

## Section of Proctology

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### Some Observations on the Treatment of Carcinoma of the Rectum

#### PRESIDENT'S ADDRESS

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In this Address I propose to review the treatment of 267 cases of rectal carcinoma which have been under my care at the London Hospital during the past ten years; most emphasis will be placed on the immediate and late results of synchronous combined excision of the rectum for carcinoma, but a report on sphincter-saving operations will also be given, since it is important that the outcome of as many of the latter procedures as possible be published so that their value can be assessed: the problem of local recurrence is of major importance to all who carry out these operations and any experience in this connexion may be valuable to others even if the number of cases is small.

#### DEFINITION

A definition of the term rectal cancer is first required since the dividing line between a growth of the upper rectum and the lower pelvic colon is notoriously difficult to determine; some go by the relation of the ulcer to the peritoneal reflection, others by its distance from the anus as determined by the sigmoidoscope. Both these criteria vary considerably in different people, so that in this paper neoplasms have been classified as carcinomas of the rectum, if their surgical removal would have necessitated mobilization with subsequent partial or complete removal of that part of the bowel which lies below the peritoneum. Operations for cancer of the large bowel in which the rectum proper was not disturbed have not been included.

Tables I and II show the methods of treatment which have been adopted with the immediate mortality.

TABLE I.—PALLIATIVE OPERATIONS

| Type of operation  | Numbers  | Mortality |
|--------------------|----------|-----------|
| Colostomy .. ..    | 43       | 13 (30%)  |
| Laparotomy .. ..   | 3        | 0         |
| Diathermy .. ..    | 3        | 0         |
| No treatment .. .. | 6        | 0         |
|                    | <hr/> 55 |           |

TABLE II.—RADICAL OPERATIONS

|                               | Numbers   | Mortality |
|-------------------------------|-----------|-----------|
| Hartmann's .. ..              | 24        | 3 (13%)   |
| Anterior resection .. ..      | 24        | 2 (8%)    |
| Perineal excision .. ..       | 4         | 0         |
| Abdomino-anal anastomosis ..  | 2         | 0         |
| Pull-through .. ..            | 4         | 2         |
| Synchronous combined excision | 154       | 11 (7%)   |
|                               | <hr/> 212 |           |

#### PALLIATIVE MEASURES

The number of advanced cases of rectal cancer admitted to a large general hospital is possibly higher than at a special hospital such as St. Mark's; this may account for the number of patients who had a palliative colostomy. The operation was only carried out when the local or general condition of the patient prevented excision of the growth. Many of these patients were in a very poor state with advanced obstruction and carcinomatosis; the majority of the deaths was from terminal

bronchopneumonia. In our view, palliative colostomy should, as a rule, be performed only when the carcinoma is irremovable and the patient has definite symptoms of intestinal obstruction. The performance of a colostomy alone has little effect on the symptoms of the ulcer, since bleeding and rectal discharge continue, and we believe that excision, preferably with preservation of the sphincters, should be done on as many advanced cases as possible even if they are clinically incurable. In the last 60 cases admitted under my care, colostomy has been performed eight times; the remainder had the rectum excised.

An increased rate of resection should not be confused with a greater rate of cure, but the former figures indicate that a large number of people are now made more comfortable for a time because their primary growths have been excised. In a few cases when excision has been impossible, diathermy to the ulcer has given temporary relief.

#### RADICAL OPERATIONS

I should like first to consider Hartmann's operation. For those who are unfamiliar with this procedure, the operation consists in removing the pelvic colon and a variable amount of the rectum. The anal canal and the terminal part of the rectum are left in situ and a permanent colostomy is performed in the left iliac fossa. In this operation we have not closed the rectal stump, but have used it as a convenient place through which to put a tube to drain the presacral space after re-formation of the pelvic peritoneal floor.

In the past this operation was reserved for cases where the ulcer was above the peritoneal reflection; it could be carried out more quickly than an abdomino-perineal excision; there was less shock and the convalescence was usually smoother and quicker than after a complete operation.

Many surgeons have completely abandoned this operation for two reasons: firstly, because of recurrence in the rectal stump, and secondly, because of the introduction and adoption of procedures to restore continuity of the bowel. We still find it a useful method in an elderly patient with a high growth when an abdomino-perineal seems unnecessary and if the condition of the patient or the length of bowel available renders an anastomosis impracticable.

The results of this operation are seen in Table III. 9 patients were operated on five or more years ago with 2 operative deaths; of the remainder, 4 are alive and well to-day; 3 of these were early cases,

TABLE III.—RESULTS OF HARTMANN'S OPERATIONS

| Year | A cases | B cases | C cases | Alive in 1951       |
|------|---------|---------|---------|---------------------|
| 1942 |         | 1       |         | 0                   |
| 1943 |         | 1       |         | 1                   |
| 1944 | 1       |         | 1       | 1 (A)               |
| 1945 | 1       | 1       |         | 1 (A)               |
| 1946 | 2       |         | 1       | 1 (C)               |
| 1947 | 1       | 2       | 4       | 3 (1 of each grade) |
| 1948 |         |         |         |                     |
| 1949 | 1       | 1       | 1       | 1 (A)               |
| 1950 | 1       | 2       | 1       | 2                   |
| 1951 |         |         | 1       | 1                   |

NOTE.—A cases: growth confined to the bowel.  
 B cases: growth had invaded peritoneal coat.  
 C cases: growth had invaded glands.

