

HERNIA

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by

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Hernia appears to be very frequent amongst our population. Whether it is more frequent than it is in other countries I am unable to say, and I do not think that the congenital factors which cause hernia occur more often here. The only factors I can think of, which, perhaps are more often met with amongst us, are the habit of many of the labouring classes to wear a sash or "terha" round their waist, and the tendency to adiposity. The sash prevents the bulging forward of the abdominal wall on bending forwards and causes a rise in abdominal pressure which is directed to the lower part of the abdomen and the inguinal regions. Adiposity interferes with the defences of the inguinal canal as will be discussed later.

In order to repair hernia efficiently an appreciation of the causation and anatomy are absolutely necessary.

CAUSATION. In order that a hernia may develop, two factors must concur viz., intrabdominal pressure and weakness of the abdominal walls. These factors are complementary, but both must be present in some degree; and, in point of fact, even in normal conditions they are; since the intrabdominal pressure is always plus and the passage of the processus infundibuliformis and the testis and cord in the male, and the round ligament in the female, create a breach in the walls of the abdomen. That a hernia does not occur more often is due to the fact that the breach is adequately defended.

THE DEFENCES OF THE INGUINAL CANAL. The first line of defence is the *obliquity* of the inguinal canal. The internal and external rings do not lie opposite each other, but are separated by the length of the inguinal canal so that, when-

ever there is an increase in the intrabdominal pressure, the posterior wall is closely applied to the anterior and the canal is blocked. This valve-like action depends on the aponeuroses, that of the external oblique in front and the transversalis or endo-abdominal fascia behind. The muscles interpose a shutter of actively contracting tissue especially at the external and internal rings when one or the other of the fasciae is deficient. The muscles also support the middle part of the canal between the two rings. During contraction the arch of the internal oblique and transversalis above the canal is flattened and these muscles come down to the inguinal ligament. The interposition of actively contracting muscle between the aponeurotic walls of the inguinal canal affords most important support since fascia, though resistant, is inelastic and if overstretched is unable to return to its former position, whereas muscle allows itself to be stretched, but immediately recoils as soon as the stretching force ceases to act.

The cremaster muscle by its contraction pulls up the cord and is able to counteract any downward thrust transmitted through the cord. The defences of the inguinal canal, therefore, can be summarized as a valve like action of the aponeurotic walls and a sphincter like action of the muscles.

LYTLOE (1945) has described a sort of fascial sling which, during contraction of the abdominal muscles, pulls the internal ring upward and outward, under cover of the internal oblique and transversus muscles. I have not been able to make out this sling; transverse fibres do thicken the endoabdominal fascia on the medial and superior parts of the internal ring, but they seem to be deficient below and laterally; moreover observation during opera-

tions under local anaesthesia, show that it is the muscles that move down and cover the ring; the fascia on the medial side of the ring appears to be too taut to allow any outward and upward movement.

A breakdown in the defences of the inguinal canal is likely to be followed by the formation of an inguinal hernia.

By far the commonest cause of weakness of the inguinal region is the imperfect obliteration or non-obliteration of the processus infundibuliformis. The presence of a preformed sac interferes with the valve-like action of the aponeuroses which sooner or later are wedged apart by omentum or bowel within the sac. A lobule of fat which is often found in the canal also acts in this manner and frequently is a cause of hernia. This lobule of fat is not derived from the subperitoneal fat, and lies outside the internal spermatic fascia; it seems to be derived from fat along the lower border of the internal oblique or transversus muscles to which its pedicle is attached.

Maldevelopment of the Internal oblique and Transversus muscles deprives the medial part of the fascial posterior wall of the inguinal canal of its muscular support. The wall gives way resulting in the usual type of direct hernia which begins as a diffuse bulge forward of that part of the posterior wall of the inguinal canal between the internal ring and the public spine.

In such cases the internal oblique and transversalis muscles arch high up over the cord, the conjoint tendon is ill-developed or may be absent, the muscles being inserted in the linea semilunaris. The lower borders of the muscles are thin, and mainly aponeurotic. It appears that the posterior wall begins to give way at the extreme lower border just at the attachment of the transversus fascia to the inguinal ligament and the pelvic fascia. When, at operation, the coverings split transversely to form an upper and a lower flap, the upper flap is thick and consistent, with many bundles of

fibres running transversely, while the lower flap is thin, flimsy and transparent. Between this covering and the peritoneal sac, there is usually a more or less abundant layer of fat which in obese subjects is of considerable thickness, and in cases of some duration may contain on its medial side part of the bladder wall.

It is remarkable that this type of opening never merges with the internal abdominal ring even when the latter, as is not uncommon, gives passage to a small processus infundibuliformis; but the two are always separated by a septum of fascia. With time, the bulge may develop a diverticulum where the external abdominal ring leaves it unsupported, this diverticulum protrudes through the ring and may even find its way to the scrotum.

