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Fatal liver gas gangrene after biliary surgery

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ABSTRACT

INTRODUCTION: Liver gas gangrene is a rare condition with a highly mortality rate. It is mostly associated with host factors, such as malignancy and immunosuppression.
PRESENTATION OF CASE: A 57-year-old female was admitted to our hospital with abnormalities of her serum hepato-biliary enzymes. She had a history of hypertension, diabetes mellitus, cerebral infarction, and chronic renal failure. She was diagnosed with bile duct cancer of the liver hilum and a left hepatectomy was carried out, with extrahepatic bile duct resection. Initially her post-operative state was uneventful. However, she suddenly developed melena with anemia on post-operative day (POD) 18. A Computed tomography (CT) examination on POD 19 revealed a massive build up of gas and portal gas formation in the anterior segment of the liver. Although we immediately provided the drainage and a probe laparotomy, she died on POD 20 due to shock with disseminated intravascular coagulation.
DISCUSSION: Liver gas gangrene is rare and has a high mortality rate. This case seems to have arisen from an immunosuppressive state after major surgery with biliary reconstruction for bile duct cancer and subsequent gastrointestinal bleeding, leading to gas gangrene of the liver.

1. Introduction

Massive liver gas gangrene is a rare but devastating complication. Mostly Clostridium perfringen infection has been described in the literature [1], recent reports however have shown other gut-derived bacteria [2]. Development of this complication is associated with host conditions such as malignancy and immunosuppression. We report a case of liver gas gangrene after biliary surgery and discuss about the etiology with other cases reported in Japan. This work has been reported in line with the SCARE criteria [3].

2. Presentation of case

A 57-year-old female was admitted to our hospital with abnormalities of her serum hepato-biliary enzymes. She had a history of hypertension, diabetes mellitus, cerebral infarction, and chronic kidney disease and was taking medicines for that condition. Although her glomerular filtration rate (GFR) was less than 40 ml, she didn't require hemodialysis. Morphological studies and a biopsy specimen revealed bile duct cancer, located between the left intra-hepatic duct and right extra-hepatic duct (Fig. 1). We performed a left hepatectomy with extrahepatic bile duct resection. The anterior and posterior branches of the bile duct were reconstructed separately. Her post-operative course was normal until port-operative day (POD) 18, except for a small amount of bile leakage from the resected surface. She could walk to the cafeteria and take some coffee. On POD 18, she suddenly developed melena with anemia. An emergency endoscopic examination of the upper gastro-intestinal (GI) tract was unremarkable. A computed tomography (CT) examination showed a tiny gas formation in the liver but no massive bleeding in the GI tract. She had complained abdominal discomfort then. A CT examination on POD 19 revealed a massive build up of gas and portal gas in the anterior segment of the liver (Fig. 2). Simultaneously, her conscious level worsened and mechanical ventilation was required. Serum hepato-biliary enzymes were elevated and severe acidosis was shown in her blood samples (Table 2). We performed percutaneous drainage for the gas forming area immediately and started intensive care for her shock condition. Then, a probe laparotomy was planned for her GI bleeding after negative findings on interventional angiography and colonoscopy. The colonoscopy findings revealed massive intestinal bleeding from the oral side of the Bauhin (ileocecal) valve. Intra-operative findings showed the disrupted surface of the anterior segment of liver and partial necrosis of the small intestine (Fig. 3).

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Fig. 1. Cholangiography by ERCP showing biliary stenosis in the liver hilum.

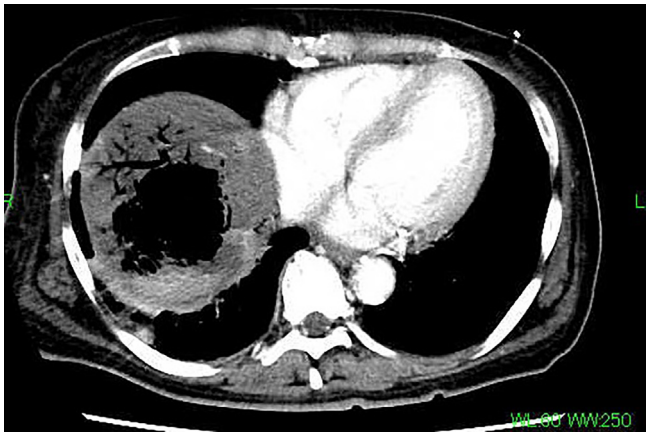

Fig. 2. Enhanced CT scan showing gas accumulation in the anterior segment of the liver. Portal gas is also detected.

