Fulminant abdominal gas gangrene in metastatic colon cancer

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Abstract. We report a case of fulminant abdominal gas gangrene in a patient with metastatic colon cancer. A 39-year-old patient with descending colon, high-grade adenocarcinoma and coexisting liver and lymph node metastases received two courses of chemotherapy. The patient developed sudden acute abdominal symptoms accompanied by septic shock parameters. The imaging findings on computed tomography were characteristic for abdominal gas gangrene, involving liver metastases, portal vein and lymph nodes with associated pneumoperitoneum. The patient succumbed to the disease within hours following the onset of symptoms.

Introduction

Gas in the primary tumor, and or its metastatic sites, indicates either massive tissue necrosis or metastasis with abscess formation (1,2). If anaerobic infection is the affecting cause, the infected tumor site may present with gas gangrene, which may have a fatal outcome. Diagnosis of gas gangrene of an anaerobic infection is frequently obtained via imaging findings (3,4). We report a case of fulminant gas gangrene in a patient with colon cancer, who presented with air in the portal vein, lymph node and liver metastases resulting in pneumoperitoneum complications.

Case report

A 39-year old female was referred to the Bilim University School of Medicine, Istanbul, Turkey, with metastatic colon cancer. Colonoscopy revealed a mass in the splenic flexura that was causing partial lumen obstruction. Computed tomography (CT) of the abdomen revealed multiple hepatic metastases involving both hepatic lobes, the largest of which measured 15 cm (Fig. 1). The histopathological diagnosis of the colon mass was high-grade adenocarcinoma. The previous medical history of the patient was normal; however, familial history for colon cancer was positive for her mother and maternal grandmother. The blood laboratory test results at presentation revealed increased carcinoembryonic antigen(CEA) levels of 143 ng/ml, elevated aspartate transaminase (AST) levels of 99 IU/l and bilirubin levels of 2.32 mg/dl. CT of the chest was negative for metastatic involvement. The patient received first-line chemotherapy with leucovorin and fluorouracil with oxaliplatin (FOLFOX), which was well tolerated. The patient's blood laboratory tests immediately prior to the second course of chemotherapy revealed CEA of 72 ng/ml, elevated AST levels of 72 IU/l and bilirubin levels of 0.95 mg/dl.

Three days after the completion of a second course of chemotherapy, the patient was admitted to the emergency room with complaint of sudden onset of right upper quadrant pain and fever persisting for a couple of hours. A physical examination revealed a toxically ill patient with a tender abdomen. She was hypotensive (80/45 mm Hg), with a fever of 38˚C and a pulse of 100 bpm. Her blood test values were beyond the normal range and were: AST (408 IU/l), alanine transaminase (ALT) (84 IU/l), total bilirubin (3.67 mg/dl), partial thromboplastin time (PTT) (26.8 sec), white blood cell count (WBC) ($28x10^9$/l) and C-reactive protein (CRP) (37.3 mg/l). An abdominal X-ray of the patient revealed circumscribed air in the liver and under the diaphragm (Fig. 2). The patient underwent CT of the abdomen with IV contrast, which revealed air in the liver metastases, the retroperitoneal lymph nodes and the portal venous system, as well as in the peritoneal cavity. A subtle amount of air was also traced within the bowel wall at the primary tumor location (Fig. 3). The radiological findings were compatible with gas gangrene in the primary and metastatic sites of the tumor, resulting in pneumoperitoneum complications. The patient's vital signs and general condition deteriorated rapidly and she was transferred to the intensive care unit with symptoms of septic shock. Despite aggressive medical treatment at the intensive care unit, the patient succumbed to the disease within hours following the onset of septic shock symptoms.

Discussion

Air in metastatic liver lesions is not an uncommon finding, particularly, if there is a history of surgical or radiological intervention for the treatment. Sudden tissue necrosis and/or external air during the procedure may be entrapped in the lesion. If the lesion is superimposed with pyogenic infection,

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Figure 1. Axial contrast-enhanced CT reveals multiple hepatic metastases of the colon cancer (arrows) the largest of which measured 15 cm. CT, computed tomography.

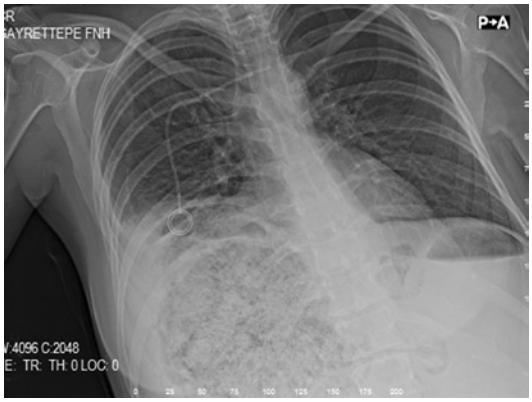

Figure 2. Chest X-ray in AP view reveals air in the liver and free air under the diaphragm. AP, anteroposterior.

