Split ileostomy and ileocolostomy for Crohn's disease of the colon and ulcerative colitis: a 20 year survey

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SUMMARY The clinical course of 140 patients who have had a split ileostomy for ulcerative colitis or colonic Crohn's disease over a 20 year period is reported. In 37 patients with ulcerative colitis there was no sustained improvement. In the 102 patients with Crohn's disease there was an immediate clinical improvement in 95, which was sustained in 65. Thirty patients have subsequently required a proctocolectomy for persistent inflammation, and 28 are still defunctioned. Bowel continuity was restored after 61 split ileostomies and in 44 patients intestinal continuity remains intact at the present time (mean follow up since closure = 62.5 months, range 0-231 months). It is concluded that a split ileostomy is a safe conservative operation producing at least temporary improvement in severely ill and malnourished patients with Crohn's colitis, and that if a subsequent resection becomes necessary it may be less extensive than was thought applicable at the initial operation. In 27 patients a resection has not been required.

Isolation of the large bowel by means of an end ileostomy was first tried by Brown¹ in the treatment of ulcerative conditions of the colon, but the results were disappointing. Truelove² showed that corticosteroid enemas improved rectal inflammation in ulcerative colitis and this led to the suggestion that an external diversionary operation would not only defunction the colon, but would also allow administration of topical corticosteroids to the whole colon in patients with acute exacerbations. Preliminary results of this combined treatment showed that the 26 patients with ulcerative colitis who had failed to respond to medical treatment had no improvement after diversion.³ Five patients with Crohn's colitis who were included in the study, however, showed a marked improvement in general health which warranted further assessment of this method of treatment. This paper reports our long-term experience with the technique, and although our aim was to use it only for patients with Crohn's colitis, in some patients the diagnosis was found eventually to be ulcerative colitis.

The original aims of the operation were: (1) To facilitate limited resection. In patients with a segment of severe colonic disease in association with

a mild diffuse colitis it was hoped that a period of faecal diversion might allow less inflamed bowel to heal so that strictures or fistulae could be excised without a major resection or a proctocolectomy being undertaken. (2) To facilitate major resection. In severely ill patients it was envisaged that an improvement in the poor general condition would follow faecal diversion, and thus would make subsequent major surgery safer. (3) To allow healing of inflamed bowel. Patients in this category usually had severe symptoms in spite of medical treatment. In most cases the symptoms were sufficient to warrant a proctocolectomy, although the disease, while diffuse, did not appear to be very severe.

For a number of reasons these aims have subsequently become modified. The effective use of total parenteral nutrition has helped to prevent and treat severe malnutrition, and has also allowed a 'medical defunctioning' of the bowel for short periods, but where it failed to improve a patient's general condition a surgical defunctioning has been performed. It has also become apparent that, despite improvement in the disease, complete healing of the inflamed bowel rarely occurs. Furthermore, in some patients the technique has been modified to combine a primary limited resection of severe lesions with defunctioning of less severely inflamed bowel.

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OPERATION

The faecal stream is diverted and the colon defunctioned by the operation of split ileostomy, operative details of which have been previously described.⁴ The operation has usually been performed under intravenous steroid cover. The terminal ileum is divided about 5–10 cm from the ileocaecal valve and a Brooke ileostomy⁵ is fashioned in the right iliac fossa. The distal ileum is brought to the skin surface as a mucous fistula in the right hypochondrium. This operation, without resection of bowel, is referred to as a 'simple split' in the following text.

Postoperatively, oral steroid treatment is decreased gradually and if possible stopped after two or three months. Daily topical steroid infusions (prednisolone 20 mg, Predsol Retention Enema, Glaxo) through the mucous fistula are continued for several months or a year. If the disease becomes quiescent or asymptomatic the colon is left defunctioned for about 18 months. The patient is then reassessed to determine the extent and severity of residual disease. If investigation shows no evidence of active disease the continuity of the bowel is restored. Sometimes a segment of the colon may show continued inflammation and this may require a limited resection at the time of closure. If the disease remains active and widespread a proctocolectomy is performed.