1 had glandular involvement. 2 patients have developed recurrences in the rectal stump; both have died. This series is too small for any statistical analysis, but it is probable that this operation still has a small but definite place in the treatment of rectal cancer.

#### Anterior Resection

This is probably the most popular operation in this country for preservation of the sphincters, since successful cases have perfect sphincter control—which is not always so with other types of conservative operations. Our indications for this operation have been:

(1) A mobile growth above the peritoneal reflection when we have thought it unnecessary to perform an abdomino-perineal excision.

(2) As a palliative procedure in advanced cases so as to avoid a colostomy and to enable the primary growth to be removed.

This operation has not been performed for any growth which extends below the peritoneal reflection or if there is wide involvement of the peritoneal floor, retroperitoneal tissues or adjacent viscera.

The following points are important:

(1) A final decision in favour of an anastomosis should not be made until firstly the rectum has been

thoroughly mobilized, secondly the descending colon freed, if necessary, by mobilizing the splenic flexure, and thirdly, the inferior mesenteric artery has been ligated at the highest points requisite for a radical excision of the growth and lymphatic field. If there is insufficient viable bowel left for an anastomosis, then an abdomino-perineal or Hartmann's excision should be carried out.

(2) The anastomosis should be performed in two layers without tension; the site should always be drained because a certain amount of leakage is almost inevitable.

(3) The peritoneal floor should, if possible, be re-formed above the anastomosis, as this forms a useful barrier against infection.

(4) It has always been my custom to perform a temporary transverse colostomy at the time of the operation unless performing a palliative resection.

Many authorities state that a colostomy is not needed and it is true to say that it is possible to carry out a large number of these operations successfully without a colostomy, but occasionally leakage will occur which may prove disastrous if the faecal stream has not been diverted.

Pre- and post-operative chemotherapy has made this operation a very safe one, but too much trust should not be placed in its powers, particularly if the proximal large bowel has not been completely emptied by pre-operative treatment.

The results up to date are as follows: In 4 cases a palliative resection was performed; 1 of these patients died from peritonitis. In the remaining 20 cases (Table IV) there was 1 death from a

TABLE IV.—RESULTS OF ANTERIOR RESECTIONS

| Year | A cases | B cases | C cases | Alive in 1951                           |
|------|---------|---------|---------|---|
| 1947 |         |         | 1       | 0                                       |
| 1948 | 1       | 1       | 1       | 3 (1 local recurrence)                  |
| 1949 | 1       | 1       | 2       | 0 (1 at operation)<br>(1 no recurrence) |
| 1950 |         | 1       | 3       | 4                                       |
| 1951 | 3       | 1       | 4       | 8                                       |

pulmonary embolus; 2 patients have developed a recurrence at or near the suture line; 1 has died and the other has survived three years after the recurrence was removed by diathermy two years ago.

*Local recurrence in anterior resections.*—The incidence of local recurrence is one peculiar to operations on the rectum and it is surely due to one of the following causes:

(1) Excessive handling of the bowel during mobilization of the rectum.

(2) Imperfect cleaning of the rectum before anastomosis, with subsequent implantation of cancer cells.

(3) Cutting through the rectum too near the growth.

I think that the last factor may well be the most important one; in our experience there has rarely been any temptation to preserve too much of the pelvic colon, but it is very easy to divide the rectum too high in order to facilitate an easier anastomosis. I believe that this temptation is one of the most serious objections to this operation.

Local recurrences are unusual in pull-through or abdomino-anal operations; in both these procedures excessive manipulations are carried out, but in the end more rectum is removed and the danger of local recurrence seems to be less than in the intra-abdominal anastomoses.

Until the dangers of local recurrence are reduced, anterior resection should not be accepted as a routine procedure for rectal cancer, although it is one which has a very definite place in the treatment of high growths.

#### *Perineal Excision*

I have had little experience in perineal excision; 3 of the 4 patients are now dead from recurrence; 1 has survived three years. This procedure has no advantage over the radical excision as it is no less hazardous and is far less radical.

#### *Abdomino-anal Anastomosis*

This operation was only carried out twice, once as a palliative resection and once as a formal excision. The latter patient is well after two years but has little sphincter control. It is probable that this operation is the most radical sphincter-saving procedure provided that adequate mobilization of the colon can be achieved.

