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Comparison of Short-Term Outcome Following Early Versus Conventional Closure of Temporary Covering Ileostomy Stoma

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Abstract

Background: An ileostomy is a surgical procedure in which the small intestine (Ileum) is diverted through an opening in the abdominal wall, creating a stoma to allow waste to bypass the colon and exit the body.Early and conventional closure of ileostomy stomas are strategies to restore bowel continuity after temporary diversion. Early closure, performed within weeks, may reduce complications like dehydration and enhance recovery, while conventional closure, typically after 8-12 weeks, minimizes risks of anastomotic failure. Optimal timing balances patient safety and recovery outcomes. To assess the differences between the standard stoma closure and early stoma closure after a temporary covering ileostomy stoma and the post-operative results of them.

Materials and methods: This quasi-experimental investigation was carried out throughout September 2021 to August 2022. There were 66 patients with temporary covering ileostomies in all, 33 of whom had early closure while the remaining 33 received traditional stoma closure. Patients were monitored after surgery on the first, fifth, and eighth postoperative days, as well as for two weeks after the index procedure.

Results: All the patients were evaluated for wound infection, abdominal distension, anastomotic leakage and Length of Hospital stay (LoH) post operatively. The overall complications were in 1st POD (12% vs 33.3%, p=0.039), 5th POD (21.2% vs 36.4%, p=0.174ns), 8th POD(21.2% vs 33.3%, p=0.268ns) after after 2 weeks (6.1% vs 27.3%, p=0.020). LoH was (93.9% vs 69.7%, p=0.010).

Conclusion: Early closure group showed less complications then conventional closure group. More patients stayed at hospital less then 10 days post operatively in early closure group. So it can be said that early ileostomy closure is possible and can be done to reduce morbidity in patients.

Key words: Early stoma closure; Ileostomy stoma; Length of hospital stay.

Introduction

Loop ileostomy is a common technique used in colorectal surgery to establish a fecal diversion and bypass the bowels, in order to protect either a distal gut anastomosis or divert part of perforated ileum where primary repair is considered risky. In patients with high-risk colorectal anastomoses, the risk of leakage increases when it is closer to the anorectal junction. Construction of a temporary ileostomy not only helps in reducing this anastomotic leakage rate but also lessens the need for reoperation.[1,2]

Ideally, an ileostomy would be created only for the 10–15% of patients who would have an anastomotic leakage, but these patients cannot be predicted early. This means that stoma is created in up to 85% of the patients unnecessarily.[3] Among them19.7% of patients will experience stoma-related complications.[4]

The reversal of an ileostomy typically has a low mortality rate but There is certainly a considerable rate of complications associated with the reversal of a loop ileostomy, however, the ideal timing for this surgical procedure is still debated, with varying reports regarding when to perform the closure.[5] Generally, ileostomy is reversed after a duration of 8 to 12 weeks. This extended timeframe puts patients at risk for complications related to the stoma. Studies indicate that these complications can affect 10 to 30% of patients during that period, complicating their care.

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Additionally, even in the absence of complications, a temporary ileostomy can adversely affect a patient's quality of life, hindering their daily activities. Performing an early closure of a temporary stoma may help alleviate both stoma-related issues and patient discomfort.

A different approach might involve shortening the duration each patient spends with an ileostomy, thereby decreasing their risk of potential complications and lessening the adverse effects on their quality of life.

Recent research indicates that reversing a temporary stoma 2 to 3 weeks post-surgery is practical. Additional studies have shown that there is no significant difference in outcomes related to morbidity and mortality between early and late stoma closures. However, postponing stoma reversal could lead to serious complications, which can range from 0% to 9%, along with minor complications that may occur between 4% and 30%, often necessitating reoperation.

The ideal timing for reversing a temporary ileostomy stoma continues to be a topic of contention and the available evidence regarding the results of early stoma closure is insufficient. Hence, further studies are needed to adequately assess its efficacy. Chittagong Medical College Hospital is a government-run tertiary care facility in Bangladesh, where the practice of early closure of a temporary ileostomy stoma has recently been promoted and adopted. To assess the difference between the standard stoma closure and early stoma closure after a temporary covering ileostomy stoma and the post-operative results of them.

Materials and methods

This research was a quasi-experimental investigation conducted from September 2021 to August 2022 at the Surgery Department of Chittagong Medical College Hospital. Ethical clearance was obtained from ethical review committee of Chittagong Medical College. It was performed on 66 patients who had temporary covering ileostomy among which 33 patients underwent early closure and other 33 patients underwent conventional stoma closure. Consecutive study population was screened by the following inclusion and exclusion criteria to select the eligible participants.

