THE SURGERY OF DIFFUSE ULCERATIVE COLITIS
Including A Review of 100 Cases of Colitis Treated by Total Colectomy and Ileo-Rectal Anastomosis

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In this paper the method of treatment of diffuse ulcerative colitis by total colectomy and by the subsequent restoration of continuity of the intestinal tract by anastomosis of the ileum to the rectum is described. The concept of preservation of the rectum in all except the very rare cases—the exclusions include those in which cancer has already supervened or in which the rectum is riddled with multiple fistulae—has been followed by the author since 1952, and what follows is based on his experience in a consecutive series of 100 cases so treated and on their subsequent detailed observation in the follow-up clinic at the Gordon Hospital, London.

In advocating a new procedure to replace an old it must be shown that:
1. The old is undesirable.
2. The new is based on sound theoretical considerations.
3. The new can be achieved with a low mortality.
4. Post-operative complications in the new bear comparison with those in the old.
5. The return of the patient to good health is at least as good with the new procedure as with that which it is designed to replace.

Before describing operative details it is proposed to examine these points:

The Undesirability of an Ileostomy

No one would deny the heavy burden that is inflicted upon a patient by the institution of a permanent ileostomy in spite of the marked improvement of modern ileostomy bag design. For those of finer aesthetic sensibility its formation often at the threshold of their early adult and married lives may prove intolerable. The physician is reluctant to advise and the patient to consent to this operation until he or she is so emaciated, toxaemic and ill that the risks of operation may be great. To offer to the physician and to the patient a method of cure that allows a normal route of evacuation is likely to bring the patient to the surgeon at an earlier stage in the disease and thus diminish its mortality. An ileostomy is also associated with frequent complications, such as prolapse stenosis, perforation and ulceration. Obstruction, too, is not uncommon and amongst ileostomy patients there is a very definite mortality due to these causes.

Theoretical Basis for Retention of the Rectum

It is claimed by those advocating total excision of the large intestine and the formation of a permanent ileostomy that such radical surgery is essential, as, if the rectum is retained, the disease persists therein and the local and general manifestations of the disease are unrelieved. Such an idea presupposes that the ulcerative changes in the condition are irreversible, but it is an idea that is not in full accord with the facts.

Healing of the ulcerated areas, for example, takes place in those cases treated successfully by a medical régime and the complete resolution of a previously diffusely ulcerated bowel must have been observed by most surgeons at one time or another, sigmoidoscopying such patients in the various stages of their illness. The ulceration, therefore, is not an irreversible process in every case and this resolution may sometimes be observed even in the type of case usually necessitating surgery for its cure. Pseudopolyps, too, may disappear and this is not remarkable, as they are but partially raised oedematous fragments of mucosa, which lose their separate identity with the re-epithelialization of the raw areas of the bowel wall with which they are surrounded.

The impression that the writer has of this disease is that, provided the toxaemia with which it is associated can be overcome—and in the chronic as well as the acute stage of the condition it and all its secondary manifestations are severe—the ulceration will resolve. This viewpoint is supported by our clinical observations that the resolution of the ulceration lags behind the patient's return to reasonable health.

Because of these considerations it seemed likely
region. If it is retained the toxaemia of the disease is likely to remain unrelieved and the ulceration in the residual bowel will fail to heal.

It is true that successful cases have been reported in which a part of the pelvic colon has been retained. But in most cases the operation has proved unsuccessful. This is readily attributable to the fact that in the successful cases the disease has been less severe in the distal colon, so that its retention has not interrupted the control of the toxaemia. It is, however, impossible to assess in which cases some of the pelvic colon could be retained and therefore its removal in all becomes essential.

We have taken rectal biopsies from our patients before colectomy and after ileo-rectal anastomosis, photographs of which are shown in Figs 1a and b. As will be seen, the acute inflammatory changes have disappeared in the post-operative biopsies and the rectal mucosa has become re-epithelialized by extension from islets of mucosa that have escaped destruction by the disease.

