Original Article

Ann Coloproctol 2018;34(5):266-270
https://doi.org/10.3393/ac.2017.12.13

Annals of Coloproctology
pISSN 2287-9714 eISSN 2287-9722
www.coloproctol.org

Postoperative Outcomes of Stoma Takedown: Results of Long-term Follow-up

Bomina Paik[1], Chang Woo Kim[1], Sun Jin Park[2], Kil Yeon Lee[2], Suk-Hwan Lee[1]

[1]Department of Surgery, Kyung Hee University Hospital at Gangdong, Kyung Hee University School of Medicine, Seoul; [2]Department of Surgery, Kyung Hee Medical Center, Kyung Hee University School of Medicine, Seoul, Korea

Purpose: Stoma takedown is a frequently performed procedure with considerable postoperative morbidities. Various skin closure techniques have been introduced to reduce surgical site infections. The aim of this study was to assess postoperative outcomes after stoma takedown during a long-term follow-up period.
Methods: Between October 2006 and December 2015, 84 consecutive patients underwent a colostomy or ileostomy takedown at our institution. Baseline characteristics and perioperative outcomes were analyzed through retrospective reviews of medical records.
Results: The proportion of male patients was 60.7%, and the mean age of the patients was 59.0 years. The overall complication rate was 28.6%, with the most common complication being prolonged ileus, followed by incisional hernia, anastomotic leakage, surgical site infection, anastomotic stenosis, and entero-cutaneous fistula. The mean follow-up period was 64.3 months. The univariate analysis revealed no risk factors related to overall complications or prolonged ileus.
Conclusion: The postoperative clinical course and long-term outcomes following stoma takedown were acceptable. Stoma takedown is a procedure that can be performed safely.

Keywords: *Postoperative complications; Ileostomy; Colostomy; Surgical wound infection*

INTRODUCTION

Stoma formation is common in colorectal surgery. The construction of a diverting stoma is often indicated in patients with both benign and malignant colorectal diseases, with studies reporting a significant reduction in anastomotic leakage and reoperation rates in the presence of a stoma [1-3]. Despite its obvious advantages, stomas cause substantial discomfort in the everyday lives of patients, such as difficulties in readjusting to normal daily life and the psychological damage that ensues [4]. In addition, complications such as prolapse, necrosis, stenosis, and skin irritation are not uncommon, which leads to extended hospital stays or unscheduled hospital visits and a considerable increase in medical expense [5]. Therefore, stoma takedown is the answer to the possible problems except for specific situations, for example, a permanent stoma and poor condition or performance of the patient.

However, stoma takedown sometimes causes several complications [6, 7]. Surgical site infection (SSI) is the most common complication, followed by intestinal obstruction, incisional hernia, and anastomotic leakage from the site of the ileostomy or colostomy repair. Although several reports have been published concerning postoperative outcomes after stoma takedown, only a few have addressed long-term outcomes. The aim of this study was to assess postoperative outcomes after stoma takedown during a long-term follow-up period.

METHODS

Patients

Between October 2006 and December 2015, a total of 162 patients underwent stoma formation with the intention of future takedown at the Department of Surgery at Kyung Hee University Hospital at Gangdong. Among these, 84 patients who underwent a

Received: June 23, 2017 • Accepted: December 13, 2017
Correspondence to: Suk-Hwan Lee, M.D.
Department of Surgery, Kyung Hee University Hospital at Gangdong, Kyung Hee University School of Medicine, 892 Dongnam-ro, Gangdong-gu, Seoul 05278, Korea
Tel: +82-2-440-6295, Fax: +82-2-440-6073
E-mail: leeshdr@khu.ac.kr
ORCID code: https://orcid.org/0000-0001-6470-8620

