POST-OPERATIVE COMPLICATIONS FOLLOWING ILEOSTOMY REVERSAL: A DESCRIPTIVE STUDY FROM A TERTIARY CARE HOSPITAL IN PAKISTAN

Dr. Sundas Laghari[1], Dr. Anum Asif[2], Dr. Sadia Paras[3], Dr. Muhammad Hasnain Tanveer[4], Dr. Fareeha Naz[5], Dr. Rabia Zahid[6]

Link: https://medinsighthub.com/post-operative-complications-following-ileostomy

[1]Registrar Department of General Surgery Liaquat Medical University of Health Science's Jamshoro

[2]SR Department of General Surgery Liaquat Medical University of Health Science's Jamshoro

[3]Assistant Professor Department of General Surgery Isra University Hyderabad

[4]House Officer Emergency Department Institute Muhammad Medical College Mirpurkhas Sindh Pakistan

[5]ER Women Medical Officer at Muhammad Medical College Mirpurkhas Sindh Pakistan

[6]Women Medical Officer Muhammad Medical College Mirpurkhas Sindh Pakistan Emergency Department

ABSTRACT

Background: Ileostomy reversal is a common surgical procedure, yet it carries considerable postoperative morbidity. Limited data exist from Pakistan regarding the frequency and pattern of these complications.

Objective: To determine the frequency of postoperative complications associated with ileostomy reversal at Liaquat University Hospital, Jamshoro.

Methods: This descriptive Study was conducted in the Department of General Surgery, Liaquat University Hospital, from May 2019 to October 2019. A total of 184 patients aged 16–50 years who underwent ileostomy reversal were

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included. Patients with major comorbidities or chronic intestinal disease were excluded. Anastomoses were performed using either hand-sewn or stapled techniques. Postoperative outcomes assessed included ileus, small-bowel obstruction, anastomotic leakage, surgical-site infection (SSI), prolonged hospital stay (> 5 days), and mortality (within 7 days). Data were analyzed using SPSS v20 with χ^2 testing ($p < 0.05$ significant).

Results: Mean patient age was 36.7 ± 8.2 years; 130 (70.7%) were male. Postoperative ileus occurred in 19.6%, SSI in 13.6%, small-bowel obstruction in 5.4%, anastomotic leakage in 4.3%, prolonged hospital stay in 14.7%, and mortality in 3.8%. Anastomotic leakage was significantly more frequent in patients > 40 years ($p = 0.003$).

Conclusion: Ileostomy reversal carries notable short-term morbidity. Early stoma closure when feasible, optimization of older patients, and strict pre-operative care can reduce postoperative complications.

Keywords: Ileostomy reversal; postoperative complications; surgical site infection; anastomotic leak; ileus; small bowel obstruction

Introduction:

An ileostomy is a surgically created opening in the abdominal wall where the distal portion of the ileum is brought to the surface to divert fecal contents away from the distal bowel. It is a common and often life-saving procedure performed to protect a distal colorectal or coloanal anastomosis, or to manage intestinal perforations, inflammatory bowel disease, trauma, and certain malignancies. The diversion allows healing of the distal bowel by temporarily redirecting fecal flow. Once the underlying pathology has resolved or the anastomosis has matured, the stoma can be reversed to restore bowel continuity. Although ileostomy reversal is generally considered a routine operation, it is not without risk and is associated with a significant rate of postoperative morbidity.

Reported rates of complications after ileostomy closure vary widely, ranging from 10% to 69% in different studies [1–3]. The most frequently observed complications include postoperative ileus, small bowel obstruction, surgical-site infection (SSI), and anastomotic leakage [4]. Other less common issues include wound dehiscence, intra-abdominal abscess formation, and incisional hernia at the stoma site. These complications may prolong hospital stay, increase healthcare costs, delay return to normal activity, and, in severe cases, result in mortality [5,6]. Despite advancements in surgical techniques and perioperative care, these outcomes continue to challenge surgeons worldwide.

The timing of ileostomy reversal plays a crucial role in determining postoperative outcomes. Reversal is typically recommended within 6 to 12

weeks after the primary procedure, allowing inflammation and edema to subside while ensuring adequate healing of the distal anastomosis [7]. However, delays are common, particularly in low- and middle-income countries, where factors such as poor nutritional status, limited access to surgical care, and the need for adjuvant therapy contribute to postponement [8]. Prolonged intervals between ileostomy creation and reversal can increase adhesion formation and technical difficulty during takedown, subsequently elevating the risk of postoperative ileus and small bowel obstruction [9].

