

Abdominal Fat Necrosis Mimicking Malignancy: A Case Report and Diagnostic Insight

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Abstract

Fat necrosis is a rare benign condition in which adipose tissue undergoes ischemic or inflammatory changes, often presented as a mass or soft tissue nodule. Its pathophysiology remains unclear, with trauma and ischemia considered primary causes. Abdominal fat necrosis may mimic malignancy, making it challenging to diagnose based on imaging alone.

We report the case of a 35-year-old woman who presented with two months history of abdominal pain, and palpable nodules in the anterior abdominal wall. A prior cesarean section performed eleven years earlier was her only relevant medical history. Contrast-enhanced CT scan revealed ill-defined enhancing soft tissue thickening and stranding involving anterior abdominal wall extending posteriorly to involve omentum and peritoneal fat with soft tissue nodularity of the omentum and circumferential thickening of the wall of adjacent transverse colon. The imaging findings raise suspicion of malignancy, specifically peritoneal carcinomatosis, with a differential diagnosis of chronic inflammatory process. The ultrasound-guided core biopsy revealed chronic inflammation and fat necrosis, excluding malignancy. The patient received anti-inflammatory therapy, and follow-up imaging showed mild interval regression in the lesion size.

This case highlights the diagnostic challenges in differentiating fat necrosis from malignancy on imaging alone, emphasizing the importance of integrating clinical history, imaging, and histopathology for accurate diagnosis. Prompt recognition and appropriate management can lead to successful outcomes in patients with fat necrosis.

Keywords: Fat necrosis, Chronic inflammation, Malignancy, Peritoneum, Omentum

Introduction

Fat necrosis is a form of aseptic inflammation characterized by the death of adipocytes, typically triggered by trauma, surgery, or ischemia.¹ Abdominal fat necrosis may present as abdominal pain mimicking acute abdomen or may remain asymptomatic. The primary processes include torsion of epiploic appendages, infarction of the greater omentum, and fat necrosis secondary to trauma or pancreatitis.²

Less common entities such as pancreatic fat saponification,

heterotopic mesenteric ossification, and pseudolipoma of the capsule of Glisson can simulate more serious pathologies including malignancy, diverticulitis, or appendicitis.³ These atypical presentations, which may include palpable lumps or systemic symptoms such as vomiting and diarrhea, contribute to the diagnostic complexity.

We present a case of abdominal fat necrosis that closely mimicked malignancy in terms of clinical symptoms and radiologic appearance but was ultimately diagnosed as a benign inflammatory process through histopathology.

Case Presentation

A 35-year-old female presented with a two-month history of dull, non-radiating abdominal pain and palpable nodules over the anterior abdominal wall in the periumbilical location. The pain was not associated with fever, weight loss, nausea/vomiting, or changes in bowel habits. Her medical history was notable only for a lower segment cesarean section performed 11 years prior. On clinical examination, multiple firm nodules were palpable along the anterior abdominal wall in the umbilical and periumbilical region without overlying skin changes or signs of infection. There was no evidence of ascites or systemic inflammation.

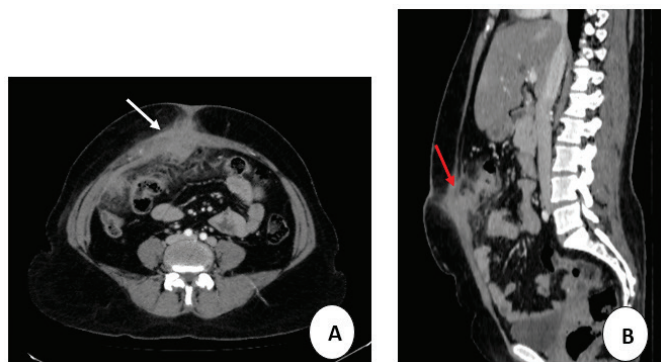


FIGURE 1: Contrast-enhanced CT Abdomen and pelvis (Axial and Sagittal views)
A: Ill-defined enhancing soft tissue thickening and stranding of anterior abdominal wall in the umbilical and periumbilical region (white arrow).
B: Soft tissue thickening and stranding in the subcutaneous plane at the umbilical region and underlying peritoneal fat (red arrow).

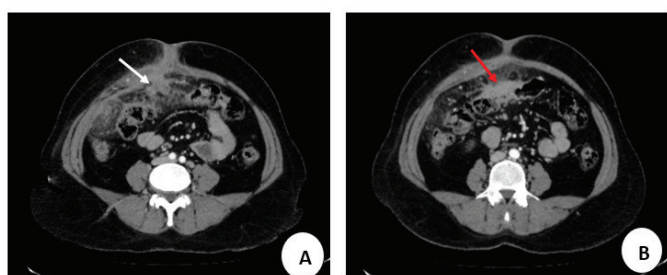


FIGURE 2: Contrast enhanced CT Abdomen and pelvis (Axial views)
A: Omental soft tissue nodularity extending into the peritoneal fat (white arrow). The absence of fat density within the nodule raises suspicion for peritoneal carcinomatosis.
B: Circumferential thickening of the adjacent transverse colon wall (red arrow) suspicious for malignant infiltration and serving as a possible primary source of peritoneal disease.

