

Progression of remnant gastric cancer is associated with duration of follow-up following distal gastrectomy

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Abstract

AIM: To re-evaluate the recent clinicopathological features of remnant gastric cancer (RGC) and to develop desirable surveillance programs.

METHODS: Between 1997 and 2008, 1149 patients underwent gastrectomy for gastric cancer at the Department of Digestive Surgery, Kyoto Prefectural University of Medicine, Japan. Of these, 33 patients underwent gastrectomy with lymphadenectomy for RGC. Regarding the initial gastric disease, there were 19 patients with benign disease and 14 patients with gastric cancer. The hospital records of these patients were reviewed retrospectively.

RESULTS: Concerning the initial gastric disease, the

RGC group following gastric cancer had a shorter interval [$P < 0.05$; gastric cancer *vs* benign disease: 12 (2-22) *vs* 30 (4-51) years] and were more frequently reconstructed by Billroth- I procedure than those following benign lesions ($P < 0.001$). Regarding reconstruction, RGC following Billroth- II reconstruction showed a longer interval between surgical procedures [$P < 0.001$; Billroth- II *vs* Billroth- I : 32 (5-51) *vs* 12 (2-36) years] and tumors were more frequently associated with benign disease ($P < 0.001$) than those following Billroth- I reconstruction. In tumor location of RGC, after Billroth- I reconstruction, RGC occurred more frequently near the suture line and remnant gastric wall. After Billroth- II reconstruction, RGC occurred more frequently at the anastomotic site. The duration of follow-up was significantly associated with the stage of RGC ($P < 0.05$). Patients diagnosed with early stage RGC such as stage I - II tended to have been followed up almost every second year.

CONCLUSION: Meticulous follow-up examination and early detection of RGC might lead to a better prognosis. Based on the initial gastric disease and the procedure of reconstruction, an appropriate follow-up interval and programs might enable early detection of RGC.

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Key words: Remnant gastric cancer; Surveillance; Follow-up; Reconstruction; Distal gastrectomy

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INTRODUCTION

The incidence of remnant gastric cancer (RGC) following distal gastrectomy has been reported to account for 1%-2% of all gastric cancers in Japan^[1,2]. Previously, RGC was reported to be caused by multiple factors, and the incidence, pathological features, and potential mechanisms have been extensively investigated^[3-5]. Specifically, RGC is commonly found at an advanced stage, resulting in low rates of curative resection (38%-40%) and a consequently poor prognosis^[6,7]. However, recently, the incidence and etiology of RGC have been changing^[8] because of the long latency periods, decreasing prevalence of gastrectomy for benign disease^[6,9], early detection and improved outcomes in patients with gastric cancers^[10,11]. Moreover, recent advances in diagnostic and treatment techniques have led to a higher detection rate of early RGC following distal gastrectomy^[12]. Consequently, endoscopic therapy such as endoscopic mucosal resection or endoscopic submucosal dissection is applicable for treatment of early-stage RGC^[13,14]. Indeed, more than half of the RGC patients were treated for T1 or T2, node-negative and early stage cancer at our institution and almost 80% of patients with RGC were curatively resected. Therefore, it is necessary to re-evaluate the risk factors of RGC to develop an optimal new surveillance program and treatment guide. However, there is limited information available to help guide the treatment of patients with RGC. This study was designed to re-evaluate the clinicopathological characteristics and surgical outcomes of RGC and to develop desirable surveillance programs.

MATERIALS AND METHODS

Patients

Between 1997 and 2008, 1149 patients underwent gastrectomy for gastric cancer. Of these, 33 consecutive patients with primary RGC were treated in the Department of Digestive Surgery, Kyoto Prefectural University of Medicine. All patients underwent gastrectomy with lymphadenectomy for RGC. The clinicopathologic findings of these patients were determined retrospectively based on their hospital records. Macroscopic, microscopic and histopathological classifications of gastric cancers were based on the Japanese Classification of Gastric Carcinomas^[15] and tumor-node-metastasis staging system^[16].

