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Unplanned laparoscopic peritoneal biopsy for gastric cancer

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ABSTRACT

Introduction: It is thought that the sensitivity of computed tomography (CT) in detecting peritoneal metastases (PM) is low. In this study, we aimed to present our experience on gastric cancer (GC) patients with intraoperatively detected PM whose preoperative CT was normal in terms of distant metastasis.

Materials and Methods: We retrospectively analyzed the demographics and perioperative data of ten patients with gastric adenocarcinoma whose preoperative CT was normal in terms of PM, but intraoperatively PM was detected.

Results: The mean age of the patients was 68.30±9.44 years. Six patients (60%) were male. Tumors were mostly localized in the distal 1/3 of the stomach (n=5, 50%). The median carcinoembryonic antigen and carbohydrate antigen 19.9 levels were 2.00 ng/ml (0.60–37.50) and 30.76 IU/ml (3.28–449.30), respectively. There were PM on the visceral peritoneum (small bowel mesentery) in two patients (20%) and on the parietal peritoneum in eight patients (80%). The operations were terminated in five patients (50%) when the PM detected as they did not have any complications due to cancer. Laparoscopic feeding jejunostomy (n=2, 20%), laparoscopic tube gastrostomy (n=1, 10%), and laparoscopic gastroenterostomy (n=2, 20%) were performed on the patients with oral intake deficiency due to GC.

Conclusion: Preoperative staging with CT before GC surgery is still valid. Multidetector CT scan should be preferred. However, it is still not enough for detecting all PM before surgery. Staging laparoscopy should be in mind, especially for patients with a high risk of PM.

Keywords: Advanced gastric cancer; computed tomography; minimal invasive; peritonitis carcinomatosa.

Introduction

The choice of treatment method for gastric cancer (GC) is strongly dependent on the tumor size, lymph node involvement, and distant metastasis. Therefore, accurate preoperative staging is essential.[1] Peritoneal carcinomatosis (PC) is seen in 55–60% of patients with metastatic GC, and pretreatment diagnosis of this situation is critical. One of the most frequently used non-invasive methods for

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pretreatment PC diagnosis is computed tomography (CT).[2] In a systematic review, it was stated that the sensitivity of CT in detecting peritoneal metastases (PM) is very low.[1] In this study, we aimed to present our experience on GC patients with intraoperatively detected PC whose preoperative CT was normal in terms of distant metastasis.

Materials and Methods

This study was approved by the local ethical committee (2020/1396). Two hundred and thirteen GC patients underwent curative or palliative laparoscopic GC surgery between November 2014 and December 2020. The inclusion criteria were the age ≥18 years, the diagnosis of gastric adenocarcinoma, not receiving any neoadjuvant chemotherapy or radiotherapy, having a normal preoperative CT in terms of distant metastasis, and intraoperatively detected PC. Finally, ten patients were included in the study. Written informed consent was obtained from patients before surgery. Patients were evaluated via physical examination, upper gastrointestinal endoscopy, and a single detector triphasic CT with oral and intravenous contrast. Positron emission tomography was not performed. The decision for the operation was made by the multidisciplinary tumor board. The operations were performed by the senior surgeon or training surgeons under the supervision of the senior surgeon. Patients' on-table preparations and position were as previously described.[3] Palliative approaches were performed according to the surgeon's decision, the tumor's location, and the patient's condition. Laparoscopic feeding jejunostomy, laparoscopic gastroenterostomy, or laparoscopic tube gastrostomy were performed if needed for palliation as previously described.[4,5]

Age, gender, comorbidity, The American Society of Anesthesiologists classification (ASA), body mass index (BMI), carcinoembryonic antigen (CEA) (normal value between 0 and 5.5 ng/ml) and carbohydrate antigen 19.9 (CA 19-9) (normal value between 0 and 35 IU/ml) levels, tumor location, the time interval between CT and surgery, type of surgery, the use of the intraoperative frozen section, operative time, intraoperative blood loss, conversion to laparotomy, time to oral intake, length of hospital stays, need for reoperation, intraoperative and postoperative complications, 30-day mortality, and time to adjuvant chemotherapy were retrospectively analyzed.

Statistical Analysis

The Shapiro-Wilk test was performed to analyze the normality of the distribution of continuous variables. Continuous variables were given as mean±standard deviation or median (minimum-maximum) as appropriate and categorical variables were given as frequencies and percentages.

Results

The rate of undetected PM on preoperative imaging was 5.7% in this study. Table 1 shows the preoperative find-

Table 1. Preoperative findings and demographic data of the patients

Patient number	Age (years)	Gender	BMI (kg/m²)	Comorbidity	ASA	CEA (ng/ml)	CA 19-9 (IU/ml)	Tumor location	Time interval between CT and surgery
1	67	M	25	CAD	2	0.6	449.3	Middle 1/3	NA
2	53	M	26.1	DM	2	3.47	19.7	Linitis plastica	NA
3	57	M	20.2	–	1	1.04	41.4	Distal 1/3	18
4	77	M	26	–	2	4.1	60.4	Proximal 1/3	21
5	76	F	25.1	DM. HT	3	1.1	18.6	Linitis plastica	28
6	67	M	NA	HT	3	0.95	3.28	Distal 1/3	20
7	63	M	27.3	–	2	2.91	20.13	Distal 1/3	NA
8	78	F	20.8	–	2	5.2	81	Distal 1/3	8
9	64	F	27	–	3	37.5	183	Proximal 1/3	55
10	81	F	NA	–	3	1	19	Distal 1/3	3

M: Male; F: Female; CAD: Coronary artery disease; HT: Hypertension; DM: Diabetes mellitus; BMI: Body mass index; ASA: The American Society of Anesthesiologists classification; CEA: Carcinoembryonic antigen; CA 19-9: Carbohydrate antigen 19.9; NA: Nonavailable; CT: Computed tomography.

ings and demographic data of the patients. The mean age of the patients was 68.30±9.44 years. Six patients (60%) were male. The median BMI was 25.55 kg/m^2 (20.20–27.30) (we could not achieve the BMI of two patients, therefore, the analysis was performed on eight patients). Four patients (40%) had at least one comorbidity. The most common ASA score was 2 (n=5, 50%) and tumors were mostly localized in the distal 1/3 of the stomach (n=5, 50%). The median CEA and CA19-9 levels were 2.00 ng/ml (0.60–37.50) and 30.76 IU/ml (3.28–449.30), respectively.

