



Original article

Laparoscopy in the management of scirrhous gastric cancer

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Abstract:

Background. Scirrhous gastric cancer frequently shows extensive tumor spread, and gastrectomy for cure of the disease is not possible in the presence of peritoneal dissemination, which is often overlooked by conventional computed tomography. The aim of this study was to evaluate our experience of 16 patients who underwent laparoscopy in the management of scirrhous gastric cancer, and to examine whether peritoneal dissemination could be diagnosed accurately by laparoscopy.

Methods. All patients had nonobstructed, nonbleeding scirrhous gastric cancer and had no evidence of metastatic disease by ultrasonography and computed tomography. Laparoscopy was performed under general anesthesia with CO₂ pneumoperitoneum. A Hasson trocar and two manipulating forceps were inserted, and the surfaces of the peritoneum, omentum, stomach, spleen, pancreas, liver, and diaphragm were examined.

Results. The mean time for laparoscopy was 20 min. Peritoneal dissemination was disclosed in 4 patients (25%), and systemic and intraperitoneal chemotherapy was done without laparotomy. In 12 patients, subsequent gastrectomy with a curative intent was successfully performed. Pathology revealed that the tumor diffusely invaded the whole thickness of the gastric wall; the mean size of resected tumors was 12 cm, and the mean number of positive nodes was 17. Nine patients died of the disease with a mean survival period of 10 months, and 7 patients were alive without recurrence during a mean follow-up period of 11 months.

Conclusions. Laparoscopy is useful for the evaluation of peritoneal spreads of advanced gastric cancer, can avoid unnecessary laparotomy because of peritoneal dissemination, and is important for the choice of treatments in patients with scirrhous gastric cancer.

Key words: laparoscopy, staging, stomach, cancer, scirrhous gastric cancer, peritoneal dissemination

Introduction

Scirrhous gastric cancer shows highly malignant behavior and often accompanies extragastric tumor invasions [1–3]. Gastrectomy for curative intent is not possible in the presence of peritoneal dissemination, and the benefit of palliative gastrectomy for survival and quality of life (QOL) of patients with scirrhous gastric cancer is not clear [4]. Therefore, preoperative staging is important in the management of scirrhous gastric cancer [5,6].

Ultrasonography (US) and computed tomography (CT) are the modalities for clinical staging for advanced gastric cancer [7,8]. Endoscopic ultrasonography (EUS) also plays an important role in the evaluation of depth of wall invasion and perigastric lymph node involvement. These modalities are useful for the diagnosis of gross metastatic diseases, but their ability to detect small metastatic seedings is limited [9,10].

Recently, staging laparoscopy has been shown to be a useful tool in patients with cancer of the pancreas [11], esophagus [12], gastric cardia [13], and stomach [5,6,14,15]. Laparoscopy provides a direct and detailed intraabdominal view, and small deposits on the peritoneal surface are easily recognized under laparoscopy. Biopsy of the peritoneal deposits and collection of the peritoneal fluids help the definite diagnosis of the disseminated disease.

In this study, we review our experience of 16 patients who underwent laparoscopy in the management of scirrhous gastric cancer, and evaluate the usefulness of preoperative laparoscopic examination in the management of advanced gastric cancer.

Patients and methods

This study included 16 consecutive patients who underwent laparoscopy to avoid unnecessary laparotomy. All

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patients had nonobstructed, nonbleeding scirrhous gastric cancer and had no evidence of metastatic disease at the time of preoperative examination by US, CT, barium enema, and digital examination of the rectum. These patients were considered to be fit for gastrectomy, and laparoscopy was performed without any intraoperative accidents or complications.

The age and sex of patients, chief complaint, weight loss, diagnosis of endoscopic biopsy, preoperative findings of US and CT, laparoscopic findings, and cytology of peritoneal irrigation were examined by medical charts and radiological reports. In patients who underwent gastrectomy, the type of operation, and histopathological findings of the removed stomach and lymph nodes were investigated by operation records and histopathology reports. These clinicopathological findings were based on the Japanese classification of gastric carcinoma outlined by the Japanese Gastric Cancer Association [16].

Laparoscopy was performed under general anesthesia and CO₂ pneumoperitoneum. A Hasson trocar was inserted below the umbilicus. The parietal and visceral serosal surfaces of the peritoneum were initially inspected. The visible surfaces of the stomach, spleen, liver, diaphragm, and omentum were examined. Two manipulating instruments were inserted at the right and left sides of the abdomen. Trendelenburg position facilitated the detailed exploration of the pelvic cavity and Douglas pouch. In female patients, the ovaries were examined to rule out Krukenberg metastases. The laparoscopy time was the interval between the insertion of Hasson trocar and the removal of trocars.

