

Laparoscopy-assisted resection of an appendiceal mucinous cystadenoma

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We present a 48-year-old man with a complaint of dull right-lower abdominal pain who was diagnosed with mucocele of the appendix. He underwent laparoscopy-assisted resection of the tumor. In the procedure, the entire right colon was freed from the retroperitoneal structures without rupturing the tumor; and ileocecal resection and anastomosis were performed extracorporeally. The pathological diagnosis of the tumor was mucinous cystadenoma of the appendix, measuring 9.0 cm × 8.0 cm × 4.0 cm. The postoperative course was uneventful, and he had no recurrent disease at a 2-year follow up. When resecting an appendiceal mucinous tumor laparoscopically, it is essential (1) to keep the tumor intact during manipulation, and to use a wound-protecting device when delivering the lesion; (2) to consider the extent of tumor resection with a negative surgical margin as well as prophylactic lymph node dissection in cases of suspected adenocarcinoma, even though the oncological adequacy of the laparoscopic procedure for carcinoma remains to be elucidated; and (3) to check whether any mucinous fluid has accumulated in the abdominal cavity, which represents an indication for open surgery.

Key words: appendiceal mucocele, laparoscopic surgery, pseudomyxoma peritonei

INTRODUCTION

Mucinous cystadenoma of the appendix is a rare condition that develops as a result of proliferation of mucin-secreting cells in the occluded appendix [1-3]. Rupturing an appendiceal tumor usually results in dissemination of these cells within the peritoneal cavity, the condition known as pseudomyxoma peritonei [1, 4-6]. Furthermore, it is sometimes difficult to differentiate benign cystadenoma from adenocarcinoma preoperatively since both mucoceles are usually larger, measuring up to 6 cm and associated with a 20% incidence of perforation [1, 2, 4].

During surgical treatment of a mucinous tumor of the appendix, it is important to keep the mass intact and to inspect thoroughly for the presence of mucoid fluid accumulations, which are potential risks for pseudomyxoma peritonei. Therefore, the possibility of tumor dissemination in the laparoscopic procedure has made it contraindicated for surgical treatment of mucinous appendiceal disease, due to the greater possibility of inappropriate manipulation [7], and this has resulted in few reports describing laparoscopic procedures [2, 3, 7-9]. Here we report a case of appendiceal mucinous cystadenoma that was successfully treated by laparoscopy-assisted resection.

CASE REPORT

A 48-year-old man visited the surgical service of Eiju General Hospital complaining of dull right-lower abdominal pain that had persisted for several months. He had a history of appendicitis that had been treated conservatively 6 months previously. A physical exami-

nation revealed slight tenderness in the right-lower quadrant of the abdomen, but no mass was palpable. The findings of a laboratory blood test were normal. An abdominal CT scan demonstrated a cystic tumor, 10 cm × 5 cm, in the right abdomen dorsal to the cecum and the ascending colon (Fig. 1a). Lymph node swelling and fluid collection were absent. A barium enema study demonstrated a filling defect in the mesenteric side of the cecum, and the appendix was not visualized (Fig. 1b). Colonoscopic examination revealed no mucosal lesion and an appendiceal orifice was not detected.

In October, 2004, the patient underwent elective laparoscopic surgery. With the patient in a supine position with the legs apart, a 12-mm trocar was introduced in the left-upper abdomen on the middle clavicular line 2 cm below the costal margin. Pneumoperitoneum was then established followed by the introduction of a 12-mm trocar in the left-lower abdomen, initially for a flexible fiberscope, above the symphysis pubis, and a 5-mm trocar in the right-upper abdomen. The enlarged tip of the appendix protruding from the cystic mass was observed in the right-lower abdomen. With the patient in the reverse Trendelenburg position, the gastrocolic ligament was dissected from the left one-third portion toward the right, and then the mesentery of the right colon was freed cranially to expose the second portion of the duodenum and Gerota's fascia. At this point, the most cephalic portion of the tumor was seen in the dorsal aspect of the ascending colon. No mucoid fluid or nodule was observed in the right retrohepatic space or within the omentum.

