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Original Research Article

Comparison of Early Ileostomy Reversal at Two Months Versus Ileostomy Reversal at Three Months

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Abstract:
Objective: To compare the frequency of postoperative complications between early ileostomy reversal at two months and ileostomy reversal at three months after primary surgery. **Study Design:** Randomised controlled trial. **Place and Duration of Study:** Conducted from 3rd May 2025 to 3rd October 2025 at the Department of General Surgery, Gulab Devi Teaching Hospital, Lahore. **Methodology:** Total 90 patients were included, with 45 patients in each group. Patients aged 14 to 55 years who were planned for ileostomy reversal after typhoid perforation, small bowel obstruction, traumatic perforation or iatrogenic perforation were enrolled. Patients were randomly allocated into two groups. Group I underwent ileostomy reversal at two months, while Group II underwent ileostomy reversal at three months after primary surgery. Mean and standard deviation was calculated for quantitative variables. Frequency and percentage was calculated for qualitative variables. Chi-square test and Fisher exact test were applied after stratification. A p-value of ≤0.05 was considered statistically significant. **Results:** Mean age was 35.93 ± 11.30 years in Group I and 36.44 ± 10.37 years in Group II. Males were 30 (66.7%) in Group I and 31 (68.9%) in Group II. Postoperative complications were observed in 11 (24.4%) patients in Group I and 7 (15.6%) patients in Group II, with no statistically significant difference (p=0.292). Wound complications were found in 4 (8.9%) and 5 (11.1%) patients, respectively. Postoperative bowel obstruction occurred in 5 (11.1%) patients in Group I only. **Conclusion:** Ileostomy reversal at two months and three months showed comparable postoperative outcomes. Both timings were safe and feasible in carefully selected patients.

Keywords: Colorectal surgery; Ileostomy; Postoperative complications; Randomised controlled trial; Stoma closure; Surgical outcomes.

INTRODUCTION

Anastomotic leakage is a common complication of colorectal surgery, which is linked to morbidity, prolonged hospital stay, and high cost of treatment [1]. This complication develops due to the fact that an anastomosis of the intestine, formed as a result of the surgical intervention, fails to heal properly, resulting in leaking of intestinal contents into the abdominal cavity [2]. In order to avoid complications, an ileostomy is made in order to divert the fecal stream and facilitate healing of the anastomosis [3]. An ileostomy closure is carried out later, when enough time has passed for healing of the anastomosis.

Ileostomy reversal after two months has also been suggested as a safe approach among selected cases where the healing process is well established without the presence of any sign of anastomosis leakage or infection [4]. Advocates claim that this will help in avoiding the complications associated with stoma, improving nutrition, and the quality of life by allowing faster return to bowel function [5]. On the other hand, ileostomy reversal after three months is still the usual procedure because it allows more time for proper healing of the anastomosis and recovery

after the surgery [6]. Surgeons prefer delay in reversal because it can possibly minimize the chance of complications, but it will increase stoma morbidity [7].

Despite being considered a fairly safe operation, ileostomy reversal may be connected with certain complications that may appear. Such complications may include wound infection, anastomotic leak, postoperative ileus, small bowel obstruction, intraabdominal infection, hemorrhage, and incisional hernia [8]. In addition, some patients may have difficulties with their bowels after the reversal and they will feel a frequent urge to defecate or even experience fecal incontinence [9].

There is controversy about the ideal time for performing ileostomy reversal after colorectal surgery, and there is no agreement on which procedure, early or late, is better. Early reversal will reduce the risk of stoma complications, but delayed reversal will allow the anastomosis to heal properly. However, the research on the safety and efficacy of ileostomy reversal after two months or three months is still controversial. Therefore, this study was conducted to compare the outcomes of early ileostomy reversal at two months versus ileostomy reversal at three months in order to provide evidences that may help surgeon select the most appropriate timing for stoma closure and improve patient outcome.

METHODOLOGY

A randomised controlled trial was carried out in the Department of General Surgery, Gulab Devi Teaching Hospital, Lahore, from 3rd May 2025 to 3rd October 2025. Ethical approval was obtained from the Institutional Review Board of Akhtar Saeed Medical and Dental College under Ethical Certificate No. AAMC/IRB/EA35/2025 before commencement of the study. The trial was prospectively registered at ClinicalTrials.gov under Trial Registration Number NCT07601594. The required sample size was calculated by using the OpenEPI sample size calculator with 5% level of significance, 80% study power considering a postoperative complication rate of 27.9% in the early ileostomy reversal group and 7.9% in the standard ileostomy reversal group [10]. A total of 90 patients were included, with 45 patients in each group. Patients were recruited by non-probability consecutive sampling technique.