Several studies have explored risk factors associated with complications following ileostomy closure. These include patient-related variables such as older age, high body mass index (BMI), anemia, and comorbidities, as well as procedure-related factors including operative time, anastomotic technique (hand-sewn versus stapled), and surgeon experience [10–12]. Moreover, local wound management techniques—such as purse-string skin closure—have been shown to reduce surgical-site infection rates compared to primary closure [13]. Despite this growing body of international literature, the applicability of these findings to resource-limited settings like Pakistan remains uncertain due to differing patient profiles, disease patterns, and healthcare infrastructure.

In Pakistan, ileostomy formation is frequently performed for typhoid or tubercular perforations of the small intestine conditions that continue to contribute significantly to surgical morbidity in developing nations [14,15]. These patients are often young adults presenting with peritonitis, sepsis, and electrolyte imbalances. Following recovery, ileostomy reversal may be delayed for logistical or economic reasons, potentially predisposing patients to higher postoperative complication rates. While some tertiary centers in Pakistan have documented their experience with stoma formation, few have systematically evaluated outcomes after ileostomy reversal. As a result, local surgeons rely primarily on international data, which may not reflect the challenges of surgical practice in this context.

Given the frequency with which ileostomies are performed and the potential burden of postoperative complications, there is a clear need for local data to guide surgical decision-making and patient counseling. Understanding the magnitude and nature of postoperative morbidity in our population is essential to developing evidence-based strategies for preoperative optimization, appropriate timing of closure, and enhanced recovery protocols.

Therefore, this study was designed to determine the frequency and pattern of postoperative complications associated with ileostomy reversal at Liaquat University Hospital, Jamshoro. By quantifying the incidence of key complications including postoperative ileus, small bowel obstruction, surgical-site infection, and anastomotic leakage this research aims to identify areas for quality improvement and provide a foundation for future interventional studies aimed at reducing morbidity and mortality associated with ileostomy reversal in Pakistan.

Review of Literature:

Ileostomy and its subsequent reversal represent an essential aspect of colorectal and general surgical practice. The procedure is commonly performed to divert fecal flow, thereby protecting distal anastomoses following surgery for colorectal malignancy, inflammatory bowel disease, or intestinal perforation. While ileostomy creation has significantly reduced mortality related to anastomotic leakage, its closure is not free of complications and remains a subject of continued research and debate [1,2].

Loop ileostomy was first described by Turnbull and Weakley in 1966, who demonstrated its technical simplicity and ability to effectively divert fecal content [3]. Since then, it has been widely adopted as a temporary measure to mitigate the risks associated with low pelvic anastomoses. However, closure of the ileostomy—though usually performed as an elective procedure—carries potential morbidity and, in some cases, mortality. Reported complication rates following ileostomy reversal range from 10% to 69%, with most studies documenting rates between 15% and 30% [4–6]. Commonly reported adverse outcomes include postoperative ileus, small bowel obstruction, surgical-site infection (SSI), and anastomotic leakage [7].

Postoperative ileus remains one of the most frequent complications after ileostomy closure, affecting 10–30% of patients [8]. It results from multifactorial causes, including intraoperative bowel handling, fluid imbalance, and opioid analgesia. Although often self-limiting, prolonged ileus can delay oral intake and discharge, increasing healthcare costs. Small bowel obstruction, with an incidence of 5–15%, is typically due to adhesions or kinking at the anastomotic site [9]. Anastomotic leakage, though less common (2–6%), is among the most serious complications and is associated with sepsis, reoperation, and mortality [10]. Surgical-site infection following ileostomy reversal occurs in approximately 10–20% of cases,

depending on closure technique and wound management [11].

Several studies have compared surgical techniques to reduce these complications. The use of stapled anastomosis has been associated with shorter operative time and lower obstruction rates compared to hand-sewn closure [12]. Similarly, the purse-string skin closure technique has demonstrated significantly lower SSI rates and improved cosmetic outcomes when compared with primary closure [13]. A randomized trial by Banerjee et al. (2017) found a 75% reduction in wound infection with purse-string closure compared to linear suturing [14]. Despite these technical refinements, the overall burden of morbidity remains significant, particularly in resource-limited healthcare systems.

