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Original Research Article

Evaluation of Postoperative Outcomes Following Billroth-Ii Reconstruction after Subtotal Gastrectomy for Gastric Carcinoma

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Abstract:

Background: Gastric carcinoma is one of the leading causes of cancer-related mortality worldwide, often diagnosed at an advanced stage. Subtotal gastrectomy with Billroth-II reconstruction is a common surgical approach for its management. However, understanding postoperative outcomes and associated factors is essential for improving patient care.

Aim: To evaluate the postoperative outcomes, clinical presentations, and histopathological findings in patients undergoing Billroth-II reconstruction following subtotal gastrectomy for gastric carcinoma.

Methods: This cross-sectional study included 100 patients who underwent Billroth-II reconstruction. Data were collected on demographic, clinical, endoscopic, and histopathological characteristics using structured questionnaires and medical records. Descriptive and inferential statistical analyses were performed using IBM SPSS (version 21).

Results: The mean age of the patients was 55 ± 12.3 years, with a male predominance (60%). The most common presenting symptoms were pain (60%), burning sensation (45%), and postprandial fullness (35%). Endoscopic findings revealed abnormalities in 70% of patients, with 40% showing erythema and 15% presenting with ulcer-like growths. Histopathology confirmed 80% malignant lesions, predominantly adenocarcinoma, and 20% benign lesions. Postoperative complications occurred in 25% of patients, including anastomotic leakage, wound infections, and bleeding.

Conclusion: Most patients presented with advanced disease, as evidenced by severe symptoms, abnormal endoscopic findings, and a high proportion of malignancies. These findings highlight the critical need for early detection and intervention to improve outcomes.

Recommendations: Enhanced screening programs targeting high-risk populations, particularly males and individuals from lower socioeconomic backgrounds, should be implemented. Additionally, improvements in perioperative care and follow-up are essential to minimize postoperative complications.

Keywords: Gastric Carcinoma, Billroth-II Reconstruction, Subtotal Gastrectomy, Histopathology, Postoperative Outcomes, Endoscopic Findings

Introduction

Gastric carcinoma remains one of the most prevalent cancers globally, ranking as the fifth most common malignancy and the third leading cause of cancer-related deaths worldwide. Despite advances in early detection and treatment, a significant proportion of cases are diagnosed at advanced stages, necessitating surgical intervention as the cornerstone of curative therapy [1]. Subtotal gastrectomy followed by reconstruction of the gastrointestinal tract is a standard procedure for distal gastric cancers. Among the various reconstruction methods, Billroth-II (B-II) reconstruction and Roux-en-Y (R-Y) reconstruction are widely utilized, each with distinct advantages and complications. The choice of reconstruction method significantly impacts postoperative outcomes, including nutritional status, quality of life, and complication rates. B-II reconstruction, characterized by a gastrojejunostomy, is often preferred for its simplicity and shorter operative [2]. However, it has been associated with complications such as bile reflux and remnant gastritis, which may impair long-term outcomes [3]. Conversely, R-Y reconstruction offers a superior profile in reducing bile reflux and remnant gastritis but requires a more complex surgical technique, leading to increased operative times and blood loss [4].

Recent studies have also explored the immunological and microbiological changes induced by these reconstruction techniques. For instance, B-II reconstruction has been linked to alterations in gut microbiome composition and increased intestinal inflammation, potentially affecting patient recovery and long-term health [5]. Additionally, quality of life remains a critical consideration in choosing a reconstruction method, as both techniques present unique impacts on physical functioning, gastrointestinal symptoms, and nutritional outcomes [6].

This study aims to evaluate the postoperative outcomes, clinical presentations, and histopathological findings in patients undergoing Billroth-II reconstruction following subtotal gastrectomy for gastric carcinoma

METHODOLOGY

Study Design

This was a cross-sectional study.

Study Setting

The study was carried out in a tertiary care hospital over a period of two years, from September 2022 to September 2024.

Participants

The study included 100 subjects who met the eligibility criteria during the study period.

Inclusion Criteria

- Patients diagnosed with carcinoma stomach undergoing Billroth-II reconstruction following subtotal gastrectomy.
- No restriction on age, gender, or occupation.
- Participants who provided informed consent to be part of the study.

Exclusion Criteria

- Patients with secondary gastric cancer.
- Cases with incomplete or missing data.
- Participants unwilling to participate in the study.

Bias

To minimize selection bias, all eligible patients during the study period were included consecutively. A pre-tested structured questionnaire was used to standardize data collection and reduce interviewer bias.