Contrast-enhanced CT (CECT) of the abdomen and pelvis demonstrated ill-defined enhancing soft tissue thickening and stranding involving the anterior abdominal wall, extending posteriorly to involve the omentum and peritoneal fat (Figure 1). Multiple soft tissue nodules were seen in the omental fat (Figure 2A). Circumferential wall thickening of the adjacent transverse colon was noted (Figure 2B). The absence of internal fat density and the presence of enhancing nodularity raised suspicion for peritoneal carcinomatosis, omental metastases, or colonic malignancy.

An ultrasound-guided core biopsy of the largest omental nodules was performed with a 16G core biopsy needle. Histopathological examination revealed fibroadipose tissue with fat necrosis and chronic inflammatory infiltrate. No malignant cells, granulomas, or atypical cells were identified. Given the benign pathology and absence of systemic symptoms or progressive disease, the patient

was managed conservatively, and close follow-up was suggested. At three months, follow-up CT showed interval reduction in lesion size and the patient reported substantial symptomatic improvement. Surgical intervention was not required.

Discussion

Adipose tissue is now recognized as an active endocrine organ that contributes to energy metabolism, immune modulation, and hormone production.⁴ Fat necrosis refers to the inflammatory breakdown of adipose tissue following ischemia, trauma, or surgical insult. The necrotic process triggers the release of lipids and inflammatory mediators, leading to localized swelling and mass effect.

Abdominal fat necrosis (AFN) often presents with nonspecific symptoms such as localized pain, tenderness, or palpable masses. In some cases, it can mimic intra-abdominal malignancies, abscesses, or ischemic bowel due to overlapping imaging features.⁵ Primary abdominal fat necrosis includes idiopathic omental infarction (IOI) and epiploic appendagitis (EA), typically presenting with right-sided abdominal pain.² Secondary causes involve post-traumatic, postoperative, or pancreatitis-related fat necrosis, and can occur anywhere in the abdomen.⁶

CT is the preferred first-line imaging modality for assessing suspected AFN due to its wide availability and rapid acquisition.^{7,8} Radiological findings include fat stranding, soft tissue nodularity, and ill-defined masses without internal fat density. These can resemble liposarcoma, carcinomatosis, or inflammatory conditions.⁹ While post-surgical fat necrosis can be encapsulated without invasive features,^{10,11} this case demonstrates more aggressive, infiltrative pattern that is highly deceptive.

While CT was helpful and aided in the diagnosis in our case, MRI using diffusion-weighted imaging and contrast enhancement can provide superior soft tissue contrast and may be a useful problem-solving tool in ambiguous cases to delineate peritoneal involvement.^{12,13} However, as our case demonstrates, the imaging overlap can be so significant that biopsy remains necessary.¹⁴ In this case, the absence of recent trauma and the remote history of cesarean section suggested a chronic ischemic or inflammatory process. Imaging findings of nodularity, loss of fat attenuation, and bowel wall thickening were concerning for malignancy. However, histopathology confirmed the benign fat necrosis.

Microscopically, fat necrosis features necrotic adipocytes, lipid-laden macrophages, and variable inflammatory infiltrate. Special stains such as AFB and PAS are negative unless secondary infections are present.¹⁵

Clinicians must consider fat necrosis in the differential diagnosis of patients with atypical imaging findings, particularly those with prior abdominal surgery. Early biopsy can prevent overtreatment, unnecessary surgical procedures, and healthcare burden.

Conclusion

Fat necrosis is a benign but often misleading condition that can closely mimic intra-abdominal malignancies on imaging. An accurate diagnosis requires careful integration of clinical history, radiologic assessment, and histopathological confirmation. Recognizing fat necrosis early and distinguishing it from malignant conditions helps to avoid unnecessary surgical interventions and reduces healthcare costs. This case underscores the importance of maintaining a broad differential diagnosis when interpreting

abdominal lesions, especially in patients with prior surgical history.

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Author Contributions

Conceptualization, Shahzad R; data acquisition, writing original draft, writing review and editing contributed by all authors. All authors have read and agreed to the published version of the manuscript.

Conflict Of Interest

The authors declare no conflict of interest.

Informed Consent Statement

Written informed consent has been obtained from the patient to publish this manuscript.

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