After the patient was placed in the Trendelenburg

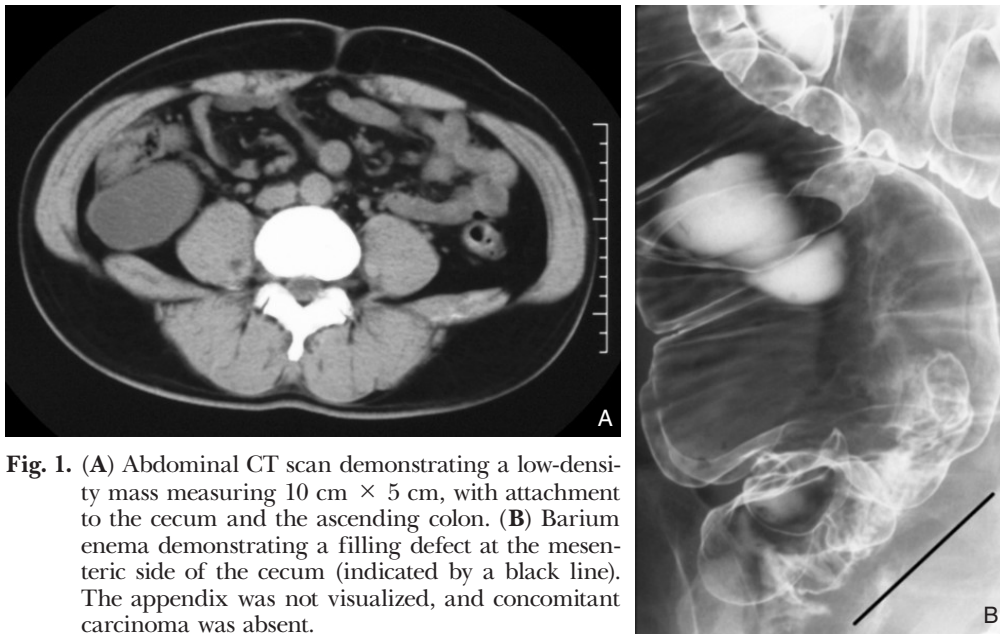


Fig. 1. (A) Abdominal CT scan demonstrating a low-density mass measuring 10 cm × 5 cm, with attachment to the cecum and the ascending colon. (B) Barium enema demonstrating a filling defect at the mesenteric side of the cecum (indicated by a black line). The appendix was not visualized, and concomitant carcinoma was absent.

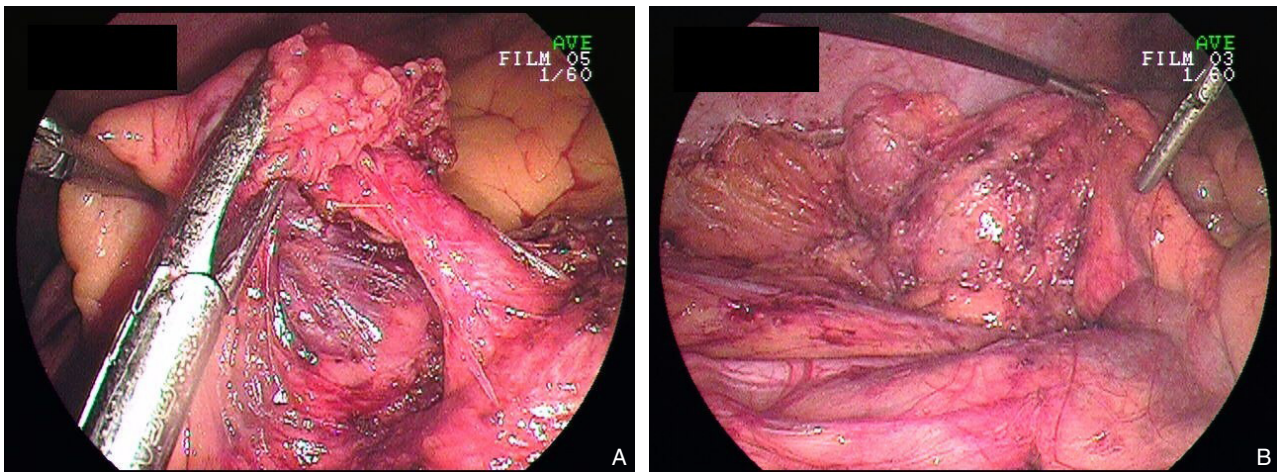


Fig. 2. (A) The ileocecal artery was exposed at the root in order to remove the lymph nodes along the vessel. (B) Laparoscopic view of the completed mobilization of the entire right colon without rupture of the tumor.

