CASE REPORT

Infarction and Perforation of the Small Intestine due to Tumor Emboli from Disseminated Rectal Cancer

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Small bowel perforation due to hematogenous metastatic tumor emboli is a rare event, especially in a patient with rectal cancer. We report a 75-year-old man with relapsed rectal cancer who developed an acute abdomen, which was found to be due to a perforated terminal ileum. Emergency surgery involved segmental resection and ileostomy. The pathology of the resected small bowel showed multifocal and extensive metastatic tumor emboli in the entire wall, leading to transmural infarction followed by perforation, without a discrete tumor mass. The pathology with immunohistochemistry showed a rectal tumor that was positive for CK-20 but negative for CK-7 and TTF-1. This extremely rare complication of rectal cancer resulted from ischemia and infarct caused by disseminated metastatic tumor emboli without direct invasion or mass formation. (*Gut and Liver* 2008;2: 130-132)

Key Words: Small intestine; Infarction; Intestinal perforation; Rectal cancer; Tumor embolism

INTRODUCTION

The pathogenesis of small bowel perforation secondary to metastatic carcinoma is poorly understood because it is a rare event. Three mechanisms are usually proposed; an obstructing tumor leading to increased intra-luminal pressure and perforation; local trauma secondary to direct invasion of adjacent primary tumors; or metastatic tumor embolization leading to bowel ischemia and perforation.

In general, small bowel perforation secondary to gastrointestinal tumors may occur due to obstructing or invading tumors. However, we here report that disseminated

tumor emboli of rectal cancer caused extensive transmural infarction followed by perforation of small bowel without obstructing or invading tumors.

CASE REPORT

A 75-year-old man presented with dysarthria and right lower extremity weakness. Three years ago, he had undergone abdominoperineal resection for rectal cancer followed by adjuvant chemoradiotherapy with 5-fluorouracil and leucovorin, but he was lost to follow-up after completion of the treatment. His computerized tomography (CT) of the chest showed an endobronchial lesion in left upper bronchus and multiple pulmonary nodules in both lobes, and his magnetic resonance imaging of the brain also showed multiple cerebral metastatic lesions. Carcinoembryonic antigen (CEA) level was elevated upto 28.1 ng/mL. To differentiate the recurrence of previous rectal cancer from primary lung cancer, he underwent bronchoscopic biopsy of the endobronchial lesion, pathology of which was confirmed to be metastatic rectal adenocarcinoma. The immunohistochemistry of the tumor showed negativity for cytokeratin (CK) 7 and thyroid transcription factor (TTF)-1 but positivity for CK20.

During the hospitalization, he abruptly complained of severe abdominal pain. His vital sign was as follows; the pulse rate of 101 beats per minute (bpm); the respiration rate of 20 bpm; the blood pressure of 177/87 mmHg; and body temperature of 35.4°C. Physical examination showed rigid whole abdomen with diffuse tenderness, rebound tenderness and notable muscle guarding. Following plain abdominal X-ray showed accumulation of right subdia-

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phragmatic free air (Fig. 1) and CT of the abdomen and pelvis showed suspicious of perforated ileum (Fig. 2). He underwent emergency surgery with segmental ileal resection and ileostomy. Intraoperatively, the two perforated

Fig. 1. Plain chest X-ray showing accumulation of subdiaphragmatic free air (solid arrows).

Fig. 2. CT scan showing the perforated site of the terminal ileum (solid arrow).

sites in the terminal ileum were observed (Fig. 3) with the diffusely hemorrhagic and fibrotic mesentery, but there were no discrete mass or recurrent masses in the abdomen. The pathology of resected ileum demonstrated metastatic adenocarcinoma with extensive transmural infarction with perforations and the presence of multifocal and extensive metastatic lymphovascular tumor emboli in the entire wall (Fig. 4). The tumor cells in the lymphovascular space were also negative for TTF-1 and CK7 but positive for CK20. Thereafter, he recovered to take a meal from the operation, but could not receive further chemotherapy at all.

DISCUSSION

Small bowel perforation due to metastatic tumor is a rare event. In an Ise's report, out of 478 cases of small bowel metastases found in the literatures small bowel perforation occurred in 121 cases (25.3%).¹ Most common primary sites for small bowel metastasis were malignant melanoma of skin (216 cases, 45.2%) and lung can-

Fig. 3. The surgical specimen showing the perforated sites in the terminal ileum (solid arrow).

Fig. 4. Pathologic findings. (A) A tumor embolus (solid arrow) is noticed in a blood vessel with the inflammatory cells and necrosis (Hematoxylin & Eosin stain $\times 400$). (B) Several tumor emboli (solid arrows) are noticed in blood vessels (Hematoxylin & Eosin stain $\times 400$).

cer (162 cases, 33.9%).¹ Shiraishi *et al.* reported that out of 23 patients who required surgical treatment due to metastatic tumors of the small intestine, 16 cases (69.6%) showed intestinal obstruction while the other 7 cases (30.4%) showed acute peritonitis with intestinal perforation.² Of interest, they suggested specific pathophysiologic features that intestinal perforation occurred exclusively at the ileocecal region and the tumors originated mainly from upper aerodigestive tract cancer.² In an autopsy data of 423 cases of primary lung cancer, 6 (30.0%) of 20 patients with small bowel involvement experienced perforation and peritonitis.³ In a single institution data of 7,695 cases of malignant melanoma, 62 of 68 patients who underwent surgical exploration for metastatic tumors to gastrointestinal tract had involvement of the small bowel but intestinal perforation occurred in only 3 patients.⁴ In our case, although the pathology was confirmed metastatic rectal cancer supported by the immunohistochemistry,^{5,6} the tumor behaved like lung cancer in that there was a endobronchial lesion with multiple pulmonary and brain metastases. The perforation also occurred at the ileocecal region. Therefore, small bowel perforation due to metastatic tumor emboli might have unique pathogenesis different from other types of intestinal metastases, which can be elucidated in further studies about the mechanism of organ-specific metastases, such as interplay of adhesion molecules and chemokines and the role of cancer stem cells.

Practically, although small intestinal perforation due to metastatic tumors is an extremely rare complication, we have to face therapeutic dilemmas when this rare complication occurs. Emergency surgery is almost indicated to resolve the perforation. However, the actual type of intervention might depend on both patient factors, such as clinical conditions and capability of sustain major oper-

ation, and disease factors, such as extent and prognosis of the underlying tumors. Since our patient was an elderly one with the presence of other significant metastases and poor performance status, segmental resection of perforated ileum and ileostomy or diverting procedure may be most appropriate to avoid the possibility of anastomotic insufficiency and to promote his quick recovery. However, in a treatment-naïve patient with a favorable tumor, such as lymphoma or breast cancer, good performance status, and major surgical intervention for the treatment of intestinal metastases can be justified.

In conclusion, small bowel perforation due to metastatic tumor emboli might have unique pathogenesis and can be regarded as a distinct entity. In addition, although emergency surgery is indicated, the type of treatment should be determined based on both patient and disease factors.

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