FDG PET/CT Depicting Right Iliac Vein Tumor Thrombosis following Low Anterior Resection in Rectal Cancer Patient: A Case Report and Literature Review

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Abstract

Venous tumor thrombus is a rare complication of rectal cancer but is more common in other types of cancer, like renal cell carcinoma and hepatocellular carcinoma. The usual site of tumor thrombus in rectal cancer patients is the inferior mesenteric vein (IMV), which is seldom seen in the common iliac vein, with only a few cases reported till now. We present a case of fluorodeoxyglucose (FDG) avid right iliac vein tumor thrombosis after low anterior resection in a patient with rectal cancer and review the literature.

Keywords
► rectal cancer
► tumor thrombus
► FDG PET/CT
► nuclear medicine

Introduction

Venous tumor thrombi are rare in colorectal cancer, found in only 1 to 2% of patients.1 They usually appear in the inferior mesenteric vein (IMV) in patients with rectal cancer and are seldom seen in the common iliac vein.2 Inflammatory infiltrates play a crucial role in venous thrombus development, which can be detected at an early stage with high sensitivity and specificity using fluorodeoxyglucose positron emission tomography computed tomography (FDG-PET/CT) through focally increased FDG uptake.3,4 This study describes a case of a rare venous tumor thrombus in the iliac vein following radical resection of a rectal tumor.

Case Report

A 61-year-old woman presented with a 6-month history of progressive constipation, anal pain, and weight loss. The clinical examination was unremarkable. On blood workup, complete blood counts showed a high carcinoembryonic antigen of 16.4 ng/mL. Colonoscopy showed a mass causing significant stenosis. The diagnosis was made based on histopathology of the biopsy, which confirmed the diagnosis of invasive moderately differentiated adenocarcinoma.

Magnetic resonance imaging (MRI) showed that the circumferential lesion was located in the lower part of the rectum, with peritoneal and cervix invasion and numerous mesorectal lymph nodes and tumor deposits. The preoperative clinical stage was T4N2b.

After completion of 5 weeks of capecitabine and 25 fractions of external beam radiation therapy (EBRT), CT, and MRI showed two new right lobe hepatic lesions, with partial regression of the rectal mass. After this, four cycles of FOLFOX followed by FOLFIRI and bevacizumab were given to the patient before performing a surgical intervention, including laparoscopic-assisted low anterior resection, right hepatectomy, diverting colostomy, and total abdominal hysterectomy. Pathologic examination after surgery revealed a stage IIIA, moderately differentiated, KRAS mutated adenocarcinoma with cervix invasion and liver metastases. Immunohistochemical stains for mismatch repair (MMR) proteins showed intact nuclear expression for PMS2, MLH1, MSH6, and MSH2. The circumferential resection margin (CRM) was negative (6 mm).
After this, the patient presented with right lower limb deep vein thrombosis (DVT) and right upper limb weakness, which were treated with rivaroxaban 40 mg × 2. A follow-up CT showed hypoattenuating lesions inferior to the abdominal aortic bifurcation. This required correlation with MRI, revealing a few enlarged necrotic bilateral common iliac lymph nodes and an elongated segmental right iliac vein thrombus (Fig. 1). The patient’s serum carcinoembryonic antigen was 4.9 ng/mL; other parameters were normal.

FDG PET/CT scan was requested for the patient, because of its high diagnostic efficacy in determining disease recurrence, assessing the presence of metastasis, and detecting tumor thrombus by discerning the high glucose metabolic activity of malignant cells and providing the metabolic information of tumor thrombus. In this study, an FDG PET/CT scan confirmed the findings of few hypermetabolic common iliac lymph nodes as well as an intensely hypermetabolic elongated disseminated right iliac vein thrombus with maximum standardized uptake value (SUVmax) of 28, which led to the diagnosis of a malignant tumor thrombus rather than a benign venous thrombus due to the intensity of FDG uptake by the thrombus (Fig. 2).

Discussion
A variety of prognostic factors play a role in the prognosis for colorectal cancer, including the histotype, differentiation, extension of the primary tumor, and the presence of local and/or distant metastases. The latter is the most important prognostic factor in determining treatment type.

Tumor thrombosis is primarily found in patients with liver cancer, renal carcinoma, and adrenal tumors, but is a rare complication of rectal cancer patients. However, a recent study found that moderately differentiated adenocarcinoma has the potential to develop venous tumor thrombosis, which may develop in the IMV, inferior vena cava (IVC), and internal iliac vein. Because the distal rectum has double venous drainage: to the portal system via the IMV, which
Because of the rarity of tumor thrombus after rectal cancer surgery, especially when it is located in the common iliac vein, this case is of particular significance. In such cases, the gold standard in the diagnosis of tumor thrombus is conventional venography.\textsuperscript{14} but FDG PET/CT can help differentiate between venous thrombi and tumor thrombi hinging on the high glucose metabolic activity of malignant cells.\textsuperscript{15} which should be performed before interventional angiography is conducted.

**Conclusion**

Our case report emphasizes the importance of physicians being aware of such a presentation when rectal cancer patients experience swelling and weakness in their legs following surgery. To avoid further complications, the physician should use FDG PET/CT to rule out tumor thrombus as a possible cause and treat accordingly.

**Ethics Approval**

All procedures performed were by the ethical standards of the institutional and/or national research committee and with the Helsinki Declaration as revised in 2013 and its later amendments or comparable ethical standards.

**Informed Consent**

Written informed consent for publication of the data was obtained from the participants.

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**Conflict of Interest**

None declared.

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