



Original article

Effect of periodic endoscopy for gastric cancer on early detection and improvement of survival

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Abstract

Background. Increases in the detection of early gastric cancer have indisputably, improved long-term survival. The aim of this study was to establish the value of periodic gastric endoscopy and the appropriate intervals for its performance.

Methods. We compared, retrospectively, the clinicopathologic characteristics and outcomes of two groups of patients who had undergone surgical treatment for gastric cancer. Of a total of 361 patients, 106 had undergone endoscopic examination within 2 years before the detection of gastric cancer (group 1), and 255 had either undergone no endoscopic examination or had had endoscopic examination more than 2 years before the detection of gastric cancer (group 2). For the evaluation of survival rate, the patients in each group were classified into two subgroups: group 1a, endoscopic examination within 1 year before detection; group 1b, endoscopic examination more than 1 year and within 2 years; group 2a, endoscopic examination more than 2 years and within 4 years before detection; and group 2b, endoscopic examination more than 4 years before detection, or no endoscopic examination.

Results. Gastric cancer in group 1 was characterized by small tumor size, no tumor invasion beyond the submucosa, few instances of lymphatic and vascular permeation, and few lymph node metastases. The 5-year survival rate for group 1 patients (96.5%) was significantly higher than that for group 2 patients (71.0%; $P < 0.01$). The survival rates for group 1a patients and group 1b patients were not significantly different ($P = 0.4595$). The survival rate for patients in group 2a was significantly lower than that for those in group 1a ($P < 0.05$).

Conclusion. Periodic gastric endoscopy enables early detection of cancer, thereby improving survival. The optimal interval for periodic examination appears to be 2 years.

Key words Gastric cancer · Endoscopy · Prognosis

Introduction

Gastric cancer is the most common cancer in Japan, and 5-year survival rates in patients undergoing resection for early gastric cancer exceed 90% [1,2]. Improvement in the survival rate has been a direct result of the progress in early diagnosis and surgical treatment of gastric cancer. In particular, the use of a gastric screening test conducted on a national scale is credited for increasing the early detection and leading to an improved prognosis for patients with gastric cancer [3–5]. The outcomes of surgical treatment for gastric cancer are closely related to the stage of disease progression, and, thus, early detection indisputably results in an improved survival rate [6,7]. The screening program test consists of a double-contrast barium meal study and subsequent endoscopic examination. In some instances, endoscopic examination is done without the barium meal study as individual screening. Kubota et al. [5] compared the efficacy of the two screening methods (barium meal and endoscopy) and recommended endoscopic screening as the better method. However, whether annual endoscopic examination is necessary is questionable, and the optimal interval between screenings is unclear. To investigate the optimal interval for repeated gastric endoscopic examinations, we compared the clinicopathologic features and survival rates of gastric cancer patients who underwent endoscopic examination within 2 years before cancer detection with those of gastric cancer patients who underwent endoscopic examination more than 2 years before detection or who were not examined endoscopically.

Patients and methods

Between January 1990 and December 1999, 362 patients at the Arita Gastrointestinal Hospital underwent surgical treatment for primary gastric cancer. One

patient was lost to follow-up. Of the remaining 361 patients, 106 had undergone endoscopic examination of the stomach within 2 years before the detection of gastric cancer (group 1), and the remaining 255 patients had either undergone endoscopic examination of the stomach more than 2 years before detection or had not been examined endoscopically (group 2). Information on each patient's age, sex, tumor location, tumor size, macroscopic appearance, histologic type, depth of invasion, lymphatic and vascular permeation, lymph node metastasis, and operation method was obtained retrospectively from the medical charts. The clinicopathologic findings were evaluated according to the Japanese classification of gastric carcinoma outlined by the Japanese Gastric Cancer Association [8]. Tumor locations were classified into three equal areas: upper, middle, and lower thirds of the stomach. The dominant location of each tumor was designated as the tumor's location. Tumor size was determined by measuring the maximum diameter on the resected specimen. The macroscopic appearance of tumors was classified into two types: superficial and Borrmann type. The superficial type consisted of early type and advanced type macroscopically resembling the early type [9]. The predominant histologic feature found in serial cut sections was adopted as the histologic type. In patients with definite residual disease, operative curability was regarded as non-curative resection. When multiple cancers were found in an individual, the data for the deepest one were used for evaluation.

Follow-up data was obtained through a yearly routine examination at the hospital or by telephone contact with the patient or family. For the evaluation of survival rates, the patients in each group were classified into two subgroups: group 1a, patients who had undergone endoscopic examination within 1 year before the detection of gastric cancer; group 1b, patients who had undergone endoscopic examination more than 1 year and within 2 years before detection; group 2a, patients who had undergone endoscopic examination more than 2 years and within 4 years before the detection of gastric cancer; and group 2b, patients who had undergone endoscopic examination more than 4 years before detection, or who had not been examined endoscopically.

