**Benefit of Minimally Invasive Treatment of Concomitant Multiple Aortic Aneurysms, Atrial Septal Defect and Colon Cancer**

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Minimally invasive treatment of cardiovascular disease might decrease the risk of morbidity and mortality for high-risk patients. We describe a patient with concomitant large thoracic and abdominal aortic aneurysms, atrial septal defect (ASD) with heart failure and colon cancer with bleeding. We applied minimally invasive, transcatheter closure of the ASD and a hybrid approach to treat two aortic aneurysms, followed by colectomy. The postoperative course was uneventful with no complications. Minimal invasive treatment for cardiovascular diseases allowed safe and early treatment of malignancy in an elderly, high-risk patient.

**Keywords:** multiple aortic aneurysms, hybrid therapy, Amplatzer septal occluder

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**Introduction**

The number of aging patients with concomitant cardiovascular diseases and malignancies has increased and clinicians are frequently confronted with a dilemma regarding treatment. We describe an elderly woman with multiple aortic aneurysms, atrial septal defect and colon cancer that were successfully treated using minimally invasive strategies.

**Case Report**

A 77-year-old woman was hospitalized with dyspnea upon exercise and diagnosed with heart failure (New York Heart Association [NYHA] class III) induced by an atrial septal defect (ASD). Thoracic and abdominal aortic aneurysms as well as sigmoid colon cancer were also detected. Her medical history included cigarette smoking, coronary artery disease (CAD) and paroxysmal atrial fibrillation (pAF). The CAD was treated by percutaneous coronary intervention (PCI) at the age of 71 years, and the pAF was treated by catheter ablation at the age of 75. The ASD was not treated using an Amplatzer septal occluder at that time because repeated transseptal puncture and catheter ablation would be difficult once the device was deployed. The patient was followed up for possible recurrence of pAF before ASD closure.

On radiography, the cardiothoracic index was 70.0%, and pulmonary congestion was observed (Fig. 1A). Transesophageal echocardiography (TEE) revealed a large secundum-type ASD measuring 20 × 12 mm surrounded by a >5 mm rim. Pulmonary hypertension was evident, with pulmonary artery systolic pressure of 62 mmHg, and a left-to-right shunt with a ratio of total pulmonary to total systemic blood flow (Qp/Qs ratio) of 3.8. Computed tomography (CT) showed a 45-mm saccular, descending thoracic aortic aneurysm (TAA), which seemed about to rupture, and a 52-mm, fusiform, infrarenal abdominal aortic aneurysm (AAA). The AAA proximal neck angle was about 90°, and the bilateral common iliac arteries were severely calcified and...
First, the ASD was closed using an Amplatzer septal occluder, which improved the heart failure. The preoperative Qp/Qs ratio and NYHA class improved from 3.8 to 1.8 and from class III to class I, respectively.

Considering the risk that the saccular aneurysm in the descending aorta would rupture during surgery for colon cancer, we planned to repair the aortic aneurysms first. Although total endovascular aortic narrowed (Fig. 2). The patient had anemia (Hb 8.1 g/dL) due to melena. Colonoscopy revealed an irregularly elevated tumor that was diagnosed by biopsy as adenocarcinoma and clinical stage I after further analysis (Fig. 1B). The anemia was improved from Hb 8.1 g/dL to 10.3 g/dL by taking iron preparation in 2 weeks. Since then anemia did not progress with conservative therapy. A treatment plan was designed after considerable discussion with relevant departments.

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![Fig. 1](image1.png)  
**Fig. 1** (A) The initial chest radiograph. (B) Colonoscopy revealed an irregularly elevated tumor that was diagnosed by biopsy as adenocarcinoma.

![Fig. 2](image2.png)  
**Fig. 2** Preoperative computed tomography (CT) images of aneurysms. (A) Saccular and fusiform. (B) Aneurysms in descending thoracic and infrarenal abdominal aortae, respectively. Endovascular repair is unsuitable for treating these aneurysms due to proximal neck angle of about 90° and severe calcification as well as narrowing of the common iliac arteries, respectively.
Abdominal aortic aneurysms and colon cancer with anemia. The heart failure was initially treated using an Amplatzer ASD occluder. Transcatheter ASD closure has the advantages of being significantly less invasive than surgery and a shorter hospital stay. Although the long-term outcomes are unclear, transcatheter ASD closure is effective for patients with concomitant cardiovascular diseases and malignancy.

We address the most symptomatic or threatening lesion first when considering treatment plans for patients with concomitant aortic aneurysms and colon cancer. Our patient had anemia due to bleeding from colon cancer, and the colon cancer was likely to progress during the surgical period for aortic aneurysms. On the other hand, we considered treating the aortic aneurysms because the risk of rupture was high during the colectomy period. Among 80 reports of concomitant AAA and colon cancer, 11% of AAA ruptured during the colectomy period when colectomy was the first procedure. The risk of aneurysm rupture seemed higher in our patient because she had a very ill-formed, saccular thoracic aneurysm on the verge of rupture and abdominal aneurysms, so the aortic aneurysms were treated first.

One series of patients who underwent endovascular aortic aneurysm repair (EVAR) before colectomy had a short surgical duration and hospital stay, as

**Discussion**

The number of patients with concurrent pathologies such as cardiovascular and malignant diseases is increasing as the population ages. The patient described herein had heart failure due to an ASD, thoracic and abdominal aortic aneurysms and colon cancer with anemia. The heart failure was initially treated using an Amplatzer ASD occluder. Transcatheter ASD closure has the advantages of being significantly less invasive than surgery and a shorter hospital stay. Although the long-term outcomes are unclear, transcatheter ASD closure is effective for patients with concomitant cardiovascular diseases and malignancy.

One month from transcather ASD closure a hybrid approach comprising open repair of the abdominal aortic aneurysm and endovascular repair of the thoracic aortic aneurysm proceeded under general anesthesia. The transperitoneal approach was used. The juxtarenal abdominal aneurysm was replaced using a bifurcated artificial prosthesis, and two stent grafts were then placed in the descending thoracic aorta through the right limb of the bifurcated prosthesis (Fig. 3). Contrast angiography confirmed the absence of endoleaks and good graft patency.

One month later, the patient underwent Hartmann’s operation, which constitutes a surgical resection of the sigmoid colon with a colostomy. The postoperative course was good, and she was discharged from hospital 23 days later.
Conclusions

We devised a treatment strategy and method to address concurrent multiple cardiovascular diseases and colon cancer in an elderly female patient. The outcomes and postoperative courses of patients who have been treated by a combination of minimally strategies such as Amplatzer ASD closure and TEVAR are generally favorable. Minimally invasive strategies are beneficial for high-risk patients and allow the planning of effective treatment strategies.

Disclosure Statement

All authors have no conflict of interest.

References