#### *Pull-through Operation*

2 out of the 4 patients on whom a pull-through operation was carried out died from sloughing of the colon; the 2 survivors are interesting. One was a man aged 82 who survived three years before dying of liver metastasis; the pelvis was clear at post-mortem. The other was a lady aged 76 who

is alive and well four years later at the age of 80. This operation seems to be well tolerated by the aged, but has necrosis as a special danger. Doubtless with experience this complication would tend to disappear.

#### *Combined Excision of the Rectum*

In 1939 Mr. Hermon Taylor and I started to perform synchronous combined excision of the rectum for cancer shortly after Mr. Lloyd-Davies' description of this operation from St. Mark's Hospital (Lloyd-Davies, 1939). Since that date we have carried out 154 excisions; 123 of them have been done by Mr. Hermon Taylor and myself and 31 by my first assistant and myself. At first we had a succession of anaesthetists, but during the past few years we have included in our team first Dr. B. Kenton and then Dr. A. I. Parry Brown and Dr. S. D. K. Stride.

Since the technique we now use differs in certain aspects from that carried out at St. Mark's Hospital, we propose to discuss at some length certain features of this operation which we hope may be of general interest.

*The advantages of this method* may be summarized as follows. The patient does not have to be moved during the operation; this lessens shock and saves time. When the growth is a large one with peri-rectal induration a single operator often has difficulty in determining the tissue planes between the growth and such structures as the bladder or prostate. With two surgeons each can help the other to identify these important landmarks and each can indicate to the other the appropriate lines of cleavage. In this way the operability rate can be raised, as more formidable growths may be tackled with confidence.

This method is also valuable when adjacent viscera have to be removed, since very large excisions can be performed with a minimum of disturbance or blood loss. Furthermore this is an excellent operation for training assistants in the technique of rectal excision. The trainee can in turn be entrusted with the abdominal or perineal phase of the operation while under the direct supervision of his senior partner.

Although the main value of the lithotomy Trendelenburg position is in excision of the rectum, it is also useful in sphincter-preserving operations, notably anterior resection or abdomino-anal anastomosis. In these cases the assistant at first stands between the abducted legs and retracts the bladder or uterus; later on he can prepare the rectum or anal canal for anastomosis without disturbing the patient or the abdominal surgeon. This position is also useful in operations for complete rectal prolapse when a combined attack is made on the prolapse from the abdomen and the perineum.

*The apparatus needed.*—Proper leg irons are essential; the pattern used at St. Mark's Hospital has proved satisfactory. These instruments can be fitted to any standard operation table. The supports can be adjusted to any height and the degree of abduction of the legs and thighs may be altered by means of ball and socket joints. It is useful to have a rubber pelvic support clamped to the end of the table, as devised by Goligher, but in its absence a sandbag provides an efficient substitute.

*Pre-operative treatment.*—Patients should be admitted to hospital for about one week before operation; they are not, of course, confined to bed.

In addition to the usual investigations before a major rectal operation, special care should be devoted to the elimination of sepsis from the bowel. Many cases of rectal cancer are infected and in some instances the infection has spread into the surrounding cellular tissues.

A routine course of one of the insoluble sulphonamides should be given for five days before operation; in addition we also give a daily injection of vitamin K in order to prevent any possibility of intestinal hæmorrhage. 2 cases of this nature have been seen at the London Hospital, one of which was fatal.

If the patient is sensitive to sulphonamides, we give a two-day course of streptomycin orally; this drug should not be given for a longer period before operation or the intestinal bacteria may become streptomycin resistant. We have, so far, not found it necessary to resort to Chloromycetin, Aureomycin or Terramycin, since they are expensive drugs and in America their value is not considered to be any greater than that of the sulphonamides in pre-operative therapy.

If the patient has any fever or clinical evidence of perirectal induration, penicillin therapy should also be administered for a similar period in the hope of diminishing the infection.

In addition, skilled instruction should be given in breathing exercises, which are most valuable after the operation but the patients must know beforehand how to carry them out.

*Anæsthesia.*—The main problem in the successful management of these cases is the regulation of blood pressure both during and in the immediate post-operative phase. Although the age incidence of the disease is wide, many of the patients are elderly and unable to tolerate a prolonged fall in blood pressure. Consequently the anaesthetist's problem is to ensure a small drop in blood pressure during the active part of the operation and to provide a satisfactory level relative to the patient's normal reading at the end of it.

We have found that attention to the following points helps us to maintain these ideals:

Firstly: The fall due to blood loss is controlled by blood replacement from the commencement of the operation with an intravenous transfusion.

Secondly: In dissection of the rectum and colon disturbances of the circulation from stimulation of the autonomic ganglia underlying the pelvic fascia are almost unavoidable as traction on this layer cannot be cushioned by extreme muscular relaxation, as can traction on mesenteries in the upper abdomen. Consequently,

some form of nerve block is the ideal method to prevent a reflex fall in blood pressure, and this we obtain by a medium spinal analgesia.

