Abstract

Background
Synchronous neoplasms of the colorectum and kidney rarely occur. This paper is the second report on synchronous sigmoid colon and renal cancers treated laparoscopically. In this report, we describe synchronous cT4b sigmoid colon and left renal cancers treated laparoscopically simultaneously, along with the summary and review of reported cases.

Case presentation
A 45-year-old male presented with high fever and left lower abdominal pain. Computed tomography showed a solid sigmoid colon tumor that was 7cm in diameter and perforated its mesentery. Colon cancer was suspected to infiltrate the adjacent organs including the abdominal wall. In addition, a 5-cm tumor on the left kidney was accidentally discovered, which was suspected to be renal cancer. Colonoscopy showed a circumferential tumor at the sigmoid colon that was 25cm from the anal verge. There was no evidence of distant metastasis. After intravenous antibiotics therapy, we planned laparoscopic left hemicolectomy and nephrectomy. The sigmoid colon cancer adhered to the abdominal wall, small bowel, and appendix; therefore, we performed en bloc resection of the tumor and the adjacent organs. After colectomy, we performed left nephrectomy. Postoperative course was good. The patient was discharged 12 days after the operation.

Conclusion
Laparoscopic synchronous resection is a feasible and curable procedure providing several benefits for the patient. Furthermore, left hemicolectomy and radical left nephrectomy can be a good indication of synchronous resection because both include the same procedure such as mobilization of the splenic flexure. For cT4b colon cancer like in our case, en bloc resection without touching the adhesion can be a curable procedure.

Key words: colon cancer, renal cancer, synchronous cancer, laparoscopy

Introduction
Colon cancer is one of the most common malignancies. The cases of morbidity due to renal cancer are also increasing worldwide. However, synchronous neoplasms of these two organs rarely occur. By far, there are only five reports on synchronous colorectal and renal cancers treated laparoscopically. Our patient suffered from synchronous left renal and sigmoid colon cancer that penetrated the mesentery. The sigmoid colon cancer was suspected to infiltrate the adjacent organs; therefore, we performed left hemicolectomy with en bloc excision of the abdominal wall, small bowel, and appendix and nephrectomy laparoscopically. We report a case that was successfully treated with this extended radical operation and present a literature review of previous reports for synchronous colon and renal cancers.

