CASE REPORT

A case of completely resected cecum cancer with synchronous metastases to the small intestine found in acute appendicitis

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Abstract : Purpose : Risk of malignant tumors increase with age ; hence, careful examination of older patients should be consdiered when identifying the causes of acute appendicitis. Here, we report a case of a patient with cecum cancer with synchronous metastases to the small intestine that was found during acute appendicitis. Case Report : A 74-year-old man presented with right lower abdominal pain. Physical examination revealed deep tenderness at McBurney's point. Enhanced computed tomography scan showed an abscess around the enlarged appendix and a thickened cecum wall. Colonoscopy revealed a type 2 tumor in the ileocecal region, and pathological examination of the biopsied specimen revealed adenocarcinoma. Microscopic findings revealed two type 2 tumors in the small intestine, pathologically diagnosed as cecum cancer metastases. The final diagnosis was acute appendicitis caused by cecum cancer with synchronous metastases to the small intestine, pStage ⅣB pT4bN1aM1b. The patient received adjuvant chemotherapy and has currently been disease-free for 24 months. Conclusions : In prolonged appendicitis among older adults, the possibility of malignancy should be considered during preoperative examination and prior to selecting a treatment plan. Delays in the diagnosis of colorectal cancer and metastases may lead to missed opportunities for complete resection and poor prognosis. J. Med. Invest. 71 : 293-297, August, 2024

Keywords **:** *acute appendicitis, cecum cancer, small intestine metastasis*

INTRODUCTION

Acute appendicitis is a disease encountered by clinicians daily. Colorectal tumors may cause acute appendicitis, accounting for approximately 0.9% of all acute appendicitis cases (1). The frequency of malignant tumors increases with age (2) ; therefore, careful examination of older patients is necessary to identify the causes of acute appendicitis and whether it can be attirubted to a malignancy. If the diagnosis and treatment strategy for appendicitis are incorrect, the opportunity for radical resection to manage malignant diseases could be missed, leading to a poorer prognosis. Furthermore, surgeons should be mindful that colorectal cancer with metastases could still be fully cured following complete resection of all tumors, including metastatic tumors (3).

In this report, we describe a case of completely resected cecum cancer with synchronous metastases to the small intestine that was found in an older adult during acute appendicitis.

CASE REPORT

A 74-year-old man was admitted to the emergency department of our hospital with right lower abdominal pain that began one day before. The patient had a history of a left inguinal hernia and was not taking any oral medications at the time of admission.

Physical examination revealed deep tenderness at McBurney's point without abdominal distension. The blood test on admission revealed leukocytosis (15,100 /μL) and an elevated C-reactive protein level (10.71 mg/dL ; normal range : 0.1> ng/mL). An enhanced computed tomography (CT) scan showed an abscess around the enlarged appendix and a thickened cecum wall (Figures 1a, b). Malignancy was suspected owing to cecal wall thickening and elevated carcinoembryonic antigen level (26.2 ng/mL ; normal range : 0.1-5.0 ng/mL). Hence, non-operative management was selected with a plan to perform a colonoscopy after administering antimicrobial treatment to manage the acute appendicitis. However, conservative treatment remained ineffective, and on day 7 post admission, the patient's C-reactive protein levels were persistently high (14.8 mg/dL), and CT findings were only minimally improved (Figures 1c, d).

On day 9, colonoscopy revealed a 40 mm-wide type 2 tumor covering the appendiceal orifice in the ileocecal region (Figure 2). Pathological examination of the biopsied specimen revealed adenocarcinoma. Acute appendicitis caused by cecum cancer without distant metastases was preoperatively diagnosed as cStage IIC cT4bN0M0.

On day 11, an open ileocecal resection with D3 lymph node dissection was performed. Intraoperative findings showed that the small intestine on the proximal side was tightly adherent to the ileocecal lesion (Figure 3a). Direct tumor invasion was suspected ; therefore, combined resection of a suuficient distance of the small intestine was performed (Figure 3b). The abdominal cavity was checked thoroughly and no dissemination, other small intestinal lesions, or liver metastases were observed.