Thirdly: Minimizing movement of the anæsthetized patient is a great help and in the combined lithotomy Trendelenburg position the operation can be completed without changing the position of the patient. As this position is not easily tolerated by a conscious patient, a light general anæsthetic is given, which is achieved with thiopentone and the anæsthesia continued with nitrous oxide and oxygen in the ratio of 60 to 40. Under the narcosis light nupercaine 1 : 1,500 is injected intrathecally between L.3 and L.4 vertebræ with the patient in the right lateral position. A maximum dose of 6 ml. is given according to size and the patient turned on to the prone position with 10 degrees Trendelenburg tilt for five minutes and then fixed in position on the table.

Whilst the legs are being adjusted the blood transfusion is started.

In the majority of patients this dose of 6 ml. produces a block to T.10, if not higher, and allows the greater part of the surgery to be completed without the transmission of powerful stimuli. If the upper abdomen is not adequately relaxed when the surgeon wishes to explore the liver for secondaries, then a minimum amount of pentothal will provide adequate facilities. On the other hand, in the rare case when the spinal anæsthetic is not sufficiently high, curare will provide the necessary relaxation.

Finally, spinal analgesia *per se* will cause a fall in blood pressure if the thoracic sympathetic outflow is blocked. This is avoided to a great extent by the minimal dose used. Such fall in pressure that does occur is easily regulated by intravenous methedrine—6 mg. as an initial dose and 3 mg. at a time for additional doses. With a maximum dose of 15 mg. of methedrine we have always been able to provide a reasonable blood pressure for suture of the perineum.

Although many anæsthetists have been obtaining adequate results with much simpler techniques, namely by a sequence of pentothal, nitrous oxide, oxygen and *d*-tubocurarine chloride, we have felt justified in carrying on with our more involved method as our patients have maintained a very even post-operative course with a minimum of chest complications, but we shall from time to time try fresh methods in order further to improve our results.

*Position on the table.*—When the patient has been anæsthetized he must be arranged on the table (Fig. 1). The shoulder pieces must be tested so that it is impossible for him to slip downwards during the operation. The right arm is abducted to receive the blood transfusion, which is commenced at the beginning of the operation, so that an immediate supply of blood is available in case of unexpected hæmorrhage or collapse. Normally two pints are required but more should be ready in case of need.

Diathermy should be available should bleeding occur from the pre-sacral veins, which sometimes happens when the growth is adherent to the sacrum.

*The incision.*—There are two possible incisions. One is the lower left paramedian incision, with a stab wound for the colostomy over the left iliac fossa. The other is the left lower oblique incision extending from the pubes immediately lateral to the rectus tendon, upwards and outwards along the curve of the rectus muscle and diverging laterally in its upper part across the transversus and internal oblique muscles. The upper and outer inch or so of this incision will accommodate the colostomy at the end of the operation. It was our practice for a long time to use the paramedian incision following Miles' original description, but we have largely abandoned it in favour of the oblique incision which gives a more direct approach to the congenital membranes which bind the colon to the iliac fossa.

*The peritoneal flaps.*—Deep in the hollow of the pelvis there is an adequate amount of peritoneum available to reconstitute the pelvic floor after removal of the specimen, but higher up difficulty may arise in covering the promontory of the sacrum and in securing an adequate closure of the peritoneum just below this point. This consideration must be borne in mind while fashioning the lateral peritoneal flaps. One has little choice on the left side except to take care not to sacrifice any lateral peritoneum by careless separation of the congenital membranes while the colon is being mobilized from the left iliac fossa. On the right side, however, there is a broad expanse of peritoneum from the right

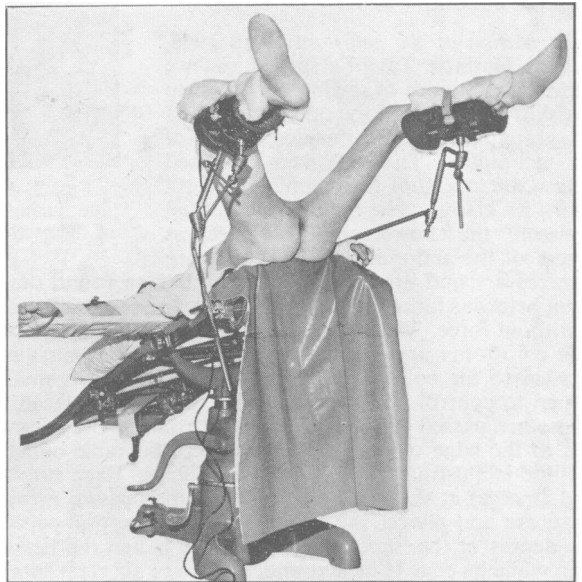


FIG. 1.—Position of patient on operating table for synchronous combined rectal excision.

iliac fossa up the right side of the pelvic mesocolon which can be utilized to cover the prominent sacrum. The incision which demarcates the right peritoneal flap therefore passes from the depths of the pelvis anteriorly, ascending laterally round the right wall of the pelvis to the root of the mesocolon below the level of the sacral promontory, and then curving once more down towards the mid-line. The delicate peritoneal flap outlined is gently raised by a combination of sharp and blunt dissection until it is mobilized as far as the right iliac fossa, while below it is lifted away from the side of the pelvis (Fig. 2). It will be found that the ureter adheres naturally to the underside of this flap where it need not be disturbed. The peritoneal incision is carried similarly round the left side of the pelvis and a flap is raised conserving as much of the lateral peritoneum as possible. It is important that both flaps should be fully mobilized from the walls of the pelvis and iliac fossæ at the beginning of the operation; it is too late to repair this omission when the suturing of the pelvic floor is half completed and the sutures begin to cut out.