The complicated regimented glandular pattern of the normal bowel lining (Fig. 2) is not regained entirely and in view of its gross destruction this is readily understandable. But it does simulate this pattern and provides a satisfactory lining to a rectum, which, although rendered less distensible and more rigid by fibrosis than the normal, can, nevertheless, function most efficiently.

Can Total Colectomy and Ileo-Rectal Anastomosis be Carried Out with a Low Mortality?

In the writer's personal series of 100 cases three have died, an operative mortality of 3 per cent. One death followed a burst abdomen complicating a post-operative obstruction. The second death occurred in an elderly male who at the time of admission with peritonitis, the result of perforation of the transverse colon, had an associated uraemia consequent upon retention of urine due to
prostatic enlargement. The third case died of general toxaemia. There has been one death in the follow-up period, the result of coronary thrombosis. Thus the mortality of the operation, performed often on patients who by any standards were desperately ill, compares very favourably with that of any published series of cases in which the total excision of the large intestine and the institution of a permanent ileostomy has been the method of treatment.

This low mortality has been due in part to the observation of certain essential surgical principles in dealing with the disease. These are:

(a) Excise the colon in the fulminating case or whenever haemorrhage, peritonitis or gross toxaemia are an indication for operating, but do not attempt restoration of continuity at this stage in the treatment if the patient is desperately ill. We consider that the simple institution of an ileostomy alone in such patients has no place in the surgery of ulcerative colitis. All the complications of the disease can continue in its presence and death may result. The source of the disease must be removed, however ill the patient, and skilled anaesthesia and speed of operation are necessary adjuvants to success.

(b) In carrying out a colectomy followed by ileo-rectal anastomosis in a one-stage operation, never fail to establish a temporary decompression of the bowel by the formation of an ileostomy in the manner to be described. It must be remembered that the wall of the rectum is diseased. Its normal mucosa is in great part destroyed and its wall either thickened by inflammation and oedema or thinned by extension of the ulcerative process through its various layers. The anastomotic line between this and the ileum is therefore bound to be an uncertain one and any increase in intraluminal tension which will result from the development of even minor degrees of post-operative ileus may prove sufficient to cause its disruption with resulting fatal peritonitis. By instituting a 'safety valve' ileostomy above the anastomotic line the latter is protected from any rise in pressure, the result either of gas or faecal distension of the ileum, as both will find a ready source of exit through such a stoma.

(c) Adopt the two-stage operative procedure subsequently described, not only in all desperately ill cases, but in those in which any doubt exists as to the patient's general condition at the completion of the colectomy. The elimination of the additional operative time occupied in establishing an anastomosis may prove to be the difference between life and death. However, with increasing experience in the surgery of this condition progressively fewer patients are treated by the author by this method.

(d) In the event of the development of post-operative obstruction the condition must be treated conservatively for a minimum period only. Should the obstruction not respond rapidly operation must be undertaken.

As a result of the excision of the colon marked dilatation of the small intestine can occur with but minor obvious abdominal distension and the degree of the condition is usually far greater than is apparent from clinical examination. If the patient is re-operated upon before his general condition starts to decline, there is every chance of his recovery. But as there is so little margin in these patients during the early post-operative phase between a reasonably good general condition and one that makes further operation hazardous, conservative treatment must never be continued into this second stage.

Post-operative Complications

Intestinal Obstruction

This has constituted the major post-operative complication and in 11 cases surgery has been required for its relief. In nine cases the obstruction developed in the immediate post-operative period and redeveloped in one of the patients on two further occasions and in another on one occasion within four weeks of the initial colectomy. The cause of the obstruction in this group was in all except two cases due to a plastic peritonitis and adhesions, the latter often being associated with small localized intra-peritoneal abscesses. In the remaining two, one resulted from a volvulus of the small intestine and the other was due to a stenosis of a small segment of the intestine, the cause of which was quite obscure.

In the two late cases the obstruction occurred over a year after the initial operation and resulted from well-formed intra-peritoneal bands.