There is a different and much rarer type of direct hernia of which the genesis is altogether different. It has been called "Funicular hernia" by Ogilvie and others. In this type the protrusion occurs through an opening, more or less circular, in the transversus fascia forming the posterior wall of the inguinal canal usually in its medial half. The opening is surrounded by a circular ring of fibrous tissue. This hernia is formed by the protrusion of a lobule of subperitoneal fat through a congenital hiatus in the fascia, the protrusion becomes larger, widens the opening and then pulls behind it a small diverticulum of peritoneum which becomes the sac.

OPERATIVE TREATMENT OF HERNIA. Many attempts to treat hernia by operation have been made, but a really effective treatment dates from the time of Bassini, Marey, Halsted.

For some reason or other it was the Bassini operation that attracted most followers and a time came when Bassini became synonymous with operation for hernia.

Eduardo Bassini was born in Pavia in 1844. His parents were well to do, and he qualified from the University of his native town in 1866 when he was twenty two

years old. Soon after he qualified he joined Garibaldi's army as a combatant soldier and was wounded and taken prisoner at the battle of Villa Gloria during the assault on Rome which was defended by French troops. He was freed at the end of the war and returned to Pavia. But his wound, a bayonet wound of the abdomen that had given rise to a faecal fistula, still gave him trouble and it was two years before it finally healed. He then entered the Clinic of Porta who was the chief surgeon, at Pavia, and also attended the Institute of Pathology where he came under the influence of the famous Golgi.

In 1873 he undertook a tour of study in foreign clinics during which he visited the clinic of Bilroth in Vienna, that of Langenbeck in Berlin and that of Nussbaum in Munich; he then went to London to the clinics of Lister and Spencer Wells. Back from London he was appointed surgeon to the hospital in Spezia whence he went to Padova as Professor of Surgery and substituted Vanzetti in the Chair of Clinical Surgery. During this period he introduced Listerian principles and was one of the first to practice antiseptics in Italy.

In 1888, at the age of forty four years he became Professor of Clinical Surgery in the University of his native town of Pavia. In 1919, on reaching the age limit of 65 years, he retired and he died of angina pectoris on the 20th July 1924.

It was during the period between his return from abroad and his appointment to the Chair at Pavia that Bassini worked out the technique of his operation for hernia, which he published in the *Archives fur Klin., Chirurgie* (1890, Vol. 40 p. 429), then the leading surgical periodical in the world.

The operation attracted immediate attention and Bassini's Clinic in Pavia became the Mecca of Surgeons both from Italy and abroad who came to witness the operation at the hands of the master. Quickly it spread throughout Europe.

Bassini's operation has recently been

strongly criticised because in many cases it has been found wanting. Much of this criticism is undeserved. It is the surgeons who carried it out in unsuitable cases, where it was bound to fail, who should be criticised or, perhaps, even more those surgeons who ignored a fundamental principle introduced by Bassini himself, and for which he deserves great credit; that in operative Surgery the tissues should be cleanly dissected and sutured layer by layer. In the operation for hernia, Bassini insisted that the sutures between the lower border of the Int. Oblique and Transversalis and the inguinal ligament should include the transversalis fascia, because as he pointed out, unless the sutures include the fascia, they cut out and the hernia recurs.

Since the publication of Bassini's and Halstead's papers numerous new operations have been proposed differing from the standard operations of Bassini and Halstead mainly in points of detail and the bibliography of hernia has grown enormously.

Most of these proposed methods have already fallen into oblivion, but from time to time important new principles have been introduced to meet special conditions. Harold Edwards (1943) in his masterly review gives a list which he calls "The Hernia Calendar".

The most important modifications which have been introduced since Bassini and Halsted's papers, fall into three groups:

Group I: In which autogenous fascia used.

- a) Mc Arthur (1904) uses pedicled strips from the aponeurosis of the External Oblique.
- b) Gallie and Le Mesurier (1924) use free strips cut from the fascia lata.
- c) Flaps of fascia, free or pedicled, as patches.

Group II: In which foreign bodies are introduced.

Mc Gavin (1909) and Cole

use silver filigree.
 Maingot sutures with floss silk.
 Tantalum gauze.
 Mair uses a free strip of skin.

Group III: Which involve the complete closure by suture of the inguinal canal and the transplantation of the cord elsewhere. Andrews transplants the cord between flaps of the External Oblique into the subcutaneous tissue and Schmieden pushes the testes and cord through the muscular part of the internal oblique and transversalis and closes the canal completely.

