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Abstract

Some cases of early gastric cancer are accompanied with complications of the upper gastrointestinal tract. The characteristics of these complications were investigated, and the problems of diagnosis and treatment were discussed. Out of 297 cases of early gastric cancer, 18 cases were accompanied with complications of the upper gastro-intestinal tract, including 11 cases of bleeding, a case of perforation and 6 cases of pyloric stenosis. All 18 cases were of the macroscopically depressed type, and about 85 percent of the 297 early gastric cancer cases were of the depressed type. The depressed lesions were often accompanied by ulceration which was an important factor causing the complications, and the mechanism of which appeared to be the same as that of a benign ulcer. There are some cases of early gastric cancer which are discovered by their complications, and it would be more difficult to find an early gastric cancer lesion if there were a benign lesion at the same time. Therefore, it is necessary to take much care when diagnosing and treating cases which have such complications. An endoscopic examination before the operation is especially important, and a biopsy is indispensable.

KEYWORDS: early gastric cancer, complication, bleeding, perforation, pyloric stenosis

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EARLY GASTRIC CANCER AND ITS COMPLICATIONS : BLEEDING, PERFORATION AND PYLORIC STENOSIS

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Some cases of early gastric cancer are accompanied with complications of the upper gastro-intestinal tract. The characteristics of these complications were investigated, and the problems of diagnosis and treatment were discussed. Out of 297 cases of early gastric cancer, 18 cases were accompanied with complications of the upper gastro-intestinal tract, including 11 cases of bleeding, a case of perforation and 6 cases of pyloric stenosis. All 18 cases were of the macroscopically depressed type, and about 85 percent of the 297 early gastric cancer cases were of the depressed type. The depressed lesions were often accompanied by ulceration which was an important factor causing the complications, and the mechanism of which appeared to be the same as that of a benign ulcer. There are some cases of early gastric cancer which are discovered by their complications, and it would be more difficult to find an early gastric cancer lesion if there were a benign lesion at the same time. Therefore, it is necessary to take much care when diagnosing and treating cases which have such complications. An endoscopic examination before the operation is especially important, and a biopsy is indispensable.

Key words : early gastric cancer, complication, bleeding, perforation, pyloric stenosis.

In Japan, gastric cancer is common among malignant diseases and the research on the diagnosis and therapy of gastric cancer has made remarkable progress in the last twenty years. For example, improvements in X-ray technique and the introduction of endoscopy and biopsy now offer accuracy in the diagnosis of gastric cancer (1-6). Since the concept of "early gastric cancer" was introduced in 1962, diagnostic technique has progressed greatly. In this report, the author presents some cases of early gastric cancer which had complications of the upper gastro-intestinal tract and described the characteristics of the lesions and the problems of diagnosis and therapy. The complications included bleeding, perforation and pyloric stenosis. The relationship of early gastric cancer to each complication and some other characteristic aspects are discussed.

MATERIALS AND METHODS

Between 1970 and 1979, 297 patients with early gastric cancer who underwent gastrectomies at the Ohnishi Hospital, Matsusaka, Mie, Japan, were studied. Among these patients, 20 (6.7 %) had bleeding, 2 (0.67 %) had perforation and 6 (2.0 %) had pyloric stenosis. Some cases had benign lesions distant from the early cancers, so the only cases which were studied were those in which the complication was thought to be directly related to the early gastric cancer lesion. There were 11 (3.7 %) such bleeding cases, one (0.34 %) such perforation case, and 6 (2.0 %) such pyloric stenosis cases, totalling 18 cases, (6.1 %).

