An Address

ON

THE MODERN TREATMENT OF HERNIA.

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BY

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THE treatment of hernia is a well worn subject, and one which cannot be dealt with to any purpose without introducing some technicalities. I dare to hope that even these will not prove uninteresting, since upon them depends the success or failure of the treatment of conditions which are seen so commonly by every practitioner of medicine or surgery. It can also be claimed that important advances in surgical treatment have been made in very recent times, and I may be able to bring to your notice methods which are still but little known. Although the subject is so well worn that surgery might be thought to have arrived almost at the point of final standardization, and that the results had been brought as near to perfection as might be, yet I have an uneasy feeling that we are rather further from attaining perfection than is commonly supposed, and that the economic loss to the community from the prevalence of all forms of hernia is still much greater than it ought to be.

Since 1919 I have worked at the City of London Truss Society in Finsbury Square, a charity which during the last 120 years has dispensed appliances for the treatment of hernia to some three-quarters of a million patients. We still see several thousand patients each year, but it is, of course, obvious that the advance of surgery has greatly reduced the need for the use of trusses. A large proportion of our patients are past middle age, for nearly all the younger patients now obtain treatment by operation at the hospitals. The very existence of trusses is to some extent a confession of surgical failure, but I think there will always be some scope for their use, although it will contract year by year. It is my experience at the Truss Society which has given me the slight uneasiness already mentioned. An apposite story is related of John Langton, one of my distinguished predecessors in Finsbury Square. The incident took place at a meeting of the Royal Medical and Chirurgical Society, a precursor of the Royal Society of Medicine. A discussion turned on the results of the operation for the cure of hernia, and a surgeon assured the meeting that the hernias operated on by him never recurred. Langton thereupon rose to his feet, pulled out of his pocket a paper on which was written a list of the patients he had seen at the Truss Society with recurrent hernias and the names of the surgeons who had done the operations. "Your name, Sir," he said, "stands at the head of the list." The moral of the story, I fear, still holds good, for patients who have been disappointed in what they were led to expect was going to be "radical cure," tend to gravitate to the Truss Society rather than to return to the surgeon whom they regard as responsible for their disappointment. During the last ten years a record has been kept of patients with hernias that have recurred after operation; over 350 such patients have been seen, although this record is probably not quite complete.

Truss Society, 1917-1926.

Recurrent hernias:

Inguinal...	275
Femoral...	90

365

Clearly, therefore, there is still room for improvement in surgical technique. To some extent the result may perhaps

be explained by the fact that there is a tendency for hernias to be operated upon at hospitals by the more junior operators, but I am sure that the blame can only be very partially shifted in this way. I believe that very few of the simpler cases of hernia dealt with by routine operations will show a recurrence. The failures are due rather to a lack of elasticity in the methods in general use, so that the more difficult technical problems are not always met by adequate adaptability on the part of the operator.

In the past, as the literature shows, an immense amount of ingenuity has been expended upon the details of ordinary operative procedure. I do not propose, however, to cloud the issue by dwelling on a great variety of methods of performing a routine operation for, say, congenital oblique inguinal hernia. I wish instead to direct attention to the comparatively few variations which I have introduced into my own practice for dealing successfully with the more difficult problems. I shall survey in succession the treatment of inguinal, femoral, umbilical, and ventral hernias.

INGUINAL HERNIA.

In operating on an ordinary oblique inguinal hernia I believe that the prime necessity is the complete removal of the sac, and that the other details of the operation are of small account. The difficulties will arise in treating direct inguinal hernias and oblique hernias in older patients

whose muscles are atrophied and internal abdominal rings stretched. In the second type the conditions have approximated to the direct inguinal hernia, the deep epigastric vessels having been pushed towards the pubic spine. It is the close relation of the direct hernial sac to the pubic spine which is the chief cause of the difficulty in retaining the hernia by means of a truss. Patients with these hernias are often thin, and a truss-pad covering the whole area of the protrusion almost inevitably impinges on the pubic spine, and is thus rendered both inefficient and painful. Operation is therefore to be recommended for these