In the former group it has usually been found at operation that the sites of obstruction are multiple, requiring full separation of the whole of the bowel. Following this, there is no certainty that the adhesions will not re-form to produce further obstructive episodes and in two of our cases, as noted, such occurred. In order to eliminate this possibility we now pass a long plastic tube through the ileostomy after the adhesions have been separated. This is then threaded throughout the length of the small intestine, in the same way as a tape is threaded through the top of a pair of pyjama trousers, until its tip lies in the upper part of the jejunum. In the post-operative period one is then certain that, however many adhesions form, a passage through the intestine is assured. The manoeuvre takes a very short time to perform and we consider it easier than the plication method of
Nobel. The tube is removed some five days after operation.

Burst Abdomen

Complete disruption of the abdominal incision occurred in two cases. In five further cases partial disruption was accompanied by the formation of faecal fistulae, which in each case required operation for their closure.

Secondary Haemorrhage

This was a complication in three cases, in one of which the bleeding was intra-peritoneal and the abdomen required reopening for its arrest.

Acute Staphylococcal Enteritis

This complicated the post-operative period in one patient and nearly caused her death. The condition responded to massive intravenous saline transfusions combined with large doses of oral penicillin and chloramphenicol.

Pelvic Abscesses

In spite of drainage into the pelvis following the colectomy, a localized collection of pus formed in two cases, in both of which the recovery was uneventful after the drainage of the abscess.

Superficial Fistulae in Ano

These developed in four patients in the early post-operative period. All were laid open and healed satisfactorily.

Post-operative complications have, therefore, been frequent, but few can be attributed to the particular operation itself. Mostly they have been the result of an operation undertaken in a grossly debilitated patient in whom widespread infection of the peritoneal cavity has been present before operation was carried out.

The Return of the Patient to Good Health

The 100 patients under consideration have been operated upon in the period February 1952 to July 1958. Three as noted died soon after operation and a further patient, after over one year of good health, succumbed to a coronary thrombosis. Another who at operation 18 months previously had three separate carcinomata of the colon associated with her ulcerative colitis has now, after full return to good health, developed signs of secondary deposits. Five of the series at the time of compiling this analysis are still in their final stages of treatment.

Of the remaining 90 patients, one was discharged prematurely from hospital at her own request and elsewhere had an ileostomy formed. Without exception the remaining 89 have returned to full work, the vast majority to occupations they filled before their illness. They include a doctor, nurses, business executives, a cleric, an actor, housewives, a long-distance lorry driver, school children, engineers and an engine driver. There has been a return to maximum pre-illness weight in most cases and some have so exceeded it that a weight-reducing diet has had to be imposed.

With regard to the number of bowel actions, 77 have their bowels open six or less times in each 24 hours. Of these, 18 have them open six times, 25 five times, 24 four times, seven three times, two twice, and one once. Twelve have actions in excess of six, but in no case has this interfered with their full employment. After several months not only do the number of actions progressively lessen, but many patients cease to take any drugs at all, whilst the rest are maintained on ‘Isogel’ and small doses of codeine phosphate, and sometimes one of the anti-cholinergic drugs. In only one case did perianal excoriation develop, and this was controlled by local applications and by higher drug dosages. Any patient who has his or her bowels open six times or less we find quite untroubled by the excess number, as in any case a visit to the toilet is necessitated this number of times for the purpose of urination and all patients are quite able to control their action for half an hour or so.

One patient, apart from the one mentioned above, had an associated stage 3 carcinoma of the transverse colon at the time of operation and is alive and well at the end of four years.

A further patient had gross ascites, the result of cirrhosis of the liver complicating the disease. Before her colectomy all liver tests were grossly impaired, but these returned to normal within three months of her operation. Thirty-three months after her colectomy she remains fit and well, in full-time employment as a secretary and with no ascites. Two patients became pregnant and have had normal confinement.