position and tilted left side down with a fiberscope introduced from the left-lower port, we dissected the ileal mesentery beginning from just medial to the cecum and carried it cephalad, medially, and to the left toward the inferior edge of the duodenum whilst taking great care not to grasp the tumor directly, which was located dorsal to the cecum and the ascending colon. By blunt dissection, a tunnel was created in the retroperitoneum in order to separate the ileal and right colon mesentery from retroperitoneal structures. The tumor was encapsulated, and no retroperitoneal invasion was observed. Since the perioperative diagnosis of the tumor could not rule out a malignant epithelial tumor, ileocecal vessels were exposed, clipped, and divided at the root in order to remove the lymph nodes along the vessels (Fig. 2a). Finally, the lateral attachments of the right colon were carefully incised and the right colon was completely freed from the retroperitoneum without rupturing the tumor (Fig. 2b).

The freed right colon was delivered through the right-upper wound that was extended to 7 cm and protected with a device. Ileocecal resection with suf-

ficient margins and functional end-to-end anastomosis using linear staplers were performed extracorporeally. Pneumoperitoneum was reestablished, and the mesenteric defect was sutured intracorporeally; we also confirmed the absence of mucoid fluid accumulations in the pelvis. A closed suction drain was placed in the retroperitoneum close to the anastomosis.

Postoperative pain was minimal, and the patient was ambulatory on the next day. There were no complications, and the patient was discharged on the 10th postoperative day. A gross pathologic examination demonstrated a 9.0 cm × 8.0 cm × 4.0 cm cystic structure with a thick wall and mucoid fluid, and that it had adhered tightly to the posterior wall of the cecum and the ascending colon (Fig. 3). Microscopic examination revealed that the structure had an atypical epithelium (Fig. 4). The absence of malignant cells was confirmed both in the tumor and dissected lymph nodes, and hence the tumor was diagnosed as mucinous cystadenoma of the appendix. The patient had no recurrence at a 2-year follow up.

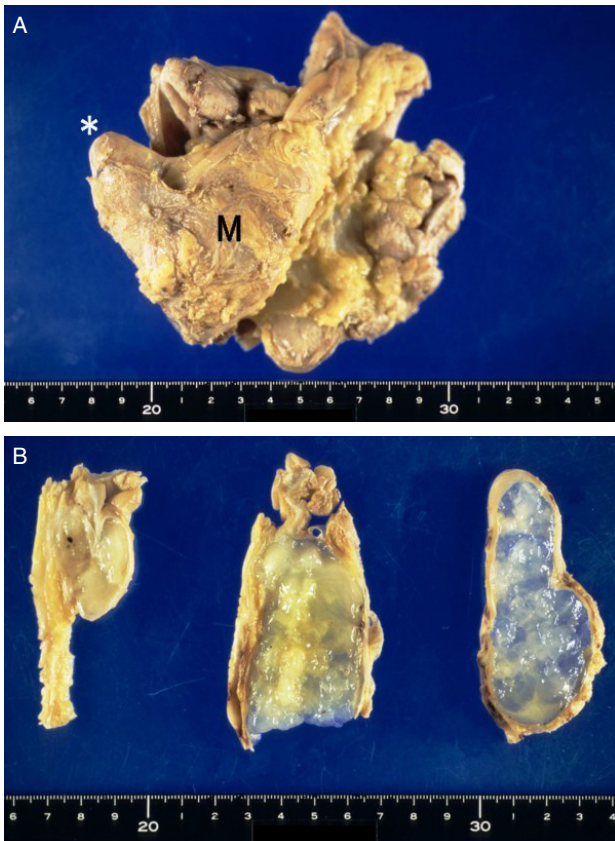


Fig. 3. (A) Gross pathologic examination of the resected specimen demonstrating a 9.0 cm × 8.0 cm × 4.0 cm mucinous tumor (M) with tight adhesion to the posterior wall of the cecum and the ascending colon. The tip of the appendix is indicated by the asterisk. (B) Cross sections demonstrating mucoid fluid in the cystic structure with a thickened wall.