Macroscopic findings revealed a type 2 tumor in the ileocecal region, directly invading the ileum (Figure 4a). In addition, two non-contiguous lesions were found in the small intestine (Figure 4b, Figure 5). Microscopic findings revealed no pathological continuity between the two tumors, and the histological type was the same as that of moderately differentiated adenocarcinoma. The two small intestine lesions were pathologically distant from the primary lesion, predominantly located in the submucosal

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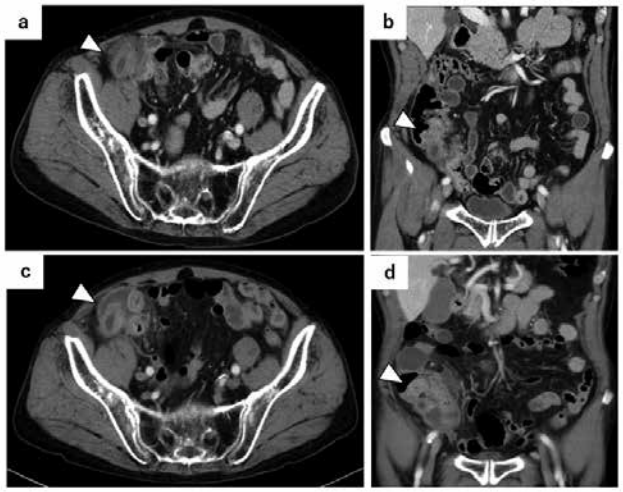

Figure 1. Enhanced abdominal computed tomography findings on admission and day 7 post admission.
a : Enhanced and thickened appendiceal wall with a slight surrounding abscess on admission (white arrowhead). b : Thickening of the cecal wall on the cranial side of the enlarged appendix on admission (white arrowhead). c, d : Exacerbation of the abscess and non-improvement of cecal wall thickening on day 7 post admission (white arrowhead).

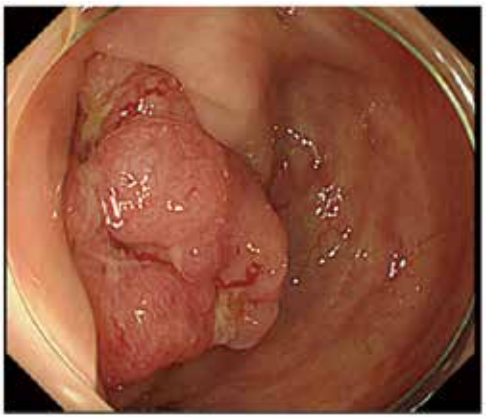

Figure 2. Colonoscopy on day 9 post admission.
Colonoscopy revealed an approximately 40 mm-wide type 2 tumor covering the appendiceal orifice in the cecum.

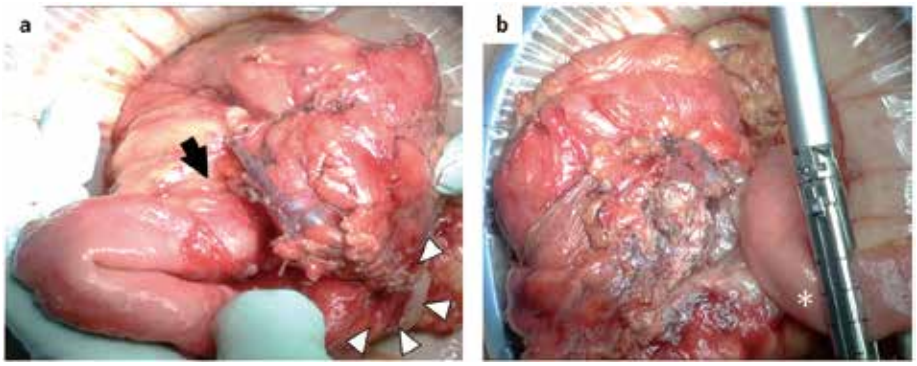

Figure 3. Intraoperative findings observed on day 11, while performing an open ileocecal resection with D3 lymph node dissection.
a : The ileum that had exited the ileocecal region (black arrow) was re-involved at the oral side (white arrowheads). The ileum was suspected to have direct tumor invasion. b : Combined resection of the ileocecal and small intestine lesions with sufficient oral side distance from suspicion of direct tumor invasion (white asterisk).

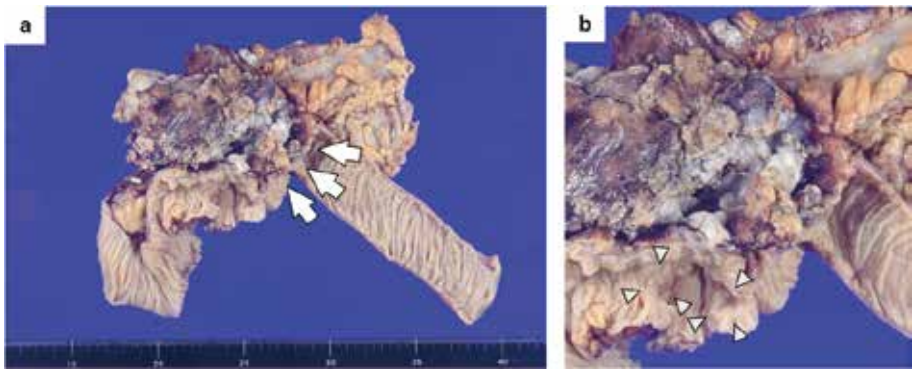

Figure 4. Macroscopic findings of the resected specimens.
a : A type 2 tumor was found in the ileocecal region, directly invading the ileum (white arrow).
b : Two non-contiguous lesions were found in the small intestine (white arrowhead).

area (Figure 6a).

