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Additional Gastrectomy After Endoscopic Mucosal Resection for Early Gastric Cancer

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The aim of this study was to examine the clinicopathological characteristics of cases undergoing additional gastrectomy after endoscopic mucosal resection (EMR) for early gastric cancer (EGC) and the appropriate strategy for treating those after incomplete EMR. We studied 16 patients who underwent additional gastrectomy after EMR for EGC. The reasons for additional gastrectomy were positive horizontal margin (8 cases), indeterminate horizontal margin (2 cases), positive vertical margin (4 cases), submucosal invasion (7 cases), lymphatic invasion (4 cases), venous invasion (1 case), and local recurrence (2 cases, including overlapped cases). Residual cancer was found in 6 of the 13 cases (46%), while no lymph node metastasis was found in any case; there were cases in which local resection was possible depending on tumor location and cases in which additional gastrectomy was performed due to suspected residual cancer but the specimens were free of cancer; follow-up without intervention appears to be feasible in some of these cases. When performing additional gastrectomy after EMR, the most appropriate method should be chosen so as not to worsen the quality of life of the patient while taking radical cure into consideration.

Key words: Gastric cancer – Endoscopic mucosal resection – Surgical treatment – Residual cancer – Lymph node metastasis

Endoscopic mucosal resection (EMR) for early gastric cancer (EGC) is an effective therapy for differentiated intramucosal carcinoma of less than 2 cm in diameter with a low possibility of lymph node

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Table 1 Relationship between operative indications and residual cancer

Reasons for operative indications	Total number (n = 16)	Residual cancer (n = 8)
HM1	6	4
SM2 deeper, VM1	2	2
SM2, HM1	1	0
SM2 deeper, HM1, VM1	1	0
SM2, HMX, ly(+)	1	0
SM2 deeper, VM1, ly(+),v(+)	1	0
HMX, ly(+)	1	0
SM1, ly(+)	1	0
Local recurrence	2	2

HM, horizontal margin; VM, vertical margin; ly, lymphatic invasion; v, venous invasion; (+), positive.

metastasis and no ulceration.[1,2] Many patients suffering from ECG have received benefits from EMR and have avoided laparotomy and maintained a better quality of life (QOL).[3,4] However, additional gastrectomy is needed in some cases for recurrence, possibilities of persistence of cancer cells, and lymph node metastasis after EMR.[5] To our knowledge, the number of reports on additional gastrectomy after EMR is limited.[6–9] Under the circumstances, inappropriate additional gastrectomy may reduce the patients' QOL or lead to adverse outcomes. In the present study, we examined the clinicopathologic characteristics of cases undergoing additional gastrectomy after EMR and the appropriate strategy for treating those after incomplete EMR.

Patients and Methods

We studied 16 patients (12 men and 4 women, median age 66.5 years, range 52–78 years) who underwent additional gastrectomy after EMR for EGC at the Surgical Departments at Katsushika Medical Center Hospital and Kashiwa Hospital at the Jikei University School of Medicine from January 1996 to August 2005. The indications for EMR consisted of differentiated cancers less than 2 cm in diameter without ulceration and a diagnosis of intramucosal carcinoma based on gross evaluation. In all cases, EMR had been performed using the strip biopsy method. The EMR specimens were sectioned at 2-mm intervals; the margins were defined as negative when several normal gland ducts were found in the margins, and as nonevaluable when reconstruction of the specimen was not possible or when they were nonevaluable due to the cauterization effect during resection. The indications for additional gastrectomy consisted of positive surgical margins and submucosal or vascular invasion by histopathologic examinations or recurrence. We examined the reasons for additional gastrectomy, tumor location, tumor size, gross type, histologic type, depth of wall invasion, presence or absence of lymphatic or venous invasion, horizontal margins, vertical margins, frequency of resection, and the presence or absence of residual cancer cells or lymph node metastasis in the specimens from the additional gastrectomy. The clinicopathologic findings were recorded according to the Japanese Classification of Gastric Carcinoma of the Japanese Gastric Cancer Association.[10]

Results

The reasons for additional gastrectomy consisted of positive horizontal margin (8 cases), indeterminate horizontal margin (2 cases), positive vertical margin (4 cases), submucosal invasion (7 cases), lymphatic invasion (4 cases), venous invasion (1 case), and local recurrence (2 cases; including overlapped cases). Residual cancer was found in 6 of the 13 cases (46%) in which additional gastrectomy was performed due to suspected residual cancer (Table 1). Although 3 cases had a tumor exceeding 20 mm in size, with 1 case having a positive horizontal margin and the other 2 indeterminate horizontal margins, no residual cancer was found in the specimens from additional gastrectomy in any of such cases. Even among the cases with a tumor size of 20 mm or smaller, 7 cases were found to have a positive horizontal margin, and in 3 of these cases, no residual cancer was found in the specimens from additional gastrectomy. Whereas 7 cases had submucosal invasive cancer and 4 of these cases had a positive vertical margin, no residual cancer was found in the specimens from additional gastrectomy in 2 of such cases. In 2 cases with recurrent tumors, Case 3 showed recurrence at 1 year after EMR and Case 4 showed recurrence at 3 months after EMR (Table 2). The times from EMR to surgery ranged from 2 weeks to 1 year and 2 months (median 1.5 months). The procedures performed consisted of distal partial gastrectomy (14 cases), proximal gastrectomy (1 case), and segmental gastrectomy (1 case). The number of dissected lymph nodes was 1 to 44 (median 14), with none of the cases having lymph node metastasis. All patients are still alive and free of recurrence at 5 years after surgery.