colostomy or ileostomy takedown were included; 78 patients were excluded due to reasons including follow-up loss (n = 20), Hartmann reversal (n = 18), refusal of further stoma takedown surgery by the patients or a family member (n = 7), plans to undergo, but have not yet undergone, takedown (n = 6), transfer to another hospital (n = 6), and death (n = 21). According to the treatment policy at our hospital, for those being treated with concurrent chemoradiotherapy due to rectal cancer, the stoma takedown procedure was performed only after confirmation of an intact anastomosis through a gastrografin radiologic study after completion of chemotherapy. If the radiologic study revealed no signs of leakage and the patients' general condition was fit for surgery, an ileostomy or colostomy takedown was performed 3–4 weeks after the completion of chemotherapy; in circumstances where signs of leakage were present or the patient required additional time for recovery from the effects of chemotherapy, takedown was delayed according to the doctor's decision. Medical records were retrospectively reviewed to obtain data related to the following baseline and perioperative variables: age, sex, body mass index, American Society of Anesthesiologists physical status classification, past medical history, preoperative serum albumin level, initial surgery, indication for stoma, time between stoma formation and takedown, operation type, method of anastomosis, duration of surgery, postoperative hospital stay, early and late postoperative complications, and readmission within 30 days after surgery. Local Institutional Review Board approved retrospective database review with exemption of patients' approval (KHNMC 2018-07-002).

Operative techniques

All patients either received second generation cephalosporin as prophylactic antibiotics (before incision) or were already on regular antibiotics prior to surgery. All procedures were carried out under general anesthesia and in the supine or lithotomy position. Procedures included takedown of a loop ileostomy and loop colostomy. The method of bowel anastomosis, either hand-sewn or stapled, was selected at the discretion of the surgeon. After stoma takedown, the abdominal wall was closed layer by layer with interrupted vicryl 1-0 or continuous prolene 2-0 sutures. Wound closure was completed by using various methods according to the surgeon's preference: linear primary suture, delayed primary intention, or subcuticular purse-string suture. A linear primary suture was performed by using interrupted sutures that were tied intraoperatively following an elliptical incision around the stoma (Fig. 1). The sutures were left loose and tied postoperatively to allow healing for the delayed primary intention (Fig. 2A). Wet dressing with saline was applied for 3–5 days, and skin approximation was achieved when no signs of infection were seen in the wound (Fig. 2B). Finally, the purse-string suture involved a cir-

Fig. 1. Linear suture.

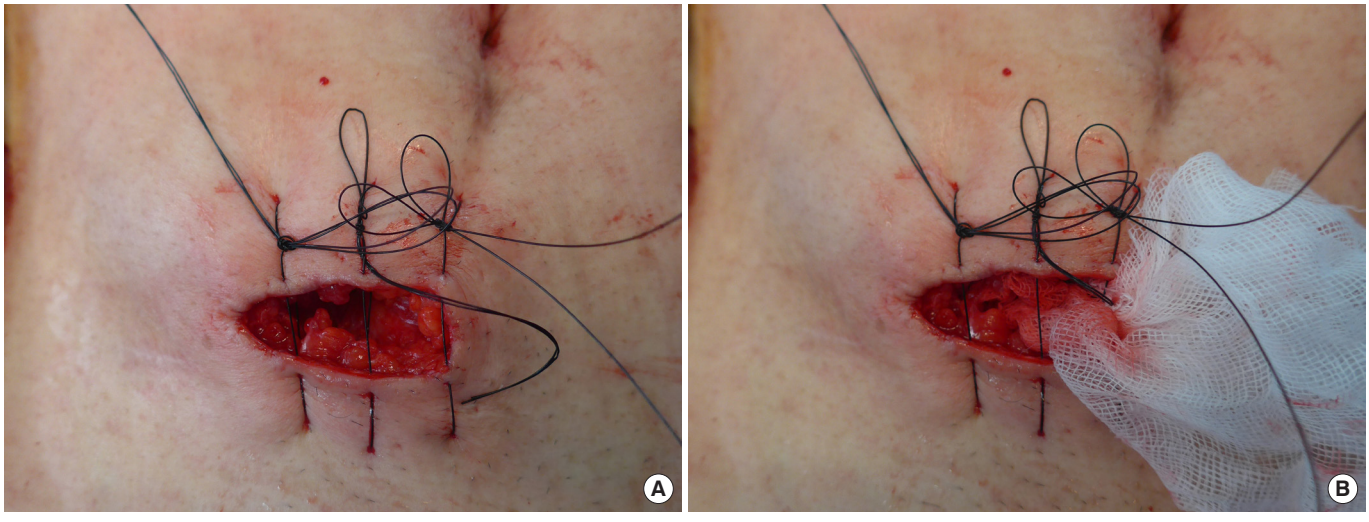

Fig. 2. (A) Delayed primary intention. (B) Delayed primary intention with saline wet dressing applied.

cumstomal skin incision around the stoma, followed by a purse-string subcuticular suture using nylon 2-0 (Fig. 3).

