GLOBAL HEALTH & MEDICINE
ISSN / eISSN: 2434-9186 / 2434-9194
Volume 08, Issue 06.
https://ghsjournal.com/

COMPARISON OF OUTCOMES OF STAPLED VERSUS CONVENTIONAL ANASTOMOSIS IN PATIENTS UNDERGOING ILEOSTOMY REVERSAL SURGERY

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ABSTRACT

OBJECTIVE

To compare the outcomes of stapled versus conventional anastomosis in patients undergoing ileostomy reversal.

METHODOLOGY

This investigation followed a randomized controlled trial design and was conducted in the Department of General Surgery, Liaquat University of Medical and Health Sciences (LUMHS) from March 2025 to September 2025. A total of 128 adults (18–60 years) undergoing elective ileostomy reversal were enrolled. Inclusion required defined clinical and radiological criteria, while patients with parastomal hernia, BMI ≥35, or chronic illness were excluded. Participants were randomized to undergo either stapled or hand-sewn anastomosis. Data were meticulously recorded and analyzed using SPSS Version 26, with the Chi-square test employed to determine statistical significance at $p \leq 0.05$.

RESULTS

A total of 128 patients (mean age 32.17±7.97 years in stapled and 34.11±8.47 years in hand-sewn groups) were randomized, with male predominance in both cohorts. Stapled anastomosis significantly reduced operative time (74.5 vs. 86.5 minutes) and surgical site infections (14.1% vs. 35.9%, p=0.004). No significant differences were observed in anastomotic leakage (3.1% vs. 4.7%) or hospital stay.

CONCLUSION

Health Affairs ISSN - 0278-2715 Volume 13 ISSUE 9 page 4580-4588
Journal link: https://health-affairs.com/
Abstract Link: https://health-affairs.com/13-9-4580-4588/
Submission 16 July 2025
Acceptance 28 Aug 2025
Publication 30 September 2025

GLOBAL HEALTH & MEDICINE
ISSN / eISSN: 2434-9186 / 2434-9194
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The use of stapled anastomosis in ileostomy reversal was associated with a significantly reduced incidence of surgical site infections and shorter operative duration compared to manual techniques. However, the occurrences of anastomotic leakage and the duration of hospital stay did not exhibit any statistically significant variation between the two groups. These findings suggest stapled anastomosis as a safe and efficient technique, offering clinical advantages without increasing complication rates. Broader multicenter studies with long-term follow-up are warranted to validate its role as a preferred option in stoma reversal surgery.

KEYWORDS
Ileostomy reversal; Stapled anastomosis; Hand-sewn anastomosis; Anastomotic leakage; Surgical site infection; Postoperative outcomes

INTRODUCTION

Enteric fever caused by Salmonella typhi is one of the most common causes of intestinal perforation in developing countries, and the estimated prevalence of ileal perforation in blood-culture confirmed enteric fever is reported to be 1% [1]. Ileal perforation results from necrosis of Peyer patches in the ileum and is typically seen by the third week of disease. Patients are present with an acute abdomen due to faecal peritonitis and require emergency surgical exploration and repair of perforation with or without temporary exteriorization of bowel as a de-functioning ileostomy [2]. While a temporary ileostomy is beneficial in terms of optimization of bowel wall and treatment of infection before anastomosis is planned, it is also associated with various complications, including skin excoriations, electrolyte disturbance, stomal prolapse, stomal retraction and parastomal hernia [3]. Therefore, stoma reversal surgery is recommended as early as possible to restore normal physiological functioning of the bowel [4].

Stoma reversal requires internalization of the ileum loop followed by intestinal anastomosis to establish intestinal continuity. Anastomosis has conventionally been done with hand-sewn technique with absorbable or non-absorbable sutures [5]. However, it is time-consuming and may cause edema of the intestinal wall, increasing the risk of anastomosis leakage [6]. Stapler devices have proved to be a safer and quicker alternative to conventional methods for intestinal anastomosis in expert hands and have been proposed to be associated with reduced intraoperative and postoperative complications [7]. Few studies have attempted to assess the outcomes of stapler versus conventional intestinal anastomosis in patients undergoing stoma reversal surgery.

Hussain et al, compared the result of stapled versus conventional anastomosis in patients undergoing ileostomy reversal in their retrospective comparative study. The mean age of patients in their study was 39.7 ± 14.5 years. They reported that anastomosis leakage was seen in 33.33% patients undergoing conventional closure and 26.66% patients undergoing stapled closure [8]. Kumari et al, also compared the outcomes of stapled versus conventional anastomosis in patients undergoing ileostomy reversal in their randomized controlled trial. They

GLOBAL HEALTH & MEDICINE
ISSN / eISSN: 2434-9186 / 2434-9194
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stated that stapled closure was linked to significantly reduced incidence of anastomosis leakage (0% versus 3.7%), surgical site infection (13.8% versus 34.9%) and prolonged hospital stay (1.8% versus 8.7%) [9]. In another study, Haider S et al, reported that there was no significant difference in the incidence of anastomosis leakage in ileostomy closure done with stapler versus conventional closure (3.7% versus 5.6%) [10].