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Table 2 Clinicopathlogic data in 16 patients who underwent gastrectomy after endoscopic mucosal resection for early gastric cancer

	Endoscopically-resected specimen										Surgically-resected specimen	
Case	Tumor location	Tumor size (mm)	Macroscopic type	Histologic type	T	ly	v	HM	VM	Number of pieces	R	Tumor size (mm)
1	L-Ant	3	II c	tub1	M	-	-	+	-	1	-	-
2	U-Less	5	II a	tub1	M	-	-	+	-	1	+	32
3	M-Less	8	II c	tub1	M	-	-	-	-	5	+	10
4	L-Ant	10	II a	tub1	M	-	-	-	-	3	+	10
5	L-Less	15	II a	tub1	M	-	-	+	-	1	+	35
6	L-Less	17	II c	tub1	M	-	-	+	-	1	+	14
7	M-Less	19	II a	tub1	M	-	-	+	-	1	+	2
8	L-Less	25	II a + II c	tub1	M	+	-	X	-	7	-	-
9	M-Less	38	II a	tub1	M	-	-	+	-	2	-	-
10	L-Gre	20	II c + II a	tub1	SM1	+	-	-	-	1	-	-
11	U-Less	12	II c	tub1	SM2	-	-	+	-	1	-	-
12	L-Gre	40	II	tub1	SM2	+	-	X	-	1	-	-
13	M-Less	7	II c	tub1	SM2 deeper	-	-	-	+	1	+	5
14	L-Less	16	II c	tub1	SM2 deeper	+	+	-	+	1	-	-
15	M-Gre	20	II a	tub1	SM2 deeper	-	-	+	+	6	-	-
16	M-Post	20	II c	tub2	SM2 deeper	-	-	-	+	1	+	25

T, depth of tumor invasion; HM, horizontal margin; VM, vertical margin; ly, lymphatic invasion; v, venous invasion; N, lymph node metastasis; R, residual cancer; +, positive; X, unknown; –, negative.

Discussion

Local persistence/recurrence of gastric cancer after EMR is reported to be approximately 12%,[11] and another study demonstrated local persistence/recurrence of 64% when margin-positive gastric mucosal cancer was followed without treatment after EMR.[12] Nagano *et al*[6] examined additional gastrectomy cases and reported that residual cancer was noted in 5.8% of cases with the intramucosal carcinoma with positive horizontal margins, whereas residual cancer was observed in 15.4% and lymph node metastasis in 10.3% of the cases with submucosal invasive cancer with positive vertical margins. In the present study there was residual cancer in 66.7% of cases with the intramucosal carcinoma with positive horizontal margins and in 50% of the cases with submucosal invasive cancer with positive vertical margins. On the other hand, another report found no residual cancer in 41.5% of gastric specimens removed by additional gastrectomy after EMR,[13] while in the present study there was no residual cancer in 53.8% of additional gastrectomy performed for suspected residual cancer. These findings were attributed to necrosis and disappearance of cancer due to the cauterization effect during resection. One report showed that the risk factors for underestimation of the extent and depth of cancer included tumor location and gross type, and Tajiri *et al*[14] reported that correct diagnosis of the spread and depth of cancer in the upper and mid-portion of the stomach was difficult due to the differences between their endoscopic and biopsy findings. Also, a large proportion of residual cancer after EMR has been found in the upper and mid-portion of the stomach.[15] Takekoshi *et al*[16] reported that incomplete resection of antral lesions accounted for 4% of the cases, while incomplete resection of the angular incisure of the body of the stomach accounted for 10% to 20% of the cases. Incomplete resection often occurs when the lesion exceeds 15 mm or is located in the body or cardia of the stomach, and another report revealed that it was technically difficult to obtain sufficient margins from the specimens obtained by EMR for cancers located in the upper or mid-portion of the stomach.[3] The present study also indicated that 50% of cases with the additional gastrectomy had cancers in the upper or mid-portion of the stomach. Yoshii *et al*[17] compared their endoscopic findings with gross findings and demonstrated that correct diagnosis of the spread and depth of cancers for 0–IIc lesions was difficult. Another report showed that in flat or depressed lesions, the difference between the margins diagnosed by gross observation of the resected specimens and those diagnosed by histopathologic examinations was 2 to 5 mm.[18] The present study showed that 43.8% had 0–IIc lesions. The number of piecemeal resections in EMR is reportedly large

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among patients receiving non-curative resection, and Ono *et al*[4] raised the possibility of high recurrence rate when piecemeal resection was carried out, even when complete. Our clinical experience also showed that recurrence is common in cases receiving piecemeal resection. Given in the present study that no lymph node metastasis was found in any cases undergoing additional gastrectomy, and there were cases in which local resection was possible depending on tumor location and cases in which additional gastrectomy was performed due to suspected residual cancer but none was found; close follow-up without intervention appears to be feasible in selected cases with such conditions. In conclusion, when performing additional gastrectomy after EMR, the most appropriate method should be chosen so as not to jeopardize the QOL of the patient while taking curability into consideration.

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