Simultaneous endovascular aortic aneurysm repair and laparoscopic-assisted colectomy in a patient with an abdominal aortic aneurysm and concomitant advanced colon cancer

Tomoki Tamura,1 Seiichiro Yamamoto,1 Takurin Akiyoshi,1 Masanori Inoue,2 Motohito Nakagawa,1 Toshio Kanai1

1 Department of Surgery, Hiratsuka City Hospital, Hiratsuka, Kanagawa, Japan
2 Department of Radiology, Hiratsuka City Hospital, Hiratsuka, Kanagawa, Japan

Management of patients with an abdominal aortic aneurysm (AAA) and concomitant malignancy is controversial, particularly when both diseases require urgent surgical treatment. We present the case of an 88-year-old woman with a large AAA and concomitant advanced colon cancer. We performed a simultaneous endovascular aortic aneurysm repair (EVAR) and a laparoscopic-assisted colectomy. The patient's postoperative course was uneventful, and she was discharged on postoperative day 7 without complications. One-stage management with a minimally invasive procedure of simultaneous EVAR and laparoscopic surgery may provide an alternative and effective method for a patient with a large AAA and concomitant advanced abdominal malignancy.

Key words: abdominal aortic aneurysm, colon cancer, endovascular aortic aneurysm repair, laparoscopic-assisted colectomy

Introduction

The incidence of abdominal aortic aneurysm (AAA) and various concomitant malignancies ranges between 3.9% and 12.7%.1,2 The reported incidence of AAA and concomitant colorectal cancer varies from 0.5% to 3.8%.2,4 However, the optimal management of patients with an AAA and concomitant colorectal cancer is controversial, particularly when both diseases require urgent surgical treatment. Recently, endovascular aortic aneurysm repair (EVAR) has become a standard therapy for AAA.5-7 Also, short and long-term effectiveness of laparoscopic-assisted surgery for colon cancer has been reported.8,9 Therefore, if the anatomical criteria are satisfied, simultaneous EVAR and laparoscopic-assisted surgery may provide an alternative method for patients with an AAA and concomitant abdominal malignancy. In the present case report, we report a case of a simultaneous AAA and transverse colon cancer successfully treated by an EVAR and a laparoscopic-assisted colectomy.

Case Report

An 88-year-old woman was referred to our institution with consciousness disorder as the chief complaint. At this time, the patient had extensive anemia and a pulsatile abdominal mass. Her blood hemoglobin levels and hematocrit values were 5.0 g/dl and 15.8%, respectively. The patient underwent emergency computed tomography (CT), which revealed an infrarenal AAA with a diameter of 83 mm. The AAA was not ruptured (Figure 1A), and a tumor was identified in the transverse colon (Figure 1B). Distant metastasis was not detected by CT. Colonoscopy demonstrated a hemorrhagic and circumference type III tumor in the transverse colon (Figure 2), and biopsy revealed moderately differentiated tubular adenocarcinoma. We diagnosed the patient with a large AAA and concomitant advanced transverse colon cancer. The apparent cause of anemia was bleeding from the transverse colon cancer. Considering the advanced age of the patient and the advanced stage of both diseases, we planned simultaneous surgery using minimally invasive EVAR and laparoscopic-assisted colectomy. Right internal iliac artery coil embolization was performed prior to the surgery because the right common iliac artery
Simultaneous EVAR and laparoscopic surgery

**Figure 1A.** Three-dimensional computed tomography showing a large fusiform infrarenal abdominal aortic aneurysm with a severe angulated proximal neck