The above résumé of post-operative results indicates that they are equally as good following this operation of total colectomy and ileo-rectal anastomosis as in any recorded series of patients treated by total ablation of the large intestine and the institution of a permanent ileostomy.

Indications for Operation

In the selection of those patients upon whom operation is to be undertaken and in the choice of the optimum time for such a proceeding the closest co-operation between physician and surgeon is essential. There is no doubt that in all cases, except perhaps those suffering from the fulminating form of the disease, the initial treatment of the condition should be medical. Should the disease fail to respond to such treatment, however, it should not be continued beyond the point at
which further deterioration in the patient’s general condition will add hazards to the risk of operation if this is undertaken and the surgeon observing the patient throughout the course of the disease is the better arbiter to advise when this stage has been reached.

Moreover, as in the writer’s opinion every endeavour should be made to preserve the rectum when surgery is undertaken, operation should be carried out before that part of the bowel is so damaged by complete stricture formation or by multiple abscesses and fistulae as to make its retention impossible. Periodic rectal examinations and sigmoidoscopies should therefore be undertaken by the surgeon throughout the medical treatment of the disease in order that changes likely to give rise to these complications may be recognized at an early stage. Only if the treatment of the disease is regarded as a combined responsibility of physician and surgeon will this end be achieved.

Hard and fast rules are difficult to lay down for a condition the vagaries of which are widely recognized, but, accepting the generalizations mentioned above, the following types and complications of the disease are likely to require surgery for their cure.

1. The chronic case in which the disease has been present usually for many years. Periodic flare-ups of the condition have necessitated absences from work and often in-patient hospital treatment. Latterly the exacerbations have been worse, less amenable to medical treatment and accompanied by a progressive deterioration in the patient’s general condition.

2. The acute case not responding to treatment. In this type the rapid decline in the patient’s general condition and the symptoms of his or her acute illness are not halted by medical treatment. It is particularly in these cases that surgery is unfortunately delayed until extreme emaciation and severe toxaemia increase its risks (Fig. 3).

3. The fulminating case. In these cases progress of the disease is rapid. A few weeks may separate the patient from perfect health and his death from general peritonitis. A hectic temperature and a toxaemia of the profoundest degree are accompanied by the frequent passage of large quantities of pus and blood. Emaciation and dehydration are marked and the abdomen is tumid and tender. Death usually results from perforation of the colon, the whole of which is affected by widespread ulceration at one or multiple points.

4. The case with uncontrollable haemorrhage. Usually the bleeding in ulcerative colitis is controllable with transfusions and iron therapy and other medical treatment. Occasionally, however, the haemorrhage is so severe that operation alone can arrest it.

5. The case with complications. Remote complications, such as arthritis, erythema nodosum, spreading skin ulceration or iritis, are unlikely to resolve until the diseased colon is excised. Local complications, such as perforation or pericolic...
abscess formation or obstruction, will also require operation for their relief.

6. Premalignant and malignant change. Malignancy in ulcerative colitis commences in areas of stricture formation. The presence of a stricture revealed by X-ray or by sigmoidoscopy is therefore an indication for operation. Established malignant change is an obvious indication for urgent operation.

Although every case reported in this series has been selected for operation in accordance with the guiding principles set out above, the complete return to good health and a normal existence of the vast majority leads the writer to believe that the indication for operation should be extended to include those numerous patients in whom, although the disease is kept in check by a medical régime, cure is never effected and a constant sub-normal level of health exists.

Operative Technique

Before proceeding to a description of operative technique it must be emphasized that whenever a colectomy is undertaken it must be total and never partial. This is because ulcerative colitis severe enough to merit surgery for its cure is a widespread disease. It is true that in certain cases pre-operative X-ray examination may have failed to demonstrate disease in the right side of the colon and at operation this side may appear normal, but initially the disease affects the mucosa only and the early changes are not revealed by a barium enema. Moreover, that part of the bowel which may be seemingly normal at operation will in nearly every case, when examined pathologically, show multiple scattered foci of the disease. If this part of the bowel is left, these small ulcers will coalesce, so that the whole of the remaining colon will become affected and all the symptoms of the disease will return.

