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【 CASE REPORT 】

Two Cases of Endometriosis in the Cecum Detected by Contrast-enhanced Computed Tomography with Air/Carbon Dioxide Insufflation

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Abstract:
We herein report two patients with endometriosis in the cecum. Both patients presented with a protruding, subepithelial tumor on colonoscopy and were diagnosed with cecal endometriosis after surgical resection. It is notable that the cecal lesions were not initially identified on computed tomography (CT), while CT colonography with air/carbon dioxide insufflation resulted in the detection of the cecal tumor. These cases highlight the possibility of false-negative results on conventional CT in patients with cecal endometriosis. We consider CT colonography with air/carbon dioxide insufflation useful for detecting cecal tumors in such cases.

Key words: endometriosis, subepithelial lesion, submucosal tumor, cecum, colonoscopy

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Introduction

Endometriosis is defined as the presence of tissue that normally lines the uterus, e.g., endometrial glands and stroma, outside the inner uterine lining (1-4). Although endometriosis commonly involves the ovaries, fallopian tubes, and uterine and ovarian ligaments, endometrial epithelial and stromal cells often spread beyond the genital organs. Among instances of extra-genital endometriosis, the intestines, particularly the sigmoid colon and rectum, are most frequently affected, while cecal involvement is rare (5).

We herein report two patients with endometriosis in the cecum. Of note, although the patient's cecal lesion was observed as a protruding subepithelial tumor during colonoscopy, the tumorous lesions were not initially identified on computed tomography (CT). To our knowledge, this is the first report of false-negative results on CT for diagnosing cecal endometriosis despite the detection of a subepithelial tumor on colonoscopy. The efficacy of CT colonography with air/carbon dioxide insufflation in cecal tumor detection is discussed later in this report.

Case Report

Case 1

A Japanese woman underwent total vaginal hysterectomy for uterine myoma and endometriosis at 39 years old. In addition, the patient underwent partial mastectomy at 40 years old for right breast cancer and partial thyroidectomy at 46 years old for thyroid cancer. At 47 years old, she underwent colonoscopy for the investigation of abdominal distention and diarrhea. The patient had been prescribed trimebutine, famotidine, and hydroxyzine for abdominal distention. A physical examination revealed no palpable mass or tenderness in her abdomen. Laboratory tests and a urinalysis showed no abnormalities, and the levels of carcinoembry-

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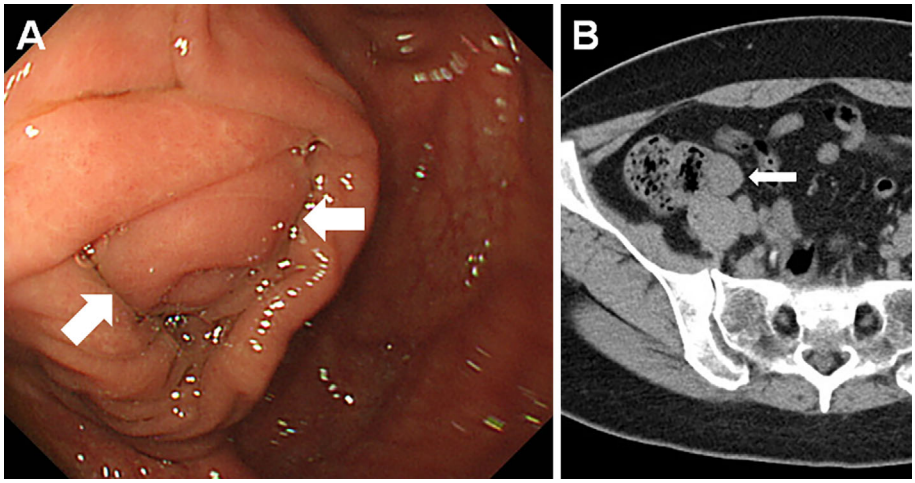

Figure 1. **Colonoscopy and CT images of Case 1. A subepithelial lesion was observed in the cecum during colonoscopy (A). No tumor was initially reported on CT (B). However, in retrospect, the cecal endometriosis was identifiable on the CT images (B, arrow).**

