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Omental Fat Necrosis Mimicking Metastatic Recurrence in a Patient With Colorectal Cancer: A Case Report

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Abstract

Metastatic recurrence of colorectal cancer is associated with significant morbidity and requires prompt evaluation and appropriate management. However, several benign conditions can mimic recurrent malignancy on imaging, potentially leading to unnecessary interventions or systemic therapy. Fat necrosis is a benign inflammatory process involving adipose tissue that may present as a mass and mimic malignant disease. We report the case of a 35-year-old man with a history of stage II colorectal adenocarcinoma who developed a solitary omental lesion during post-treatment surveillance. Contrast-enhanced computed tomography (CT) demonstrated a well-defined omental lesion suspicious for metastatic recurrence. However, the serum carcinoembryonic antigen level was within the normal range, and the lesion showed no significant fluorodeoxyglucose F-18 (FDG) uptake on positron emission tomography (PET)-CT. Given the discordant clinical, biochemical, and radiological findings, image-guided biopsy was performed. Histopathological examination revealed fat necrosis without evidence of malignancy. The lesion subsequently resolved on follow-up ultrasonography, and the patient continued on regular clinical and radiological surveillance. This case highlights the importance of considering benign mimickers such as fat necrosis in patients with a history of malignancy and emphasizes the role of tissue diagnosis when imaging findings suggest an isolated metastatic lesion but the overall clinical picture is discordant.

Categories: Pathology, Oncology, Internal Medicine
Keywords: adenocarcinoma, carcinoma colon, case report, early onset colorectal cancer, fat necrosis, metastatic recurrence, omental lesion

Introduction

Colorectal cancer (CRC) is one of the most common malignancies worldwide, and recurrence remains an important concern following curative-intent treatment. A nationwide Danish cohort study of patients with stage I-III CRC demonstrated that recurrence continues to occur during post-treatment follow-up, highlighting the importance of surveillance after curative surgery [1]. Fat necrosis is a benign inflammatory process involving adipose tissue that may present as a mass and mimic malignant disease. Encapsulated fat necrosis was described in the breast in the 1970s, with subsequent reports characterizing nodular-cystic forms of the condition [2,3].

Fat necrosis may occur following trauma, surgery, inflammation, pancreatitis, or vascular compromise and can present as a mass lesion that may be difficult to distinguish from malignancy on imaging. Abdominal fat necrosis may mimic malignant lesions, including liposarcoma and peritoneal or omental metastases, on imaging [4,5]. In patients previously treated for colorectal cancer, a newly identified omental mass raises concern for metastatic recurrence. This case highlights the diagnostic challenge posed by a solitary omental lesion during surveillance for colorectal cancer and emphasizes the importance of integrating clinical findings, tumor-marker trends, and multimodality imaging, with histopathological confirmation when findings are discordant.

Case Presentation

A 35-year-old man presented with complaints of constipation for the past three months. There was no history of weight loss, vomiting, bleeding per rectum, abdominal distention, or loss of appetite. There was no significant family history of malignancy.

On examination, the patient had a good performance status, stable vital signs, and no significant abnormalities on systemic examination. Per-rectal examination was normal. Baseline complete blood count and renal and hepatic function tests were within normal limits. Colonoscopy revealed an ulceroproliferative growth in the rectosigmoid region, and the scope could not be advanced beyond the lesion (Figure *1*). Biopsy of the lesion demonstrated moderately differentiated adenocarcinoma.