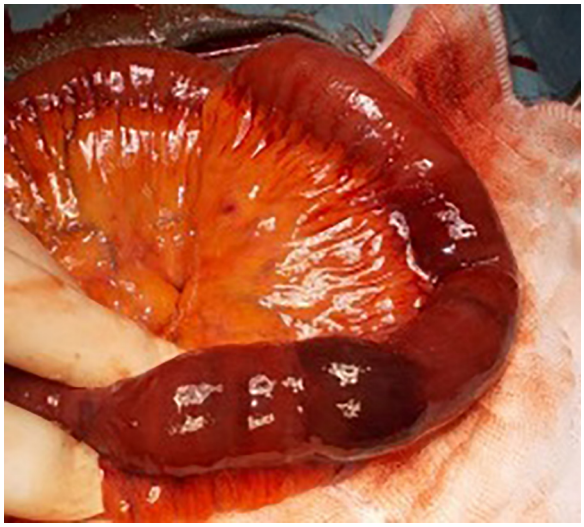

Fig. 3. Intra-operative-findings shows an ischemic area of small intestine. Resected specimen was diagnosed as a necrosis of small intestine by pathological confirmation.

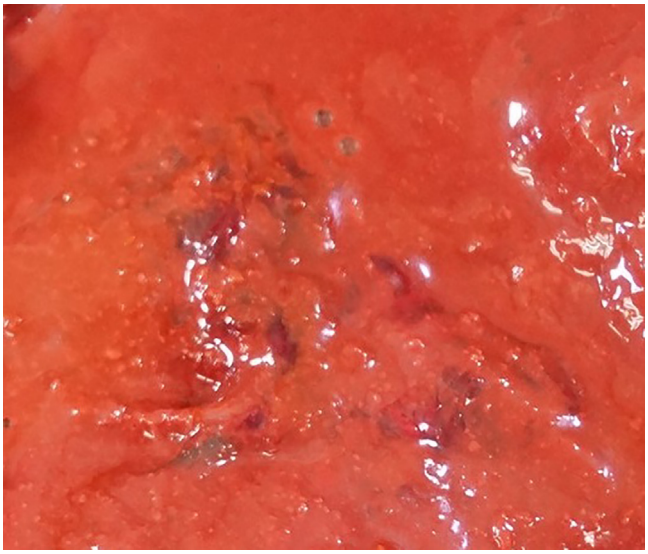

Fig. 4. Autopsy findings showed sponge-like appearance of anterior segment of liver.

Surgical debridement of the liver surface with saline lavage, gauze packing on the debridement part, and partial resection of the small intestine were performed. After surgery, shock and a disseminated intravascular coagulation (DIC) state continued and she died on POD 20. The autopsy findings revealed the sponge-like appearance of the anterior segment of liver (Fig. 4). Necrotic membrane with bleeding was seen in the mucosal layer of the resected intestine. Arterial thrombosis was not seen in superior mesenteric artery, common hepatic artery, or peripheral vessels of small intestine. Enterococcus species and Klebsiella pneumoniae were detected in the blood and drainage samples. Serum endotoxin was negative.

3. Discussion

Since the first description of gas gangrene of an organ by Fraenkel in 1889, few cases of acute organ failure following acute Clostridium perfringens infection have been described in the literature [4]. Up to the middle of the last century, generalized gas gangrene was most often a consequence of soil-contaminated war wounds and was mostly lethal [5]. Today, gas gangrene has been classified into three types: post-traumatic, post-operative and spontaneous [4]. This last type is often observed on a background of malignant or immunosuppressive primary disease. Clostridium perfringens infection has mostly been described in the literature, however recent reports have vshown other gut-derived bacteria, such as E. coli, Enterococcus and Klebsiella species [6]. Because gas gangrene caused by clostridia and several other species occurs in anaerobic condition, gas gangrene of blood enriched organs such as liver seems to be extremely rare.

Nine publications were reported by Ichushiweb in Japan from 1979 [2,7–11]. Table 1 shows the patient's characteristics and a short summary of liver gas gangrene, including our case. The outcomes of the reported cases were dismal and showed rapid progression. Nine cases (90%) were fatal, four (40%) within 6 h of arrival at the hospital or diagnosis. Clostridium perfrigens was detected in blood samples from these 4 cases. Seventy percent of the patients had a history of malignant disease and, in 2 of 7 cases with hepatocellular carcinoma, the liver gas gangrene developed after embolic treatment for hepatocellular carcinoma. Interestingly, 70% of the cases had the previous surgical treatment for primary malignant disease and liver gas gangrene had occurred within 70 (6–70) days after treatment, except for 2 poorly described cases (Table 1). In