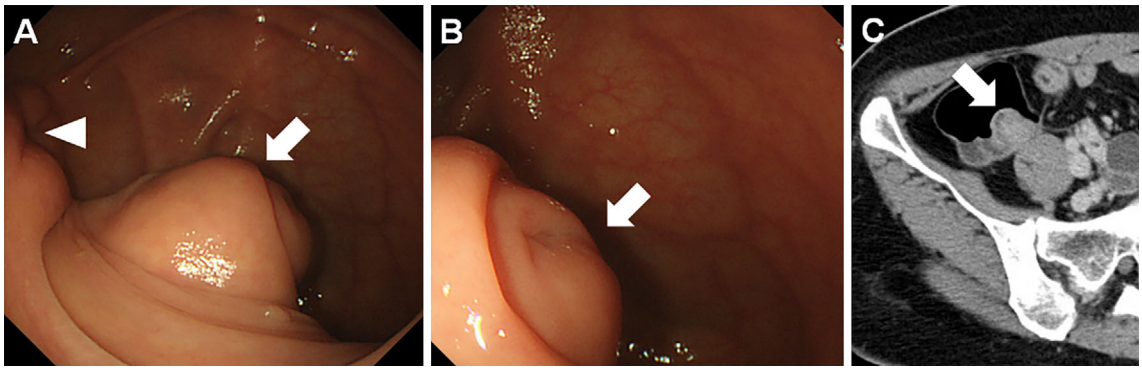

Figure 2. **Colonoscopy and CT images of Case 1. Colonoscopy performed after 15 months revealed the cecal tumor again (A, arrow), while the Bauhin's valve was intact (A, arrowhead). The top of the tumor was slightly depressed (B, arrow). Contrast-enhanced CT performed just after colonoscopy revealed a cecal tumor with heterogenous internal density and moderate, slow enhancement (C, portal venous phase).**

onic antigen and carbohydrate antigen 19-9 were within the normal ranges.

Colonoscopy revealed a subepithelial lesion in the cecum (Fig. 1A). However, no tumor was reported on CT (Fig. 1B). Colonoscopy performed 15 months later revealed a cecal tumor, the height of which had apparently increased when compared with the previous examination (Fig. 2A, arrow). The Bauhin's valve was intact (Fig. 2A, arrowhead). The top of the tumor was slightly depressed, suggesting that the appendiceal orifice was involved in the tumor (Fig. 2B, arrow). Endoscopic ultrasonography showed that the tumor was mostly hyperechoic.

Contrast-enhanced CT performed immediately after colonoscopy revealed a tumor in the cecum with heterogeneous internal density and moderate, slow enhancement (Fig. 2C, portal venous phase). We performed ileocecal resection with lymph node dissection, since there was a possibility that the cecal tumor was a malignant lesion, such as an appendiceal mucinous neoplasm or metastatic tumor. The histopathological evaluation of the resected specimen (Fig. 3A, resected tumor, arrow; Fig. 3B, cut section of the formalin-fixed specimen) revealed endometrial tissue in the muscularis propria to the subserosa of the cecum (Fig. 3C). Endometrial epithelial cells were positive for the estrogen receptor (Fig. 3D), and the endometrial stromal cells were positive for estrogen receptor and CD10 (Fig. 3E). In retrospect, the cecal endometriosis had been identifiable in the previous CT images as a mass lesion (Fig. 1B, arrow).

Case 2

A 38-year-old Japanese woman underwent total abdominal hysterectomy and bilateral salpingo-oophorectomy at 38 years old for adenocarcinoma *in situ* of the uterine cervix. Prior to surgery, the patient underwent colonoscopy for the first time for screening purposes, revealing a subepithelial lesion in the cecum. However, no tumor was identified in the ileocecal area on CT, so no further intervention was performed for the cecal lesion at that time. Although colono-