Methods

The current study has been undertaken to analyse the long-term results of a split ileostomy. One hundred and forty patients have been treated. The preliminary report³ described 31 patients, but only eight are identifiable from their case histories in order to be included in this study. In addition, a further 109 cases have been reviewed making a total of 117. A full follow-up was possible in 88 patients. Seventy-eight were seen in the outpatient clinic, six patients were reviewed by completion of a postal questionnaire, and full details of four patients who have moved from this region were forwarded by their present doctors. Nine patients have died during the 20 year period and 20 were reviewed until they were lost to follow-up.

The diagnosis of each patient was reassessed using the combination of clinical, radiological, and histopathological criteria described by Lockhart-Mummery and Morson.^{6,7} Over the period of review the diagnosis of several patients has been altered, especially as operative specimens became available for histopathological study.

A detailed record was made of the course of the disease and treatment for each patient. The date of

onset of symptoms and subsequent major episodes of the illness such as relapses and operations were recorded as 'events'. At each 'event', the clinical findings, laboratory investigations, histopathological, and radiological reports were reviewed, and the extent of the disease was assessed. Medical and surgical treatment and their complications were recorded in detail. The state of the patient's health at the time of follow up was recorded.

Results

TYPES OF INFLAMMATORY BOWEL DISEASE

Patients with ulcerative colitis

Thirty-seven patients with ulcerative colitis have been treated with a split ileostomy. Twenty-six patients were previously reported,³ but subsequently the diagnosis of three was changed to Crohn's colitis. The identification of these 23 patients is not possible from the earlier report. Since 1965 a further 14 patients have been treated by a split ileostomy but only four were known to have ulcerative colitis at the time of operation. In the remainder the final diagnosis of ulcerative colitis was made only after histological examination of resected specimens. The disease did not settle in 10 and they have required a proctocolectomy after a mean time of 13.5 months' defunction (range 1–37 months). Two patients responded well to faecal diversion but relapsed soon after closure of the split ileostomy and required proctocolectomies. The remaining two patients had subtotal colectomies with ileorectal anastomoses. Both have recurrent disease needing medical treatment. There were no deaths in this group of 14 patients.

One patient had a good clinical response to split ileostomy for supposed Crohn's disease, but active colonic disease persisted. She had a subtotal colectomy and ileorectal anastomosis but has continued to have relapses of rectal disease needing medical treatment. This is the only patient in this series in whom the histopathology of the operative specimen is not conclusive of either ulcerative colitis or Crohn's disease and is thus classified as indeterminate colitis. This patient is, of course, not included in the Crohn's group.

Patients with Crohn's disease

One hundred and two patients have had split ileostomies for Crohn's colitis. Sixty-two patients were women and 40 men with a mean age of onset of disease of 26.6 years (range 4–74 years). One hundred and fourteen split ileostomies have been performed in these patients; 10 were defunctioned twice and one a third time. The mean time from onset of disease to the first split ileostomy was 57.3

months (range 0–309 months), and the mean duration of disease from its onset to the review was 127 months (range 5–479 months). Fifty-eight cases presented primarily in Oxford and 44 patients were referred from other doctors in the United Kingdom and abroad.

At the time of the split ileostomy the majority of patients had colonic or ileocolic disease, but five had disease confined to the terminal ileum (Table 1). Eighty-five elective split ileostomies were performed; 69 for the failure of medical treatment, five without prior medical treatment, and 11 for perianal disease without major intestinal inflammation. The laparotomy findings during emergency surgery are shown in Table 2. Faecal diversion was used during 29 emergency operations, to defunction inflamed bowel, and also as a safeguard when an anastomosis was at risk of dehiscence. The combination of a split ileostomy and a bowel resection was used more frequently in emergency operations than during elective procedures (Table 3).

IMMEDIATE EFFECT OF SPLIT ILEOSTOMY IN PATIENTS WITH CROHN'S DISEASE

After faecal diversion, with or without an associated resection, 95 patients (93%) showed an immediate improvement of general health and symptoms. The improvement was sustained in 65 patients (64%) but was partial and unsustained in 30 (Table 4), of whom 16 had a proctocolectomy after a mean period of 16.4 months (range 4–54 months). Seven patients did not respond and all these were brought to a proctocolectomy within a year (mean 5.6 months).

