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The Effect of Partial Gastrectomy in the Treatment of Early Gastric Cancer and Its Impact on the Gastrointestinal Function of Patients

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Abstract: *Objective:* To investigate the impact of partial gastrectomy on gastrointestinal function in the treatment of patients with early gastric cancer. *Methods:* A sample of 20 patients with early-stage gastric cancer treated from January 2022 to January 2023 was randomly divided into two groups. Group A underwent partial gastrectomy, while Group B underwent distal subtotal gastrectomy. Surgical outcomes, complication rates, BMI indices, and quality of life were compared. *Result:* All surgical outcomes of patients with early gastric cancer in group A were better than those in group B ($P < 0.05$); the postoperative complication rate for early gastric cancer in group A was lower than that in group B ($P < 0.05$); the BMI index for patients with early gastric cancer in group A was higher than that in group B at different times ($P < 0.05$); the postoperative quality of life (SF-36) score of group A for early gastric cancer was higher than that of group B ($P < 0.05$). *Conclusion:* Partial gastrectomy for patients with early gastric cancer can increase BMI, optimize surgical outcomes, improve gastric function, and enhance the quality of life for gastric cancer patients.

Keywords: Early gastric cancer; Partial gastrectomy; Gastrointestinal function

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1. Introduction

The incidence of gastric cancer is high among digestive system tumor diseases. In patients with early-stage gastric cancer, the disease is confined to the mucosal and submucosal layers, and no invasive metastasis occurs. Clinical analysis indicates that patients with early gastric cancer often experience atypical symptoms, such as abdominal distension, abdominal pain, and reduced appetite [1]. As diagnostic technology continues to advance, the early detection rate of gastric cancer has been increasing yearly. Therefore, it is essential to explore efficient diagnosis and treatment options for early gastric cancer to extend the survival period of gastric cancer patients.

Radical gastrectomy is a clinical approach for treating early gastric cancer, and it has yielded a 5-year postoperative survival rate of 80%–90% [2]. However, there are safety concerns associated with implementing radical resection treatment. Gastric cancer patients may have gastrointestinal-related conditions, and as their

gastrointestinal function deteriorates, it may affect food absorption, leading to secondary malnutrition and weight loss, ultimately reducing postoperative survival rates for gastric cancer patients. Some scholars suggest optimizing and refining radical gastrectomy by minimizing the resection range of gastric cancer lesions to enhance the recovery outcomes of gastric cancer patients. This study employs a sample of 20 cases of early-stage gastric cancer treated from January 2022 to January 2023 to explore the effectiveness of partial gastrectomy.

2. Materials and methods

2.1. General information

Twenty cases of early-stage gastric cancer treated from January 2022 to January 2023 were selected as samples and randomly divided into two groups. There was no difference in the data of early gastric cancer patients in group A and group B ($P > 0.05$), as shown in **Table 1**.

Table 1. Early gastric cancer data analysis

Group	*n*	Gender (%)		Age (years)		Tumor diameter (cm)	
		Male	Female	Range	Mean	Range	Mean
Group A	10	6 (60.00)	4 (40.00)	47–80	64.11 ± 2.85	1–7	4.31 ± 1.22
Group B	10	5 (50.00)	5 (50.00)	47–81	64.13 ± 2.83	1–8	4.29 ± 1.21
χ^2 / t		0.2020		0.0157		0.0368	
P		0.6531		0.9876		0.9710	

2.2. Inclusion and exclusion standards

Inclusion criteria included patients diagnosed with gastric cancer using gastroscopy and CT, patients with indications for gastric cancer resection, stage II–III gastric cancer according to Tumor, Node, Metastasis (TNM) staging system, and informed consent.

Exclusion criteria included patients with coagulation disorder, severe complications of gastric cancer, and other malignant tumors.

2.3. Treatment methods

Group A patients underwent partial gastrectomy. Patients were placed in a supine position, and tracheal intubation was performed. An abdominal midline incision was made to access the stomach and identify the location and extent of the gastric tumor. Resection began 5 cm above the tumor and extended to a point 3 cm from the pylorus. This procedure involved complete lesion removal and lymph node dissection. Notably, the operation prioritized the preservation of the pyloric branch, hepatic branch, celiac branch, and other vagus nerves. After the partial resection, the gastric pyloric vestibule and the remaining greater curvature of the stomach were anastomosed end-to-end. The suturing was completed, and a drainage tube was placed before closing the abdominal cavity. Postoperative prophylactic anti-infective drugs were administered.

Group B underwent distal subtotal gastrectomy. Patients were placed in a supine position, and tracheal intubation was performed. An abdominal midline incision was made to access the stomach and abdominal cavity. The precise location and extent of the tumor were determined, along with an assessment of tumor tissue infiltration into adjacent tissues and adhesion conditions. Resection was performed in the distal area more than 5 cm above the tumor, involving the removal of most of the distal stomach and thorough lymph node dissection.