The timing of stoma closure is another crucial determinant of outcomes. Early closure (within 8–12 weeks) is often associated with fewer adhesions and shorter operative time, while delayed closure increases technical difficulty and complication rates [15]. However, in many developing countries including Pakistan reversal is frequently delayed due to patient malnutrition, anemia, sepsis, or socioeconomic barriers [16]. These factors may contribute to higher postoperative morbidity and underscore the importance of preoperative optimization.

International data on ileostomy reversal outcomes are abundant, but studies from South Asia remain limited. Research from India and Bangladesh has reported postoperative complication rates of 20–30%, with SSI and ileus being most common [17]. In Pakistan, only a few small institutional reports exist, and variations in surgical expertise, patient population, and perioperative protocols make it difficult to generalize findings. Consequently, there is a lack of standardized local data to guide surgical practice and counseling for ileostomy closure. Given the frequency of ileostomy procedures and the potential impact of postoperative morbidity on patient recovery, further region-specific studies are warranted. Understanding the magnitude and determinants of complications in the local population will help refine perioperative management, establish institutional benchmarks, and ultimately improve patient outcomes following ileostomy reversal.

Materials and Methods:

Study Design and Setting

This was a descriptive case Study conducted in the Department of General Surgery**,** Liaquat University Hospital, Jamshoro, Pakistan. The

hospital serves as a major tertiary-care referral center in Sindh province and receives a diverse patient population from both urban and rural areas. The study was carried out over a **six-**month period**,** from 1st May 2019 to 31st October 2019**.**

Ethical Approval and Consent

The study protocol was approved by the institutional ethical review board; written informed consent was taken from all patients prior to inclusion, ensuring confidentiality and the right to withdraw at any stage without prejudice.

Study Population

A total of 184 patients who underwent ileostomy reversal during the study period were included. Patients were selected using a non-probability consecutive sampling technique.

Inclusion Criteria

- Patients of either gender, aged 18 to 50 years, undergoing elective ileostomy reversal.
- Those who provided written informed consent for participation and follow-up.

Exclusion Criteria

- Patients with chronic intestinal diseases such as tuberculosis, malignancy, ulcerative colitis, or Crohn's disease**.**
- Patients with systemic comorbidities including uncontrolled diabetes mellitus (HbA1c >6%), **hypertension** (BP >140/90 mmHg), chronic hepatitis B or C (with parenchymal liver changes on ultrasound), or bleeding disorders.
- Patients with psychiatric illness**,** poor nutritional status, or deemed unfit for surgery under general anesthesia.
- Patients lost to follow-up within 30 days after surgery.

Sample Size Determination

The sample size was calculated using RAOSOFT sample size calculator, based on a previously reported proportion of anastomotic leakage (2.15%) [1], with a 95% confidence interval**,** 2.1% margin of error, and expected response distribution of 50%, yielding a minimum required sample size of 184 patients**.**

Preoperative Evaluation

All patients underwent routine preoperative evaluation including complete blood count, serum electrolytes, renal function tests, and chest X-ray. Nutritional optimization was ensured, and any correctable deficiencies were addressed before surgery. Patients were kept nil per

oral for 8 hours before operation and received standard intravenous antibiotic prophylaxis at induction of anesthesia.

Surgical Technique

All surgeries were performed by consultant general surgeons with assistance from senior residents. The patient was positioned supine, and the previous stoma site was excised circumferentially. The bowel was mobilized carefully to prevent mesenteric injury. Bowel continuity was restored using either a hand-sewn end-to-end or side-to-side anastomosis with absorbable sutures or a linear stapler, according to surgeon preference. Fascial closure was achieved with interrupted non-absorbable sutures. Skin closure technique (primary or purse-string) was left to the surgeon's discretion. Standard postoperative care protocols were followed, including early ambulation and gradual reintroduction of oral feeding.

Operational Definitions

To maintain uniformity, postoperative complications were defined as follows:

- **Postoperative ileus:** Absence of bowel sounds and intolerance to oral intake for ≥5 postoperative days, requiring nasogastric decompression.
- **Small bowel obstruction:** Clinical signs of obstruction with radiologic evidence of multiple air-fluid levels on abdominal X-ray.
- **Anastomotic leakage:** Feculent discharge from drain or wound with radiologic confirmation.
- **Surgical site infection (SSI):** Purulent wound discharge with erythema or local temperature >38°C within 30 days post-surgery.
- **Prolonged hospital stay:** Length of stay >5 days following ileostomy reversal.
- **Mortality:** Death occurring within 7 days postoperatively.

