

## A Study of Gastric Ulcer and Cancer Perforation

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### INTRODUCTION

Ten years have passed since the Emergency Medical Center was established. During this period 24 patients with gastric perforation, including 16 cases with gastric ulcer and eight cases with gastric cancer, were surgically operated. A series of study was made with those 24 cases referring to their symptoms, preoperative diagnoses, modes of operation, prognosis (especially as to death immediately after surgery), etc. Some knowledge obtained from the study is reported below.

#### *Gastric Ulcer Perforation*

There were 83 patients surgically operated for gastric ulcer in the past 10 years, including 16 cases (19%), operated in emergency due to gastric ulcer perforation their age ranging from 15 to 77 years, 62.5 years on the average. They were operated hours to two days after incidence, 15.8 hours on the average. All of six cases (38%) known as gastric ulcer perforation by preoperative diagnosis had the history of gastric ulcer. One case out of six felt pain on the next day after gastric radiology, which suggests that perforation was induced by radiology. On abdominal X-ray films 13 cases (81%) were free gas positive. Perforations were found at the cardia (C) in two cases, the body (M) in seven cases the antrum (A) in seven cases, all found on the anterior wall, except one case who had it on the posterior wall at the gastric angle. Gastrectomy was carried out in 11 cases, and

simple closure of perforation and drainage in five patients including two who had shocks before the operation. When symptoms were improved, two cases had the secondary gastrectomy. Postoperative complications were noted in two cases as postoperative wound infection, three cases as renal dysfunction, one case each as hepatic insufficiency and pneumonia. A patient operated two days after perforation died of hepatic insufficiency on the 9th day after the operation. This is the only case of death caused by surgery. The one died of renal insufficiency 37 days after the operation was the patient who had some degrees of shock before the operation, and had an cardiac arrest during surgery, being endotoxin positive. After resuscitation, simple protection of the perforated area and peritoneal drainage were conducted, but withdrawal from shock was difficult after the operation, and died of renal insufficiency.

#### *Gastric Cancer Perforation*

Out of 220 patients operated for gastric cancer, patients (3.6%), four males and four females had perforation. Their age at the time of operation ranged from 25 to 88 years, 61 years on the average. Out of three cases diagnosed as gastric cancer perforation preoperatively, two were already to be operated for gastric cancer, while another one was immediately before the operation found perforation upon gastrographic radiology. Case No. 2 and 6 (Table 1) had severe pain immediately after gastroendoscopy, which was probably the cause of perforation.

**Table 1.** Preoperative Diagnosis, Operation and Prognosis in Gastric Cancer Perforation

Case No.	Age	Sex	Preoperative diagnosis	Operative method	Radicality	Postoperative complication	Prognosis (Died of)
1	67	M	Gastric cancer perforation	Gastrectomy (Primary) Lymphnode dissection (after 1M)	Curative	Leakage of anastomose	Cancer (21th month)
2	65	M	Gastric cancer perforation	Omental wrapping of perforated area	Noncurative	Renal insufficiency	After surgery (9 days)
3	78	F	Gastro intestinal tract perforation	Gastrectomy	Noncurative	Pneumonia	Cancer (7th month)
4	64	M	Gastro intestinal tract perforation	Gastrectomy	Noncurative	Hepatic insufficiency	Cancer (3th month)
5	25	F	Gastro intestinal tract perforation	Total gastrectomy splenectomy	Curative	Hepatorenal insufficiency	After surgery (3 days)
6	66	F	Gastric cancer perforation	Gastrectomy	Curative	Renal insufficiency	After surgery (5 days)
7	88	F	Gastro intestinal tract perforation	Simple closure of perforation	Noncurative	Renal insufficiency	After surgery (17 days)
8	36	F	Gastric ulcer perforation	Gastrectomy (Primary) Total gastrectomy (after 1M)	Curative	(-)	Cancer (14th month)

