

A Prospective Audit of the Complications of Loop Ileostomy Construction and Takedown

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Key Words

Loop ileostomy · Morbidity · Complication · Construction · Closure

Abstract

Aim: A prospective review of the complications of ileostomy construction and takedown. **Materials and Methods:** One hundred twenty-seven consecutive patients undergoing construction of a loop ileostomy were included in a prospective nonrandomized computer database. Complications of the loop ileostomy were assessed prior to and after closure. Three closure techniques were performed [enterotomy suture (25.7%), resection and hand sewn (31.2%) or stapled anastomosis (43.1%)] and compared. **Results:** One hundred twenty-seven (73 male, 54 female) patients, mean age 54 years were included from 1992 to 2002. Seventy-two patients underwent anterior resection for low rectal carcinoma, 30 an ileoanal pouch for ulcerative colitis and 25 for miscellaneous conditions. Fifty-nine pre-takedown complications occurred in 50 (39.4%) patients. The most common were dermatitis (12.6%) and erythema (7.1%). The most severe were dehydration in 1 patient and stomal prolapse in 4 patients. Closure was associated with a complication rate of 33.1% and a mortality rate of 0.9%. Wound infection occurred in 18.3% and small bowel obstruction in 4.6%.

Anastomotic leak requiring reanastomosis occurred in 2.8% and enterocutaneous fistula treated conservatively in 5.5%. There were no statistically significant differences in morbidity between closure techniques ($p = 0.892$). There were no statistically significant differences in complications ($p = 0.516$) between patients with ulcerative colitis and those with neoplasia (39.29% vs. 32.2%). **Conclusions:** Loop ileostomy construction and takedown is associated with considerable morbidity, mostly minor. No differences exist between technique used for closure or the baseline pathology of the patient.

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Introduction

The increase in sphincter-saving colorectal surgery over the last 2–3 decades [1–3] has led to an increase in the construction of temporary loop ileostomies [4]. They are used to defunction the distal bowel after low colorectal/coloanal anastomoses, for perianal Crohn's disease, after construction of a pelvic reservoir and other miscellaneous indications [5, 6]. Low pelvic anastomoses (<6 cm from the anal verge) are associated with an increased rate of complications [7–9]. Conversely, the overall morbidity associated with the construction and takedown of a loop ileostomy varies between different authors and

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0253-4886/04/0000-0000\$21.00/0

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ranges between 10.8 and 69% [10, 11]. This morbidity has an effect on patient's health, postoperative hospital stay and in-hospital costs [12].

Therefore, it is important to strike a balance between the morbidity associated with the construction and closure of a loop ileostomy and the potential morbidity which stems from the lack of its use. The aim of this study was to prospectively evaluate the complications associated with loop ileostomy construction and takedown.

Materials and Methods

A total number of 127 consecutive patients who underwent construction of a loop ileostomy between the years 1992 and 2002 at Hospital Clínico Universitario, Valencia, were consecutively included in this nonrandomized study. Data was obtained from a computerized database completed prospectively, which collected all information regarding patient details, operative indications, type of procedure performed and postoperative morbidity and mortality. The latter was divided into early (within 30 days of the procedure) or late (after 30 days) postoperative morbi-mortality.

Techniques for Construction and Closure of the Ileostomy

An enterostomal therapist (employed since 1997) evaluated patients undergoing an elective procedure preoperatively and the stoma site was marked. Abdominal wall trepanation was performed after laparotomy. The most distal segment of ileum, which could be brought through the skin incision without tension, was employed. The ileostomy was constructed by everting the proximal limb and suturing the distal limb to the dermis without division or occlusion. No fixation sutures were used to fix the afferent limb to the peritoneum and/or to the fascia. A supporting rod was not used. All patients in our series were prescribed an astringent diet and antidiarrheal medication as required as soon as the ileostomy started functioning, in order to maintain a low-volume output.

The distal anastomosis was checked for stenosis or patency with a water-soluble contrast enema prior to closure of the loop ileostomy, a minimum of 6–8 weeks after the initial procedure. All operations were carried out or supervised by the same four staff colorectal surgeons. Bowel preparation was not used and the antibiotic regime consisted of amoxicillin 500 mg and clavulanic acid 0.125–2 g i.v. 30 min preoperatively and three separate 1-gram i.v. doses at 8-hour intervals postoperatively.

