

## Case Report

# Laparoscopic Sentinel Node Navigation Surgery for a Small Type III Gastric Carcinoid Tumor

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### ABSTRACT

We report on a patient with a small gastric carcinoid tumor and lymph node micrometastasis detected with sentinel node navigation surgery and infrared ray laparoscopy. A sporadic carcinoid tumor around 10 mm in diameter was diagnosed, and partial gastrectomy was performed with sentinel node navigation surgery and infrared ray laparoscopy, for which our institution has reported the validity for detecting metastasis in the lymphatic basin. Because examination of frozen sections of sentinel lymph nodes was negative for metastasis, we completed the operation without additional lymphatic radical dissection. The careful immunohistological examination of the sentinel lymph nodes revealed a micrometastasis of approximately 0.1 mm. We concluded that additional lymphatic dissection was not necessary in this case, because the other sentinel lymph nodes showed no metastasis. (Jikeikai Med J 2012 ; 59 : 17-20)

Key words : carcinoid tumor, sentinel node navigation surgery, micrometastasis, laparoscopic surgery

### INTRODUCTION

Gastric carcinoid tumors are rare, accounting for 0.3% to 1.77%<sup>1</sup> of all gastric tumors. Gastric carcinoid tumors have been classified into 3 clinicopathologic subtypes, of which type III has the highest rate of regional lymph node metastasis. Therefore, type III tumors should be treated with radical gastrectomy. We herein report on a patient who underwent modified gastrectomy combined with sentinel node navigation surgery (SNNS) for an isolated gastric carcinoid tumor, which was classified as type III.

### CASE REPORT

A 60-year-old asymptomatic man was referred to our hospital after an abnormality was found on upper gastrointestinal endoscopy. Results of routine hematological studies were unremarkable except for a serum carcinoembryonic antigen level of 25.0 ng/ml. The serum gastrin level was within the normal range. A second gastrointestinal endoscopic examination disclosed a small, elevated lesion on the greater curvature of the gastric body (Fig. 1A) which was diagnosed at biopsy as a carcinoid tumor. Endoscopic ultrasonography showed the tumor to be 9.6 mm in diameter (Fig. 1B). Colonoscopic examination revealed a type 2

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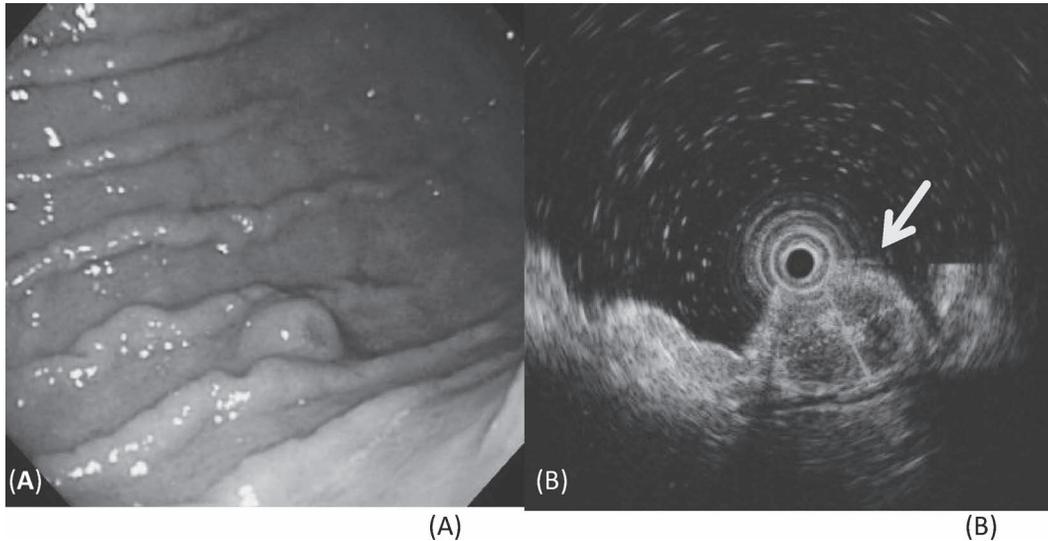


Fig. 1. A : Gastric endoscopy revealed a small, elevated lesion in the gastric body.  
B : The tumor measured  $9.6 \times 6$  mm and was judged with endoscopic ultrasonography to be confined to the submucosa.

cancer in the ascending colon. Computed tomography and ultrasonography showed no metastasis. With final preoperative diagnoses of a type III gastric carcinoid without lymph node metastasis and a cancer of the ascending colon, we performed infrared ray laparoscopy (IRL)-SNNS for the gastric carcinoid and laparoscopic right hemicolectomy with lymph node dissection for the colon cancer.