Patients aged 14 to 55 years of either gender who were scheduled for ileostomy reversal following typhoid perforation, small bowel obstruction, traumatic perforation or iatrogenic perforation were included in the study. Patients with previous total colectomy, malignancy, anterior resection, or abdominal tuberculosis were excluded from the study. Written informed consent was obtained from every patient before enrolment.

Baseline information including name, age, gender, height, weight for calculation of body mass index, comorbidities including hypertension and diabetes and surgery for which ileostomy reversal was planned were documented. A detailed medical history was obtained and complete clinical examination was performed before surgery. Patients were randomly allocated into two equal groups by using a random number table. Patients assigned even numbers were placed in Group I, while patients assigned odd numbers were placed in Group II. Group I underwent early ileostomy reversal at 2 months after the primary surgery, whereas Group II underwent ileostomy reversal at 3 months after the primary surgery. All procedures were performed by the same surgical team under the supervision of a consultant surgeon with more than 5 years of surgical experience. The duration of surgical procedure was recorded for every patient and all patients were followed throughout their hospital stay to observe any postoperative complications.

The outcomes was assessed by determining the frequency of postoperative complications after ileostomy reversal. Postoperative complications were considered when any surgical or medical complication developed following the reversal procedure during hospital stay. Wound complication were considered when surgical site infection or wound dehiscence was identified clinically or confirmed on radiological imaging. Postoperative bowel obstructions was considered when patients developed clinical signs and symptoms of intestinal obstruction with radiological confirmation requiring medical or surgical management. Intra-abdominal abscess was considered when a fluid collection within the abdominal cavity was confirmed on imaging and required drainage or antibiotic treatments. Enterocutaneous fistula was considered when an abnormal communication between the bowel and skin was confirmed clinically and/or by radiological imaging. Anastomotic insufficiency was considered when failure of healing at the anastomotic site resulted in leakage confirmed by radiological imaging or re-operations. Medical complications were considered as any non-surgical complication, including infections or cardiovascular events, confirmed by clinical assessment or laboratory investigations. Mortality was recorded when death occurred during the postoperative hospital stay.

All collected data were entered and analysed using IBM SPSS version 27. Numerical variables including age, weight, height, body mass index and duration of surgical procedure were presented as mean ± standard deviation. Categorical variables including gender, comorbidities, surgery for which reversal was performed and postoperative complications were expressed as frequencies and percentages. Chi-square test was applied to compare postoperative complications between both groups. Data were stratified according to age, gender, comorbidities,

body mass index, surgery for which reversal was performed and duration of surgical procedure to control possible effect modifiers for postoperative complications. Post-stratification chi-square test was applied to assess the association of postoperative complications between both groups. A p-value of ≤0.05 was considered significant.

RESULTS

Both groups were well matched in terms of baseline demographic characteristics. The mean age were 35.93 ± 11.30 years in Group I and 36.44 ± 10.37 years in Group II. Mean height were 1.67 ± 0.09 m in both groups. Mean weight were 76.99 ± 11.25 kg in Group I and 76.35 ± 9.89 kg in Group II, while mean BMI were 27.37 ± 2.83 kg/m^2 and 27.27 ± 2.86 kg/m^2, respectively. Mean operative duration were 59.51 ± 7.97 minutes in Group I and 59.56 ± 8.00 minutes in Group II. Regarding gender, males constituted 30 (66.7%) patients in Group I and 31 (68.9%) in Group II, whereas females were 15 (33.3%) and 14 (31.1%), respectively. Hypertension were present in 3 (6.7%) patients in Group I and 7 (15.6%) in Group II, and diabetes were noted in 8 (17.8%) and 5 (11.1%) patients, respectively. The most common surgical indication in Group I were typhoid perforation, seen in 25 (55.6%) patients, followed by small bowel obstruction in 9 (20.0%), iatrogenic perforation in 6 (13.3%), and traumatic perforation in 5 (11.1%) patients. In Group II, typhoid perforation were present in 20 (44.4%) patients, traumatic perforation in 10 (22.2%), iatrogenic perforation in 7 (15.6%), and small bowel obstruction in 8 (17.8%) patients (Table-I).

Table 1. Patients Demographics in both groups

Variables	Group I (2 months) n=45	Group II (3 months) n=45
	Mean ± SD	Mean ± SD
Age (years)	35.93 ± 11.30	36.44 ± 10.37
Height (m)	1.67 ± 0.09	1.67 ± 0.09
Weight (kg)	76.99 ± 11.25	76.35 ± 9.89
BMI (kg/m^2)	27.37 ± 2.83	27.27 ± 2.86
Duration (min)	59.51 ± 7.97	59.56 ± 8.00
Gender	**n (%)**	**n (%)**
Male	30 (66.7%)	31 (68.9%)
Female	15 (33.3%)	14 (31.1%)
Comorbidity		
Hypertension	3 (6.7%)	7 (15.6%)
Diabetes	8 (17.8%)	5 (11.1%)
Surgery Indication		
Typhoid Perforation	25 (55.6%)	20 (44.4%)
Small Bowel Obstruction	9 (20.0%)	8 (17.8%)
Traumatic Perforation	5 (11.1%)	10 (22.2%)
Iatrogenic Perforation	6 (13.3%)	7 (15.6%)