Although stapled anastomosis correlated with a markedly decreased duration of surgical procedures, there exists a paucity of data regarding the safety of stapled anastomosis about the risk of anastomotic leakage and surgical site infections. The rationale underpinning our study is to address this lacuna through a prospective randomized controlled trial. To date, no investigation has been undertaken within our institutional context with this specific aim. The outcomes of this research will aid surgeons in the selection of a more efficacious and safer intestinal anastomosis technique during stoma reversal surgery, which is anticipated to not only diminish the postoperative morbidity experienced by patients but also reduce the burden on healthcare resources by reducing the necessity for extended hospital stays and minimizing the use of healthcare resources for the management of postoperative complications.

METHODOLOGY

This research study was conducted at the Department of General Surgery (LUMHS), Jamshoro. The objective of the research was to evaluate the outcomes associated with stapled anastomosis in comparison to conventional hand-sewn anastomosis in patients undergoing ileostomy reversal, with particular emphasis on the rates of anastomotic leakage, surgical site infection, and extended duration of hospital stay.The recruited participants included adult patients aged from 18 to 60 years of both genders, scheduled for elective ileostomy reversal. Eligibility criteria required a history of loop ileostomy performed at least 12 weeks earlier for typhoid enteric perforation, confirmed by histopathology, along with radiological confirmation of distal bowel patency and functional integrity using a contrast loopogram. Only clinically stable patients without signs of intra-abdominal sepsis, with adequate nutritional status, and without unresolved postoperative complications were included.

Patients were excluded if they had a parastomal hernia, received immunosuppressive therapy within the preceding two weeks, had a history of coagulation disorders or recent antiplatelet drug use, had a (BMI) ≥ 35 kg/m², or suffered from chronic systemic illnesses such as tuberculosis, chronic kidney disease, or chronic liver disease.The sample size was calculated using the WHO calculator based on the frequency of surgical site infection in stapled versus conventional anastomosis (13.8% vs. 34.9%). With 95% CI and 80% power, the required sample size was 64 patients in each arm, totalling 128 participants. A non-probability consecutive sampling method was used for recruitment. After obtaining written informed consent, patients were randomized into one of the two intervention arms using a computer-generated sequence. Allocation concealment was maintained through the sequentially numbered, opaque, sealed

Health Affairs ISSN - 0278-2715 Volume 13 ISSUE 9 page 4580-4588
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ISSN / eISSN: 2434-9186 / 2434-9194
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https://ghsjournal.com/

envelope (SNOSE) method, handled by an independent researcher not involved in patient care.All procedures were performed under general anaesthesia with prophylactic antibiotic coverage, following standard surgical protocols. In one arm, the anastomosis was fashioned using a linear stapler, while in the other, a conventional hand-sewn technique was employed. Postoperative monitoring continued throughout the hospital stay, and predefined outcomes were assessed using strict clinical, physical, and radiological criteria. Data were systematically documented in a structured proforma, securely archived, and subjected to analysis utilizing SPSS Version 26. Descriptive statistics were computed for both qualitative and quantitative variables.Categorical variables were evaluated through the application of the Chi-square test, establishing statistical significance at $p \leq 0.05$.

RESULTS

A sample of 128 subjects participated in the study. Of these, 64 belonged to the stapled group and 64 to the conventional group. The mean age in the stapled cohort was 32.17 ± 7.97 years. The mean age in the conventional cohort was 34.11 ± 8.47 years. The mean operative duration was significantly lower in the stapled cohort (74.50 ± 13.51 minutes) than in the conventional cohort (86.53 ± 14.23 minutes). The average hospital stay was 5.47 ± 1.08 days for the stapled group and 5.10 ± 1.49 days for the conventional group. In terms of gender, the stapled cohort included 67.2% males and 32.8% females. The conventional cohort had 57.8% males and 42.2% females. For residential status, 62.5% of the stapled cohort and 51.6% of the conventional cohort lived in urban areas. The remaining 37.5% and 48.4%, respectively, were from rural regions. Based on ASA classification, 31.3% of the stapled cohort and 17.2% of the conventional cohort were ASA I. The rest (68.8% and 82.8%) were classified as ASA II (TABLE I).

In the analysis of outcomes between the two groups, the number of patients with anastomotic leakage was 2 (3.1%) in the stapled cohort and 3 (4.7%) in the conventional cohort, and no statistically significant difference was observed between the two groups (p=0.500).The incidence of surgical site infections was markedly lower in the stapled cohort, manifesting in 9 patients (14.1%), in contrast to 23 patients (35.9%) in the conventional cohort (p=0.004). An extended duration of hospitalization was recorded in 2 patients (3.1%) from the stapled cohort and 6 patients (9.4%) from the conventional cohort; nevertheless, this discrepancy did not achieve statistical significance (p=0.137) (TABLE II).