abscess formation may have an air fluid level rather than central gas accumulation within the lesion. The affected liver lesion is the only site with air content if there is no underlying anaerobic systemic infection (1,3,5). Portal venous gas has been reported as a rare but life-threatening complication of colon cancer. Gas entry into the portal venous system occurs via various mechanisms in colon cancer patients. A rapid and aggressive response to chemotherapy may result in tissue necrosis at the primary tumor site and necrotizing enterocolitis complications result if the lesion becomes infected. In necrotizing enterocolitis, air accumulates in the intestinal wall and then enters the portal venous system. Another reported source of air entry into the portal vein is necrotic liver metastasis with superimposed infection. Gas builds up in the metastatic infection, which may enter the portal venous system in the proximity of the lesion. However, this method of entry faces portal venous resistance in physiological hepatopedal flow. Therefore, its distribution in the portal venous system is expected to be limited (6,7). A more severe form of portal venous gas entry occurs in association with anaerobic infections. Anaerobic infections with *Clostridium septicum* have been reported to affect liver metastases with concomitant anaerobic sepsis. Anaerobic sepsis is a rare complication in colon cancer patients that may lead to gas gangrene in distant metastatic sites of the primary tumor (2). In the present case, we observed gas in numerous stages of tumor spread, which was indicative of systemic anaerobic infection. Imaging findings of anaerobic infections complicated by abdominal gas gangrene have been described elsewhere. In a previous case with *Clostridium septicum* infection gas was caused in metastatic liver lesions, resulting in pneumoperitoneum complications (4). In the present case, the imaging findings and complications were similar. Gas in the lymphatic

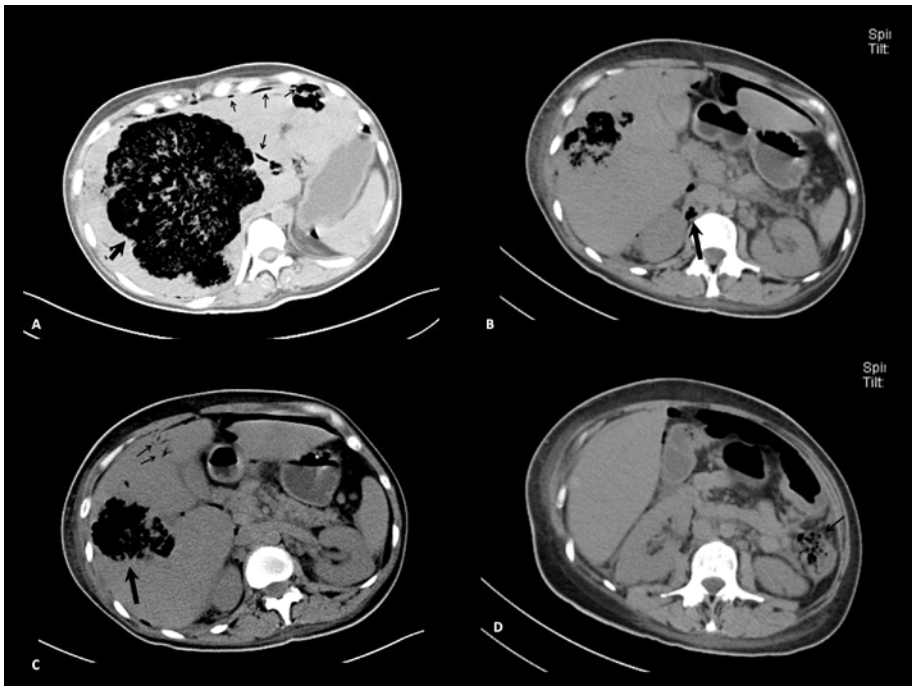

Figure 3. Axial non-contrast CT reveals (A) gas within the liver metastasis (long arrow) and within the peritoneal cavity adjacent to the liver surface (small arrows), a lower section CT image. (B) Gas is observed within the retrocaval lymph node (small arrow) and in the liver metastasis (long arrow). (C) Portal venous gas is observed in the distant branches of the portal vein (small arrows). (D) The primary tumor site in the descending colon contains a small amount of gas on the wall and in the adjacent fat plane (arrows). CT, computed tomography.

system was a unique finding in our report, which was demonstrated on CT and has not previously been presented. The grave complication in the present case was a rare instance of spontaneous pneumoperitoneum, resulting from liver metastasis with anaerobic infection. Associated pneumoperitoneum is extremely rare in both metastatic infections and liver abscesses. Abscess rupture with spillage of the infectious material and associated toxins into the peritoneal cavity has been reported, resulting in mortality approaching 30% (8).

Although there was time-related failure to obtain blood cultures for anaerobic infection, the imaging findings were highly suggestive for the diagnosis of this case. Anaerobic sepsis has a poor outcome. Therefore, the earliest initiation of antibiotic therapy is necessary. Imaging diagnosis of anaerobic infection may speed up the use of antibiotics prior to the blood culture results. Thus, imaging diagnosis of gas gangrene is crucial for earliest intervention. In the present case, peritoneal involvement of anaerobic infection may have worsened the vital signs of the patient, leading to mortality.

In conclusion, we have described a case of fulminant abdominal gas gangrene, which was associated with anaerobic sepsis in a colon cancer patient. The CT imaging findings proved useful for the diagnosis. Severe distribution of gas gangrene, including the peritoneal cavity, resulted in poor outcome.

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