Gastrointestinal tract reconstruction was carried out, suturing was completed, a drainage tube was left in place, and the abdominal cavity was closed. Postoperative prophylactic anti-infective drugs were administered.

2.4. Observation indicators

The observation indicators in this study include:

(1) Surgical outcomes: Operation time, first time out of bed, first flatulence, length of hospital stay, and intraoperative bleeding.
(2) Complication rates: Gastric retention, venous thrombosis, dumping syndrome, reflux esophagitis.
(3) BMI indices: Recorded at two weeks, four weeks, eight weeks, and 16 weeks after surgery.
(4) Quality of life: SF-36 score positively correlates with quality of life in patients with early gastric cancer.

2.5. Statistical research

The data of patients with early gastric cancer were processed with SPSS 21.0. Count data were recorded as % and the χ^2 test was performed. Measurement data were recorded as mean ± standard deviation (SD), and the *t*-test was performed. There is statistical significance when $P < 0.05$.

3. Results

3.1. Surgical outcomes

Table 2 shows that all surgical outcomes of patients with early gastric cancer in group A were better than those in group B ($P < 0.05$).

Table 2. Comparison of surgical outcomes for patients with early gastric cancer (mean ± SD)

Group	Operation time (min)	Getting out of bed for the first time (d)	First exhaust (h)	Length of stay (d)	Intraoperative blood loss (mL)
Group A (n = 10)	108.84 ± 11.85	2.84 ± 0.61	17.24 ± 1.58	7.21 ± 1.52	275.36 ± 22.61
Group B (n = 10)	120.49 ± 14.88	3.92 ± 0.82	21.88 ± 1.96	9.33 ± 1.69	336.25 ± 28.36
t	1.9367	3.3417	5.8283	2.9494	5.3088
P	0.0686	0.0036	0.0000	0.0086	0.0000

3.2. Complication rates

The postoperative complication rate of patients with early gastric cancer in group A was lower than in group B ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of complication rates in patients with early gastric cancer [n (%)]

Group	Gastric retention	Venous thrombosis	Dumping syndrome	Reflux esophagitis	Incidence
Group A (n = 10)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Group B (n = 10)	1 (10.00)	1 (10.00)	1 (10.00)	1 (10.00)	4 (40.00)
χ^2	-	-	-	-	5.0000
P	-	-	-	-	0.0253

3.3. BMI indices at different postoperative periods

Table 4 shows that Group A's BMI indices were higher than Group B's at different postoperative periods ($P < 0.05$).

Table 4. Comparison of BMI indices at different postoperative periods (mean ± SD)

Group	2 weeks after surgery (kg/m^2)	4 weeks after surgery (kg/m^2)	8 weeks after surgery (kg/m^2)	16 weeks after surgery (kg/m^2)
Group A (n = 10)	18.42 ± 1.02	19.33 ± 1.09	20.35 ± 1.25	21.84 ± 1.85
Group B (n = 10)	14.61 ± 0.98	15.86 ± 1.07	17.23 ± 1.11	19.18 ± 1.13
t	8.5177	7.1841	5.9019	3.8803
P	0.0000	0.0000	0.0000	0.0011

3.4. Quality of life

After surgery, the SF-36 score in group A was higher than in group B ($P < 0.05$), as indicated in **Table 5**.

Table 5. Comparison of quality of life among patients with early gastric cancer before and after treatment (mean ± SD)

Group	Good health (points)		Mental health (points)		Body functions (points)		Social functions (points)	
	Before	After	Before	After	Before	After	Before	After
Group A (n = 10)	52.84 ± 2.15	79.61 ± 3.28	51.94 ± 2.54	78.28 ± 3.36	53.16 ± 2.42	79.36 ± 3.42	54.11 ± 2.82	80.36 ± 3.58
Group B (n = 10)	52.81 ± 2.19	71.88 ± 2.94	51.88 ± 2.55	71.79 ± 2.96	53.19 ± 2.39	72.81 ± 3.18	54.13 ± 2.81	72.96 ± 3.29
t	0.0309	5.5495	0.0527	4.5833	0.0279	4.4353	0.0159	4.8129
P	0.9757	0.0000	0.9585	0.0002	0.9781	0.0003	0.9875	0.0001

4. Discussion

In the context of increasing life and work-related pressures, the annual incidence rate of gastric cancer is on the rise, leading to shorter survival periods for patients. A summary analysis reveals that gastric cancer is associated with various factors:

(1) Dietary habits: Regional variations in the incidence of gastric cancer are evident, with high occurrences in eastern coastal and northwest regions, and lower numbers in the south. Individuals who consume pickled, smoked, and grilled foods are exposed to fungi and nitrites, increasing their risk of developing gastric cancer.

