Colorectal Cancer Liver Metastasis Presenting as Pneumoperitoneum: Case Report and Literature Review

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Abstract Pneumoperitoneum presenting as air under diaphragm on erect chest X-ray is usually a result of hollow viscous perforation but can be a result of many other diagnoses including necrotising enterocolitis and ruptured liver abscess. We report a case of colon cancer with liver metastases presenting as pneumoperitoneum. This was a result of infection of the metastases with *Clostridium septicum* with resultant rupture in to sub diaphragmatic space.

Keywords Colorectal cancer · Pneumoperitoneum · *Clostridium septicum* infection

Background

Colorectal cancer accounted for 14 % of all cancer diagnoses in men and 12 % in women in England, in 2008. In 2008, there were approximately 18,000 new cases of colorectal cancer diagnosed in men and 14,600 in women. This is equivalent to an incidence of 57 new cases per 100,000 men and 37 per 100,000 women [1]. Colorectal cancer usually presents with symptoms due to the primary cancer causing either change in bowel habit or iron-deficiency

anemia and weight loss depending on the side of the lesion [2]. They can also present as an emergency as obstruction or bleeding. Up to 25 % of these will have liver metastases at presentation and a further 30 % will develop liver metastases 2 years following diagnosis of a primary [3]. Pneumoperitoneum on erect chest X-ray in the emergency department warrants a prompt referral to surgery and usually results in exploratory laparoscopy/laparotomy with resultant mortality and morbidity.

Case Report

A 63-year-old fit and healthy male gardener presented with 15-day history of abdominal and right-sided pleuritic chest pain to the emergency department. He was pyrexial on presentation with tachycardia, tachypnea, and hypoxia. His blood test, sputum culture, and blood culture revealed the evidence of the tender right upper quadrant and right lower chest. An erect anteroposterior chest X-ray revealed gas under the right hemidiaphragm (Fig. 1). He had evidence of acute renal failure and was resuscitated with fluids. As there was a lack of correlation between the history, examination findings, and X-ray findings, he underwent CT scan of the abdomen and pelvis. The CT scan showed thickening of the ascending colon in the region of the hepatic flexure (Fig. 2). There was a large mass in the liver occupying segments 4A, 4B, 5 and 8 of

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Fig. 1 Erect chest X-ray demonstrating right sided pneumoperitoneum

Fig. 2 CT image of abdomen demonstrating thickened hepatic flexure suggestive of tumour

the liver. There was associated gas within and around this mass. This was continued with subdiaphragmatic gas; appearances suggested an infected metastases of an abscess which had ruptured, thus causing the pneumoperitoneum (Figs. 3 and 4). There were evidences of bilateral lung nodules in keeping with metastases (Fig. 5). There was no evidence of hollow viscous perforation or infection. The patient was treated with intravenous antibiotics and active monitoring of observation and urine output.

He was discussed and subsequently transferred to the regional hepatobiliary unit for further care. He underwent colonoscopy which showed impassable circumferential tumor in the ascending colon. Biopsy from this lesion confirmed moderately differentiated adenocarcinoma. He had a further CT scan, which demonstrated a 12 cm×9 cm metastases, containing pockets of gas and widespread metastases involving all the segments of liver. He also had bilateral widespread pulmonary metastases and adrenal metastases. His abscess was treated conservatively, and he was discharged from the liver unit after 5 weeks. By this time he was very weak and required carer support at home. He was referred for palliative chemotherapy, but due to his poor performance status and presence of an active abscess in the liver, he was not fit for chemotherapy.

Investigations

Blood tests on the day of admission indicated a white cell count of 12.8, C-reactive protein of 317, and acute renal failure with urea of 18.7 and creatinine of 223. He had

Fig. 3 CT scan image of abdomen demonstrating gas containing abscess in the liver with rupture in to the sub diaphragmatic space

Fig. 4 CT image demonstrating the heterogeneity of the liver metastases containing solid, liquid and gaseous components.

deranged clotting screen. The blood culture showed presence of *Clostridium septicum*, and sputum culture was growing *Haemophilus influenzae*.

Erect anteroposterior chest X-ray showed air under the right dome of diaphragm and the CT scan demonstrated the thickened ascending colon with liver metastases which was infected and perforated to subdiaphragmatic space. There was evidence of pulmonary metastases.

Treatment

The patient was treated with Intravenous antibiotics for a week and was discharged home with carer support and McMillan nurse input.

Outcome and Follow-Up

The patient was not suitable for resection of metastases to the extensive liver and lung involvement. His colon cancer was not symptomatic. He was followed up by the oncologist to reassess fitness for palliative surgery or chemotherapy.