Data Collection

Demographic, clinical, and perioperative data were collected using a structured pro forma by the principal investigator. Variables included age, sex, residence (urban/rural), BMI, preoperative hemoglobin level, duration of surgery, and length of hospital stay**.** Patients were monitored daily for postoperative complications and followed up for 30 days after discharge, either through hospital visits or telephonic contact.

Statistical Analysis

Data were analyzed using SPSS version 26th (IBM Corp., USA)**.**

Quantitative variables such as age, BMI, hemoglobin, operative time, and hospital stay were presented as mean ± standard deviation (SD) **and** 95% confidence intervals (CI)**.** Qualitative variables, including sex, residence, and postoperative complications, were expressed as frequencies and percentages**.** Effect modifiers such as age, gender, BMI, hemoglobin, and duration of procedure were assessed through stratification**.** The Chi-square test was applied to examine the association between categorical variables, with $p < 0.05$ considered statistically significant.

Results

A total of 184 patients undergoing ileostomy reversal during the six-month study period were included in the analysis. All patients completed in-hospital follow-up; however, six patients were lost to outpatient follow-up after 30 days and excluded from long-term outcome analysis.

Demographic and Baseline Characteristics

The mean age of the study population was 36.67 ± 8.23 years (range: 18–50 years). The majority of patients were between 31 and 40 years of age (57.6%). There were 130 males (70.6%) and 54 females (29.3%)**,** giving a male-to-female ratio of approximately 2.4:1. The mean body mass index (BMI) was 24.02 ± 1.83 kg/m², and the mean preoperative hemoglobin level was 9.81 ± 0.75 g/dL**.** The mean operative duration was 39.07 ± 11.01 minutes, and the mean postoperative hospital stay was 3.63 ± 1.57 days (range: 2–10 days).

Table 1: Summarizes the descriptive statistics of the continuous variables.

Descriptive characteristics of the study population (n = 184)

Variable	**Mean ± SD**	**95% CI (Lower–Upper)**
Age (years)	36.67 ± 8.23	35.47 – 37.87
BMI (kg/m²)	24.02 ± 1.83	23.75 – 24.28
Hemoglobin (g/dL)	9.81 ± 0.75	9.70 – 9.92
Duration of surgery (minutes)	39.07 ± 11.01	37.46 – 40.67
Hospital stay (days)	3.63 ± 1.57	3.40 – 3.85

Distribution by Residence: Among the 184 participants, 102 (55.4%) were residents of urban areas and 82 (44.6%) were from rural regions (Figure 1). No significant differences in baseline characteristics were noted between these two groups.

Postoperative Complications

Overall postoperative morbidity was 47 cases (25.5%), with the most frequent complications being postoperative ileus (19.6%), surgical site infection (13.6%), and prolonged hospital stay (14.7%). Other complications included small bowel obstruction (5.4%), anastomotic leakage (4.3%), and mortality (3.8%). A summary of all recorded complications is shown in **Table 2**.

Table 2: Frequency of postoperative complications (n = 184)

Complication	Frequency (n)	Percentage (%)
Postoperative ileus	36	19.6%
Surgical site infection	25	13.6%
Small bowel obstruction	10	5.4%
Anastomotic leak	8	4.3%
Prolonged hospital stay (>5 days)	27	14.7%
Mortality (within 7 days)	7	3.8%

Association between Age and Postoperative Complications

When stratified by age, anastomotic leakage was significantly more frequent among patients older than 40 years (11.3% vs. 1.5%, p = 0.003). Similarly, small bowel obstruction occurred more commonly in the older age group (11.3% vs. 3.1%, p = 0.025). Other complications, including ileus, SSI, and prolonged hospital stay, showed no statistically significant difference between age groups. (Table 3)

Table 3: Postoperative complications by age group

Complication	≤ 40 years (n=131)	> 40 years (n=53)	p-value
Postoperative ileus	27 (20.6%)	9 (17.0%)	0.574
Small bowel obstruction	4 (3.1%)	6 (11.3%)	0.025*
Anastomotic leak	2 (1.5%)	6 (11.3%)	0.003*
Surgical site infection	16 (12.2%)	9 (17.0%)	0.393
Prolonged hospital stay	20 (15.3	7 (13.2	0.721