When peritoneal metastasis consisting of tumor cell deposits on peritoneal surface was disclosed under laparoscopy, tube insertion for peritoneal chemotherapy was done without laparotomy. When peritoneal dissemination was not present, radical gastrectomy and lymph node dissection followed by systemic chemotherapy with cisplatin (CDDP), methotrexate (MTX), and 5-FU was subsequently performed in a usual manner [17,18]. In one patient with pancreatic invasion, total gastrectomy with distal pancreatectomy was done.

Results

Chief complaint was epigastralgia in 8 patients and abdominal fullness or vomiting in 7; weight loss was noticed in 11 (Table 1). Barium meal study and fiberscopy showed the location of tumor was the whole stomach in 14 patients, and preoperative CT showed enlargement of regional lymph nodes in 8.

The time for laparoscopy ranged from 10 to 45 min, with a mean of 20 min (Table 2). Under laparoscopy, direct invasion to the pancreas (case 8) and transverse colon (case 9) was detected. Peritoneal deposits of tumor cell on the pelvic cavity and Douglas pouch was disclosed in four patients (cases 1,3,9,16) (Figs 1, 2). In three of four patients with peritoneal dissemination, laparotomy was not done and systemic chemotherapy with MTX (100mg/m²) and 5-FU (600mg/m²) and intraperitoneal chemotherapy with CDDP (20mg/m²) was started on the next day. No patient experienced

Table 1. Clinical findings before laparoscopy for scirrhous gastric cancer

Case	Age	Sex	Weight loss(kg)	Endoscopic biopsy	Findings of	
					US	CT
1	61	M	4	Signet	—	—
2	62	M	5	Poorly	—	N(+)
3	46	F	5	Signet	—	—
4	35	M	—	Signet	—	—
5	53	M	7	Signet	—	N(+)
6	40	M	5	Signet	—	N(+)
7	73	M	1	Poorly	—	N(+)
8	69	M	—	Poorly	—	—
9	43	F	5	Signet	—	N(+)
10	77	F	11	Signet	—	N(+)
11	66	M	10	Moderately	—	—
12	59	F	3	Poorly	—	N(+)
13	68	F	—	Poorly	—	—
14	73	M	—	Poorly	—	—
15	78	M	—	Poorly	—	—
16	53	M	3	Signet	—	N(+)

US, ultrasonography; CT, computed tomography; M, male; F, female; Signet, signet-ring cell carcinoma; Poorly, poorly differentiated adenocarcinoma; Moderately, moderately differentiated tubular adenocarcinoma; N(+), node-positive on computed tomography

Table 2. Laparoscopic findings of scirrhous gastric cancer

Case	Laparoscopy time (min)	Laparoscopic findings					Cytology	Gastrectomy	Chemotherapy
		T4	N4	H	P				
1	30	—	—	—	+	ND	—	—	
2	20	—	—	—	—	—	Total	UFT	
3	45	—	—	—	+	+	—	MTX/5FU/CDDP	
4	15	—	—	—	—	—	Total	5'DFUR	
5	15	—	—	—	—	—	Total	UFT	
6	15	—	—	—	—	—	Total	UFT	
7	40	—	—	—	—	+	Total	MTX/5FU	
8	15	+	—	—	—	—	Total	—	
9	15	+	—	—	+	+	—	MTX/5FU/CDDP	
10	15	—	—	—	—	+	Distal	MTX/5FU/CDDP	
11	10	—	—	—	—	—	Total	5FU	
12	10	—	—	—	—	—	Distal	UFT	
13	10	—	—	—	—	—	Total	5'DFUR	
14	10	—	—	—	—	—	Total	MTX/5FU	
15	10	—	—	—	—	—	Total	MTX/5FU	
16	45	—	—	—	+	ND	—	MTX/5FU/CDDP	

T4, Adjacent organ invasion; N4, extended lymph node involvement; H, liver metastasis; P, peritoneal dissemination; ND, not done



Fig. 1. Laparoscopic view of metastatic deposit on the parietal peritoneum in a patient with scirrhous gastric cancer