Case Report
A 45-year-old male presented with high fever at
night and left lower abdominal pain. He mentioned narrowing of his stool for 6 months. His medical history included type 2 diabetes mellitus that had not been treated for 5 years. On physical examination, a firm and immobile mass approximately 8 cm in size was palpable on the left lower abdomen. Blood examination revealed elevated count of white blood cells up to 14,100/μL and C-reactive protein level up to 11.9 mg/dL. Carcinoembryonic antigen and carbohydrate antigen 19–9 tumor markers were not elevated. Computed tomography (CT) showed a solid sigmoid colon tumor that was 7 cm in diameter, perforated its mesentery, and was suspected to infiltrate the abdominal wall (Fig. 1a, 1b). Several dilated lymph nodes were observed at the root of the inferior mesenteric artery. The tumor caused stricture of the sigmoid colon, but there was no sign of ileus. In addition, a 5-cm hypervascular mass was accidentally discovered on the left kidney (Fig. 1c). There was no evidence of metastasis. Colonoscopy showed a circumferential tumor at the sigmoid colon that was 25 cm from the anal verge (Fig. 2). The scope could not pass through the obstructive tumor. Histopathologic examination revealed the suspicion of adenocarcinoma. The patient was admitted to the hospital and administered in-
travenous antibiotics and total parenteral nutrition. After 2 weeks of antibiotic therapy, the signs of inflammation decreased on blood examination. However, CT revealed that the size of the tumors and lymph nodes remained unaltered. Magnetic resonance imaging (MRI) showed the tumor was suspected to infiltrate the abdominal wall and small bowel (Fig. 3). The preoperative diagnosis was sigmoid colon cancer at cT4bN2M0 Stage III C (UICC 7th edition) and left renal cancer at cT1bN0M0 Stage I. We discussed about the operative methods with urologists and planned to perform laparoscopic left hemicolectomy and nephrectomy. The patient was placed in the lithotomy position, and colectomy was performed first. The surgeon and the cameraman stood on the patient’s right side, and the assistant stood on the patient’s left side. First, a 12-mm port was inserted into the umbilicus. Intraabdominal inspection showed the bulky sigmoid colon cancer suspected of infiltrating the left lower abdominal wall, small bowel, and appendix. Two ports for the operator were placed as usual: a 12-mm port at the lower right quadrant and a 5-mm port at the upper right quadrant. Two ports were placed for the assistant to avoid damaging the tumor: a 12-mm port at the lower left quadrant and a 5-mm port at the suprapubic bone. There was the possibility that the adhesion of the small bowel and the appendix to the tumor was an infiltration; hence, we did not perform adhesiotomy (Fig. 4a). The small bowel was transected intracorporeally using an endoscopic 60-mm linear stapler (Medtronic, Ireland), and the appendix was resected at its root. Then, the inferior mesenteric artery and vein were skeletonized, clipped, and divided with adequate lymph node dissection. After dissecting the perirectal space, the rectum was transected at the level of the promontory. The tumor was suspected to infiltrate the abdominal wall; hence, we dissected the peritoneum and a portion of the left rectus and transverse abdominis muscles to avoid damaging the tumor. The colon was pulled out from the extended umbilical incision, and the descending colon was transected. After en bloc removal of the tumor, the small bowel, which was transected first, was reconstructed with functional end-to-end anastomosis technique. Then, the operation table was tilted down to the right side, and nephrectomy was performed laparoscopically by the same surgeon under the guidance of a urologist. First, the left colon and splenic flexure were mobilized, and the left ureter, gonadal vessels were identified. The left renal vessels were identified, clipped, and divided accordingly. The renal vein was divided at the central part from the left adrenal vein branched. The tumor was adjacent to the left adrenal gland, which was difficult to be preserved, so we dissected it together. After dissecting the left kidney and adrenal gland free from the retroperitoneum, the left ureter and gonadal vessels were

Fig. 3 MRI of the tumor suspected to infiltrate the abdominal wall and small bowel (white arrow head).

Fig. 4 a: Suspected infiltration of the tumor to the small bowel and the abdominal wall.
b: Surgical field after colectomy and nephrectomy. SB: small bowel, SP: spleen, IMA: inferior mesenteric artery, LRA: left renal artery.
clipped and divided. The left kidney and the left adrenal gland were placed into an endoscopic retrieval bag and pulled out from the umbilical incision (Fig. 4b). Then, the descending colon was pulled out from the umbilical incision, and the anvil head was inserted to the side wall of the descending colon. A side-to-end anastomosis was performed with EEA™ 25-mm stapler (Ethicon, Ireland) using double stapling technique. The colonoscope was inserted before and after the reconstruction of the bowel to wash the bowel and confirm that there was no leak after the anastomosis. Hemostasis was confirmed, and three 24 Fr Blake drains were placed each in the left subphrenic position, dorsal side of the anastomosis, and anus. The operative time was 590 minutes, and the amount of blood loss was 20ml. Histopathological analysis revealed colonic papillary adenocarcinoma with no apparent invasion of the tumor to adjacent organs (7cm, pT3N0M0) and clear renal cell carcinoma (3.5cm, pT1aN0M0, G2>1 Fuhrman Grade 3). The penetration was observed at the bottom of the colon cancer. Postoperative course was uneventful, and the patient was discharged 12 days after the operation. Due to the perforation of the tumor, the tumor was judged as high-risk Stage II and the patient underwent adjuvant chemotherapy with tegafur-uracil for 6 months. No recurrence was documented 6 months after the operation.