A circumstomal incision was made and the stoma was mobilized from surrounding fascial and peritoneal adhesions. Three techniques were used for closure of the loop ileostomy based upon the surgeon's preference: Closure of the enterotomy with 3/0 Vicryl® (Johnston & Johnston Intl., Woluwe, Belgium) single layer interrupted sutures, resection of the thickened free edges and hand-sewn end to end anastomosis with single layer interrupted 3/0 braided multifilament reabsorbable sutures, minimal resection of the borders and side-to-side stapled anastomosis using a Proximate® 75 mm reloadable linear cutter (Ethicon Endo-Surgery, Inc. Johnson & Johnson, Cincinnati) followed by stapled closure of the ends with the same stapler. All skin incisions were primarily closed with staples.

We assessed the morbidity attributed to the ileostomy prior to its closure, and both short- and long-term postoperatively.

Definitions

(1) Early postoperative obstruction was defined as clinical and radiological signs of obstruction which required readmission to hospital within the first 30 postoperative days.

(2) Prolonged postoperative ileus was defined as the inability to tolerate oral intake a minimum of 5 days postoperatively together with a need for nasogastric decompression and an absence of bowel sounds.

(3) In the pre-takedown period, erythema was defined as a simple redness surrounding the ileostomy whilst dermatitis was considered to be present when the erythema was associated to inflammatory changes such as scaling, localized pain or swelling. After closure, wound infection was considered to be present when there was an association of localized redness, heat, pain or tenderness, and swelling or wound discharge of purulent fluid.

(4) Anastomotic leak was considered when there was evidence of generalized peritonitis, enterocutaneous fistula or radiographic evidence of a leak on contrast enema (for pelvic anastomosis).

Statistical Analysis

All statistics were calculated using the Statistical Package for the Social Science (SPSS), Chicago, IL Version 11.0 for Windows. Nominal variables were described as means and standard deviation. The Mann-Whitney U test was used for comparison of medians and categorical variables were compared using the χ^2 test. $p < 0.05$ was considered statistically significant.

Results

A total of 127 (73 male and 54 female) consecutive patients with a mean age of 54 years (SD 18.58) were included in this study.

Indications for Loop Ileostomy

The most frequent pathologies requiring construction of a loop ileostomy are listed in table 1. Preoperative stoma siting was performed in 65.4% of patients and elective construction in 92.9%.

Pre-Takedown Complications

There were a total number of 59 (46.46%) complications in 50 (39.4%) patients. The complications are listed in table 2. Two patients required readmission to hospital. One because of severe dehydration and prerenal renal failure and one for ileostomy prolapse which required refashioning of the ileostomy. There were no differences in the number of complications in the group of patients who did not have their stoma marked (17/44, 38.64%) in comparison to those who had their stoma site marked preoperatively (32/83, 38.55%) ($p = 0.993$). Thirteen (10.24%) patients had a subclinical or clinical leak of their

Table 1. Pathologies associated with construction of a loop ileostomy together with percentage which were preoperatively sited, percentage of elective procedures and closures

Pathology	n (%)	Preoperative siting, n (%)	Elective ileostomy construction, n (%)	N° takedown n (%)
Anterior resection-low rectal carcinoma	72 (56.7)	50 (69.4)	69 (95.8)	59 (81.9)
Ileoanal pouch-UC	30 (23.6)	18 (60)	30 (100)	28 (93.3)
Anterior resection-diverticulitis	5 (3.9)	3 (60)	1 (20)	4 (80)
Ileoanal pouch-FPC	9 (7.1)	5 (55.6)	9 (100)	9 (100)
Perianal Crohn's disease	2 (1.6)	2 (100)	1 (50)	2 (100)
Rectal trauma	1 (0.8)	1 (100)	0 (0)	1 (100)
Others	8 (6.3)	4 (50)	8 (100)	6 (75)
Total	127	83 (65.4)	118 (92.9)	109 (85.8)

UC = Ulcerative colitis, FPC = familial polyposis coli.

primary pelvic anastomosis despite the construction of the loop ileostomy, of which 4 (3.15%) patients had to be reoperated. The indications for reoperation were evidence of generalized peritonitis or a worsening of clinical signs or evidence of sepsis after conservative management.