RESULTS

Of the 11 patients with bleeding, 10 were males, and their ages ranged from 34 to 69 years (mean 50.2). There were many patients aged 30 to 40 years old who had melena (Table 1). An X-ray examination of all 11 patients was done before the operation, and 9 patients (81.8 %) received an endoscopic examination and biopsy, the results of which were all positive. The preoperative diagnosis

Table 1. CASES OF EARLY GASTRIC CANCER WITH COMPLICATIONS

Age/Sex	Chief complaint	Preoperation	Visual diagnosis	Macroscopic type	Microscopic type	Size (mm)	Depth	Location
Bleeding								
69, Male	heatoemesis	IIC+III	IIC	IIC+III	Adc. pap.	18×14	sm	A. post.
44, Male	“	G.U.	IIC+III	IIC+III	Adc. tub.	43×30	sm	A. less.
36, Male	melena	Borr. 3	IIC+III	IIC+III	Adc. tub.	15×14	m	A. ant.
34, Male	“	IIC	IIC	IIC with scar	Adc. muc. et. sci.	25×22	m	M. ant.
51, Female	“	Borr. 3	IIC	IIC+III	Adc. sci.	48×32	sm	MC. less.
45, Male	“	IIC	IIC	IIC with scar	Adc. sci. et. muc.	62×60	m	M. less.
67, Male	“	IIC+III	IIC+III	IIC+III	Adc. pap.	70×45	sm	MC. less.
42, Male	“	IIC+III	IIC	IIC+III	Adc. muc.	100×90	sm	A. less.
51, Male	hematoemesis & melena	IIC	IIC	IIC	Adc. tub.	18×15	m	A. ant.
47, Male	“	IIC	IIC+III	IIC+III	Adc. muc.	21×7	m	M. ant.
66, Male	“	Borr. 2	Borr. 2	II + IIa	Adc. pap.	31×17	sm	A. ant.
Perforation								
36, Male	severe pain	G.U.	IIC+III	IIC+III	Adc. tub.	60×35	sm	A. less.
Pyloric stenosis								
39, Male	neusea, vomiting	Borr. 3	G.D.U.	IIC+III	Adc. muc.	20×15	m	A. less.
24, Male	“ , “	Borr. 3	G.D.U.	IIC+III	Adc. muc.	60×60	sm	A. less.
76, Male	“ , “	Borr. 3	III+IIC	III+IIC	Adc. pap.	70×40	sm	A. less. great.
48, Female	“ , “	Borr. 3	IIC with scar	IIC with scar	Adc. tub.	32×12	sm	A. less.
58, Male	“ , “	Borr. 3	IIC+III	IIC+III+IIa	Adc. pap.	55×40	sm	A. less. great.
44, Male	nausea	IIC+IIa	IIC+III	IIC+III	Adc. sci.	60×35	sm	A. less.

G.U.: Gastric ulcer, Adc.: adenocarcinoma, pap.: papillotubulare, tub.: tubulare, sci.: scirrhousum, muc.: mucocellulare, Borr.: Borrmann, less.: lesser curvature, great.: greater curvature, ant.: anterior wall, post.: posterior wall, G.D.U.: gastro-duodenal ulcer.

was 7 cases (63.6 %) of early gastric cancer, 3 (27.3 %) of advanced gastric cancer and 1 (9.1 %) of gastric ulcer. All patients received an extended gastrectomy. The postoperative macroscopic diagnosis was 10 cases of early gastric cancer, and 1 case of advanced gastric cancer. The lesions were in the A area in 6 cases, in the M area in 3 cases and in the MC-area in 2 cases. The major parts of the lesions were in the anterior wall and the lesser curvature (Fig. 1). Macroscopically the cancers were of the depressed type in all 11 cases, and 9 cases of the 11 had ulcerations in the early gastric cancer itself. The depth of the ulcerations were ul-II in 5 cases, ul-III in 3 cases, and ul-IV in 1 case (Table 2). In 5 cases the cancer infiltrated the mucosal layer (m), and in 6 cases, it infiltrated the submucosal layer (sm). Three cases were well differentiated histologically and 8 cases poorly differentiated. The smallest lesion was 1.5 × 1.4 cm, and the largest 10.0 × 9.0 cm (Table 3).

