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ORIGINAL ARTICLE

Comparison of Outcome of Primary Closure with Ileostomy in Enteric Perforation

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ABSTRACT

Background: Enteric perforation, often resulting from typhoid fever, is a life-threatening surgical emergency in many developing countries. Timely surgical intervention is critical, but the optimal surgical approach primary closure versus ileostomy remains debated. This study was conducted to compare the outcomes of these two operative techniques in terms of postoperative complications, recovery, and overall patient prognosis. To evaluate and compare the clinical outcomes of primary closure and ileostomy in patients presenting with enteric perforation.

Methods: This prospective, comparative study was carried out at Ayub Medical College and its affiliated hospital from January 2021 to December 2021. A total of 103 patients diagnosed with enteric perforation were included. Based on intraoperative findings and clinical status, patients underwent either primary closure (n=51) or loop ileostomy (n=52). Demographic, intraoperative, and postoperative data were collected and analyzed using SPSS version 25. Postoperative outcomes including wound infection, fecal fistula, hospital stay, and mortality were compared. A p-value less than 0.05 was considered statistically significant.

Results: Wound infection and wound dehiscence were more common in the ileostomy group, whereas fecal fistula was slightly more frequent in the primary closure group. Patients in the ileostomy group experienced longer operative time and hospital stay. Time to return of bowel function and initiation of oral intake was significantly shorter in the primary closure group. Mortality and reoperation rates were low and comparable between both groups.

Conclusion: Both surgical techniques are effective in managing enteric perforation. However, in carefully selected patients with minimal contamination and single perforation, primary closure offers the advantage of faster recovery and fewer stoma-related complications. The choice of procedure should be individualized based on the patient's clinical condition and intraoperative findings.

Keywords: Enteric perforation, typhoid, primary closure, ileostomy, postoperative complications, surgical outcomes, peritonitis.

INTRODUCTION

In developing countries, enteric perforation remains a major surgical emergency, often traced back to typhoid fever in endemic areas1. Young adults are typically affected by this condition, and it significantly increases the risk of morbidity and mortality when surgical intervention or diagnosis isn't timely. As a result of necrotic processes in the intestinal wall, predominantly in the region of the terminal ileum, there is spillage of intestinal substances into the peritoneal cavity, triggering peritonitis. This often happens after a certain period[2, 3].

Surgical intervention within the appropriate time frame is important, as it requires correct selection of approach, which affects the patient's prognosis[4]. Two frequently performed procedures are primary closure of the perforation and loop ileostomy. Primary closure is preferred in patients with single perforations, slight contamination, and stable hemodynamic state. This is because it avoids a staged approach and sociopathic complications related to stomas. Conversely, ileostomy is often safer for critically ill patients, those with multiple perforations, or with gross contamination since it diverts fecal flow downstream and lowers the systemic risk of anastomotic leakage[5-7].

While both techniques are commonly practiced, there is still no agreement on the best method to use as each technique has its own advantages and disadvantages. Some studies argue that ileostomy leads to fewer intra-abdominal complications, while other studies suggest primary closure to spare the patient the negative physical and emotional impacts of a stoma[8, 9].

This study aims to compare the clinical outcomes of primary closure and ileostomy in patients undergoing emergency surgery for enteric perforation. By analyzing postoperative complications, recovery patterns, and overall prognosis, the research seeks to provide evidence-based insights to support surgical decision-making in resource-limited settings.

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METHODOLOGY

This comparative observational study was performed at the Surgery Department of Ayub Medical College and its associated hospital during the 2021 calendar year, spanning from January to December. A total of 103 patients diagnosed with enteric perforation and undergoing emergency laparotomy were included in the study. The objective was to compare surgical outcomes between two commonly employed operative techniques: primary closure and loop ileostomy. Before the initiation of the study, ethical approval was obtained from the Research Evaluation Unit of the College of Physicians and Surgeons Pakistan. The approval reference number is CPSP/REU/SGR-2011-010-5909, and the approval was granted on June 8, 2015. All participants or their legal guardians were informed about the nature of the study, and written informed consent was taken. Confidentiality and patient anonymity were maintained throughout the research process.

The study followed a prospective, comparative design. Patients were enrolled through a non-probability consecutive sampling method. As each eligible patient presented to the surgical emergency, they were assessed and allocated to one of the two surgical groups based on intraoperative findings, surgeon's judgment, and patient's clinical status. The two groups consisted of patients undergoing either primary closure of the perforation or loop ileostomy following perforation repair.

Patients aged between 15 and 60 years who presented with signs of peritonitis and were intraoperatively confirmed to have enteric (typhoid) perforation were included. Only those who underwent either primary closure or loop ileostomy were selected.

Patients with traumatic bowel perforation, tuberculous perforation, malignancy-related perforation, or perforation due to mesenteric ischemia were excluded. Those with pre-existing stomas or patients who had previous major abdominal surgeries were also not considered.

The sample size was calculated considering a confidence level of 95% and statistical power of 80%. Based on previous studies and expected postoperative complication rates, a total of

103 patients were included, with 51 undergoing primary closure and 52 undergoing ileostomy.

