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Two Techniques, One Goal: A Prospective Study on Early Postoperative Outcomes between Stapled and Hand-Sewn Gastrojejunostomy in Distal Gastric Cancer

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Abstract

Background: Gastrojejunostomy is a critical surgical procedure for patients with gastric cancer. While both stapled and hand-sewn techniques are widely practiced, their comparative efficacy and safety remains a subject of ongoing evaluation.

Methods: This prospective comparative study was conducted in the Department of General Surgery at Enam Medical College and Hospital and Shaheed Suhrawardy Medical College and Hospital, Dhaka, Bangladesh, from September 2022 to August 2024. A total of 120 patients undergoing gastrojejunostomy for operable distal (antrum & pylorus) gastric cancer were enrolled and divided into two groups: Group A (stapled, n=60) and Group B (hand-sewn, n=60). Baseline demographic, intraoperative and early postoperative outcomes were analyzed and compared using appropriate statistical tests.

Results: Baseline characteristics such as age, sex, BMI and ASA grades were similar between groups ($p > 0.05$). The stapled group had significantly shorter operative time (140.5 ± 15.2 vs. 165.3 ± 18.6 minutes, $p < 0.001$) and anastomotic time (18.2 ± 3.4 vs. 32.5 ± 5.6 minutes, $p < 0.001$). Time to appear bowel sound, initiation of oral intake and length of hospital stay were significantly improved in the stapled group ($p < 0.01$). Although surgical site infection and anastomotic leakages were slightly lower in the stapled group, the differences were not statistically significant. Clavien-Dindo complication grading showed comparable safety profiles in both groups.

Conclusion: Stapled gastrojejunostomy offers significant advantages in operative efficiency and early postoperative recovery without increasing complication rates, suggesting it may be a preferred technique for selected patients with distal gastric cancer.

Keywords: Gastrojejunostomy; Stapled anastomosis; Hand-sewn technique; Distal Gastric cancer; Postoperative outcomes

Introduction

Gastric cancer remains one of the leading causes of cancer-related mortality worldwide, particularly in developing countries where it often presents at an advanced stage [1]. Despite notable advancements in chemotherapy and targeted therapies, surgical resection continues to be the cornerstone of treatment for resectable gastric cancer [2]. Gastrojejunostomy plays a pivotal role in gastric cancer surgery, especially in cases requiring distal gastrectomy [3]. The method used to construct the gastrojejunostomy can significantly

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impact postoperative recovery and complication rates, both of which are crucial determinants of short-term surgical outcomes and overall patient quality of life [4].

Historically, hand-sewn anastomosis has been the standard technique employed by surgeons due to its simplicity, affordability, and long-established clinical utility. This approach provides surgeons with direct control over tissue apposition and hemostasis, allowing for meticulous placement of sutures [5]. However, hand-sewn anastomoses are often time-intensive and highly operator-dependent, which may introduce variability in surgical outcomes [6]. With the introduction of mechanical stapling devices, stapled gastrojejunostomy has emerged as a popular alternative, offering a faster anastomotic process with more standardized results. The stapled approach is believed to reduce operative time, minimize tissue handling and trauma, and potentially lower the risk of anastomotic leaks due to uniform staple line integrity [7].

Nevertheless, despite the growing utilization of staplers in gastrointestinal procedures, debate persists regarding the extent to which stapled anastomosis provides superior clinical outcomes compared to traditional hand-sewn techniques [8]. Comparative studies have yielded mixed results—while some report benefits of stapled anastomosis in terms of reduced anastomotic time and earlier return of bowel function, others have found no statistically significant differences in postoperative complication rates or recovery durations [9]. Furthermore, the increased cost associated with stapling devices may pose a considerable challenge in resource-limited healthcare environments like Bangladesh, where surgical decisions are often influenced by issues of accessibility and financial feasibility [10].

Given these uncertainties, it is essential to evaluate the effectiveness and safety of both techniques in local settings through well-designed prospective studies. This study aimed to compare early postoperative outcomes between stapled and hand-sewn gastrojejunostomy in patients undergoing surgery for distal gastric cancer. Key outcome measures include operative time, blood loss, time to return of bowel function, length of hospital stay and early postoperative complications. By providing evidence from a Bangladeshi surgical context, this study seeks to guide surgical practice and optimize patient care through informed technique selection.

