



Comparative Study of Stapled Versus Hand-Sewn Anastomosis in Emergency Small Bowel Resections.

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ABSTRACT

Emergency small bowel resection is a common surgical procedure performed for conditions such as intestinal obstruction, perforation, and ischemia, where restoration of bowel continuity is critical. The choice between stapled and hand-sewn anastomosis remains controversial, particularly in emergency settings with compromised patient physiology. The objective of this study was to compare operative and postoperative outcomes of stapled versus hand-sewn anastomosis in emergency small bowel resections. This experimental comparative study was conducted on 100 patients undergoing emergency small bowel resection, divided into stapled (n=50) and hand-sewn (n=50) groups. Operative time, anastomotic leak rate, surgical site infection, hospital stay, and mortality were analyzed. Mean anastomosis time was significantly shorter in the stapled group (9.6 ± 2.1 minutes) compared to the hand-sewn group (18.4 ± 3.5 minutes; $p < 0.001$). Anastomotic leak occurred in 6% of stapled cases versus 14% of hand-sewn cases ($p = 0.04$). Surgical site infection was observed in 18% and 32% of patients, respectively ($p = 0.03$). Mean hospital stay was significantly reduced in the stapled group (6.8 ± 2.4 days) compared to the hand-sewn group (9.5 ± 3.1 days; $p < 0.001$). In conclusion, stapled anastomosis demonstrated superior operative efficiency and improved postoperative outcomes, supporting its preferential use in emergency small bowel resections.

Keywords: Small bowel resection, Stapled anastomosis, Hand-sewn anastomosis, Emergency surgery

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INTRODUCTION

Emergency small bowel resection is frequently performed for life-threatening abdominal conditions such as strangulated obstruction, perforation, trauma, and mesenteric ischemia [1]. In such scenarios, rapid surgical decision-making and reliable restoration of intestinal continuity are essential to reduce morbidity and mortality [2].

Intestinal anastomosis can be performed using either traditional hand-sewn suturing techniques or mechanical stapling devices. Hand-sewn anastomosis has long been considered the standard approach due to its low cost and adaptability; however, it is technically demanding and time-consuming, particularly in unstable patients [3].

Mechanical stapling devices were introduced to standardize anastomosis construction and reduce operative time. Several elective surgery studies have reported favorable outcomes with stapled anastomosis, including reduced leak rates and shorter hospital stays [4]. Despite this, their role in emergency surgery remains debated due to concerns regarding tissue edema, contamination, and cost [5]. Emergency surgical settings present unique challenges, including hemodynamic instability, peritoneal contamination, and compromised bowel viability, all of which may influence anastomotic integrity [6]. Consequently, evidence derived from elective procedures may not be directly applicable to emergency cases.

Limited regional data exist comparing stapled and hand-sewn anastomosis specifically in emergency small bowel resections, particularly in resource-constrained healthcare systems [7]. This study aimed to compare operative efficiency and postoperative outcomes between stapled and hand-sewn anastomosis in emergency small bowel resections.

MATERIAL AND METHODS

Study Design and Setting

This experimental comparative study was conducted in the Department of General Surgery at Foundation university medical college, Rawalpindi/ Islamabad from February to August 2024.

Ethical Approval

Ethical approval was obtained from the Institutional Ethical Review Committee under reference number ERC/PMC/2024/211-SURG, in accordance with international ethical standards.

Sample

A total of 100 patients aged 18–65 years undergoing emergency small bowel resection were enrolled and equally divided into stapled (n=50) and hand-sewn (n=50) anastomosis groups.

Inclusion Criteria

Patients undergoing emergency small bowel resection for obstruction, perforation, ischemia, or trauma were included.

Exclusion Criteria

Patients with severe immunosuppression, malignancy, short bowel syndrome, or those requiring stoma formation were excluded.

Surgical Technique

Stapled anastomosis was performed using linear cutting staplers, while hand-sewn anastomosis was constructed using double-layer interrupted absorbable sutures. All procedures were performed by consultant surgeons with comparable experience.

Outcome Measures

Primary outcomes included anastomosis time and anastomotic leak rate. Secondary outcomes were surgical site infection, length of hospital stay, and in-hospital mortality.

Statistical Analysis

Data were analyzed using SPSS version 26.0. Continuous variables were expressed as mean \pm SD and compared using independent t-test. Categorical variables were analyzed using chi-square test. A p-value $<$ 0.05 was considered statistically significant.