Perioperative outcomes were analyzed during follow-up. Complications were defined as any deviation from the normal postoperative course; those occurring within 30 days after the surgery were defined as early complications, and those occurring after 30 days as late complications [8]. SSI was defined, according to the Guideline for Prevention of SSI reported by the Centers of Disease Control, as an infection occurring within 30 days after the operation, involving only the skin or subcuticular tissue of the incision, with at least one of the following signs: purulent drainage, with or without laboratory confirmation, from the superficial incision; organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision; having at least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat and superficial incision is deliberately opened by surgeon, unless incision is culture-negative [9]. Prolonged postoperative ileus was defined as the presence of two or more of the following signs on or after postoperative day 4: nausea/vomiting; inability to tolerate oral diet for >24 hours; absence of flatus for >24 hours; abdominal distension; or radiologic confirmation [10]. Complications were graded according to the

Fig. 3. Purse-string suture.

Table 1. Baseline characteristics of the patients (n = 84)

Variable	Value
Male sex	51 (60.7)
Age (yr)	59.0 ± 11.5
Body mass index (kg/m^2)	22.8 ± 4.4
ASA PS classification	
I	33 (39.3)
II	39 (46.4)
III	12 (14.3)
Smoker	11 (13.1)
Alcohol user	16 (19.0)
Past medical history	44 (52.4)
Preoperative albumin (g/dL)	4.1± 0.4
Indication for stoma	
For safe anastomosis	46 (54.8)
Bowel perforation	13 (15.5)
Anastomotic leakage	22 (26.2)
Others	3 (3.6)

Values are presented as number (%) or mean ± standard deviation.
ASA PS, American Society of Anesthesiologists physical status.

Table 2. Perioperative outcomes (n = 84)

Variable	Value
Time from stoma formation to takedown (mo)	5.3 ± 4.0
Initial surgery	
Loop ileostomy	80 (95.2)
Loop colostomy	4 (4.8)
Method of anastomosis	
Hand-sewn	12 (14.3)
Stapling	72 (85.7)
Method of wound closure	
Linear primary suture	34 (40.5)
Delayed primary intention	26 (31.0)
Purse-string suture	24 (28.6)
Operation time (min)	83.5 ± 57.5
Postoperative hospital stay (day)	9.5 ± 7.8
Time to first flatus (day)	2.8 ± 1.1
Time to first sips of water (day)	2.9 ± 1.1
Time to first soft diet (day)	5.2 ± 5.5
Postoperative complications	24 (28.6)
Surgical site infection	2 (2.4)
Prolonged ileus	12 (14.3)
Anastomotic leakage	3 (3.6)
Anastomotic stenosis	2 (2.4)
Entero-cutaneous fistula	2 (2.4)
Incisional hernia	4 (4.8)
Clavien-Dindo classification	
I/II/IIIa	16 (64)
IIIb/IV	9 (36)
Readmission within 30 days after surgery	3 (3.6)
Mortality within 30 days after surgery	0 (0)
Follow-up period (mo)	64.3 ± 31.6

Values are presented as mean ± standard deviation or number (%).

Clavien-Dindo classification of surgical complications [8].

Statistical analyses were performed using the IBM SPSS ver. 18.0 (IBM Co., Armonk, NY, USA). Categorical variables were analyzed using the chi-square test or Fisher exact test whereas continuous variables were subjected to the Student t-test or the Mann-Whitney test. A P-value of <0.05 was considered to indicate significance. Numerical variables, which were dichotomized according to the median value of each variable or the clinical importance for cutoff, and categorical variables were selected for risk factor analyses of postoperative complications. When a variable showed statistical significance, it was selected for multivariate analysis.

