

# Postoperative Complications of Uncut Roux-En-Y Gastrojejunostomy for Distal Gastric Cancer: A Study in a Tertiary Care Hospital

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## ABSTRACT

**Background:** Gastric cancer ranks as the fifth most prevalent malignancy globally. Common gastric surgical procedures include loop gastro-jejunostomy and Roux-en-Y gastro-jejunostomy. Both procedures carry the risk of potential complications. This study aimed to assess the postoperative complications of uncut roux-en-Y gastrojejunostomy for distal gastric cancer. **Methods:** This observational study was conducted at the Department of Surgical Oncology at the National Institute of Cancer Research and Hospital (NICRH), Dhaka., Bangladesh from January 2019 to June 2020. As the study subjects, a total of 50 cases with distal gastric cancer underwent uncut roux-en-Y gastrojejunostomy were enrolled purposively. For data analysis, MS Office tools and SPSS Version 26.0 were applied. **Results:** In our study, immediate postoperative complications included paralytic ileus (4%), persistent abdominal pain (4%), Roux stasis syndrome (4%), and superficial wound infection (4%) observed in 8 cases. During the first follow-up, nausea (16%), upper abdominal pain (12%), vomiting (12%), and heartburn (8%) were reported, some persisting up to the third month. Mortality occurred in 16 cases (33.33%), with 11 deaths (22%) attributed to chemotherapy complications and 1 (2%) to immediate postoperative complications. **Conclusion:** Paralytic ileus, Roux stasis syndrome, and superficial wound infection are found in some patients as the postoperative complications of uncut roux-en-Y gastrojejunostomy for distal gastric cancer. On the other hand, nausea, upper abdominal pain, vomiting, heartburn, and belching are found prevalent even after 3 months of gastrojejunostomy.

**Key words:** Complications, Uncut Roux-en-Y gastrojejunostomy, Distal gastric cancer, Nausea, Vomiting.

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## INTRODUCTION

**G**astric cancer is a prevalent malignancy of the gastrointestinal tract, posing a significant threat to survival. With approximately 951,600 new cases reported annually worldwide, it ranks fourth among all malignant tumors [1, 2]. Gastric cancer also ranks third in cancer mortality, claiming about 723,100 lives yearly. Treatment options depend on various factors, including tumor characteristics, disease stage, patient age, and overall health. Surgery remains the primary curative approach [3]. The clinical stage at presentation significantly impacts patient outcomes. The primary treatment for gastric cancer is radical surgical resection, although adjuvant chemotherapy, radiotherapy, and molecular targeted therapy are also utilized [4]. Following distal gastrectomy, the three common reconstruction methods are Billroth-I, Billroth-II, and Roux-en-Y anastomosis [5]. Recent studies suggest that Roux-en-Y (RY) reconstruction offers superior long-term functional outcomes compared to Billroth methods [6]. RY reconstruction addresses issues such as alkaline bile reflux and anastomosis problems, albeit with a risk of Roux stasis syndrome [7]. To mitigate postoperative complications, a modified reconstruction technique was developed, involving occlusion of the jejunal lumen proximal to the gastrojejunostomy, based on the Billroth-II technique with Braun anastomosis [8]. The “uncut Roux-en-Y (U-RY) anastomosis,” introduced in 1988, represents an enhancement of RY anastomosis [8]. Ectopic pacemakers and motor abnormalities can arise in the Roux limb following conventional Roux-en-Y reconstruction [9]. Research has shown that ectopic pacemakers in the Roux limb are closely associated with delayed gastric emptying after Roux gastrectomy. Subsequent studies have indicated that the U-RY anastomosis effectively prevents Roux stasis syndrome, reflux gastritis, and reflux esophagitis [10]. For the “Uncut” part of the procedure, the jejunal lumen was occluded 25-45 cm distal to the ligament of Treitz using a single, double-row non-cutting linear GI stapler. The staple line was then reinforced by interrupted sero-muscular sutures with 3/0 silk to prevent staple line dehiscence. Gastrojejunostomy was constructed 5 cm distal to the jejunal occlusion site. Approximately 20-30 cm distal to the anastomosis, on the efferent limb, a “Braun” side-to-side jejunojejunostomy was created with the afferent limb for diverting duodenal fluids. This anastomosis corresponds to a site 10-20 cm distal to the ligament of Treitz on the proximal jejunum (afferent limb) [11]. The objective of this study was to assess the postoperative complications of uncut roux-en-Y gastrojejunostomy for distal gastric cancer.

