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Comparative Study Between Stoma and Primary Anastomosis in Emergency Gut Surgery

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ABSTRACT

Background: Emergency bowel surgery is frequently required for intestinal perforation, obstruction, and trauma, and postoperative wound morbidity remains a major driver of prolonged hospitalization and adverse outcomes. Objective: To compare postoperative wound infection and wound dehiscence rates between stoma creation and primary anastomosis in emergency gut surgery. Methods: This comparative non-randomized clinical study was conducted at the Department of Surgery, Bolan Medical College/Sandeman Provincial Hospital, Quetta, from 04 January 2025 to 04 July 2025. Eighty-six patients undergoing emergency gut surgery were enrolled consecutively and grouped according to operative procedure: stoma creation (Group A, n=43) or primary anastomosis (Group B, n=43). Patients were followed during admission and at one week and one month postoperatively to determine wound infection and wound dehiscence. Between-group comparisons were performed using chi-square tests, and effect sizes were expressed as risk ratios with 95% confidence intervals. Results: Mean age was 37.3±9.9 years, with no significant difference between groups (p=0.231). Wound dehiscence occurred in 25.6% of Group A versus 34.9% of Group B (p=0.348; RR 0.73, 95% CI 0.38–1.41). Wound infection occurred in 4.7% of Group A versus 30.2% of Group B (p=0.002; RR 0.15, 95% CI 0.04–0.64). Conclusion: Stoma creation was associated with significantly lower postoperative wound infection compared with primary anastomosis, while wound dehiscence rates were comparable.

Keywords

Emergency laparotomy; stoma; primary anastomosis; wound infection; wound dehiscence; intestinal perforation.

INTRODUCTION

Emergency bowel surgery remains one of the most frequent life-saving interventions performed in surgical units and is most commonly required for intestinal perforation, obstruction, ischemia, and trauma-related injuries, particularly in low- and middle-resource settings where delayed presentation and severe peritoneal contamination are common.(1) Among these indications, intestinal perforation—especially terminal ileal perforation—contributes substantially to emergency laparotomy burden in South Asia and is associated with high postoperative morbidity due to sepsis, anemia, hypovolemia, and diffuse peritonitis at presentation.(9,12,17) Surgical decision-making in such scenarios typically revolves around restoring bowel continuity through primary anastomosis versus performing bowel diversion with stoma creation, and the optimal approach remains debated due to competing risks of anastomotic failure, wound complications, and need for subsequent reversal surgery.(2,3)

The preference for primary repair and anastomosis has evolved over decades, including in trauma surgery where multiple studies have demonstrated the feasibility of primary repair in stable patients with controlled contamination, reducing the morbidity of diversion and the burden of stoma-related complications.(4-6,7) However, evidence from perforation-dominant case-mixes typical of developing regions often differs from trauma-driven populations, and outcomes may be more strongly influenced by delayed presentation, systemic inflammatory response, fecal contamination, and poor baseline nutritional status.(10,11,13,14) Several institutional series have reported conflicting findings: some describe higher complication rates in diversion groups due to stoma-related morbidity, while others suggest that diversion may reduce septic complications by limiting contamination and bypassing fragile bowel segments, especially in high-risk presentations.(7-9) Moreover, wound infection and wound dehiscence remain among the most common early postoperative complications after emergency laparotomy, and their occurrence has direct implications for prolonged hospitalization, delayed recovery, and increased re-intervention risk.(10-13)

Despite available international evidence, there is a persistent knowledge gap regarding outcomes in local emergency surgical populations where delayed arrival, severe peritonitis, and mixed etiologies are frequently encountered, and where operative choice may differ in real-world practice depending on intraoperative findings and surgeon judgment.(1-8) Therefore, the present study compares stoma creation versus primary anastomosis in emergency gut surgery patients managed at a tertiary care public-sector hospital in Quetta, focusing specifically on clinically relevant early complications, wound infection and wound dehiscence, within the defined postoperative follow-up period. We hypothesized that stoma creation is associated with lower wound infection rates, while wound dehiscence rates may remain comparable between both procedures.

