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Original research

Readmissions following elective radical total gastrectomy for early gastric cancer: A case-controlled study

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ABSTRACT

Background: Readmission after gastrectomy is one of the factors that reflect quality of life. Therefore, we analyzed the several factors related to readmissions after total gastrectomy for early gastric cancer.

Methods: From January 2002 through December 2009, 102 consecutive patients who underwent radical total gastrectomy for early gastric cancer were enrolled in this study. We evaluated the incidence, cause, time point, and type of treatment for readmission after discharge; we compared the readmission and non-readmission groups in regard to clinicopathologic features and postoperative outcomes.

Results: The readmission rate during the five years after total gastrectomy was 22 of 102 (21.6%). The most common cause for readmission was esophagojejunostomy stricture (5 cases). The treatment given for 31 readmissions included 23 conservative therapies, 3 radiologic or endoscopic interventions, and 5 re-operations. No significant differences were detected in the clinicopathologic feature, postoperative outcomes, or 5-year survival rates between the readmission and non-readmission group. No specific risk factor was found to be associated with readmission.

Conclusion: Although we could not determine a specific risk factor associated with readmission after radical total gastrectomy, prevention of readmission by evaluating the causes and treatments after radical total gastrectomy can improve the patient's quality of life.

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1. Introduction

Worldwide, more than 800,000 patients are diagnosed with gastric cancer each year. The second most common cause of cancer-related death worldwide is gastric cancer.¹ Surgical resection for gastric cancer is the only therapeutic modality that may be curative.² The incidence of early gastric cancer in Korea has been increasing because of recent improvements in early diagnosis.³

There are several methods of treatment for early gastric cancer, including endoscopic treatment (e.g., endoscopic submucosal dissection and endoscopic mucosal resection).⁴ However, many cases of early gastric cancer require radical subtotal gastrectomy or total gastrectomy for the treatment of potential lymph node metastasis. In addition, minimally invasive subtotal gastrectomy or total gastrectomy is performed for early gastric cancer.⁵

Currently, many surgeons as well as patients have focused on quality of life after gastrectomy.^{6–8} Readmission after gastrectomy

is one of the factors that impact the quality of life. While the literature contains some studies regarding readmission after discharge,^{9–13} reports on readmission after gastrectomy for gastric cancer are extremely limited.¹⁴ Moreover, the literature contains no reports regarding readmission after radical total gastrectomy for early gastric cancer.

Therefore, we analyzed the incidence and cause of readmissions after radical total gastrectomy for early gastric cancer and investigated the risk factors associated with readmission after surgery.

2. Patients and methods

From January 2002 through December 2009, 102 consecutive early gastric cancer patients who underwent radical total gastrectomy performed by three surgeons (Min-Chan Kim, Ki-Han Kim, and Ghap-Joong Jung) at Dong-A University Medical Center were enrolled in this study.

A Dong-A gastric data base has been prospectively accumulated since 2002. Data were prospectively retrieved from surgical and pathological reports, with follow-up data obtained from the outpatient clinical data base. We excluded 291 advanced gastric cancer patients because postoperative chemotherapy can affect

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readmission. The hospital admission records were reviewed to identify readmissions associated with only gastric cancer or surgery. During the first five postoperative days, 15 patients died of other diseases. We reviewed the clinicopathological characteristics, postoperative outcomes, postoperative morbidities and mortalities, and survival related to readmission after radical total gastrectomy for early gastric cancer. We divided the readmission into 4 periods (<1 month, 1–3 months, 3 months to 1 year, and >1 year). In addition, the causes for readmission, the time point of readmission, the number of readmissions, the types of treatment, and the risk factors associated with readmission were evaluated. In this study, gastric cancer stage was classified according to the 7th edition of the American Joint Committee on Cancer (AJCC) staging criteria.¹⁵ All values were expressed as mean \pm standard deviation (SD).

All patients were managed routinely by a standardized perioperative protocol, as follows: (1) no nasogastric intubation or preoperative mechanical bowel preparation; (2) minimal spillage of gastric contents; (3) use of two closed suction drains; (5) sips of water 72 h postoperatively; (6) a clear liquid diet 4 days postoperatively; (7) hospital discharge 8 or 9 days postoperatively after a soft diet with no abnormal clinical symptoms. All patients underwent total gastrectomy with Roux en Y esophagojejunostomy and lymphadenectomy for no. 1, 2, 3, 4, 5, 6, 7, 8a, 9, 11p, and 11d lymph nodes.