Of the 37 patients who had a poor or absent response to split ileostomy the symptoms continued in 23 patients and relapsed in 14 after diversion. Relapse was defined as the appearance of the clinical features of Crohn's disease after a symptom-free interval in patients with known disease, provided that other non-related causes of the symptoms had been excluded.⁸ The cumulative relapse rates (Fig. 1) of disease in defunctioned bowel and after closure of the ileostomy were

Table 2 *Laparotomy findings in 29 patients treated by emergency operation*

Inflammatory mass	14
Acute colonic dilatation	4
Obstruction	6
Perforation	7
Severely inflamed bowel	2
Anastomotic dehiscence	3

calculated by the method described by Armitage.⁹

LONG-TERM RESULTS OF SPLIT ILEOSTOMY IN PATIENTS WITH CROHN'S DISEASE

The sequence of operations performed is seen in Fig. 2. Thirty patients (29%) have required a proctocolectomy; in 25 without closure of their split ileostomy. There was no significant improvement in haemoglobin, white cell count, sedimentation rate, or serum albumin measurements, and little clinical improvement (Table 5) between the time of the initial split ileostomy and proctocolectomy in these patients.

Twenty-eight patients have not been closed. Five died before closure of the split ileostomy, and one patient has been lost to follow-up. Seven patients are to have bowel continuity restored within the next few months. Fifteen patients are not to have their ileostomies closed. In two of these anal sphincter function is uncertain because of previously severe rectal and perianal disease, and five are receiving medical treatment for active colonic disease. The remaining eight patients prefer to remain defunctioned, rather than risk a relapse after reconnection.

Sixty-one closures of split ileostomies have been performed after a mean period of external faecal diversion of 20.1 months (range 1–61 months). The closure operation usually consisted of a simple reanastomosis, but in 13 patients a limited resection was necessary for residual disease. Of the 61 patients, 44 remain closed at the present time (mean follow up since closure, 62.5 months, range 0–231 months), and 17 have been resplit or progressed to

Table 1 *Anatomical distribution of Crohn's disease at time of split ileostomy*

	Number of operations
Small bowel	5
Ileocolic	22
Colonic	54
Colonic and small bowel	32
No information	1
Total	114

Table 3 *Split ileostomy and associated resections*

	Elective	Emergency	Total
'Simple'	67	8	75
with small bowel resection	7	3	10
with right hemicolectomy	3	7	10
with subtotal colectomy	7	11	18
with left hemicolectomy and small bowel resection	1	—	1
Total	85	29	114

Table 4 Immediate response to split ileostomy and eventual outcome in 102 patients with Crohn's colitis

	Total	Procto- col- ectomy	Closure of ileostomy	Defunc- tioned
No response	7	7	—	—
Partial response	30	16	6	8
Good response	65	7	38	20

proctocolectomy (Fig. 2). Twenty-seven (44%) of the patients who were closed were simply split and reanastomosed without resection, and 13 have not needed any further surgical treatment. Only two patients have required a resection at both operations.

During the period of colonic defunction there was obviously a significant clinical improvement in patients whose ileostomies were closed (Table 6). In these patients there was a significant reduction in the need for steroid treatment by the time of ileostomy closure in contrast with those patients who required a proctocolectomy (Table 7). Although the colonic inflammation in the defunctioned colon mostly settled, histological examination of endoscopic biopsies shows evidence of residual inflammation. The colon becomes contracted and relatively shortened during the period of defunction but dilates satisfactorily after reconnection.

EFFECTS OF SPLIT ILEOSTOMY FOR SPECIFIC INDICATIONS IN PATIENTS WITH CROHN'S COLITIS

Elective indications

Forty-four (52%) of the elective split ileostomies were closed, 19 remain open and 22 came to proctocolectomy.

Fig. 2 The sequence of operations.

Twenty-nine patients had severe perianal disease at the time of the operation. In 11 patients the diversion was indicated for perianal disease alone and in the remainder for a combination of severe intestinal inflammation and perianal disease. An improvement was recorded in the perianal inflammation of 19 patients, but only nine had their ileostomies closed and eight came to proctocolectomy. A full description of these patients will be reported separately.

