

## Differential Considerations for Omental Fat Infiltration and Thickening on CT

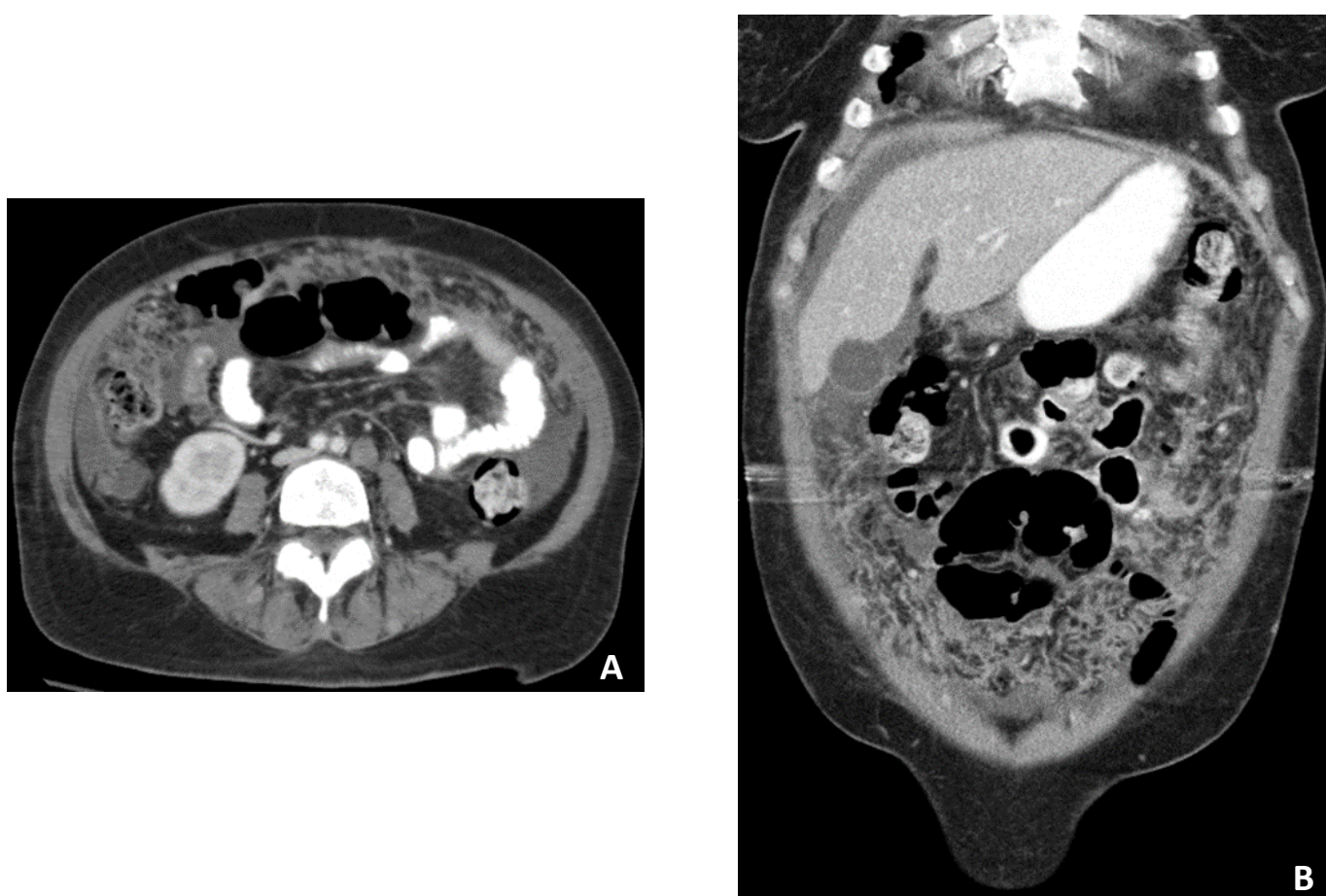
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### Case Presentation

A 62-year-old woman presented to the emergency room with diffuse abdominal pain and abdominal distention. White blood cell (WBC) and platelet counts were within normal limits. Radiographs of the abdomen demonstrated no evidence of pneumoperitoneum. Subsequently, CT of the abdomen and pelvis was performed for further evaluation (Fig.).



**Figure.** Axial (A) and coronal reformatted (B) contrast-enhanced (oral and IV) CT images of the abdomen and pelvis reveal extensive nodular and curvilinear soft tissue deposits in the omental fat anterior to the small bowel and the colon. Free intraperitoneal fluid is seen in both paracolic gutters.

## Key Imaging Finding

Diffuse omental thickening and infiltration

## Differential Diagnoses

Segmental omental infarction

Omental hematoma

Peritoneal carcinomatosis

Tuberculous peritonitis

## Discussion

Interstitial Abdominal pain as a presenting symptom engenders a broad differential diagnosis. The role of imaging for localization and causation of abdominal pain is well-established.