Histologic types were classified as differentiated (papillary, moderately or well-differentiated adenocarcinoma) and undifferentiated (poorly or undifferentiated adenocarcinoma, signet-ring cell carcinoma, and mucinous adenocarcinoma).

Follow-up program after initial gastrectomy

The follow-up program after initial gastrectomy at our institution is comprised of a regular physical examination and laboratory blood tests, chest X rays, an upper gastrointestinal series or endoscopy and ultrasonography or computer tomography for the first 5 years, and yearly endoscopy thereafter, if possible.

Evaluation of clinical associations between remnant gastric cancer and various clinical factors

The correlations between clinical factors and an initial factor such as previous disease or method of reconstruction in initial surgery were examined. Moreover, the follow-up interval is very important for screening recurrence and second primary gastric cancers. Therefore, correlation between follow-up periods and progression was evaluated in RGC.

Statistical analysis

The patient was included as a cause-specific death when the cause of death was specified as recurrent RGC. χ^2 test and Fisher's exact probability test were performed for categorical variables, while Student's *t*-test and Mann-Whitney *U*-test for unpaired data with continuous variables were performed to compare the clinicopathological characteristics between two groups. Kruskal-Wallis *H* test was used as a nonparametric procedure that can be used to compare more than two groups for analyses of follow-up interval. A *P* value less than 0.05 was considered significant.

RESULTS

Clinicopathologic characteristics of patients with primary remnant gastric cancer

The mean patient age was 68 years, and the male:female ratio was 2.7:1. Regarding the initial gastric disease, there were 19 patients with benign disease and 14 patients with gastric cancer. The median interval between the 1st and 2nd surgery was 20 years. Reconstruction during the 1st surgery was mainly Billroth- I or Billroth- II. En bloc resection of the tumor by total remnant gastrectomy was performed with jejunal mesentery and D2 lymphadenectomy and concomitant organ resection. Eighteen patients additionally received splenectomy, four patients received distal pancreatectomy, two patients received partial colon resection and two patients received liver resection. Reconstructions were performed in 16 patients by Billroth- I, 16 patients by Billroth- II and one by Roux-en-Y procedure for all resected RGC tumors. Tumors were located at the anastomotic site in 16 (61%) patients, corpus and/or cardia in nine (34%), and throughout the

Table 1 Association between clinicopathologic characteristics and initial disease *n* (%)

Variables	<i>n</i>	Initial disease		<i>P</i> value
		Benign (<i>n</i> = 19)	Cancer (<i>n</i> = 14)	
Age (yr) (mean)		70 (51)	66 (49)	0.26
Gender				
Male	24	15 (63)	9 (38)	0.35
Female	9	4 (44)	5 (56)	
Interval from initial surgery				
Year (median)		30 (4-51)	12 (2-22)	< 0.05
Reconstruction of 1st surgery				
Billroth- I	16	4 (25)	12 (75)	< 0.001
Billroth- II	16	15 (94)	1 (6)	
R-Y	1	0 (0)	1 (100)	
Location of RGC				
Anastomotic site	11	9 (82)	2 (18)	0.08
Suture line	7	2 (29)	5 (71)	
Others	15	8 (53)	7 (47)	
Histological type				
Differentiated	13	8 (62)	5 (38)	0.71
Undifferentiated	20	11 (55)	9 (45)	
Lymphatic invasion				
Negative	16	8 (50)	8 (50)	0.39
Positive	17	11 (65)	6 (35)	
Venous invasion				
Negative	16	8 (50)	8 (50)	0.39
Positive	17	11 (65)	6 (35)	
Tumor size				
cm (mean)		51 (46)	61 (54)	0.40
Depth of tumor				
T1	10	4 (40)	6 (60)	0.18
T2, 3, 4	23	15 (65)	8 (35)	
Lymph node metastasis				
Negative	20	10 (50)	10 (50)	0.27
Positive	13	9 (69)	4 (31)	
Stage				
I	17	8 (47)	9 (53)	0.21
II, III, IV	16	11 (69)	5 (31)	

Significant values are shown in boldface type. *P* values were derived from χ^2 or Fisher's exact test and were considered significant at < 0.05. R-Y: Roux-en Y; RGC: Remnant gastric cancer.

whole remnant in one (4%) patient. Consequently, more than half of the RGC patients demonstrated T1 or T2, undifferentiated, node-negative and early stage cancer. In 78.8% (26/33) of patients, resections were performed with curative intent.