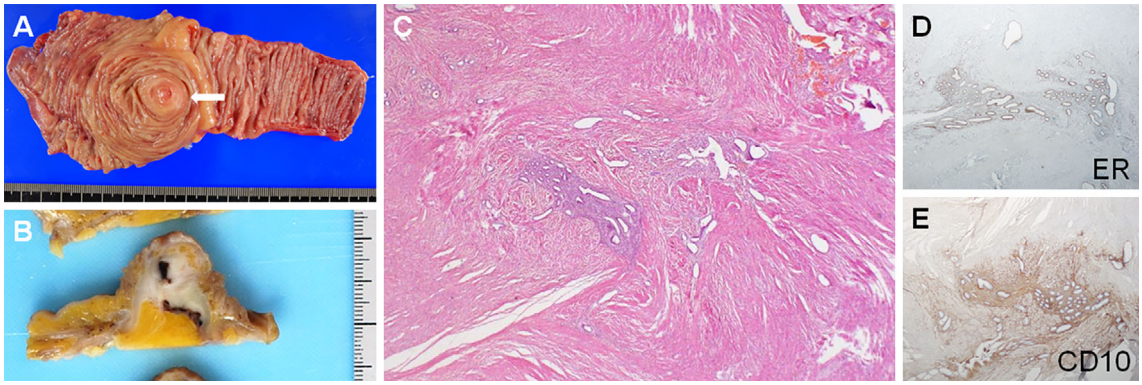

Figure 3. **Resected cecal tumor of Case 1. We performed ileocecal resection with lymph node dissection (A, resected tumor, arrow; B, cut section of the formalin-fixed specimen). Pathologically, the endometrial tissue was observed in the muscularis propria to the subserosa of the cecum (C, Hematoxylin and Eosin staining, ×4). The endometrial epithelial cells were positive for ER (D, ×4), and the endometrial stromal cells were positive for ER and CD10 (E, ×4). ER: estrogen receptor**

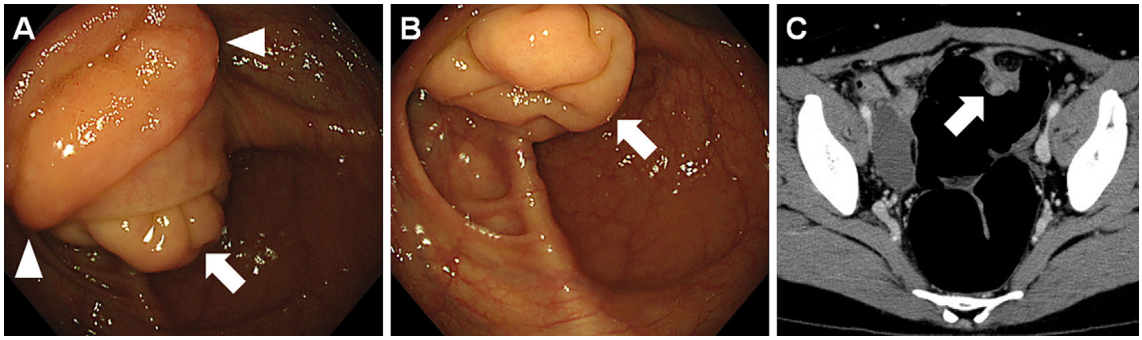

Figure 4. **Colonoscopy and CT images of Case 2. Colonoscopy revealed a subepithelial tumor in the cecum (A, B, arrows). The Bauhin's valve had been deformed due to the tumor (A, arrowheads). Contrast-enhanced CT with colorectal carbon dioxide insufflation revealed a cecal tumor with partial enhancement (C, arrow). The fat tissue seemed to have folded up into the tumor.**

scopy performed at 41 years old showed a protruding lesion in the cecum again, no tumor was found on contrast-enhanced CT. Colonoscopy performed at 44 years old revealed the cecal tumor once again; she was therefore referred to our hospital for the further investigation of the cecal tumor.

The patient had been diagnosed with chronic hepatitis B, hypertension, and anxiety disorder, for which she had been taking entecavir, irbesartan, fluvoxamine, and etizolam. A physical examination revealed ulcer scars due to the gynecological surgery; however, there was no palpable mass or tenderness in her abdomen. Laboratory tests and a urinalysis showed no abnormalities; the levels of carcinoembryonic antigen and carbohydrate antigen 19-9 were within the normal ranges. Colonoscopy revealed a protruding tumor covered with undamaged mucosa in the cecum (Fig. 4A, B, arrows). The Bauhin's valve had become deformed due to the tumor (Fig. 4A, arrowheads).