Values for results were expressed as means (SD), and differences between the two groups were determined with the Mann-Whitney *U* test, χ^2 test, or Fisher's exact test, as applicable. The survival rates were evaluated by the Kaplan-Meier method, and the log-rank test was used for the analysis of significance. Significance was established if the *P* value was less than 0.05.

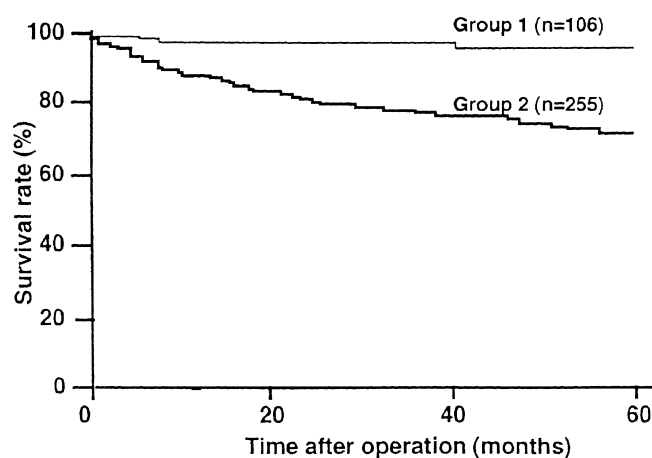


Fig. 1. Cumulative survival rates for 106 patients who underwent endoscopic examination within 2 years before detection of gastric cancer (group 1) and 255 who underwent examination more than 2 years before detection or who had had no endoscopic examination (group 2). The survival curves for the two groups were significantly different ($P < 0.01$)

Results

Table 1 shows the clinicopathologic features of gastric cancer in group 1 and group 2. Gastric cancer in group 1 was characterized by small tumor size (2.6 ± 2.1 cm), superficial type (96%), no tumor invasion beyond the submucosa (92%), few lymphatic (18%) and vascular permeations (16%), and few lymph node metastases (8%). In group 1, all but two patients were cured by resection. Age, sex, and histologic type were not significantly different between the two groups.

The cumulative 5-year survival rate for group 1 patients (96.5%) was significantly higher than that for group 2 patients (71.0%; $P < 0.01$) (Fig. 1). For the four subgroups, cumulative 5-year survival rates were 98.2% (group 1a), 94.2% (group 1b), 80.4% (group 2a), and 70.0% (group 2b) (Fig. 2). The difference between group 1a and group 1b survival rates was not significant ($P = 0.4595$). The difference between group 1a and group 2a survival rates was significant ($P < 0.05$), although the difference between group 1b and group 2a survival rates was not significant ($P = 0.0533$).

Discussion

Increases in the diagnosis of early gastric cancer unquestionably improve survival rates [6,7]. Early detection of carcinoma by gastric screening conducted on a national scale contributes to favorable prognosis for long-term survival. In this study, to investigate the effect of periodic gastric endoscopic examination on survival rate, we clarified the clinicopathologic characteristics of

Table 1. Clinicopathologic features

	Group 1 ^a (<i>n</i> = 106)	Group 2 (<i>n</i> = 255)	<i>P</i> Value
Age (mean ± SD) (years)	63.3 ± 10.4	61.2 ± 13.0	NS
Sex			
Male	78 (74)	168 (66)	NS
Female	28 (26)	87 (34)	
Tumor location			
Upper third	18 (17)	32 (13)	NS
Middle third	56 (53)	129 (51)	
Lower third	32 (30)	94 (37)	
Tumor size (mean ± SD) (cm)	2.6 ± 2.1	4.4 ± 3.4	<0.01
Macroscopic type			
Superficial type	102 (96)	163 (64)	<0.01
Borrmann type	4 (4)	92 (36)	
Borrmann 1	1 (1)	0 (0)	
Borrmann 2	3 (3)	40 (16)	
Borrmann 3	0 (0)	36 (14)	
Borrmann 4	0 (0)	16 (6)	
Histologic type			
Differentiated	75 (71)	155 (65)	NS
Undifferentiated	30 (29)	84 (35)	
Depth of invasion ^b			
m/sm	97 (92)	141 (59)	<0.01
mp/ss	5 (5)	46 (19)	
se/si	3 (3)	52 (22)	
Lymphatic permeation			
Negative	86 (82)	118 (49)	<0.01
Positive	19 (18)	121 (51)	
Vascular permeation			
Negative	88 (84)	131 (55)	<0.01
Positive	17 (16)	108 (45)	
Lymph node metastasis ^c			
Negative	82 (92)	150 (69)	<0.01
Positive	7 (8)	66 (31)	
Operation			
Resection	105 (99)	239 (94)	<0.05
Local resection	28 (26)	31 (12)	
Distal gastrectomy	62 (58)	155 (61)	
Proximal gastrectomy	5 (5)	10 (4)	
Total gastrectomy	10 (9)	43 (17)	
Nonresection	1 (1)	16 (6)	
Curability			
Curative	104 (98)	225 (88)	<0.01
Noncurative	2 (2)	30 (12)	

Values in parentheses are percentages

NS, Not significant

^aGroup 1, Examination within 2 years before detection; group 2, more than 2 years or no examination

^bm/sm, Tumor invasion of mucosa/submucosa; mp/ss, muscularis propria/subserosa; se/si, penetration of serosa/adjacent structures

^cCases except patients who underwent surgical treatment without lymph node dissection

gastric cancer in patients who had undergone endoscopic examination within 2 years before the detection of gastric cancer. This study involved a relatively large group of patients from a single institute.

