복강내로 파열된 가스 형성 화농성 간농양의 성공적인 내과적 치료 증례

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Ruptured Gas-forming Pyogenic Liver Abscess into the Peritoneal Cavity Treated Successfully with Medical Treatment

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Gas-forming pyogenic liver abscess (GFPLA) is very rare and has a very high mortality in case of rupture into the abdominal cavity, which usually require surgical treatment. We experienced a case of a ruptured GFPLA due to *Klebsiella pneumoniae* complicated with peritonitis and sepsis in a 68-year-old diabetic woman. Immediate and aggressive medical treatments including intravenous antibiotics, percutaneous drainage, and continuous renal replacement therapy dramatically improved the liver abscess, peritonitis, and metabolic problems. We report an unusual case of a ruptured GFPLA without surgical management, treated successfully with only medical treatment. (Korean J Gastroenterol 2018;70:45-48)

Key Words: Liver abscess, pyogenic; Rupture; *Klebsiella pneumoniae*; Peritonitis

INTRODUCTION

Pyogenic liver abscess (PLA) is an uncommon disease with an annual incidence rate ranging from two to 45 cases per 100,000 hospital admissions worldwide. Gas-forming pyogenic liver abscess (GFPLA) is even rarer, which accounts for 7% to 24% of PLA. When GFPLA is ruptured into the abdominal cavity and causes peritonitis, which is much rarer and surgical treatment is required. Here, we present a very rare case of a ruptured GFPLA accompanied with peritonitis and septic shock, which was fully recovered with only medical treatment.

CASE REPORT

A 68-year-old woman visited our hospital with a five-day history of fever and abdominal pain. She had no remarkable medical history. On physical examination, blood pressure was 119/73 mmHg, body temperature was 38.4 °C and heart rate was 145 beats/min. Tenderness on right upper quadrant of abdomen was noted. Laboratory data revealed a hemoglobin of 13.1 g/dL, white blood cell count of 3.73×10⁹/L, platelet count of 128,000/mm³, aspartate aminotransferase of 698 IU/L, alanine aminotransferase of 650 IU/L, total bilirubin of 1.3 mg/dL, albumin of 2.6 g/dL, prothrombin time of...
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Fig. 1. CT scan of the abdomen. (A) CT scan of the abdomen shows a huge gas-forming abscess in the right lobe of the liver. (B) Contrast-enhanced CT shows free air in the perihepatic space caused by ruptured gas-forming pyogenic liver abscess (arrowheads). (C) Follow-up abdominal CT shows a significant decrease in the size of the abscess cavity and disappearance of air bubbles of extrahepatic sites. CT, computed tomography.

Fig. 2. The serial changes of serum levels of CRP, WBC and glucose during admission. CRP, C-reactive protein; WBC, white blood cells; PCD, percutaneous catheter drainage; CRRT, continuous renal replacement therapy.