#### PROCEDURE AND RESULT

We started the operation laparoscopically, and indocyanine green (ICG) (5 mg/ml ; Diagnogreen ; Daiichi Pharmaceutical, Tokyo, Japan) was injected endoscopically around the tumor. Twenty minutes later, sentinel lymph nodes (SNs) stained with ICG were observed intraperitoneally around the serosa and surrounding fat tissue with ordinary light and infrared ray electronic endoscopy. The ICG flowed through the right gastroepiploic vessels, and, therefore, we performed No. 4d lymphatic basin dissection<sup>2</sup> (Fig. 2). Because frozen section examination showed that 6 SNs in the lymphatic basin were free of cancer, only partial gastrectomy was done. After the partial resection of the stomach, we performed right hemi-colectomy with D2 lymphatic dissection laparoscopically for the cancer of the ascending colon. The surgery was completed in 330 minutes with minimal blood loss. The small, elevated gastric lesion was 12 mm in diameter and was confirmed with his-

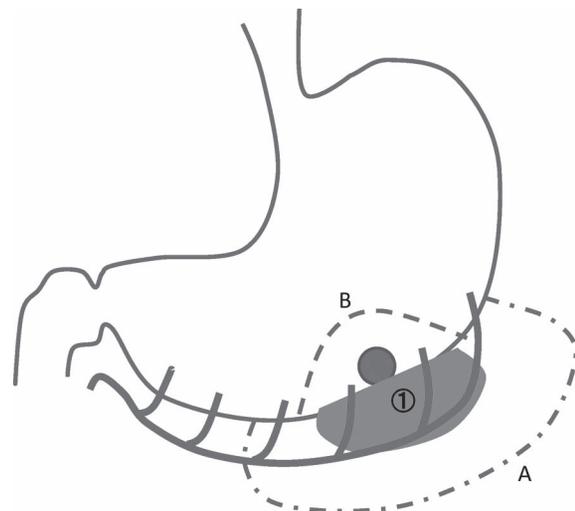


Fig. 2. ICG flowed through the right gastroepiploic vessels (area ①), and, therefore, No. 4d lymphatic basin dissection was performed (line A). Examination of frozen sections of sentinel lymph nodes in the lymphatic basin was negative for metastasis, and, therefore, we performed only wedge resection of the stomach (line B).

tological examination to be a carcinoid tumor confined to the submucosal layer (Fig. 3A). Careful pathological examination and immunohistological staining with chromogranin A of the SNs detected with ICG revealed only a single micrometastasis that measured approximately 0.1 mm (Fig. 3B). The cancer of the ascending colon was type 2 with no lymph node metastasis and measured  $30 \times 22$

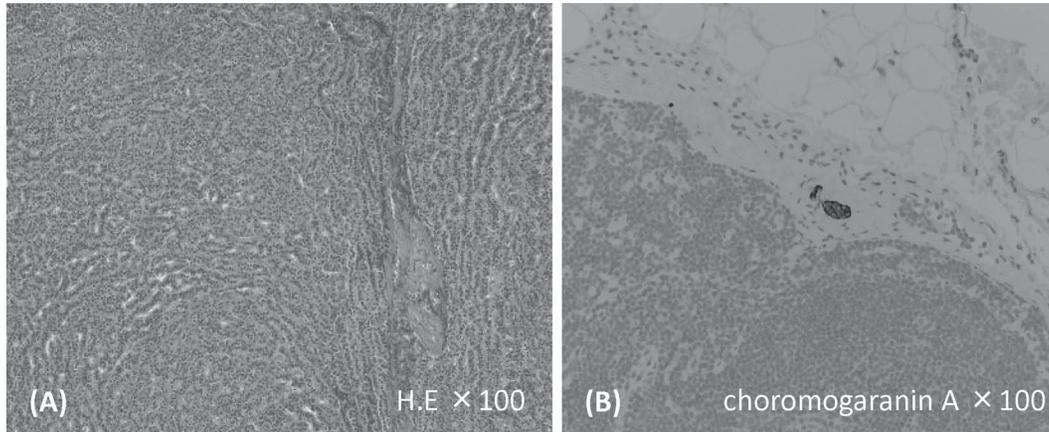


Fig. 3. A, B : Histological examination showed that the tumor was a carcinoid tumor with lymph node micrometastasis that measured approximately 0.1 mm in diameter.

mm. The patient was discharged 10 days postoperatively without complications. As of 30 months after surgery, he remains well with no recurrence or metastasis.

