Single-stage open surgical management of symptomatic abdominal aortic aneurysm and colorectal carcinoma using nais technique: a case report

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Abstract:

Background: The occurrence of simultaneous malignant diseases and abdominal aortic aneurysm (AAA) is reported to be around 5.4-6.7%. Surgical intervention for abdominal cancer can elevate the risk of AAA rupture and infection. Here, we present a case report detailing a single-stage open surgical approach for the treatment of a symptomatic abdominal aortic aneurysm and an advanced colorectal carcinoma using the NAIS technique.

Case Report: A 71-year-old patient with a 7cm symptomatic infrarenal AAA and ileus due to advanced colorectal carcinoma was evaluated. The patient also had comorbid conditions, including arterial hypertension, chronic obstructive pulmonary disease, and diabetes mellitus. A CT scan was performed, and due to the unsuitable anatomy of the AAA for endovascular repair, a synchronous open approach was chosen. The first stage involved a total colectomy with ileo-rectal anastomosis. Subsequently, AAA resection and aorto-biiliac bypass with the NAIS technique were performed, utilizing bilateral femoral veins as graft material. The patient was discharged on the 8th postoperative day. Follow-up CT scans at the first, second, and fourth year showed no residual tumor formation and a patent graft.

Conclusion: Simultaneous open repair of AAA and concurrent malignant diseases demands meticulous attention to detail, considering the higher cumulative morbidity and mortality associated with single-stage operations. Managing patients with this dual pathology poses a significant surgical challenge, particularly in the absence of a clear consensus in the existing literature.

INTRODUCTION

Concurrent presentation of an abdominal aortic aneurysm (AAA) and colorectal carcinoma is rare, with an observed prevalence between 0.5% and 4% among individuals with AAA.[1] The simultaneous management of both pathologies poses substantial surgical challenges—particularly with respect to determining the optimal sequence of interventions and appropriate vascular reconstruction strategies. We present the case of a septuagenarian male who arrived with an acute abdomen secondary to a symptomatic infrarenal AAA and concurrent ileus attributable to advanced colorectal cancer. Given the aneurysm's unfavorable vascular anatomy, endovascular repair was contraindicated, necessitating an open, synchronous surgical approach. In such contaminated operative fields, achieving vascular control requires careful consideration of diverse revascularization options: aortic ligation with extra-anatomic bypass, in situ cryopreserved allografts, antibiotic-impregnated prostheses, or the neoaortoiliac system (NAIS) reconstruction utilizing autologous femoral veins (FVs)—first described by Clagett et al. in 1993[2]. Herein, we report a single-stage open operation employing NAIS for simultaneous AAA repair and resection of advanced colorectal malignancy.

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doi: DOI: 10.59037/fkdhyv71
ISSN 2732-7175 / 2025 Hellenic Society of Vascular and Endovascular Surgery Published by Rotonda Publications

CASE DISCUSSION

A 71-year-old man presented to the emergency department following one week of lower back and abdominal pain, which had dramatically worsened over the previous three days. He reported intermittent lower back discomfort during the preceding year but had not undergone any diagnostic evaluation. His medical history included arterial hypertension, chronic obstructive pulmonary disease, and type II diabetes mellitus. On examination, he exhibited signs of peritonitis; laboratory studies showed leukocytosis (20,000/mm^3). Contrast-enhanced computed tomography identified a 7 cm infrarenal AAA and evidence of ileus secondary to advanced colorectal carcinoma. Endovascular exclusion was deemed unfeasible due to anatomical constraints, prompting selection of a synchronous open operative strategy.

Under general anesthesia, bilateral femoral veins were harvested to construct a bifurcated venous conduit. Through a midline laparotomy, proximal aortic control was achieved, followed by aneurysmotomy and proximal anastomosis of the NAIS graft to the infrarenal aortic segment. Distal anastomoses were performed on both common iliac arteries. Following extensive peritoneal lavage, an omental flap was mobilized to envelop the graft. Subsequent oncological resection entailed a total colectomy with anterior rectal excision. The patient was transferred to the intensive care unit postoperatively and discharged on 8th postoperative day. Adjuvant chemotherapy consisted of five cycles of capecitabine. Serial surveillance via CT imaging at 1st, 2nd , 3rd and 4th years post-procedure demonstrated no evidence of residual malignancy and confirmed graft patency.

Surgical Technique

Under general anesthesia, the patient was placed in a supine position. Initial dissection focused on the bilateral femoral triangle for femoral vein (FV) harvesting. Great care was taken to preserve the deep femoral vein and its major tributaries. Approximately 25 cm of FV was harvested from each side to construct a bifurcated autologous conduit.

Following femoral vein harvesting, a midline laparotomy was performed. Extensive adhesiolysis was required due to tumor-related ileus. The infrarenal abdominal aorta and bilateral common iliac arteries were mobilized and controlled proximally and distally. After systemic heparinization, aortic clamping was achieved, and aneurysmotomy was performed. A proximal anastomosis between the aortic neck and the NAIS conduit was constructed using 4-0 polypropylene in a continuous fashion.

The autologous FV graft was configured in a pantaloon shape to create a bifurcated conduit, with distal anastomoses performed to each common iliac artery. Following completion of the vascular reconstruction, the aneurysmal sac was reapproximated over the graft, and the conduit was wrapped with an omental flap to enhance graft protection and reduce infectious risk.

Colorectal resection proceeded with oncologic principles. A total colectomy and anterior rectal resection were performed en bloc. Given the extent of the disease and the contamination risk, a terminal ileostomy was created. Extensive peritoneal lavage concluded the abdominal procedure, and the abdominal wall was closed in layers.

DISCUSSION

The coexistence of an AAA and colorectal carcinoma poses a multifaceted surgical dilemma. While staged interventions may reduce operative complexity, they also carry risks of aneurysm rupture in the interim or progression of malignancy. Conversely, synchronous repair confers the advantage of single-anesthetic exposure but raises concerns over increased morbidity, particularly in contaminated fields.

Historically, staged approaches have dominated management paradigms. However, contemporary evidence supports select use of one-stage procedures in appropriate patients. In our case, anatomical constraints precluded endovascular aneurysm repair (EVAR), and oncologic urgency rendered staged intervention inadvisable.

In situ reconstruction with autologous femoral vein—pioneered by Clagett et al.—offers durable outcomes even in contaminated fields, with reduced infection risk compared to prosthetic materials [3]. The NAIS technique is particularly valuable in infected or potentially septic scenarios where prosthetic use would be contraindicated.[4,8] While technically demanding and time-intensive, NAIS reconstruction eliminates the need for synthetic grafts, has demonstrated long-term patency, and exhibits lower reinfection rates[5,6,8].

Our patient's outcome supports the viability of a synchronous open approach in selected high-risk individuals[4]. Despite the inherent complexity, careful planning, multidisciplinary coordination, and meticulous surgical technique facilitated a favorable recovery[7,9,10]. Long-term follow-up has confirmed both oncologic remission and vascular graft durability.

CONCLUSION

This case highlights the feasibility and effectiveness of a synchronous, single-stage surgical approach to managing concurrent abdominal aortic aneurysm and colorectal carcinoma using neoaortoiliac system (NAIS) reconstruction. In anatomically or oncologically complex cases where endovascular repair is not an option and delayed treatment poses significant risk, autologous in situ reconstruction offers a viable alternative. The use of femoral vein grafts minimizes the risk of graft infection in contaminated surgical fields and achieves satisfactory vascular and oncologic outcomes. This case supports the selective application of NAIS in multidisciplinary surgical management strategies for complex coexisting pathologies.

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