RESULTS

A total of 84 patients were included in this study (Table 1). The proportion of male patients was 60.7%, and the mean age of the patients was 59.0 years. Indications for stoma formation included prophylactic diversion for ensuring safe anastomosis in 46 patients (54.8%), bowel perforation in 13 patients (15.5%), anastomotic leakage of initial operation in 22 patients (26.2%), and other reasons in 3 patients (3.6%).

Perioperative outcomes are shown in Table 2. The time from stoma formation to takedown was 5.3 months. Most of the patients underwent an ileostomy rather than a colostomy (95.2%). The surgical stapler method were used for anastomosis more frequently than the hand-sewn method (95.2%). The mean operation time was 83.5 minutes, and the postoperative hospital stay was 9.5 days. The postoperative complication rate for this study was 28.6% (24 complications in 20 out of 84 patients), among which prolonged ileus was the most common. Among the 16 early complications (within 30 days after takedown), only 2 patients required surgery; both of these were due to stoma repair site leakage. As for the 8 late complications (30 days or longer after takedown), 6 required surgical management for the following reasons: incisional hernia (n = 3), stoma repair site leakage (n = 1), entero-cutaneous fistula (n = 1), and stoma repair site stenosis (n = 1). The univariate analyses revealed no risk factors related to overall complications or prolonged ileus, so no multivariate analyses were performed due to the lack of significant factors (Table 3).

DISCUSSION

Stoma takedown, though a simple procedure from a technical point of view, is frequently accompanied by numerous complications. The morbidity rate is reported to be between 2 and 33% [6]. In a large cohort study by Sharma et al. [7] involving 5,401 patients undergoing ileostomy takedown, 502 patients (9.3%) had major complications and 452 (8.4%) had minor complications; 32 deaths (0.6%) were recorded. Of the 5,401 patients, 362 (6.7%) experienced a SSI, which was the most common complication.

Consequently, methods for reducing the incidence of SSIs following stoma reversal have been an issue of interest. Because stoma closure by linear suture has SSI rates of up to 41.2% [11], newer techniques, such as delayed primary intention and purse-string suture, have been suggested and investigated [12, 13]. The

Table 3. Risk factors for complication (univariate analysis)

Variable	Overall complication		Prolonged ileus	
	HR (95% CI)	P-value	HR (95% CI)	P-value
Male sex	0.712 (0.252–2.006)	0.520	0.741 (0.204–2.691)	0.649
Age (>60 yr)	0.667 (0.237–1.878)	0.443	0.250 (0.051–1.223)	0.087
ASA PS classification (≥III)	2.500 (0.699–8.947)	0.159	2.800 (0.748–10.486)	0.126
Body mass index (≥25 kg/m^2)	1.750 (0.592–5.176)	0.312	1.000 (0.244–4.101)	>0.999
Smoking	1.146 (0.274–4.786)	0.852	2.667 (0.596–11.941)	0.200
Alcohol	1.477 (0.447–4.887)	0.523	2.500 (0.648–9.651)	0.184
Diabetes mellitus	1.538 (0.499–4.745)	0.453	1.900 (0.503–7.171)	0.344
Cerebrovascular disease	2.105 (0.327–13.552)	0.433	4.600 (0.682–31.007)	0.117
Albumin (<3.5)	-		0.155 (0.009–2.661)	0.199
Indication for stoma		0.449		0.330
Prophylactic	1		1	
Therapeutic	1.467 (0.544–3.952)		1.852 (0.536–6.391)	
Stoma type		0.259		0.539
Ileostomy	1		1	
Colostomy	3.211 (0.423–24.359)		2.091 (0.199–21.945)	

HR, hazard ratio; CI, confidence interval; ASA PS, American Society of Anesthesiologists physical status.

purse-string suture method is a hybrid technique in that it enables effective drainage of contaminants and secretions even after closure, and facilitates approximation of wound margins to accelerate wound healing [14, 15]. This, in effect, leads to reduced patient discomfort and improved cosmesis, in addition to a reduced incidence of SSIs. In our study, the influence of the three different wound closure methods on the incidence of SSIs could not be evaluated due to the limited number of SSIs.