Methodology and Materials

This prospective comparative study was conducted in the Department of General Surgery at Enam Medical College and Hospital and Shaheed Suhrawardy Medical College and Hospital, Dhaka, Bangladesh, over a period of two years from September 2022 to August 2024. A total of 120 patients diagnosed with operable distal (in antrum and/or pylorus) gastric cancer requiring gastrojejunostomy were enrolled and divided into two groups: Group A (n=60), who underwent stapled gastrojejunostomy and Group B (n=60), who underwent hand-sewn gastrojejunostomy.

Inclusion Criteria:

- Age ≥18 years.
- Histologically confirmed gastric carcinoma.
- Operable distal (antrum & pylorus) gastric cancer.
- Fit for surgery as per clinical and anesthetic assessment.
- Availability of complete medical records for data analysis.
- Provided informed written consent to participate.

Exclusion Criteria:

- <18 years.
- Proximal gastric cancer.
- Advanced gastric cancer (distant metastasis).
- Severely ill or moribund patients who are unfit for surgery & present with severe comorbid conditions (e.g., decompensated heart failure, end-stage renal disease).
- Refusal or inability to provide informed consent.

All surgeries were performed under general anesthesia by experienced surgical teams. In Group A, a linear stapler was used to create the gastrojejunostomy, while in Group B, the anastomosis was completed using a two-layer hand-sewn technique with absorbable and non-absorbable sutures. Postoperative parameters such as operative time, blood loss, time to first bowel sound, time to oral intake, hospital stay and early complications (e.g., surgical site infection, anastomotic leak) were recorded and compared between the two groups. Complications were graded using the Clavien-Dindo classification system. All patients were followed for at least seven postoperative days or until discharge. Data were collected using a structured case record form and analyzed using SPSS version 25. Quantitative variables were expressed as mean ± standard deviation and compared using the independent samples t-test, while categorical variables were analyzed using the Chi-square test or Fisher's exact test as appropriate. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1 summarizes the baseline demographic and clinical characteristics of the patients in both groups. The mean age was 58.3 ± 10.2 years in the stapled group and 59.1 ± 9.8 years in the hand-sewn group ($p = 0.65$). Male patients predominated in both groups, with 44 males and 16 females in the stapled group and 40 males and 20 females in the hand-sewn group ($p = 0.56$). The mean BMI was 23.5 ± 3.1 kg/m² in the stapled group compared to 24.1 ± 2.8 kg/m² in the

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hand-sewn group (p = 0.42). Regarding ASA physical status classification, the distribution was similar across both groups, with 20 patients in ASA I, 30 in ASA II and 10 in ASA III in the stapled group versus 24, 26 and 10 patients respectively in the hand-sewn group (p = 0.83).

Table 1: Baseline Demographic and Clinical Characteristics.

Variable	Stapled Group (n=60)	Hand-Sewn Group (n=60)	p-value
Mean Age (years)	58.3 ± 10.2	59.1 ± 9.8	0.65
Sex (Male/Female)	44 / 16	40 / 20	0.56
Mean BMI (kg/m²)	23.5 ± 3.1	24.1 ± 2.8	0.42
ASA Grade (I/II/III)	20/30/10	24/26/10	0.83

Table 2: Intraoperative Outcomes.

Variable	Stapled Group (n=60)	Hand-Sewn Group (n=60)	p-value
Mean Operative Time (minutes)	140.5 ± 15.2	165.3 ± 18.6	<0.001
Mean Blood Loss (ml)	220.4 ± 50.6	240.8 ± 48.3	0.08
Anastomotic Time (minutes)	18.2 ± 3.4	32.5 ± 5.6	<0.001

Table 3: Early Postoperative Outcomes (Within 7 Days).