Association between clinicopathologic characteristics and initial disease

Clinicopathologic findings of 33 patients with primary RGC are listed in Table 1 according to the nature of the primary disease. Patients with RGC following gastric cancer showed a significantly shorter interval between the 1st and 2nd surgery [*P* < 0.05, gastric cancer *vs* benign disease: 12 (2-22) *vs* 30 (4-51) years] and were more frequently reconstructed by the Billroth- I method than those following benign disease (*P* < 0.005). Other factors did not significantly differ between the two groups.

Association between clinicopathologic characteristics and reconstruction of 1st surgery

Table 2 shows details of 33 RGC patients according to

Table 2 Association between clinicopathologic characteristics and reconstruction of 1st surgery *n* (%)

Variables	<i>n</i>	Reconstruction at first surgery		<i>P</i> value
		Billroth- I (<i>n</i> = 16)	Billroth- II (<i>n</i> = 16)	
Age (yr) (mean)		68 (50)	69 (50)	0.64
Gender				
Male	24	13 (54)	11 (46)	0.69
Female	8	3 (38)	5 (63)	
Interval from initial surgery				
Year (median)		12 (2-36)	32 (5-51)	< 0.001
Initial gastric disease				
Benign	19	4 (21)	15 (79)	< 0.001
Cancer	13	12 (92)	1 (8)	
Location of RGC				
Anastomotic site	11	2 (18)	9 (82)	0.11
Suture line	7	5 (71)	2 (29)	
Others	14	9 (64)	5 (36)	
Histological type				
Differentiated	13	8 (62)	5 (38)	0.47
Undifferentiated	19	8 (42)	11 (58)	
Lymphatic invasion				
Negative	15	6 (40)	9 (60)	0.48
Positive	17	10 (59)	7 (41)	
Venous invasion				
Negative	16	8 (50)	8 (50)	0.72
Positive	16	8 (50)	8 (50)	
Tumor size				
mm (mean)		51	56	0.67
Depth of tumor				
T1	10	6 (60)	4 (40)	0.76
T2, 3, 4	22	10 (45)	12 (55)	
Lymph node metastasis				
Negative	14	9 (47)	10 (53)	1
Positive	13	7 (54)	6 (46)	
Stage				
I	17	9 (53)	8 (47)	1
II, III, IV	15	7 (47)	8 (53)	

Significant values are shown in boldface type. *P* values were derived from χ^2 or Fisher's exact test and were considered significant at < 0.05. RGC: Remnant gastric cancer.

the method of reconstruction. RGC following Billroth- II reconstruction showed a longer interval between surgical procedures (*P* < 0.001) and tumors were more frequently associated with benign disease (*P* < 0.001) than those following Billroth- I reconstruction. Figure 1 shows the tumor location of 32 RGC following distal gastrectomy according to the method of reconstruction. After Billroth- I reconstruction, RGC occurred more frequently near the suture line and remnant gastric wall. After Billroth- II reconstruction, RGC occurred more frequently at the anastomotic site.

The duration of follow-up after distal gastrectomy

The duration of follow-up was significantly associated with the stage of progression in RGC (*P* < 0.05). Patients diagnosed with early stage RGC such as stage I - II tended to have been followed up almost every second year (Figure 2).