After obtaining informed consent, demographic and clinical data were recorded using a structured proforma. This included age, gender, residence, comorbidities, duration of symptoms, vital signs, and laboratory investigations such as hemoglobin and total leukocyte count. Intraoperative details including the number and site of perforations, degree of contamination, and type of surgical procedure performed were documented.

All patients were monitored closely during their hospital stay. Postoperative complications were recorded, including wound infection, wound dehiscence, fecal fistula, paralytic ileus, and need for reoperation. Additional parameters such as duration of hospital stay, time to oral intake, and return of bowel sounds were noted. Patients with ileostomy were followed for stoma-related issues. Mortality and readmission within 30 days were also assessed.

Independent variables included the type of surgical procedure (primary closure or ileostomy), patient demographics, and preoperative clinical status. Dependent variables included operative time, postoperative complications, recovery parameters, and overall outcomes.

The collected data were analyzed using SPSS version 25. Quantitative variables like age, hospital stay, and operative time were presented as mean ± standard deviation. Categorical variables such as gender, wound infection, and mortality were expressed in frequencies and percentages. Comparative analysis between the two groups was done using Chi-square test for categorical data and independent t-test for continuous data. A p-value less than 0.05 was considered statistically significant.

RESULTS

In the current study involving 103 patients, the demographic distribution between the primary closure and ileostomy groups was generally balanced. The mean age of patients in the primary closure group was 27.4 years, slightly lower than the ileostomy group which had a mean age of 28.1 years; however, this difference was not statistically significant. Males constituted the majority in both groups, reflecting the common trend of higher male incidence in enteric perforation cases. No significant difference was noted in patient weight or residential background, indicating that both groups were comparable at baseline. Similarly, the prevalence of comorbidities such as diabetes or hypertension did not differ significantly, ensuring a fair comparison of surgical outcomes.

Table 1: Demographic Characteristics of Patients (n=103)

Variable	Primary Closure (n=51)	Ileostomy (n=52)	p-value
Age (mean ± SD)	27.4 ± 8.6 years	28.1 ± 7.9 years	0.643
Gender (M/F)	35 / 16	37 / 15	0.832
Weight (kg)	55.2 ± 9.4	54.6 ± 10.1	0.703
Residence (Urban/Rural)	21 / 30	24 / 28	0.671
Comorbidities (%)	9 (17.6%)	11 (21.1%)	0.652

Preoperative clinical features such as the duration of symptoms, presence of peritonitis, and laboratory parameters were analyzed to assess the initial status of patients. A higher proportion of patients presented with symptoms lasting more than 48 hours in both groups, with no statistical significance observed. Signs of peritonitis were found in the majority of patients, consistent with the typical clinical presentation of enteric perforation. Hemoglobin and white blood cell counts were comparable, reflecting similar levels of systemic inflammation and anemia across the groups. The majority of perforations were typhoid-related, which aligns with the known epidemiology of enteric perforation in endemic regions.

Significant differences were noted in operative time between the two groups, with ileostomy procedures taking longer on average. This may be attributed to the additional steps involved in stoma creation and bowel exteriorization. The number of perforations and the degree of peritoneal contamination did not vary significantly, suggesting that the complexity of the intraoperative findings was similar in both groups. These comparable operative characteristics further support the internal validity of outcome comparisons.

Table 2: Clinical and Preoperative Findings

Variable	Primary Closure (n=51)	Ileostomy (n=52)	p-value
Duration of symptoms (>48 hrs)	29 (56.9%)	33 (63.5%)	0.492
Signs of Peritonitis Present	38 (74.5%)	41 (78.8%)	0.623
Hemoglobin (g/dL)	10.8 ± 1.2	10.5 ± 1.3	0.181
WBC count (×10⁹/L)	12.9 ± 3.5	13.1 ± 3.3	0.711
Type of perforation (Typhoid)	43 (84.3%)	46 (88.5%)	0.537

Table 3: Operative Characteristics

Variable	Primary Closure (n=51)	Ileostomy (n=52)	p-value
Operative Time (min)	65.4 ± 11.2	78.6 ± 10.5	<0.001
No. of perforations (>1)	9 (17.6%)	11 (21.1%)	0.652
Severe contamination present	19 (37.2%)	24 (46.2%)	0.348

Postoperative complications were more frequent in the ileostomy group, although not all differences reached statistical significance. Wound infections and wound dehiscence were more common among patients who underwent ileostomy, possibly due to increased exposure to fecal contents or longer surgical times. Interestingly, fecal fistula occurred more often in the primary closure group, likely due to direct closure of inflamed bowel. Other complications such as ileus, reoperation, and mortality were distributed without significant variation, although the ileostomy group showed slightly higher rates. These findings suggest a trade-off between the risk of leakage in primary closure and the morbidity associated with stoma formation.