Complications after Ileostomy Closure

One hundred and nine (85.8%) of the total 127 patients had their ileostomies closed. Mean follow-up after closure was 18.93 months (SD 5.18). The mean interval from ileostomy construction to take-down was 9.13 (SD 18.58) months and was influenced by hospital waiting lists and the need for postoperative chemotherapy. The decision for closure was not affected by age – median 54 years (17–86) versus median 64.5 years (26–79) for the groups who had their stoma closed/not closed, respectively ($p = 0.176$). Baseline pathology had no influence on stoma closure either ($p = 0.522$). There were no differences in the time for closure between those patients who had complications either in the pre-takedown period [median 8 months (2–41) vs. 8 months (4–26), $p = 0.333$] or after ileostomy closure [median 8 months (4–19) vs. 8 months (2–41), $p = 0.794$] for those patients with and without complications, respectively.

Overall, 42 patients (33.1%) had a complication after takedown. Thirty-five (32.1%) of 109 patients had some kind of complication in the immediate postoperative period (within 30 days after closure of the ileostomy) (table 3). There was 1 death due to pulmonary thromboembolism. There were 9 anastomotic leaks (8.3%). Three (2.8%) required reanastomosis and 6 (5.5%) were manifested as an enterocutaneous fistula and treated conservatively

Table 2. Pre-takedown complications

Complication	n (%)	Re-admission	Re-operation
Erythema	9 (7.1)	0	0
Stomal mucositis	8 (6.3)	0	0
Peristomal dermatitis	16 (12.6)	0	0
Flat ileostomy	6 (4.7)	0	0
Peristomal fistula	5 (3.9)	0	0
Retraction	5 (3.9)	0	0
Prolapse	4 (3.1)	1	1
Mucosal ischemia	1 (0.8)	0	0
Parastomal hernia	4 (3.1)	0	0
Dehydration	1 (0.8)	1	1

with a satisfactory outcome. One patient had two consecutive anastomotic leaks which required reanastomosis and finally a terminal Brooke ileostomy was constructed. Of the 5 (4.6%) cases of small bowel obstruction, one required reoperation and reanastomosis due to stenosis of the closure. The only late complication recorded was an incisional hernia at the stoma site in 13 patients of which 8 have been corrected to date (table 3).

Comparison of Closure Technique

Of the 109 patients who had their ileostomy closed, 28 (25.7%) had an enterotomy closure, 34 (31.2%) had resection and hand sewn anastomosis, and 47 (43.1%) had resection and stapled side to side anastomosis. Techniques of closure were compared for general complications, rate of wound infection, bowel obstruction and

Fig. 1. Comparison of techniques with respect to the rate of complications.

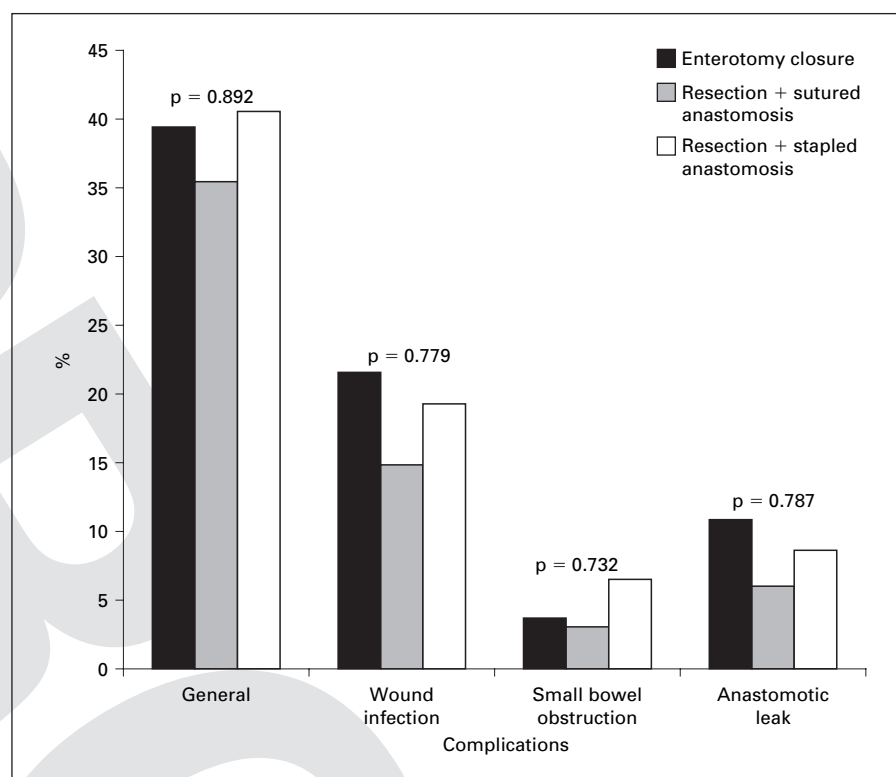


Table 3. Complications associated with ileostomy takedown in the postoperative period