**Discussion**

The incidence of synchronous renal cell carcinomas and colorectal cancers is rare and accounts for 0.05 %—4.85 % 1-3). Currently, with the improvement in the quality of imaging modalities such as CT and MRI, an increasing number of asymptomatic synchronous renal neoplasms are accidentally discovered during preoperative examination for colorectal carcinoma 6). Halak et al. reported that the synchronous renal cell carcinoma may be found in 4.85% of colorectal carcinoma, but the discovery rate of synchronous colorectal and urologic cancers may be increasing. To the best of our knowledge, this is the sixth published case report of a combined laparoscopic colectomy and nephrectomy written in English (Table 1).

Synchronous colon and renal cancers should be resected in a one-stage procedure for curability if possible 6). Combined surgery also provides the pa-
tient with various benefits, such as reduced length of hospitalization, less postoperative pain and morbidity, early return to work, and cosmetic benefit\textsuperscript{5-7}. Another benefit of combining left hemicolectomy and left nephrectomy is that they both include the same procedure such as the mobilization of the splenic flexure. Considering the surgical approach, the conventional open approach is technically easy to resect these synchronous cancers. However, a large incision may be needed to accommodate the operative fields for both the colon and kidney, which can cause additional postoperative morbidity\textsuperscript{9}. Laparoscopic approach has several advantages, namely, less invasiveness, short hospital stays, less bleeding with the magnified surgical field, and lower morbidity\textsuperscript{3,10}. Additionally, the present sigmoid colon cancer adhered to the left lower abdominal wall, and the median incision or even the right pararectal incision could injure the adhesion that may have caused exposure of the cancer. This is also one of the reasons we chose the laparoscopic approach, which gives us the intra-abdominal good visual field and it helped to circumvent injuring the tumor unintentionally. In our case, it took longer time than the reported cases. Compared to the other cases, the colorectal tumor of our case was suspected to invade the other organs, which needed combined resection with adjacent organs and might extended the operation time.

The sequence of resection is also the issue of synchronous resection. In case either of the tumors is benign, it should be resected before the malignant lesion to reduce the chance of spreading the malignant cells to the abdominal cavity. From the reported cases, there is no constant rule of the order in which the organs are resected. In our case, the sigmoid colon cancer adhered to the abdominal wall and adjacent organs and disturbed the surgical field; therefore, we performed colectomy first. In addition, we proceeded with the left hemicolecotomy first because we thought that we could perform the colectomy as usual while keeping the appropriate usual layers because the left renal cancer seemed to be kept in a capsule. Ng et al. reported that they prefer to perform colectomy first because they believed that the retroperitoneal urologic organs will be exposed better after mobilization of the large bowel, especially when both tumors are located on the same side of the abdomen. They also noted that if the urological procedures are performed first, the bowel will be distented gradually, and the subsequent colorectal dissection and resection may become technically difficult\textsuperscript{8}. We agree with their opinion and think colectomy should be performed first during synchronous resection of colon and renal cancers, especially when both tumors are located on the same side.

As a result, in this case, there was no invasion of the sigmoid colon cancer to adjacent organs, but the adhesion could not be judged for whether it is an invasion of the tumor or inflammatory adhesion during the operation. Kapoor et al. reported that en bloc resection of right-sided colon cancers that invade the adjacent organs is feasible with low mortality and morbidity and extended survival rates\textsuperscript{11}. To attest the oncologically curative surgery, we believe that en bloc resection without touching the adhesion that is suspected of invasion should be performed, unless the adhesion is undoubtedly an inflammation.

Here, we reported a case of the synchronous cT4b sigmoid colon cancer and left renal cancer treated laparoscopically simultaneously. For synchronous cancers suspected of invasion to adjacent organs like in our case, combined en bloc laparoscopic resection is feasible and can be a curative procedure although further experiences are needed to evaluate oncological safety of it.

Conflict of interest: None.

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