

Ileostomy without External Appliances: A Survey of 25 Patients Provided with Intra- Abdominal Intestinal Reservoir

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GOOD results after present day surgical treatment for colitis has led to wider use of proctocolectomy both in patients with mucous ulcerative colitis and with transmural regional enteritis (Crohn's disease) localized to the colon. Consequently the number of patients provided with permanent ileostomy has increased. The improvement in surgical technics in the construction of the ileostomy, and the development of ileostomy appliances has greatly facilitated the care of these patients. Because of the rapid improvement in general physical condition after removal of the diseased intestine the patients in general adjust themselves very well to the permanent ileostomy and its care. In spite of the fact that most of these patients are very satisfied with the outcome of the surgical treatment there are, however, still many drawbacks of even a well functioning ileostomy. The flow of intestinal contents through the ileostomy is more or less continuous and not voluntarily controlled, except to a small extent by the diet. Ileostomy appliances have to be carried continuously to collect the intestinal discharge. The possibility for leakage is always present and odor from the intestinal discharge constitutes a serious problem for many patients. Occasional or constant skin irritation is the most frequent late complication of ileostomy.^{2, 8, 11}

In a previous publication the use of terminal ileal reservoirs in five patients with permanent ileostomies was reported.⁸ The construction of the ileal reservoir utilized

the principle of the fixed direction of the peristaltic contractions in the intestine and resulted in a pouch without any pressure waves during filling and with a considerable capacity. The preliminary experiences from these five patients provided with intra-abdominal reservoirs were very encouraging as three of the patients had complete fecal continence and emptied their reservoir 2-3 times a day. They did not use external ileostomy appliances. In this report a series of 25 patients provided with ileostomy reservoir are reported and certain modifications in the original operative procedure are described.

Material

Twenty-five patients who have undergone proctocolectomy have been provided with ileostomy reservoirs. In 18 patients the operative procedure described under A was applied and in seven the method outlined under B was used. The colon and rectum were removed in 20 patients because of mucous ulcerative colitis, in four patients because of transmural Crohn's disease in the colon and in one patient because of familial polyposis. In one patient with Crohn's disease the distal ileum was also involved and approximately 80 cm. of the ileum was removed in connection with the proctocolectomy. In 19 patients the reservoirs were created in connection with proctocolectomy and in six patients the reservoir procedures were performed as secondary operations 1 to 6 years after the primary proctocolectomy. These patients were selected for the procedure because of consistent skin irritation around the

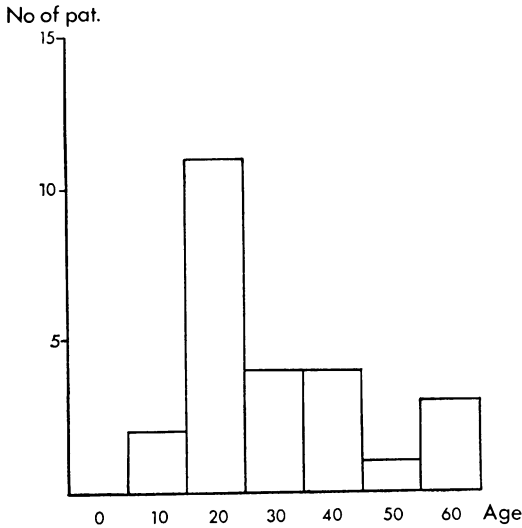


FIG. 1. Age distribution of 25 patients provided with intra-abdominal ileostomy reservoir.

ileostomy. The age distribution of the total material is given in Figure 1.

The previously reported series of five patients are included in the present material. Three of these patients have, because of retraction of the stoma, later been operatively revised according to the procedure described below. The other two patients have the original model of corner outlet as outlined in the primary publication.

Operative Procedure

The operative procedure was in principle the same whether performed in connection

with the proctocolectomy or as a secondary operation. The two procedures applied on the present material are separately described under A and B.

A. Thirty centimeters of the distal ileum was split at its antimesenteric border and folded like a U (Fig. 2A, B). The legs of the U were sutured together with two layers of continuous catgut. The U was then folded up as shown in C and the reservoir closed with two layers of continuous catgut. In one corner a small opening was left. The afferent ileum was then divided 8–10 cm. proximal to the reservoir and the proximal end of the divided intestine was anastomosed to the open corner, also using continuous or interrupted catgut (Fig. 3A, B). The distal part of the divided ileum forms the outlet of the reservoir and was used for the ileostomy as described later on.