Literature Review

Clostridium septicum is an anaerobic, spore- and gas-forming gram-positive bacillus and can cause rapidly progressing sepsis [4]. It is associated more commonly with

Fig. 5 CT image demonstrating multiple nodules in right base of lung likely to be metastatic lesions

gastrointestinal and hematological malignancies [4–6]. *C. septicum* is a ubiquitous organism in the environment, but there is no consensus whether it is a commensal in humans. It probably gains entry into portal blood stream via damaged colonic mucosa and multiplies rapidly in the presence of necrotic tissue [6]. There has been a reported association between malignancy and *C. septicum* infection [5]. There is a reported association between colonic malignancy and infection with *C. septicum* [4].

Liver abscess due to *C. septicum* has been reported in patients with underlying liver disease [6]. It typically happens in a large metastasis which has become ischemic as a result leading to an ideal anaerobic environment for the growth of *C. septicum*. *C. septicum* liver abscess has also been reported following ligation of the hepatic artery with resultant liver necrosis [7]. Liver abscess frequently contains gas; however, rupture of the abscess with resultant gas in the subdiaphragmatic space is rare [7–9]. Abscess can rupture into intraperitoneal space, causing peritonitis and resulting in a high mortality [7, 8]. Primary hepatocellular carcinoma has also been reported to present as abscess following infection with a gas-forming organism *Salmonella* [10, 11].

Hepatic metastases presenting as pneumoperitoneum have been reported in a patient with known colon cancer and hepatic metastases [12] where CT scan has diagnosed this as infected hepatic metastases rather than a perforated colonic cancer. Another case has been reported in a patient with previous pancreatic cancer who underwent exploratory laparotomy for presumptive diagnosis of bowel perforation when purulent fluid from the subdiaphragmatic region was found, with no evidence of perforation [13].

Ours is the first case report of a colorectal liver metastasis presenting as pneumoperitoneum without previous history of cancer.

Learning Points

Primary and metastatic liver malignancies can occasionally present as liver abscess and even more rarely as

pneumoperitoneum. They are associated with high mortality due to the nature of pathogenicity of *C. septicum*.

An awareness of this possibility and a high index of suspicion even in patients not known to have colonic cancer could help to avoid unnecessary exploratory laparotomy with associated morbidity.

References

1. ONS (2011) Colorectal (bowel) cancer rise in male colorectal cancer.
2. Northover JMA, Arnott S, Jass JR, et al (2002). Colorectal cancer. Oxford University Press.
3. Scheele JSR, Altendorf-Hofmann A, Paul M (1995) Resection of colorectal liver metastases. World J Surg 19:59–71
4. Koransky JR, Stargel MD, Dowell VR Jr (1979) *Clostridium septicum* bacteremia its clinical significance. Am J Med 66:63–66
5. Alpern RJ, Dowell VR Jr (1969) *Clostridium septicum* infections and malignancy. JAMA 209:385–388
6. Kolbeinson EA (1991) Recognition, management, and prevention of *Clostridium septicum* abscess in immunosuppressed. Arch Surg 126:642–645
7. Chau Ays GV, Gurd FN (1951) Clostridial infection as a cause of death after ligation of the hepatic artery. Am Arch Surg 63:390–402
8. Lee T-Y, Wan YL, Tsai C-C (1994) Gas-containing liver abscess: radiological findings and clinical significance. Abdom Imaging 19:47–52
9. Salky Ba KA, Bauer JJ, Gelernt IM, Kreel I (1982) Ruptured hepatic abscess: a rare cause of spontaneous pneumoperitoneum. Am J Gastroenterol 77:880–881
10. Lee CC, Poon SK, Chen GH (2002) Spontaneous gas-forming liver abscess caused by salmonella within hepatocellular carcinoma a case report and review of the literature. Dig Dis Sci 47:586–589
11. Yeh TS, Jan YY, Jeng LB, Chen TC, Hwang TL, Chen MF (1998) Hepatocellular carcinoma presenting as pyogenic liver abscess: characteristics, diagnosis, and management. Clin Infect Dis 26:1224–1226
12. Urban BA, McCormick R, Fishman EK, Lillemoe KD, Petty BG (2000) Fulminant *Clostridium septicum* infection of hepatic metastases presenting as pneumoperitoneum. Am J Radiol 174:962–964
13. Fondran J, Williams GB (2005) Liver metastasis presenting as pneumoperitoneum. Southern Med J 98:248–249