A 36-year-old male was the only patient with perforation, making the incidence 0.34 %. In this case, the preoperative diagnosis was of a gastric ulcer, and the patient received an emergency operation. During the operation, this patient was diagnosed as having early gastric cancer, and he received the necessary extended operation. The lesion was located on the lesser curvature in the A area, and its size was 6.0 × 3.5 cm. The lesion had an ulceration (1.5 × 1.2 cm), and the

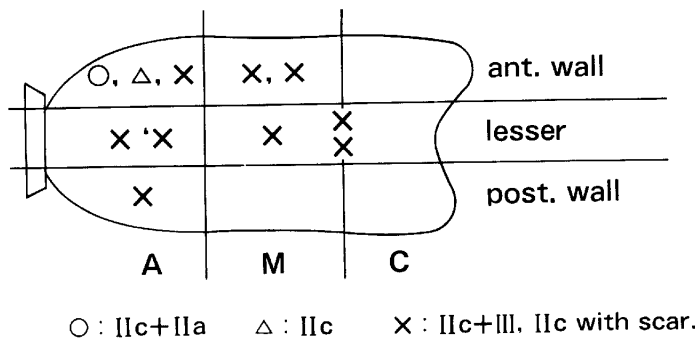


Fig. 1. Location of Bleeding lesions.







TABLE 2. DEPTH OF ULCERS IN EARLY GASTRIC CANCER (297 CASES)

Depth	Bleeding	Total
ul-II	5 (55.6 %)	72 (47.4 %)
ul-III	3 (33.3 %)	55 (36.2 %)
ul-IV	1 (11.1 %)	25 (16.4 %)
Total	9	152*

*Ulceration occurred in 152 of 316 (early gastric cancer) lesions (48.1 %).

TABLE 3. MACROSCOPIC TYPE & SIZE. (BLEEDING CASES)

Size	Type			
	Without ulceration		With ulceration	
< 2 cm	IIC	sm	IIC+III	m
			IIC+III	sm
2 cm ≤ < 3 cm			IIC+III	m
			IIC with scar	m
3 cm ≤ < 4 cm	IIC+IIa	sm		
4 cm ≤ < 5 cm			IIC+III	sm
			IIC+III	sm
5 cm ≤			IIC with scar	m
			IIC+III	sm
			IIC+III	sm

case	sketch		
39 Male	D.U. (ul-II) 	20mm×15mm	IIC+III m, ul-II Adc. mucocellulare
24 Male	D.U. (ul-II) 	60×60	IIC+III sm, ul-IV Adc. tubulare
76 Male		70×40	III+IIC sm, ul-IV Adc. papillotubulare
48 Female	duodenal invasion 	32×12	IIC with scar sm, ul-II Adc. tubulare
58 Male	 IIa	55×40	IIC+III+IIa sm, ul-II Adc. papillotubulare
44 Male		60×35	IIC+III sm, ul-II Adc. scirrhosum

Adc.: adenocarcinoma

Fig. 2. Location of the Pyloric Stenosis lesions.

perforation (6 × 5 mm) was in the center of the ulceration. Macroscopically, the cancer was of type IIC + III, and microscopically, it was poorly differentiated. The infiltration of the cancer was into the submucosal layer (sm). Microscopically, the structure of the perforated area was similar to that of a benign ulcer.

Pyloric stenosis (Table 1, Fig. 2.) was diagnosed based on roentgenograms and clinical findings. There were 6 patients, or 2.0 % of the 297 early gastric cancer patients having pyloric stenosis. There were 5 males and 1 female, and their ages ranged from 24 to 76 years (mean 48.2). All cases had a long standing clinical course, the shortest one being 7 months and the longest one 13 years (mean 5.3 years). The clinical course was longer than that of the other two complications.