B. In seven patients the following procedure was applied: Approximately 15 cm. of the distal ileum was left untouched. Thirty cm. of the ileum, proximal to this terminal segment was folded like an up side down U and the legs were sutured together at the antimesenteric border with continuous catgut (Fig. 4A). The legs of the U were then split open at the antimesenteric border (Fig. 4B) and the

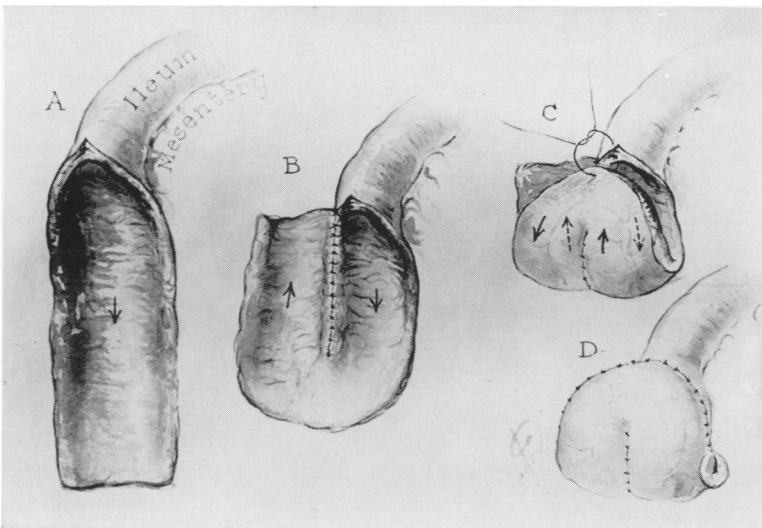
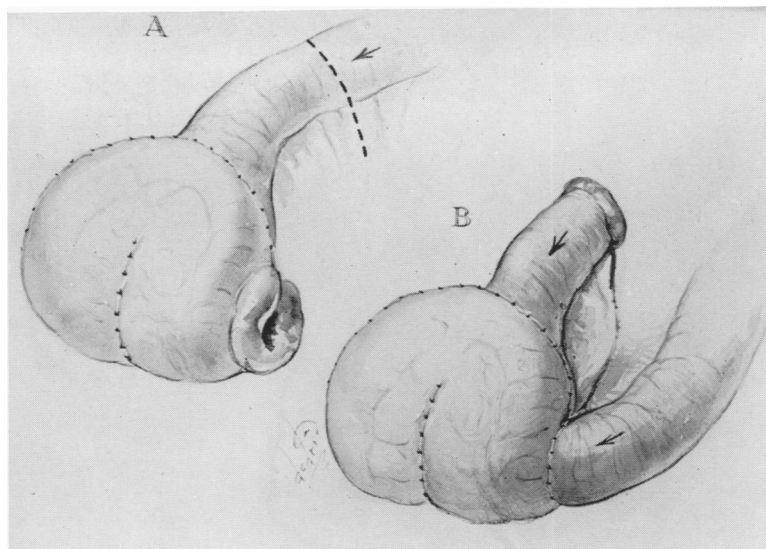


FIG. 2. Construction of ileostomy reservoir according to the method described under A in the text.

FIG. 3. Construction of the reservoir outlet according to the method described under A in the text.



mucous membrane of the "legs" was sutured, also with continuous catgut (Fig. 4C). The proximal leg of the U was split open in the proximal direction approximately 2 cm. beyond the end of the suture line, as indicated in C of Figure 4. The terminal unsplit ileal segment was then invaginated into the lumen of the reservoir as shown in Figure 4D. The invaginated "nipple," projecting into the reservoir measured 2-3 cm. The serosal surface of the invaginated intestine was sutured to the serosa of the surrounding ileum with interrupted silk. The reservoir was then closed with two layers of continuous catgut as shown in Figure 4E. The valve function of the "nipple" was now tested by injecting air through a catheter into the reservoir while clamping the afferent ileal loop. In no instance could leakage of air through the outlet be observed after removal of the catheter. The air was then removed by inserting the catheter again.

An opening was then made in the skin at the site chosen for the ileostomy (Fig. 5). Beneath the skin the incision through the abdominal wall was directed medially and caudally through the fascia, rectus muscle and peritoneum so that the canal for the ileostomy passed obliquely through the rectus muscle. The terminal segment of the

ileum was then pulled through the canal and after eversion of the intestinal wall sutured to the edges of the opening in the skin with interrupted catgut. The projecting intestine was made shorter than for a conventional ileostomy, a total length of 1-2 cm. Before closing the wound, the lateral space was closed by suturing the parietal peritoneum to the reservoir with interrupted silk, and a tube (size 25-28 Charrière) was introduced through the ileostomy to drain the reservoir for the first 5 to 7 days postoperatively.

