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Case Report

Gas forming pyogenic liver abscess in a diabetic patient: a rare case report

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ABSTRACT

Pyogenic Liver Abscess (PLA) is an uncommon disease with an annual incidence rate ranging from 2 to 45 cases per 100000 hospital admissions worldwide. Gas-Forming Pyogenic Liver Abscess (GFPLA) is even rarer, which accounts for 7% to 24% of PLA and is associated with a high mortality rate in spite of aggressive management. It is commonly associated with underlying immunosuppression like diabetes mellitus. Gas formation occurs as a result of mixed acid fermentation within the abscess by formic hydrogenlyase, an enzyme produced by certain bacteria. Common presentations include fever and abdominal pain, but can be nonspecific, resulting in a delay of diagnosis. Management includes urgent surgical drainage of the abscess under broad spectrum antibiotic coverage. We report a case of GPLA as a result of Klebsiella species in a case of diabetes mellitus.

Keywords: Pyogenic, Gas-forming, Diabetes mellitus, Formic hydrogenlyase, Immunosuppression

INTRODUCTION

Hepatic abscess described by Hippocrates around 400BC either pyogenic or non-pyogenic have uniformly fatal outcome if left untreated. Pyogenic Liver Abscess (PLA) is a relatively uncommon condition associated with significant morbidity and mortality.[1]

Gas-Forming PLA (GFPLA) is even less common, accounting for 7%-24% of all PLA and has a high fatality rate in spite of aggressive management.[2]

Pyogenic liver abscesses are caused by a wide range of bacteria. Escherichia coli was previously the most common causative pathogen of pyogenic liver abscesses. Recently, however, Klebsiella pneumoniae has become the leading cause of both PLA and GFPLA in many Asian populations and in some Western populations. Pyogenic liver abscesses occur more frequently in adults with co-morbid conditions like diabetes mellitus. Patients with GPLA are often sicker and have higher mortality rates. Despite the recommended aggressive approach to treatment, mortality rates throughout the mid-twentieth century remained high at 60-80%. Advances in diagnostic and therapeutic radiology, coupled with improvements in microbiological identification and therapy, have recently decreased mortality rates to <5-30%.[3,4]

We report a case of GFPLA as a result of Klebsiella species in a diabetic who presented to us as a case of PUO.

CASE REPORT

A 52 year old male with history of diabetes mellitus and recurrent urinary tract infection visited our Emergency Department (ED) because of fever on and off associated with chills and discomfort in right upper abdomen and loss of appetite since last one month. He was non-alcoholic and without any history of biliary surgery in the past. He had received treatment for the same and was getting symptomatically relieved for few days only. At the ED, all samples were sent for biochemical investigation and culture sensitivity by automated method and regular insulin and broad spectrum intravenous antibiotics were started. All vital parameters were normal except raised body temperature (102 degree F.) and tachycardia (around 120 beats/min). Systemic examination revealed mildly enlarged firm tender liver (2 cm below right costal margin along right midclavicular line). Laboratory investigation showed increased leukocyte count, elevated c-reactive protein (33 mg/dl.), raised HbA1C with poorly-controlled diabetes mellitus (HbA1C 10.7%), high aspartate aminotransferase (254 IU/L), high alanine aminotransferase (226 IU/L), and high alkaline phosphatase (346 IU/L) with normal kidney function tests (Urea - 23.2 mg/dl and creatinine - 0.37 mg/dl). Ultrasound abdomen showed a capsulated well defined SOL with echogenic matter inside measuring 60 mm × 40 mm noted in segment VIII of right lobe of liver with normal intrahepatic vascular and biliary radicles, portal vein and common bile duct. Abdominal Computed Tomography (CT) revealed an air containing ill marginated hypodense lesion of size 85 mm × 63 mm × 75 mm seen in segment VIII of liver which on contrast study showed an irregular wall showing subtle enhancement (Figure 1 and 2).