*Formation of the colostomy.*—In 1946,

at Mr. Hermon Taylor's suggestion, we began the practice of sewing the colon to the skin at the end of the operation, and I am grateful to him for this description of his technique. The abdomen is closed below the stump of the colon, which still bears its clamp. No sutures are placed between the bowel and the deepest layers of the abdominal wall, as they are unnecessary and predispose to deep infection round the colostomy. The layers are sutured together from below as far as the colon, which is enclosed sufficiently loosely to allow a finger to pass alongside it without force. When the skin has been closed, a waterproof dressing is applied to the wound below. The colostomy and the area are dressed with penicillin-sulphonamide powder. Tissue forceps are applied to the colon, the clamp is removed and a small swab with a tape attached is put into the lumen to control the contents while sutures are placed between the skin and the end of the bowel. These are passed in such a way as to roll out the edge of the bowel so that the edge of the mucosa lies to the edge of the skin, while a considerable collar of bowel projects above the surface. The method is illustrated in the diagram (Fig. 3). Each stitch enters the skin half an inch from the wound and emerges at the skin edge itself. It then passes through the edge of the bowel wall from mucosa to serosa and pierces the colon again from serosal aspect an inch proximally, finally emerging from the depths of the lumen. As the suture is tied the bowel wall is drawn out on to the surface of the skin while its edge is tucked under. Five or six such stitches produce a final effect like a sea-anemone,

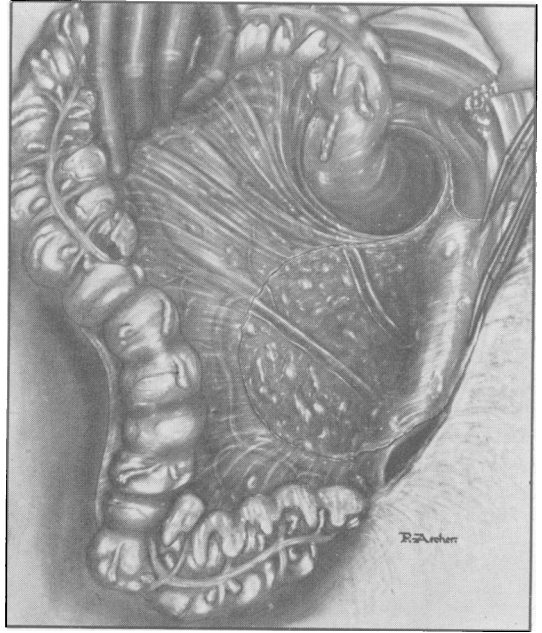


FIG. 2.—Showing extent of peritoneal flap on right side during the abdominal phase of combined excision of the rectum.

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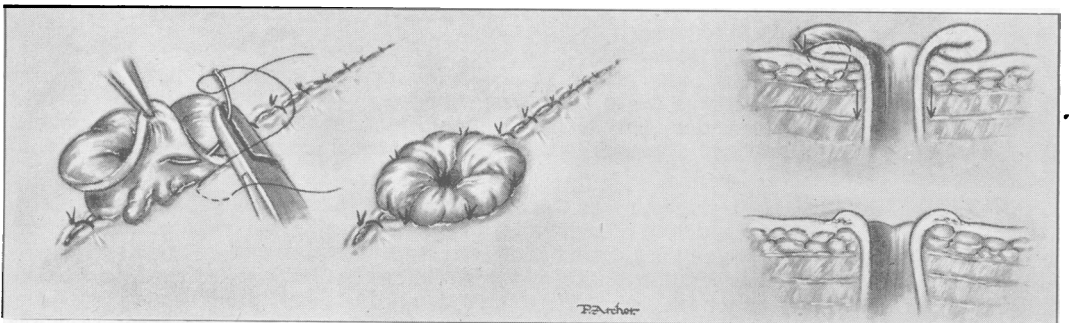


FIG. 3.—Method of stitching colostomy to the skin which avoids stenosis and retraction. (For details see text.)

which is covered with an oily dressing after removal of the occluding swab. This method provides an immediate free vent for escape of gas and faeces, primary healing occurs between skin and mucosa and the colon is held in an elastic way which accommodates any retraction that may occur. Infection is uncommon and we have had no serious trouble with this method of colostomy since we first used it six years ago.

