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## Case Report

# Metastatic Cecal Adenocarcinoma presenting as acute appendicitis ☆☆☆★

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## ABSTRACT

This case report details the findings of metastatic colon cancer in an older male patient who initially presented with signs and symptoms of acute appendicitis. The patient underwent routine CT (Computed Tomography) imaging for diagnostic evaluation of appendicitis. Subsequently, the patient was found to have findings consistent with acute appendicitis secondary to obstruction from a cecal mass with evidence of hepatic and pulmonary metastases. This case report demonstrates the radiological findings of acute appendicitis secondary to metastatic colorectal disease and highlights the importance of considering underlying malignancy in cases of appendicitis occurring in older individuals.

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## Introduction

Appendicitis is an abdominal pathology with an overall lifetime risk of 8.6% in males and 6.7% in females [1–4]. Commonly occurring in children and young adults, the etiology of acute appendicitis is luminal obstruction from fecaliths or lymphoid hyperplasia [1,2,5]. When occurring in older patient populations, appendicitis is rarely seen secondary to an

underlying neoplastic luminal obstruction [1–3,5,6]. Neoplastic changes may be identified on initial CT evaluation performed for appendicitis if there is concurrent presence of a large mass, invasion of intestinal mucosa, presence of enlarged lymph nodes, or evidence of metastatic proliferation. However, if these changes are not identified, colonoscopy can be a useful screening tool in older patient populations presenting with appendicitis in order to identify malignancy at earlier, treatable stages [1,6,7].

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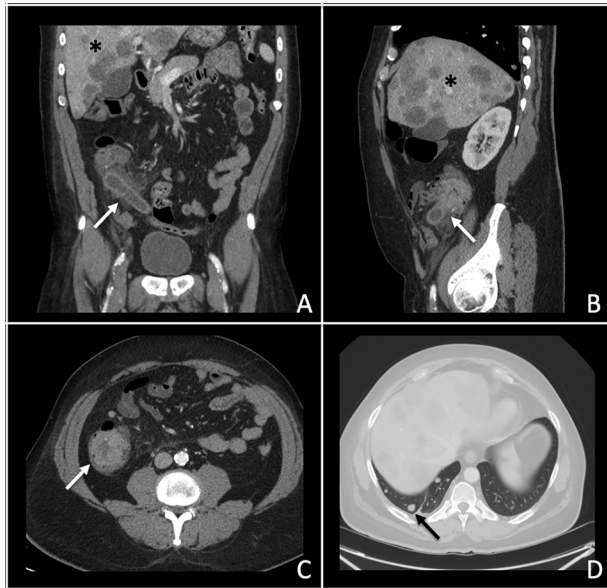
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**Fig. 1** – A panel of multiple images from patient’s CT scan of the abdomen and pelvis acquired after IV contrast. The coronal reconstruction (A) shows an enlarged appendix (white arrow) measuring about 1.5 cm in thickness, with mural thickening and enhancement, and surrounding fat stranding. These findings are consistent with acute appendicitis. The sagittal image (B) shows a mass like enhancing mural nodularity in the cecum occluding the appendiceal ostium (white arrow). Images A and B also show multiple hepatic hypodensities (black asterisk) suggestive of metastatic disease. The axial image (C) shows circumferential mural thickening and enhancement of the cecum (white arrow), the site of primary adenocarcinoma. The visualized lung bases, as seen in the lung windows (D), show multiple nodules (black arrow) in the right lung base, suggestive of pulmonary metastases.

## Case report

The patient is a 59-year-old male with a past medical history of hypertension and hyperlipidemia who presented to the emergency department (ED) with an initial complaint of right lower quadrant abdominal pain. Due to a high suspicion of appendicitis, the patient underwent CT imaging for confirmatory diagnosis. CT of the abdomen and pelvis with IV (intravenous) contrast (Fig. 1) demonstrated a thickened and dilated appendix with peri-appendiceal fat stranding consistent with a diagnosis of acute appendicitis. CT also demonstrated nodular mural thickening and enhancement involving the cecum with regional lymph node involvement, suggestive of a primary right-sided colon cancer as the etiology for the acute appendicitis. Furthermore, multiple bilobar hypoattenuating masses were seen throughout the liver parenchyma. Solitary pulmonary nodules were noted in the visualized lower lobes of the lungs. The patient underwent surgical treatment for appendicitis and a hemicolectomy with ileostomy was performed to excise the cecal mass. Pathology results of the le-

sion demonstrated colon adenocarcinoma and liver biopsy was consistent with metastatic disease.

## Discussion

Acute appendicitis is the most common abdominal emergency occurring predominantly between the ages of 10 to 20 [1,3,4]. The pathophysiology of appendicitis relates to obstruction of the lumen of the appendix—usually by a fecalith or lymphoid hyperplasia [1–3,5,8]. Obstruction of the appendiceal lumen results in increased intramural pressure disrupting venous and lymphatic outflow [8]. Developing vascular and lymphatic compromise and secondary ischemia enables bacterial proliferation [8]. Left untreated, appendicitis can lead to complications such as perforation, abscess formation, and frank peritonitis [8].

In older patients, neoplasm may be the source of appendiceal luminal occlusion resulting in appendicitis as the first manifestation of underlying malignancy [1,2,5–7]. Dr. Shears first described this phenomenon depicting the onset of acute appendicitis as a result of cecal adenocarcinoma [2,5,9]. Since then, the incidence of cecal or right-sided colon cancer as a cause of acute appendicitis has been reported in 2% to 15% of cases throughout literature [1,2,5–7,9]. Neoplasm induced appendicitis has several proposed mechanisms: physical obstruction of the appendiceal lumen, obstruction of the appendiceal lumen due to surrounding inflammatory changes, or distal colonic obstruction resulting in increased cecal pressure [2,5,6]. Appendicitis occurring in later decades of life has higher probability of association with underlying malignancy.