The most frequent complaints were of heart burn and epigastralgia which had continued for a long time. All 6 cases had nausea, 5 cases had vomiting, a sense of being full and body weight loss, and 3 cases had appetite loss. The maximum body weight loss was 10 kg. In cases which had long clinical course, the patients induced themselves to vomit when they felt nausea or the sense of being full. All cases had stenosis or obstruction of the pyloric canal and delayed passage of barium from the stomach to the duodenum, some cases had a dilated stomach. Tumors or tumor-like resistance was palpated in the epigastral area in all cases, and patients complained of nausea or pain when pressure was applied to that area. Five patients underwent endoscopic examination and biopsy before the operation. The result of the biopsy was positive in 4 cases, 80 %. The pre-operative diagnosis was of advanced cancer (Borrmann type 3) in 5 cases, and early gastric cancer (IIc + IIa) in one case, 16.7 %. The clinical manifestations of all the patients improved within the first week of conservative therapy, and the patients all received an operation. The postoperative macroscopic diagnosis was of early gastric cancer in 4 cases and gastro-duodenal ulcer in 2 cases. The cancer was located in the lesser curvature in the A area in all 6 cases. The lesions spread to the anterior and posterior wall of the antrum, so it seemed that the lesions tightened the pyloric canal. The length between the anal edge of the lesions and the pyloric ring was less than 1.5 cm in all cases. One case had duodenal invasion. Macroscopically, all lesions were of the depressed type, and had ulcerations. The lesion was over 5 cm in 4 cases, and infiltration was into the submucosal layer in 5 cases. Two cases were well differentiated and 4 cases poorly differentiated type. Two cases had separate duodenal ulcers and gastric ulcers, near the pyloric ring and in the angulus far from the early gastric cancers, respectively.

DISCUSSION

It has been claimed that bleeding from gastric cancer is a secondary result of a peptic ulcer in the upper gastro-intestinal tract (7-15). There have been many reports of bleeding from gastric cancer (12-23), but few regarding early gastric cancer (24-26). The present author reports 11 cases (3.7 %) of bleeding out of 297 cases of early gastric cancer, which represents 1.2 % of 912 cases of advanced and early gastric cancer at Ohnishi Hospital. The incidence is lower than that of other authors' (5-15 %) (1, 2, 20, 23). Melena was more frequent than hematemesis (9 cases, 81.8 % of 11) as reported by other authors' (12-14, 21, 22). X-ray and endoscopic examination were done for preoperative diagnosis, however, the biopsy was the most important diagnostic method in the bleeding cases. Lesions were located mostly in the A to M area (27) and the anterior wall to the lesser curvature, as described by other authors (13, 14, 19). Many lesions were of the depressed type with an ulceration in the lesion itself (81.8 %). In 2 cases without ulceration, the bleeding was caused by carcinomatous erosion (28). Out of all

the early gastric cancer cases there were 316 lesions of which 269 lesions (85.1 %) were of the depressed type and 152 lesions (56.5 %) had ulceration. Histologically 8 cases (72.7 %) were poorly differentiated, the incidence being the same as that of other authors (12-18). Out of all 316 lesions, 199 were poorly differentiated (63.0 %), and considering only the 152 lesions with ulcerations, 109 lesions were poorly differentiated (71.7 %). This high incidence is due to the cells being loosely attached and easily stripped in poorly differentiated lesions (24, 25, 29). The infiltration of the cancer was into the mucosal layer in 5 lesions and into the submucosal layer in 6 lesions. Out of all 316 lesions, infiltration was into the mucosal layer in 170 and the submucosal layer in 146 lesions. There was no significant relation between the depth of infiltration and the bleeding, and between the size of the lesion and the bleeding (12-15, 19, 20).

Only 5 cases of early gastric cancer with perforation have been reported (Table 4) (30-32), and only one case (0.34 %) was experienced among the 297 early gastric cancer patients of this study. Perforation accompanying gastric cancer was reported by Laennec for the first time in 1824 (33), and in Japan it was reported first by Saito in 1916 (34). In Japan the incidence of gastric cancer with a perforation including both early and advanced cancer, is 0.4 % (35, 36). Once perforation occurs, it is difficult to diagnose the cancer before the operation, and such patients are operated upon urgently for perforation of a peptic ulcer. Most of the cases are diagnosed during the operation, so it is important to diagnose carefully with a fresh specimen taken during the operation (37). The perforation occurs in the ulceration which is in the poorly differentiated, depressed cancer lesion (35). Since the area of perforation accompanying early gastric cancer is similar histologically to that of a benign peptic ulcer, the author believes that the