Inclusion criteria:

- Patients who underwent ileostomy due to perforation of ileum or any other portion of gut distal to ileum following blunt abdominal trauma, penetrating injury etc.
- Patients who had defunctioning ileostomy to give rest to any anastomosis distal to ileum.
- Age 18 to 70 years.

Exclusion criteria:

- Patients who underwent ileostomy for some specific infections. e.g ileal perforation due to typhoid ulcer, tubercular ulcer or Crohn's disease.
- Patients who show signs of sepsis during the postoperative period, along with any radiological indications of distal bowel narrowing detected on a distal loopogram prior to stoma closure.
- Patients exhibiting inadequate nutritional health (Hemoglobin < 8 g%, Albumin < 3 g/dL

Patients who were admitted to the Department of Surgery at CMCH and underwent a temporary ileostomy after bowel surgery whether in an elective or emergency context were evaluated for their eligibility, regardless of the reason for the initial surgery.

Patients were randomly assigned to either Group A, which included those underwent early stoma closure (Within 2-3 weeks after the initial surgery) or Group B, which consisted of patients receiving conventional stoma closure (Within 8-12 weeks following the initial surgery). Each patient, along with their caregiver, provided written informed consent after a comprehensive explanation of the related risks, benefits, and details of the study protocol.

The preoperative information collected included the patient's age, gender, overall health status and comprehensive medical history. The duration between the initial surgery and the stoma closure was recorded. In both groups, the majority of patients were admitted one day before their planned surgery.All the patients were evaluated clinically for anemia, malnutrition, any preexisting stoma related complications etc. Data related to all necessary preoperative assessments (Complete blood count, urine analysis and microscopic assessment, serum albumin, serum

electrolytes, chest X-ray, random blood sugar, electrocardiogram distal loopogram) was gathered. Subsequently, patients in Group A received early stoma closure, while Group B patients underwent standard stoma closure. The temporary stoma was closed under general or spinal anesthesia with an elliptical incision around the stoma, followed by mobilization and sutured anastomosis using a hand-sewn interrupted technique in a single layer with Vicryl 3-0 RBN. After the operation, patients received analgesic injections for 2–3 days, after which oral analgesics were administered. The nasogastric tube was removed on the first postoperative day, following an evaluation of the patient's overall condition. Additional intravenous (IV) fluids were provided until oral fluids were introduced. Most patients began oral fluids between the third and fifth postoperative days and the resumption of a normal diet typically occurred between 5 to 7 days post-surgery. Intravenous antibiotics were continued postoperatively until the patient transitioned to oral feeding, as per standard protocol. Patients were monitored for any symptoms such as vomiting, abdominal bloating, duration of ileus, ability to tolerate a regular diet and signs of anastomotic leakage.

Patients were followed up on1st, 5th, 8th and 14th postoperative day. In the meantime, patients were discharged from hospital if they fulfill the discharge criteria which include absence of anastomotic leakage, wound infection, abdominal distension,return to normal diet. To assess the differences in incidence rates between the two randomized groups, I employed a Chi-square test. The comparison of hospital stay durations was also carried out using the Chi-square test. All statistical analyses were conducted with SPSS statistical software, version 22.0 (IBM Corp). A p-value of less than 0.05 was regarded as statistically significant.

Results

Table I Distribution of the study participants according to BMI (n=66)

BMI (kg/m^2)	Early closure (n=33)		Conventional closure (n=33)		p value
	n	%	n	%	
<18.5 (Underweight)	1	3	0	0.0	
18.5-24.9 (Normal)	22	66.7	20	60.6	
25-29.9 (Overweight)	9	27.3	11	33.3	
≥30 (Obese)	1	3.0	2	6.1	
Mean±SD	23.64±2.86		24.53±3.28		0.244^{ns}
Range (Min-max)	18-30		19.5-37.3		

ns= not significant.
p value reached from Unpaired-t test.

Table I illustrates the distribution of participants in the study based on their BMI. It was found that over two-thirds (66.7%) of patients in the early closure group had a BMI ranging from 18.5 to 24.9 kg/m² (Normal) while this was true for 20 patients (60.6%) in the conventional closure group. The average BMI was 23.64±2.86 kg/m² for the early closure group and 24.53±3.28 kg/m² for the conventional closure group. The differences in BMI between the early closure and conventional closure groups were not statistically significant (p>0.05).