MATERIALS AND METHODS

A comparative clinical study was conducted in the Department of Surgery, Bolan Medical College/Sandeman Provincial Hospital (SPH), Quetta, from 04 January 2025 to 04 July 2025, after approval from the institutional ethical and research committee. Written informed consent was obtained from all eligible participants or their attendants before enrollment. Patients presenting to the emergency department and undergoing emergency bowel surgery for intestinal perforation, obstruction, or traumatic intestinal injury requiring operative management were recruited consecutively and included in the study. Patients were allocated into one of two operative groups based on the procedure performed: Group A (Stoma creation) and Group B (Primary anastomosis). Because allocation was determined by intraoperative surgical decision-making rather than a random sequence, the study should be interpreted as a non-randomized comparative study rather than a randomized controlled trial, and the findings reflect outcomes within routine clinical practice.

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All surgeries were performed by a single consultant general surgeon with at least five years of post-fellowship experience to minimize operator variability. The operative approach followed standard emergency laparotomy principles, including source control and bowel handling based on intraoperative assessment of bowel viability, contamination, and feasibility of safe continuity restoration.(3,7) For Group A, the diseased bowel segment was exteriorized and a stoma was created (ileostomy/colostomy as clinically indicated), while in Group B, bowel continuity was restored using primary anastomosis after resection or repair as required. Perioperative care—including antibiotic therapy, fluid resuscitation, and postoperative wound management, was administered according to institutional protocols. Patients were reviewed daily during hospital admission and subsequently evaluated at one week and one month postoperatively, with follow-up focused on detection of early surgical site morbidity.

The primary outcomes were the incidence of wound infection and wound dehiscence within the follow-up period. Wound infection was assessed clinically based on the presence of purulent discharge, erythema with tenderness, localized warmth, wound breakdown with discharge, or surgeon-diagnosed surgical site infection requiring intervention, while wound dehiscence was defined as partial or complete disruption of the fascial or wound closure identified clinically during admission or follow-up. Demographic and clinical variables recorded included age, sex, operative approach, and indication for emergency surgery (intestinal perforation, obstruction, trauma). Data were entered and analyzed using SPSS version 23.0. Quantitative variables were summarized as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Between-group comparisons were performed using independent t-test for age and chi-square or Fisher's exact tests for categorical variables, as appropriate. Effect sizes were additionally calculated for primary outcomes as risk ratios (RR) and absolute risk differences (ARD) with 95% confidence intervals (CI) to enhance clinical interpretability. (8-15) A two-sided p-value <0.05 was considered statistically significant. Stratified analyses by age group, sex, and indication were performed as exploratory analyses; these were interpreted cautiously given smaller subgroup cell counts. (16-19)

RESULTS

A total of 86 patients undergoing emergency gut surgery were enrolled, with 43 patients in the stoma group (Group A) and 43 patients in the primary anastomosis group (Group B). The overall mean age was 37.3 ± 9.9 years. Mean age was 36.0 ± 9.7 years in Group A and 38.6 ± 10.1 years in Group B, with no statistically significant difference (p=0.231). Males constituted 67.4% (29/43) of Group A compared with 51.2% (22/43) of Group B (p=0.124). The most frequent surgical indication was intestinal perforation (51.2% vs 48.8%), followed by obstruction (34.9% vs 25.6%) and trauma (14.0% vs 25.6%), with no significant difference in indication distribution (p=0.348) (Table 1).

Table 1. Baseline Characteristics and Surgical Indications (n=86)

Variable	Category	Stoma (n=43)	Primary Anastomosis (n=43)	P-value
Age group (years)	20–30	15 (34.9%)	12 (27.9%)	0.529
	31–40	16 (37.2%)	17 (39.5%)	
	41–50	9 (20.9%)	7 (16.3%)	
	51–60	3 (7.0%)	7 (16.3%)	
Sex	Male	29 (67.4%)	22 (51.2%)	0.124
	Female	14 (32.6%)	21 (48.8%)	
Indication	Intestinal perforation	22 (51.2%)	21 (48.8%)	0.348
	Obstruction	15 (34.9%)	11 (25.6%)	
	Trauma	6 (14.0%)	11 (25.6%)	