Postoperative complications were observed in 11 (24.4%) patients in Group I and 7 (15.6%) patients in Group II, with the difference were not statistically significant (p = 0.292). Wound complications were the most common complication type in both groups, occurring in 4 (8.9%) patients in Group I and 5 (11.1%) in Group II. Postoperative bowel obstruction were noted exclusively in Group I, affecting 5 (11.1%) patients, while no such complication were recorded in Group II. Intra-abdominal abscess were observed in 1 (2.2%) patient in Group I only, whereas anastomotic insufficiency were reported in 1 (2.2%) patient in Group II only. Medical complications were equally distributed, with 1 (2.2%) patient in each group (Table-II).

Table 2. Comparison of postoperative complications between the two groups n=90

Variables	Group I (2 months) n=45 n (%)	Group II (3 months) n=45 n (%)	p value
Postoperative Complications			
Yes	11 (24.4%)	7 (15.6%)	0.292*
No	34 (75.6%)	38 (84.4%)	

Total	45 (100%)	45 (100%)	
Complication Type			
Wound Complications	4 (8.9%)	5 (11.1%)	
Postoperative Bowel Obstruction	5 (11.1%)	0 (0.0%)	
Intra-abdominal Abscess	1 (2.2%)	0 (0.0%)	
Anastomotic Insufficiency	0 (0.0%)	1 (2.2%)	
Medical Complications	1 (2.2%)	1 (2.2%)	

**Chi-square test*

The association of postoperative complications with demographic and clinical variables were assessed across both groups and no statistically significant differences were identified in any of the stratified analyses. Notably, among patients with BMI ≤25 kg/m^2, complications were observed in 4 (30.8%) patients in Group I compared to none in Group II, though this difference did not reach statistical significance (p = 0.098). Similarly, among patients aged ≤30 years, complication rates were higher in Group I at 4 (26.7%) versus 1 (7.1%) in Group II, although again this were not statistically significant (p = 0.330) (Table-III).

Table 3. Association of postoperative complications with demographic variables

Demographic Variable	Subgroup	Group	Complications Yes n (%)	Complications No n (%)	p-value
Age (years)	≤30	Group I	4 (26.7%)	11 (73.3%)	0.330**
		Group II	1 (7.1%)	13 (92.9%)	
	>30	Group I	7 (23.3%)	23 (76.7%)	0.704*
		Group II	6 (19.4%)	25 (80.6%)	
Gender	Male	Group I	9 (30.0%)	21 (70.0%)	0.334*
		Group II	6 (19.4%)	25 (80.6%)	
	Female	Group I	2 (13.3%)	13 (86.7%)	1.000**
		Group II	1 (7.1%)	13 (92.9%)	
BMI (kg/m^2)	≤25	Group I	4 (30.8%)	9 (69.2%)	0.098**
		Group II	0 (0.0%)	11 (100.0%)	
	>25	Group I	7 (21.9%)	25 (78.1%)	0.898*
		Group II	7 (20.6%)	27 (79.4%)	
Comorbidity	Hypertension	Group I	1 (33.3%)	2 (66.7%)	1.000**
		Group II	1 (14.3%)	6 (85.7%)	
		Group I	3 (37.5%)	5 (62.5%)	

	Diabetes	Group II	1 (20.0%)	4 (80.0%)	0.608**
Surgery Indication	Typhoid Perforation	Group I	4 (16.0%)	21 (84.0%)	0.362**
		Group II	1 (5.0%)	19 (95.0%)	
	Small Bowel Obstruction	Group I	3 (33.3%)	6 (66.7%)	1.000**
		Group II	2 (25.0%)	6 (75.0%)	
	Traumatic Perforation	Group I	2 (40.0%)	3 (60.0%)	0.560**
		Group II	2 (20.0%)	8 (80.0%)	
	Iatrogenic Perforation	Group I	2 (33.3%)	4 (66.7%)	1.000**
		Group II	2 (28.6%)	21 (84.0%)	
Duration (min)	≤60	Group I	6 (23.1%)	20 (76.9%)	0.254**
		Group II	2 (8.7%)	21 (91.3%)	
	>60	Group I	5 (26.3%)	14 (73.7%)	
		Group II	5 (22.7%)	17 (77.3%)	1.000**

*Fischer Exact Test, **Chi-Square Test

DISCUSSION

In this study early reversal at 2 months and 3 months were compared in terms of postoperative complications, and the overall complication rates were 24.4% in Group I and 15.6% in Group II, however this difference were not statistically significant (p = 0.292). This suggest that early reversal at either time point were equally safe and does not significantly increase the risk of complications, which may be attributed to the adequate healing of bowel anastomosis and resolution of peritoneal inflammation within this period. Postoperative bowel obstruction were observed exclusively in Group I, affecting 5 (11.1%) patients, while no such complication were recorded in Group II. This findings may be explained by the relatively shorter interval allowed for adhesion maturation and bowel adaptation in the 2-month group, as adhesions formed in the early postoperative period are often denser and less organised thereby increasing the risk of mechanical obstruction at the time of reversal.