Furthermore, a strong lymphatic invasion of the primary and metastatic lesion (V1b) and lymph node metastasis were observed in the small mesentery (Figure 6b). As a result, the two type 2 tumors in the small intestine were pathologically diagnosed as metastases of cecum cancer. The final diagnosis of the patient was cecum cancer with synchronous metastases to the small intestine that was found in acute appendicitis ; specifically, a diagnosis of pT4bN1aM1b, pStage ⅣB, according to the 8th edition of the TNM classification of the Union for International Cancer Control.

The patient did not experience any complications after undergoing the surgery. He was discharged on postoperative day 7 and received capecitabine plus oxaliplatin as an adjuvant chemotherapy for 6 months. The patient is currently alive and disease-free 24 months postoperatively.

DISCUSSION

Colon cancer should be considered a potential cause of acute appendicitis among older patients. In most cases, obstruction of the appendiceal orifice due to fecal stones, appendiceal stones, enlarged lymphoid tissue, and tumors cause acute appendicitis. Appendicitis caused by tumor obstruction is relatively rare (1). Collins reviewed the causes of appendicitis in 50,000 patients, demonstating that the incidence of obstructing cecum cancer was 0.118% (4). However, in older patients, Bizer reported that 1.8% of patients aged over 65 years had acute appendicitis as an initial symptom of cecum cancer (5). Appendicitis in older patients tends to have a higher combined rate of cancer than in younger patients ; therefore, clinicians must always be mindful of the possibility of appendicitis and cancer among this population.

It is generally difficult to diagnose appendicitis caused by cecum cancer preoperatively. Appendicitis due to cecum cancer is caused by perforation or obstruction, often showing unclear imaging findings, and requiring emergency surgery (6, 7), where the presence of cecum cancer can be missed. Previously, there have been a few cases wherein the presence of cancer was missed during initial surgery and this was highly disadvantageous for the patient (8-10). Thus, not recognizing malignant tumors in time, leads to tumor progression and increased metastases. Therefore, preoperative diagnosis of cecum cancer should be performed whenever possible.

Kuramitsu *et al*. reported that the following cases with five distinct characteristics should be suspected of cecum cancer : [1] older adults with severe inflammation of appendicitis ; [2] hypochromic anemia ; [3] abnormal findings in the cecum wall on preoperative ultrasonography or CT scan ; [4] mass or

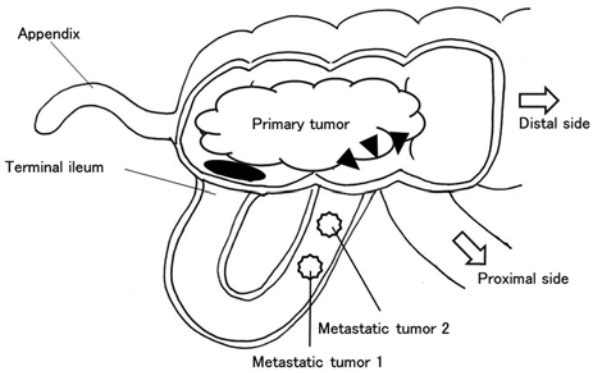

Figure 5. Schematic diagram of the resected specimens.
Distance from the termial ileum to the metastatic tumor 1 was 15 cm. Distance between two metastatic tumors was 1.5 cm. Primary tumor was found in the ileocecal region, directly invading the ileum (black arrow).

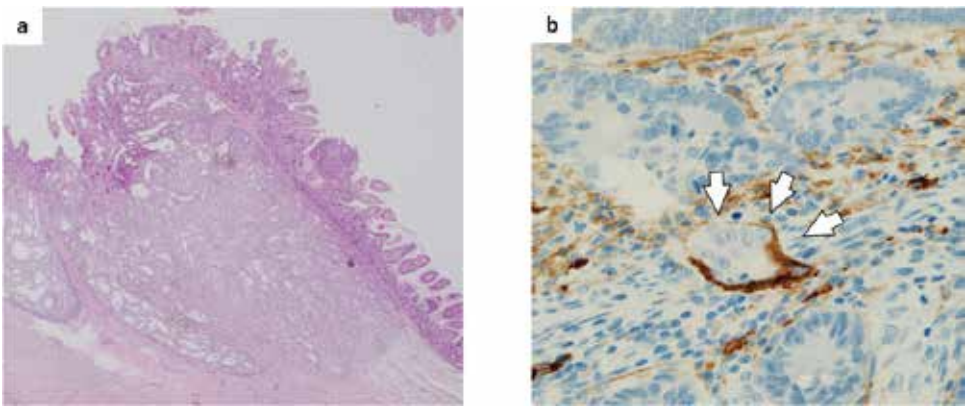

Figure 6. Microscopic findings of the resected metastasis tumors.
a : The small intestine metastasis was pathologically predominantly in the submucosal area. b : Lymphovascular invasion of the small intestine metastasis (×400). Lymphatic vessels are immunostained with D2-40 (white arrowhead).