The omentum is a double layer of peritoneum that hangs down like a protective apron from the greater curvature of the stomach and proximal portion of the duodenum and drapes anterior to the small bowel and transverse colon.<sup>1</sup> It is largely composed of a semi-mobile fatty tissue with small intervening vessels which are most commonly the gastroepiploic vessels. Omental thickness varies, primarily in relation to the patient's BMI.<sup>2</sup>

CT findings of omental fat stranding and infiltration and/or soft tissue density foci are helpful in narrowing a vast differential for abdominal pain to include diseases which primarily affect the omentum. These conditions include segmental omental infarction, omental hematoma, and peritoneal carcinomatosis, and tuberculous peritonitis. Solid neoplasms of the omentum containing fat are rare. Liposarcoma, which is typically found in the retroperitoneum, is rare in the peritoneal cavity. Certain imaging characteristics, paired with patient history, help to differentiate between many possible etiologies.

### Segmental Omental Infarction.

Compromise of the vascular supply to the omental apron can result in omental infarcts, often hemorrhagic.<sup>3</sup> Etiologies include primary vascular disorders, direct vascular injury and torsion. Primary torsion is idiopathic; secondary torsion results from a

leading mass or inflammatory focus or adhesions from previous abdominal surgery.<sup>4</sup> This process often involves the right side of the omentum for various reasons, including redundancy and increased mobility of the tissue on the right side, possibly resulting in a higher risk of torsion. Additionally, an embryologic variant of blood supply to this portion of the omentum may predispose patients to a higher risk of venous thrombosis.<sup>2</sup> The imaging finding of swirling fatty tissue surrounding a central vascular structure may in fact be a specific finding of omental torsion.<sup>3</sup>

### Omental Hematoma.

Omental involvement in traumatic injuries results more commonly from penetrating trauma compared to blunt abdominal trauma.<sup>5</sup> Isolated omental or mesenteric injury is uncommon; secondary injuries are typically seen.<sup>9</sup> Just as direct trauma to omental vasculature can cause infarction, it can also result in omental hematoma. CT findings often include a distinct omental fluid collection measuring blood attenuation but can also manifest as an ill-defined hyperdense region of infiltration of the omental fat with associated hemoperitoneum. A careful search for active hemorrhage with high-attenuation extravascular foci is of utmost importance.

The patient's medical history and clinical presentation are key in identifying patients with omental hematoma. Occasionally, a history of trauma is not elicited, such as in cases of domestic violence or in patients suffering from head injury or the effects of alcohol or illicit drugs.

### Peritoneal Carcinomatosis.

Malignant seeding of the peritoneal cavity is a common occurrence in many genitourinary (particularly ovarian) and gastrointestinal cancers. Omental involvement can range from "increased density of fat anterior to the colon or small bowel to large masses, called omental cakes."<sup>6</sup> When carcinomatosis manifests as ill-defined fatty infiltration or small soft tissue density nodules, it can be especially difficult to distinguish from other omental pathologies, including rare primary neoplasms.

Even in the absence of a known primary at the time of imaging, peritoneal carcinomatosis must rank high

on the differential for omental lesions. Histopathological confirmation with biopsy is often necessary.

### Tuberculous Peritonitis.

Since the omentum is bathed in peritoneal fluid, it is not uncommonly involved in infectious processes which result in peritonitis. Direct extension of tuberculosis from the gastrointestinal tract or surrounding lymph nodes can result in the uncommon entity of tuberculous peritonitis. There are three subtypes of this disease process, all characterized clinically by abdominal pain. The first, known as wet peritonitis, involves abdominal ascites. The second is coined the fibrotic type and is “characterized by large omental and mesenteric masses.”<sup>7</sup> The third type is dry peritonitis and involves diffuse fibrous scarring of the peritoneal contents, including the mesentery and omentum. A fibrous wall covering the infiltrated omentum, manifesting as a “thin omental line,” is a common finding and suggests peritoneal TB over alternative disease processes.<sup>8</sup> Additionally, adjacent mesenteric lymph nodes with hypoattenuating centers secondary to caseous necrosis may be present, as is true in general in cases of TB. Moreover, findings suggestive of thoracic TB can be quite helpful in suggesting peritoneal TB as a diagnosis, but the benefit of such thoracic findings is absent in approximately 50% of cases.<sup>7</sup>

Because CT findings are not specific or pathognomonic, the patient’s clinical history and laboratory findings, coupled with a high clinical suspicion, are important in securing a diagnosis.

## Diagnosis

Peritoneal carcinomatosis

## Summary

Abdominal pain is one of the most common presenting symptoms in the emergency room. Diffuse omental thickening and/or stranding, or the presence of focal omental nodules on CT examination are useful clues in limiting the differential to disorders which affect the omentum. Correlating these findings with the clinical scenario and medical history aids the

practicing radiologist in directing the referring physician to a correct and specific diagnosis.

## References

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