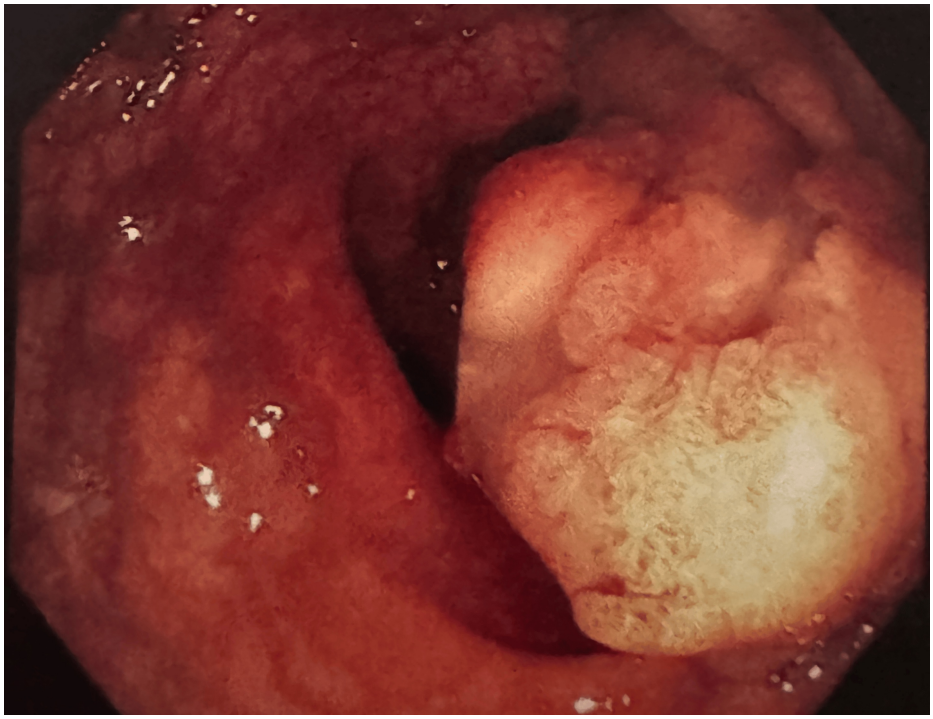


FIGURE 1: Colonoscopy showing an ulceroproliferative growth in the rectosigmoid region with a friable, irregular surface and luminal narrowing.

Contrast-enhanced imaging demonstrated a polypoidal mass lesion in the sigmoid colon with round mesocolic lymph nodes, without evidence of distant metastasis. The serum carcinoembryonic antigen (CEA) level was 13 ng/mL (reference range: <5 ng/mL).

The patient underwent left hemicolectomy. Histopathological examination of the resected specimen demonstrated moderately differentiated adenocarcinoma, pT3N0, with 12 lymph nodes examined (Figure *2*).

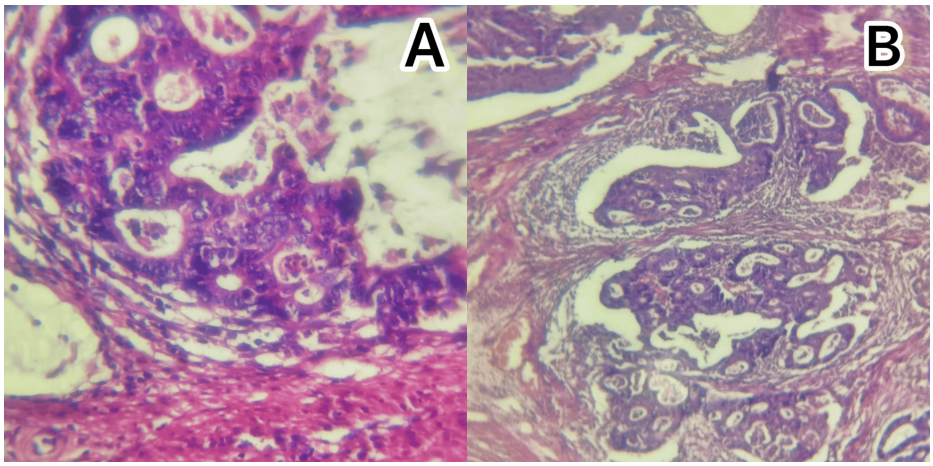


FIGURE 2: Histopathological features of colorectal adenocarcinoma (H&E staining).

Moderately differentiated adenocarcinoma showing (A) neoplastic cells (x40) and (B) glandular architecture (×10)

Molecular studies showed microsatellite stable status (MSS) as well as a KRAS G12D mutation. In view of the obstructive symptoms and elevated preoperative CEA level, the patient received adjuvant chemotherapy with CAPOX (capecitabine and oxaliplatin) for six months, completing eight cycles. He was subsequently

kept under regular follow-up.