14.1 sec (81%), and blood urea nitrogen of 23 mg/dL and creatinine of 1.3 mg/dL. Arterial blood gas analysis revealed pH 7.425, pCO₂ 25 mmHg, pO₂ 80.4 mmHg, HCO₃ 19.6 mEq/L, and O₂ saturation 96.4%. Serological tests for hepatitis B and C were negative. The serum level of C-reactive protein was increased by 25.6 mg/dL (normal range, 0-0.8 mg/dL). Her serum glucose and HbA1c levels were 601 mg/dL and was 10.9%, respectively, which was consistent with diabetes mellitus. Abdominal contrast-enhanced computed tomography (CT) scan revealed a huge abscess with gas formation in the right lobe of the liver, which size was measured as 10 cm in diameter. In addition, free air and ascites were noted along right subphrenic area and right paracolic gutter due to leaking from hepatic abscess (Fig. 1A, B). These findings indicated rupture of gas-forming liver abscess into the peritoneal cavity. Patient’s condition was not good for surgical treatment because of uncontrolled high serum glucose levels and sepsis state. We consider medical therapy first. The patient underwent ultrasound guided percutaneous catheter drainage (PCD). Broad spectrum intravenous antibiotics (imipenem/cilastatin) and insulin treatment were started. Later, Klebsiella pneumoniae was isolated from both peripheral blood and drained bloody pus. Even though the best treatment, her condition deteriorated and progressed to metabolic acidosis by sepsis (white blood cells count of 7.25×10⁹/L, platelet count of 41,000/mm³, aspartate aminotransferase 740 IU/L, alanine aminotransferase 610 IU/L, creatinine 1.08 mg/dL, arterial blood gas analysis revealed pH 7.25, pCO₂ 39.6 mmHg, pO₂ 89.4 mmHg, HCO₃ 17.8 mEq/L, and O₂ saturation 95.4%). She underwent continuous renal replacement therapy for three days. After the continuous renal replacement therapy, the acidemia and right upper quadrant tenderness were improved. Intravenous antibiotics and PCD were maintained. Follow-up CT scan showed slowly decreased abscess size and perihepatic fluid collection. Therefore, we kept PCD drainage. The drainage tube was removed 51 days after admission as the patient’s condition was improved and follow-up CT showed significant size reduction of the abscess and diminished fluid collection of subphrenic, perihepatic, and paracolic gutter (Fig. 1C). Finally,
the patient was fully recovered and discharged with oral antibiotics (Fig. 2).

**DISCUSSION**

GFPLA is less common, accounting for 7% to 24% of all PLAs. Most reports of GFPLA have come from Asia, most commonly associated organisms are the *Klebsiella* spp. A variety of microorganisms may be identified in older adults with PLA. In addition to *Klebsiella pneumoniae*, other causative agents such as *Escherichia coli* and polymicrobial with or without anaerobic bacteria are frequently found in older adults. Cases of PLA with *Clostridium perfringens* are rarely reported.

Diabetes mellitus, biliary stones, malignancy, liver cirrhosis, and alcoholism are the risk factors for PLA in older adults. Younger individuals are more likely to be male and have alcoholism and cryptogenic etiology than older adults. On admission, older adults have significantly less common right upper abdominal tenderness than younger individuals, resulting in delay in diagnosis. The patient had only uncontrolled severe hyperglycemia caused by newly diagnosed diabetes mellitus. High fever and right upper quadrant pain were obvious in this patient who was relatively old age.

Diagnosis can easily be made using radiological imaging such as sonography and CT. On ultrasonography, GFPLA presents with diffuse hyperechoic spots with acoustic shadows, and CT reveals a low attenuation area with Hounsfield units similar to that of the lungs. Radiographs may show pockets of gas within the liver parenchyma, but this has been reported to be visible in only up to 36% of patients with GFPLA.

The production of gas occurs as a result of mixed acid fermentation of glucose within the abscess. The mechanism involves fermentation by formic hydrogenlyase, an enzyme that is produced only in an acidic environment, when the local pH reaches 6 or less as a result of acid accumulation. Formic hydrogenlyase converts formic acid accumulated within the abscess into carbon dioxide and hydrogen gas. It also been postulated that poor microcirculation in the affected areas contributes to gas accumulation, which may explain the higher incidence of GFPLA in individuals with diabetes mellitus.

GFPLA is a significant cause of morbidity and mortality, especially in older adults with diabetes mellitus. To reduce morbidity and mortality, adequate antibiotics, such as ceftriaxone with or without metronidazole, and good control of blood glucose with early adequate drainage are mandatory. Surgical drainage is performed in case of large and multi-loculated abscesses, ruptured abscesses, percutaneous drainage failure and critically ill patient with severe sepsis (high American Society of Anesthesiologists [ASA] score, low albumin and hemoglobin). Because our patient exhibited a septic shock condition, we performed ultrasound-guided abscess drainage with the administration of intravenous antibiotics.

A case of successful non-surgical treatment of ruptured PLA has been reported recently. However, in case of ruptured GFPLA into the peritoneal cavity, surgical treatment has known to be only treatment option. To the best of our knowledge, the present case may be the first report that ruptured GFPLA accompanied with peritonitis and sepsis, which was fully recovered with only medical treatment.

**REFERENCES**