Where the colostomy has been previously established for intestinal obstruction it will of necessity be of the "spur" type. At the second stage it is important not to be satisfied with section and closure of the colon beyond the spur, retaining this as a permanent arrangement. Faeces would collect and become inspissated in the blind distal stump of colon and give rise to irritation and infection with recurrent pain and trouble with the colostomy. It is important to secure an end colostomy, and this can best be done by excising the temporary colostomy with the specimen and making a new end colostomy by drawing down the colon a little further. The alternative plan of turning the distal stump of the colon inside out and cutting it off is more difficult to do, is apt to give rise to bleeding from the mesentery and often results in a misshapen colostomy opening with a recess where faeces may lodge.

*Perineal phase.*—The surgical anatomy of the perineal part of this operation has been fully described by Mr. C. Naunton Morgan (1949). His paper should be studied by all who are interested in this procedure.

The rectum is first gently cleaned out and lightly packed with gauze. The packing distends the rectum slightly and makes it less likely to be injured during the perineal dissection. The anus is then closed with a purse-string suture of silk which is left long for traction.

The incision is at once deepened posteriorly for the removal of the coccyx. It is now possible to insert a finger on either side of the mid-line above the ileo-coccygeus portions of the levator ani muscles. These, together with the ischiorectal fat and inferior rectal vessels should be divided as far laterally as possible. A self-retaining retractor may then with advantage be inserted.

At this stage the abdominal surgeon passes his hand down behind the rectum in front of the pre-sacral fascia of Waldeyer. His fingers put on stretch the attachment of this fascia to the posterior part of the ano-rectal junction. This attachment should be divided transversely by the perineal dissector. This step will free the whole of the rectum posteriorly (Fig. 4).

It is imperative that the pre-sacral fascia be divided in the right plane. If the dissection is carried out behind this fascia hæmorrhage may occur from a plexus of veins going into the sacrum; furthermore post-operative retention is apt to persist from interference with the hypogastric plexus.

The anterior part of the wound is then deepened until the transverse perineal muscles are seen. Next the pubo-coccygeus muscles are divided as they run in a strap-like manner along the side of the rectum. When these muscles have been divided it is possible to palpate the groove between the prostate and rectum. Carrying the anterior dissection deeper, the diverging fibres of the recto-urethralis muscle can be seen; these should be cut transversely. A blunt hæmostat may then be introduced between the rectum and the prostate which opens up the fascial space of Denonvilliers. This space may occasionally be difficult to determine from below, but in these cases the correct plane can at once be demonstrated by the abdominal surgeon. In this way injury to the rectum or prostate may readily be avoided and the two surgeons should meet anteriorly at the lowest limit of the recto-vesical pouch. Lastly the lateral ligaments of the rectum have to be cut; these are often thick and may be the seat of carcinomatous infiltration; they should be divided as far out as possible. The whole specimen is now free and may be delivered through the perineum.

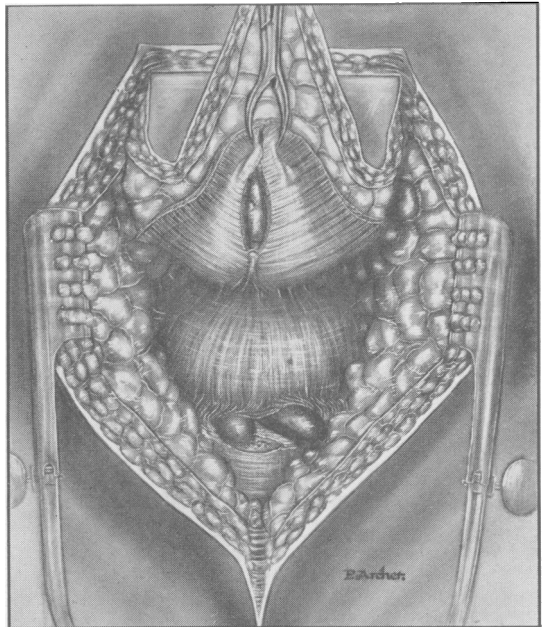


FIG. 4.—Division of the presacral fascia of Waldeyer during the perineal dissection. Note the abdominal operator's fingers protruding through the incision in the fascia.

## TREATMENT OF THE PERINEAL WOUND

The cavity should be swabbed out with hot packs and all bleeding points controlled by ligation or diathermy. Before attempting to close the perineal wound it is generally necessary to rotate the thighs inwards so that the tension on the perineum can be diminished; this may be done by loosening the appropriate joints on the leg supports.

If the patient's systolic blood pressure is 100 or over, it is usually safe to sew up the wound completely save for a rubber drain posteriorly. When the pressure is low, or if there is still oozing, the wound ought to be packed; failure to do this may result in a serious reactionary hæmorrhage. We have always used sterile oiled silk reinforced with rolls of gauze. The pack is brought out of the posterior part of the wound, the remainder being sewn up.