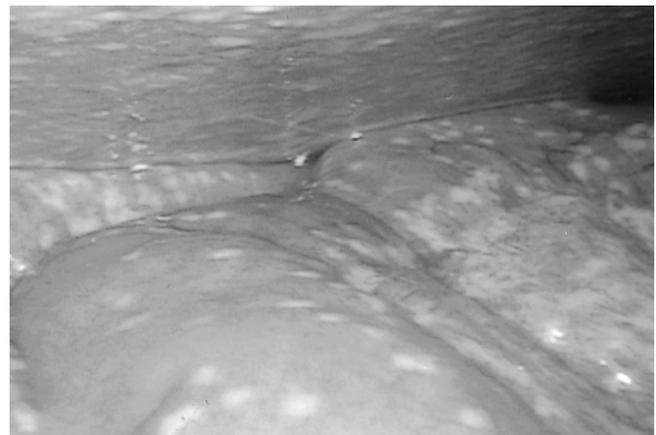


Fig. 2. Laparoscopic findings of peritoneal dissemination on the small intestine and abdominal wall

neoadjuvant chemotherapy. The other patient refused anticancer drugs and was discharged without chemotherapy.

In 12 patients with no laparoscopic evidence of peritoneal tumor deposits, subsequent laparotomy confirmed that there was no peritoneal dissemination. Total gastrectomy or distal gastrectomy with a curative intent was successfully performed. The size of tumors ranged from 7 to 24 cm, with a mean of 12 cm (Table 3). Histological type was poorly differentiated adenocarcinoma with or without signet-ring cells in 11 patients. The depth of tumor invasion was to the serosa in 9, subserosa in 2, and pancreas in 1. In 11 of 12 patients, lymph

node metastasis was present: the level of positive nodes was n2 in 7, n1 in 3, and n3 in 1; the number of positive nodes ranged from 1 to 31, with a mean of 17. In 2 patients without macroscopic deposits at laparoscopy, cytology of peritoneal irrigation at laparotomy was positive. These patients were treated by systemic chemotherapy after gastrectomy (Table 2), but died of the disease after 9 and 12 months, respectively.

A follow-up study demonstrated that nine patients died of the disease with a survival period from 5 to 19 months, showing a mean of 10 months. Seven patients were alive without recurrence during a follow-up period from 1 to 19 months, with a mean of 11 months.

Table 3. Pathological findings of resected scirrhus gastric cancer

Case	Size (cm)	Gross type	Histological type	Depth of tumor invasion	Lymph node metastasis	
					Level	Number
2	24 × 14	Borrmann 4	Poorly	Serosa	n2	13
4	9 × 8	Borrmann 4	Poorly	Serosa	n2	26
5	7 × 5	Borrmann 4	Poorly	Serosa	n3	29
6	8 × 8	Borrmann 4	Poorly	Subserosa	n1	1
7	11 × 8	Borrmann 4	Poorly	Serosa	n2	18
8	8 × 4	Borrmann 4	Poorly	Pancreas	n1	10
10	12 × 7	Borrmann 4	Poorly	Serosa	n2	22
11	11 × 10	Borrmann 4	Papillary	Subserosa	n1	2
12	7 × 5	Borrmann 4	Poorly	Serosa	n2	6
13	17 × 16	Borrmann 4	Poorly	Serosa	n0	0
14	18 × 13	Borrmann 4	Poorly	Serosa	n2	30
15	13 × 8	Borrmann 4	Poorly	Serosa	n2	31

Discussion

To avoid unnecessary laparotomy, we have introduced preoperative laparoscopy in patients with scirrhus gastric cancer. In our series, all nodules of peritoneal dissemination were clearly diagnosed at laparoscopy, and there was no case in which dissemination was not detected at laparoscopy but was found at laparotomy. Thus, laparoscopic exploration could correctly diagnose peritoneal dissemination that was not detected by US, CT, barium enema, and digital examination of the rectum. Because laparoscopic exploration was performed under general anesthesia and CO₂ pneumoperitoneum, the peritoneal cavity including Douglas pouch was fully examined using two manipulating instruments.

