer border of the rectus sheath as well as the insertion of the rectus muscle from the pubic bone. The lower leaf is then likewise clipped and retracted downwards and outwards to display the recurved medial aspect of Poupart's ligament and its point of insertion into the pubic spine.

In the upper part of the wound the ilio-hypogastric nerve will be seen coursing downwards to disappear in the region of the pubis, while a little below this, lying on the surface of the cremaster, is the ilio-inguinal nerve, which must on no account be damaged during the subsequent dissection.

In the case of a long-standing oblique inguinal hernia with an unusually large sac and a wide neck, the sac is isolated from the cord and the neck of the sac is clearly defined at the internal ring, twisted, ligatured, and divided. In the case of a direct inguinal hernia I make it a rule neither to disturb the sac in any way nor to attempt to ligature or invaginate it.

The object of the operation is to produce a solid, flat, uniform fibrous silk sheet to protect the whole of the posterior wall of the inguinal canal and at the same time to provide a suitable aperture for the passage of the cord at a newly reconstructed and more laterally placed internal ring. This is obtained by constructing a lattice with a twenty-inch strand of floss silk threaded on a small curved round-bodied trocar-pointed needle. The cord is lifted upwards and out of the way in the loops of Morant Baker forceps and the suture is introduced by taking a good bite of the deep aspect of Poupart's ligament, first of all at its point of insertion into the pubic spine and then through the lateral tendinous fibres of the rectus muscle at its origin from the body of the pubis.

The end of the suture is not tied at this stage, but is left long and caught up in the jaws of artery forceps. The suture is then continued in a lateral direction—i.e., towards the internal ring—taking first a bite of the ilio-pectineal ligament, then of the recurved edge of the inguinal ligament, including Gimbernat's ligament, then a bite on each side of the cremaster, then of the conjoined tendon, and then back again to the ilio-pectineal ligament and Poupart's ligament. Cooper's ligament is approximated to the innermost margin of the inguinal ligament to obliterate the

crural canal, thereby guarding against the possible subsequent formation of a femoral hernia.

When the crural canal has been efficiently closed from above, the suturing is continued laterally, the conjoined tendon and internal oblique muscle being drawn over to the recurved edge of Poupart's ligament until the internal ring is reached. The stitches are placed almost vertical and side by side, and must not be pulled upon in such a way as to strangle the tissues or to drag the inguinal ligament out of its normal alignment. When the internal ring is approached the cord is drawn firmly outwards and slightly downwards by making traction on the Morant Baker forceps, and the upper and outer margins of the internal oblique are retracted upwards and outwards. The internal ring—or rather the *new* internal ring—should always be reinforced, and in placing it as far as possible from the external ring care should be taken not to compress the cord unduly at its point of emergence from the abdomen. This reinforcement is best carried out as follows:

The floss silk is knotted or locked on the curved edge of the internal oblique, just above the reflected cord. It is carried transversely across above the cord, passed through the internal oblique muscle and locked, and then passed downwards to pick up the edge of the inguinal ligament lateral to the cord. Lastly, three sutures are repeated in the reverse direction, being knotted or locked at each angle so that the emerging cord is buttressed and surrounded by a double ring of reinforcing floss silk. From this point the suture is carried towards the medial end of the canal with a wider transverse, picking up the external oblique muscle or conjoined tendon and anchoring this structure to the inguinal ligament.

At the extreme medial point of the canal the free end of the suture, after once again passing through Gimbernat's ligament, through the periosteum of the pubic spine, and through the dense fibres of the origin of the rectus muscle, is tied to the end which was left long and is steadied with artery forceps. The edges of the aponeurosis of the external oblique are then sutured behind the cord, using a continuous suture of No. 00 twenty-day chromic catgut, thus placing the cord subcutaneously. The wound is now closed.