	%)	%)	
Mortality	3 (2.3%)	4 (7.5%)	0.091

*Significant at $p < 0.05$

Complications by Gender

Gender-based analysis showed slightly higher rates of postoperative ileus in males (22.3%) compared to females (13.0%), though the difference was not statistically significant ($p = 0.146$). No significant gender-related differences were found for other complications ($p > 0.05$). (Table 4)

Table 4: Postoperative complications by gender

Complication	Male (n=130)	Female (n=54)	p-value
Postoperative ileus	29 (22.3%)	7 (13.0%)	0.146
Small bowel obstruction	9 (6.9%)	1 (1.9%)	0.167
Anastomotic leak	6 (4.6%)	2 (3.7%)	0.782
Surgical site infection	16 (12.3%)	9 (16.7%)	0.432
Prolonged hospital stay	20 (15.4%)	7 (13.0%)	0.672
Mortality	4 (3.1%)	3 (5.6%)	0.424

Complications by Residence

Complications were slightly more frequent among urban residents, particularly prolonged hospital stay (19.6% vs. 8.5%, $p = 0.035$). Other differences between urban and rural patients were not statistically significant.

Mortality

A total of 7 deaths (3.8%) were recorded within seven days post-surgery. The most common causes were anastomotic leakage with sepsis (n=4) and severe postoperative pneumonia (n=3). No significant association between mortality and gender, BMI, or residence was observed.

Summary of Key Findings

- **Mean age:** 36.67 ± 8.23 years
- **Male predominance:** 70.6%
- **Overall complication rate:** 25.5%
- **Most frequent complication:** Postoperative ileus (19.6%)
- **Anastomotic leak:** 4.3%, significantly associated with older age (>40 years, p=0.003)
- **Mortality:** 3.8%

These findings suggest that while ileostomy reversal is a routine

surgical procedure, postoperative complications remain relatively frequent. Older patients, in particular, have a higher risk of anastomotic leak and small bowel obstruction.

Discussion:

The present study evaluated the frequency and pattern of postoperative complications following ileostomy reversal at a tertiary care hospital in Pakistan. Among 184 patients, the overall postoperative morbidity was 25.5%, with postoperative ileus (19.6%) and surgical site infection (13.6%) being the most common complications. Anastomotic leakage occurred in 4.3% of patients and was significantly associated with older age (>40 years), while the mortality rate was 3.8%. These findings confirm that ileostomy reversal, though considered a routine procedure, carries a notable risk of morbidity and mortality.

The complication rates observed in this study are comparable to those reported internationally. Studies have shown that morbidity after ileostomy closure ranges from 10% to 69% depending on patient selection, timing, and operative technique [1,2]. In a large prospective series by Shabbir et al., the overall morbidity after ileostomy closure was 17.3%, with wound infection and ileus being the most frequent complications [3]. Similarly, Li et al. reported a 25% morbidity rate, which aligns closely with our results [4]. In a recent Pakistani study by Shaikh et al., complications occurred in 28.5% of patients, with ileus and wound infection as leading causes [5]. These consistencies reinforce that postoperative morbidity following ileostomy reversal remains a significant clinical concern, even in experienced hands.

Postoperative ileus was the most frequent complication in our cohort (19.6%). This rate falls within the commonly reported range of 10–30% [6]. The development of ileus is multifactorial related to bowel manipulation, intraoperative edema, electrolyte imbalance, and opioid use. In resource-limited settings, delayed reversal and nutritional deficiencies may further exacerbate intestinal dysmotility. Early mobilization, opioid-sparing analgesia, and use of enhanced recovery protocols have been shown to mitigate this risk [7].

Surgical site infection (SSI) was the second most common complication, affecting 13.6% of patients. SSI remains a well-documented problem after stoma reversal, with global rates varying between 10% and 20% [8]. The risk is often attributed to the contaminated nature of the surgical field, technical factors, and skin closure methods. Studies have demonstrated that the **purse-string closure technique** can significantly

reduce SSI rates compared to primary linear closure [9]. Given the high incidence observed in this study, adoption of the purse-string technique and adherence to strict aseptic protocols may reduce wound-related morbidity in our institution.