Six months after completion of treatment, a follow-up ultrasound demonstrated a solitary omental lesion of size 4 x 5 cm. The serum CEA level was 4.5 ng/mL (reference range: <5 ng/mL). Contrast-enhanced computed tomography (CT) demonstrated a well-defined omental lesion measuring approximately 4 x 5x 4.7 cm anterior to the spleen, which was considered suspicious for metastatic disease (Figure *3*). Given the patient's previous history of colorectal adenocarcinoma, the lesion was initially considered suspicious for an omental metastatic deposit. However, fluorodeoxyglucose (FDG) uptake on positron emission tomography (PET)-CT demonstrated no significant FDG uptake within the 4 x 5 cm omental lesion anterior to the spleen. In addition, the serum CEA remained within the normal range, and the patient had no clinical symptoms suggestive of recurrent disease.

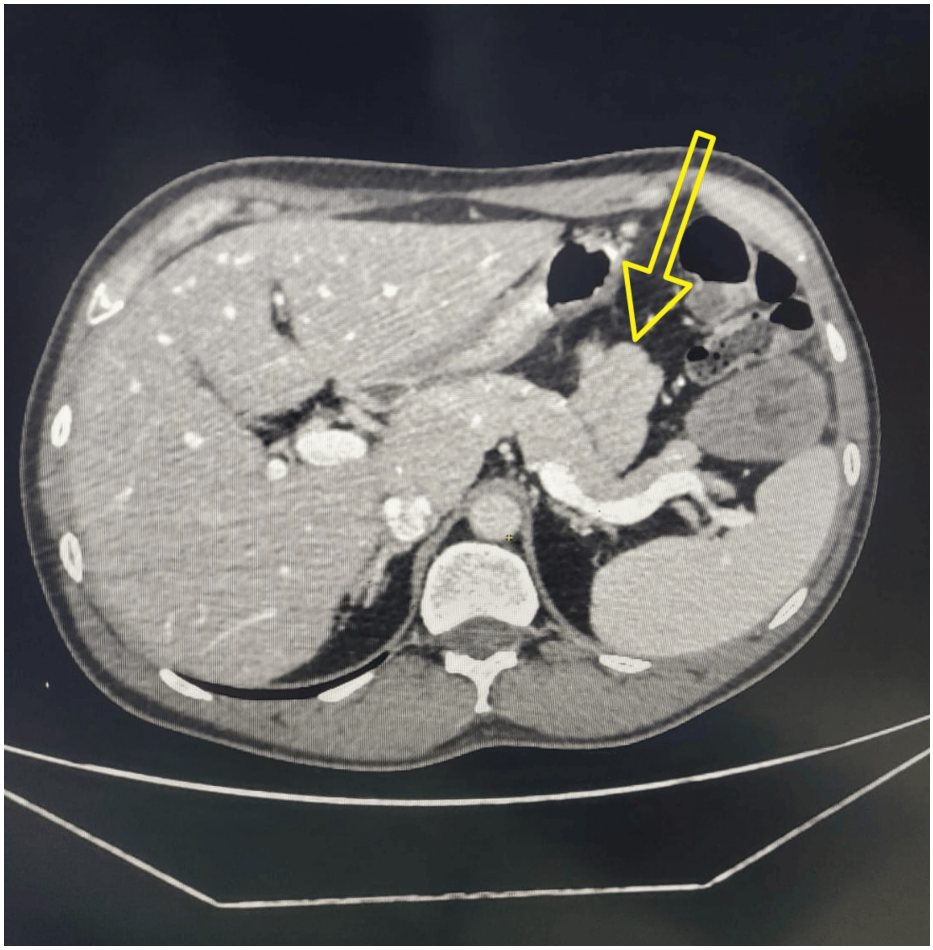


FIGURE 3: Omental lesion mimicking metastatic recurrence

Contrast-enhanced computed tomography showing a well-defined oval omental lesion measuring approximately 4x5x4.7 cm anterior to the spleen (arrow), predominantly of fat attenuation of -110 Hounsfield units (HU) with thin internal soft-tissue strands. There was minimal peripheral rim enhancement and no enhancing solid nodules or calcification. Mild surrounding fat stranding was present, without ascites, peritoneal nodularity, or lymphadenopathy. It was initially considered suspicious for an omental metastatic deposit.

Considering the solitary nature of the lesion, the patient’s young age, normal CEA level, absence of symptoms, and the discordance between the CT appearance and PET findings, an image-guided biopsy was performed to establish the diagnosis before considering treatment for presumed metastatic recurrence. Histopathological examination demonstrated fat necrosis without evidence of malignancy (Figure *4*).