The overall postoperative complication rate in the present study were 24.4% in Group I (2 months) and 15.6% in Group II (3 months), with no statistically significant difference between the two groups (p = 0.292), suggesting that both reversal timings were equally safe. These findings were consistent with those reported by Sharma et al. [11], who also found no significant difference in postoperative complications between early and late ileostomy closure groups, and similarly concluded that early reversal does not increase postoperative morbidity. Rooh-ul-Ain et al. [12] likewise reported comparable complication rates between early and delayed reversal groups, with wound infection in 13.6% and

anastomotic leakage in 8.0% of early closure patients, and no statistically significant differences were observed (p = 0.350), which is in agreement with the present findings. Kisielewski et al. [13] further supported this, as their multicentre LILEO study also demonstrated comparable postoperative morbidity and major complication rates regardless of closure timing, reinforcing the notion that the interval to reversal alone may not be the principal determinant of surgical outcomes. Shahzad et al. [18] similarly reported that overall complication rates were comparable between early and delayed reversal groups in patients with intestinal perforation, with no significant difference in postoperative morbidity, which further corroborates the safety of early ileostomy reversal observed in the present study.

Postoperative bowel obstruction were exclusively observed in Group I of the present study, affecting 5 (11.1%) patients, while no such complication were recorded in Group II. This finding may be related to the relatively immature adhesion formation at 2 months, as adhesions at this stage are often denser and less organised, potentially increasing the risk of mechanical obstruction at the time of reversal. Khan et al. [14] similarly reported small bowel obstruction in 5% of their patients undergoing ileostomy reversal, though their study did not stratify by timing of closure. Fukudome et al. [15] reported overall complications in 48.3% of early closure patients versus 27.8% in late closure, with minor wound complications being more frequent in the early group, which is partially comparable to the higher complication burden observed in Group I of the present study. Yadav et al. [19] further noted that intraoperative adhesions were less severe in patients undergoing early closure at 4–6 weeks compared to those undergoing delayed closure at 8–12 weeks, which supports the pathophysiological reasoning that adhesion maturity and organisation at the time of reversal may significantly influence postoperative bowel function.

Wound complications were observed in 4 (8.9%) patients in Group I and 5 (11.1%) in Group II, with no significant difference between the groups. This comparable distribution suggest that wound healing at the stoma site were more likely influenced by patient-specific factors such as nutritional status and local tissue condition rather than the timing of reversal. Khan et al. [14] reported surgical site infection as the most frequent complication, occurring in 8% of their patients, which is closely comparable to the wound complication rates observed in both groups of the present study. Hassan et al. [16] reported wound infection in 17.6% of early closure and 29.7% of late closure patients (p = 0.082), and although the rates were higher than those in the present study, the lack of statistical significance were similarly observed, indicating that wound-related morbidity may be driven more by patient comorbidities and surgical technique than by the time interval between stoma formation and closure. Shahab et al. [20] reported that skin excoriation occurred in only 1 (3.3%) patient following early closure compared to 10 (34%) patients after delayed closure, suggesting that prolonged stoma maintenance itself may contribute to local tissue damage and wound-related complications, which were less evident in the present study owing to the relatively early reversal performed in both groups.

There are some limitations that need to be mentioned in the present study. First of all, the study is characterized by being carried out at only one center, which can restrict the possibility for generalization of results. The total number of participants was 90, which means that further studies should involve more people and cover more centers in order to provide conclusions about the best moment for ileostomy closure. The study duration was also short and no functional outcomes were analyzed.

CONCLUSION

In conclusion, the current study proves that the early reversal of ileostomies, performed either after 2 months or 3 months of the initial operation, is a safe process with similar postoperative complication rates in both groups of patients. Within the early period of this period, the time of reversal was not found to be an important factor determining postoperative morbidity.

Disclaimer:
No disclaimer is provided.
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Ethical Approval:
Approval for this research was taken from the Hospital Institutional Ethics Committee before starting the study.
Patients' Consent:
All patient gave written informed consent before they were included in the research.
Conflict of Interest:
The author declares that there is no any conflict of interest related to this research.

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