Outcome Variable	Stapled Group (n=60)	Hand-Sewn Group (n=60)	p-value
Time to First Bowel Sound (hours)	24.6 ± 6.2	30.1 ± 7.5	0.002
Time to Oral Intake (days)	2.4 ± 0.5	3.2 ± 0.6	<0.001
Length of Hospital Stay (days)	7.1 ± 1.5	8.4 ± 2.0	0.003
Surgical Site Infection (n, %)	4 (6.7%)	10 (16.7%)	0.23
Anastomotic Leak (n, %)	0	2 (3.3%)	0.31
Mortality (within 7 days)	0	0	—
Total Estimated Cost (Average)	64,000	51,500	<0.001

Table 2 compares the intraoperative outcomes between the stapled and hand-sewn groups. The mean operative time was significantly shorter in the stapled group (140.5 ± 15.2 minutes) compared to the hand-sewn group (165.3 ± 18.6 minutes), with a statistically significant difference (p < 0.001). Similarly, the mean anastomotic time was markedly reduced in the stapled group (18.2 ± 3.4 minutes) compared to the hand-sewn group (32.5 ± 5.6 minutes), also showing a highly significant difference (p < 0.001). Although the mean intraoperative blood loss was slightly lower in the stapled group (220.4 ± 50.6 ml) compared to the hand-sewn group (240.8 ± 48.3 ml), the difference was not statistically significant (p = 0.08).

Table 3 illustrates the early postoperative outcomes within 7 days following surgery in both groups. Patients in the stapled group experienced a significantly faster return of bowel function, with a mean time to first bowel sound of 24.6 ± 6.2 hours compared to 30.1 ± 7.5 hours in the hand-sewn group (p = 0.002). The time to initiation of oral intake was also significantly shorter in the stapled group (2.4 ± 0.5 days) versus the hand-sewn group (3.2 ± 0.6 days), with a highly significant difference (p < 0.001). Moreover, the mean length of hospital stay was reduced in the stapled group (7.1 ± 1.5 days) compared to the hand-sewn group (8.4 ± 2.0 days), which was statistically significant (p = 0.003). Although the incidence of surgical site infection was lower in the stapled group [4 patients (6.7%)] compared to the hand-sewn group [10 patients (16.7%)], the difference was not statistically significant (p = 0.23). Two case of anastomotic leak was reported in the hand-sewn group, while none occurred in the stapled group (p = 0.31). No mortality was observed in either group within the first 7 postoperative days. The total estimated cost for the stapled gastrojejunostomy group (64,000 BDT) was significantly higher than the hand-sewn group (51,500 BDT), primarily due to the cost of stapling devices. This difference was statistically significant (p = <0.001), highlighting the increased financial burden associated with stapled techniques in the Bangladeshi healthcare context.

Table 4 presents a comparison of postoperative outcomes at one month following gastrojejunostomy. Delayed gastric emptying was more frequent in the hand-sewn group (8.3%) compared to the stapled group (3.3%), though the difference did not reach statistical significance (p = 0.24). Improvement

Table 4: Postoperative Outcomes (After 1 Month).

Outcome Variable	Stapled Group (n=60)	Hand-Sewn Group (n=60)	p-value
Delayed Gastric Emptying (n, %)	2 (3.3%)	5 (8.3%)	0.24
Nutritional Status Improved (n, %)	48 (80%)	42 (70%)	0.22
Readmission Rate (n, %)	0 (3.3%)	0 (0%)	—
Overall Patient Satisfaction (n, %)	54 (90%)	48 (80%)	0.14

Table 5: Postoperative Complications (Clavien-Dindo Classification).

Complication Grade	Stapled Group (n=60)	Hand-Sewn Group (n=60)	p-value
Grade I	8 (13.3%)	12 (20%)	0.49
Grade II	2 (3.3%)	4 (6.7%)	0.55
Grade III or Higher	0	2 (3.3%)	0.31

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in nutritional status was noted in a higher proportion of patients in the stapled group (80%) than in the hand-sewn group (70%), with no significant difference (p = 0.22). There was no re-admission in either group. Overall patient satisfaction was reported to be higher in the stapled group (90%) than in the hand-sewn group (80%), though this difference was not statistically significant (p = 0.14).

Table 5 outlines the distribution of postoperative complications based on the Clavien-Dindo classification. Minor complications (Grade I) occurred in 8 patients (13.3%) in the stapled group and 12 patients (20%) in the hand-sewn group (p = 0.49). Grade II complications, requiring pharmacological intervention, were reported in 2 patient (3.3%) in the stapled group and 4 patients (6.7%) in the hand-sewn group (p = 0.55). Only two major complication (Grade III or higher), requiring surgical, endoscopic, or radiological intervention, was observed in the hand-sewn group (3.3%), while none occurred in the stapled group (p = 0.31). Overall, there were no statistically significant differences between the two groups regarding the severity of postoperative complications.