Fig. 1 The cumulative relapse rate during colonic defunction (n=14) and after closure of split ileostomy (n=61).

Table 5 Incidence of symptoms and signs at time of split ileostomy and subsequent proctocolectomy without prior closure of ileostomy (n=25)

	Split ileostomy	Procto- colectomy
Constitutional	19	10
Acute abdomen	3	2
Diarrhoea/rectal discharge	16	12
Pain	20	13
Ulcerative colitis picture	4	2
Perianal disease	7	12
Extraintestinal disease	4	2

Six patients who presented with severe colonic Crohn's disease in childhood required large doses of steroids, and in one case azathioprine, to control the disease. Steroid side effects and growth retardation were prominent, and the patients showed no signs of puberty. There was a reluctance on the part of the parents and clinicians to perform a proctocolectomy in such young patients especially if the colitis was thought to be because of Crohn's disease and so the defunctioning technique was used. The operations were performed between the ages of 12 and 16 years. One patient died soon after his split ileostomy as the result of peritonitis from an extending fistula. Two later required a proctocolectomy and one patient is still defunctioned. Two patients have had their ileostomies closed and are fit and well. All the surviving patients passed through puberty satisfactorily when the corticosteroid therapy was discontinued or reduced.

Acute indications

Seventeen (59%) of the split ileostomies performed acutely were closed, nine remain open, and three patients have had a proctocolectomy. After the operation there was an improvement in the general health of 14 patients with acute inflammatory masses. Diversion was combined with a resection of the mass in eight of these patients. In six the mass was not resected and it gradually resolved and

Table 6 Incidence of symptoms and signs at time of split ileostomy and subsequent closure (n=61)

	Split ileostomy	Closure of ileostomy
Constitutional	38	2
Acute abdomen	21	2
Diarrhoea/rectal discharge	41	3
Pain	38	1
Ulcerative colitis picture	3	—
Perianal disease	17	1
Extraintestinal disease	12	3

Table 7 Patients receiving steroid treatment at time of split ileostomy, closure of ileostomy, and proctocolectomy

	Steroid treatment	
	+	—
Split ileostomy*	38	23
and closure	9	52
Split ileostomy†	19	6
and proctocolectomy	14	11

* $\chi^2=27.13$, $p \leq 0.01$; † $\chi^2=1.43$, NS.

eventually disappeared, so that in one patient a simple reanastomosis was possible. Eight patients were closed, two required a proctocolectomy, three are still defunctioned, and one has died.

MORTALITY AND MORBIDITY

Three patients (3%) died in hospital after a split ileostomy. One woman (aged 27 years) died of a massive pulmonary embolus two days post-operatively, and a boy (aged 13 years) developed obstruction and peritonitis after the operation. Another young man (aged 21 years) developed several intra-abdominal abscesses after a split ileostomy. He was seriously ill with multiple enterocutaneous fistulae for over a year and was maintained on total parenteral nutrition until his death. Six other patients died during the period of review. Two of these were unrelated to the disease (extradural haematoma and chronic respiratory disease). Two patients died after proctocolectomy, one from overwhelming sepsis and a pulmonary embolus, and the other from multiple pulmonary emboli. A further two patients died after discharge from hospital. A woman (aged 40 years) had a cardiac arrest while being anaesthetised elsewhere for the incision and drainage of an ischiorectal abscess and a man (aged 46 years) was admitted to hospital with shock and pneumonia and died almost immediately.

The morbidity recorded in the hospital notes of the patients reviewed is shown in Table 8. Split ileostomy was uncomplicated in nearly two-thirds of the cases. The ileostomy stomas caused considerable problems and were refashioned on 16 occasions. Pulmonary emboli were diagnosed in four patients and were implicated in three of the deaths. Twelve patients became obstructed after the split ileostomy; eight of these resolved on conservative management, and four needed operative correction. One of these patients was obstructed from a small bowel stricture of Crohn's disease that should, in retrospect, have been resected at the initial

Table 8 Morbidity of split ileostomy for Crohn's disease

Complications	No.
Total operations	114
Uncomplicated	68
Spout problems	16
Peritonitis	4
Wound and abdominal infections	12
Wound dehiscence	3
Fistulae	5
Obstruction	12
Pulmonary embolus	4
Other	12

operation. The other patients were obstructed by adhesions and intra-abdominal herniation of bowel.