DISCUSSION

Gastric cancer is the second leading cause of cancer-

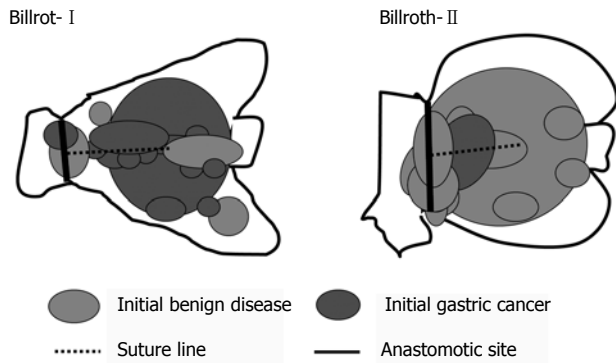


Figure 1 Location of 32 remnant gastric cancer tumors following distal gastrectomy according to the method of reconstruction. After Billroth- I reconstruction, remnant gastric cancer (RGC) occurred more frequently near the suture line and remnant gastric wall; whereas, RGC after Billroth- II reconstruction occurred more frequently at the anastomotic site.

related death in the world^[17]. However, recent advances in diagnostic methods, less invasive treatment techniques and better peri-operative management have increased the early detection of gastric cancer and decreased the mortality and morbidity rates^[18-20]. Consequently, the number of cured patients has been increasing and some of these patients are at risk of acquiring second primary cancer in the remnant stomach. This implies that more cases of RGC will be encountered in the future.

In previous reports, RGC was commonly found at an advanced stage, resulting in low rates of curative resection (38%-40%) and a consequent poor prognosis^[6,7]. However, recently, the incidence and etiology of RGC following distal gastrectomy may be changing due to diagnostic and technological advances. In our study, more than half of the RGC patients were treated for T1 or T2, node-negative and early stage cancer, contrary to that in previous series (Table 1). Almost 80% of patients were curatively resected with intensive lymphadenectomy. Thereby, the survival curves of primary proximal gastric cancer (PGC) and RGC were similar and without a significant difference, although patients with RGC tended to have a higher incidence of undifferentiated cancer, vascular invasion, and T4 component than patients with PGC (data not shown). Therefore, RGC is not always advanced at diagnosis and if so, intensive surgery for RGC does not necessarily mean a poor prognosis in comparison to that for primary gastric cancer. Therefore, it is necessary to re-evaluate the risk factors of RGC to develop an optimal new endoscopic surveillance program and treatment guide.

Regarding surveillance systems for early detection and curative treatment of RGC, periodic endoscopic examinations of the gastric remnant are shown to be extremely important in our study (Figure 1). However, a follow-up program that is too intensive may not be beneficial to the patient. The initial gastric disease and the interval between the 1st and 2nd surgery could affect the incidence of RGC. In our study, RGC following gastric cancer had a significantly shorter interval between 1st and 2nd surgery than that following benign disease [$P <$

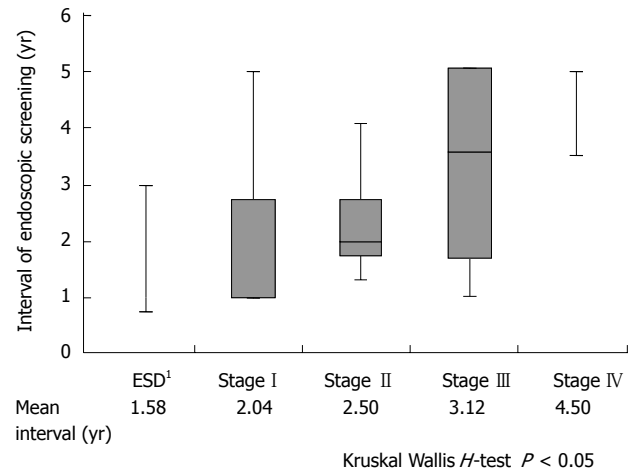


Figure 2 Association of endoscopic follow-up intervals and the stage of progression. The follow-up interval was significantly associated with the stage of progression in remnant gastric cancer ($P < 0.05$). ¹Patients treated with endoscopic submucosal dissection (ESD), who were not included in this study, are presented for the purpose of comparison.

