e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(9); 359-366

Review Article

Clinical Outcomes of Ostomies: A Chart Review

Kalva Harsha Sai[1], V. Mahidhar Reddy[2], G. Bharath[3], N. Venkata Harish[4], M. Monica Ram[5]

[1]Resident, Department of General Surgery, NMC, Nellore
[2]Professor, Department of General Surgery, NMC, Nellore
[3]Assistant, Department Professor of General Surgery, NMC, Nellore
[4]Professor, Department of General Surgery, NMC, Nellore
[5]Associate, Department Professor of General Surgery, NMC, Nellore

Received: 01-06-2026 / Revised: 15-07-2026 / Accepted: 21-08-2026
Corresponding author: Dr. Kalva Harsha Sai
Conflict of interest: Nil

Abstract

Background: Ostomy formation is frequently performed as a lifesaving procedure in patients with intestinal obstruction, perforation, trauma, malignancy, and other gastrointestinal conditions. Although reversal restores intestinal continuity and improves quality of life, it is associated with significant postoperative morbidity. Identification of patient- and procedure-related factors associated with adverse outcomes is therefore important for optimizing the timing and safety of ostomy reversal.

Aim: To evaluate the clinical outcomes, postoperative complications, and factors associated with adverse outcomes following colostomy and ileostomy reversal.

Materials and Methods: A prospective and retrospective observational chart review was conducted in the Department of General Surgery, Narayana Medical College and Hospital, Nellore, over a 12-month period. Thirty-five patients aged ≥18 years who underwent colostomy or ileostomy reversal were included by convenient sampling. Demographic characteristics, comorbidities, indication and type of ostomy, duration of stoma, timing of reversal, operative findings, anastomotic technique, postoperative complications, hospital stay, readmission, and follow-up outcomes were analyzed. Statistical analysis was performed using descriptive statistics, Chi-square test, t-test, and multivariate logistic regression, with $p<0.05$ considered statistically significant.

Results: The study included 22 males (62.9%) and 13 females (37.1%), with the majority aged 41–60 years (45.7%). Comorbidities were present in 60% of patients. Intestinal obstruction was the commonest indication for ostomy formation (40%), followed by perforation peritonitis (25.7%). Colostomy constituted 57.1% and ileostomy 42.9% of cases, while 74.3% were loop stomas. Delayed reversal (>3 months) was performed in 71.4% of patients. Dense adhesions were observed in 51.4%. The overall postoperative complication rate was 37.1%, with surgical site infection (20%) being the most common complication, followed by postoperative ileus (11.4%). Early reversal was significantly associated with postoperative complications (60% vs. 28%, p=0.036), as were dense adhesions (p=0.012) and presence of comorbidities (p=0.018). On multivariate analysis, dense adhesions (AOR 5.62, p=0.009), comorbidities (AOR 4.85, p=0.019), age >60 years (AOR 3.92, p=0.037), and early reversal (AOR 3.47, p=0.048) were independent predictors of postoperative complications. Colostomy reversal showed higher complication and readmission rates than ileostomy reversal, although differences were not statistically significant.

Conclusion: Ostomy reversal is associated with considerable postoperative morbidity, with surgical site infection being the most frequent complication. Advanced age, comorbidities, early reversal, and dense intra-abdominal adhesions were significant predictors of adverse postoperative outcomes. Careful patient selection, optimization of comorbidities, appropriate timing of reversal, and meticulous management of adhesions may improve outcomes following ostomy closure.

Keywords: Ostomy Reversal; Colostomy; Ileostomy; Postoperative Complications.

