



# The role of follow-up endoscopy after total gastrectomy for gastric cancer

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## KEYWORDS

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**Abstract** *Background.* Follow-up endoscopy after total gastrectomy for gastric cancer is commonly performed without there being any definite evidence of clinical relevance. Therefore, we investigated the role of the upper endoscopic examinations after total gastrectomy for gastric cancer.

*Methods.* The medical records of 212 early gastric cancer (EGC) patients and 622 advanced gastric cancer (AGC) patients who underwent follow-up endoscopic examination after total gastrectomy between 1994 and 2001 were reviewed.

*Results.* Two of 212 EGC patients and 233 of 622 AGC patients revealed tumour recurrence at all sites. All the endoscopically accessible local tumour recurrences ( $n=24$ ) were found in the AGC group. Anastomosis site stenosis was detected in 72 of 834 patients.

*Conclusion.* Follow-up endoscopy after total gastrectomy for gastric cancer is useful in detecting complications and tumour recurrence. However, this procedure has a limited role in the clinical management and overall survival for patients with recurrent gastric adenocarcinoma.

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## Introduction

After the report of recurred gastric cancer in the remnant stomach,<sup>1</sup> follow-up endoscopic examinations are generally recommended after a subtotal

gastrectomy.<sup>2-4</sup> Tumour recurrence in the remnant stomach after partial gastrectomy can be treated by an additional total gastrectomy, and this may occasionally result in long-term survival.<sup>5</sup> However, the role of follow-up endoscopy after total gastrectomy remains questionable because there is no remnant gastric mucosa. Moreover, an unresectable distant tumour recurrence is more common than loco-regional tumour recurrence after total gastrectomy.<sup>6</sup> In this report, the pattern of tumour

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recurrence after total gastrectomy for gastric cancer and the role of follow-up endoscopy after surgery are evaluated.

## Patients and methods

### Patients

We reviewed the medical records of 834 patients diagnosed with gastric adenocarcinoma (mean age of 53.3 year-old, and the male to female ratio was 539:295) who underwent radical total gastrectomy from January 1994 to May 2001 in Samsung Medical Center. The follow-up examination after surgery included a physical examination, chest radiography, abdominal computed tomography (CT) and endoscopy at a time period ranging from 6 to 12 months. The cancer was staged according to the Union International Contra la Cancrum (UICC) tumour node metastasis (TMN) classification.<sup>7,8</sup> The gastric cancers were defined as early gastric cancer (EGC) and advanced gastric cancer (AGC). EGC was defined as gastric adenocarcinoma that was confined to the mucosa or submucosa regardless of the lymph node involvement.<sup>9</sup>

Among 834 gastric carcinomas, there were 212 EGCs and 622 AGCs. No significant difference was found between the EGC group and the AGC group for the mean age, gender and the follow-up duration (Table 1). The size of the tumour was larger in the AGC group than the EGC group ( $6.7 \pm 3.4$  and  $3.7 \pm 2.3$ , respectively,  $p < 0.001$ ).

### Type of recurrence

The type of tumour recurrence was divided into three groups;<sup>6</sup> (1) distant or hematogenous tumour recurrence, (2) peritoneal tumour recurrence and (3) loco-regional tumour recurrence. Loco-regional tumour recurrence included both endoscopically accessible tumour recurrence (at the anastomosis site or within-loop) and endoscopically inaccessible tumour recurrence (enlarged regional lymph nodes or a mass near the resected site). In those patients with loco-regional tumour recurrence with anastomotic stenosis, a comparison with benign fibrotic stenosis was performed.

### Statistics

Student's *t*-test was used for the statistical assessment of para-metrical data and chi-square test was used for non-parametrical data. The Kaplan-Meier method was used to estimate the survival

**Table 1** Basal characteristics of the patients

	EGC (n=212)	AGC (n=622)	p-value
Mean age (years old)	56.3 (30-77)	52.3 (23-82)	NS
Sex (male:-female)	135:77 (1.8:1)	404:218 (1.9:1)	NS
Mean follow-up duration (mo.)	36.7 (1-99)	32.2 (2-101)	NS
Size of tumour (cm)	$3.7 \pm 2.3$	$6.7 \pm 3.4$	<0.001
Number of lesion			
Single	202	617	NS
Multiple	10	5	
Stage <sup>a</sup>			
IA	182	0	<0.001
IB	25	123	
II	3	154	
IIIA	0	157	
IIIB	0	64	
IV	0	115	
Others	2	9	
Histology			
Well differentiated	39	24	NS
Moderate differentiated	68	137	
Poorly differentiated	61	285	
Signet ring cell	55	124	
Others	3	57	
Tumour recurrence	2	233	<0.001

EGC, early gastric cancer; AGC, advanced gastric cancer; NS, not significant.

<sup>a</sup> Staging according to the Union International Contra la Cancrum (UICC) tumour node metastasis (TMN) classification.

probability as a function of time. *p*-value less than 0.05 was considered as statistically significant.