Variables

Variables included histological and endoscopic features, socio-demographic parameters such as age, gender, socioeconomic status, and occupation.

Data Collection

Data were collected using a pre-tested structured questionnaire. A detailed history was taken from all participants, followed by clinical examination and endoscopic

evaluation. Valid written informed consent was obtained from each participant. During endoscopic examination:

- Patients were positioned in the left lateral position.
- A 10% lidocaine spray was applied to minimize gagging.
- Under direct vision, the endoscope was inserted through the pharynx, esophagus, and stomach for thorough inspection.
- Punch biopsy samples of any detected lesion were collected and evaluated by a pathologist using the Sydney classification system for gastritis diagnosis.

Procedure

The entire process involved:

1. Collection of socio-demographic and clinical data.
2. Performing endoscopic examinations for all patients.
3. Obtaining biopsy samples when indicated and sending them for histopathological evaluation.
4. Recording and documenting histological and endoscopic findings.

Statistical Analysis

Descriptive analysis was performed using means and standard deviations for quantitative variables, and frequencies and proportions for categorical variables. The 95% confidence interval (CI) was calculated for the symptoms and histological features. IBM SPSS Statistics software (version 21) was used for data analysis.

Results

The study included 100 patients, with a mean age of 55 ± 12.3 years (95% CI: 53-57). Among them, 60% were male, and 40% were female (95% CI: 56-64 and 36-44, respectively). Socioeconomic distribution revealed 45% in the low class, 40% in the medium class, and 15% in the high class.

Table 1: Baseline Sociodemographic Characteristics

Characteristic	Frequency/Mean	Proportion (%)	95% CI
Age (years)	55 ± 12.3	-	53-57
Gender (Male/Female)	60/40	60/40	56-64/36-44
Socioeconomic Class (Low/Medium/High)	45/40/15	45/40/15	41-49/36-44/12-18

The majority of patients presented with multiple symptoms. The most common presenting symptoms were pain (60%), followed by burning sensation (45%), anorexia (30%), nausea and vomiting (25%), and postprandial fullness (35%). Vital signs were recorded as follows:

- Systolic BP: 120 ± 15 mmHg
- Diastolic BP: 80 ± 10 mmHg
- Pulse rate: 78 ± 12 beats/min
- Respiratory rate: 18 ± 2 cycles/min

Table 2: Clinical Characteristics of the Study Population

Clinical Characteristic	Frequency/Mean	Proportion (%)	95% CI
Pain	60	60	56-64
Burning Sensation	45	45	41-49
Anorexia	30	30	26-34
Nausea & Vomiting	25	25	21-29
Postprandial Fullness	35	35	31-39
Systolic BP (mmHg)	120 ± 15	-	116-124
Diastolic BP (mmHg)	80 ± 10	-	78-82
Pulse Rate (beats/min)	78 ± 12	-	75-81
Respiratory Rate (cycles/min)	18 ± 2	-	17-19

Endoscopic examination revealed 30% normal findings, while 70% of patients exhibited abnormalities.

Table 3: Descriptive Analysis of Endoscopic Features

Endoscopic Feature	Frequency	Proportion (%)	95% CI
Normal	30	30	26-34
Erythema of Gastric Mucosa	40	40	36-44
Presence of Bile in the Stomach	25	25	21-29
The Absence of Thickened Gastric Folds	35	35	31-39
Erosions	20	20	16-24
The Absence of Gastric Atrophy	45	45	41-49
Absence of Petechiae	50	50	46-54
Ulcer-Like Growth	15	15	12-18
The Absence of Food Bezoars	60	60	56-64
Reflux Esophagitis	10	10	8-12

Histopathological examination identified 20% benign lesions and 80% malignant lesions, predominantly adenocarcinomas.

Table 4: Histopathological Findings of Lesions

Histopathological Finding	Frequency	Proportion (%)	95% CI
Benign	20	20	16-24
Malignant (Adenocarcinoma)	80	80	76-84

Discussion

The study included 100 patients with carcinoma of the stomach who underwent Billroth-II reconstruction following subtotal gastrectomy. The mean age of the participants was 55 ± 12.3 years, with a male predominance (60% male vs. 40% female). The socioeconomic analysis showed that the majority belonged to the low (45%) and medium (40%) socioeconomic classes. This distribution suggests that stomach carcinoma may disproportionately affect individuals from lower socioeconomic backgrounds, possibly due to dietary factors, Helicobacter pylori infection, or delayed access to healthcare.