TABLE 4. CASES OF PERFORATION IN THE LITERATURE

Author	Itano (1981)	Oana <i>et al.</i> (31) (1978)	Maeda <i>et al.</i> (32) (1980)
case (age, sex)	36 Male	47 Male	41 Female
chief complaint	severe epigastralgia	epigastralgia	epigastralgia
status	tenderness (+ +) resistance (+) Blumberg (+)	(+) (+) (+)	(±) (±) (±)
preope. diag.	G.U.	G.U. or D.U.	G.U. or D.U.
postope. diag.	IIC + III	IIC + III	G.U.
macroscopic type	IIC + III	IIC + III	III
microscopic type	Adc. tub.	Adc. muc.	Adc. muc.
depth	sm	m	m
size of perforation	60×35 (6×5)mm	60×25 (8×8)	13×13 (13×13)
location	A. less.	M. ant.	M. ant.

mechanism of ulceration in early gastric cancer is the same as that in a benign peptic ulcer (31). Perforation only occurs in the ulceration of lesions, so the tendency to perforate has no relation to the size of the early gastric cancer lesion itself. The location of early gastric cancers having ulcerations is as same as that of other early gastric cancers (23-25). As the therapy, a radical operation should be performed (35-39).

The incidence of pyloric stenosis was 2 % (6 cases) of 297 cases. Most of the reported cases of pyloric stenosis occur in those of benign ulcers or advanced gastric cancer. A few cases have been reported of pyloric stenosis in connection with early gastric cancer (30, 41-47). Balint (41) reported that the pyloric stenosis with early and advanced gastric carcinoma was 11.0 %. In comparison, the incidence of pyloric stenosis in benign ulcers is 1.5 %-8.6 % (42, 48). Takeda (45) reported the incidence of pyloric stenosis or pyloric obstruction to be 1.5 % in benign ulcers and 2.9 % in the depressed type of early gastric cancer. The clinical manifestations are mostly those of the stenosis itself. The key to diagnosis is roentgenography of the stomach, including such findings as delayed passage of barium from the stomach to the duodenum and the stenotic shadow of the pyloric area (41-43, 44, 47). It is characteristic that the clinical course of pyloric stenosis is longer than that of other complications. In Balint and other's reports, half of the pyloric stenosis cases had long clinical courses of over 10 years. It is very difficult to diagnose in detail before the operation because the lesion is in a special area of the stomach, the pyloric canal, the lesion itself is deformed by edema and constriction, and there is stagnant food in the stomach (45, 47, 49-52). It is known that many malignant lesions occur in the pyloric area (45, 49), and it is important to distinguish whether the pyloric stenosis is due to a benign ulcer or malignant lesion. Even if biopsies reveal malignant lesions, it is still difficult to distinguish whether the lesion is in the early or advanced stage and what macroscopic type the lesion is (44, 45). According to the clinical course of the six cases in this study which improved within the first week of conservative therapy, there is a high possibility that those cases were benign or of early cancer (30). Pathologically, all 6 cases were of the depressed type of early gastric cancer with ulceration (45). Four of the six cases had poorly differentiated lesions. Ulceration in early gastric cancer plays a very important role in the mechanism of pyloric stenosis, since the pyloric stenosis is thought to be caused by the edema and scar formation of the ulceration (45). In all the cases of pyloric stenosis, the lesion was located in the pyloric canal less than 1.5 cm from the pyloric ring, and its long axis ran parallel to the ring. The size of the ulcerations were more than half the length of the lesion which occupied more than 65 % of the pyloric canal.

The pyloric stenosis may occur when there is an ulceration in a depressed type cancer, the length between the pyloric ring and the anal edge is less than 1.5 cm or there is duodenal invasion, the ratio of the length of the lesion to the pyloric canal is over 65 % and the ratio of the diameter of the ulceration and the

lesion is over 50 %.

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