## Results

### Recurrence of tumour

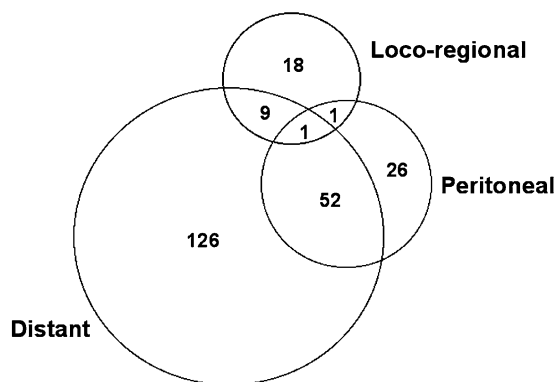
Among the 212 EGC patients, two patients had tumour recurrence after their total gastrectomy. Both of these two recurrences revealed as distant tumour recurrences. In one patient, multiple metastases in the liver and distant lymph nodes

were found at 41 months after surgery. In another patient, conglomerated para-aortic lymphadenopathy was found 19 months after surgery. In this patient, severe bilateral hydronephrosis was combined with multiple distant lymph-node metastases. There were no endoscopically accessible loco-regional tumour recurrences during a mean follow-up of 36.7 months in the EGC group.

Among the 622 AGC patients, 233 patients revealed tumour recurrence. The patterns of tumour recurrence are shown in Fig. 1 and Table 2. Isolated tumour recurrence was noticed in 170 cases, while 63 cases had two or more sites of tumour recurrence. As a single pattern, distant tumour recurrence was observed most frequently, and this was followed by peritoneal tumour recurrence and loco-regional tumour recurrence.

### Endoscopic findings

The endoscopic findings of the anastomosis site of tumour recurrence group (10 patients) and within-loop tumour group (14 patients) revealed stenosis in 10 cases, mass in eight cases, ulcer in three cases, discoloration in two cases and mucosal nodularity in one case (Fig. 2). There was no significant difference in sex, age, tumour size, resection margin and tumour stage between the endoscopically accessible tumour recurrence group ( $n=24$ ) and the non-recurrence group ( $n=548$ ). Of these 24 patients, only five patients underwent operation. Most of these 24 patients died within the first year after the diagnosis of tumour recurrence and the median



**Figure 1** Patterns of tumour recurrence ( $n=233$ ) after total gastrectomy for 622 advanced gastric cancer patients. Isolated loco-regional tumour recurrence was found in 18 patients (7.7%) with combined tumour recurrence being found in 29 patients (12.4%). Isolated peritoneal tumour recurrence was found in 26 patients (11.2%) with combined tumour recurrence being found in 80 patients (34.3%). Isolated distant tumour recurrence was found in 126 patients (54.1%) with combined tumour recurrence being found in 188 patients (80.7%).

**Table 2** Patterns of tumour recurrence ( $n=233$ ) after total gastrectomy in 622 advanced gastric cancer patients

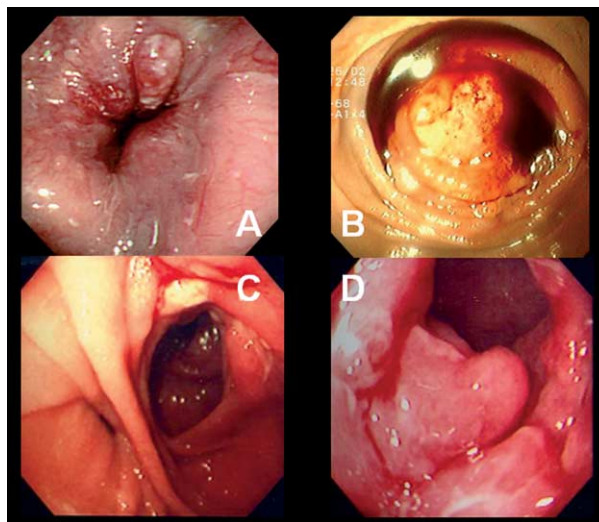
	Alone (%)	Combined (%)
Loco-regional	18 (7.7)	29 (12.4)
Regional LN	4 (1.7)	5 (2.1)
Anastomosis	10 (4.3)	10 (4.3)
Loop	4 (1.7)	14 (6.0)
Peritoneal	26 (11.2)	80 (34.3)
Distant	126 (54.1)	188 (80.7)

LN, lymph node.

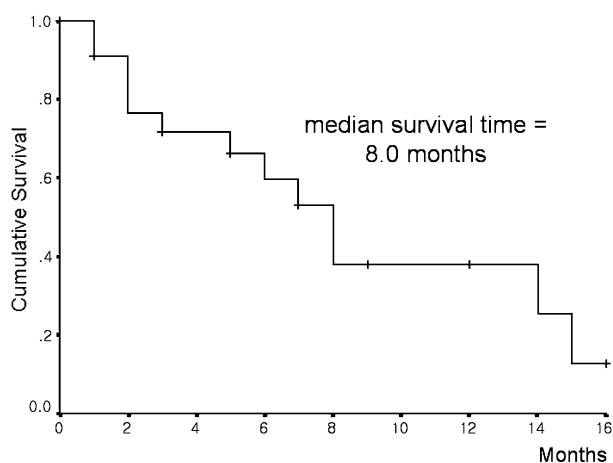
survival time was 8 months (Fig. 3). Only three patients survived longer than 1 year after the tumour recurrence.

