

Clinical Outcomes of Gastrojejunostomy With Versus Without Jejunoejunostomy Following Partial Gastrectomy: A Comparative Observational Study

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ABSTRACT

Background

Distal partial gastrectomy with gastrojejunostomy is a commonly performed procedure for distal gastric carcinoma and gastric outlet obstruction. However, postoperative complications may adversely affect recovery. The addition of jejunoejunostomy has been proposed to improve biliary drainage and reduce postoperative morbidity, although evidence remains limited.

Objective

To compare the clinical outcomes of gastrojejunostomy with and without jejunoejunostomy following partial gastrectomy.

Methods and Materials

A comparative observational study was conducted at Ibn Sina Medical College Hospital, Dhaka, Bangladesh, from June 2021 to May 2022. Fifty patients aged >30 years who underwent open partial gastrectomy with gastrojejunostomy were included, comprising 25 patients with jejunoejunostomy and 25 without. Demographic data, postoperative complications, and clinical outcomes were analysed using SPSS version 24.0.

Results

Most patients were aged 50–59 years, and 76% were male. Postoperative complications occurred in 12% of patients undergoing gastrojejunostomy with jejunoejunostomy compared with 44% of those undergoing gastrojejunostomy alone. Good recovery was achieved in 96% and 80% of patients, respectively. No mortality occurred in the jejunoejunostomy group, whereas three deaths (12%) were reported in the group without jejunoejunostomy.

Conclusion

The addition of jejunoejunostomy to gastrojejunostomy following partial gastrectomy was associated with fewer postoperative complications and improved clinical outcomes. The findings suggest that jejunoejunostomy may be a valuable adjunctive procedure in selected patients undergoing partial gastrectomy.

Keywords

Gastrojejunostomy; Jejunoejunostomy; Partial Gastrectomy; Gastric Cancer; Gastric Outlet Obstruction; Postoperative Complications.

INTRODUCTION

Gastric cancer remains one of the leading causes of cancer-related mortality worldwide and continues to pose a significant healthcare burden, particularly in developing countries. Despite advances in early diagnosis and multimodal treatment strategies, surgery remains the cornerstone of curative treatment for distal gastric carcinoma. Distal partial gastrectomy is widely performed for patients with respectable distal gastric malignancies and selected benign conditions causing gastric outlet obstruction. Following gastric resection, restoration of gastrointestinal continuity is essential for maintaining adequate nutritional status and quality of life.

A gastrojejunostomy is an anastomosis between the stomach and the jejunum. It can be carried out in both open or laparoscopically. Some authorities have even created gastrojejunostomies endoscopically¹. There are numerous motives to enhance a jejunostomy, consisting of bypass obstructions, as phase of a weight-loss procedure, and as section of a reconstruction after gastric resection. The first profitable gastrojejunostomy was once carried out with the aid of Anton Woelfer in 1881 to bypass a cancer of the pylorus². However, the

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creation of a gastrojejunostomy where the stomach is anastomosed to the jejunum except growing a separate limb for pancreatobiliary secretions is recognized as a Billroth II process after Woelfer's teacher, Dr. Theodor Billroth, even although Billroth did not perform his first profitable gastrojejunostomy till 1885³.

Jejunojejunostomy is the anastomosis between two parts of the jejunum⁴. It may lead to a marked reduction in the functional volume of the intestine. This approach is also carried out by Laparoscopic surgery⁵. This procedure can lead to infections, hemorrhage, strictures, ulcers, intestinal obstruction, thromboembolism and malnutrition^{6,7}.

Gastrojejunostomy (GJ) has been a traditionally standard therapeutic option for palliation of a gastric outlet obstruction (GOO) caused by unresectable malignancy^[8, 9], although the procedure is associated with significant morbidity and mortality. Most of the studies have included patients with GOOs caused by various malignancies such as gastric cancer, duodenal cancer, pancreaticobiliary cancer and metastatic malignancies^{9,10-15}. Consequently, such differences might have affected the results of the clinical outcomes.

In addition, there are special types of gastrojejunostomies^[16], inclusive of a palliative gastrojejunostomy barring a gastrectomy, a gastrojejunostomy with a distal gastrectomy, and Roux-en-Y gastrojejunostomy with distal gastrectomy. Moreover, in patients with a gastrojejunostomy, a jejunojejunostomy between the afferent loop and the efferent loop can be created depending on the surgeon's preference.

Several studies have investigated various reconstructive techniques following gastrectomy, including Billroth I, Billroth II, Braun enteroenterostomy, and Roux-en-Y reconstruction. Roux-en-Y reconstruction is often considered the gold standard for reducing bile reflux; however, it is technically more demanding and may be associated with Roux stasis syndrome. In contrast, Billroth II reconstruction combined with Braun jejunojejunostomy offers a technically simpler alternative while potentially reducing bile reflux and afferent loop complications.