Table 2. Intraoperative variables

Patient number	Surgery	Intraoperative frozen section	Operative time (min)	Intraoperative blood loss (ml)	Conversion
1	Laparoscopic feeding jejunostomy	Periton	150	30	No
2	–	Small bowel mesentery	45	0	No
3	–	Periton	120	20	No
4	Laparoscopic feeding jejunostomy (after one week PEG tube placed endoscopically)	Periton	60	0	No
5	–	–	60	5	No
6	Palliative antecolic isoperistaltic gastro-enterostomy	–	180	70	No
7	–	Small bowel mesentery	60	0	No
8	–	Periton	45	0	No
9	Laparoscopic tube gastrostomy	–	180	20	No
10	Palliative antecolic isoperistaltic gastro-enterostomy	Periton	45	0	No

PEG: Percutan endoscopic gastrostomy.

Table 3. Postoperative variables

Patient number	Re-operation	Post-operative complication	Time to oral intake (day)	Length of hospital stay (day)	30 day mortality	Time to adjuvant chemotherapy (day)
1	No	–	2	7	No	73
2	No	–	1	1	No	25
3	No	–	2	4	No	30
4	No	–	1	3	No	26
5	No	–	1	2	No	No (nonstable clinical status)
6	No	–	1	4	Yes	No (exitus)
7	No	–	1	2	No	50
8	No	–	1	1	No	6
9	No	Pulmonary embolism (Post-operative first day)	4	10	No	13
10	No	–	3	5	No	No (advanced age)

We could achieve seven patients' data of time interval between CT and surgery and the meantime was 21.86±16.84 days. Intraoperative and postoperative variables are summarized in Table 2 and Table 3. The operations were terminated in 5 patients (50%) when the PC detected as they did not have any complications due to cancer. Laparoscopic feeding jejunostomy (n=2, 20%), laparoscopic tube gastrostomy (n=1, 10%), and laparoscopic gastroenterostomy (n=2, 20%) were performed on the patients with oral intake deficiency due to GC. There were PM on the visceral peritoneum (small bowel mesentery) in two patients (20%) and on the parietal peritoneum in eight patients (80%). The intraoperative frozen section was performed in 7 (70%, n=2 small bowel mesentery biopsy, n=5 peritoneal biopsy) patients. All were in favor of malignancy. The median operative was 60 min (45–180) and the median intraoperative blood loss was 2.5 ml (0–70). There were no conversion and reoperation. Only one postoperative complication was observed. One patient (10%) developed pulmonary embolism on postoperative day 1 and was treated medically. One patient (10%) died within 30 days of surgery due to liver failure. The median time to oral intake was 1 day (1–4) and the mean length of hospital stay was 3.90±2.84 days. Seven patients (70%) could receive chemotherapy postoperatively and the meantime to chemotherapy was 31.85±22.84 days.

Discussion

PC is seen in 10–20% of GC patients who are planned to have a curative surgery, therefore, it is thought that by performing staging laparoscopy the unnecessary exploratory laparotomy will be reduced.[6] According to Kim et al.,[7] staging laparoscopy should be preferred in patients with a tumor diameter ≥10.3 cm or with an advanced T stage, even the preoperative CT scan was normal in terms of PC. A preoperative CT scan is not as good as laparoscopy in terms of detecting PC. Laghi et al.[8] reported that CT detected approximately 12–33% less PC compared to surgical detection. In the large-scale study conducted by Kim et al.,[7] the sensitivity of CT was found to be very low and a correct diagnosis of PC was made at a rate of 28.3%. In another study of 657 patients, the false negativity rate of CT was reported as 31%.[9]

Since typical CT findings of PC are mostly seen in the advanced stages of cancer, the specificity of CT is high; but its sensitivity is low.[2] In order not to miss PC, it is recommended to use a multidetector CT scan with 5 mm images.[8] A single-detector CT was used in our study and this may be the reason for us to miss the PC. Li et al.[2] stated that small metastases in the peritoneum that can not be detected by CT mostly settle on the major omentum and the second most common localization was the parietal peritoneum. On the contrary of the literature, the most common localization of missed metastases was the parietal peritoneum in this study.

The common features of patients with preoperatively detected PC are the presence of enlarged lymph nodes, omental cake, Blumer's shelf, peritoneal thickening, ascites, and a tumor size larger than 5.2 cm.[6] In the systematic review by Wang et al.[1] it was founded that endoscopic ultrasonography was more sensitive and more specific in detecting PC compared to CT.

Conclusion

Preoperative staging with CT before GC surgery is still valid. Multidetector CT scan should be preferred. However, it is still not enough for detecting all PC before surgery. Staging laparoscopy should be in mind, especially for patients with a high risk of PC.

Disclosures

The study was approved by the Inonu University Faculty of Medicine Ethics Committee (date: 22/12/2020, decision no: 2020/1396).

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Conflict of Interest: None declared.

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