patients, but if the routine operation for inguinal hernia is performed recurrence will almost certainly take place within a comparatively short time. The reason of this is not obscure, for the protrusion occurs in the triangle bounded by the deep epigastric vessels on the outer side, the edge of the conjoint tendon on the mesial side, and the pubic bone below. The transversalis fascia is bulged through this space and, even when the wide-mouthed sac has been ligatured and removed, it is impossible to suture the internal oblique muscle or the conjoint tendon to the inner part of the inguinal ligament in such a way as to form a strong floor to this part of the inguinal canal; for there is an actual deficiency in the floor of the inguinal canal which must be permanently closed (Fig. 1). A simple and satisfactory way of doing this is to use a flap derived from the internal oblique layer of the rectus sheath. The external oblique aponeurosis is lifted up, and can be separated from the internal oblique layer without difficulty. A semi-circular flap is cut and turned over from above through 180 degrees so as to lie beneath the spermatic cord. The cut edge is then sutured with thick catgut to the inguinal ligament from the pubic spine outwards, almost to the internal abdominal ring. This flap then completely covers the site of the protrusion, and forms a new strong floor to the inguinal canal (Fig. 2). It is not under tension, and will therefore not tend to retract afterwards. The same procedure can be used for the smaller recurrent hernias and for others in which there is any doubt as to the efficacy of the ordinary operation. No additional shock or risk to the patient is thereby created. The results of this operation have been excellent, and no recurrence has yet taken place in a series of twenty-one hernias that I have dealt with in this way. The operation can be performed under a local anaesthetic with advantage both to patient and surgeon.

[3447]

FIG. 1.—Diagrammatic section through the parts concerned in direct inguinal hernia, showing the two layers of the anterior rectus sheath.

FIG. 2.—The same after removal of the sac, and suturing of a fascial flap to the inguinal ligament.

I shall now pass to the consideration of a much more serious problem—namely, the treatment of the large inguinal hernias in old and middle-aged patients, which until recently have been regarded by most surgeons with the greatest misgiving when the question of operation

where they are put, so that a hernia treated by their aid remains cured. He had further successfully tested the method in a hundred human beings before he published it to the world. The operation is a major one and is by no means easy. Absolute asepsis is essential, and all skin

FIGS. 3, 4, AND 5.—GALLIE'S OPERATION FOR INGUINAL HERNIA.

FIG. 3.—Insertion of the first fascial suture and formation of a new internal abdominal ring.

FIG. 4.—Insertion of the second row of fascial sutures.

FIG. 5.—Completion of the fascial sutures.

arose. The cause of these large hernias may be long neglect or the use of inefficient trusses. The patient may be very fat or very thin. At the best the hernia can be controlled by a large and perhaps irksome truss; at the worst it cannot be controlled at all by any truss, however ingenious. The hernia seems to slide out, round, over, or under any appliance that can be devised, and shows an almost devilish malignity in circumventing the efforts of surgeon and instrument-maker. If the patient is stout, the propulsive force exerted by his abdominal contents when he coughs or strains seems to be explosive, and in addition he is often engaged in a strenuous occupation, such as gardening or carrying quarters of meat in Smithfield Market. The final result will be that he becomes completely incapacitated, and the only appliance that can be used is that known as a "bag-truss"; this is not really a truss at all, but

is, as its name implies, a bag designed to support the weight of the hernia, which would otherwise drag with its whole force on the skin of the scrotum, causing extreme discomfort to the patient. By the time that the bag truss stage is reached the operative prospects are, it must be admitted, wellnigh hopeless—not because the hernial aperture is too large, but because often the contents of the sac can no longer be accommodated within the abdominal cavity. Such a patient is likely to have been seen by more than one surgeon before he reaches this stage, but an operation has been thought to be likely to fail, and so he goes from bad to worse. I wish to insist that at the present time no patient should be allowed to reach this pass, since the hernia is now curable at an earlier stage.

Two years ago a most useful surgical tool was put into our hands by Professor Gallie of Toronto, and I believe that by its aid a cure can now be almost guaranteed to any patient suffering from even the largest hernia. The principle of Gallie's operation is not new in that it involves the use of a fascial transplant, but it is quite new in that the transplant is used in the form of a suture taken from the patient's own thigh. Gallie proved by experiments on animals that fascial sutures thus implanted are never absorbed, but remain as healthy fascia

surfaces must therefore be kept covered throughout the operation. The first stage is the incising of the stretched external oblique fascia and the isolation and removal of the hernial sac with all redundant tissues, so that the clean spermatic cord only remains. Meanwhile a second operator has incised the whole length of the opposite thigh, and has prepared three or four sutures each ten inches in length from the fascia lata. These sutures are threaded on large curved needles specially adapted for the purpose. The further stages can best be indicated by a series of diagrams.¹

1. The aponeurosis of the internal oblique is approximated to the inguinal ligament by a simple running suture which begins at the pubic spine and ends where the spermatic cord normally emerges from the abdomen; at this point it is locked by being passed through itself (Fig. 3).

2. A new internal abdominal ring is formed by a series of locked stitches passing from the inguinal ligament round the spermatic cord to the inguinal ligament on the outer side of the cord. A second row of similar stitches may be inserted in the opposite direction.

3. The first suture line is now oversewn by two or three layers of fascial stitches, passed zig-zag fashion and self-locked at frequent intervals. These sutures are not

under any tension, but are simply lying upon the first suture line so as to form a fascial grid which will in due course consolidate into a thick layer of tissue such as will effectually prevent any recurrence of the hernia (Figs. 4 and 5).