Previous studies comparing different reconstructive procedures have reported conflicting findings regarding postoperative outcomes. While some authors have demonstrated reduced bile reflux and improved quality of life with additional jejunojejunostomy, others have

reported minimal differences in clinical outcomes. Furthermore, most published studies have focused on specific malignancies or palliative procedures, limiting the generalisability of their findings.

Given the continuing debate regarding the optimal reconstructive technique following partial gastrectomy, further evaluation of the role of jejunojejunostomy remains warranted. The present study was therefore undertaken to compare the postoperative complications and clinical outcomes of gastrojejunostomy with and without jejunojejunostomy in patients undergoing partial gastrectomy at a tertiary care hospital in Bangladesh.

MATERIALS AND METHODS

Study Design and Setting

This comparative observational study was conducted in the Department of Surgery, Ibn Sina Medical College Hospital, Dhaka, Bangladesh. The study period extended from June 2021 to May 2022.

Study Population

A total of fifty patients undergoing open partial gastrectomy with gastrojejunostomy were included in the study. Eligible participants were male and female patients aged over 30 years who underwent surgery for malignant or selected benign causes of gastric outlet obstruction.

Patient Selection

The decision regarding the reconstructive technique was made by the operating surgeon after multidisciplinary consultation involving surgeons, gastroenterologists, oncologists, and radiologists. Patients subsequently underwent either gastrojejunostomy with jejunojejunostomy or gastrojejunostomy without jejunojejunostomy according to the selected surgical plan.

Inclusion Criteria

1. Patients aged over 30 years.
2. Patients undergoing partial gastrectomy with gastrojejunostomy.
3. Malignant gastric outlet obstruction.
4. Selected benign gastric outlet obstruction cases.

Exclusion Criteria

1. Patients undergoing Roux-en-Y reconstruction.
2. Emergency surgical procedures.

- Patients with incomplete clinical records.
- Cases lacking adequate postoperative follow-up data.

Surgical Procedure

All procedures were performed using an open surgical approach. Following partial gastrectomy, reconstruction was achieved through gastrojejunostomy. In one group, an additional loop jejunojunostomy was created between the afferent and efferent limbs. In the comparison group, gastrojejunostomy alone was performed.

Data Collection

Clinical information was obtained from patient records, operative notes, laboratory reports, and radiological investigations. Demographic characteristics, postoperative complications, and final clinical outcomes were documented using a structured data collection format.

Outcome Measures

Primary outcome measures included postoperative complications such as nausea and vomiting, haemorrhage, anastomotic leakage, bowel obstruction, duodenal stump blowout, bilious vomiting, and stomal ulceration.

Secondary outcome measures included overall recovery, discharge status, referral status, discharge on request, and mortality.

Statistical Analysis

Data were analysed using Statistical Package for Social Sciences (SPSS) version 24. Continuous variables were summarised using descriptive statistics, while categorical variables were expressed as frequencies and percentages. Comparative analyses were performed between the two study groups to evaluate differences in postoperative outcomes.

Ethical Considerations

Patient confidentiality was maintained throughout the study. All clinical information was anonymised prior to analysis and reporting.

Ethical Clearance

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Patient confidentiality and anonymity were maintained throughout data collection, analysis, and reporting. As this study involved retrospective analysis of routinely collected clinical data, no identifying patient information was disclosed.