Anastomotic leakage, though relatively infrequent (4.3%), remains the most serious complication due to its association with sepsis and mortality. Our leak rate is consistent with international reports ranging from 2% to 6% [10]. Notably, older patients (>40 years) demonstrated a significantly higher leak rate (p=0.003). Advancing age is a well-established risk factor for impaired anastomotic healing, possibly due to reduced vascularity, collagen deposition, and concurrent comorbidities [11]. This emphasizes the importance of careful patient selection, meticulous surgical technique, and postoperative vigilance in older individuals.

Small bowel obstruction occurred in 5.4% of patients, predominantly in those over 40 years. Similar findings have been reported in previous literature, with adhesion-related obstruction occurring in 3–10% of cases [12]. Delayed reversal has been correlated with higher adhesion density, leading to increased operative time and risk of obstruction [13]. Encouraging earlier reversal (within 8–12 weeks) where feasible could potentially minimize this complication.

The overall mortality rate in this study was 3.8%, slightly higher than that reported in high-income countries (<1%) [14]. this difference may reflect disparities in perioperative care, late presentation, and limited access to intensive care resources. Most deaths in our series were secondary to anastomotic leakage with sepsis and respiratory complications. Strengthening postoperative monitoring and early recognition of clinical deterioration could further reduce mortality.

When considering gender and residence, our analysis showed no statistically significant differences in complication rates, although prolonged hospital stay was more frequent among urban patients. This finding might reflect differing health-seeking behaviors or comorbidity profiles between rural and urban populations. BMI and hemoglobin levels were not significant predictors of complications in this study, but other research has demonstrated associations between malnutrition, anemia, and adverse postoperative outcomes [15].

Strengths and Limitations:

The strengths of this study include a relatively large sample size and standardized definitions for

postoperative complications, allowing reliable comparisons with other studies. However, several limitations must be acknowledged. This was a single-center, descriptive study without a control group, which limits causal inference. The exclusion of patients with major comorbidities may underestimate the true burden of complications in the general population. Additionally, the follow-up period was limited to 30 days, precluding assessment of late complications such as incisional hernia or stoma-site herniation.

Clinical Implications:

Despite being a routine procedure, ileostomy reversal carries significant morbidity. The results underscore the need for improved preoperative optimization—particularly in older or nutritionally compromised patients—and the implementation of enhanced recovery protocols. Use of minimally invasive approaches, standardized timing for reversal, and modern wound closure techniques can reduce complications and hospital stay.

Future Recommendations:

Future multicenter prospective studies should aim to identify independent risk factors for specific complications using multivariable analysis. Evaluating the impact of early versus delayed reversal and different closure techniques in the Pakistani context would provide further valuable insights.

Conclusion

Ileostomy reversal, though generally regarded as a minor elective procedure, carries a significant risk of postoperative morbidity. In this study, approximately one in four patients experienced at least one postoperative complication. The most frequent issues were postoperative ileus and surgical-site infection, while anastomotic leakage though less common was the most serious and strongly associated with older age. The overall mortality rate of 3.8% further highlights the potential severity of adverse outcomes following reversal.

These findings demonstrate that ileostomy closure should not be underestimated in clinical practice. Early identification of high-risk patients, careful surgical technique, and standardized postoperative management are essential to reduce morbidity and mortality. The results are consistent with international literature but emphasize that factors such as delayed reversal, malnutrition, and limited perioperative resources in low- and middle-income settings may exacerbate complication rates.

Recommendations

1. **Preoperative optimization:** Patients should undergo comprehensive preoperative assessment and correction of anemia, electrolyte imbalance, and malnutrition.
2. **Timing of reversal:** Whenever feasible, ileostomy closure should be performed within 8–12 weeks after the primary procedure to minimize adhesions and technical difficulty.
3. **Surgical technique:** Adoption of standardized, evidence-based methods such as stapled or well-constructed hand-sewn anastomosis should be encouraged. Use of purse-string skin closure can substantially reduce surgical-site infections.
4. **Enhanced recovery protocols:** Implementation of fast-track pathways focusing on early ambulation, pain control, and gradual feeding can shorten hospital stay and reduce postoperative ileus.
5. **Postoperative vigilance:** Older patients and those with delayed reversal require closer monitoring for early detection of complications, especially anastomotic leakage.
6. **Future research:** Multicenter prospective studies with longer follow-up are needed to identify independent risk factors and evaluate preventive interventions.

In conclusion, ileostomy reversal remains a necessary yet high-risk procedure. Strengthening perioperative care and adopting evidence-based strategies can significantly improve patient outcomes in our surgical settings.

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