Fig. 4. Microscopic examination of the appendiceal mucocele demonstrating atypical epithelial cells filled with mucoid fluid. No malignant cells were identified (hematoxylin and eosin staining; original magnification, ×100).

DISCUSSION

Mucocele of the appendix caused by a retention cyst, mucosal hyperplasia, mucinous cystadenoma, or mucinous cystadenocarcinoma is found in 0.2% to 0.3% of resected appendix [4, 6]. Even in a benign disease such as cystadenoma, dissemination of mucin-producing cells into the peritoneal cavity can cause pseudomyxoma peritonei [6]. Since an intact mucocele presents no future risk to the patient, it is important to remove it without trauma. To achieve this, we first mobilized the entire right colon cranially and caudally whilst taking care not to grasp the tumor directly. The lateral attachment of the ascending colon was not incised in this procedure so as to keep the tumor suspended, thereby removing the need to grasp the tumor during the laparoscopic procedure. Manipulation was facilitated with the aid of gravity by adjusting the operation table. There are few reports on laparoscopic resection of an appendiceal mucinous tumor in the literature [2, 3, 7-9]. In most of the reported cases, appendectomy [2, 7-9] or resection of the appendix with cecum [3] was performed whilst taking care not to grasp the tumor, with the resected specimen placed in a bag to deliver it through a trocar site in order to prevent dissemination of tumor cells. For laparoscopic resection of a relatively large appendiceal mucinous tumor presented in this case, mobilization procedure of the colon was also important to prevent rupturing of the tumor.

Since we could not rule out the presence of malignancy during the operation, the ileocecal vessels were divided at the root to remove the lymph nodes along the vessels. Lymph node metastasis has been reported

in cases of adenocarcinoma of the appendix [1, 6]. As for the extent of tumor resection, recent investigations have revealed that right hemicolectomy provides no survival advantage [10], and hence appendectomy or cecectomy with a negative surgical margin is preferable [6]. In our case, we have performed a laparoscopy-assisted ileocecal resection with prophylactic lymph node dissection, since the tumor adhered tightly to the posterior wall of the ascending colon and perioperative diagnosis of appendiceal carcinoma was difficult. Although pathological diagnosis revealed that the tumor was benign mucinous cystadenoma of the appendix, it was difficult to decide the extent of lymph node dissection during the operation.

Gonzalez Moreno and colleagues [7] described the first appendiceal mucinous adenocarcinoma resected by laparoscopy, in which diffuse peritoneal carcinomatosis appeared 9 months postoperatively. They recommended the conversion to open surgery when a mucinous appendiceal tumor is encountered. The oncological adequacy of the laparoscopic procedure for mucinous adenocarcinoma of the appendix remains to be elucidated.

The entire abdominal cavity should be checked for accumulations of mucinous fluid when performing laparoscopic surgery. In the upper abdomen we observed the omentum and the right retrohepatic space, while in the lower abdomen not only the right paracolic gutter but also the opposite side of the cul-de-sac as well as the deep pelvis should be checked, since such fluid accumulations are most commonly found here [6]. As far as we know, this is the first report describing intraoperative laparoscopic inspection of the residual mucinous fluid with the aid of gravity by adjusting the

patient position. If there is mucinous fluid, cytology is necessary to confirm the presence of epithelial cells. In the case of pseudomyxoma peritonei, intraoperative cytoreduction surgery as well as intrabdominal chemotherapy should be performed under open laparotomy [5, 6].

Although, clinical benefit of laparoscopic resection of appendiceal mucocele is presently unclear, the procedure is minimally invasive as demonstrated by minimal postoperative pain and quick recovery. Therefore, we believe that laparoscopic ileocecal resection will become surgical option for the treatment of appendiceal mucocele.

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