4. The spermatic cord is replaced upon the new floor to the inguinal canal thus formed, and the external oblique aponeurosis is sutured over it. This layer is probably thin and redundant, so that it must be overlapped by as much as is necessary to make all snug beneath it. This suturing can be done with a fascial strip if any remain over, but it is not essential, since the cure is not depending on this suture line for its permanence.

The patient must remain in bed for a fortnight, and at the end of this time he can be assured of possessing a very solid defence against future hernial protrusions, at any rate in the inguinal region. No attempt should be made to close the gap in the fascia lata, which does not

¹ For the very important smaller details of the operation the reader is referred to Gallie's original article, *Brit. Journ. Surg.*, 1924, xii, 289.

FIG. 6.—Diagrammatic section through the parts concerned in femoral hernia.

FIG. 7.—The same after removal of the sac, and suturing of a fascial flap to the ligament of Astley Cooper.

FIG. 8.—The same, showing a combination of direct inguinal with femoral hernia.

in any way incapacitate the patient afterwards. The whole operation will probably occupy from sixty to seventy-five minutes, so that a general anaesthetic will be contra-indicated for a stout and wheezy patient. The risk of bronchitis can be greatly reduced by the use of a local anaesthetic. My experience has shown me that the operation can be done more easily and cleanly with a local than with a general anaesthetic, and I should prefer to use it as a routine.

The results in the seven very large hernias for which

inguinal or "high operation" has not yet completely replaced the femoral or "low operation." The figures are as follows:

<i>City of London Truss Society, 1921-1926.</i>		
Recurrence following "low operation" ...	27	
Recurrence following strangulated hernia ...	14	
	41	

That is to say, one-third of the recurrences followed an operation for strangulated hernia; the remainder

FIGS. 9, 10, AND 11.—OPERATION FOR FEMORAL HERNIA.

FIG. 9.—Internal oblique aponeurosis exposed and area for flap marked by dotted line.

FIG. 10.—The flap turned down (exposing the rectus muscle) and being sutured to ligament of Astley Cooper. The femoral vessels retracted outwards.

I have used the operation during the last two years have been entirely satisfactory. One patient had two enormous direct hernias, the apertures of which would admit four fingers held flat. Gallie's method is, indeed, applicable to most of the worst hernias that are likely to be met with in ordinary practice.

FEMORAL HERNIA.

The treatment of femoral hernia is to me an even more interesting subject than inguinal hernia. Opinions are more sharply divided concerning it, while the general complacency as to the results appears to me to be even less justifiable than in the case of inguinal hernia. I hold strongly the view that femoral hernia should never be treated with a truss unless the patient refuses operation or is obviously unfit even for an operation with a local anaesthetic, and this is justified by the well known fact that the incidence of strangulation among femoral hernias is very much higher than it is among inguinal hernias. With this view most surgeons will agree, and in a large proportion of cases operation is performed. The rate of recurrence is, however, surprisingly high, and I find that during the last five years I have seen no fewer than 41 cases of recurrent hernia after operation among the comparatively small number of patients with femoral hernia attending the City of London Truss Society. This high rate is partly to be explained by the fact that the prevalent method of dealing with a strangulated femoral hernia leads almost inevitably to recurrence, and partly by the fact that the

FIG. 11.—The suturing of the flap completed; retractor removed.

followed the orthodox "low operation."

Starting even from the morphological standpoint the problem of femoral hernia is a difficult one. In the case of inguinal hernia there is the clear-cut difference between the congenital and acquired varieties, and it is recognized that for the vast majority, since they are congenital, the removal of the sac is the basis of cure. But controversy still rages round the origin of femoral hernia. The congenital school, championed by Hamilton Russell of Melbourne, holds to the developmental origin during the growth of the limb bud, whereas Sir Arthur Keith leads the party which preaches that it is acquired. The discussion, though of great academic interest, is not, in my opinion, of much practical importance, as I am satisfied that, whichever

theory be true, the mere removal of the sac is not curative. This point Professor Gask put to the test a few years ago. In 10 patients the hernia was treated by laparotomy with complete removal of the sac from within the peritoneal cavity. In 6 of the cases so treated the hernia promptly recurred, and this method of treatment had to be abandoned. The so-called "low operation" is also, in my opinion, unsatisfactory, and should no longer be used. In this operation a vertical incision is made in Scarpa's triangle (which usually results in a very ugly scar). The hernial sac is then isolated and ligatured as it emerges from the saphenous opening. Finally, the inguinal ligament is sutured to Cooper's ligament, or a purse-string suture

is used in an attempt to close the crural canal. The complete removal of the sac by this means is almost impossible for anatomical reasons; neither can it be supposed that an approximation of two tense structures, such as the inguinal ligament and the pectineal fascia, or the ligament of Astley Cooper, can be permanently maintained. That many patients treated by this method have been cured cannot be denied, for often the aperture through which the sac emerges is narrow, and a film of scar tissue is efficient in closing it; but as a routine procedure I believe it is theoretically unsound, and the recurrences that I have seen confirm this view in practice.