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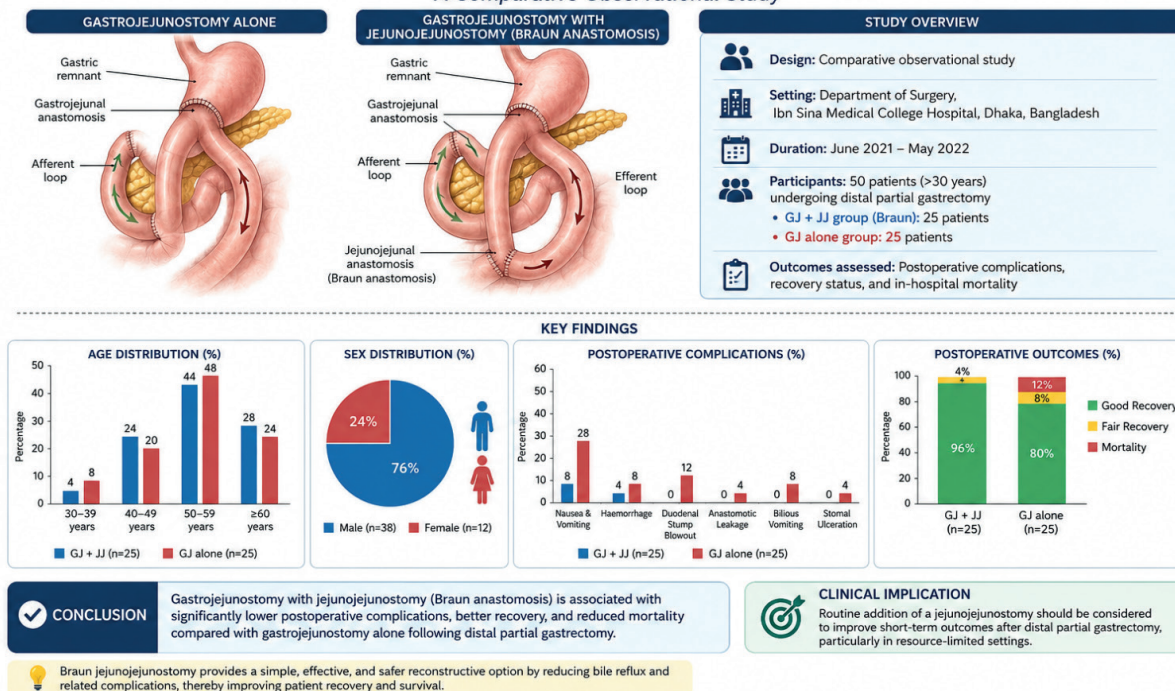


Figure: Comparative Observational Study using a diagram [authors' self-developed]

RESULTS

A total of 50 patients were included in the study. Twenty-five patients underwent gastrojejunostomy with Braun jejunoejunostomy, while twenty-five underwent conventional gastrojejunostomy without Braun jejunoejunostomy.

3.1 Demographic Characteristics

The majority of patients in both groups were aged between 50 and 59 years. Male patients predominated, accounting for 76.0% of the overall study population.

Table 1. Demographic Characteristics of the Study Population (N=50)

Age Group (Years)	GJ with Braun JJ (n=25)	%	GJ without Braun JJ (n=25)	%
30–39	3	12.0	4	16.0
40–49	8	32.0	9	36.0
50–59	13	52.0	10	40.0
60–69	1	4.0	2	8.0

Sex Distribution

Sex	Frequency	Percentage
Male	38	76.0
Female	12	24.0

3.2 Postoperative Complications

Overall postoperative complications were substantially lower among patients undergoing Braun jejunoejunostomy compared with conventional gastrojejunostomy.

Table 2. Distribution of Postoperative Complications

Complication	GJ with Braun JJ n (%)	GJ without Braun JJ n (%)
Postoperative nausea and vomiting	2 (8.0)	3 (12.0)
Hemorrhage	1 (4.0)	1 (4.0)
Anastomotic leak	0 (0.0)	1 (4.0)
Stomal stenosis	0 (0.0)	1 (4.0)
Internal herniation	0 (0.0)	0 (0.0)
Duodenal stump blowout	0 (0.0)	3 (12.0)
Bilious vomiting	0 (0.0)	1 (4.0)
Stomal ulceration	0 (0.0)	1 (4.0)
Total patients with complications	3 (12.0)	11 (44.0)

The overall postoperative complication rate was nearly four times higher among patients undergoing conventional gastrojejunostomy than among those receiving Braun jejunoejunostomy.

3.3 Clinical Outcomes

Clinical outcomes at discharge demonstrated superior recovery among patients who underwent Braun jejunoejunostomy.

Table 3. Postoperative Clinical Outcomes

Outcome	GJ with Braun JJ n (%)	GJ without Braun JJ n (%)
Discharged with good recovery	24 (96.0)	20 (80.0)
Discharged on request (DORB)	1 (4.0)	1 (4.0)
Referred	0 (0.0)	1 (4.0)
Death	0 (0.0)	3 (12.0)

Patients undergoing Braun jejunoejunostomy achieved a higher rate of successful recovery and discharge (96.0%) compared with those undergoing conventional gastrojejunostomy (80.0%). Mortality was observed only among patients undergoing conventional gastrojejunostomy.

Summary of Key Findings

- Overall complication rate was reduced from 44.0% to 12.0% with Braun jejunoejunostomy.
- No deaths occurred in the Braun jejunoejunostomy group.
- Good recovery was achieved in 96.0% of patients receiving Braun jejunoejunostomy.
- Duodenal stump blowout was observed only in the conventional gastrojejunostomy group.
- Braun jejunoejunostomy demonstrated consistently better short-term clinical outcomes following distal partial gastrectomy.