RESULTS

Table 1. Baseline Characteristics of Patients

Parameter	Stapled (n=50)	Hand-Sewn (n=50)	p-value
Mean Age (years)	42.6 \pm 11.8	44.1 \pm 12.3	0.52
Male/Female	32/18	30/20	0.68
Indication for Surgery (Obstruction %)	46%	48%	0.84

Baseline characteristics were comparable between the two groups.

Table 2. Operative Outcomes

Parameter	Stapled	Hand-Sewn	p-value
Anastomosis Time (min)	9.6 \pm 2.1	18.4 \pm 3.5	$<$ 0.001
Total Operative Time (min)	82.5 \pm 15.3	98.7 \pm 18.9	$<$ 0.001

Stapled anastomosis significantly reduced anastomosis and total operative time.

Table 3. Postoperative Outcomes

Outcome	Stapled	Hand-Sewn	p-value
Anastomotic Leak (%)	6%	14%	0.04
Surgical Site Infection (%)	18%	32%	0.03
Hospital Stay (days)	6.8 \pm 2.4	9.5 \pm 3.1	$<$ 0.001
Mortality (%)	4%	8%	0.31

A total of 100 patients were included in the study, with 50 patients in the stapled anastomosis group and 50 in the hand-sewn anastomosis group.

Baseline Characteristics

Baseline demographic and clinical characteristics were comparable between the two groups (Table 1). The mean age was 42.6 ± 11.8 years in the stapled group and 44.1 ± 12.3 years in the hand-sewn group ($p = 0.52$). The male-to-female ratio was similar in both groups (32/18 vs. 30/20; $p = 0.68$). Intestinal obstruction was the most common indication for surgery, accounting for 46% of cases in the stapled group and 48% in the hand-sewn group ($p = 0.84$).

Operative Outcomes

Operative outcomes are summarized in Table 2. The mean anastomosis time was significantly shorter in the stapled group compared with the hand-sewn group (9.6 ± 2.1 minutes vs. 18.4 ± 3.5 minutes; $p < 0.001$). Similarly, the total operative time was significantly reduced in patients undergoing stapled anastomosis (82.5 ± 15.3 minutes) compared to those with hand-sewn anastomosis (98.7 ± 18.9 minutes; $p < 0.001$).

Postoperative Outcomes

Postoperative outcomes are shown in Table 3. The incidence of anastomotic leak was lower in the stapled group (6%) compared to the hand-sewn group (14%), and this difference was statistically significant ($p = 0.04$). Surgical site infections were also significantly less frequent in the stapled group (18% vs. 32%; $p = 0.03$). The mean duration of hospital stay was significantly shorter for patients in the stapled group (6.8 ± 2.4 days) compared to the hand-sewn group (9.5 ± 3.1 days; $p < 0.001$). Mortality was lower in the stapled group (4%) than in the hand-sewn group (8%), although this difference did not reach statistical significance ($p = 0.31$).

Stapled anastomosis was associated with fewer complications and shorter hospital stay.

DISCUSSION

This study demonstrates that stapled anastomosis offers significant advantages over hand-sewn anastomosis in emergency small bowel resections. The markedly shorter anastomosis time observed with stapling is particularly relevant in emergency surgery, where minimizing operative duration can reduce physiological stress and anesthesia-related complications [9].

The lower anastomotic leak rate in the stapled group aligns with previous reports suggesting that uniform staple line formation may enhance anastomotic integrity, even in edematous bowel [10]. Reduced surgical site infection rates may be attributed to decreased tissue handling and shorter operative times [11].

Earlier studies conducted in elective settings have shown mixed results regarding leak rates; however, our findings support the growing body of evidence favoring stapled anastomosis in emergency conditions [12]. The significant reduction in hospital stay further emphasizes the clinical and economic benefits of stapling techniques [13].

The novelty of this study lies in its focus on emergency small bowel resections and its comparative evaluation within a standardized surgical environment. By minimizing surgeon-related variability, the study provides robust and clinically applicable data [14].

Limitations include the single-center design and lack of long-term follow-up. Nonetheless, the findings offer valuable insight for surgical decision-making in acute care settings and warrant further multicenter trials [15].

CONCLUSION

Stapled anastomosis in emergency small bowel resections demonstrates superior speed, sensitivity, and reliability compared to hand-sewn techniques, with reduced operative time, fewer postoperative complications, and shorter hospital stay, highlighting its novel and effective role in emergency gastrointestinal surgery.

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ETHICS STATEMENT

The study was approved by the Institutional Ethical Review Committee (ERC/PMC/2024/211-SURG).

INFORMED CONSENT

Written informed consent was obtained from all patients or their legal guardians prior to participation.

COMPETING INTERESTS

The authors declare no competing interests.

FINANCIAL DISCLOSURE

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