This study showed postoperative complication rates similar to those published in previous reports. This suggests that the technique selected to close a contaminated wound, such as a stoma takedown site, can be safely performed based on the surgeon's experience and preference. Postoperative complications, including SSIs, should be reduced to improve the quality of life of the patients and prevent additional costs. However, although patient-related factors, such as past medical history, smoking, and alcohol consumption, can influence postoperative outcomes, the authors were unable to find any significant risk factors for complications overall and for prolonged ileus in particular. This might be due to the retrospective nature of this study, which comes with the lack of many clinical clues.

This study differs from previous works in terms of the length of the follow-up period. Moreover, it was not limited to loop ileostomies, but also included loop colostomies. We analyzed late postoperative complications (28.6%) within a mean follow-up period of 64.3 months, which was an area often neglected in other studies. However, recognizing that this study has certain limitations is important. The retrospective design of the study resulted in difficulties concerning accessibility of information and the accuracy thereof. Especially, a retrospective review of medical records might lack significant data. In addition, the relatively small sample size may limit the precision of the statistical analysis and thus reduce the generalizability and clinical utility of the results.

In conclusion, the postoperative clinical course and long-term outcomes following stoma takedown were acceptable. Thus, stoma takedown is a procedure that can be performed safely.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Dusch N, Goranova D, Herrle F, Niedergethmann M, Kienle P. Randomized controlled trial: comparison of two surgical techniques for closing the wound following ileostomy closure: purse string vs direct suture. Colorectal Dis 2013;15:1033-40.
2. Matthiessen P, Hallböök O, Rutegård J, Simert G, Sjödahl R. Defunctioning stoma reduces symptomatic anastomotic leakage after low anterior resection of the rectum for cancer: a randomized multicenter trial. Ann Surg 2007;246:207-14.
3. Tan WS, Tang CL, Shi L, Eu KW. Meta-analysis of defunctioning stomas in low anterior resection for rectal cancer. Br J Surg 2009;96:462-72.
4. Gooszen AW, Geelkerken RH, Hermans J, Lagaay MB, Gooszen HG. Quality of life with a temporary stoma: ileostomy vs. colostomy. Dis Colon Rectum 2000;43:650-5.
5. Duchesne JC, Wang YZ, Weintraub SL, Boyle M, Hunt JP. Stoma complications: a multivariate analysis. Am Surg 2002;68:961-6.
6. Camacho-Mauries D, Rodriguez-Díaz JL, Salgado-Nesme N, González QH, Vergara-Fernández O. Randomized clinical trial of intestinal ostomy takedown comparing pursestring wound closure vs conventional closure to eliminate the risk of wound infection. Dis Colon Rectum 2013;56:205-11.
7. Sharma A, Deeb AP, Rickles AS, Iannuzzi JC, Monson JR, Fleming FJ. Closure of defunctioning loop ileostomy is associated with considerable morbidity. Colorectal Dis 2013;15:458-62.
8. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004;240:205-13.
9. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for prevention of surgical site infection, 1999. Centers for Disease Control and Prevention (CDC) Hospital Infection Control Practices Advisory Committee. Am J Infect Control 1999;27:97-132.
10. Vather R, Trivedi S, Bissett I. Defining postoperative ileus: results of a systematic review and global survey. J Gastrointest Surg 2013;17:962-72.
11. Hackam DJ, Rotstein OD. Stoma closure and wound infection: an evaluation of risk factors. Can J Surg 1995;38:144-8.
12. Lahat G, Tulchinsky H, Goldman G, Klauzner JM, Rabau M. Wound infection after ileostomy closure: a prospective randomized study comparing primary vs. delayed primary closure techniques. Tech Coloproctol 2005;9:206-8.
13. Vermulst N, Vermeulen J, Hazebroek EJ, Coene PP, van der Harst E. Primary closure of the skin after stoma closure. Management of wound infections is easy without (long-term) complications. Dig Surg 2006;23:255-8.
14. Reid K, Pockney P, Pollitt T, Draganic B, Smith SR. Randomized clinical trial of short-term outcomes following purse-string versus conventional closure of ileostomy wounds. Br J Surg 2010;97:1511-7.
15. Sutton CD, Williams N, Marshall LJ, Lloyd G, Thomas WM. A technique for wound closure that minimizes sepsis after stoma closure. ANZ J Surg 2002;72:766-7.