Complication	n	Percentage of total number of closures (109)	Reoperation n
Wound infection	20	18.3	0
Anastomotic leak	9: 3 with complete dehiscence, 6 enterocutaneous fistulae	8.3	3: reanastomosis
Postoperative ileus	2	1.8	0
Small bowel obstruction	5	4.6	1: reanastomosis
Pulmonary thromboembolism	1	0.9	death
Incisional hernia	13	11.9	8

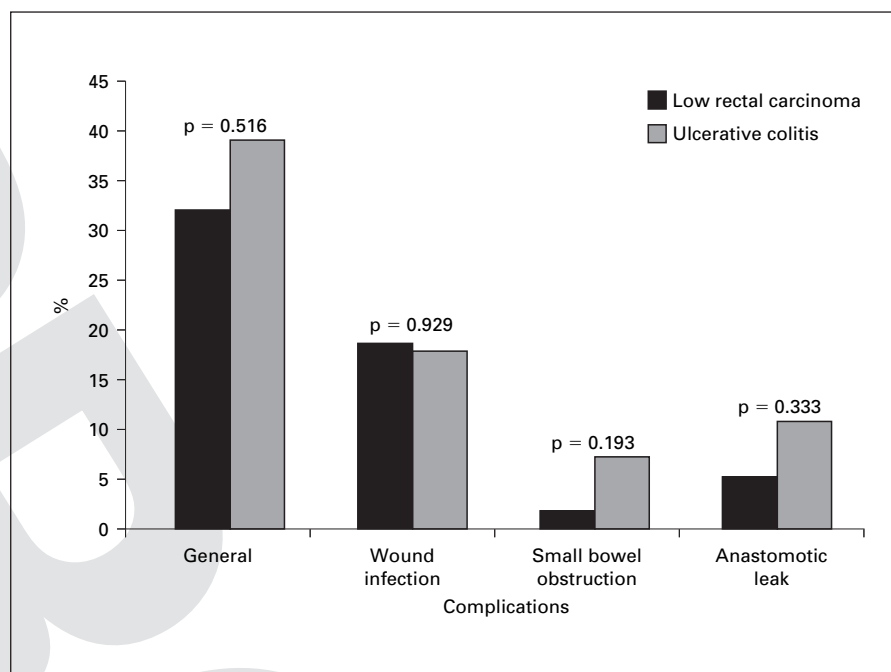
anastomotic leak (fig. 1). No significant differences were found between the three techniques used with respect to any of the complications.

Comparison of Complications in Relation to Baseline Pathology

The two most frequent operations and pathologies leading to the construction of a loop ileostomy and its

subsequent closure were an ileoanal pouch anastomosis for ulcerative colitis in 28 patients and colorectal anastomosis for low rectal cancer in 59 patients. The two groups were compared for rates of general complications, wound infection, small bowel obstruction, and anastomotic leak (fig. 2). There were no significant differences between any of the complications compared.

Fig. 2. Comparison of the rate of complications between patients with ulcerative colitis and those with low rectal carcinoma.



Discussion

Total mesorectal excision for low rectal carcinoma has gained widespread popularity and become the gold standard in rectal cancer surgery. This technique has led to a reduction in 5-year local recurrence rates to below 3–4.9% [13, 14]. In addition, after Parks and Nicholls [11] reintroduced the ileoanal anastomosis, the number of sphincter-saving procedures for ulcerative colitis have also increased. These procedures, however, are associated with a higher risk of anastomotic leak [8, 9, 15]. Consequently, the use of fecal diversion to protect the anastomosis and mitigate the consequences of an anastomotic leak has also increased.