Wound dehiscence was observed in 25.6% (11/43) of the stoma group compared with 34.9% (15/43) in the primary anastomosis group (p=0.348). The estimated risk ratio (RR) for wound dehiscence with stoma relative to primary anastomosis was 0.73 (95% CI: 0.38–1.41), and the absolute risk difference (ARD) was −9.3% (95% CI: −28.6% to 10.0%), indicating no statistically significant difference and a confidence interval that includes both clinically meaningful benefit and harm. In contrast, wound infection occurred in 4.7% (2/43) of the stoma group versus 30.2% (13/43) of the primary anastomosis group (p=0.002). The RR for wound infection was 0.15 (95% CI: 0.04–0.64), with an ARD of −25.6% (95% CI: −40.7% to −10.5%), demonstrating a statistically significant and clinically substantial reduction in wound infection associated with stoma creation during the postoperative follow-up period (Table 2).

Table 2. Primary Outcomes with Effect Sizes (n=86)

Outcome	Stoma (n=43)	Primary Anastomosis (n=43)	P-value	Risk Ratio (RR)	95% CI (RR)	Absolute Risk Difference (ARD)	95% CI (ARD)
Wound dehiscence	11 (25.6%)	15 (34.9%)	0.348	0.73	0.38–1.41	−9.3%	−28.6% to 10.0%
Wound infection	2 (4.7%)	13 (30.2%)	0.002	0.15	0.04–0.64	−25.6%	−40.7% to −10.5%

Exploratory stratified comparisons suggested that the higher wound infection burden in the primary anastomosis group persisted across key strata, particularly among male patients and patients operated for obstruction; however, these subgroup analyses contain small cell counts and should be interpreted cautiously as hypothesis-generating rather than confirmatory. Among male patients, wound infection occurred in 0/29 (0.0%) in the stoma group versus 5/22 (22.7%) in the primary anastomosis group (p=0.007). In obstruction-related surgeries, wound infection occurred in 0/15 (0.0%) with stoma versus 3/11 (27.3%) with primary anastomosis (p=0.032) (Table 3). For wound dehiscence, while certain age strata suggested higher event frequency in the anastomosis group, small denominators and unstable distribution limit reliability of inference.

Table 3. Stratified Analysis of Wound Infection and Wound Dehiscence (Exploratory)

Stratum	Outcome	Stoma n/N (%)	Primary Anastomosis n/N (%)	P-value
Sex: Male	Wound infection	0/29 (0.0%)	5/22 (22.7%)	0.007
Sex: Female	Wound infection	2/14 (14.3%)	8/21 (38.1%)	0.127
Indication: Perforation	Wound infection	2/22 (9.1%)	6/21 (28.6%)	0.101
Indication: Obstruction	Wound infection	0/15 (0.0%)	3/11 (27.3%)	0.032
Indication: Trauma	Wound infection	0/6 (0.0%)	4/11 (36.4%)	0.091
Age: 20–30	Wound dehiscence	0/15 (0.0%)	4/12 (33.3%)	0.015
Age: 31–40	Wound dehiscence	1/16 (6.3%)	6/17 (35.3%)	0.041
Age: 41–50	Wound dehiscence	1/9 (11.1%)	2/7 (28.6%)	0.376
Age: 51–60	Wound dehiscence	0/3 (0.0%)	1/7 (14.3%)	0.002*

