Case Report

Extensive accumulation of gas in the portal venous system after chemotherapy of leukemia: a case report

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Abstract: A 28-year-old man was diagnosed with acute lymphocytic leukemia and was then treated with chemotherapy drugs for 9 days. Hepatic portal venous gas (HPVG) was shown through CT scan because of a sudden abdominal pain. The presence of HPVG is a rare finding. It is most commonly caused by bowel necrosis and gas bacteria, which typically carries a grave prognosis. However, a sudden abdominal pain may have been a warning sign. Unfortunately, the patient died after completing the CT scan.

Keywords: Portal veins, chemotherapy of leukemia, necrotizing enteritis

Introduction

HPVG is a sign, rather than an isolated disease. It is related to gastrointestinal diseases and in particular necrotizing enteritis. This is the first case of HPVG caused by chemotherapy of acute lymphoblastic leukemia.

Case report

A 28-year-old man was diagnosed with acute lymphoblastic leukemia by bone marrow puncture after he was found to have a bleeding spot for three months. Laboratory data included a white cell count of $0.7 \times 10^9$/L, hemoglobin of 74.8 g/L, platelets of $13.4 \times 10^9$/L, which were significantly reduced. However, the first CT scan of the abdomen was not abnormal (Figure 1) despite sudden abdominal pain coupled with a painful expression, abdominal wall tension, and a suspicious bounce pain. CT was requested again for further evaluation after he received VTLP MDT on the ninth day, which was followed by chills and fever.

CT scan of the abdominal immediately showed the intrahepatic portal vein (Figure 2), right ventricle (Figure 3), inferior vena cava and splenic vein (Figure 4) all of which had a gas shadow to varying degrees. Minimum density projection (Min-IP) displayed that the portal vein system and mesenteric vein were filled with a wide range of gases (Figure 5). The abdominal cavity was also filled with substantial amounts of gas and some segments of small bowel were enlarged (Figure 6), especially the jejunum, with thickening of the intestinal wall. Many small bubbles or the thickening of the intestinal wall was found (Figure 7). Free gases then spread in the surrounding area of the spleen, under the abdominal wall, and in the left inguinal region (Figure 8). Diagnosis of necrotizing enteritis and gastrointestinal perforation was considered. Unfortunately, the patient died after completing the CT scan.

Discussion

Hepatic portal venous gas (HPVG) is a rare condition associated with the disease of the enterogastritis. It was first reported in 1955 by Wolfe and Evens [1]. Before this report, there have been no documented cases of HPVG associated with acute lymphocytic leukemia. Most previous reports have demonstrated that ischemia or necrosis were the main causes of HPVG [2]. Gas sources included the following contents: (1) Necrotizing enterocolitis or intestinal hypertension caused intestinal gas leakage into the mesenteric vein, (2) Septicemia caused by...
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Infection and gas produced by aerobiogenic microorganisms, and (3) Trauma or iatrogenic loss led to the extracorporeal gas entering the blood vessel. The main causes of HPVG are perforation of the intestinal wall and the pressure of the intestinal cavity. Furthermore, intestinal gas can enter the portal vein system and cause septicaemia.

The diagnosis of HPVG depends mainly on ultrasound and CT [3]. CT examination can not only determine the causes based on its high sensitivity, but also be used for evaluation of curative effect. So it has been used in the diagnosis of HPVG widely. In recent years, with the development of CT reprocessing technology, the detection rate of small amount of HPVG has greatly improved.

In this case, basic disease of the patient was acute lymphoblastic leukemia. Abdominal CT scan revealed the thickening of the intestinal wall and intestinal mucosa, which was the
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cells were dissolved and destroyed, which caused the gas to enter the intestinal wall and the abdominal cavity and/or into the portal system. At present, for the bone marrow suppression stage, the patient was very likely to be infected with the intestinal tract after intestinal perforation due to the lack of granulocytes. Additionally, the gas passed through the mesenteric venous fistula into the portal vein system, the inferior vena cava, and the right ventricle. In this case, the extensive venous system gas accumulation was considered as a result of the common causes above. HPVG should be differentiated from the internal gas accumulation in the bile duct on imaging. HPVG is mostly located in the branching gas density shadow which is extended or limited to the subcapsular 2 cm, because of the function of venous blood flow, and the latter is mostly located in the portal area due to the flow of bile [4].

HPVG is a risk signal with high mortality. However, the amount of gas accumulation has no definite relationship with the mortality rate, and its prognosis mainly depends on the primary disease. Therefore, early diagnosis and etiological treatment are key to improving the survival rate and prognosis of HPVG patients. CT examination and post-processing technology is of high value for the diagnosis and etiological diagnosis of HPVG. It is considered to be the gold standard for HPVG diagnosis, providing reliable evidence for clinical diagnosis and treatment.

Disclosure of conflict of interest

None.

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References


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