(2) *Helicobacter pylori* infection: Over 60% of patients with gastric cancer tested positive for *H. pylori* infection. *H. pylori* can promote the conversion of nitrates into nitrite and other substances, potentially leading to cancer. Infection with *H. pylori* can also cause mucosal epithelial proliferation, further raising the risk of cancer.

(3) Stomach diseases: Individuals with a history of gastritis and gastric polyps are at a higher risk of developing gastric cancer.

(4) Heredity: The incidence rate of gastric cancer is higher in direct relatives compared to the general population [3].

In the early stages of gastric cancer, patients often display no specific signs. Only a small fraction of patients may experience symptoms such as nausea, vomiting, or upper gastrointestinal ulcers, resulting in

delayed treatment [4]. As gastric cancer progresses, patients may develop symptoms such as weight loss, stomach pain, fullness, and abdominal discomfort. Severe cases can lead to fatigue, anemia, weight loss, and malnutrition. Advances in microscopy technology have significantly increased the detection rate of gastric cancer, thereby increasing the number of early gastric cancer surgeries.

During standard gastric cancer surgical treatment, a substantial portion of the gastric body is removed, often exceeding 2/3 of the organ, with thorough lymph node dissection to improve the 5-year survival rate of early gastric cancer patients [5]. However, distal subtotal gastrectomy may impair gastric emptying function, primarily due to resection of the gastric antrum and pylorus during the operation. The procedure involves resection of the distal stomach, mobilization of the duodenal bulb, dissection of the lymph nodes in adjacent stomach areas (including the left gastric artery, duodenal ligament, and common hepatic artery), and potential damage to adjacent nerve plexuses, which can affect blood supply and lead to gastric emptying disorders; resection of most of the distal gastric body can affect gastric peristalsis and gastric contraction, causing gastric dysfunction. In addition, poor intraoperative gastrointestinal decompression can cause long-term high tension in the residual stomach, leaving contractile atony and aggravating gastric emptying disorders.

In recent years, distal partial gastrectomy has gained popularity in the treatment of early gastric cancer. The procedure minimizes the impact on gastrointestinal function, preserves gastric structure, reduces complications, and is associated with better long-term outcomes. After surgery, food does not enter the duodenum and directly reaches the cavity area, thereby reducing gastrointestinal hormone secretion and myenteric plexus stimulation caused by eating, leading to the inhibition of acetylcholine secretion and the protection of gastric emptying function [6]. Relevant literature reports that partial gastrectomy is highly feasible in treating early gastric cancer, optimizing gastric emptying function, and reducing the risk of gastric cancer recurrence [7].

Based on the data analysis in this study, the operation time of patients with early gastric cancer in Group A was 108.84 ± 11.85 minutes, the first time out of bed was 2.84 ± 0.61 days after the operation, the first flatus was 17.24 ± 1.58 hours, total hospitalization time was 7.21 ± 1.52 days, and intraoperative blood loss was 275.36 ± 22.61 mL, which were better than those in group B ($P < 0.05$). Partial gastrectomy involves the removal of only a small portion of the gastric body, resulting in minor surgical trauma, less bleeding during the operation, short postoperative recovery times, and improved surgical indicators. Another set of data showed that the postoperative complication rate of patients with early gastric cancer in group A was 0.00%, which was lower than that in group B (40.00%, $P < 0.05$), which indicates that patients who undergo partial gastrectomy experience significantly lower postoperative complication rates compared to those undergoing distal subtotal gastrectomy. Partial gastrectomy reduces the extent of resection, preserves the typical structure of the stomach, and simultaneously restores gastrointestinal function, leading to little impact on the normal physiological functions of the gastrointestinal tract. Therefore, the operation is recommended as it is safer [8]. Additionally, patients who undergo partial gastrectomy exhibited higher postoperative BMI values as compared to distal subtotal gastrectomy ($P < 0.05$), which persist in the long term. The preservation of normal gastric function in partial gastrectomy helps restore appetite and allows for better nutrient absorption, leading to improved BMI indices [9]. Furthermore, patients who undergo partial gastrectomy also report higher postoperative SF-36 scores ($P < 0.05$), indicating better overall health and quality of life. The preservation of some gastric functions minimizes the impact on digestive function, resulting in improved patient well-being after surgery [10].

In summary, partial gastrectomy for early-stage gastric cancer patients can lead to shorter recovery times, improved gastrointestinal function, and overall better outcomes. It is a valuable approach in the management of early gastric cancer.

Disclosure statement

The authors declare no conflict of interest.

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