Across 86 emergency gut surgery patients, baseline characteristics were comparable between the stoma and primary anastomosis groups, with no significant differences in age distribution (p=0.529), mean age (36.0 ± 9.7 vs 38.6 ± 10.1 years; p=0.231), sex distribution (67.4% vs 51.2% male; p=0.124), or primary surgical indication profile (perforation 51.2% vs 48.8%; obstruction 34.9% vs 25.6%; trauma 14.0% vs 25.6%; p=0.348). The incidence of wound dehiscence was numerically lower with stoma creation (25.6%) than primary anastomosis (34.9%), but this difference was not statistically significant (RR 0.73, 95% CI 0.38–1.41; ARD −9.3%, 95% CI −28.6% to 10.0%; p=0.348). In contrast, wound infection was markedly lower in the stoma group (4.7%) compared with the anastomosis group (30.2%), corresponding to an 84.6% relative reduction in risk (RR 0.15, 95% CI 0.04–0.64) and a clinically important absolute risk reduction of 25.6% (95% CI −40.7% to −10.5%), achieving statistical significance (p=0.002). Exploratory stratified analyses showed that this difference remained prominent among male patients and obstruction cases, though subgroup results should be interpreted cautiously due to limited sample sizes.

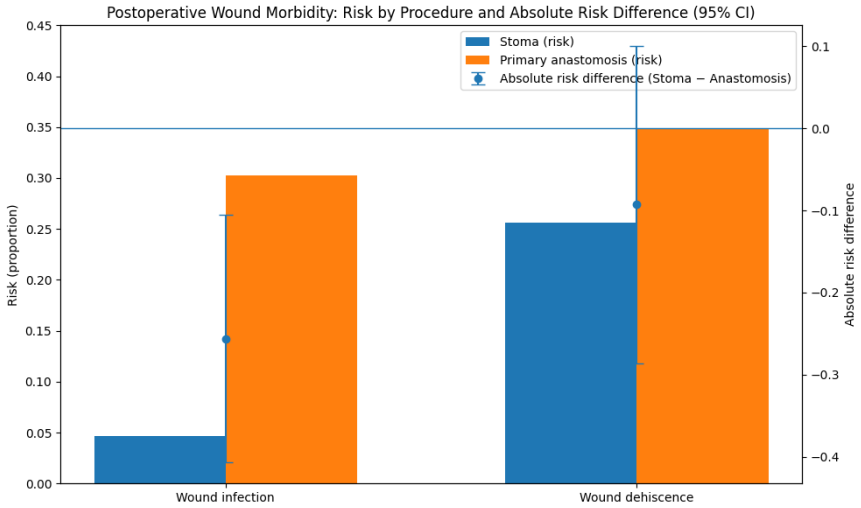

Figure 1 Postoperative Wound Morbidity: Risk by Procedure and Absolute Risk Difference (95% CI)

The figure demonstrates a pronounced gradient in postoperative wound infection risk favoring stoma creation, with infection occurring in 4.7% (2/43) of the stoma group compared with 30.2% (13/43) of the primary anastomosis group, corresponding to an absolute risk difference (ARD) of −25.6% with a 95% CI of −40.7% to −10.5%, indicating a statistically and clinically meaningful reduction. In contrast, wound dehiscence risks were closer between groups, occurring in 25.6% (11/43) with stoma creation versus 34.9% (15/43) with primary anastomosis, with an ARD of −9.3% and a 95% CI of −28.6% to 10.0%, suggesting no definitive difference and highlighting uncertainty around the magnitude and direction of effect for dehiscence.

DISCUSSION

Emergency bowel surgery in low-resource and high-burden settings frequently involves late presentations with diffuse peritonitis, systemic inflammatory response, and variable degrees of fecal contamination, all of which contribute substantially to postoperative morbidity even when definitive source control is achieved (9,11,12,17). In this comparative study of emergency gut surgery patients managed at a tertiary public-sector hospital, the principal finding was a markedly lower rate of postoperative wound infection among patients undergoing stoma creation compared with those receiving primary anastomosis (4.7% vs 30.2%). This difference was not only statistically significant but also clinically meaningful, corresponding to a large absolute risk reduction and a strong relative reduction in infection risk. In contrast, wound dehiscence occurred at a comparable frequency between groups (25.6% vs 34.9%), with confidence intervals indicating uncertainty around the magnitude of any true difference. These findings reinforce the importance of aligning operative strategy with the physiological and intraoperative risk profile in emergency laparotomy, where tissue edema, contamination, and marginal perfusion can compromise healing and predispose to surgical site infection (3,19).