DOI: 10.25258/ijcpr.18.9.50

Introduction

An ostomy is an opening that is established surgically to create communication between a hollow viscus organ and the external surface of the body to redirect the fecel opening. The intestinal

ostomies most commonly performed are colostomy and ileostomy indicated for both benign and malignant conditions such as intestinal obstruction, perforation, colorectal cancer, diverticulitis, inflammatory bowel disease, traumatic bowel injury and congenital anomalies. to To protect distal anastomoses and prevent sepsis or relieve obstruction, these procedures are often lifesaving, particularly where diversion of fecal contents is required in emergency situations. [1-4]

In an ileostomy, ileum is diverted while in colostomy a part of the colon is exteriorized through the abdominal wall. Ostomies may be temporary or permanent depending on the underlying pathology and surgical purpose. To protect distal colorectal anastomoses particularly following resections performed for malignancy or inflammatory bowel conditions such as Crohn's disease and ulcerative colitis and to manage emergency conditions like perforation, peritonitis, ischemia, or traumatic injuries to bowel,temporary stomas are commonly created. [2,4]

Eventhough ostomy formation can be lifesaving living with a stoma can have physical, psychological and social challenges. Patients commonly experience peristomal skin irritation, in ileostomies high output stoma leading to dehydration, electrolyte imbalance, parastomal hernia, prolapse and retraction. In addition to the physical symptoms, there can significant psychosocial burden including social embarrassment, altered body image and reduced quality of life.

Therefore whenever clinically feasible, restoration of intestinal normality through stoma reversal is an important procedure in patient's recovery. [2,4-6]

Ostomy reversal is not a minor surgical procedure. Although its an elective procedure significant morbidity is reported with complication rates ranging between 20- 50%. Surgical site infection, anastomotic leak, wound dehiscence, postoperative ileus, bowel obstruction, intra-abdominal abscess are the most common postoperative complications.

Reversal of Ileostomy can cause complications such as small bowel obstruction and electrolyte disturbances. Reversals of colostomy especially that performed after Hartmann's procedure are more challenging because of dense adhesions and altered anatomy and are associated with prolonged operative time and higher complication rates. [4,6-8]

Factors that influence outcomes following ostomy reversal can be both patient and procedure related. Advanced age, poor nutritional status, obesity, diabetes mellitus, hypertension, smoking and other comorbidities have been associated with adverse postoperative outcomes. Procedure related factors such as the timing whether elective or emergency, indication for initial stoma formation, time between stoma formation and stoma reversal, open or minimally invasive surgical technique and intraoperative complications influence the outcome. These factors determines the extended hospital stays, delayed functional recovery and readmission rate. [1,3,10-11]

The timing of stoma reversal still remains controversial. Early reversal is within six to twelve weeks which can reduce the stoma related morbidity and improve quality of life in selected patients. In contrary, delayed reversal is often necessitated by adjuvant therapy, unresolved sepsis, poor nutritional status which increases the risk of complications such as adhesions and parastomal hernia alongside prolonging the psychosocial burden associated with a stoma. A comprehensive assessment is necessary for identifying the ideal time, comparing surgical risk against the patient's recovery. [4,7,11]

In developing countries like India, the burden of emergency stoma formation is high, most commonly due to perforation peritonitis, trauma and late presentation of malignancy. Limitation in resources, delay in follow-up and variability in perioperative care may further influence outcomes after reversal surgery. Despite advances in minimally invasive surgery, improved stapling devices and enhanced recovery protocols, complication rates remain significant and vary widely across institutions. [1,11]

In view of this institution specific evaluation of outcomes is essential to understand local trends, identify modifiable risk factors, and optimize patient selection and perioperative management. A comprehensive chart review provides valuable real world data on complication patterns, hospital stay duration, readmission rates, and recovery outcomes following colostomy and ileostomy reversal. [11] Thus this study is done to evaluate the clinical outcomes, postoperative complications, and associated risk factors in patients undergoing colostomy and ileostomy reversal in a tertiary care setting.

Aim: To evaluate the clinical outcomes, complications, and associated factors following colostomy and ileostomy reversal through a comprehensive chart review, in order to improve patient care and surgical management.

Primary Objectives: To determine the incidence and types of postoperative complications following ostomy reversal.

Secondary Objectives: To assess short-term and long-term clinical outcomes in patients undergoing colostomy and ileostomy reversal. To identify patient-related and procedure-related risk factors associated with adverse outcomes. To evaluate the association between timing of reversal and

postoperative complications. To analyze hospital stay duration, readmission rates, and recovery patterns after reversal surgery.