Table II Distribution of the study participants according to sex (n=66)

Sex	Early closure (n=33)		Conventional closure (n=33)		p value
	n	%	n	%	
Male	29	87.9	28	84.8	0.719^{ns}
Female	4	12.1	5	15.2	

ns= not significant.
p value reached from Chi-square test.

Table II shows the distribution of the study participants according to sex. It was observed that majority (87.9%) of patients were male in early closure group and 28(84.8%) in conventional closure group. The differences of sex was not statistically significant (p>0.05) between early closure and conventional closure groups.

Table III Distribution of the study participants according to post operative complications (n=66)

Complications	Early closure (n=33)		Conventional closure (n=33)		p value
	n	%	n	%	
1st POD					
Complications present	4	12.1	11	33.3	0.039[s]
No complication	29	87.9	22	66.7	
Wound infection	0	0.0	0	0.0	-
Abdominal Distension	4	12.1	11	33.3	0.039[s]
Anastomotic leakage	0	0.0	0	0.0	-
5thPOD					
Complications present	7	21.2	12	36.4	0.174[ns]
No complication	26	78.8	21	63.6	
Wound infection	6	18.2	9	27.3	0.378[ns]
Abdominal Distension	0	0.0	1	3.1	0.313[ns]
Anastomotic leakage	1	3.1	2	6.1	0.554[ns]
8thPOD					
Complications present	7	21.2	11	33.3	0.268[ns]
No complication	26	78.8	22	66.7	
Wound infection	6	18.2	8	24.2	0.547[ns]
Abdominal Distension	0	0.0	1	3.1	0.313[ns]
Anastomotic leakage	1	3.1	2	6.1	0.554[ns]
After 2 weeks					
Complications present	2	6.1	9	27.3	0.020[s]
No complication	31	93.9	24	72.7	
Wound infection	1	3.1	6	18.2	0.045[s]
Abdominal Distension	0	0.0	0	0.0	-
Anastomotic leakage	1	3.1	3	9.1	0.302[ns]

s = significant.
ns= not significant.
p value reached from Chi-square test.

Table III shows the distribution of the study participants according to post-operative complications. It was observed that theoverall complications were less in early closure group at 1st, 5th, 8th POD and after 2 weeks. The overall complications showed statistically significant differences ($p<0.05$) between the early closure group and the conventional closure group on the first postoperative day ($p=0.039$) and two weeks later ($p=0.020$).

Table IV The allocation of study participants based on overall postoperative complications (n=66)

Complications	Early Closure	Conventional Closure	p value
Abdominal Distension	4 (12.1 %)	11 (33.3%)	0.039[s]
Wound Infection	6 (18.2 %)	9 (27.3 %)	0.378[ns]
Anastomotic Leakage	1 (3.1 %)	3 (9.1 %)	0.302[ns]

s = significant.
ns= not significant.
p value reached from Chi-square test.

Table IV illustrates the distribution of study participants based on postoperative complications. It was noted that the total complications were lower in the early closure group, but this difference was statistically significant ($p< 0.05$) only with regard to abdominal distension.

Table V Distribution of study participants based on the duration of their postoperative hospital stay (n=66)

Length of Hospital Stay post operatively	Early closure (n=33)		Conventional closure (n=33)		p value
	n	%	n	%	
≤10 days	31	93.9	23	69.7	0.010[s]
>10 days	2	6.1	10	30.3	

s = significant.
p value reached from Chi-square test.

Table V presents the distribution of study participants based on the duration of their hospital stay following surgery. It was noted that a large proportion of patients, 31 (93.9%), in the early closure group had a hospital stay of 10 days or less, while only 23 (69.7%) in the conventional closure group experienced the same duration. The variance in hospital stay length between the two groups was statistically significant ($p =0.10$).

Discussions

In our research, it was noted that 66.7% of the patients had a BMI of 18.5-24.9 kg/m² (Normal) in the early closure group, while in the conventional closure group, this figure was 60.6%.The mean BMI was 23.64±2.86kg/m^2 varied from 18-30.0 kg/m^2 in early closure and 24.53±3.28kg/m^2 varied from 19.5-37.3 kg/m^2 in conventional closure.The mean was almost similar ($p>0.05$) between early closure and conventional closure.Comparably to the current investigation, the Li and Ozuner study revealed that the mean BMI was 24.5 ± 4.98 kg/m2 in the late closure group and 24.4 ± 4.5 kg/m2 in the early ileostomy closure group ($p>0.05$).[4]