0.05; gastric cancer *vs* benign disease: 12 (2-22) years *vs* 30 (4-51) years]. However, surveillance systems for gastric cancer should be especially considered because of decreasing gastrectomy for benign disease. Furthermore, 86% of all initial gastric cancer patients underwent Billroth- I reconstruction at our institution and their median interval between 1st and 2nd surgery was 12 (2-36) years. Moreover, the duration of follow-up was significantly associated with the stage of RGC progression and an early detection of RGC led to better prognosis (Figure 2). Taken together, annual surveillance endoscopic screening should be required for at least 12 years following distal gastrectomy. Furthermore, after 12 years of follow-up, surveillance endoscopy should be recommended every second year because we found that patients diagnosed with early stage RGC such as stage I - II tended to have been followed almost every second year. In particular, meticulous endoscopy examination should be performed near the suture line and remnant gastric wall after Billroth- I reconstruction and also should be performed at the anastomotic site after Billroth- II reconstruction.

In conclusion, due to recent advances in diagnostic and treatment technologies, the etiology of RGC has been changing. Meticulous follow-up examination and early detection of RGC might lead to a better prognosis. Considering both the initial gastric disease and the procedure of reconstruction, an appropriate follow-up interval and programs should facilitate the detection of early RGC.

COMMENTS

Background

Recently, the incidence and etiology of remnant gastric cancer (RGC) have been changing because of the long latency periods, decreasing prevalence of gastrectomy for benign disease, early detection and improved outcomes in patients with gastric cancers. Moreover, recent advances in diagnostic and treatment technique have led to a higher detection rate of early RGC following distal gastrectomy.

Research frontiers

It is necessary to re-evaluate the risk factors of RGC and develop an optimal new surveillance program and treatment guide. However, there is limited information available to help guide the treatment of patients with RGC. In this study, the authors re-evaluated the clinicopathological characteristics and surgical outcomes of RGC and developed desirable surveillance programs.

Innovations and breakthroughs

In this study, more than half of the RGC patients were demonstrated to have T1 or T2, undifferentiated, node-negative and early stage cancer. The duration of follow-up was significantly associated with the stage of progression in RGC. Patients diagnosed with early stage RGC such as stage I-II tended to have been followed almost every second year. After Billroth-I reconstruction, RGC occurred more frequently near the suture line and remnant gastric wall. After Billroth-II reconstruction, RGC occurred more frequently at the anastomotic site.

Applications

RGC following gastric cancer had a significantly shorter interval between 1st and 2nd surgery than those following benign disease. Annual surveillance endoscopic screening should be required for at least 12 years following distal gastrectomy. Furthermore, after 12 years of follow-up, surveillance endoscopy should be recommended every second year.

Terminology

The incidence of RGC following distal gastrectomy has been reported to account for 1%-2% of all gastric cancers in Japan. In previous reports, RGC was commonly found at an advanced stage, resulting in low rates of curative resection (38%-40%) and a consequent poor prognosis.

Peer review

Authors have given new thoughts while designing this study. The paper is nicely written.