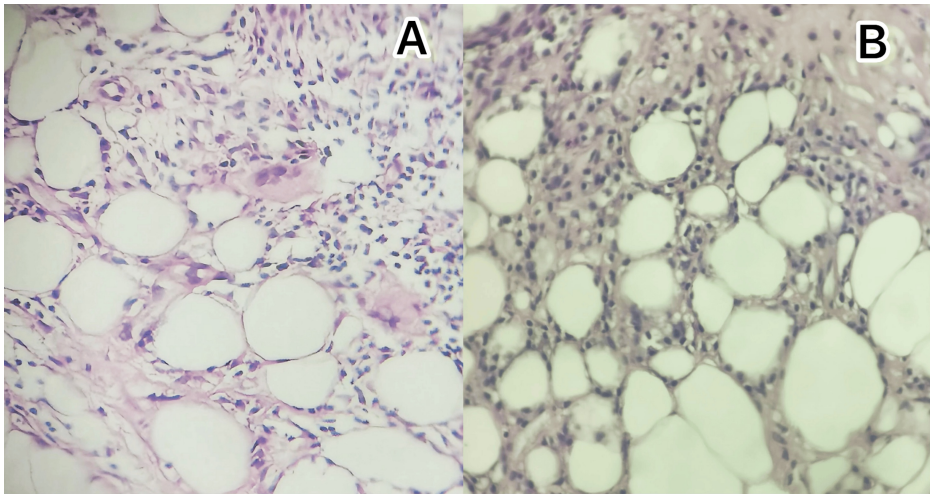


FIGURE 4: Histopathological features of omental fat necrosis (H&E staining).

Fat necrosis with (A) a foreign body giant cell reaction (×40) and (B) collections of foamy histiocytes (×40).

The patient was therefore not treated for metastatic recurrence and continued under regular clinical and radiological surveillance. Follow-up was planned every three months during the first two years and every six months thereafter for the next five years. At the eighth-month follow-up, ultrasonography (USG) of the abdomen demonstrated complete resolution of the lesion, while the serum CEA remained within the normal range (reference range: <5 ng/mL).

Discussion

Recurrence remains an important consideration following curative treatment for colorectal cancer. In a nationwide Danish cohort study involving patients with stage I-III colorectal cancer, recurrence was documented during long-term follow-up, emphasizing the need for structured postoperative surveillance [1]. Consequently, the identification of a new lesion during follow-up in a patient with previous colorectal cancer warrants careful assessment.

Fat necrosis represents a benign response to adipose tissue injury and can produce mass-like lesions that mimic malignant disease. The condition has historically been described using terms such as nodular-cystic and encapsulated fat necrosis [2,3]. Abdominal fat necrosis is a recognized entity with a broad spectrum of imaging appearances. Watanabe et al. described encapsulated abdominal fat necrosis presenting as an intra-abdominal mass and emphasized that it may mimic liposarcoma or other neoplastic lesions [4]. Their review also demonstrated that a substantial proportion of reported cases had a history of inflammation or surgery, although some patients had no identifiable precipitating factor.

Fat necrosis can mimic malignant disease because it may present as a mass or an area of abnormal fat with variable imaging appearances. The differential diagnosis of an omental lesion includes omental infarction, epiploic appendagitis, mesenteric panniculitis, and fat-containing neoplasms such as liposarcoma [4,5]. In the present case, the patient developed a solitary omental lesion six months after completion of adjuvant chemotherapy. Omental and peritoneal lesions are particularly concerning in patients with a history of colorectal cancer because peritoneal dissemination is a recognized pattern of metastatic disease. In this case, the lesion demonstrated predominantly fat attenuation, with internal soft-tissue strands, minimal peripheral rim enhancement, and mild surrounding fat stranding. Although these features were compatible with a benign fat-containing process, the patient's history of colorectal cancer warranted further evaluation. The absence of significant FDG uptake and the normal CEA level were reassuring but could not independently exclude metastatic disease. Image-guided biopsy was therefore performed, and histopathological examination confirmed fat necrosis without evidence of malignancy.

Several reports have demonstrated that fat necrosis can occur outside the breast and may involve unusual anatomical sites. The summary of some such reports is given in Table *1*.

