

➤ **Case Report** ◀

Description of the Surgical Strategy Used for the Treatment of a Complex Disease: Report of a Case

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We report a rare case in which a patient required three surgeries with competing priorities. In a 68-year-old man diagnosed with an abdominal aortic aneurysm (AAA), computed tomography (CT) revealed an infrarenal AAA, unusual thickening of the sigmoid colon that suggested cancer, and a filling defect in the left atrium. We considered the disease stage, which affects prognosis, and the risk of complications that could interfere with the treatment of the other pathologies and developed a three-stage surgical strategy: (i) endovascular aortic repair, (ii) sigmoid colectomy, and (iii) resection of the left atrial mass. The patient's postsurgical recovery was uneventful.

Keywords: abdominal aortic aneurysm, sigmoidal colon cancer, myxoma

Introduction

Although abdominal aortic aneurysms (AAAs) are often comorbid with gastrointestinal cancer, the presence of an additional intracardiac tumor is rare. The coexistence of three asymptomatic diseases complicates both diagnosis and treatment; therefore, we report this case along with a discussion of the surgical strategy selected.

Case Report

A 68-year-old man without a significant medical history was diagnosed with AAA. Computed tomography (CT) revealed a fusiform infrarenal AAA (diameter, 52 mm), unusual sigmoid colon thickening that suggested cancer,

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and a filling defect in the left atrium (Fig. 1). Transthoracic echocardiography showed a pedunculated mass (16×18 mm) that suggested myxoma, and cancer was diagnosed with a colon fiberoscopy-guided biopsy. There was no apparent lymph node metastasis of the sigmoid colon cancer, systemic arterial embolism of the cardiac tumor, or myocardial ischemia (by myocardial scintigraphy). We considered the stage of each disease since that affects long-term prognosis, and the risk of complications in treating each disease that could interfere with the treatment of the other diseases (Table 1). Based on these considerations, we developed the following three-stage surgical strategy: (i) endovascular aortic repair (EVAR) for the AAA, (ii) sigmoid colectomy, and (iii) resection of the left atrial mass.

During the EVAR, the right internal iliac artery was embolized using a self-expanding nitinol mesh occlusion device (Amplatzer Vascular Plug II™ 14 mm, St. Jude Medical Co., St. Paul, MN, USA). This was done to avoid a Type 1B endoleak because of a short landing zone in the right common iliac artery. Next, the stent grafts (Gore Excluder™, WL Gore Co., Flagstaff, AZ, USA) were deployed through a right leg approach into the right external iliac artery.

One month later, laparoscopic-assisted sigmoid colectomy was performed. Despite the excluded inferior mesenteric artery and embolized right internal iliac artery, adequate perfusion of the sigmoid branch was confirmed by pulsation and examination. Curative resection of the tumor (T3N0M0) with an adequate resection margin was confirmed by histopathology. A Type 2 endoleak from the internal mesenteric artery (IMA) did not occur, and the IMA was ligated at its root as part of the colectomy.

One month after the colectomy, a median sternotomy was performed, and the left atrial tumor was resected along with the intima and myocardium surrounding the attachment site. Myxoma was confirmed by histopathology. The patient's postsurgical recovery was uneventful.





Fig. 1 Preoperative enhanced CT scan showing a filling defect in the left atrium (A: white arrow), a fusiform infrarenal AAA (B), and unusual thickening of the sigmoid colon (C: white arrowhead).

Table 1 The three factors considered for selecting the surgical procedures and their order

Disease	AAA	Sigmoid colon cancer	Atrial myxoma
Impact on prognosis	Profound: the risk of rupture 3%–15% per year	Profound: 5-year survival rate (if curative resection) 67.4%–84.5%	Weak if benign Profound if malignant
Disadvantages of postponing treatment	Risk of rupture	Decreased curability	Systemic arterial embolism Spread if malignant
Impact of surgery on the treatment of other diseases	Risk of ischemia of sigmoid colon Intraperitoneal adhesion if laparotomy	Risk of transient bacteremia Intraperitoneal adhesion	Spread of cancer Risk of AAA rupture

Discussion

The order of and the interval between surgeries are important factors to consider to ensure the best outcome in patients with multiple concomitant diseases. In this case, we selected a surgical strategy based on the following considerations: 1) the prognosis of each disease, 2) the risk of delaying surgery, and 3) the influence of each surgery on the treatment of the other diseases (Table 1).

Although one-stage open surgery for AAA repair and colectomy has been reported,¹⁾ infection of the aortic graft may occur, resulting in high mortality.²⁾ In this case, endovascular treatment was used for the AAA to minimize the risk of graft infection and potential intraperitoneal adhesions that would affect the subsequent colectomy. However, the inferior mesenteric and right internal iliac arteries

were occluded by the preceding EVAR. This could potentially cause ischemia of the sigmoid colon, which might jeopardize a secure anastomosis following colectomy. For this reason, we chose a two-stage strategy instead of a one-stage approach and took advantage of mesenteric collateral arterial development in the month between EVAR and the subsequent colectomy. Although we prepared for bypass surgery in case of inadequate intestinal blood flow at the time of the second surgery, fortunately, bypass was not necessary. Another concern with a two-stage strategy is that colon cancer could advance during the interval between surgeries. The rather early stage of our patient's colon cancer was the deciding factor for a two-stage surgical approach.

Although the cardiac tumor was suspected to be myxoma, a benign tumor,³⁾ there was a risk of malignancy due

to possible metastasis of the colon cancer.⁴⁾ Furthermore, the cardiac tumor could cause cerebral infarction or other embolic events during the interval between surgeries. These concerns were alleviated when the tumor was confirmed to be benign. However, we prepared for a culture-drug sensitivity test in case of a malignant tumor (e.g., a leiomyosarcoma) to identify effective chemotherapy options.

All of these considerations were based on the diseases in our particular patient. In general, the strategy can vary greatly depending on the severity of the diseases in each individual patient. The most important factor in determining a surgical strategy in such complicated cases is taking into consideration the impact of each disease on the overall prognosis. If the cardiac tumor is large and is likely to cause circulatory collapse or multiple emboli, resection of the cardiac tumor should be given priority. If the AAA is large or ruptured, or if there is impending rupture, AAA repair should be performed first. There can be an enormous number of different scenarios in patients with multiple diseases. With an increased number of surgeries in elderly patients and improving surgical outcomes for many diseases, we anticipate an increasing number of cases with multiple diseases, which will require much more deliberate decision-making in the coming era. Furthermore, evaluation of diseases and organs in other surgical fields may be necessary to achieve the best possible outcomes with surgical treatment.

Conclusion

The treatment strategy can vary depending on disease severity (e.g., impending AAA rupture, serosal invasion of cancer, or an unstable cardiac tumor) and should be modified if the disease progresses unexpectedly or other

complications arise. To achieve the best outcomes when treating multiple comorbid diseases, a collaborative multidisciplinary surgical team is required as well as a detailed understanding of the case and prompt surgical execution.

Disclosure Statement

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Author Contributions

Collection of data: KK, MT, KM

Writing all: KK

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