## METHODOLOGY

This observational study was conducted at the Department of Surgical Oncology at the National Institute of Cancer Research

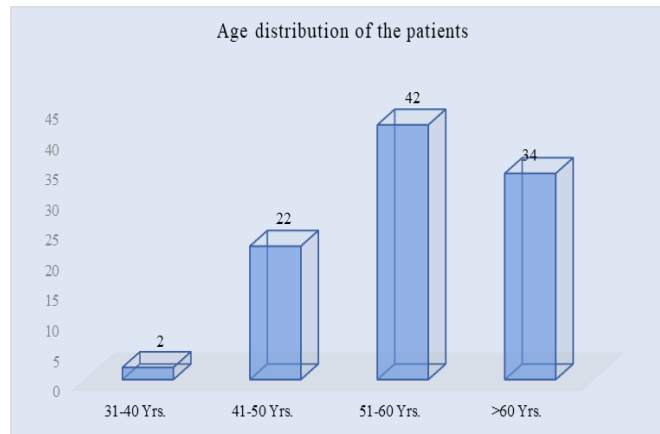
and Hospital (NICRH), Dhaka, Bangladesh from January 2019 to June 2020. A total of 50 cases with distal gastric cancer underwent the uncut Roux-en-Y gastrojejunostomy were enrolled in this study using a purposive sampling technique. The study received approval from the hospital’s ethical committee, and written consent was obtained from all participants before data collection. Inclusion criteria comprised patients who underwent the Uncut Roux-en-Y Gastrojejunostomy for surgical treatment of distal gastric cancer, while exclusion criteria included non-resectable gastric cancer, recurrent gastric cancer, distal gastric cancer with distant metastasis. Preoperative evaluation encompassed basic laboratory tests, including serum albumin, hemoglobin level, random blood sugar, and serum creatinine. Additionally, chest x-ray (posterior-anterior view), ultrasound of the whole abdomen, upper gastrointestinal endoscopy, and contrast CT scan of the abdomen were conducted. Preoperative preparation involved correction of anemia, hypoproteinemia, and standard bowel preparation. Prophylactic antibiotic (cefuroxime) was administered just before anesthesia induction and continued postoperatively for 5 days. Data processing, analysis, and dissemination were performed using MS Office tools.

## RESULT

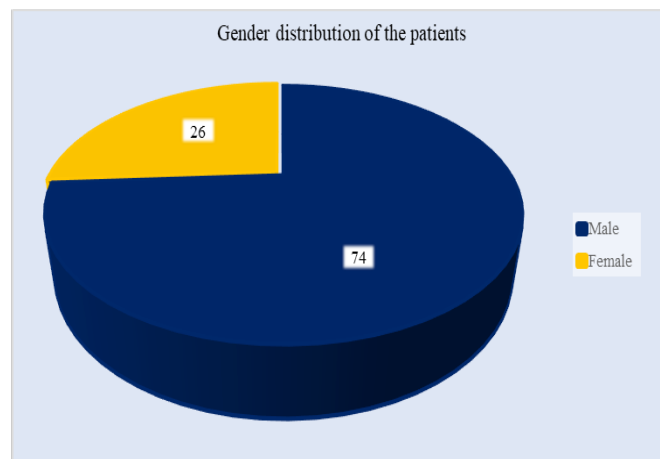
In this study, the mean age of the study subjects was  $58.58 \pm 9.85$  years. Most of the cases (74%) were male and 26% were female. As per the T-staging, the majority (40%) of our study subjects had stage T2 tumors, followed by T1 (36%) and T3 (24%) tumors. Additionally, as per the N-staging, the majority (68%) had stage N0 tumors, while the remainder had stage N1 tumors. The mean total operation time was  $173.70 \pm 20.35$  minutes, with a minimum of 150 minutes and a maximum of 250 minutes. The mean estimated blood loss was  $174.30 \pm 40.67$  milliliters. Perioperative blood transfusion averaged  $0.78 \pm 0.42$  units, while the mean time required for the uncut component was  $25.06 \pm 3.37$  minutes. The mean time for the first passage of flatus after the operation was  $2.08 \pm 0.75$  days, and the mean duration of hospital stay was  $9.64 \pm 2.67$  days. In our study of 50 cases, immediate postoperative complications were noted in 8 (16%) instances. These comprised paralytic ileus (4%), persistent abdominal pain (4%), Roux stasis syndrome (4%), and superficial wound infection (4%), each occurring in 2 cases. During the first follow-up in the second week, complications were observed in the following proportions: nausea (16%), upper abdominal pain (12%), vomiting (12%), heartburn (8%), belching (4%), abdominal distension (2%), and fever (2%) cases, respectively. During the second follow-up at the third-month post-discharge, the following complications were observed: nausea (13.64%), upper abdominal pain (9.09%), vomiting (9.09%), heartburn (2.27%), belching (2.27%), abdominal distension (4.55%) cases, respectively. At the final follow-up at 6 months, two patients were lost, leaving 48 cases for evaluation. Among