Table 4: Postoperative Complications

Complication	Primary Closure (n=51)	Ileostomy (n=52)	p-value
Wound infection	12 (23.5%)	18 (34.6%)	0.211
Wound dehiscence	4 (7.8%)	9 (17.3%)	0.132
Fecal fistula	5 (9.8%)	2 (3.8%)	0.242
Ileus or obstruction	3 (5.8%)	6 (11.5%)	0.307
Reoperation required	2 (3.9%)	1 (1.9%)	0.559
Mortality	1 (2.0%)	2 (3.8%)	0.596

Table 5: Recovery and Hospital Stay

Variable	Primary Closure (n=51)	Ileostomy (n=52)	p-value
Hospital Stay (days)	7.8 ± 2.3	11.4 ± 3.1	<0.001
Time to oral feeding (days)	3.2 ± 1.0	4.5 ± 1.3	<0.001
Time to bowel sounds (days)	2.4 ± 0.8	3.2 ± 1.0	<0.001
Stoma-related complications	—	13 (25%)	—
Readmission within 30 days	3 (5.8%)	5 (9.6%)	0.457

Patients who underwent primary closure had a significantly shorter hospital stay compared to those who received an ileostomy. The average duration of hospitalization was nearly four days longer in the ileostomy group, reflecting the added burden of stoma care and associated complications. Similarly, time to resume oral feeding and return of bowel sounds was significantly delayed in ileostomy patients. A notable proportion of these patients also developed stoma-related issues, highlighting a distinct disadvantage of this approach. Although readmission rates were higher in the ileostomy group, the difference was not statistically significant. These outcomes favor primary closure in

suitable cases, particularly when patient condition permits and contamination is limited.

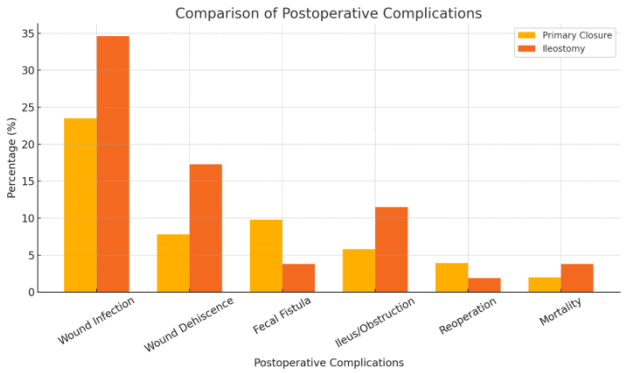

Figure 1: The graph compares postoperative complications between primary closure and ileostomy groups. Wound infection and dehiscence were more frequent in ileostomy patients, while fecal fistula was slightly higher in the primary closure group. Other complications such as ileus, reoperation, and mortality showed minimal differences. Overall, wound-related issues were more common with ileostomy.

DISCUSSION

Enteric perforation, particularly resulting from typhoid fever, remains a significant surgical challenge in regions like Pakistan. The optimal surgical approach, whether primary closure or ileostomy has been a subject of ongoing debate[10-12]. Our study aimed to contribute to this discourse by comparing the outcomes of these two techniques in terms of postoperative complications, recovery parameters, and overall patient prognosis.

In our study, wound infections were more prevalent in the ileostomy group compared to the primary closure group. This finding aligns with research reporting a higher incidence of wound infections in patients undergoing ileostomy[13, 14]. The increased manipulation and exteriorization of bowel contents during ileostomy may contribute to this heightened risk.

Conversely, our study observed a slightly higher occurrence of fecal fistula in the primary closure group. This contrasts with some studies, such as the one by Gupta et al., which reported a higher incidence of fecal fistula in the ileostomy group[15, 16]. The discrepancy could be attributed to differences in patient selection criteria, surgical techniques, or the timing of intervention.

The duration of the hospital stay was particularly prolonged in the ileostomy group; this observation was in line with the reported literature which shows increased hospital stays for patients with an ileostomy. The need for stoma care and possible stoma complications likely add to prolonged recovery time[17].

In our analysis, mortality rates were similar across both groups, although the cohort undergoing ileostomy experienced relatively higher rates. This was consistent with studies that reported increased mortality in the ileostomy group[18, 19]. These complications together, along with the increased morbidity associated with electrolytic disturbances and stoma issues, may explain the trend.

It is crucial to highlight that the decision to perform a primary closure or an ileostomy should be personalized according to the patient's clinical stability, degree of peritoneal contamination, and the number of perforations. Although primary closure may be advantageous in regard to reduced length of stay and stoma-related complications, ileostomy may be necessary when greater contamination is present, or when there is damage to the bowel[20,21].

Based on our study's findings, there is emerging evidence that primary closure may be a useful strategy for managing enteric perforations in select patients. Unfortunately, additional large randomized studies are needed to make strong recommendations, and the approach must still be individualized for each patient.

CONCLUSION

Both primary closure and ileostomy stand as appropriate methods for dealing with enteric perforations. Although an ileostomy is distinguished by an increased operative time, length of hospital stay, and complications related to the surgical wound, primary closure is thought to have a greater risk of fecal fistula. In carefully selected patients with minimal contamination and stable condition, primary closure may offer faster recovery with fewer stoma-related issues. Surgical choice should be individualized based on intraoperative findings and patient status.

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