### Stenosis of anastomosis site

Anastomosis site stenosis was detected in 72 of 834 patients (17 cases in the EGC group and 55 cases in the AGC group). All the anastomotic stenoses in the EGC group were benign, while 20% of the stenoses in the AGC group (11/55) were malignant. Malignant stenoses were noted to develop later than the benign stenoses ( $11.9 \pm 7.4$  months versus  $6.3 \pm 7.6$  months,  $p=0.03$ ). In the AGC group, there was no significant difference in age, gender, tumour size, proximal resection margin, histology and tumour stage between the benign stenosis group ( $n=44$ ) and the malignant stenosis group ( $n=11$ ). However, the distal resection margin was significantly shorter in the malignant stenosis group ( $2.3 \pm 2.1$  cm) than



**Figure 2** Endoscopic findings of peri-anastomotic tumour recurrence. Stenosis (A) was more frequently observed than mass (B), ulcer (C) or mucosal nodularity (D).



**Figure 3** Survival curve of 24 patients with the peri-anastomotic tumour recurrence. Most patients died within the first year after the diagnosis of tumour recurrence. Only three patients (12.5%) survived longer than 1 year after the recurrence.

in the benign stenosis group ( $7.4 \pm 4.3$  cm) ( $p < 0.001$ ). All patients with benign stenosis improved after the treatment with endoscopic balloon dilation.

Regarding the symptoms, there were 10 patients who did not complain any discomfort despite stenosis in the follow-up endoscopic examination. However, seven of these 10 patients required TTS (through the scope) dilatation for the treatment. Therefore, we can say that regular follow-up endoscopic examinations have additional therapeutic value in contrast to just waiting for symptoms to occur. On the other hand, in patients who complained of obstructive symptoms or weight loss, we performed endoscopic examination even it was not a follow-up period. Through this, we found 15 stenotic cases and performed additional procedure or operation. Therefore, we can say that whenever there is such symptom, it is valuable to perform endoscopic examinations apart from the routine follow-up schedules.

## Discussion

The purpose of follow-up endoscopic examination after gastrectomy is to detect the possible recurrence of tumour and the surgically related complications. Since, there is no definite consensus on post-operative follow-up, frequent examinations are recommended after gastrectomy.<sup>10</sup> However, the routine follow-up endoscopic examination must be re-evaluated as there is no remnant gastric mucosa after total gastrectomy. In the present

study, only a small proportion of tumour recurrence was endoscopically accessible, and stenosis was the most common finding.

Loco-regional tumour recurrence at the resected site or peri-anastomotic tumour recurrence is reported to occur in between 9 and 54% of patients.<sup>11-14</sup> This disagreement for the recurrence rate is probably related to the particular patient population undergoing evaluation, the definition of loco-regional tumour recurrence and the methods of describing the tumour recurrence patterns. It is assumed that the remaining tumour cells at the resected site or implantation of tumour cells are related with loco-regional tumour recurrence and that most these cases are incurable.<sup>6,11</sup> Therefore, surgery for complete resection is limited even in the endoscopically accessible recurrent cases. In the present study, a proportional number of loco-regional tumour recurrence revealed a combined tumour recurrence in other sites and curative surgery for locally recurrent gastric adenocarcinoma was rarely possible. Moreover, most of these patients died within the first year after the diagnosis of loco-regional tumour recurrence, and the mean survival time was only 8 months. Any attempts for curative treatment was futile for recurrent gastric carcinoma.

Stenosis, reflux esophagitis and loco-regional tumour recurrence are usually detected during follow-up endoscopic examinations as late complications after total gastrectomy.<sup>15</sup> Since, the long-term quality of life after surgery became more important, early management of stenosis must be considered as soon as possible.<sup>16,17</sup> In our study, the benign stenosis cases, which were found to develop significantly earlier than the malignant stenosis cases, were all curable by balloon dilatation. An operation has been considered as a first choice of therapy in the past, but endoscopic dilatation methods are recently considered as a safe and effective method.<sup>18</sup> Although some patients require repeated procedures, endoscopic balloon dilatation is usually successful after a single procedure in most cases.<sup>19</sup>

In summary, we found that endoscopic examination after total gastrectomy for gastric cancer had a limited role in the management of tumour recurrence. However, it was useful in the early detection and treatment for benign stricture. This indicates that routine follow-up endoscopy provides additional information in detecting the tumour recurrence and may improve the quality of life for detecting and treating benign stricture, but follow-up endoscopy does not enhance the survival of patients.

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