Endoscopic ultrasonography showed a hypoechoic tumor with a hyperechoic component in the periphery. The boundaries of the hypo- and hyperechoic components were hazy. Contrast-enhanced CT with carbon dioxide insufflation into the colorectum revealed a cecal tumor with partial enhancement (Fig. 4C, arrow). It appeared that the fat tissue had folded inwardly into the tumor. Based on the colonoscopy, endoscopic ultrasonography, and CT features, a benign tumor, such as cecal endometriosis and mesenteric fibromatosis, rather than a malignant tumor was suspected.

We performed laparoscopic partial cecal resection to excise the tumor. During the surgery, the appendix was found to be inverted towards the cecal lumen (Fig. 5A, arrow). A pathological analysis of the resected specimen revealed endometrial tissue in the cecum and appendix, mainly in the muscularis propria and partially in the mucosa (Fig. 5B, C). Endometrial epithelial cells were positive for the estrogen receptor (Fig. 5D), and the endometrial stromal cells were positive for estrogen receptor and CD10 (Fig. 5E). We therefore diagnosed the lesion as cecal and appendiceal endometriosis. A review of the previous CT images revealed that the cecal endometriosis was identifiable as an intestinal wall thickening with heterogeneous enhancement with contrast media.

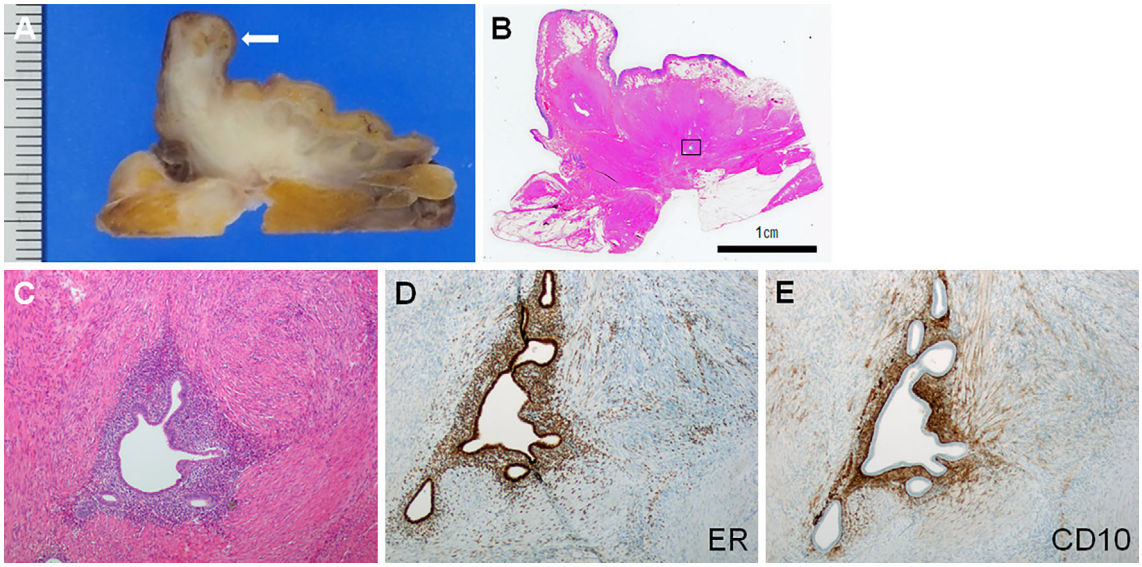

Figure 5. **Resected cecal tumor of Case 2. The cecal tumor was resected, and the appendix was found to be inverted towards the cecal lumen (A, arrow). A pathological analysis of the resected specimen (B) revealed endometrial tissue in the cecum and appendix, mainly in the muscularis propria and partially in the mucosa (C, Hematoxylin and Eosin staining, ×10, magnifying view of the squared part in B). The endometrial epithelial cells were positive for estrogen receptor (D, ×10), and the endometrial stromal cells were positive for estrogen receptor and CD10 (E, ×10). ER: estrogen receptor**

Discussion

Among the various sites of intestinal endometriosis, the rectosigmoid is the leading site for intestinal endometriosis, accounting for more than 90% of cases, followed by the proximal colon, small intestine, and appendix (6-8). The frequency of the cecal involvement is reportedly less than 5% of all intestinal endometriosis cases. Although no clear consensus exists concerning the pathogenesis, transplantation of the endometrial tissue through retrograde menstruation is believed to be a cause of extragenital endometriosis (9, 10).