Discussion

This prospective comparative study evaluated early postoperative outcomes between stapled and hand-sewn gastrojejunostomy in patients undergoing surgery for distal gastric cancer. The findings revealed that stapled anastomosis resulted in significantly shorter operative and anastomotic times, earlier return of bowel function, quicker oral intake and shorter hospital stay, with comparable complication rates and no early mortality, consistent with several previous studies.

The stapled group demonstrated a significantly shorter mean operative time (140.5 ± 15.2 minutes) compared to the hand-sewn group (165.3 ± 18.6 minutes, p < 0.001). This aligns with the study by Liaqat et al., which reported reduced operative time in stapled gastrojejunostomy procedures [11]. Similarly, Mashal et al., found that linear staplers reduced both operative and anastomotic times in gastric cancer surgeries compared to hand-sewn techniques [12].

The anastomotic time was also significantly lower in the stapled group (18.2 ± 3.4 vs. 32.5 ± 5.6 minutes, p < 0.001). This outcome supports the findings of Islam et al., who observed that stapling substantially shortens the duration required for gastrointestinal anastomosis without compromising safety or integrity [13]. Additionally, Hussain et al., emphasized the time-saving advantage of stapled techniques, which can be particularly beneficial in long and complex oncologic procedures [14].

Although intraoperative blood loss was slightly lower in the stapled group (220.4 ± 50.6 ml vs. 240.8 ± 48.3 ml), the difference was not statistically significant (p = 0.08). This result is similar to that reported by Lee et al., who found no significant difference in blood loss between the two techniques during gastrojejunostomy after pancreaticoduodenectomy [15].

Early postoperative recovery markers clearly favored the stapled group. Patients in this group experienced earlier return of bowel sounds (24.6 ± 6.2 vs. 30.1 ± 7.5 hours, p = 0.002) and resumed oral intake sooner (2.4 ± 0.5 vs. 3.2 ± 0.6 days, p < 0.001). These findings are consistent with the meta-analysis by Hajibandeh et al., who concluded that stapled anastomoses are associated with faster gastrointestinal recovery following upper GI surgeries [16].

Hospital stay was also significantly reduced in the stapled group (7.1 ± 1.5 vs. 8.4 ± 2.0 days, p = 0.003), supporting results from Ghafoor et al., who demonstrated shorter hospitalizations in stapled anastomosis groups across elective gastrointestinal surgeries [17]. Similarly, Charalabopoulos et al., found that minimally invasive stapled techniques led to more rapid postoperative recovery in patients undergoing total gastrectomy [18].

In terms of complications, both groups had comparable safety profiles. Surgical site infection occurred in 6.7% of stapled cases versus 16.7% in hand-sewn (p = 0.23), consistent with the findings of Bangaru et al., who reported no significant difference in infection rates [19]. Two anastomotic leakages were noted in the hand-sewn group, while none occurred in the stapled group, again reflecting results by Chen et al., where stapled anastomoses were found to have a marginally lower leak rate, though not always statistically significant [20].

Using the Clavien-Dindo classification, most complications in both groups were minor (Grade I or II), with only two Grade III complications observed in the hand-sewn group. This safety trend echoes the findings of Uprak et al., who found no significant difference in major complications between stapled and hand-sewn Billroth II gastrojejunostomies [21].

Limitations of the study

- This was a two-center study, which may limit the generalizability of the findings to broader populations.
- Additionally, long-term outcomes could not be assessed due to the relatively short follow-up duration.

Conclusion

In conclusion this study suggests that stapled gastrojejunostomy is a safe and efficient alternative to the conventional hand-sewn method, especially in terms of operative efficiency and enhanced early recovery. While cost considerations and availability of stapling devices may still influence technique selection in resource-limited settings, the clinical advantages demonstrated in this and previous studies

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support broader adoption where feasible. Further large-scale studies with long-term follow-up are recommended to assess differences in delayed complications, nutritional outcomes and anastomotic patency.

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Conflicts of interest

There are no conflicts of interest.

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