Total Colectomy Ileo-Rectal Anastomosis with Temporary Ileostomy (one-stage operation)

This is carried out in the following steps:

1. The incision. The abdomen is opened by a long left paramedian incision. In no case has the mobilization of the splenic flexure presented undue difficulty through this exposure.

2. Mobilization of the right side of the colon. The colectomy is commenced by incising the peritoneum of the right paracolic gutter from the caecum to the hepatic flexure, thus permitting the bowel to be drawn into the wound. The mesocolon is divided close to the bowel.

3. Mobilization of the transverse colon. This is freed from the stomach by division of the great omentum and from the posterior abdominal wall by division of the mesocolon. In many cases it will be found that the lesser sac of peritoneum has been obliterated by inflammatory adhesions, so that these two structures have to be divided step by step in one layer. The colon is freed as far to the left as possible.

4. Mobilization of the descending colon. An incision in the left paracolic gutter allows this to be brought into the wound and again the mesocolon is divided close to the bowel.

5. Mobilization of the splenic flexure. As a result of freeing the colon proximal and distal to the flexure it will be found that the division of the supporting peritoneal ligaments of the latter now become reasonably easy. The corresponding part of the mesocolon containing branches of the middle colic and left colic artery is divided, so that the whole of the large intestine as far as the pelvic colon is now freed.

6. Mobilization of the pelvic colon. The mesocolon with its sigmoidal arteries is divided close to the bowel.

7. Mobilization of the rectum and division of the superior haemorrhoidal artery. The division of the peritoneum of the pelvic mesocolon is continued downwards along the sides of the upper third of the rectum. The superior haemorrhoidal artery just below the origin of the last sigmoid vessel is then identified and after isolation divided. The division of this artery is essential. We are of the opinion that in ulcerative colitis the blood supply to the colon is excessive, and that the elimination of a considerable part thereof to the rectum remaining at the completion of the operation is at least partially responsible for the healing that takes place subsequently. The upper third of the rectum is then separated from its posterior attachments to the sacrum.

8. Division of the ileum and the terminal mesentery. The small intestine, if not involved by disease, is divided between clamps close to the caecum, but if inflammation has spread backwards through the ileo-caecal valve division is effected above the involved region. The maximum length of small intestine that has been removed has been 15 in.

9. Division of the rectum. This is divided through its upper third at the uppermost limit of viability. It is never necessary to remove more of the rectum than is dictated by this factor.

10. Anastomosis of ileum to rectum. An end-to-end anastomosis is carried out in two layers. The free edge of the mesentery is then sutured to the peritoneum of the posterior abdominal wall to eliminate the hiatus resulting at the completion of this anastomosis, which if left may give rise to one form of post-operative obstruction.

11. Formation of safety valve temporary ileostomy. A circle of skin the size of a sixpence is excised from the right iliac fossa and a stab
wound made to divide all layers of the abdominal wall. Through this incision a knuckle of small intestine a few inches above the anastomosis is drawn out and maintained in position with Babcock's forceps. The space between the lateral abdominal wall and the emerging loop of small intestine is then obliterated by suturing the mesentery to the peritoneum. A further possible source of post-operative obstruction is thus avoided.

12. **Final steps.** The laparotomy wound is closed with drainage down to the site of the anastomosis. The knuckle of intestine is sutured to the peritoneum around the stab wound through which it emerges. The apex of this knuckle is then opened and its edges sutured to the margins of the circle of skin (Figs. 4 and 5).

**Total Colectomy, Ileostomy and Proctostomy (two-stage operation)**

The steps of this operation are similar, except that the rectum requires somewhat further mobilization, particularly by division of its lateral ligaments, so that after removal of the colon its open end may be brought to the surface of the abdomen and sutured to the edges of the lowermost part of the paramedian incision. The end of the ileum is also brought through the incision a little above the proctostomy (Fig. 6). When the patient has sufficiently recovered the two ends are united after their dissection by a formal end-to-end anastomosis.