these, a poor outcome was observed in 39.58% of cases. The overall mortality rate was 33.33%. Bile reflux with reflux gastritis was noted in 2(4.17%) cases, bile reflux without reflux gastritis in 1 (2.08%) case, and recanalization occurred in 3(6.25%) cases. Roux stasis syndrome developed in 2(4.16%) cases. In this study, a total of 16(33.33%) cases resulted in mortality. Among them, 11(22%) deaths were attributed to complications of chemotherapy, 3(6%) to cardiovascular disease, 1(2%) to immediate post-operative complications, and 1 (2%) to liver metastasis.

Age (Years)	n	%
31-40 Yrs.	1	2%
41-50 Yrs.	11	22%
51-60 Yrs.	21	42%
>60 Yrs.	17	34%



**Figure 1:** Column chart showed age wise patients distribution (N=50)



**Figure 2:** Pie chart showed gender wise patients distribution (N=50)

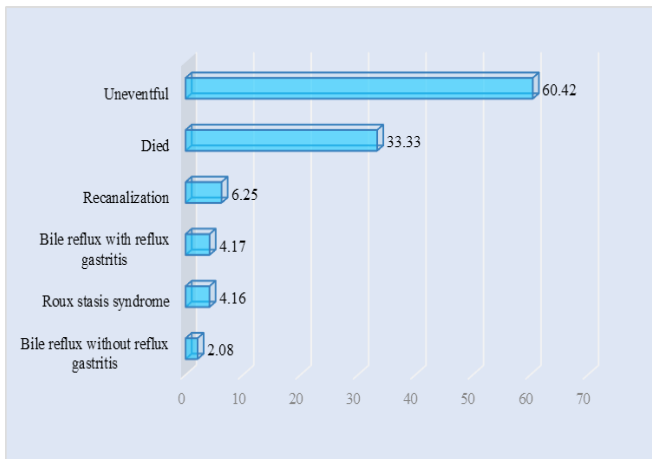
Variable	Mean ± SD
Total operation time (min)	173.70 ± 20.35
Estimated blood loss (ml)	174.30 ± 40.67
Per-operative BT (Unit)	0.78 ± 0.42
Operative time (min)	25.06 ± 3.37

Variable	Mean ± SD
Time to pass flatus (Days)	2.08 ± 0.75
PO hospital stay (Days)	9.64 ± 2.67

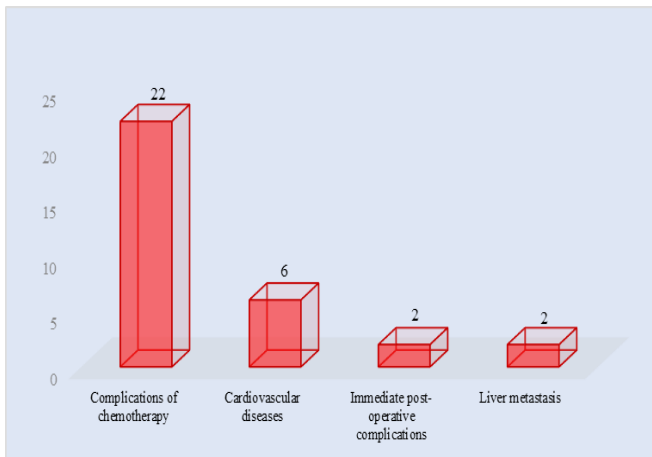
Complications	n	%
Paralytic ileus	2	4%
Persistent abdominal pain	2	4%
Roux stasis syndrome	2	4%
Superficial wound infection	2	4%
Uneventful	42	84%

Complications at 1 <sup>st</sup> weeks	n	%
Nausea	8	16%
Upper abdominal pain	6	12%
Vomiting	6	12%
Heartburn	4	8%
Belching	2	4%
Abdominal distension	1	2%
Fever	1	2%
No complaints	35	75%