Intestinal endometriosis is generally asymptomatic because endometriotic implants in the intestines are confined to the serosal fat tissues and plexuses in the majority of cases. However, intestinal endometriosis may present with abdominopelvic pain, constipation, diarrhea, painful bowel movements, or even bowel obstruction (8, 11). In the present two cases, the patient in Case 2 was asymptomatic. Although the patient in Case 1 presented with abdominal distention and diarrhea, we speculate that these symptoms did not result from cecal endometriosis, as there were no mucosal alterations or deformities of the intestinal lumen.

Of note, in the present two patients, the cecal mass was not initially noted on CT findings, even by radiologists, despite the fact that cecal endometriosis was observed as a protruding tumor during colonoscopy. In retrospect, cecal endometriosis was identifiable on the previous CT images of both patients (Fig. 1B, arrow). We speculate that the heterogeneity in the tissue composition of the intestinal endometriosis and complexity of the structure in the ileocecal region underlay the overlooking of the cecal lesions.

Intestinal endometriotic lesions are composed of endometrial epithelial and stromal cells, which exist with cells from the surrounding tissues, such as peritoneal fat tissue, muscle layers of the intestine, and tissue-infiltrated blood cells in variable proportions (12). In the present patients, the ectopic endometrial tissue showed a patchy distribution mainly within the existing muscularis propria (Fig. 3, 5) instead of a solid tumor with homogenous cellularity. Due to heterogeneity in tissue composition, it likely presents as a soft lesion that may change its morphology, rather than presenting as a solid, firm to hard lump. Intestinal endometriosis may also present with a mixed and/or iso-density tumor with an unclear contour. In addition, the ileocecal region comprises the cecum, appendix, ileocecal valve, and the terminal ileum. It is occasionally difficult to identify neoplastic lesions because of the complex structure of this region (13). Feces in the intestinal lumen and compaction of the intestines with peristalsis may also hamper the identification of mass lesions in the ileocecal area. In the present two patients, CT with air or carbon dioxide distention of the colon was useful for detecting cecal endometriosis (Fig. 2C, 4C). We therefore consider that images obtained via CT colonography with air/carbon dioxide insufflation are more useful than conventional CT. Although CT colonography with per-oral or anal administration of a negative or positive contrast agent may also be beneficial (5, 14, 15), this concept requires further investigation.

Although we did not perform magnetic resonance imaging

(MRI) in the present two patients, MRI is proving increasingly used for the detection and diagnosis of endometriosis. The sensitivity of MRI for the evaluation of endometriosis is reportedly 69-92%, and the specificity is 75-98% (16-19). Endometriotic lesions typically show low to intermediate signal intensity on T1- and T2-weighted imaging. Dilated endometrial glands show small foci of high signal intensity on T2-weighted imaging and often high signal intensity on T1-weighted imaging. Hemorrhaging in the ectopic endodermal glands is observed as a high signal intensity on T1-weighted imaging with fat saturation (19). These MRI features will aid in the preoperative diagnosis and detection of intestinal endometriosis. In addition, MRI generally allows superior soft tissue characterization compared with CT and ultrasonography (20). Furthermore, MRI does not utilize ionizing radiation. Consequently, MRI may be more rewarding in patients with cecal subepithelial tumors showing negative conventional CT findings than CT colonography with air/carbon dioxide insufflation.

Differential diagnoses for subepithelial cecal lesions include mucinous cystadenoma, mucinous cystadenocarcinoma, appendiceal adenocarcinoma, neuroendocrine tumor, metastatic tumor, lipoma, lymphoma, pericolonic abscess, and intestinal endometriosis (21, 22). Considering the high malignant potential of mucinous cystadenocarcinoma, appendiceal adenocarcinoma, neuroendocrine tumor, and metastatic tumor, surgical resection of cecal subepithelial lesions was performed in the previously reported cases for the definite pathological diagnosis and treatment (22). We also performed surgical resection in these patients because cecal malignancy could not be excluded preoperatively.

In conclusion, these cases highlight the possibility of false-negative results with conventional CT in patients with cecal endometriosis. We consider CT colonography with air/carbon dioxide insufflation preferable to conventional CT for tumor detection in patients with cecal lesions identified during colonoscopy.

The authors state that they have no Conflict of Interest (COI).

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