Table I: Baseline Demographic and Clinical Characteristics of Study Patients(n=128)		
Baseline Characteristics of Study Population	**Groups**	
	Stapled (n=64)	**Conventional** (n=64)

Health Affairs ISSN - 0278-2715 Volume 13 ISSUE 9 page 4580-4588
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Age in years, Mean ± SD		32.17 ± 7.97	34.11 ± 8.47
Duration of Surgery in mins, Mean ± SD		74.50 ± 13.51	86.53 ± 14.23
Length of Hospital Stay in days, Mean ± SD		5.47 ± 1.08	5.10 ± 1.49
Gender, *n* (%)	Male	43 (67.2)	37 (57.8)
	Female	21 (32.8)	27 (42.2)
Residential Status, *n* (%)	Urban	40 (62.5)	33 (51.6)
	Rural	24 (37.5)	31 (48.4)
ASA Status, *n* (%)	I	20 (31.3)	11 (17.2)
	II	44 (68.8)	53 (82.8)

Table II: Comparison of Postoperative Outcomes Between Study Groups (n=128)

Postoperative Outcomes, *n* (%)	**Groups**			**P-Value**
	Stapled (n=64)	**Conventional** (n=64)	**95% C. I**	
Anastomosis Leakage	2 (3.1)	3 (4.7)	0.106-4.064	0.500
Surgical Site Infection	9 (14.1)	23 (35.9)	0.122-0.696	0.004*
Prolonged Hospital Stay	2 (3.1)	6 (9.4)	0.060-1.607	0.137

DISCUSSION

This randomized controlled trial compared stapled and hand-sewn anastomosis results during ileostomy reversal. The focus was on anastomotic leakage, surgical site infection, and length of stay. Patients were recruited using strict clinical and radiological criteria to ensure safety and homogeneity. Entry was limited to adults aged 18 to 60 years who had a loop ileostomy for perforated typhoid. Enteric perforation is a significant burden in developing countries [1,2]. Clinical stability was required, along with adequate nutrition and radiological proof of distal bowel patency before reversal. These requirements align with surgical doctrine to prevent postoperative morbidity [3,4]. At least 12 weeks separated the initial and reversal surgeries, allowing for optimum bowel healing, as suggested by Shahab et al. [4].

The incidence of surgical site infection was significantly lower in the stapled group (14.1%)

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compared to the hand-sewn group (35.9%, p=0.004). This reduction aligns with the findings of Kumari et al. [9] and supports conclusions from systematic reviews, which suggest that stapled closure may decrease the risk of contamination and tissue trauma [13,14]. While the difference in anastomotic leakage rates (3.1% vs. 4.7%, p=0.500) was not statistically significant, there was a trend toward lower leakage in the stapled group, consistent with previous reports by Hussain et al. [8,11]. In pediatric populations, as noted by Fujii et al. [12], and among adults, Cirocchi et al. [13] similarly observed no significant difference in leak rates between stapled and hand-sewn techniques. Additionally, the stapled cohort required substantially less operative time, corroborating findings by Gohil et al. [6], Islam et al. [7], and meta-analyses by Milanchi and Allins [14] and McDermott et al. [15]. Although the mean hospital stay was marginally longer in the stapled group (5.47 vs. 5.10 days), this difference was not significant and may reflect institutional discharge protocols rather than the surgical technique itself. Overall, this study supports the growing body of evidence that stapled anastomosis is a safe and efficient alternative to hand-sewn closure, offering reduced infection rates and shorter operative times without increasing the risk of leakage or prolonged hospitalization. Strengths of this study include its randomized controlled design, clearly defined inclusion and exclusion criteria, standardized surgical protocols, and the use of concealed allocation via SNOSE methodology, all of which enhance its validity and minimize bias. However, certain limitations must be acknowledged: the study was conducted at a single center, the sample size was relatively modest, and follow-up was limited to the hospital stay, precluding assessment of long-term outcomes such as stricture formation or functional recovery. Additionally, blinding of surgeons was not feasible, which may have introduced performance bias. Nevertheless, this research provides valuable data on a well-characterized patient cohort and further supports the safety, efficiency, and infection-reducing potential of stapled anastomosis in ileostomy reversal. Future research should include larger, multicenter trials with extended follow-up periods and cost-effectiveness analyses across diverse clinical settings to confirm these findings.

CONCLUSION

The use of stapled anastomosis in ileostomy reversal was associated with a significantly reduced incidence of surgical site infections and shorter operative duration compared to manual techniques. However, the occurrences of anastomotic leakage and the duration of hospital stay did not exhibit any statistically significant variation between the two groups. These findings suggest stapled anastomosis as a safe and efficient technique, offering clinical advantages without increasing complication rates. Broader multicenter studies with long-term follow-up are warranted to validate its role as a preferred option in stoma reversal surgery.

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Submission 16 July 2025
Acceptance 28 Aug 2025
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