REFERENCES

- 1 Ohashi M, Katai H, Fukagawa T, Gotoda T, Sano T, Sasako M. Cancer of the gastric stump following distal gastrectomy for cancer. *Br J Surg* 2007; **94**: 92-95
- 2 Kaneko K, Kondo H, Saito D, Shirao K, Yamaguchi H, Yokota T, Yamao G, Sano T, Sasako M, Yoshida S. Early gastric stump cancer following distal gastrectomy. *Gut* 1998; **43**: 342-344
- 3 Kaminishi M, Shimizu N, Shiomoyama S, Yamaguchi H, Ogawa T, Sakai S, Kuramoto S, Oohara T. Etiology of gastric remnant cancer with special reference to the effects of denervation of the gastric mucosa. *Cancer* 1995; **75**: 1490-1496
- 4 Tersmette AC, Offerhaus GJ, Tersmette KW, Giardiello FM, Moore GW, Tytgat GN, Vandenbroucke JP. Meta-analysis of the risk of gastric stump cancer: detection of high risk patient subsets for stomach cancer after remote partial gastrectomy for benign conditions. *Cancer Res* 1990; **50**: 6486-6489
- 5 Ahn HS, Kim JW, Yoo MW, Park do J, Lee HJ, Lee KU, Yang HK. Clinicopathological features and surgical outcomes of patients with remnant gastric cancer after a distal gastrectomy. *Ann Surg Oncol* 2008; **15**: 1632-1639
- 6 Sasako M, Maruyama K, Kinoshita T, Okabayashi K. Surgical treatment of carcinoma of the gastric stump. *Br J Surg* 1991; **78**: 822-824
- 7 Newman E, Brennan MF, Hochwald SN, Harrison LE, Karpeh MS. Gastric remnant carcinoma: just another proximal gastric cancer or a unique entity? *Am J Surg* 1997; **173**: 292-297
- 8 Tanigawa N, Nomura E, Lee SW, Kaminishi M, Sugiyama M, Aikou T, Kitajima M. Current state of gastric stump carcinoma in Japan: based on the results of a nationwide survey. *World J Surg* 2010; **34**: 1540-1547
- 9 Kodera Y, Yamamura Y, Torii A, Uesaka K, Hirai T, Yasui K, Morimoto T, Kato T, Kito T. Gastric stump carcinoma after partial gastrectomy for benign gastric lesion: what is feasible as standard surgical treatment? *J Surg Oncol* 1996; **63**: 119-124
- 10 Maruyama K, Kaminishi M, Hayashi K, Isobe Y, Honda I, Katai H, Arai K, Kodera Y, Nashimoto A. Gastric cancer treated in 1991 in Japan: data analysis of nationwide registry. *Gastric Cancer* 2006; **9**: 51-66
- 11 Kitano S, Shiraishi N, Uyama I, Sugihara K, Tanigawa N. A multicenter study on oncologic outcome of laparoscopic gastrectomy for early cancer in Japan. *Ann Surg* 2007; **245**: 68-72
- 12 Nakayoshi T, Tajiri H, Matsuda K, Kaise M, Ikegami M, Sasaki H. Magnifying endoscopy combined with narrow band imaging system for early gastric cancer: correlation of vascular pattern with histopathology (including video). *Endoscopy* 2004; **36**: 1080-1084
- 13 Takenaka R, Kawahara Y, Okada H, Tsuzuki T, Yagi S, Kato J, Ohara N, Yoshino T, Imagawa A, Fujiki S, Takata R, Nakagawa M, Mizuno M, Inaba T, Toyokawa T, Sakaguchi K. Endoscopic submucosal dissection for cancers of the remnant stomach after distal gastrectomy. *Gastrointest Endosc* 2008; **67**: 359-363
- 14 Hirasaki S, Kanzaki H, Matsubara M, Fujita K, Matsumura S, Suzuki S. Treatment of gastric remnant cancer post distal gastrectomy by endoscopic submucosal dissection using an insulation-tipped diathermic knife. *World J Gastroenterol* 2008; **14**: 2550-2555
- 15 Japanese Gastric Cancer Association. Japanese classification of gastric carcinoma. 13th ed. Tokyo: Kanehara & Co., 1999
- 16 Sobin LH, Wittekind CH. TNM Classification of Malignant Tumors. 6th ed. John Wiley: New York, 2002: 170-173
- 17 Parkin DM, Bray F, Ferlay J, Pisani P. Global cancer statistics, 2002. *CA Cancer J Clin* 2005; **55**: 74-108
- 18 Gotoda T. Endoscopic resection of early gastric cancer. *Gastric Cancer* 2007; **10**: 1-11
- 19 Degiuli M, Sasako M, Ponti A. Morbidity and mortality in the Italian Gastric Cancer Study Group randomized clinical trial of D1 versus D2 resection for gastric cancer. *Br J Surg* 2010; **97**: 643-649
- 20 Katai H, Sasako M, Fukuda H, Nakamura K, Hiki N, Saka M, Yamaue H, Yoshikawa T, Kojima K. Safety and feasibility of laparoscopy-assisted distal gastrectomy with suprapancreatic nodal dissection for clinical stage I gastric cancer: a multicenter phase II trial (JCOG 0703). *Gastric Cancer* 2010; **13**: 238-244

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