Postoperative Management

After operation the patients were continued on parenteral fluid therapy for 3-5 days and the tube draining the reservoir remained in place for about 5 days. Thereafter the reservoir was emptied by introducing a plastic catheter (size 25-32 Charrière) into the reservoir approximately four times a day but later on less frequently. The ileostomy was covered by a compress and the patients were trained in emptying the reservoir and also in washing the reservoir if needed.

The patients have been repeatedly re-examined with regard to the capacity of the reservoir and possible leakage through the ileostomy. They have been questioned

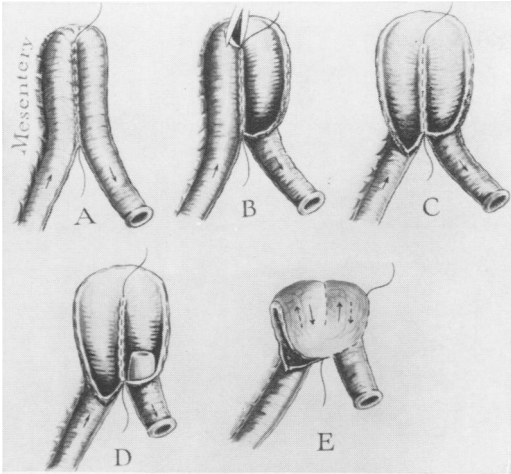


FIG. 4. Construction of the reservoir according to the procedure described under B in the text.

about the frequency of emptyings, leakage of gas and odor and whether they use ileostomy bags.

Results

All patients survived operation without any serious complications. The postoperative course has been the usual one after proctocolectomy with rapid improvement in general health and gain in weight.

All patients empty their reservoirs through a plastic tube one to four times a day. In nine patients the ileostomies are completely continent, which means that neither feces nor "gas" is involuntarily expelled through the ileostomy (Table I). In 13 patients there is escape of "gas" through the stoma but no feces and in three patients both "gas" and occasionally some "feces" are expelled through the ileostomy. Twenty-two patients never use external ileostomy appliances, they keep the ileostomy covered by compresses. When outside the home, three patients, "to be safe," however, use ileostomy bags. Three of the patients provided with a "nipple" according to procedure B have had some difficulties in introducing the catheter into the reservoir for emptying. In none of the patients are there skin problems and they are satisfied with this type of ileostomy despite occasional leakage in some patients. In patients in whom the reservoirs were created

as secondary operations because of consistent skin irritation the skin problems were eliminated after operation and the patients are satisfied with the new type of ileostomy. They have discarded ileostomy appliances and are now using only compresses over the ileostomies.

The capacity of the reservoir, which at the operation is approximately 70 ml. increases during the first 3 months after the operation up to around 500 ml. Parallel to the increasing capacity the function of the ileostomy reservoir improves.

Discussion

The need to improve the situation for patients after proctocolectomy has repeatedly been substantiated in publications reporting different methods for establishing fecal continence after this operation. In selected patients preservation of the rectum and ileo-rectal anastomosis is possible but in the majority the rectum is involved and has to be sacrificed.⁷ Ileo-anal anastomosis has been proposed and performed but results have been unsatisfactory.^{1, 6, 10} In patients with profuse ileostomy discharge reversal of a terminal ileal segment has been performed.⁵ In dogs, Valiente and Bacon⁹ constructed a terminal ileal pouch according to the so called "pantaloon" operation and this pouch was inserted between the anus and ileum to retain ileal contents enough to decrease bowel movements to acceptable rates. This principle for con-

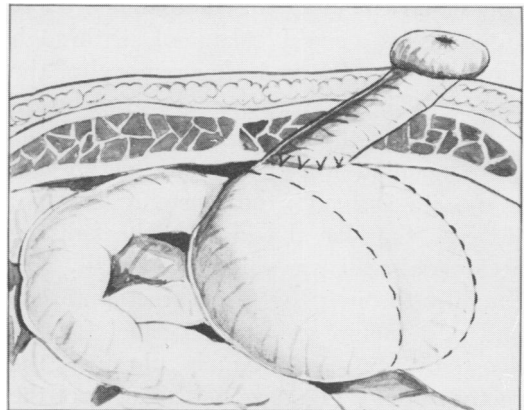


FIG. 5. Reservoir and outlet *in situ*.

structing a pouch does not, however, eliminate pressure waves produced by the motor activity of smooth muscle⁴ and the method has not come to clinical use. In the present type of intestinal pouch motor activity in the different parts of the intestine forming the "reservoir" counteract each other and no pressure waves appear on filling the reservoir.⁸

The initial encouraging experiences with ileostomy reservoir in the first series of patients previously published,⁸ have in the present series been fully confirmed. In the original procedure the corner of the reservoir was taken out as an ileostomy but as already mentioned in the original paper the creation of the outlet of the reservoir was not satisfactorily solved. By the modifications described in the present report these problems have been overcome.