In order to avoid the formation of dead spaces in which serum may collect and thus predispose to infection, stitch abscess, and so forth, the subcutaneous tissues and the fasciae of Scarpa and Camper on each side of the wound are evenly and accurately approximated with a series of closely placed interrupted sutures of the finest plain catgut. The skin edges themselves are closed with vertical mattress sutures of deknatel or fine silk and a few Michel clips, after which a simple gauze dressing is applied, this being kept in position by means of a broad piece of flexible elastic strapping. The Michel clips are removed at the end of forty-eight hours and the skin stitches on the fourth day. It is most important to keep the patient in bed for a period of not less than three weeks.

Conclusion

It will thus be seen that much importance is attached to strengthening the whole of the posterior wall of the inguinal canal, especially its medial aspect, where recurrence is so prone to occur, and to closing the crural canal from above, thereby preventing the possibility of a subsequent femoral hernia such as is sometimes seen following even a most thorough operation for direct inguinal hernia.

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Clinical Memoranda

Herpes Zoster with Muscular Paralysis and Disturbance of Sensation

In the *Journal* of February 15 (p. 234) Drs. Carter and Dunlop drew attention to instances of paresis following upon herpes zoster. A case of like nature under my care is of interest on account of the severity and wide distribution of the motor and sensory disturbances which have accompanied the herpetic symptoms.

CASE REPORT

The patient, a man aged 68, was apparently vigorous and healthy, with no history of previous illness of importance. The Wassermann reaction was negative. In October, 1940, he had an attack of pain in the neighbourhood of the left hip and thigh and the outer aspect of the left leg; this was accompanied by an eruption of herpetic vesicles on the left buttock and by a simultaneous foot-drop on the left side. The general symptoms were slight, and he was able to continue at fairly laborious work. The pain was troublesome for about two months and then gradually subsided, so that at the end of three months it amounted to little more than discomfort. The pain was not aggravated by bending down and did not interfere with his work, and was thus unlike that usually present in sciatica.

The case came under my observation on February 11, 1941, four months after the onset. On examination the scars of a few herpetic vesicles were present on the inner part of the left buttock. All the muscles of the left thigh and leg exhibited a generalized wasting, moderate in grade, with the exception of the anterior tibial group, where the wasting was extreme. The tibialis anticus, extensor longus digitorum, and extensor proprius hallucis were paralysed, with reaction of degeneration and resultant complete foot-drop. No paresis was observed in other muscle groups. Both knee-jerks were active; the left ankle-jerk was diminished, and the right ankle-jerk still more so, being barely perceptible. Hyperaesthesia was present on the outer and anterior aspects of the left leg, with patches of hyperaesthesia along the anterior and posterior borders of this area. Hypo-aesthesia of higher grade, involving both pin-prick and light touch, was also present on the dorsum of the left foot, extending from the ankle-joint to the root of the toes. There was no disturbance of sensation in the neighbourhood of the site of the herpetic vesicles on the left buttock.

On March 11, one month from the previous examination and five months from the onset, there was distinct evidence of amelioration of the symptoms. Tonus was now present in the anterior tibial group of muscles, assisted by faint voluntary power in the peroneus tertius, which had previously been inactive. The hypo-aesthesia of the leg had been replaced by hyperaesthesia, particularly in the form of tingling on percussion. The hypo-aesthesia of the dorsum of the foot was unchanged.

COMMENTARY

The motor and sensory symptoms do not correspond to the distribution of peripheral nerves, and they have not the character of a root syndrome. The paralysis of the anterior tibial muscles corresponds to a lesion of the L4 and L5 segments, the sensory changes in the leg and foot to the S1 and S2 segments, and the herpetic symptoms to the S3 segment. Taken together the features are those of a diffuse affection of the cord, almost entirely on the left side, involving both the motor and sensory regions of the lower lumbar and upper sacral segments and the root ganglion of the third sacral. Such widespread symptoms are in accordance with the diffuse pathological changes described in Lhermitte, as quoted by Carter and Dunlop.

Notwithstanding the severity of the paralysis of the anterior tibial muscles the evidence of regeneration leads to the expectation of some measure of ultimate recovery.

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