## POST-OPERATIVE TREATMENT

The pack, if present, is loosened at the end of forty-eight hours and removed on the third day. Afterwards the wound is irrigated daily until the patient gets up, when a daily bath replaces the wash-out. After irrigation the wound should be lightly packed with gauze. When the perineal wound is stitched up, the stitches are removed ten days after operation; no other treatment is then required.

The catheter is removed on the fifth day; in certain cases it may need to be reinserted if the tone of the bladder has not returned.

From the beginning the patient is encouraged to move about in bed and to take regular leg and breathing exercises. We do not consider early ambulation is essential provided that adequate exercises are performed; indeed getting up too soon may cause the perineal stitches to pull out when the patient sits down.

We have had one death from pulmonary embolus, in 1940 before our post-operative routine was established; femoral vein ligation has so far not been required.

## OPERATIONS IN WOMEN

The same procedure is carried out, but if the growth is on the anterior rectal wall then the posterior vaginal wall should be removed in order to prevent vaginal recurrences. No attempt is made to sew up the posterior vaginal wall, but if the wound is packed the packing is brought out through the vagina and the perineal wound is sewn up. Sterilization should be performed in all cases if the woman is of child-bearing age; we have had one patient who became pregnant and had a successful Cæsarean section at full term. She is so far well, but this is an experience which should not be allowed.

## TREATMENT OF ADVANCED CASES

*Men.*—In the male with advanced growths on the anterior rectal wall we have removed the vesicles, part of the bladder and a slice of the prostate. The late results of these operations have been disappointing and in the future we shall have to consider the work of Appleby (1950), who advocates pelvic evisceration in these cases with transplantation of the ureters.

*Women.*—In women total hysterectomy with removal of part of the vagina has often to be carried out, since invasion of the uterus or vaginal vault is not uncommon. The combined method is very useful in these cases especially in the dissection around the vaginal fornices. Ligation of one or both of the anterior divisions of the internal iliac arteries may profitably be done in these operations, but care should be taken in elderly women, as bilateral ligation of these vessels may lead to sloughing of the base of the bladder with the formation of an intractable vesico-vaginal fistula. Unilateral ligation of the anterior division is, however, always safe; it should preferably be done on the side where the growth is most advanced.

## RESULTS

During the past ten years we have carried out 154 combined excisions, 86 males and 68 females. The majority of these operations have been done in one stage, preliminary colostomy being reserved for a few patients with intractable intestinal obstruction.

These patients were largely unselected, 15 of them were over 70, the oldest being 79 and the youngest 21. 11 patients died—a mortality of 7%.

Pathologically the specimens were graded according to Dukes' classification; 24% were Stage A, 41% Stage B and 35% Stage C. The follow-up records were as follows: 68 patients were operated on five years or more ago; they consisted of 14 A cases (9 of whom are alive and well (64%)), 34 B cases (5 of whom survive (15%)) and 20 C cases (with 4 survivals (20%)). In addition, 7 other patients died from other conditions and were found at post-mortem to have had no recurrence of their carcinoma. The times after operation varied from six to two years. The only A case to die from another cause is of considerable interest. In 1946 we carried out a right hemicolectomy and a combined excision for two separate carcinomata of the ascending colon and rectum. Both were Stage A. In 1951 he was admitted with an extensive primary "leather bottle" carcinoma of his stomach; I carried out an abdomino-thoracic gastrectomy, but he died two weeks later. Post-mortem showed no evidence of recurrences from his large bowel and the pathological report revealed a primary gastric neoplasm.



During the same period I have treated 45 cases of carcinoma of other parts of the large bowel by excision. They were comprised of 19 A (42%), 13 B and 13 C cases. 3 patients died, a mortality of 6.6%. 21 of these patients had their operation five years or more ago and so far 10 are alive (48%). 9 out of 14 A cases (64%), and 1 B case are alive; all the C cases are dead.

The late results of early cases of colonic cancer appear in this series to be similar to those of the rectum but the proportion of early cases is higher (42% compared with 24%) since obstructive symptoms often lead the patient to seek advice before the glands have become involved, or extra-colonic spread has occurred.

It would not be profitable to discuss cases operated upon less than five years ago but one may assume that the survival rates will be approximately the same as in the earlier series.

Another method of assessing the prognosis of rectal cancer has been on an anatomical basis, namely the relation of the ulcer to the lowest point of the peritoneal reflection. It has been stated that carcinomas above this reflection have a better prognosis than those below. This statement has to some extent been borne out in our series. 77 patients had a radical excision five or more years ago. In 61 cases the ulcer was below the peritoneal reflection; only 14 survived (18%). In 16 patients the ulcer was situated above the peritoneum and these cases were all included in this paper as their treatment required partial or complete removal of the rectum proper. 8 have survived (50%). One of the survivors in the second group was a C case, the others were A or B. The 8 deaths occurred in 3 A, 4 B and 1 C cases.