All of them complained of increasing abdominal pain as one of clinical symptoms, out of which five cases (63%) revealed muscular defense and cases (63%) showed free gas on abdominal X-ray films. Perforations were noted in the antrum (A) in four cases, the body (M) in three cases and cardia (C) in one case. All of them were located on the anterior walls close to the lesser curvature of stomach. Mode of operation was selected according to perioperative conditions of the patients. Out of six gastrectomized cases the R<sub>2</sub> operation was performed on three cases only, and two of them had the secondary operation after improvement of symptoms. Two patients out of eight could have drainage after simple protection of the perforated area, showing the curative resection rate of 50%. All of them died from three days to 21 months after surgery, wherein death immediately after operation was noted at 50%, which is much higher as compared with 11.6% of postoperative death in gastric cancers without perforation. As shown in Table 2, all these cancers were ulcerative type (three cases of Borrmann II and five cases of Borrmann III), of highly

advanced cancer at Stage III or further. As to the histology, there were three cases of poorly differentiated adenocarcinoma, three cases of signet ring cell carcinoma and one case each of moderately and well differentiated adenocarcinoma, revealing the majority of the poorly differentiated type. The histological development was noted to be upto ss $\gamma$  with five cases. Type of Stage III or further was noted in only three cases except one case unknown in its histological advancement, revealing that there was a difference in development of cancer between the histological and macroscopical findings.

#### Postoperative Course of Gastric Ulcer and Gastric Cancer

In case of peritonitis caused by gastrointestinal perforation, anesthetic risks at emergency operation, endotoxin shocks caused by intraperitoneal contamination, and bleeding are expected at the early stage of prognosis. Table 3 shows a comparison of preoperative conditions in case of perforation between ulcer and cancer.

When age at the time of operation, time from

**Table 2.** Perforated area, and Macroscopical and Histological Advancement in Gastric Cancer

Case No.	Perforated area	Borrmann's Classification	Macroscopic progress	Histological differentiation	Histological development of cancer
1	M (anterior wall)	III	StageIV P <sub>0</sub> H <sub>0</sub> S <sub>3</sub> N <sub>1</sub>	signetring cell carcinoma	ss- $\gamma$
2	M (anterior wall)	II	StageIV P <sub>0</sub> H <sub>0</sub> S <sub>3</sub> N <sub>2</sub>	poorly differentiated adenocarcinoma	—
3	A (anterior wall)	II	StageIV P <sub>0</sub> H <sub>2</sub> S <sub>2</sub> N <sub>1</sub>	signetring cell carcinoma	ss- $\gamma$
4	A (anterior wall)	III	StageIV P <sub>1</sub> H <sub>2</sub> S <sub>3</sub> N <sub>(3)</sub>	poorly differentiated adeno carcinoma	se
5	C (anterior wall)	III	StageIII P <sub>0</sub> H <sub>0</sub> S <sub>2</sub> N <sub>0</sub>	poorly differentiated adenocarcinoma	ss- $\gamma$
6	A (anterior wall)	III	StageIII P <sub>0</sub> H <sub>0</sub> S <sub>2</sub> N <sub>1</sub>	well differentiated adenocarcinoma	ss
7	A (anterior wall)	II	StageIII P <sub>0</sub> H <sub>0</sub> S <sub>2</sub> N <sub>1</sub>	moderately differentiated adenocarcinoma	s- $\beta$
8	M (anterior wall)	III	StageIII P <sub>0</sub> H <sub>0</sub> S <sub>2</sub> N <sub>(2)</sub>	signet ring cell carcinoma	ss- $\gamma$

**Table 3.** Gastric Ulcer and Cancer Perforations in Comparison

	Gastric ulcer (16 cases)	Gastric cancer (8 cases)
Age at surgery	62.5±13.9	61.1±20.7
Time from incidence to surgery (hr)	15.8±13.1	15.6±23.0
Time for surgery (hr) (anesthetic time)	2.4±1.0 (3.4±1.1)	3.0±0.8 (3.6±0.7)
Perioperative bleeding (ml)	207±111*	381±226*
Pre operative laboratory test		
BT (°C)	36.5±0.5**	37.2±0.5**
WBC	9138±4251	10700±4171
TP (g/dl)	6.2±0.6	6.5±0.6
BUN (mg/dl)	32.3±16.9	19.5±6.5
Cre (mg/dl)	1.9±1.5	1.0±0.2
Death immediately after surgery (%)	1 (6.3%)	4 (50%)