#### DISCUSSION

Although gastric carcinoid tumors are rare, the widespread use of upper gastrointestinal endoscopy and immunohistological techniques allows gastric carcinoid tumors to be detected at an early stage. Rindi et al. have characterized 3 clinicopathologic subtypes of carcinoids according to the presence or absence of hypergastrinemia and histological features<sup>3</sup>. Type I is associated with chronic atrophic gastritis; type II includes carcinoid tumors associated with Zollinger–Ellison syndrome or multiple endocrine neoplasia type 1; and type III is sporadic and has malignant potential without hypergastrinemia. Recent reports on gastric carcinoid tumors have described favorable prognoses after specific treatments for each type of carcinoid tumors<sup>4–6</sup>. On the other hand, Modlin et al. have reported that type III has the worst prognosis<sup>7</sup> and should be treated aggressively with surgical resection<sup>8,9</sup>. The guidelines of the European Neuroendocrine Tumor Society and the National Comprehensive Cancer Network specify that all sporadic gastric carcinoids be treated with gastrectomy and radical lymphadenectomy similar to how gastric adenocarcinoma is treated<sup>10,11</sup>. However, accurate rates and predictors of lymph node metastasis have not been determined. Therefore, a consensus is lacking regarding the extent of gastric resection and the range of lymphatic dissection for sporadic gas-

tric carcinoid tumors. Soga et al. have reported a linear correlation between the rate of lymph node metastasis and the size of gastric carcinoid tumors: 8.2% for  $\leq 10$  mm, 24.2% for 11 to 20 mm, 34.4% for 21 to 30 mm, and 55.6% for 31 to 40 mm<sup>12</sup>. The rates of metastasis for tumors confined to the submucosal layer were 7.9% for lesions  $\leq 10$  mm and 21.4% for 10.1- to 20-mm lesions<sup>13</sup>. Mandeep et al. have reported the relations of tumor size and depth to lymph node metastasis. They reported no lymph node metastasis with intraepithelial tumors smaller than 2 cm; moreover, the rate of lymph node metastasis with tumors smaller than 1 cm invading the lamina propria or submucosa was 3.4%<sup>14</sup>. On the basis of these reports, we believe that isolated type III gastric carcinoid tumors around 10 mm in size can be treated with partial gastrectomy and limited regional lymphadenectomy. We have previously reported the validity of modified gastrectomy combined with SNNS<sup>15</sup>. For early gastric adenocarcinoma, SNNS has generally been performed with either the radioisotope method or the ICG method. Because of its safety, simplicity, and low cost, we have been using the ICG method. Nimura et al. have reported that the ICG method with ordinary light has an unacceptable false-negative rate<sup>16</sup>. Moreover, Kelder et al. have evaluated IRL and the ICG method alone and reported SN identification rates of 99.5% and 85.8%, respectively, and sensitivities of 97.0% and 48.4%, respectively. The detection rate with intraoperative examination of frozen sections of lymph nodes macroscopically metastasis was 92.3% for the lymphatic basin dissection method and 50.0% for the pick-up method<sup>17</sup>.

These data suggest that the pick-up method of SNs is associated with a risk of leaving lymph nodes behind in the peritoneal fat. In the International Union Against Cancer classification, the micrometastasis in the present case of approximately 0.1 mm is defined as isolated tumor cells<sup>18</sup>. Saito et al. have reported recurrence of early gastric cancer with micrometastasis in lymph nodes<sup>19</sup>. Therefore, the lymphatic basin dissection method combined with IRL rather than the pick-up method is essential and seems appropriate for dissecting lymph nodes with micrometastasis, because false-negative lymph nodes would also be resected in the lymphatic basin<sup>20-22</sup>. We believe that these techniques are feasible for an isolated sporadic carcinoid tumor of around 10 mm. Therefore, we performed no additional treatment in the present case.

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