**Closure of Safety Valve Ileostomy**

A formal closure of the ileostomy formed in the one-stage operation is carried out about three weeks after the colectomy, but before this minor operation is undertaken a barium enema X-ray is

**Fig. 4.**—Diagram to show the formation of the safety valve ileostomy.

**Fig. 5.**—Photograph showing the positioning of the ileostomy in the right iliac fossa.

**Fig. 6.**—Photograph showing the ileostomy and proctostomy formed in the first stage of a two-stage operation.
Post-operative Care

Sufficient has been said with regard to post-operative complications to indicate that the treatment of these patients in this stage of their illness demands the closest care from nursing staff, house officers, chief assistant and surgeon.

Those patients who have had steroid therapy during their medical care will have been operated under a cover of cortisone and the administration of this is continued in the first post-operative days. Even though this drug has not been given during medical treatment, post-operative collapse of the patient's blood pressure may often be due to cortisone deficiency and it must be administered by the intravenous route immediately.

As soon as the ileostomy starts to work, the actions from which are collected in disposable ileostomy bags, fluid and electrolyte balances require daily estimations and replacement when imbalances are shown. Deficiencies develop very rapidly with corresponding dramatic deterioration in the patient's condition. Vitamin complexes and antibiotics are added routinely to the intravenous drip. Codeine phosphate, ½ gr. t.d.s. and 1 gr. nocte, 'Isogel', 1 dr. t.d.s., and one of the anticholinergic drugs are given by mouth as soon as intestinal activity has returned to normal, in order to diminish the number of actions and increase the solidity of the stool.

The closest record is kept of the volume of all faecal discharges, as a lessening of this may be the first indication of a subacute or complete intestinal obstruction. Initially this complication may not be accompanied by anything more than transient vomiting or minimal abdominal distension, as with the removal of the colon the relatively increased capacity of the peritoneal cavity allows the small intestine to dilate markedly before this is readily apparent on abdominal examination. It is emphasized again that conservative treatment in the event of obstruction must never be persisted with if it does not produce rapid relief or if there is the slightest decline in the patient's condition.

Persistent post-operative fever is usually the sign of an intraperitoneal collection of pus, and again this must be sought for clinically and drained surgically.

Partial wound breakdown sometimes results in the formation of faecal fistulae, which constitute some of the most difficult post-operative complications with which to deal. These fistulae rarely heal on their own, the fluid and electrolyte losses are severe and the excoriation of the abdominal wound increases its breakdown. In spite of the poor condition of these patients re-operation must be undertaken before the patient's condition declines further. It is not sufficient to expose the fistula and to oversew this, as further breakdown is almost certain. The affected loop must be dissected out, oftentimes a delicate and difficult procedure, as other coils of bowel are matted to that in which the fistula lies, and a small length of the bowel containing the fistula must be excised, restoration of continuity being affected by a formal end-to-end anastomosis. The preliminary dissection must have been sufficiently extensive to ensure that this is under no tension whatsoever.

In spite of all these post-operative difficulties, the vast majority of patients, as shown, can be restored to perfect health. However, we know of no type of case in the province of the general surgeon which can produce more anxieties in the post-operative stages and are of the opinion that these cases are best treated in units specializing in the care of diseases of the large intestine.

Conclusion

The series of cases reported in this article represent, with the exception of six cases recorded below, every case of ulcerative colitis treated surgically by the author in the period under review. In all the rectum was affected. Of the six cases referred to above, four had incurable associated carcinoma at the time they were admitted for treatment, one was given a permanent ileostomy as his sphincter mechanism had been destroyed by peri-rectal abscesses and operations therefore at another hospital, and a further case had a left hemicolectomy performed misguided by the author for what was then thought to be disease localized to the left side of the colon. Six months later he developed recurrences of every symptom of ulcerative colitis and died of an overwhelming haemorrhage.

Acknowledgments

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