\* p&lt;0.05 \*\* p&lt;0.1

incidence of perforation to operation, time needed for operation and anesthesia, volume of bleeding, preoperative blood biochemical tests, etc., are compared between cancer and ulcer, no significant difference was observed except volume of bleeding. Although two cases of preoperative shock and one case of endotoxin positive were observed in the patients with ulcer perforation, many more died immediately after the operation in cancer perforation.

## DISCUSSION

Duodenal ulcer followed by gastric ulcer has been the most frequent cause of perforation in the upper gastrointestinal tract. Compared with such benign ulcer perforation the frequency of gastric cancer perforation is very low, reported as 0.15-2.89%.<sup>1)2)</sup> In the authors' clinic the fre-

quency was 3.4%, much higher than the incidence in other reports, probably because many patients with acute celiopathy visit our institution with the Emergency Medical Center.

It is very important in gastrointestinal perforations that (1) a diagnosis should be made as early as possible, (2) a mode of surgery should be selected to meet conditions of the patient, and (3) Peri-and postoperative management of peritonitis should be appropriate

There are many reports referring to the perforation and surgery, as well as prognosis.<sup>3)</sup> It is stated that frequently endotoxin shock and bleeding shock occur in the patients 24 hours or more after the incidence, inducing unfavorable postoperative courses. The authors experienced that only one patient with gastric ulcer perforation operated two days after incidence died immediately after surgery. Accordingly, not only for those free gas positive on X-ray films but even for those negative the respective surgery should be given without waste of time if perforation is suspected. Principally as a routine, extensive gastrectomy should be applied to gastric ulcer. However, it is sometimes limited to a simple closure of the perforated area or omental filling when a shock is advanced or blood pressure is unstable perioperatively. The authors had to conduct only simple closure on five cases out of 16, although two cases of which had the secondary gastrectomy after improvement of conditions. The surgical operation should be repeated positively when ulcer is hardly cured after the operation or hemorrhage continues.

In gastric cancer perforation the radical cure must be considered simultaneously in addition to treatment of the perforated area. The R<sub>2</sub> operation is advisable, although it is often limited to noncurative resection, in most of those cases of advanced cancer.<sup>4)</sup> In this study four patients out of eight (50%) were noncurative. However, development of cancer differs in certain extent, as observed perioperatively and histologically,<sup>5)</sup> therefore, even if it had been diagnosed as gastric ulcer perioperatively and noted as cancer postoperatively, or the operation is limited to an extent of R<sub>1</sub> due to poor conditions, it is possible to expect the radical cure by conducting the secondary R<sub>2</sub> operation

after improvement of the postoperative course. It may also be necessary to have the perforated area biopsied routinely during the operation in case of gastric perforation taking difficulties of the pre-and perioperative diagnosis of perforated gastric cancer into account.<sup>6)</sup>

As the peri-and postoperative management of peritonitis, sufficient intraperitoneal washing, drainage and treatment for the shock are required. In gastrointestinal perforations the authors used to conduct intraperitoneal washing with 10,000 ml or more of physiological saline solution together with prophylactic treatment for renal and hepatic insufficiency after the operation.

Prognosis of perforated gastric cancer was very unfavorable, showing a high death rate immediately after the operation, although no difference in preoperative conditions was noted compared with that in perforated gastric ulcer. It is probably due to lack of readiness for the anesthetists and surgeons, who did not expect advanced cancer in addition to perforated gastric cancer.

## CONCLUSION

The authors reported on 24 patients with gastric perforation treated in our clinic. All of them are surviving except one patient with gastric ulcer perforation who died after the operation. On the contrary, in gastric cancer perforation 50% of the patients died after poor postoperative courses. It was tried intensively to select a mode of operation to meet the general conditions of the patient taking the secondary operation into account.

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