In planning the operative procedure for a hernia, it should be borne in mind that hernias differ from one another. It has already been pointed out that hernia is the result of the concurrences of two sets of factors, the anatomical and the mechanical. Surgery has no direct control over the mechanical factor; its role is the correction of the anatomical factor, in other words of the restoration of the defences of the inguinal canal. The aim of the surgeon in dealing with a particular hernia is to find out in what way the anatomy of the region has departed from normal and to apply the appropriate remedy. It follows, therefore, that there can be no set operation for hernia to be used indiscriminately, but each particular hernia is to be treated by the appropriate procedure. It follows also that many of the statistical tables published which purport to give the results of a proposed operation are of little value unless accompanied by a detailed statement of the type of cases on which it has been carried out.

OPERATION TECHNIQUE

With the exception of special types of hernia only occasionally met with, ordinary

hernias can be classified into a) **OBLIQUE** and b) **DIRECT**. These require quite a different operation.

OPERATION FOR OBLIQUE HERNIA

The anatomical defect in the great majority of oblique hernias is the preformed sac and therefore, its complete removal is the first step of the operation, a step which is common to all types.

The second step is to ascertain if the internal inguinal ring has been widened, and to what extent. Three degrees may be recognised. The ring may be widened only slightly, such as occurs in recent hernias in infants and young persons. When the hernia has been of long standing the ring is widened towards the medial side, the fascial floor of the inguinal canal becomes lax and bulges forward giving rise, in extreme cases, to what has been described as an indirect direct hernia. This may be called the second degree. In the third degree which is met with in old standing hernias both the internal and the external rings are widened so that they overlap in part or completely. Such a condition is usually accompanied by some degree of pressure atrophy of the muscles and the inguinal canal has lost all its defences.

The second step of the operation should be the repair of the gap in the endoabdominal fascia caused by the widened internal abdominal ring.

When the ring has been only slightly widened it will be found that the fascia is adherent to the neck especially on its superior and medial aspect, and when the sac is pulled up prior to ligature, a sort of funnel of fascia is pulled up with it. If the transfixing suture is passed through this part, the ligature of the sac will also close the widened part of the ring, and effectively repair the fascia. When the muscles are in good condition and the stump of the sac retreats behind the muscles this is all that is necessary. The external oblique aponeurosis is sutured and the

operation is concluded.

In widening of the second degree the fascia requires closing separately. There are various ways of closing the gap. The most efficient way is by a stitch which may be called the purse string Usuture. The borders of the widened Internal ring are defined, picked up in forceps and a purse string suture is passed through the medial and upper borders. The ends of this suture are passed under the fascia and muscles on the lateral side and brought out through the muscles about one inch from the ring, pulled taut and tied. This ligature takes up the slack so that the fascial floor of the inguinal canal again becomes taut, at the same time the opening through which the cord passes is pulled up under cover of the muscles. If the muscles are in good condition again this is all that is necessary, but in most cases the muscles have undergone some pressure atrophy and in such cases it is well to make use of the cremaster muscle and fascia and to pull them up under the border of the internal-oblique by one or two U sutures and then to suture the lower border of the internal oblique to the inguinal ligament so as to extend downwards and inwards its origin from this structure as in the original method of Halsted. In this way adhesion will occur between the superficial layer of the cremasteric fascia and the fascia covering the internal oblique.

In the third degree of dilation where the internal and external rings come to lie almost one on the other, the posterior wall has to be reconstructed in order to restore the obliquity of the canal.

These cases require the original Bassini procedure namely suture of the conjoint tendons and muscles, together with the Transversus Fascia, to the Inguinal ligament deep to the cord with the following additions.

1. The Cremasteric fascia and what remains of the transversus fascia on the lower side of the opening are imbricated under the superior flap of muscles and

fascia as in the Halsted operation.

2. The upper flap, consisting of what remains of the conjoint tendon, internal oblique and transversus muscle with the transversalis fascia, are sutured to the inguinal ligament deep to the cord by means of linen or silk sutures and of a strip of fascia from the external oblique as in the Mc Arthur procedure.

3. If, owing to atrophy the upper structures cannot be approximated to the inguinal ligament; a relaxation incision through the anterior layer of the rectus sheath prolonged outward as necessary according to the procedure of Scot and Tanner (1942), is added so as to relieve tension.

4. In extreme cases strips of fascia lata are used but since the relaxation incision has been practised the use of fascia lata strips has become very infrequent.

The imbrication of the cremasteric fascia under the upper flap serves two purposes. First, it provides broad surfaces for union and secondly, by interposing a continuous layer of fascia, it prevents the subperitoneal fat from insinuating itself between the fascia sutures and starting a recurrence. Ordinary sutures are used in addition to the fascial sutures since fascia is slippery and apt to slide in the first four days. The stay sutures take the strain and prevent this sliding until the fascial strips heal. In cases of large hernias in elderly people it is of advantage to remove the testicle and cord and to obliterate the canal completely.