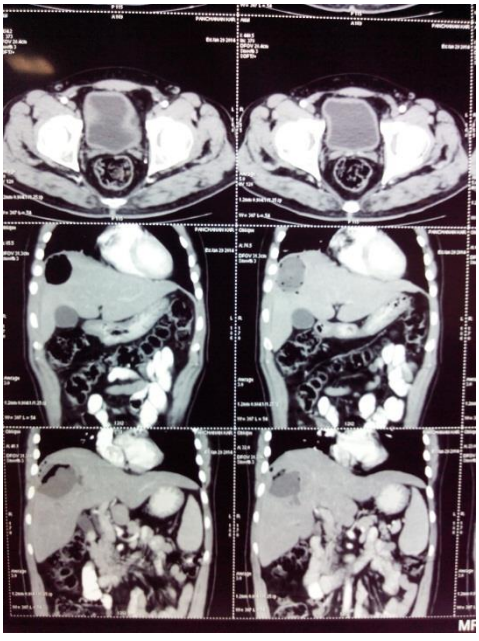

Figure 1: Contrast-enhanced computed tomography scan of the abdomen showing a huge gas-forming abscess with an air-fluid level in right lobe of the liver.

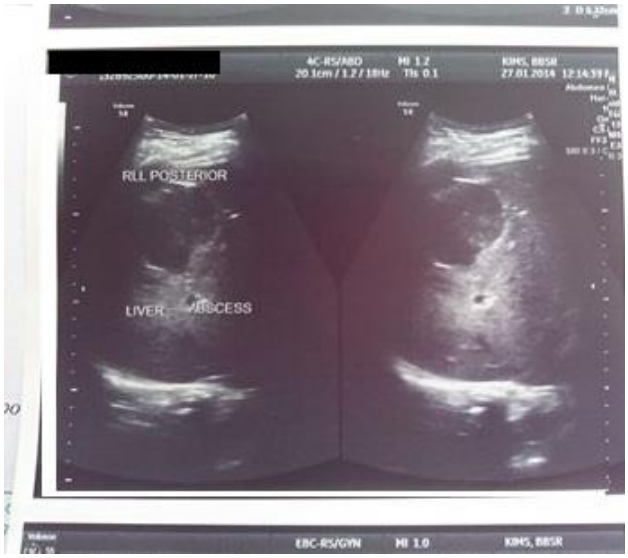

Figure 2: Ultrasound abdomen showed a capsulated well defined SOL with echogenic matter inside noted in segment VIII of right lobe of liver.

Yellowish white pus was aspirated from the cavity under ultrasound guidance which on culture showed Klebsiella pneumonia species. The patient received percutaneous surgical drainage (pig-tail drainage). Urine culture was positive for Klebsiella pneumonia whereas blood cultures on more than one occasion were sterile. As per the sensitivity pattern in both pus and urine culture, antibiotic was changed to intravenous colistin and regular insulin was continued along with other supportive symptomatic therapy. An abdominal Computed Tomography (CT) conducted after the completion of a 2 week antibiotic course demonstrated resolution of his liver abscess. The patient was discharged 21 days after admission and he remained well on follow-up.

DISCUSSION

Pyogenic Liver Abscess (PLA) is an uncommon disease with an annual incidence rate ranging from two to 45 cases per 100000 hospital admissions worldwide and GFPLA accounts for 7 to 24% of them.[2,5] Gas-Forming Pyogenic Liver Abscess (GFPLA) was first reported by Smith.[6] GFPLA is uncommon in western countries and most reports on GFPLA came from the East, for example Taiwan.[2,7] Klebsiella pneumoniae is the most common pathogen of GFPLA. In our case also yellowish white pus was aspirated from the cavity under ultrasound guidance which on culture showed Klebsiella pneumonia species. Apart from the Klebsiella spp., other organisms reported to cause GFPLA include E. coli, Salmonella and Clostridial infections.[8-10] GFPLA is commonly associated with underling DM. Hyperglycemia is an important risk factor for GFPLA and poor control of DM plays a role in the development of GFPLA.[7,11]