Materials and Methods: Prospective and retrospective observational study done in Narayana Medical College and Hospital, Nellore for 12 months period 35 cases selected by convenient sampling.

Inclusion Criteria: Patients who underwent colostomy or ileostomy reversal surgery. Patients aged 18 years and above. **Exclusion Criteria:** Patients who lost to follow-up, Patients who underwent permanent stoma procedures, those who received colostomy or ileostomy reversal for the reasons unrelated to the primary conditions.

Data Collection Method: All patients who underwent colostomy or ileostomy reversal surgery at Department of General Surgery, Narayana Medical College and Hospital, Nellore during the study period were included. The study followed an Prospective and retrospective observational design. Data was collected using a structured clinical proforma.

Retrospective data related to the pre-operative period were collected from patient case files in hospital medical records department. Eligible cases were identified using operation theatre registers. Demographic details, clinical history, indication for ostomy, duration of stoma, comorbidities, and pre-operative investigations were recorded.

Prospective data were collected from the time of admission for reversal surgery until discharge. Operative details, intraoperative findings, and perioperative management were documented through direct review of inpatient records. Postoperative progress was monitored daily during hospitalization. Postoperative complications, need for interventions, and duration of hospital stay were recorded. Early postoperative outcomes were assessed from inpatient case records. Follow-up information was obtained from outpatient visit records. Readmission details related to postoperative complications was obtained.

Study Variables: Independent Variables: Age, gender, comorbidities, indication for ostomy, type of stoma, duration of stoma, timing of reversal, surgical technique.

Dependent Variables: Postoperative complications, length of hospital stay, readmission, morbidity, and mortality.

Outcome Measures: Primary outcomes include postoperative complications such as surgical site infection, anastomotic leak, bowel obstruction, and wound dehiscence. Secondary outcomes include duration of hospital stay, time to return of bowel function, and readmission rates.

Data Analysis: Data will be entered into Microsoft Excel and analyzed using SPSS. Descriptive statistics will be used to summarize data. Continuous variables will be expressed as mean and standard deviation, while categorical variables will be expressed as frequencies and percentages. Inferential statistics such as Chi-square test and t-test will be applied where appropriate. A p-value of <0.05 will be considered statistically significant.

Results

Table 1: Age and Gender Distribution of Study Participants

Age Group (years)	Frequency (n)	Percentage (%)
≤40	11	31.4
41–60	16	45.7
>60	8	22.9
Male	22	62.9
Female	13	37.1

Table 2: Comorbidity Profile of Study Participants

Comorbidity	Frequency (n)	Percentage (%)
Diabetes mellitus	9	25.7
Hypertension	7	20.0
Diabetes + Hypertension	5	14.3
None	14	40.0
Total	**35**	**100**

Table 3: Indications for Ostomy Formation

Indication	Frequency (n)	Percentage (%)
Intestinal obstruction	14	40.0
Perforation peritonitis	9	25.7
Trauma	6	17.1
Malignancy	4	11.4
Inflammatory bowel disease	2	5.7
Total	35	100

Table 4: Stoma Characteristics

Type of Stoma	**Frequency (n)**	**Percentage (%)**
Colostomy	20	57.1
Ileostomy	15	42.9
Stoma Configuration	**Frequency (n)**	**Percentage (%)**
Loop stoma	26	74.3
End stoma	9	25.7
Timing of Reversal	**Frequency (n)**	**Percentage (%)**
Early (≤3 months)	10	28.6
Delayed (>3 months)	25	71.4
Degree of Adhesions	**Frequency (n)**	**Percentage (%)**
Dense	18	51.4
Mild to moderate	12	34.3
Minimal / none	5	14.3
Type of Anastomosis	**Frequency (n)**	**Percentage (%)**
Hand-sewn	23	65.7
Stapled	12	34.3