The observed reduction in wound infection with stoma creation is biologically plausible in high-risk emergency settings. Diversion may reduce fecal load across compromised bowel segments and can indirectly limit intra-abdominal contamination progression or ongoing leakage risk in patients with fragile bowel wall integrity, particularly in ileal perforation scenarios linked to enteric fever and other inflammatory etiologies.(9,14,21) Moreover, diversion may shorten operative time and reduce the extent of bowel manipulation in unstable patients, lowering inflammatory burden and subsequent wound morbidity. While several trauma-focused studies have supported primary repair or anastomosis when patients are hemodynamically stable and contamination is controlled, such evidence is often derived from settings with earlier presentation, better

perioperative optimization, and different microbiological profiles than those seen in perforation-dominant case-mixes common in developing regions.(4-7) Accordingly, results from trauma-dominant populations may not generalize to mixed emergency laparotomy cohorts where delayed care and peritonitis severity are more influential determinants of postoperative infection risk (10,13,30).

The present findings are directionally consistent with institutional experiences reporting that complication patterns following emergency bowel surgery are strongly dependent on contamination severity and patient physiology, and that diversion may offer a safer route in select high-risk contexts despite stoma-related morbidity.(1,8) In contrast, other series have reported higher overall complication rates in diversion groups, largely due to stoma-specific complications such as peristomal skin irritation, prolapse, retraction, and necrosis, and the burden of reversal surgery.(37-40) Importantly, the current study focused specifically on wound infection and wound dehiscence and did not quantify stoma-specific complications; therefore, the comparative advantage observed for wound infection should be interpreted as an outcome-specific benefit rather than an overall superiority across all postoperative domains. Large audits and cohort studies have demonstrated that stoma complication rates can be substantial and are influenced by emergency formation, surgeon technique, patient comorbidity, body mass index, and immunosuppression, emphasizing the need for careful stoma-site planning and postoperative stoma care support.(37-40) Therefore, the clinical decision is not simply stoma versus anastomosis, but rather a tailored selection based on intraoperative findings, contamination, bowel viability, and postoperative care capacity.

The comparable wound dehiscence rates between groups are also clinically important, as dehiscence reflects multifactorial healing impairment linked to systemic illness, nutritional status, anemia, septic physiology, surgical technique, and postoperative wound care, factors that may not be substantially altered by diversion alone.(12,17,35) Although exploratory stratified comparisons suggested patterns in some age strata, these analyses were underpowered and should be interpreted cautiously. Additionally, because group allocation was determined by surgeon judgment rather than randomized allocation, confounding by indication may have influenced results; for example, surgeons may have preferentially selected diversion in patients perceived to be at higher anastomotic risk, which would bias outcomes toward the null or distort comparative effects depending on baseline severity distribution. Future studies should incorporate standardized severity stratification tools, document contamination grades and physiological indices, and employ either true randomization where ethically and clinically feasible or robust multivariable modeling and propensity-based methods to reduce confounding bias (30,31).

Despite these limitations, the study provides clinically relevant local evidence that in emergency gut surgery populations with mixed indications, stoma creation was associated with substantially lower postoperative wound infection compared with primary anastomosis. This finding supports a risk-adapted approach in which diversion is considered a protective strategy in selected high-risk cases rather than an inferior option, while also highlighting the need for comprehensive comparative assessment including anastomotic leak, intra-abdominal sepsis, length of hospital stay, mortality, reoperation rates, and stoma-related morbidity to determine net benefit in this population (3,36-40).

CONCLUSION

In patients undergoing emergency gut surgery at a tertiary care hospital in Quetta, stoma creation was associated with a substantially lower rate of postoperative wound infection compared with primary anastomosis, while wound dehiscence rates were comparable between groups. These findings support a risk-adapted operative strategy in emergency laparotomy, particularly in high-risk presentations where bowel edema, contamination, and physiological compromise may predispose to postoperative infection, although broader outcomes—including stoma-related complications and major septic events, should be incorporated in future well-designed comparative trials to define the optimal approach across varying clinical scenarios.

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