Complications at 3 <sup>rd</sup> month	n	%
Nausea	6	13.64%
Upper abdominal pain	4	9.09%
Vomiting	4	9.09%
Heartburn	1	2.27%
Belching	1	2.27%
Abdominal distension	2	4.55%
No complaints	33	75%



**Figure 3:** Bar chart showed outcomes by an endoscope (N=48)



**Figure 4:** Column chart showed causes and number of deaths (N=50)

## DISCUSSION

The mean age of our study subjects was  $58.58 \pm 9.85$  years, ranging from 31 to 80 years. Park and Kim [12] reported a mean age of  $57.6 \pm 11.9$  years. Regarding tumor staging, the majority (40%) had stage T2 tumors, followed by T1 (36%) and T3 (24%) tumors. In terms of nodal staging, most (68%) had stage N0 tumors, with the remaining having stage N1 tumors, consistent with previous findings [13]. In the present study, the mean  $\pm$  SD surgical time was  $173.70 \pm 20.35$  minutes, consistent with findings by Zhang et al. [14] ( $175 \pm 30$  minutes). Rahman et al. [11] reported an average time of  $24 \pm 4.7$  minutes for the “Modified Uncut Roux-en-Y” component, comparable to our study’s  $25.06 \pm 3.37$  minutes. The observed estimated blood loss in our study was  $174.30 \pm 40.67$  ml, which aligns closely with Shibata et al.’s findings [15] of 381 ml (range: 185-895 ml). In the present study, wound infection occurred in only 2 (4%) cases, with 2

(4%) experiencing persistent abdominal pain, which resolved within 7 to 12 days’ post-surgery. Roux stasis syndrome (RSS) developed in 2 (4.16%) cases, aligning with findings by Park et al. [12] (5.8%) and Rahman et al. [11] (4.3%). Bile reflux with reflux gastritis was observed in 2 (4.17%) cases, while bile reflux without reflux gastritis was seen in 1 (2.08%) case. This incidence was lower compared to Park et al. [12] (23.7%) and Yang D et al. [16] (55.1%). Recanalization in the uncut site occurred in 3 (6.26%) subjects during the 6-month follow-up, a lower frequency than observed in other studies, such as Yang et al. [17] (13%). In our study, mortality occurred in 16 (33.33%) cases, with 11 (22%) attributed to complications of chemotherapy, 3 (6%) to cardiovascular disease, 1 (2%) to immediate post-operative complications, and 1 (2%) to liver metastasis. Notably, none of the postoperative complications typically associated with surgery, such as anastomosis leakage, anastomotic stenosis, duodenal stump fistula, or Roux stasis syndrome, were observed. Rahman et al. [11] demonstrated the effectiveness of uncut Roux-en-Y reconstruction in preventing Roux stasis syndrome and alkaline reflux gastritis while reducing staple-line dehiscence, suggesting it as a preferred technique for gastric bypass. Ahn et al. [18] reported no serious postoperative morbidities related to the anastomosis. Similarly, Zhang et al. [14] observed no long-term postoperative complications (>30 days after surgery), recurrence, or cancer-related mortality. Their study suggested that modified uncut Roux-en-Y anastomosis could reduce hospital stays and balance costs. In our present study, we observed significant improvements in nutritional status post-surgery, as assessed by hemoglobin and serum albumin levels. These findings align with those of Rahman et al. [11]. Sun et al. [19] found no differences in nutritional status between uncut Roux-en-Y and Roux-en-Y reconstruction.

## LIMITATION OF THE STUDY

This study was conducted at a single location and involved small sample sizes. Additionally, it was carried out over a brief duration. Consequently, the results may not accurately represent the broader situation across the entire country.

## CONCLUSION

Postoperative complications following uncut Roux-en-Y gastrojejunostomy for distal gastric cancer may include paralytic ileus, Roux stasis syndrome, and superficial wound infection. These adverse events can pose challenges to patient recovery and require prompt management to minimize their impact. Additionally, symptoms such as nausea, upper abdominal pain, vomiting, heartburn, and belching may persist beyond three months post-gastrojejunostomy, indicating the need for ongoing monitoring and intervention to address gastroesophageal reflux and other gastrointestinal issues.

Comprehensive postoperative care and close follow-up are essential to mitigate complications and optimize outcomes for patients undergoing this procedure.

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