In this current study it was observed that 87.9% of patients were male in early closure group and 84.8% in conventional closure group. The differences of sex was not statistically significant ($p>0.05$) between early closure and conventional closure groups. Male predominance was also seen in Nelson et al. study where they found 64.0% and 58.0% were male in early closure and conventional

closure respectively.[6] Similarly male predominance was also observed by Fukudome et al. Prasad, Li and Ozuner.[7,8,4]

The early closure group saw fewer overall issues on the first, fifth, and eighth post-operative days as well as two weeks after the procedure. Fewer overall complications in early closure group were also observed by Danielsen AK et el. Aljorfi et el.[9,10] The differences of overall complications were statistically significant ($p<0.05$) between early closure group and conventional closure group at 1st POD ($p=0.039$) and after 2 weeks ($p = 0.020$) in current study.

Regarding overall sequelae, both groups had higher rates of wound infection (18.2% vs. 27.3%, respectively). In agreement to our study Alves et al. revealed that surgical site infection was substantially prevalent in early closure group 19.0% than in delayed closure group 5.0%.[11] According to a study by Nelson et al. wound infection is the most frequent surgical postoperative complication. It was shown that wound infection was more common in the early closure group (32%) than standard stoma closure group (18.0%). However, the difference was not statistically significant ($p>0.05$).[6] Results of these research addressing wound infection differ with the current study. The participants in our study who were in the early closure group had their stomas closed in two to three weeks.closure surgery was done in the same admission in most of the patients which helped for frequent monitoring of the patients of this group. All of these may attribute to less wound infection in early closure group of our study.

In this present study it was reported that, 12.1% patients suffered abdominal distension in early closure group and 33.1% patients in conventional closure group. Significantly ($p<0.05$) higher in the traditional closure group. Increased post-operative bands and adhesion in the traditional closure group could be the cause of this outcome.

3.1% of the early closure group and 9.1% of the traditional closure group had anastomotic leakage. Although it was marginally greater in the group with traditional closure, it was not statistically significant. According to the Nelson et al. study, anastomotic leakage was 8% in the traditional closure group and 4% in the early closure group.[6] The difference was comparable to our findings and not statistically significant.

In the current study, it was shown that 69.7% of patients in the traditional closure group and 93.9% of patients in the early closure group stayed in the hospital for at least 10 days. When compared to the traditional closure group, the early closure group experienced a significant ($p<0.05$) reduction in hospital stay duration. Hindenburg T et al. study showed no difference in length of hospital stay in both groups.[12] Cheng Z et el. study showed relatively more duration of hospital stay in early closure group.[13] The early closure resulted in a much shorter overall hospital stay, according to the Omundsen et al. Prasad B et al. trial.[3,8] These savings, along with the lower costs associated with stoma appliances and complications related to stomas, may make this strategy extremely cost-effective.[3]

Limitations

- The current investigation was carried out in a relatively brief amount of time.
- A further weakness of the current study was its small sample size. As a result, larger sample sizes may be used for future research projects.
- Total healthcare expenditure for the patient could not be established.
- All the ileostomy closure surgeries were not done by same surgeon for which outcome may vary.

Conclusion

Early closure group showed less complications than conventional closure group in terms of abdominal distension, wound infection and anastomotic leakage. The first post-operative day saw a considerably greater level of abdominal distension in the group receiving traditional closure. Although not statistically significant, the traditional closure group had higher rates of wound infection. Anastomotic leaking does not differ significantly between the two groups. In the early closure group, more patients had shorter postoperative hospital stays. In the early closure group, fewer overall problems and shorter hospital stays were more typical. Thus, it may be concluded that closing an ileostomy early on is safe and can help lower patient morbidity.

Recomendation

To validate and appropriately interpret the results of this investigation, more randomized controlled

trials with a more homogeneous population and extra analysis stratified into ileostomy and colostomy groups are needed. Future treatment guidelines may be developed using the findings of this study, which can also be utilized to create clinical trials that replicate the results of early closure in the general population.

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Contribution of authors

KMAH-Conception, design, gathering of data, data interpretation & final approval.

SA-Analysis, critical revision & final approval.

AA- Interpretation of the data, critical revision & final approval.

JG-Data analysis, drafting & final approval.

TH-Critical revision, data interpretation & final approval.

NS-Data interpretation, analysis, critical revision & final approval.

MR- Analysis, drafting & final approval.

Disclosure

All the authors declared no conflict of interest.

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