The inguinal operation is admittedly a more intricate proceeding, and demands an accurate knowledge of the anatomy of the parts concerned. The skin incision is made as for an inguinal hernia, which is an advantage to the patient, since it is in the line of cleavage of the skin and gives a very good scar, unlike the vertical incision used for the other operation. The lower flap of skin is raised and retracted, and the hernial sac is defined, isolated up to its neck, and opened. If it contains a large mass of omentum which cannot be reduced, this must be removed. The external oblique aponeurosis is then cleaned and incised as for inguinal hernia. The lower edge of the internal oblique is then retracted upwards with the spermatic cord or round ligament. The floor of the inguinal canal in its inner half is thus exposed and is incised. The opening is enlarged and, being on the inner side of the deep epigastric vessels, is immediately over the neck of the femoral sac above the inguinal ligament. The neck of the sac is seized, and the sac pulled up through the crural canal. Before being finally removed the sac must be carefully examined and any tissue on its inner side must be peeled away, for often this tissue is the lateral part of the fundus of the bladder. When the neck of the sac has been thus defined, it is ligatured flush with the parietal peritoneum and the sac is removed. Any operator who is unaware of this quite common relationship between the bladder and a femoral hernia is sure sooner or later to endanger a patient's life by including the bladder in his ligature. It now remains to deal with the opening of the crural canal. No attempt need be made to close this, for it is better to shut it off from the abdominal cavity by bringing down a curtain from above. This can be done in most cases by suturing the lower edge of the internal oblique with two or three mattress sutures to the strong extension of the lower horn of Gimbernat's ligament,

inguinal operation that it weakens the floor of the inguinal canal just in the position where a direct hernia is liable to develop. It is clear, however, that the internal oblique muscle, if used in the way described, is closing this deficiency in the floor of the inguinal canal at the same time that it is forming a curtain between the crural canal and the abdominal cavity.

This operation has been found to be efficient in 125 patients operated on by several surgeons in the wards of the Surgical Unit at St. Bartholomew's Hospital during the last six years. I was myself responsible for about a third of these. Most of the patients have been reviewed at intervals since they left hospital. In the great majority the crural canal was of the common small size, and I have found signs of recurrence in only three instances. I believe, however, that the operation described, though better than the low operation, is not to be relied upon where the opening is of larger size or where it has been deliberately enlarged as in dealing with a strangulated hernia. I have therefore devised another procedure for use in the more serious cases. The operation is probably not new, but I have been unable to find any description of it in the literature of the subject.

The principle involved is an extension of the plastic operation already described for the treatment of direct inguinal hernia. The earlier stages of the operation are carried out just as has been already detailed. But when the sac has been removed a rather large semicircular flap is cut from the aponeurosis of the internal oblique layer of the rectus sheath, and this is turned over through almost 270 degrees so that its lower edge can be sutured to the ligament of Astley Cooper or even to the periosteum of the pubic bone from behind Gimbernat's ligament to the femoral vessels (Figs. 6, 7, and 8). This strong aponeurotic curtain is under no tension at all, and remains as a permanent and efficient bar against recurrence of the hernia. Nor is any deficiency left in the floor of the inguinal canal. The suturing of this flap is not an easy thing to do. The sutures must be inserted at the bottom of a deep hole, and the femoral vessels are in imminent danger of being injured unless properly safeguarded. I have found the operation is greatly facilitated by using a wide retractor with a slit in the centre of the blade. The instrument is so inserted that it retracts and protects the femoral vessels both above and below the inguinal

FIG. 12.—Diagrammatic section through an obese woman, showing the relation of the umbilical hernial sac to the surface.

FIGS. 13, 14, AND 15.—OPERATION FOR UMBILICAL HERNIA.

FIG. 13.—The sac and contents have been defined and separated. The dotted lines indicate the lateral extensions of the incision.

FIG. 14.—The suturing of the aponeurotic flaps.