The clinical manifestations of GFPLA which usually include fever and right upper quadrant abdominal pain

but can be nonspecific, resulting in a delay of diagnosis and are not different from those of non-GFPLA.[12] However, some clinical differences exist. Statistically, among patients with PLA, the incidence of bacteremia and septic shock in GFPLA patients is higher than that in non-GFPLA patients.[11] The mortality rate is also higher (27.7-30.4%) than non-GFPLA group (5.3-14.4%).[12,13] Patients with GPLA are sicker and progression can be very rapid. Two large case series studies from Taiwan which involved 28 and 83 patients with GPLA, respectively, showed significant differences between GPLA and non-GPLA. These studies showed a statistically higher incidence of septic shock, bacteremia and mortality in patients with GPLA compared to non-GPLA patients. Symptoms duration was also shorter with more abnormal blood parameters: higher serum glucose, urea, serum aspartate aminotransferase and alkaline phosphatase.[12,13] However in our case the blood parameters were abnormal but symptoms were of longer duration and patient was not in shock.

The production of gas occurs as a result of mixed acid fermentation within the abscess. The mechanism involves fermentation by formic hydrogenlyase, an enzyme that is only produced in an acidic environment when the local pH reaches 6 or less as a result of acid accumulation. Formic acid accumulated within the abscess is converted to carbon dioxide and hydrogen gas by formic hydrogenlyase.[2] The organisms reported to produce this enzyme include Klebsiella spp. and E. coli. Hyperglycemia is an important factor and poor DM control leads to compromised immunity, neutrophil dysfunction and chemotaxis dysfunction. This provides a favorable microenvironment for rapid growth and vigorous metabolism of the organisms, leading to gas formation.[7] Poor microcirculation in the affected areas has also been postulated to contribute to gas accumulation. This may explain the reason for higher incidence of GPLA in patients with DM. Our patients had poorly-controlled DM.

The diagnosis of GFPLA can be made by demonstrating gas in the liver parenchyma through hepatic imaging, including ultrasonography, CT scan which shows a low attenuation area with Hounsfield units similar to that of the lungs[12,14,15] and careful evaluation of abnormal gas patterns on plain abdominal radiographs. Furthermore, CT scan is the most sensitive imaging modality. On plain films air-fluid levels and mottled gas patterns are the most common findings, but gas formation in the liver parenchyma is reported to be noted in only up to 36% of patients with GFPLA on plain radiographs.[2]

Management of GPLA includes hemodynamic support, broad spectrum intravenous antibiotics and urgent drainage that can be either percutaneous or surgical, as the risk for rupture is high. The mortality rate remains high at up to 37.1%.[2] The recommended duration of parenteral antibiotic therapy is 2-3 weeks, or until there is a favorable clinical response. Complementary oral antimicrobial therapy must then be continued for a further 2-4 weeks or until clinical, biochemical and radiological follow-up demonstrates complete resolution of the abscess cavity. In our case, liver abscess was managed by physicians in close collaboration with the radiologists and intravenous antibiotic was given for 2 weeks followed by another 2 weeks of complementary oral antibiotic as per the sensitivity pattern in pus culture report. Surgical referrals are only considered if responses are slow or if our standard treatment is expected to fail. However, it is very important to consider this option earlier and liaise closely with the surgical department. Surgery should not be delayed if medical treatment or percutaneous drainage fails.[15]

CONCLUSION

In conclusion, our case highlights the importance to consider GFPLA in patients with poorly controlled DM presenting with fever, abdominal pain and other nonspecific symptoms. It is very important to perform imaging studies early to reach a diagnosis, as GFPLA is still associated with a high mortality. These patients often require urgent drainage of the abscess. Despite the reported success of percutaneous drainage techniques, there remains a role for open surgical intervention in the management of gas forming pyogenic abscess.

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