Discussion

Surgery has an undisputed place in the management of inflammatory bowel disease. In Crohn's disease there is a continuing debate about the particular operation which is best suited to a specific indication and site of disease, because the disease is at present incurable, tends to relapse, and often requires repeated operations. There is, therefore, a need to preserve intestine if possible. In ulcerative colitis the situation is more clearly defined, mainly because the disease is curable at the expense of a proctocolectomy.

In ulcerative colitis our results confirm the earlier studies.³⁻¹⁰ Faecal diversion does not cause sustained clinical improvement in the disease or in general health and most patients soon progress to major excisional surgery. Since 1965 split ileostomy has been used intentionally in only four young patients with known ulcerative colitis in an attempt to spare them a proctocolectomy. At the time of diversion the other 10 patients had diagnoses of Crohn's colitis or of an indeterminate colitis. These patients were diverted mostly over 10 years ago and reflect the occasional difficulty in making a definite preoperative diagnosis in some cases. Today, however, with colonoscopy and biopsy, double contrast radiology, and greater clinical experience this uncertainty is greatly reduced.

In contrast the effectiveness of a split ileostomy in Crohn's colitis is striking. The diversion usually results in an immediate improvement in general health. It is this respite in the course of the disease that makes the technique so valuable, so that time is obtained to improve the patient's condition and allow any resection which is necessary. In a majority of patients the improvement followed simple split ileostomy, although in some it occurred after diversion combined with a resection. The

improvement was confirmed in several small series,¹¹⁻¹⁴ after the publication of the preliminary study. Subsequently, enthusiasm for the procedure diminished, because of the incidence of extension and relapses of disease in the isolated colons, the poor rate of restoration of bowel continuity, and the frequent progression of perianal disease.

Recently there has been renewed interest in conservative surgical techniques for the treatment of Crohn's disease. Zelas and Jagelman¹⁵ have reported 79 patients with Crohn's colitis in whom a loop ileostomy was used to divert the faecal stream. They emphasised the immediate general improvement in these patients and recommended the procedure as the initial management of debilitated patients before definitive surgery. The loop ileostomy is quick and easy to construct and replace but it does not ensure complete colonic defunction. We have seen several complications of this operation, such as ileostomy prolapse and difficulty in fitting the bag, and prefer to continue with our own technique of complete faecal diversion.

The favourable response to external faecal diversion is not universal. In seven of our patients there was no response at all and they soon required proctocolectomy (mean 5.6 months). In 30 others it was partial and not sustained, and over half of these eventually required a proctocolectomy (mean 16.4 months). Oberhelman¹⁶ reported an improvement in all his 31 cases, Zelas and Jagelman¹⁵ in 72 of 79, and Burman *et al*¹³ in 28 of 29. Other groups did not do as well; Howell Jones *et al*¹¹ obtained only a temporary remission in 19 of 21 patients, and only two patients had a sustained remission.

The role of faecal diversion in emergency surgery is limited. Bowel frequently has to be resected (Table 3) – for example, for perforation or toxic dilatation. The defunctioning of inflammatory masses, however, has resulted in the reduction of inflammation and facilitated subsequent surgery. In acute operations, therefore, faecal diversion can be used to conserve mild or moderately inflamed bowel not needing resection, to isolate inflammatory masses, and also as a safeguard when an anastomosis is at risk of dehiscence.

There were five patients in the series with inflammation confined to the small bowel, and they were diverted because it was complicated by the presence of an inflammatory mass or perianal disease. Uncomplicated small bowel disease should be treated by resection and anastomosis.