FIG. 15.—The operation completed with two rows of sutures.

known as the ligament of Astley Cooper. This procedure is open to objection in that a structure is again being dragged down out of its proper line of action into contact with another tense structure. In practice, however, it is found to be efficient when the opening of the crural canal is small. In most patients the lower edge of the internal oblique, being muscular, not aponeurotic, comes down without much tension. The muscle fibres no doubt undergo fibrosis afterwards, but the fibrous curtain so produced remains as an efficient bar against the recurrence of the hernia. The objection has been brought against the

ligament, which is itself occupying the slit in the centre. Adequate room for working is thus obtained, and the retraction of the vessels outwards ensures that they come closely up against the outer edge of the aponeurotic flap when they are released. When the sutures are being inserted the needle carrying them must be made to emerge below the crural canal and is then passed back again through the canal, so that the sutures are tied above the inguinal ligament. Three deep sutures are usually enough; a fourth is sometimes inserted to secure the outer edge of the flap to the inguinal ligament over the femoral

vessels (see drawings). The external oblique aponeurosis is then sutured as before. The stages of the operation are shown in the accompanying drawings (Figs. 9, 10, 11).

This operation I have now performed twenty-one times:

<i>Reasons for which the Operation was done.</i>				
Large hernia	...	...	...	11
Recurrent hernia	...	...	...	4
Strangulated hernia	...	...	...	3
Prevascular hernia	...	...	...	1
Bilocular hernia (Fig. 8)	...	...	...	1
For demonstration	...	...	...	1
				21

It will be seen that in all except one case the circumstances made the routine operation unlikely to result in a permanent cure. In every patient so far treated in this way the result has been satisfactory. Several patients have been men doing heavy work. I make no apology for having done the operation on one occasion in order to demonstrate it to another surgeon, for I believe it to be theoretically the best operation for all cases; it takes, however, a somewhat longer time to perform than the other operation, and it seems unnecessary to use the more elaborate method when the simpler suffices.

One of the most important applications of the inguinal operation, and of my own modification of it in particular, I believe to be in the treatment of strangulated femoral

according to the condition found. The sac is then removed and the peritoneum closed. It now remains to finish the operation in such a way that the hernia will not recur. Gimbernat's ligament has not been damaged, but the opening is likely to be fairly large after the hernia has been reduced. Recurrence can be prevented by turning down a flap from the rectus sheath, as already described, the operation being done with the same care as would be used in doing it under ordinary conditions.

I have insisted that the time factor is not necessarily of great importance because I have found that the operation can best be done under a local anaesthetic. The patient suffers very little disturbance by this method, and there is no necessity for haste. I have done the operation in this way on a frail old lady of over 80, who made an uninterrupted recovery, and it has been equally satisfactory in other patients. The last one that I operated on had a hernial sac measuring 5 by 3 inches and containing a large mass of omentum with several inches of strangulated gut; size, however, is no bar to the successful employment of local anaesthesia, and this patient was undisturbed by the operation, and made an uneventful recovery.

UMBILICAL HERNIA.

Umbilical hernia as seen in children does not often call for operation, and when it does so a cure can usually be

FIGS. 16, 17, AND 18.—GALLIE'S OPERATION FOR VENTRAL HERNIA.

FIG. 16.—Insertion of the first fascial suture.

FIG. 17.—Insertion of the second fascial suture.

FIG. 18.—Completion of the fascial fligree.

hernia. The low operation may be actually dangerous, and should seldom be used. It is well known that a common form of strangulated hernia is the so-called "Richter's hernia," in which less than the whole circumference of the intestine is nipped in the neck of the sac. Sometimes the sharp edge of Gimbernat's ligament causes a local necrosis of the wall of the gut where it is in contact with it, so that perforation is liable to occur. If any attempt is made to deal with the hernia from below, the manipulation may only result in the premature reduction of the contents. The perforated gut slips back into the peritoneal cavity, and the patient is likely to die of general peritonitis. Even if this does not occur, it will be difficult to deal satisfactorily with the strangulated gut from below unless the crural canal is first greatly enlarged. Often this has been done in the past by dividing Gimbernat's ligament, and I believe it is the destruction of this important structure which has contributed largely to the very high rate of recurrence following the relief of a strangulated femoral hernia, as illustrated by the figures already given. I believe, therefore, that the high operation should always be used when the hernia is strangulated, and that it is usually more important to do the operation properly than to save time. The peritoneal cavity must be opened above the inguinal ligament before the hernial sac is opened, and the loop of gut entering the hernia must be identified. The surgeon then has complete control of the situation, and the patient is protected against the danger mentioned above. The sac is then opened, and the constriction at the neck is relieved, not by dividing Gimbernat's ligament, but by nicking the anterior margin. In this way only the fibrous tissue in the neck of the sac is incised, or at the worst some fibres of the inguinal ligament. The strangulated gut can thus be reduced, and is treated appropriately