The role of CT for the preoperative evaluation of gastric cancer is controversial [7–10]. Some authors consider that CT is useful for the staging [7,8], while others report that CT does not accurately indicate tumor extension [9,10]. In the previous study, we evaluated the utility of CT in assessing the perigastric spread of advanced gastric cancer [19]. The study included 56 patients with node-positive gastric cancer and showed that accuracy of preoperative CT in determining the pancreatic invasion, extended lymph node involvement, and liver metastasis was 73%, 70%, and 96%, respectively. Peritoneal dissemination was not detected in 15 of 56 patients (27%), and stage IV disease was not correctly diagnosed in 18 of 40 patients (45%). In this study, diagnostic accuracy rate of CT with regard to peritoneal dissemination was 69%. Thus, perigastric and peritoneal spreads of the tumor are sometimes overlooked in CT examination, and the combination of CT, US, and laparoscopy is important for preoperative staging of advanced gastric cancer.

The usefulness of laparoscopy has been reported by several authors [5,6,13–15]. Molloy et al. [13] prospectively examined the role of laparoscopy using a total of 244 patients with cancer of the gastric cardia and esophagus. Laparoscopy detected inoperable disease in 92 patients (38%): hepatic metastasis (31%), peritoneal extension (10%), lymph node involvement (2%), and direct invasion to the adjacent organs (2%). General anesthesia for laparoscopy was poorly tolerated in 11 patients (5%), and therefore laparoscopy prevented ill-advised laparotomy in 103 patients (42%). Molloy et al. concluded that laparoscopy might be a valuable investigation tool when used to assess the feasibility of operation.

Lowy et al. [5] evaluated the results of staging laparoscopy for 71 patients with potentially resectable gastric cancer. Laparoscopy identified peritoneal metastases in 16 patients (23%) who was judged to be eligible for curative resection by current generation CT. Of these, 3 were treated with intraperitoneal hyperthermic perfusion and 1 with palliative gastrectomy. Thus, in the remaining 12 patients, the identification of occult peritoneal disease by means of laparoscopy allowed avoidance of laparotomy. The authors advocated laparoscopy as an important staging procedure for all patients with potentially resectable gastric cancer.

In the study of D'Ugo and colleagues [6], laparoscopic findings were compared with US/CT findings in 70 consecutive cases of gastric cancer. Laparoscopy showed an overall staging accuracy of 69%, compared to 33% for US/CT. Laparoscopy correctly evaluated 16 of 19 T4 cases (84%) compared to US/CT (42%). Laparoscopy diagnosed 18 patients (26%) with peritoneal dissemination that was not detected by US/CT examination. D'Ugo et al. mentioned that laparoscopy played a cru-

cial role in determining the resectability of the tumor and curability of the disease, thus avoiding unnecessary laparotomy.

Stell et al. [14] compared the accuracy of US, CT, and laparoscopy in the staging of 103 patients with gastric cancer. Laparoscopy was more sensitive in detecting hepatic, nodal, and peritoneal metastases, and was more accurate in preoperative staging than US and CT. Burke et al. [15] reviewed 111 patients who were judged to be free of intraabdominal metastatic disease on CT. Laparoscopy accurately staged 94% of the patients, with a sensitivity of 84% and specificity of 100%. The prevalence rate of unsuspected metastatic disease was 37% by laparoscopy, and 24 patients who underwent laparoscopy only were discharged earlier than those who underwent exploratory laparotomy without resection (1.4 days vs 6.5 days, $P < 0.05$). None of these 24 patients required a subsequent laparotomy, and the median survival (6 months) was not different from that for laparotomy group. Thus, laparoscopy is sensitive and specific in the staging of advanced gastric cancer, and is less invasive than laparotomy for the patients with unresectable gastric cancer. We agree with these data showing favorable results of laparoscopy.

In our series, pathology of the resected stomach after laparoscopic exploration showed that the tumor was a histologically poorly differentiated type and diffusely invaded the whole thickness of the gastric wall. The mean size of tumors was 12 cm, and the mean number of metastatic lymph nodes was 17. These findings indicate that our series included tumors showing highly aggressive behavior even if the gastrectomy was grossly curative [20–23]. Postoperative intraperitoneal chemotherapy might be beneficial for these patients [24].

In conclusion, laparoscopy in combination with US and CT is essential for the evaluation of tumor spreads in scirrhous gastric cancer. Laparoscopy can avoid unnecessary laparotomy because of peritoneal dissemination and is useful for the choice of treatments in patients with advanced gastric cancer, which includes tumors showing grossly scirrhous type [2], measuring 10 cm or more in size [23], and having enlarged lymph nodes on CT [17,25]. Whether any surgical therapy is unnecessary when only a few nodes of peritoneal dissemination exists is unknown and must be examined in a large series of scirrhous gastric cancer.

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