Table 5: Intraoperative and Post Op Complications

Intraoperative Complications	**Frequency (n)**	**Percentage (%)**
Present	4	11.4
Absent	31	88.6
Postoperative Complication	**Frequency (n)**	**Percentage (%)**
Surgical site infection	7	20.0
Postoperative ileus	4	11.4
Anastomotic leak	2	5.7
Wound dehiscence	2	5.7
Intra-abdominal collection	1	2.9
Time to Bowel Activity	**Frequency (n)**	**Percentage (%)**
≤72 hours	24	68.6
>72 hours	11	31.4
Long-Term Complication	**Frequency (n)**	**Percentage (%)**
Incisional hernia	3	8.6
Altered bowel habits (increased frequency / constipation)	2	5.7
Chronic abdominal pain or discomfort	2	5.7
Adhesive intestinal obstruction	1	2.9
Anastomotic stricture	1	2.9
Readmission	**Frequency (n)**	**Percentage (%)**
Yes	4	11.4
Time to Resume Activity	**Frequency (n)**	**Percentage (%)**
≤4 weeks	18	51.4
4–6 weeks	17	48.6

Table 6: Comparative Analysis of Short-Term and Long-Term Clinical Outcomes between Colostomy and Ileostomy Reversal

Outcome	**Category**	**Colostomy (n=20)**	**Ileostomy (n=15)**	**p-value**
Postoperative Complications	Present	9 (45.0%)	4 (26.7%)	0.314
	Absent	11 (55.0%)	11 (73.3%)	
Major Complications (Clavien–Dindo III–IV)	Present	2 (10.0%)	1 (6.7%)	0.721
	Absent	18 (90.0%)	14 (93.3%)	
Long-Term Complications	Present	6 (30.0%)	3 (20.0%)	0.489
	Absent	14 (70.0%)	12 (80.0%)	
Readmission	Yes	3 (15.0%)	1 (6.7%)	0.452
	No	17 (85.0%)	14 (93.3%)	

Table 7: Comparison of Mean Postoperative Hospital Stay between Colostomy and Ileostomy Reversal

Outcome	**Colostomy (n=20)**	**Ileostomy (n=15)**	**t value**	**p-value**
Mean hospital stay (days)	8.7 ± 3.4	7.5 ± 2.6	1.18	0.221

Table 8: Association between Demographic Profile and Postoperative Complications

Variable	Postoperative Complications		Total (n)	p-value
	Present n (%)	Absent n (%)		
Age group (years)				
≤40	2 (18.2)	9 (81.8)	11	**0.041***
41–60	6 (37.5)	10 (62.5)	16	
>60	5 (62.5)	3 (37.5)	8	
Gender				
Male	9 (40.9)	13 (59.1)	22	0.462
Female	4 (30.8)	9 (69.2)	13	
Comorbidity status				
Present	11 (52.4)	10 (47.6)	21	**0.018***
Absent	2 (14.3)	12 (85.7)	14	

***Statistically significant at p < 0.05**

Table 9: Association between Procedure-Related Factors and Postoperative Complications

Procedure-Related Variable	Complications		Total (n)	p-value
	Present n (%)	Absent n (%)		
Type of stoma				
Colostomy	9 (45.0)	11 (55.0)	20	0.314
Ileostomy	4 (26.7)	11 (73.3)	15	
Stoma configuration				
Loop	8 (30.8)	18 (69.2)	26	0.128
End	5 (55.6)	4 (44.4)	9	
Timing of reversal				
Early (≤3 months)	6 (60.0)	4 (40.0)	10	**0.036***
Delayed (>3 months)	7 (28.0)	18 (72.0)	25	
Degree of adhesions				
Dense	10 (55.6)	8 (44.4)	18	**0.012***
Mild–moderate / minimal	3 (17.6)	14 (82.4)	17	
Type of anastomosis				
Hand-sewn	10 (43.5)	13 (56.5)	23	0.221
Stapled	3 (25.0)	9 (75.0)	12	

***Statistically significant at p < 0.05**

Table 10: Multivariate Logistic Regression for Predictors of Postoperative Complications

Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Age >60 years	3.92	1.08 – 14.21	0.037*
Comorbidity present	4.85	1.29 – 18.26	0.019*
Early reversal (≤3 months)	3.47	1.01 – 11.92	0.048*
Dense adhesions	5.62	1.52 – 20.73	0.009*