It is possible that the improved prognosis in this group is either due to earlier diagnosis, which is doubtful, or because lesions above the peritoneal reflection are less likely to invade secondary lymphatic channels or systemic veins. It is in this group also that sphincter-saving operations are commonly performed; in our small series none had this type of operation, but 9 had a Hartmann's excision, with 4 survivals, and 7 had an abdomino-perineal, with 4 living.

Before adopting whole-heartedly conservative resection of the rectum, we must therefore be certain that our five-year cures in early cases of high carcinomas are equal to those on whom a complete resection was performed. If this test fails, then we shall have to revise our ideas.

#### FOLLOW-UP OF ADVANCED CASES

We thought it might be useful to review the survival of advanced cases, namely those in the male whose prostate was involved, and in the female where the uterus and vaginal vault were invaded. If these patients only survive a short time after their operations, then it might be argued that very extensive procedures in such cases were unjustifiable.

6 males had a routine excision of the rectum with partial resection of the prostate. 2 of these men are alive and well two years later; the other 4 died in periods between three to one year after their operations. It is possible that pelvic evisceration might have saved some of these 4 patients.

Ten women had an abdomino-perineal excision plus hysterectomy. 2 of them died from the effects of the operation; 3 are surviving after one year; the remainder died in periods from three to one year after their excisions. Although the expectation of life is not great after these operations, these patients often develop recto-vaginal fistulæ if left untouched, and it is probable that a radical excision is justifiable for that reason alone.

*The reasons for death after rectal excision* (Table V).—It is interesting to note that none was due to peritonitis, although a considerable number of these cases was operated on before the introduction of the insoluble

TABLE V.—CAUSES OF DEATH AFTER COMBINED EXCISION OF THE RECTUM

|      |  |
|------|--|
| 1940 | Pulmonary embolus.                         |
| 1941 | Pelvic cellulitis, injury to ureter.       |
| 1942 | Pelvic cellulitis, injury to ureter.       |
| 1944 | Acute intestinal obstruction.              |
| 1944 | Cerebral thrombosis                        |
| 1946 | Reactionary hæmorrhage.                    |
| 1946 | Permanent bladder paresis, pyelonephritis. |
| 1946 | Acute intestinal obstruction.              |
| 1949 | Hæmatemesis plus colonic bleeding.         |
| 1949 | Paralytic ileus.                           |
| 1950 | Agranulocytosis.                           |

sulphonamides. It makes one wonder if, in fact, these drugs are of great value in rectal excision, although their importance before anastomotic procedures is beyond doubt.

Taking the deaths in order of their occurrence, the only case of pulmonary embolus occurred before we had established a routine of post-operative exercises, but we are probably fortunate not to have had another fatal case. The 2 deaths from cellulitis were almost certainly due to injury to the ureter; these occurred early in our series and we hope will not be repeated. The 2 cases of obstruction might have been saved; one was from a Meckel's diverticulum, the other from an adhesion to the new pelvic floor. The patient with the reactionary hæmorrhage had her operation under a high spinal anaesthetic, so nowadays this misfortune should not recur.

The man with permanent bladder paresis was the only patient we have had whose bladder tone would not return. He finally died ten weeks after the operation from ascending infection of his kidneys. The growth in this patient was very adherent to the side wall of the pelvis and it is probable that the nerves to his bladder were irretrievably damaged during the operation.

The woman who died from hæmatemesis also had bleeding from the colostomy; no cause was found at post-mortem. We considered her bleeding might have been due to a vitamin deficiency following her chemotherapy; this complication should now be prevented by the routine administration of vitamin K.

The man with the paralytic ileus was a frail patient of 71; at post-mortem there was general distension of the intestine but no actual peritonitis.

Our last fatal case was in a woman of 71 who had a routine excision plus hysterectomy. She got up ten days later but developed cystitis and was given a further course of sulphonamides. A high fever developed, and examination of her blood revealed a complete absence of granulocytes and a total white count of 200. Despite penicillin, blood transfusions and pentose nucleotide she died two weeks later. There was no post-mortem.

#### CONCLUSION

During the same period 240 more cases of rectal cancer were treated by other members of the surgical staff, so that my total by no means exhausts the material available at the London Hospital.

The follow-up records show clearly that although the operative mortality for rectal cancer is very low, the ultimate results are disappointing. 77 patients had their operations over five years ago; 68 had an abdomino-perineal and 9 a Hartmann's resection. 61% of the A cases are alive, 16% of the B and 27% of the C patients. That is, 22 have been saved so far out of 77. These figures are very depressing, but for better results we must at the present time depend on earlier diagnosis; this can only come from the patients in the first instance and then early co-operation from our colleagues in general practice.

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[Figs. 1, 3 and 4 are reproduced from a forthcoming edition (G. T. Pack and I. M. Ariel) of "Treatment of Cancer and Allied Diseases", Paul B. Hoeber, Inc., New York.]