Clinical suspicion of appendicitis is usually confirmed with diagnostic evaluation through imaging. Ultrasound is an imaging modality that is useful in children and pregnant women as a method of lowering exposure to ionizing radiation [3]. Direct characteristics of appendicitis on ultrasound include non-compressibility of the appendix, appendix diameter greater than 6 mm, single wall thickness greater than 3mm, target sign, and an appendicolith [3]. Indirect characteristics such as free fluid surrounding the appendix, increased echogenicity of local mesenteric fat, and thickening of the peritoneum may also be visualized [3]. Ultrasound visualization of the appendix may be difficult in some patients due to body habitus or pregnancy, in which cases MRI may be used as an alternative imaging modality without exposing individuals to radiation.

CT scan has greater than 95% accuracy for diagnosis of acute appendicitis and is recommended by the ACR as first line imaging for the diagnosis of appendicitis in adults [3,8]. Criteria for acute appendicitis on CT are appendiceal diameter greater than 6mm, wall thickening greater than 2mm, wall enhancement, and peri-appendiceal fat stranding [4,8]. CT may also demonstrate evidence of an appendicolith or evidence of colonic malignancy as the obstructive lesion resulting in appendicitis. In older patients, it is important to consider underlying malignancy for the initial presentation of appendicitis.

CT is routinely used as an imaging modality for gastrointestinal symptoms, such as those associated with appendicitis, but it is not commonly used to diagnose colorectal can-

cer [10]. However, with the increased use of CT as a modality for abdominal pathology, radiologists may be the first to identify underlying features of colonic malignancy [10]. Primary colonic tumors appear as a “discrete soft tissue mass” that can obstruct the intestinal lumen [10]. Larger masses may undergo central necrosis and have lower central attenuation. Some cancers may cause nodular wall thickening that narrows the intestinal lumen—similar to findings presented in the case report [10].

CT is also optimal for recognizing local spread of disease. Localized extension of a tumor can be seen as thickening and intrusion of pericolic fatty tissue [10]. Loss of fat planes between the colon and adjacent organs such as the bladder, uterus, or abdominal and pelvic musculature is also suggestive of tumor extension [10]. Furthermore, CT has high specificity for identifying possible lymphatic metastasis with lymph nodes measuring  $\geq 1.0$  cm considered as pathologic [10].

Colon cancer commonly metastasizes to the liver and can also affect distant organs such as the lungs, adrenal glands and bones [10]. CT is proficient in identifying metastatic disease if present. Liver metastases are best identified during the portal venous phase of hepatic enhancement as they are hypodense compared to the surrounding enhanced parenchyma [10–12]. Pulmonary metastases are also common in colon cancer and can be easily visualized on CT imaging. Typically, pulmonary metastasis will demonstrate numerous peripherally located nodules and diffuse thickening of the interstitium [13]. In a patient with known primary malignancy, the appearance of multiple bilateral pulmonary nodules is highly indicative of metastatic disease [14].

Colon cancer is not always adequately visualized on CT especially in cases with small tumors without local or distant spread. CT is limited in detecting lesions that are smaller than 3 mm to 5 mm [10]. Moreover, visualization of primary colonic malignancy can also be altered in a setting of acute inflammatory changes such as those occurring in appendicitis [7]. Colonic distention and opacification is imperative as many tumors may present as colonic wall thickening and luminal narrowing [10]. Thus, accurate diagnosis may also be disrupted in the setting of inadequate bowel prep making it difficult to identify malignant characteristics [7,10,12]. Due to these obscuring factors, it is imperative for physicians to be cognizant of possible underlying malignancy for older patients presenting with acute appendicitis without features of malignancy on initial CT. Therefore, older patients presenting with acute appendicitis and a reassuring CT scan are still recommended to follow up with colonoscopy to ensure no evidence of malignant disease.

Unfortunately, our patient had metastatic disease at the time of initial diagnostic imaging performed for acute appendicitis. In their study, Lai et al. reports that most colon cancers presenting as acute appendicitis were right-sided cancers. Furthermore, patients who had colon cancer associated with appendicitis were more likely to have higher staging and distant metastasis compared to patient's with colon cancer without appendicitis [5]. Similarly, our patient initially presented with symptoms of acute appendicitis, and subsequent CT imaging demonstrated appendiceal obstruction secondary

to a cecal mass with evidence of hepatic and pulmonary metastases.

## Conclusion

Appendicitis is a common abdominal pathology requiring immediate surgical intervention. In children and young adults it is a result of appendiceal ostial obstruction due to a fecalith or lymphoid hyperplasia. Appendicitis occurring in older individuals should raise suspicion for possible malignancy as an etiology for appendiceal obstruction and inflammation. Diagnostic evaluation of appendicitis with CT may demonstrate evidence of primary colonic malignancy. This is especially true in cases with evidence of distant metastases to the liver and lungs, which are easily visualized on CT. It is important for radiologists to be aware of features of malignancy such as colonic wall thickening, presence of a discrete mass, luminal narrowing, active lymph nodes, and regional metastases in order to identify neoplasia at earlier, treatable stages. However, reassuring findings on CT are not exclusive to the absence of malignancy and clinical judgment should be made to pursue further testing if warranted based on patient medical history and comorbidities.

## Ethical Clearance

This project did not involve any research and no ethical clearance was required.

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