The screening program used in Japan usually consists of a double-contrast barium meal study and subsequent closed endoscopic examination. Thirty patients (12%) in group 2 had had a noncurative resection. Of these, 4 patients had undergone a barium meal study within 1 year before the detection of gastric cancer, at which

time they were diagnosed as having no gastric abnormalities. The accuracy of barium meal study for detecting early gastric cancer is, seemingly, inferior to that of endoscopy. Kubota et al. [5] reported that endoscopic examination appeared to detect smaller gastric cancer at an earlier stage than barium meal study, although no significant differences in survival rate were noted between patients who received these two screening methods. We also recommend endoscopic screening as the best screening method.

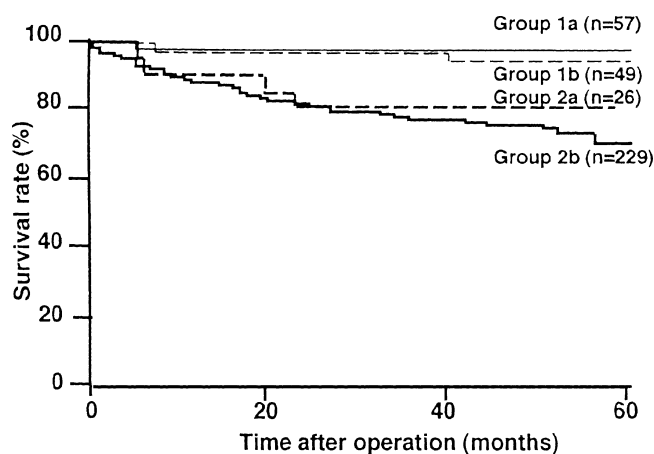


Fig. 2. Cumulative survival rates for 57 patients who underwent endoscopic examination within 1 year before detection of gastric cancer (group 1a), 49 who underwent examination more than 1 year and within 2 years before detection (group 1b), 26 who underwent examination more than 2 years and within 4 years before detection (group 2a), and 229 who underwent examination more than 4 years before detection or who had had no endoscopic examination (group 2b). The difference between group 1a and group 2a was significant ($P < 0.05$). The differences between group 1a and group 1b; group 1b and group 2a, and group 2a and group 2b were not significant ($P = 0.4595, 0.0533$, and 0.4143 , respectively)

In this series, although most gastric cancer patients who had undergone endoscopic examination within 2 years before the detection of gastric cancer (group 1) had early-stage cancer, nine had advanced gastric cancer. Of these, two patients were definitely not cured by the operation. One had multiple liver metastases and the other had liver metastasis and peritoneal dissemination. Although a polypoid lesion had been pointed out in both patients when they had undergone endoscopic examination, they themselves chose not to have further examinations.

Determining the optimal interval between screening tests is important. Shiratori et al. [10] recommended an interval of 1.5 years for gastric screening with a double-contrast barium meal study and subsequent endoscopic examination as being beneficial for detecting early cancer. In our series, of the gastric cancer patients who had undergone endoscopic examination within 2 years before the detection of gastric cancer, all but two were cured by resection. The survival rates for patients who had undergone endoscopic examination within 1 year before the detection of gastric cancer and patients who had undergone endoscopic examination more than 1 year and within 2 years before the detection of gastric cancer were not significantly different, whereas the survival rates for patients who had undergone endoscopic examination more than 2 years before detection were significantly lower than the rates for patients who had

undergone endoscopic examination within 1 year before detection. This finding indicates that the optimal interval between gastric endoscopic screenings is 2 years. Some gastric cancers grow extremely rapidly and are highly malignant [11–14]. Detection of this type of tumor at an early phase of development is very difficult, and the usual screening test is relatively ineffective. The early detection of these tumors is an important issue for further studies. In general, previous reports have shown that patients diagnosed with asymptomatic gastric cancer had a better clinical outcome than those diagnosed with symptomatic cancer [5,15]. The ultimate goal of gastric endoscopic screening is to detect these asymptomatic cancers.

In conclusion, periodic endoscopic examination improves the prognosis for survival of gastric cancer patients. Although the present study was a retrospective study without a control group for comparison, our findings indicate that 2 years seem to be the examination interval that provides the optimal chances of detecting the cancer in time to perform a curative resection.

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