***Statistically significant at p < 0.05**

Discussion

In the present study, the mean age of the study population was 45.8 ± 13.6 years, with the majority of patients belonging to the 41–60 years age group (45.7%). 31.4%, of the patients aged ≤40 years while elderly patients above 60 years were 22.9% . This indicates that ostomy reversal is frequently performed among middle aged patients and also higher incidence of abdominal emergencies such as perforation peritonitis, intestinal obstruction, and trauma in this age group. Similar findings have been reported in previous studies done by Poskus et al. in which the majority of patients undergoing loop ileostomy closure were middle-aged patients [12]. Schneider et al. also reported a similar distribution of age in their study on ileostomy reversal thus contributing to the observation that stoma reversal is most commonly performed in this age group. [13]

A male predominance was observed in the present study, with 62.9% males and 37.1% females. This finding is consistent with many previously published surgical series in which males represented the majority of patients undergoing abdominal emergency procedures and subsequent stoma formation. MacDonald et al., reported a higher proportion of male patients undergoing stoma reversal. The increased representation of males in such studies may be attributed to occupational exposure, trauma, lifestyle-related risk factors, and the higher incidence of certain gastrointestinal pathologies among men. [14]

In 60% of patients comorbidities were present in this study. The most common comorbidity is the diabetes mellitus (25.7%), followed by hypertension (20%), while both comorbidities were present in 14.3% of patients. The presence of comorbidities is clinically important because systemic diseases may impair wound healing, alter immune responses, and increase the risk of postoperative complications. The findings of the present study emphasize the importance of thorough preoperative assessment and optimization of comorbid conditions before undertaking ostomy reversal. Similar observations were reported by Goswami et al., who demonstrated that comorbid conditions significantly increased postoperative morbidity and mortality in patients undergoing stoma reversal. In this study logistic regression confirmed that the presence of comorbidities is an independent predictor of postoperative complications (AOR 4.85, p=0.019), suggesting the need for appropriate management before surgery. [1]

The common indication for ostomy formation in the present study was intestinal obstruction (40%), followed by perforation peritonitis (25.7%), trauma (17.1%), malignancy (11.4%), and inflammatory bowel disease (5.7%). In many Indian studies the indications for stoma creation was documented as perforation peritonitis and intestinal obstruction. [1] In contrast, studies done in Western populations commonly report colorectal malignancies as the leading cause for stoma formation. For example, Holmgren et al., in their study of rectal cancer patients undergoing anterior resection, reported that protective stomas were frequently created to prevent anastomotic leakage following colorectal surgery. Similarly, Rubinkiewicz et al. highlighted the importance of protective ileostomies in rectal cancer surgery to reduce postoperative complications. [7]

Colostomy accounted for 57.1% of cases while ileostomy constituted 42.9% in this study. Loop stomas were the most common (74.3%), while end stomas were created in 25.7% of patients. Loop stomas are generally done in temporary diversion procedures because they are surgically easier to reverse and are associated with lower morbidity compared to end stomas. Goswami et al. similarly reported that loop stomas constituted the majority of diversion procedures in their study population. [1] The mean duration of stoma before reversal in the present study was 5.6 ± 2.1 months with 71.4% of patients undergoing delayed reversal (>3 months). Only 28.6% underwent early reversal within three months. The optimal timing of stoma reversal remains a subject of ongoing debate. Early closure may improve patient comfort and quality of life.

Early reversal (≤3 months) was significantly associated with higher postoperative complication rates (60%) compared with delayed reversal (28%) (p=0.036). These findings suggest that delaying stoma closure until adequate healing and physiological recovery may reduce postoperative morbidity. Rubinkiewicz et al. similarly mentioned the importance of maintaining an adequate interval between primary surgery and stoma closure to reduce postoperative complications. [7] Goswami et al. also recommended delaying stoma reversal beyond three months to minimize morbidity and improve surgical outcomes.