effected without difficulty, whatever form of operation is used. The case is very different, however, with the other common type—namely, the obese woman with a large umbilical hernia—and the problem of treating such patients is a very difficult one. The hernia is usually protruding into a sac which is larger than it appears to be on the surface, owing to the fact that it is obscured by a layer of fat several inches in thickness (Fig. 12). Sometimes it is possible to make the patient comparatively comfortable by applying a truss or a combination of abdominal belt and truss, but it is obvious from the anatomical nature of the case that the control of the hernia can never be more than partial. The risk of strangulation always remains a grave one, and it is well known that when this occurs the patient's life is in great danger. The lot of an obese woman with a hernia is, indeed, an unenviable one, and I feel that we do not perhaps do quite as much as we might to alleviate her discomfort. Her lungs usually show emphysema and chronic bronchitis; her heart muscle is likely to be infiltrated with fat. Her figure, with its immense capacity for propulsion of abdominal contents through any weak point in its armour, seems to offer little chance of a permanent cure of the hernia. Nevertheless, I believe that we tend to take too gloomy a view of the prospects of operation, and the source from which the ray of hope emanates is a flaskful of novocain-saline-adrenaline solution.

I have found the radical cure of umbilical hernia under local anaesthesia to be a practicable undertaking even in the most obese of patients, and the post-operative terrors of vomiting, coughing, and heart failure are thereby largely removed. It is, of course, difficult to make sure of doing an efficient infiltration of all the layers by injection through the skin, but a preliminary superficial infiltration, followed

by an infiltration of the deeper layers after the skin incision has been made, will give complete anaesthesia of the parts concerned. The details of the operation have been the subject of controversy. Some surgeons advocate a longitudinal incision encircling the stalk of the hernial sac, removal of which is followed by suture of the aponeurosis of the linea alba, which is always greatly widened in these patients and can be overlapped from side to side. My own feeling is in favour of the other method advocated by the surgeons of the Mayo Clinic, their observations being based upon the results obtained in a large number of patients. The incision in this operation is transverse in both skin and aponeurotic layers. When the skin has been incised the hernial sac is defined and isolated, and the surface of the aponeurosis is cleared of fat for some distance around it, especially at the sides. An incision is then made through aponeurosis and peritoneum close to the neck of the sac, and this is carried right round the neck so that the sac, with its contents, is separated from the abdominal wall (Fig. 13). The sac is then opened and its contents either cut away or replaced in the abdomen as seems best; afterwards the peritoneum is sutured. The incision in the aponeurosis is next extended to either side as far as, or even into, the sheaths of the widely separated rectus muscles. Material can thus be obtained for overlapping the aponeurosis from above and below the situation of the former hernia, and this double layer should, in theory, form an effective bar to the recurrence of the hernia. The edge of each layer of aponeurosis is separately sutured to the other so that the strain of any coughing or vomiting after the operation is borne by a double row of sutures (Figs. 14, 15). Cure must finally depend, however, upon a firm adhesion between the surfaces of the overlapping layers of aponeurosis, since the sutures of catgut or kangaroo tendon which are commonly employed are but a temporary means to the end in view.

I have recently reviewed the patients who have been operated upon for umbilical hernia in the wards of the Surgical Unit at St. Bartholomew's Hospital. The numbers are not large enough for them to form the basis for definite conclusions, but the results at any rate show that there is at present no ground for complacency, for among ten patients operated upon by the transverse method, recurrence has taken place in three within a period of five years. The chief grounds advanced by the surgeons of the Mayo Clinic in favour of the transverse operation were the mechanical conditions governing the tension of the abdominal wall. The recti are widely separated and acting weakly, so that when the abdominal muscles contract the obliques are the strongest agents and will tend to pull open a longitudinal scar, but to close a transverse one. But after having performed the operation by their method with great care on a number of patients and having found a recurrence taking place in a patient in whom everything seemed favourable and an entirely satisfactory result had been expected, I have come to the conclusion that there is still need for improvement in some part of the treatment. The advantages of using a local anaesthetic I have already mentioned. The weak point in the technique to which I am inclined to attribute the chief responsibility for the failures is the use of dead materials for suturing the aponeurosis. Evidently these sometimes retain their hold on the tissues long enough for adhesion between the layers to take place; but sometimes they do not, and I believe that if fascial sutures are used for this purpose a cure is likely to be obtained with much greater certainty. It is clearly another department in the treatment of hernia in which the principle of Gallie's operation ought to be employed.

POST-OPERATIVE HERNIA.

It only remains to deal with the miscellaneous hernias which are so liable to follow emergency abdominal operations of all kinds, and sometimes follow operations that were not to be classed as emergencies. Most of the former are unavoidable, most of the latter avoidable; the present discussion, however, is concerned only with their treatment when they have appeared. Those that are met most commonly in practice are in the right iliac fossa after drainage of an appendix abscess, or in the epigastrium

after an operation for a perforated ulcer. Others are in the mid-line above the pubes following a prostatectomy. Another type, common in my experience at the Truss Society, is found in obese middle-aged women following a gynaecological operation, and occupies the greater part of the mid-line between the umbilicus and the pubes.

