Hepatic hydrothorax in a HCV-positive patient with liver cirrhosis
Case report and literature review

Hepatic hydrothorax (HH) is an uncommon complication of portal hypertension. The disorder is defined as the presence of transudative pleural effusion in a patient with liver cirrhosis who has no primary pulmonary or cardiac disease. The medical management of HH is often challenging, since these patients usually have advanced liver disease. The case is reported of an of HH in a 68-year-old female patient with hepatitis C virus (HCV) associated cirrhosis, without ascites, which exemplifies the many therapeutic challenges and dilemmas.

Key words
Cirrhosis
HCV
Hydrothorax
Portal hypertension

We report a case of HH in a patient with cirrhosis associated with hepatitis C (HCV), without ascites, which exemplifies the many therapeutic challenges and dilemmas.

CASE REPORT

A 68-year-old woman presented with loss of appetite and tiredness of duration of about 1 week. She had been diagnosed five years earlier with liver cirrhosis in association with HCV. Clinical examination showed decreased breath sounds and dullness to percussion over the lower four-fifths of the right hemithorax. The
liver was palpable 5 cm below the right costal margin. There was no splenomegaly and no ascites. Heart auscultation was normal with no murmurs or extra sounds. Spider nevi were present in the neck and torso and the sclerae were slightly icteric.

Laboratory investigation on admission showed: Hemoglobin (Hb) 12.5 g/dL, hematocrit 36.5%, white blood cell count 3,900/μL, platelets 73,000/μL, International Normalized Ratio (INR) 1.25, total bilirubin 1.6 mg/dL (direct 1.15 mg/dL), alanine aminotransferase (ALT) 28 IU/L, aspartate aminotransferase (AST) 46 IU/L, gamma-glutamyltransferase 28 IU/L, urea 31 mg/dL, creatinine 0.8 mg/dL.

Chest X-ray showed a massive right-sided pleural effusion (fig. 1). Abdominal ultrasound (US) failed to show ascetic fluid.

A chest drain was inserted and samples of pleural aspirate showed it to be a transudate, according to Light's criteria. Culture for T. baccilli and other bacteria was negative. After drainage, computed tomography (CT) of the thorax and abdomen showed findings consistent with hepatic cirrhosis with portal hypertension, but no pleural or peritoneal fluid (figures 2, 3). A higher dose of diuretics was prescribed and the patient was discharged.

A week later the patient was admitted to another hospital with acute shortness of breath. Again, hydrothorax was diagnosed, without ascites, the pleural fluid was drained with the use of a catheter, and the patient was discharged.

Three days later the patient was readmitted with gastrointestinal bleeding. Laboratory findings were: Hb 6.0 g/dL, INR 1.45, urea 112 mg/dL, creatinine 0.7 mg/dL, ALT 622 IU/L, AST 582 U/L, total and direct bilirubin 3.7 mg/dL and 2.5 mg/dL, respectively. The patient was treated with intravenous terlipressin, fresh frozen plasma and packed red blood cells.

Although the bleeding was controlled, the patient developed shortness of breath, and chest X-ray showed significant right pleural effusion completely covering the right lung (fig. 4). Oxygen saturation was 79% and emergency thoracentesis was performed, following which the saturation rose to 96%. The aspirate was once again found to be transudate according to Light's criteria. A further pleural drainage was necessary, after which the patient was once again discharged as her family refused to consider chemical pleurodesis.
A week later the patient was readmitted with acute gastrointestinal bleeding. Banding of three esophageal varices was performed, that arrested the bleeding (fig. 5). Next day the patient developed right-sided pleural effusion with shortness of breath and we proceeded with chemical pleurodesis with the family’s permission. Unfortunately, the procedure was complicated by pneumothorax that necessitated a chest tube. The pneumothorax resolved and pleurodesis with talc poudrage was performed without VATS, because of the patient’s poor condition. The talc pleurodesis was unsuccessful and bleomycin pleurodesis was performed, which also failed to control the hydrothorax. A large chest tube drainage was inserted but the patient died 3 days later due to massive varial bleeding.

DISCUSSION

Hepatic hydrothorax is distinctly uncommon, being observed in 4–6% of all patients with cirrhosis and up to 10% of those with decompensated cirrhosis.

The pathophysiology of HH involves the leakage of ascitic fluid from the peritoneal cavity into the pleural space through embryonic defects, which are more prevalent in the right hemi-diaphragm. These defects arise from the rupture of pleuro-peritoneal blebs as a result of raised intra-abdominal pressure from coughing, straining or the presence of ascites. The negative intrathoracic pressure aids the unidirectional flow of ascitic fluid into the pleural space. Hydrothorax occurs when the accumulation of fluid exceeds the absorptive capacity of the pleura.

Other suggested mechanisms include hypoalbuminemia, hypertension in the azygous or hemiazygous systems and lymphatic channels in the diaphragm.

In order to establish the diagnosis of HH a thorough investigation, including chest CT and echocardiography, is necessary to exclude primary cardiopulmonary disorders. In cases where the diagnosis is in doubt, in particular when the pleural effusion is left sided or ascites is absent, intra-peritoneal administration of $^{99m}$Tc-human serum albumin or $^{99m}$Tc-sulfur colloid is a valuable test. The migration of the radioisotope into the pleural cavity within hours confirms the presence of a communication between the pleural and peritoneal spaces. Other diagnostic modalities, including magnetic resonance imaging (MRI) and thoracoscopy, might assist in the detection of the underlying diaphragmatic defects.

Almost all patients with HH reported in the literature have had clinically apparent ascites. In rare cases, including our case, hydrothorax can occur without obvious ascites, in which event treating the hydrothorax is even more of a challenge, and there is no consensus about its management.

With regard to treatment, it must be kept in mind that most patients with HH have end-stage liver disease. The aim of intervention should be to relieve symptoms and prevent pulmonary complications by way of sodium restriction, administration of diuretics, and therapeutic thoracentesis. Placement of a chest tube should be avoided as this leads to uncontrollable fluid loss and increased mortality. In resistant cases, chemical pleurodesis with continuous positive airway pressure, videothoracoscopic repair of diaphragmatic defects and creation of a peritoneovenous shunt or even
TIPS\textsuperscript{27,28} may be considered until liver transplantation, which is the definitive treatment, can be performed.

In the case of the patient presented here, treatment was started with diuretics but this failed possibly because the patient’s low blood pressure precluded the use of maximal diuretic doses. The only other option was to attempt chemical pleurodesis. Many different substances, including OK-432,\textsuperscript{29} tetracycline and minocycline, have been used. Unfortunately, the patient was not a liver transplant candidate and because of her poor condition no VATS was feasible, so first talc poudrage and then bleomycin were injected via a thoracic tube, with poor results. Finally, a chest tube was inserted, but the patient died after a large variceal bleeding.

Corresponding author:
G. Hatzis, Department of Pathophysiology, School of Medicine, National and Kapodistrian University of Athens, 75 Mikras Asias street, GR-115 27 Athens, Greece
e-mail: grhatzis@med.uoa.gr