There is good corroborative evidence to confirm the improvements in health that we have seen. Generally, symptoms disappear promptly, weight increases,^{13 15-17} and abdominal masses resolve.¹⁵

Mean haemoglobin, sedimentation rate, serum albumin, and seromucoid levels improve.¹³ The need for corticosteroid treatment is much reduced but the radiological improvements lag behind the clinical.¹⁶

We have restored bowel continuity on 61 occasions. At the present time 44 patients have bowel continuity intact, with the prospect of seven more in the near future. Kivel *et al*¹⁰ test each patient before closure with a faecal challenge introduced into the mucous fistula, but we have only recently started systematically assessing the value of this. Zelas and Jagelman,¹⁵ who have used a loop ileostomy specifically as a holding procedure to improve their patients before resection, have restored bowel continuity in combination with a resection in 52 of 79 patients. In three cases they have closed the ileostomy without resection but all three have relapsed. We have closed 27 without any resection and 13 have needed no further surgery for their Crohn's disease. Most other series have been able to restore continuity in less than a third of patients.^{13 14 16-18} and many of these patients have then relapsed.

One of the major criticisms of external faecal diversion is that the disease in the defunctioned bowel may progress and extend. If disease has continued after diversion then further excisional surgery is indicated. If relapses occur after an initial, good response to split ileostomy, medical management is often sufficient to control symptoms. Relapses of disease in defunctioned bowel are usually not an indication for urgent surgery. It is interesting that relapses occur more frequently in patients once bowel continuity has been restored and this suggests a possible role of the faecal stream in the perpetuation of the inflammation.

Eleven patients had repeated split ileostomies. Their initial diversions were closed after an improvement in the colonic inflammation and a good clinical response. When recurrence occurred the patients often preferred a repeat split ileostomy especially if the only alternative was a proctocolectomy.

Despite the overall improvement in perianal disease in response to split ileostomy, the ileostomy closure rate has been poor. Split ileostomy was used in 11 patients for perianal disease alone and its advantages over a sigmoid colostomy are that it is easy to manage, permits administration of topical corticosteroids through the mucous fistula and ensures complete faecal diversion. Although there was a relief from sepsis and discomfort in 22 of 23 patients with perianal disease in Zelas and Jagelman's¹⁵ patients, other authors have found that the disease progresses. Burman *et al*¹³ report the

healing of fissures but only one of six fistulae *in ano* healed and four other patients developed them while defunctioned. The response of perianal disease to faecal diversion is variable, but in patients incapacitated by their disease it is worth a trial, if only to facilitate a later proctocolectomy.

There are reports of tumours developing in bypassed Crohn's disease of the small bowel.¹⁹ Two tumours have been reported occurring in defunctioned rectums,²⁰ and two other at the site of ileocolovesical fistulae¹⁸ also in defunctioned bowel. We have not seen any tumours in our patients, but they will be periodically re-examined to exclude an occult tumour.

Conclusions

While the aetiology of Crohn's disease is unknown, treatment can only be empirical. The advantage of a split ileostomy is that it is a conservative operation which reduces the extent of resected bowel to a minimum. A split ileostomy is of little benefit in ulcerative colitis. On the other hand, in Crohn's colitis it is a relatively simple procedure with an acceptably low mortality and morbidity, which can be performed in a sick patient in preference to an extensive resection, with an immediate improvement in the general condition of most patients. It may improve the safety of subsequent operations, limit the extent of subsequent resectional surgery, and in some cases remove the need for resection entirely.

Using the defunctioning technique for Crohn's colitis has resulted in sustained remission of symptoms for considerable lengths of time. In a substantial number of patients who would have otherwise been treated by proctocolectomy for symptoms which could not be controlled medically, it has been possible to restore intestinal continuity. Although defunctioning does not cure the disease, many of these patients have subsequently remained well enough not to need further surgery.

After our extensive experience with faecal diversion we feel that it is indicated in patients with a definite diagnosis of Crohn's colitis in the following circumstances: electively; for the failure of medical treatment, especially in debilitated patients; for symptomatic perianal disease not responding to simple local measures; in the young to preserve bowel and to attempt to prevent or delay a proctocolectomy. Acutely: to defunction inflamed colon not needing resection; to defunction inflammatory masses; to safeguard an anastomosis at risk of dehiscence.

Finally, the observation that the diversion of faeces in Crohn's colitis often results in a marked

symptomatic improvement, and that local lesions may improve substantially, poses the question of what part the faecal stream plays in the pathogenesis of Crohn's lesions.

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