DIRECT HERNIA

The anatomical factor which, usually, is responsible for a direct hernia is a maldevelopment of the Internal oblique and transversus muscles which, in their lower edge, are aponeurotic rather than muscular and inserted in the outer border of the rectus sheath. The conjoint tendon is poorly developed or even non existent; and the fascial posterior wall of the inguinal canal, between the internal ring and the pubic spine its deprived of its muscular support

and bulges out. As already pointed out the giving way occurs at the extreme lower border just above the inguinal ligament.

The surgical problem in such cases is to reattach the lower border of the fascia. Experience shows that simple suturing fails in many cases and something more is necessary to make the re-attachment permanent.

The following procedure has been adopted and has given satisfactory results:

OPERATION FOR DIRECT HERNIA

When the external oblique aponeurosis has been split and the cord retracted down, the protrusion is defined and held up by two Allis forceps. The fundus is split in the direction of the inguinal canal so as to fashion two flaps; an upper (cephalad) and a lower (caudad).

The peritoneal sac, which usually is covered by a considerable amount of fat and which often has the bladder on its medial side, is lifted up and unless it is small, is removed with the fat that covers it, the bladder having been previously separated. The opening is closed by a purse string suture introduced previous to the excision. The lower flap, usually thin and flimsy, is imbricated under the upper flap by mattress sutures. The upper flap, after trimming when necessary, is then sutured to the lower edge of the inguinal ligament by silk or linen sutures and also by fascia according to the McArthur or the Gallie technique. In this manner the lower flap which often is so thin that it will not hold sutures is used to cover the gap with a continuous layer of fascia, which effectually prevents the subperitoneal fat from insinuating itself between the sutures and starting a recurrence; at the same time providing broad fascial surfaces for union as pointed out in describing the operation for large oblique herniae.

The passing of the fascial sutures in the Mr. Arthur technique is rendered easy by the use of a special fascia carrier, made for me by Down Bros. of London in

1929. It is a modification of the ordinary ligature carrier, with jaws having the size and shape of a large Gallie needle when closed, serrated at the tip with a catch on the shanks. The point is non-cutting. The instrument is introduced closed, and when through, it is opened just enough to grasp the end of the strip of fascia which is then easily pulled through. The end of the strip is passed under the last stitch, doubled back and fixed with a silk suture. The advantage of using the instrument is that the strip of fascia can be utilised up to the last fraction of an inch. To avoid tension a relaxation incision is used.

The second type of direct hernia which has been called the funicular type and which consists of a protrusion of fat through a hiatus in the fascia transversalis; is treated by isolation of the protruded fat, its ligation and excision. When the stump is reduced the margins of the opening appear. The opening is closed by imbricating the edges on the lines of the Mayo operation for umbilical hernia.

SLIDING HERNIA

Sliding hernia presents a complicated problem. The presence of bowel adherent to or incorporated in the wall of the sac is an obstacle to the procedures described. Moreover, the presence of a sliding hernia indicates that the defences of the inguinal canal have broken down completely. The sac can be dealt with in one of two ways. When the segment of gut, incorporated in the wall of the sac is not large, the sac wall is divided a short distance from the bowel on either side, right down to the neck: the two flaps thus formed are sutured behind the bowel so as to cover with peritoneum the raw surface. The bowel is then reduced and the sac dealt with by ligation and excision. The stump is transplanted under the muscles.

If the slide is large the best way of dealing with it is to open the peritoneal cavity by a separate incision through the lower part of the rectus sheath, pull up

the bowel from above, thus everting the sac in the peritoneal cavity when it becomes the mesentery of the sliding bowel and fix it to the region of the wound so as to keep it away from the neighbourhood of the ring during healing.

In both instances the canal is reconstructed as in large hernias. These cases require fascial sutures and in elderly people with large hernias it is wise to excise the testicle and cord and close the canal completely.

It is not possible to provide statistical support for the operations described for which no claim for originality is made. They have been in use since 1929. In 1939 when time was ripe for a follow up World War II broke out and in 1940 the siege caused about a scattering and a redistribution of the population which made a later follow up impossible.

The only indication of the efficacy of

the procedures described that can be given is the very low recurrence rate. With an average of 400 to 500 operations a year not more than 1 or 2 recur. It may be objected that this is not a reliable index because patients with recurrent hernia may not, and often do not return to the same surgeon. This, however, does not apply to Malta because the Government hospital draws its patients from the poorer section of the community who have nowhere else to go if the hernia recurs.

No originality is claimed for the methods described.

It is emphasized that hernias differ in their anatomy and in the way they are formed and that for each case an appropriate procedure is to be adopted with the ultimate aim of removing the sac and of restoring the defences of the inguinal canal which prevents recurrence.

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