The routine use of a loop ileostomy has been widely debated with results to support all arguments. So far, there is no conclusive evidence on the subject. Proponents of the routine use of an ileostomy argue that although the ileostomy does not prevent leakage, the consequences of the leak are less severe, with a lower rate of major leaks [16, 17] and need for reoperations [18]. On the other hand those against the routine use of a loop ileostomy claim that it leads to an increase in morbidity and mortality together with higher hospital stay and costs [12], and the lack of its use does not lead to an increase in postoperative complications [19, 20]. In our study, 13 (10.24%) patients had a subclinical or clinical leak of their

primary pelvic anastomosis despite the construction of the loop ileostomy, of which 4 (3.15%) patients had to be reoperated. This is higher than that of 4% [17] reported by some authors, whilst others state a higher leak rate of 13.6% [11] and 16% [9]. However, results are difficult to compare due to differences in patient selection, post-operative follow-up for leaks and definitions of clinical versus subclinical leaks.

We experienced a higher number of complications related to stoma construction and takedown than most authors [10, 21, 22]. This is probably due to methodological differences in data collection and type of study carried out. The majority of complications in the pre-takedown period were minor, the most frequent being peristomal dermatitis and erythema. This complication seems to be a frequent problem at other centers too with rates which vary between 3% [23], 15% [11] and 36% [24]. In our series, one patient suffered severe dehydration and had the ileostomy closed prematurely. Other authors have experienced higher rates of 2.2% [22], 4.8% [10] and 20% [11] of dehydration. All patients in our series were prescribed an astringent diet and antidiarrheal medication as required as soon as the ileostomy started functioning, in order to maintain a low volume semi-solid to solid output. The other major complication was stomal prolapse with similar rates to those reported by Saghir et al. [24], and lower than that reported by Leong et al. [25]. The

majority of patients did not need reoperation and the problem was solved at the time of ileostomy closure. Pre-operative marking of the stoma site and the presence of an enterostomal therapist were not associated with a lower number of complications (38.64 vs. 38.55%). Other authors [26] have encountered similar results.

Complications after ileostomy closure were also frequent. Wound infection was the most frequent complication (18.3%) and was higher than that reported by other authors which were 1.3% [10] where skin incisions left open versus 2.8% [21], 3% [11] and 14.2% [22] in those who had primary closure of the skin incision. All patients in our study underwent primary closure of the skin incision after ileostomy closure. This may have been a contributing factor to the high rate of wound infection though the results reported in the literature on this subject are contradictory. However, the majority of wound infections were minor and were solved by drainage of the infection through a small opening in the wound and a course of broad-spectrum antibiotics. They did not increase hospital stay and led to a better cosmetic result than if they had been left open. The second most common complication was an incisional hernia at the stoma site in 11.9% of patients which is also higher than that reported by others (0% [11], 2.8% [21]). This may have been due to the high rate of wound infection we experienced.

Our leak rates were similar to the 0–7% leak rate described in the literature [5, 10, 11, 22, 27]. However, we found no significant differences in the number of leaks between technique of ileostomy closure and this is in accordance with the results described by other authors [6, 11, 22, 28]. Our overall rate of bowel obstruction was similar to the 1.2–14% reported in the literature [10, 11,

22, 24]. However, we did not find a significantly different rate of obstruction between the various techniques, a fact which is contrary to that reported by some [6, 22]. In their study, Hasegawa et al. [6] compared stapled versus sutured closure of the loop ileostomy in a randomized controlled trial in 141 patients. They found a lower rate of obstruction in patients with a stapled anastomosis but no differences in hospital stay, readmission and reoperation rates between the two groups.

Finally, even though patients with ulcerative colitis as baseline pathology were associated with a higher number of complications, in general, there were no significant differences when the results were analyzed statistically. Saghir et al. [24] found that age was the only factor which independently influenced the outcome of stoma surgery. Baseline pathology had no significant effect. There were also no significant differences in the complication rate after closure when baseline pathologies were compared in the study conducted by Amin et al. [21].

Summary

Both ileostomy construction and takedown are associated with a considerable number of complications. No differences exist between the three techniques used for ileostomy closure. Construction of a loop ileostomy should not be taken on lightly and careful patient selection and assessment for the need of an ileostomy is required. However, in the absence of adequate studies identifying at risk anastomoses and a consensus on the need for a routine ileostomy, we will continue to use a loop ileostomy to protect high-risk pelvic anastomosis.

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