Site	Reported presentation	Author
Abdomen/omentum	Intra-abdominal mass mimicking a neoplastic lesion	Watanabe et al. [4]
Pericardium	Fever and chest pain associated with ectopic epipericardial fat necrosis	Yoshino et al. [6]
Gallbladder	Rare membranous fat necrosis	Salehi et al. [7]
Retroperitoneum	Fat-containing retroperitoneal masses following extensive weight loss	Amblee and Ganesh [8]
Ovary	Encapsulated ovarian adipocytic lesion with fat necrosis	Gupta et al. [9]

TABLE 1: Summary of some reported extra-mammary sites of fat necrosis and their clinical presentations

Imaging plays an important role in evaluating abdominal fat necrosis. Kamaya et al. described the diverse imaging manifestations of abdominal fat necrosis and emphasized that benign fat necrosis and malignant processes, including liposarcoma or peritoneal carcinomatosis, may demonstrate overlapping appearances [5]. Correlation with the patient's clinical history and previous imaging is therefore important.

Image-guided biopsy may be considered when imaging findings are indeterminate or discordant with the clinical and biochemical picture, particularly when the lesion is solitary, and a diagnosis of metastatic disease would substantially alter management. In this patient, the solitary nature of the lesion, normal CEA level, absence of symptoms, and lack of significant FDG uptake prompted tissue sampling before treatment for presumed metastatic recurrence. The benign histopathological findings, together with complete resolution on follow-up USG, supported the diagnosis of fat necrosis. The underlying cause could not be established, although previous surgery may have contributed to localized vascular compromise or inflammation [4,5].

Other benign or non-malignant processes may also mimic metastatic disease on imaging. Chemotherapy-related hepatic changes can resemble liver metastases [10], while a variety of benign and non-neoplastic processes can mimic bone tumors or metastatic lesions [11]. These examples reinforce the broader diagnostic challenge of distinguishing malignant recurrence from treatment-related or benign abnormalities.

The case is also notable because the patient was only 35 years old at the time of diagnosis. Colorectal cancer diagnosed before the age of 50 years is generally classified as early-onset colorectal cancer (EOCRC). The incidence and clinical characteristics of EOCRC have received increasing attention, with potential contributions from genetic, environmental, metabolic, and microbiome-related factors [12]. Although no specific hereditary syndrome was identified or reported in this case, the patient's young age at presentation emphasizes the importance of appropriate evaluation and long-term surveillance.

Another important feature of this case was the discordance between the CT appearance and other clinical findings. Although the lesion was suspicious on contrast-enhanced CT, the patient's serum CEA had decreased from 13 ng/mL at initial diagnosis to 4.5 ng/mL during follow-up. Furthermore, FDG PET-CT demonstrated no significant metabolic activity within the lesion. However, a normal CEA level or non-FDG-avid lesion cannot independently exclude recurrent colorectal cancer. Studies evaluating patients with suspected recurrence have demonstrated that recurrent disease may occur despite normal CEA levels, and FDG PET-CT can also produce false-negative findings in some patients [13]. Therefore, these findings should be interpreted as part of the overall clinical assessment rather than as definitive evidence against recurrence.

The principal diagnostic lesson from this case is that a new solitary lesion in a patient with previously treated malignancy should be evaluated systematically. Imaging findings must be interpreted alongside tumour-marker trends, metabolic imaging, clinical findings, previous treatment history, and, when appropriate, tissue diagnosis.

Conclusions

Omental fat necrosis is a benign condition that can mimic metastatic recurrence in patients with a previous history of colorectal cancer. Although fat necrosis may occur following trauma, inflammation, pancreatitis, or surgery, a precipitating factor is not always identifiable. It should therefore be considered in the differential diagnosis of a new suspicious lesion during cancer surveillance. This case highlights the importance of maintaining a broad differential diagnosis when evaluating new lesions during cancer surveillance. When imaging findings are discordant with the clinical and biochemical picture, tissue confirmation should be considered before initiating treatment for presumed metastatic recurrence,

particularly when the diagnosis would substantially alter patient management.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Aysha Musthafa, Gayatri Gopan, Betty Abraham, Praveen Kesav Ramaswamy

Acquisition, analysis, or interpretation of data: Aysha Musthafa, Gayatri Gopan

Drafting of the manuscript: Aysha Musthafa

Critical review of the manuscript for important intellectual content: Aysha Musthafa, Gayatri Gopan, Betty Abraham, Praveen Kesav Ramaswamy

Supervision: Gayatri Gopan

Disclosures

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