resistance palpation under anesthetic induction ; and [5] difficulties when dissecting the appendix at the root (11). In our case, age, severe inflammation, and CT findings were applicable. Based on these findings, appendicitis was suspected due to the cecum tumor ; therefore, non-operative management was selected and a colonoscopy was planned to be performed after administering antimicrobial treatment for the acute appendicitis. As a result, we were able to diagnose the cecum cancer preoperatively and perform complete resection during the initial surgery.

One of the special features of the present case was the cecum cancer metastasis to the small intestine. Using the PubMed database, we performed a literature search using combinations of the keywords "cecum cancer," "metastasis," and "small intestine" but did not find any previously reported cases. Surgical cases of cecum cancer with synchronous metastasis to the small intestine are rare. Including inoperable cases, even small intestine metastasis of colorectal cancer has been reported to occur in only 3.0% of cases (12). Synchronous metastases have been less frequently reported, and metastatic pathways reportedly include hematogenous metastasis, lymphogenous metastasis, and implantation of free tumor cells. The major route of colon cancer metastasis to the small intestine is disseminated metastasis associated with peritonitis carcinomatosa (13) and classified as implantation of free tumor cells. In the present case, small intestinal metastasis due to peritoneal dissemination was unlikely as there was no peritoneal dissemination in the intraoperative findings. Moreover, the small intestine metastasis was pathologically distant from the primary lesion and were predominantly in the submucosal area ; therefore, direct invasion was ruled out.

We considered the pathway of metastasis to be lymphogenous owing to the following reasons. First, there was a strong lymphatic invasion of the primary and metastatic lesion, and lymph node metastasis was also observed in the small mesentery. The possibility of hematogenous metastasis was unlikely as no distant metastases was observed, such as in the lung or liver, and blood flow from the colon to the small intestine was retrograde. There have been no previous reports comparing the prognosis of hematogenous and lymphogenous metastasis in colorectal cancer ; nevertheless, lymphatic metastasis reportedly has shown better prognosis than hematogenous metastasis in advanced-stage thymic and cervical cancers (14, 15). Generally, the treatment for colorectal cancer is complete resection aimed at a radical cure. The most effective treatment for colorectal cancer often cannot be achieved because hematogenous metastases cause distant lesions ; however, lymphogenous metastases are often localized lesions that are completely resectable, aiming at a radical cure. Since there are a small number of cases reported with small intestine metastasis of colorectal cancer and because the mechanism of metastasis, such as peritoneal dissemination, cannot be strictly ruled out, it is difficult to study the effect of the metastasis pathway on prognosis. In the present case, the lesions were relatively localized and could be completely resected together with the primary lesion, which may have contributed to the good prognosis.

The small intestinal metastases could be resected simultaneously based on intraoperative findings. Therefore, the intraoperative recognition of metastases, including those in the small intestine, is important in achieving complete resection for colorectal cancer. However, early detection of small intestine metastases preoperatively is difficult. The frequency of preoperative detection of small intestine tumors is low, especially in early-stage cases, and small intestine tumors are usually diagnosed at an advanced stage in the context of an emergency involving an occlusion or bleeding (13, 16). Therefore, it is important to confirm the presence or absence of small intestine metastasis during surgery in all cases and to aim for complete resection as this is associated with a good prognosis for patients with colorectal cancer (17). Surgeons, therefore, need to reaffirm the importance of careful intraperitoneal observation during all operations, including laparotomy and laparoscopic surgery (18).

Therefore, in case of prolonged appendicitis among older adults, preoperative examination and selection of a treatment plan should be performed to consider malignancy. Moreover, intraoperative findings should be taken into account to avoid missing the opportunity for complete resection of malignant tumors, even if metastases was not suspected preoperatively.

CONFLICTS OF INTEREST

The authors declare no conflict of interest

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AUTHORS' CONTRIBUTIONS

YS reported the case and wrote the manuscript. TS and HO performed the surgery and perioperative management of the patient and helped draft the manuscript. TS, HO, and HS participated in revising the manuscript critically. All authors read and approved the final manuscript.

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ETHICAL STATEMENT

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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