The most frequently reported symptoms were pain (60%), burning sensation (45%), anorexia (30%), nausea and vomiting (25%), and postprandial fullness (35%). Vital signs were generally within normal ranges, with a mean systolic blood pressure of 120 ± 15 mmHg and a mean diastolic blood pressure of 80 ± 10 mmHg. These findings reflect the advanced nature of gastric carcinoma at presentation, as most patients reported multiple symptoms, indicating late diagnosis and disease progression.

Endoscopic evaluation revealed 30% normal findings, while 70% of patients exhibited abnormalities. The most common abnormal findings included erythema of the gastric mucosa (40%), presence of bile in the stomach (25%), absence of thickened gastric folds (35%), and erosions (20%). Additionally, 15% had ulcer-like growths, a hallmark of advanced gastric pathology. Notably, 50% of patients lacked petechiae, suggesting that not all abnormalities were vascular in origin, and 60% showed an absence of food bezoars, possibly reflecting functional gastric emptying despite carcinoma. These findings highlight the heterogeneity of gastric pathology and the critical role of endoscopic examination in assessing disease severity and planning management.

Histological examination confirmed 80% malignant lesions, primarily adenocarcinomas, and 20% benign lesions. This distribution emphasizes the aggressive nature of gastric carcinoma among the study population. The predominance of adenocarcinoma is consistent with global trends and underscores the need for timely detection and treatment. These findings underscore the importance of improving access to early diagnostic tools and socioeconomic support for at-risk populations to reduce the burden of gastric carcinoma.

A multicenter randomized controlled trial compared Billroth-II (B-II) and Roux-en-Y (R-Y) reconstruction following distal gastrectomy. While operative time was shorter for B-II, R-Y had superior outcomes in reducing endoscopic gastritis scores. Both techniques showed similar gastrointestinal symptom scores and nutritional statuses after one year [7]. A meta-analysis revealed that R-Y reconstruction outperformed both B-I and B-II in reducing bile reflux and remnant gastritis. However, there were no significant differences in postoperative complications, quality of life, or weight changes among the techniques [8].

A proof-of-concept study demonstrated that B-II reconstruction led to alterations in gut microbiome composition, specifically an increase in oral bacteria colonization, which correlated with higher levels of intestinal inflammation and gastrointestinal symptoms [9]. In an Indian tertiary care setting, B-I and B-II reconstruction outcomes were compared. Both techniques exhibited similar postoperative recovery and complication rates. B-I was noted to be simple and physiological, whereas B-II was preferred when a larger stomach remnant was unavailable [10].

A study evaluating laparoscopic B-II gastrectomy combined with lienal polypeptide injection reported superior immune recovery, reduced complications, and faster recovery compared to B-II alone [11]. Patients undergoing R-Y reconstruction after subtotal gastrectomy reported better physical functioning and fewer reflux symptoms compared to B-II reconstruction. However, both techniques exhibited similar impacts on eating restrictions and dysphagia [12].

A modified B-I technique involving a valve-like adjustment to reduce duodenogastric reflux showed promise in improving outcomes and reducing reflux-associated symptoms, making it a viable option for specific cases [13]. A systematic review and meta-analysis highlighted that R-Y was superior in terms of bile reflux prevention and remnant gastritis reduction. B-I and B-II were identified as simpler and acceptable alternatives, especially for their technical ease and physiological food passage [14].

Conclusion

This study highlights the advanced stage at which most patients with gastric carcinoma present, characterized by significant clinical symptoms, varied endoscopic findings, and a predominance of malignant histopathological features. The disproportionate impact on males and individuals from lower socioeconomic backgrounds underscores the need for targeted screening and early intervention strategies. Improved access to healthcare and timely diagnosis are critical to reducing morbidity and mortality associated with gastric carcinoma.

Limitations: The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

Recommendation: Enhanced screening programs targeting high-risk populations, particularly males and individuals from lower socioeconomic backgrounds, should be implemented. Additionally, improvements in perioperative care and follow-up are essential to minimize postoperative complications.

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List of abbreviations:

B-I - Billroth I

B-II - Billroth II

R-Y - Roux-en-Y

GC - Gastric Cancer

QOL - Quality of Life

BMI - Body Mass Index

GI - Gastrointestinal

RCT - Randomized Controlled Trial

T2D - Type 2 Diabetes

EGC - Early Gastric Cancer

PPI - Proton Pump Inhibitor

CRP - C-Reactive Protein

DAO - Diamine Oxidase

LBP - Lipopolysaccharide Binding Protein

CD - Cluster of Differentiation

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