**Figure 1B.** Contrast-enhanced computed tomography showing a transverse colon mass

**Figure 2.** Colonoscopy showing a hemorrhagic and circumference type III tumor in the transverse colon

**Figure 3.** Angiography during the endovascular aortic aneurysm repair

**Figure 4.** The formalin-fixed resected colon carcinoma
diameter was greater than 23 mm. One week after the catheter intervention, the patient underwent a simultaneous EVAR and a laparoscopic-assisted colectomy under general anesthesia. The AAA repair was performed first. The bilateral common femoral arteries were exposed through an inguinal incision. A Gore Excluder endograft (Gore & Associates, Newark, DE, USA) was chosen for the procedure. The main body of the system was inserted through the left common femoral artery using the pull-through technique because the aortic neck angle was greater than 60°. The main body was deployed successfully into position just below the left renal artery. Subsequently, the right graft limb was deployed along the right external iliac artery, and the left graft limb was deployed along the left common iliac artery. The completed aortogram confirmed that there were no endoleaks (Figure 3). After careful reversal of heparin anticoagulation by protamine administration, we performed a laparoscopic-assisted colectomy. The abdominal cavity was inspected laparoscopically, revealing that the pulsatile AAA had disappeared and no evidence of ischemic colitis. We performed a transverse colectomy with a D2 lymphadenectomy laparoscopically (Figure 4). The total duration of the combined surgery was 426 minutes, and no blood transfusion was required. We performed the EVAR before the colectomy because the risk of an AAA rupture should be eliminated first. The patient's postoperative course was uneventful, and she was extubated in the operating room, before being admitted to the intensive care unit for 1 day. Oral feeding was resumed on postoperative day 3, and she gradually recovered, before being discharged on postoperative day 7 without complications. Postoperative pathological examination revealed moderately differentiated tubular adenocarcinoma with serosa exposure (pSE) and metastases to 231 lymph nodes (pN1) (i.e., pStageIIIa, in the Japanese classification).

**Discussion**

The optimal management of patients with an AAA and concurrent malignancy is controversial, particularly when both diseases require urgent surgical treatment. The main controversy relates to the timing of the two interventions and whether they should be performed as a one- or a two-stage approach. In the case of a two-stage approach, treatment of the AAA prior to the treatment of malignancy exposes the patient to the risk of malignancy progression, whereas treatment of malignancy first exposes the patient to the risk of an AAA rupture in the perioperative and/or postoperative periods.11,12 These risks may be avoided using the one-stage approach; however, the risk of surgery may be increased by a longer duration of surgery, bleeding due to the use of anticoagulants, ischemic colitis, or anastomotic leaks.

Recently, the advantage of EVAR in patients with an AAA has been reported, and EVAR is associated with significantly lower operative mortality than that with open surgical repair. However, no differences have been observed regarding total mortality or aneurysm-related mortality in the long term.5-7

The advantage of an EVAR in patients with an AAA and concomitant malignancy may be low operative morbidity and mortality. For example, in the study by Porcellini et al.,13 11 patients who underwent an EVAR were compared with 14 patients who received an open aneurysm repair, and no patients died perioperatively in the EVAR group, whereas 3 patients died perioperatively in the open aneurysm repair group. Postoperative complications occurred in only 1 patient in the EVAR group and in 7 patients in the open aneurysm repair group for morbidity rates of 9.1% and 50%, respectively.13 Lin et al.14 compared 23 patients undergoing an EVAR with 61 patients undergoing an open aneurysm repair. Thirty-day postoperative mortality and morbidity rates were lower in the EVAR group (0% and 23%, respectively) compared with those in the open aneurysm repair group (13% and 32%, respectively). However, 2 patients in the EVAR group developed sigmoid ischemia.14 These short-term benefits are important in patients who require urgent surgical treatment for both diseases.

Laparoscopic surgery has led to great progress in the treatment of many gastrointestinal diseases.15 Laparoscopic-assisted colectomy is less invasive than open colectomy for the treatment of colon cancer in terms of postoperative recovery.5,9 The rates of recurrent cancer are similar comparing laparoscopic-assisted colectomy and open colectomy.10 These benefits are advantageous in terms of surgical stress in patients with an AAA and concomitant colon cancer. Simultaneous presentation of an AAA and abdominal malignancy has been treated previously with EVAR16,17 and also with EVAR and laparoscopic-assisted colectomy.18,19

In the case of the one-stage approach involving an EVAR and laparoscopic surgery, we suggest that the EVAR should be performed first followed by laparoscopic surgery because anticoagulation therapy is necessary for EVAR, and the presence of ischemic colitis can be inspected in the abdominal cavity laparoscopically.

In the present case report, we successfully performed a simultaneous EVAR and a laparoscopic-assisted colectomy in a patient with an AAA and concomitant
advanced transverse colon cancer without any complications. In conclusion, if the anatomical criteria are satisfied, one-stage management with a minimally invasive procedure of a simultaneous EVAR and a laparoscopic-assisted colectomy may provide an alternative intervention for patients with a large AAA and concomitant advanced colon cancer.

References