Follow-up results were obtained from patient hospital records and telephone survey. Recurrence was determined primarily by endoscopy, computed tomography, and positron emission tomography. All tracked patients were monitored postoperatively by a routine analysis of blood tests, tumor markers [carcinoembryonic antigen (CEA) and carbohydrate antigen 19-9(CA19-9)], chest radiography, endoscopy, and computed tomography. Follow-up studies were conducted every six months for two years, and every year thereafter for the next three years.

For statistical analysis, we used SPSS software version 18.0 (SPSS, Inc, an IBM Company, Chicago, Illinois, USA). The chi-square test or Fisher's exact test and Student's independent *t*-test, or the Mann–Whitney *U*-test were used to compare the clinicopathologic factors of patients in the readmission and non-readmission groups of radical total gastrectomy for early gastric cancer. Null hypotheses of no difference were rejected if *p*-values were <0.05. Survival curves were calculated by the Kaplan–Meier method. In addition, we evaluated the univariate and multivariate risk factors for readmission.

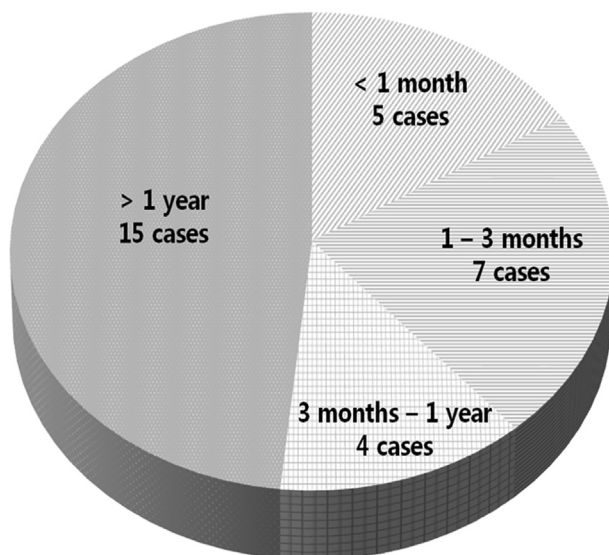


Fig. 1. The incidence of readmission according to time point. Thirty-one readmissions occurred among 22 patients after radical total gastrectomy for early gastric cancer.

Table 1

Causes and time point of 31 readmissions after radical total gastrectomy for early gastric cancer.

Reason for readmission	<1 month	1–3 months	3 months–1 year	>1 year	Total
EJ stricture	2	2	1		5
General weakness	1	1	1	1	4
Diarrhea	1	1	2		4
Intestinal obstruction	1			2	3
Ileus				3	3
GB stone			2		2
Short bowel syndrome			2		2
CBD stone			1		1
Acute cholecystitis		1			1
Anemia				1	1
Internal herniation				1	1
Small bowel strangulation				1	1
Afferent loop syndrome				1	1
Pneumonia		1			1
Others		1			1
Total	5	7	4	15	31

EJ; esophagojejunostomy.

3. Results

Among 22 patients, 31 readmissions occurred (22 of 102; 21.6%) after radical total gastrectomy for early gastric cancer.

3.1. Analysis of readmission

Fig. 1 present the time point of readmission for the 22 patients. The reasons and time points of readmission for the 22 patients are presented in Table 1. The most common cause for readmission was esophagojejunostomy stricture (5 cases). One year postoperatively, ileus was the most common cause of readmission. Among the 22 patients, four were readmitted more than once (seven times for one patient; two times for three patients).

3.2. Outcomes and type of treatments for readmission

The mean number of readmissions was 1.4 ± 1.3 and the mean length of hospital stay when readmitted was 6.2 ± 4.0 days. The type of treatment for 31 readmissions included 23 conservative therapies, 3 radiologic or endoscopic interventions, and 5 re-operations (Table 2). In 5 re-operations, there was 1 case of intestinal obstruction, 1 case of cholelithiasis, 1 case of internal herniation, 1 case of small bowel strangulation, and 1 case of afferent loop syndrome.

3.3. Clinicopathologic characteristics in both groups (readmission and non-readmission)

Table 3 presents the clinicopathological features in the readmission and non-readmission groups. The comorbidities differed statistically between the two groups ($p = 0.044$).

Table 2

Outcomes of 31 readmissions among 22 patients after radical total gastrectomy for early gastric cancer.

Outcomes	
Number of re-admissions ^a (range)	1.4 ± 1.3 (1–7)
Hospital stay ^a (range)	6.2 ± 4.0 (1–18)
Type of treatment	
Conservative therapy (%)	23 (74.2)
Radiologic or endoscopic intervention (%)	3 (9.7)
Re-laparotomy (%)	5 (16.1)

^a All values are the mean and standard deviation.

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