Although most of the patients provided with ileal reservoirs according to procedure A were continent for feces, escape of "gas" from the ileostomy could occasionally occur in some patients. By the modification described under B, involving the construction of a "valve," an attempt was made to obtain also a complete control over the escape of "gas." As three out of seven patients in this series have experienced difficulties in emptying the reservoir, obviously because of the "nipple," this procedure (B) does not seem to be qualified to replace procedure A. The absence of pressure waves in the reservoir and the oblique course of the ileostomy canal through the rectus muscle are obviously the most important factors for creating fecal continence in these patients.

The first operation using the ileostomy reservoir was performed in 1967 and this patient is doing well. She has complete fecal control and never uses external ileostomy appliances. (She gave birth to a child 5 months ago without any trouble.)

The advantage of this type of ileostomy are apparent. Intestinal contents are not expelled from the ileostomy either during rest or during coughing or straining. Instead of being stored outside the body in

TABLE 1. *The Functional Results as Judged by the Occurrence of Leakage from the Ileostomy*

Total No. of Patients	Complete Continence	Occasional Escape of "Gas"	Occasional Escape of "feces"
25	9	13	3

external appliances the intestinal discharge is now accumulated in the intra-abdominal reservoir. Emptying of the reservoir is easily performed with a catheter when it is convenient for the patient. Skin problems are completely eliminated because neither intestinal discharge nor glue from ileostomy appliances are irritating the skin.

In spite of the fact that most patients with conventional ileostomies adjust rapidly to external ileostomy appliances it is clear that this situation for many patients evokes social and psychological problems. The ileostomy reservoir offers more convenience and safety. Of interest are six patients in whom ileostomy reservoirs were created as secondary procedures. In five the operations were performed because of skin problems but one patient wanted a reservoir because of difficulties with the conventional ileostomy in his work as a land surveyor. (He was working in the woods most of the day and had troubles with frequent leakage despite different kinds of ileostomy appliances.) All patients were satisfied with the new type of ileostomy and claimed that their situations had improved. This attitude is understandable as patients previously had to spend much time in the care of the ileostomy and had more or less consistent skin irritations. After the operation they empty the reservoirs twice a day and skin problems are eliminated.

It could be objected that this method creates stasis in the ileum and could affect the intestinal microflora and absorption. In fact, there seems to be a change of ileal microbial flora toward the microbial population found in normal large bowel (to be published). Regardless of this change in intestinal microflora the absorptive capacity of the small intestine seems to be identical

with absorption in patients with conventional ileostomies. Vitamin B₁₂ absorption, however, seems to be slightly reduced (to be published). A defective absorption of vitamin B₁₂ is, however, easily compensated for by parenteral substitution.

The intestinal reservoir in patients with intramural Crohn's disease localized to the colon and rectum can also be disputed. In three patients the lesions were localized to the colon and by frozen sections from the ileum assurance was obtained that this part was not involved. In one patient the distal ileum was also involved and consequently was removed together with the colon and rectum. If later on Crohn's disease should appear in the segment used for construction of the reservoir the situation is similar to that with conventional ileostomy. The reservoir is easily examined both by endoscopy and by x-ray and should lesions occur a partial resection of the reservoir is still possible. Even complete removal of the reservoir will not sacrifice more than 30 cm. of ileum and this amount is often resected in patients with Crohn's disease localized to the distal ileum.

Although the experiences obtained in 25 patients provided with ileostomy reservoirs have been encouraging it may be emphasized that this method (procedure A) should be applied only to patients operated upon *electively* for ulcerative colitis or Crohn's disease. Furthermore, the method should not be used in patients preoperatively treated with steroids. In these patients construction of the reservoir can be made with greater safety as a secondary procedure.

Summary

Experiences from a series of 25 patients with a new type of ileostomy provided with an intra-abdominal ileal reservoir is presented. By splitting 30 cm. of the ileum at its antimesenteric border and folding the split intestine twice, a reservoir is formed by suturing the edges of the intestine. In this type of pouch the motor

activity in the different parts of the intestine counteracts itself and no pressure waves appear on filling the reservoir. The outlet of the reservoir passes obliquely through the rectus muscle which aids to close the outlet so that involuntary escape of intestinal contents from the reservoir is prevented. The capacity of the reservoir is about 500 ml.

After panproctocolectomy for ulcerative colitis, Crohn's disease, localized to the colon and rectum and for familial polyposis 25 patients have been provided with this type of ileostomy. Twenty-two of these patients have "fecal" continence and never use ileostomy appliances. They empty their reservoir 2-3 times a day by inserting a catheter through the ileostomy.

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