Intraoperative findings revealed that dense intra-abdominal adhesions were present in 51.4% of patients, while mild to moderate adhesions were seen in 34.3%. Adhesions are a common consequence of prior abdominal surgery and may significantly increase operative difficulty during stoma reversal. Extensive adhesiolysis may prolong operative time, increase the risk of bowel injury and contribute to postoperative complications such as ileus and infection. Dense adhesions were significantly associated with postoperative complications (p=0.012) and emerged as the strongest independent predictor of complications in multivariate analysis (AOR 5.62, p=0.009). Similarly Poskus et al. noted that operative complexity and surgical difficulty may influence postoperative outcomes during stoma closure. [12]

Regarding the surgical technique, handsewn anastomosis was performed in 65.7% of patients, while stapled anastomosis was used in 34.3%. Although a higher complication rate was observed in the handsewn group compared with the stapled group, the difference was not statistically significant. Previous studies have reported similar findings. Poskus et al. concluded that the method of anastomosis does not significantly influence postoperative outcomes following stoma closure, suggesting that surgical expertise and careful technique may be more important determinants of outcome. [12] The overall postoperative complication rate in the present study was 37.1%, reaffirming that ostomy reversal is associated with substantial morbidity. However, most complications were minor and amenable to conservative management. According to the Clavien–Dindo classification, 28.6% of complications were minor (Grade I–II), while major complications (Grade III–IV) occurred in only 8.6% of patients, and no procedure-related mortality was observed.

The most common complication was surgical site infection (20%), followed by postoperative ileus (11.4%). Anastomotic leak and wound dehiscence occurred in 5.7% of patients each, while intra-abdominal collection was observed in 2.9% of cases. These findings are consistent with previous

literature. Goswami et al. reported an overall morbidity rate of 45.7%, with surgical site infection being the most common complication. Poskus et al. reported complications in 18.2% of patients, with wound infection and bowel obstruction being the most frequently encountered complications.

The slightly higher complication rate observed in the present study may be related to the relatively small sample size and the inclusion of both colostomy and ileostomy reversal procedures. [1]

Table 11: Comparison of Postoperative Complication Rates Following Ostomy Reversal in the Present Study and Previous Studies

Study	Year	Study Design	Sample Size	Overall Complication Rate
Current Study	2026	Prospective and retrospective observational study	35	37.1%
Poskus et al. [12]	2013	Retrospective analysis	132	18.2%
Schneider et al.(13)	2016	Prospective cohort study	118	11.3% reoperation rate
Rubinkiewicz et al.[7]	2019	Prospective study	132	15%
Goswami et al.[1]	2025	Prospective observational study	70	45.7%
MacDonald et al.[14]	2025	Multicentre retrospective cohort study	146	52.1% (within 30 days)

Table 12: Comparison of Most Common Complication Rates Following Ostomy Reversal in the Present Study and Previous Studies

Study	Year	Most Common Complications Reported
Current Study	2026	Surgical site infection (20%), postoperative ileus (11.4%), anastomotic leak (5.7%)
Poskus et al.[12]	2013	Bowel obstruction, wound infection
Schneider et al.[13]	2016	Anastomotic leak, ileus, wound infection
Rubinkiewicz et al.[7]	2019	Surgical site infection, postoperative ileus
Goswami et al.[1]	2025	Surgical site infection (37.1%), anastomotic leak (8.6%), intra-abdominal abscess
MacDonald et al.[14]	2025	Postoperative ileus, wound infection, major surgical complications

Long-term outcomes in the present study were generally acceptable. Late complications occurred in 25.7% of patients, with incisional hernia being the most common (8.6%). Other complications included altered bowel habits, chronic abdominal pain, adhesive intestinal obstruction, and anastomotic stricture. Nevertheless, 74.3% of patients remained free of long-term sequelae, indicating satisfactory long-term functional outcomes. Kim and Kumar previously emphasized that late complications following stoma surgery may include hernia formation, prolapse, stenosis, and fistula formation, highlighting the need for long-term follow-up after stoma reversal. [15]

Postoperative recovery in the present study was generally favorable. More than two-thirds of patients regained bowel activity within 72 hours, and over half resumed routine daily activities within four weeks. The mean postoperative hospital stay was 8.2 ± 3.1 days, reflecting a moderate but acceptable healthcare burden. Patients undergoing colostomy reversal had a slightly longer hospital stay compared with those undergoing ileostomy reversal, although the difference was not statistically significant. Poskus et al. similarly reported that postoperative complications were associated with prolonged hospital stay. [12]

Comparison of outcomes between colostomy and ileostomy reversal revealed that complication rates were consistently higher after colostomy closure, although the differences were not statistically significant.