Many of these post-operative hernias can be more or less controlled with some form of truss, though operation is always to be preferred unless the patient's physical condition renders him unsuitable for it. Unfortunately, many patients have suffered enough under the first operation to make them reluctant to undergo a second. They are naturally unable to appreciate the fact that the repairing operation can usually be performed under a local anaesthetic with comparatively little pain or discomfort. The surgeons to the Truss Society have consequently had to devise many forms of truss for these hernias, which, however, I should prefer not to discuss under the title given to this paper, for the modern treatment of the condition can, I believe, offer an almost certain cure. In most instances, as I have said, a local anaesthetic can be used with advantage. For many of the interstitial hernias following operations for appendicitis a technique suffices which aims at excising all scar tissue with careful suturing of each layer in turn after it has been cleaned and defined. The case is different with the ventral hernias, especially those of the suprapubic variety, for it is difficult to find undamaged tissues for accurate suture, and recurrence has frequently followed the most painstaking attempts. The application of Gallie's principle is again found to be the solution of the difficulty, the procedure being similar to that already described for inguinal hernia, though somewhat simpler. The more difficult part of the operation is likely to be the preliminary stage—namely, the removal of the sac, followed by replacement of the contents in the abdominal cavity and suturing of the peritoneum. When this has been done the other anatomical layers used need not be defined. Even the thicker parts of the scar tissue at the edges of the opening may be used. These edges are approximated with a simple running fascial strip suture, which is locked at either end (Fig. 16). The first suture is then oversewn with at least two layers of zigzag stitches, frequently self-locked, exactly as already described for dealing with the aperture of inguinal hernias (Figs. 17, 18). If the hernia is immediately suprapubic, the first suture at any rate must begin at its lower end deep to the pubic bone itself, so that not the smallest protrusion can possibly occur afterwards at this point. Gallie's technique is so satisfactory for the repair of these hernias that it should be used without hesitation whenever there is any uncertainty as to the success of a less drastic method.

CONCLUSION.

I wish to make somewhat high claims for treatment carried out on the lines I have indicated, for I believe that by their means success can now be assured even in those cases in which formerly the results were most in doubt. The main points that I have tried to make are:

- (1) The great value of a local anaesthetic in making the operation easier for the surgeon and less dangerous for the patient, with elimination of most of the accidents likely to influence adversely the prospects of permanent cure. The risk of toxic effects on the patient, even in so extensive an operation as Gallie's method, is nil, since a solution of novocain 0.2 per cent. in normal saline solution with adrenaline 1 in 200,000 is all that need be used.
- (2) The uses to which a fascial graft of the patient's own tissue may be put, the graft being derived from the actual operation area. In this connexion I have described an operation for femoral hernia which may be new and has proved satisfactory in a considerable number of cases.
- (3) The very great advance which has resulted from the addition of Professor Gallie's technique to the surgeon's operative repertory. This again involves the use of the patient's own tissues, though the graft is taken from a distance and employed in the form of a living suture.

I am aware that even more extensive plastic operations have been described in the past, but these I regard as applicable only to such exceptional circumstances that they do not come within the scope of this survey. I am also aware that some surgeons still advocate the use of foreign materials such as silver filigrees for inguinal hernias and iron staples for femoral hernias; but although these methods may give excellent results in some hands, I believe that they are contrary to the general trend of modern surgery, which prefers to discard such artificial aids when cure can be obtained without the introduction of any foreign materials.

ACUTE INTESTINAL OBSTRUCTION DUE TO INTRA-ABDOMINAL CAUSES.

BY

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In the earlier years of my surgical experience there was a very decided prejudice against the employment of surgical measures in the treatment of acute intestinal obstruction. This prejudice was, in a measure, not to be wondered at, because the results of surgical intervention at that time, when surgery was a "last resort," were extremely depressing.

In those days, judging from my experience in Scotland, there were, relative to the number of operations performed, a good many more cases of acute intestinal obstruction compared with the number encountered in more recent years. A considerable proportion of cases occurred as a sequel to abdominal operations. That number was greatly reduced owing, I think, to more rational and careful methods of conducting such operations and their after-treatment. For example, one important item in preventing adhesions and band formation is strict attention to the exclusion of raw surfaces by "peritonealization" of pedicles and careful suturing of the abdominal wall. The irritation of rubber tubes and other stiff material used as intra-abdominal drains stimulates adhesions, from the formation of fibrous tissue, and predisposes to obstruction from kinks or bands. I have for many years almost entirely given up the use of such intra-abdominal drains as a routine, except after operations on the biliary passages, liver, or pancreas.