DISCUSSION

The present study compared the clinical outcomes of gastrojejunostomy with Braun jejunoejunostomy and conventional gastrojejunostomy following distal partial gastrectomy. The findings demonstrated that Braun jejunoejunostomy was associated with

lower postoperative morbidity, improved recovery, and reduced mortality. Patients undergoing Braun jejunojejunostomy experienced fewer complications and better short-term outcomes than those undergoing conventional gastrojejunostomy alone.

The overall complication rate was substantially lower in the Braun jejunojejunostomy group (12.0%) than in the conventional gastrojejunostomy group (44.0%). This reduction may be attributed to improved diversion of biliary and pancreatic secretions, resulting in reduced bile reflux and lower pressure within the afferent loop. Consequently, postoperative complications such as nausea, vomiting, reflux-related symptoms, and anastomotic complications may be minimized¹⁷.

Postoperative nausea and vomiting were the most common complications in both groups but occurred less frequently in patients receiving Braun jejunojejunostomy. More importantly, severe complications including duodenal stump blowout, bilious vomiting, stomal ulceration, and anastomotic leakage were observed only in the conventional gastrojejunostomy group. These findings suggest that Braun jejunojejunostomy may provide effective decompression of the afferent limb and reduce duodenal stump-related complications.

No mortality was reported in the Braun jejunojejunostomy group, whereas three deaths (12.0%) occurred in the conventional gastrojejunostomy group. Although the sample size was limited, the findings support the potential survival benefit associated with reduced postoperative morbidity.

These results are consistent with previous studies reporting improved postoperative outcomes and reduced bile reflux following Braun enteroenterostomy. While Roux-en-Y reconstruction remains effective in minimizing bile reflux, Braun jejunojejunostomy offers a technically simpler and potentially more practical alternative, particularly in resource-limited settings.

This study provides valuable local evidence from Bangladesh, where data on reconstructive techniques following distal gastrectomy remain limited. Further multicentre studies with larger sample sizes and longer follow-up are recommended to confirm these findings.

4.1 Strengths of the Study

Several strengths of this study should be acknowledged.

First, the study directly compared two commonly performed reconstructive approaches following distal partial gastrectomy within the same institution, thereby reducing variability in perioperative management.

Second, all patients underwent open surgery performed within a relatively homogeneous clinical setting, allowing for meaningful comparison of short-term outcomes.

Third, the study evaluated clinically relevant endpoints, including postoperative complications, mortality, and recovery outcomes, which have direct implications for patient care and surgical practice.

Finally, the study contributes important evidence from Bangladesh, where published research on reconstructive strategies following gastrectomy remains limited.

4.2 Limitations of the Study

Several limitations should also be considered.

First, the study included a relatively small sample size, limiting statistical power and reducing the ability to detect smaller differences between groups.

Second, the single-centre design may limit the generalizability of the findings to other institutions and patient populations.

Third, the observational design does not permit definitive conclusions regarding causality and may be subject to selection bias.

Fourth, important long-term outcomes, including nutritional status, quality of life, bile reflux gastritis, recurrence rates, and long-term survival, were not assessed.

Finally, multivariable analyses were not performed, preventing adjustment for potential confounding variables.

Future multicentre prospective studies with larger sample sizes and longer follow-up periods are therefore required to validate the findings of the present study.

4.3 Clinical Implications

The findings of this study suggest that Braun jejunojejunostomy may represent a valuable reconstructive adjunct following distal partial gastrectomy. The reduction in postoperative complications observed among patients receiving

Braun jejunojejunostomy may contribute to shorter hospital stays, lower treatment costs, improved patient satisfaction, and enhanced postoperative recovery.

In resource-limited healthcare settings, preventing postoperative complications is particularly important because complications often impose substantial financial burdens on both patients and healthcare systems. Consequently, the routine incorporation of Braun jejunojejunostomy during Billroth II reconstruction warrants further investigation.

CONCLUSION

The present study demonstrated that gastrojejunostomy with Braun jejunojejunostomy was associated with lower postoperative complication rates, reduced mortality, and improved short-term recovery compared with conventional gastrojejunostomy following distal partial gastrectomy. The findings suggest that Braun jejunojejunostomy may provide meaningful clinical benefits by reducing reflux-related complications and improving postoperative outcomes. Although the results are encouraging, larger multicentre prospective studies incorporating long-term follow-up and advanced statistical analyses are required to confirm the effectiveness and safety of Braun jejunojejunostomy in diverse patient populations.

DECLARATIONS

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

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The authors received no external funding for this study.

Conflict of Interest

The authors declare that they have no competing interests.

Author Contributions

MAJ conceived the study and participated in data collection. MOF and MBU contributed to study design and data interpretation. TI and MAUS participated in manuscript preparation. MMA critically reviewed the manuscript and approved the final version. All authors read and approved the final manuscript.

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