Postoperative complications occurred in 45.0% of colostomy reversals compared with 26.7% of ileostomy reversals, while major complications occurred in 10.0% and 6.7%, respectively. Long-term complications and readmission rates also showed a similar trend favoring ileostomy reversal and the comparison of complications with other studies as shown in Table 24. Although the sample size was insufficient to demonstrate statistical significance, these findings suggest that ileostomy reversal may be associated with a more favorable perioperative course when anatomically feasible.

References

1. Goswami H, Dharap SB, Mohare DK, Navgale SS, Kirange P, Singh S. The risk factors for complications following intestinal stoma reversal. Cureus. 2025;17(11):e12709135.
2. Gustafsson CP, Gunnarsson U, Dahlstrand U, Lindforss U. Loop ileostomy reversal—patient-related characteristics influencing time

to closure. Int J Colorectal Dis. 2018;33(5):593–600.
3. Li SQ, Lv Q, Xiang Z, Hui XS. Risk factors for postoperative complications of ileostomy reversal. J LaparoendoscAdvSurg Tech A. 2025;35(8):664–671.
4. Popazu C, Voicu D, Firescu D, Grigore I, Toma A, Derihaci RP. Optimal timing of colostomy reversal following Hartmann's proc edure: a retrospective analysis of postoperative outcomes. Diseases. 2025;13(3):72.
5. Keller DS, Khorgami Z, Swendseid B, Khan S, Delaney CP. Identifying causes for high readmission rates after stoma reversal. SurgEndosc. 2014;28(4):1263–1268.
6. Resio BJ, Jean R, Chiu AS, Pei KY. Association of timing of colostomy reversal with outcomes following Hartmann procedure for diverticulitis. JAMA Surg. 2019;154(3): 218–224.
7. Rubinkiewicz M, Witowski J, Wysocki M, Pisarska M, Kłęk S, Budzyński A, et al. Investigating risk factors for complications after ileostomy reversal in low anterior rectal resection patients: an observational study. J Clin Med. 2019;8(10):1567.
8. Glasbey JC, Adisa AO, Costas-Chavarri A, Qureshi AU, Allen-Ingabire JC, Salem HK, et al. Global variation in anastomosis and end colostomy formation following left-sided colorectal resection. BJS Open. 2019;3(3):403–414.
9. Lv Q, Shu XP, Peng D, Li SQ, Xiang Z. Predictors of complications after prophylactic ileostomy reversal for rectal cancer: a retrospective study. World J Gastrointest Surg. 2024;16(5):1354–1362.
10. Yadav P, Kushwaha J, Anand A, Sonkar AA, Yadav P. Clinical study of patients undergoing stoma reversal in a tertiary care centre: a retrospective study from a developing country. IntSurg J. 2019;6(7):2444–2448.
11. Li S, Zhou Z, Wang F, Li W, Liu C, Li L. Risk factors and incidence of surgical wound infection after stoma reversal: a systematic review and meta-analysis. PLoS One. 2025;20(7):e0328344.
12. Poskus E, Kildusis E, Smolskas E, Ambrazevicius M, Strupas K. Complications after loop ileostomy closure: a retrospective analysis of 132 patients. Viszeralmedizin. 2014;30(4):276–280.
13. Schneider V, et al. Risk factors for reoperation after ileostomy reversal – results from a prospective cohort study. Int J Surg. 2016;36:233–239.
14. MacDonald S, et al. Stoma reversal after emergency stoma formation—the importance of timing: a multi-centre retrospective cohort study. World J Emerg Surg. 2025;20(1).
15. Kim JT, Kumar RR. Reoperation for stoma-related complications. Clin Colon Rectal Surg. 2006;19(4):207–212.