All cases of intestinal obstruction are urgent—some more so than others. This urgency is dependent on the age and general condition of the patient, on the actual cause of the obstruction, and on its site. Very young and very old individuals, or patients enfeebled by concomitant disease of vital organs, are likely to go under rapidly. They cannot endure the intense pain, and may quickly succumb to shock. If pain is not typically severe in such a case the attendant may be tempted to procrastinate, but it must be remembered that the effects of toxæmia are apt to be more intense and rapid in them and to be less easily combated than in more robust individuals.

The effects on the bowel itself vary greatly according to the cause. Slight constriction or simple kinking may at first merely prevent passage of intestinal contents. Later on, increased pressure of these contents, and the congestion due to the thin-walled veins being more readily occluded than the arteries, may ultimately bring about exactly the same state of affairs in this primarily simple occlusion as in the more dangerous condition of strangulation, whether caused by band, volvulus, or intussusception. The degree of interference with the circulation of the bowel, with the nerve supply, with the mucous membrane, and the lymphatics, and with the walls of the gut as a whole, influences the rapidity with which symptoms appear and their severity.

A tight snare caused by a band over or around the bowel may affect the whole of its constituents so much, from the onset, that gangrene will occur rapidly, and be followed by peritonitis. In some cases the snare may merely be tight enough to cause, at first, occlusion only of the veins of the bowel, but this brings on congestion and distension, so that

the snare gradually becomes tighter, with involvement of other structures and corresponding increase in the severity of all the symptoms. The ultimate result of embolism or thrombosis in the mesenteric vessels is practically identical.

Apart from the purely mechanical factor in acute intestinal obstruction, there is another and almost equally important one—the absorption of toxic material from the bowel. This material is derived either from bacterial decomposition of the bowel contents above the obstruction, or from imperfect metabolism of protein contents (producing proteoses), which may have been swallowed, but more likely are secreted or exuded directly into the bowel through its mucous membrane. Toxins of the second class are more dangerous and rapid in their action. Their effect is best seen in obstruction high up in the small bowel, where bacterial decomposition is not prominent. The jejunum has been called the "poisonous proteose level" in obstruction. In these cases toxæmia becomes evident very soon, producing definite prostration or symptoms of actual shock. Persistent vomiting is established at an early stage, and is probably dependent as much on the toxæmia as on mechanical causes. Both symptoms pass off just as quickly as they appeared, after the contents of the bowel are drained away through an enterostomy. The origin of these toxins, however, is still a matter of debate. Apparently the presence of bacteria is necessary before they can provoke a fatal issue. Vomiting and toxæmia may be long postponed when the obstruction is low down in the bowel. A third important factor is the rapid depletion of the body fluid as a whole and of some of its constituents in particular. This has often a marked effect on the general circulation. In some cases the sunken eyes, pallid or "blae" facies and hands, and shrunken limbs are striking features. But these are symptoms of advanced cases of obstruction, which, in ordinary circumstances, at least of town practice, should not be allowed to occur.

ETIOLOGY AND PATHOLOGY.

In infants and young children intussusception is by far the most frequent condition which produces obstruction of the bowels. Improper feeding, causing inco-ordinate and excessive peristalsis, as well as swelling of the lymphoid accumulations which are prominent anatomical features in the wall of the bowel at this time of life, are probably the most frequent causes of this. During ordinary peristalsis, as opposed to segmentation, a distal part of the intestine dilates while the part immediately proximal to this contracts and forces the bowel contents onwards. If the contraction is excessive, the contracted part may be forced into the dilated part, which, in turn contracting, tends to carry this apex of the intussusception still further. This is apt to occur more easily in a child, in whom the equilibrium, so to speak, of the bowel is not so highly developed as in an adult, and these lymphoid swellings are apt to be caught and forced onward by the peristaltic wave. As the process develops, the bowel becomes more and more infolded, causing congestion, swelling, occlusion of the gut and its vessels, and traction on nerves, with attendant hæmorrhage and shock. In early stages the symptoms may abate because the intussusception may recede. But later on it remains strangulated and will speedily become gangrenous. In such cases the symptoms are severe and persistent, until their severity is masked by the exhaustion of the bowel and of the patient.

Children with complete obliteration or high-grade stenosis of a segment of bowel are often in such poor condition that surgical intervention is out of the question. If, however, there is no doubt of an obstruction, as revealed by persistent vomiting, local distension, and possibly by x-ray evidence, it may be worth while to give an otherwise healthy child its only chance. A rapid short-circuiting operation is usually the best procedure. Obstruction at this age may be due to a diaphragmatic hernia or to strangulation through a hole in the mesentery.

Intussusception in older children and adults is usually due to some accompanying pathological condition, most frequently a polypus, and more rarely a stricture. Intussusception or, as it is more often called, prolapse of the sigmoid or rectum, may occur without such accompaniment, and may be predisposed to by a curious ballooning of this