Early Diagnosis of Hepatic Hydrothorax with Associated Occlusion of a Peritoneo-Venous Shunt with Tc-99m MAA

Early Diagnosis of Hepatic Hydrothorax with Tc-99m MAA

Albert Y. Yang · Yang Lu

Received: 17 June 2014 / Revised: 22 July 2014 / Accepted: 24 July 2014 / Published online: 8 August 2014
© Korean Society of Nuclear Medicine 2014

A 53-year-old man with pancreatic adenocarcinoma and status post subtotal pancreaticoduodenectomy was referred to evaluate patency of a peritoneovenous shunt (Denver shunt), which was placed for refractory ascites. The patient was injected with Tc-99m macroaggregated albumin (Tc-99m MAA) radiotracer, and immediate (30 min) and 4-h delayed scintigraphic images of the chest and abdomen obtained (Fig. 1a, b). Whereas a normal peritoneal scintigraphy would show radiotracer accumulation within the peritoneal cavity and further flow through the Denver shunt to the system circulation, in this case there was nonvisualization of the Denver shunt or cardiac and/or blood pool activities on both early and delayed images, suggesting obstruction of Denver shunt. Meanwhile, tracer uptake in the right hemithorax was observed on the 4-h delayed image, which led to suspicion for hepatic hydrothorax. Of note, at the time of the nuclear medicine study, there was only a minimal right-sided pleural effusion on a chest X-ray obtained 2 h earlier (Fig. 1c, arrows).

The patient received a new Denver shunt replacement. However, a computed tomography (CT) scan of the chest obtained 2 weeks later demonstrated persistence of large ascites, and progression of hydrothorax into bilateral pleural

spaces despite replacement of a new Denver shunt (Fig. 2a). In addition, portal venous thrombosis was also noted (Fig. 2b). Despite replacement, no significant improvement in the ascites was observed; thus, the severe hepatic hydrothorax likewise recurred and was classified as refractory hydrothorax. In past studies, the peritoneovenous shunt had been used successfully for recurrent hepatic hydrothorax and ascites, but in this instance, it was unsuccessful [1]. The patient had persist large amount ascites and worsening bilateral pleural effusions, which were refractory to various treatments including thoracentesis and paracentesis, and died from septic shock 2 months later.

Hepatic hydrothorax is the development of a pleural effusion in the setting of liver cirrhosis and portal hypertension, in the absence of cardiopulmonary disease [2]. Some cases have reported a hepatic hydrothorax without appreciable ascites [3, 4]. Although the exact mechanisms are not fully understood, hepatic hydrothorax probably results from the passage of ascites from the peritoneal cavity into the pleural cavity through small diaphragmatic defects [5, 6]. Though peritoneal scintigraphy with Tc-99m sulfur colloid can be used for detection of hepatic hydrothorax [7], our case demonstrated that Tc-99m MAA also can be used for this purpose, and was able to detect a minimal pleural effusion in the setting of severe uncontrolled ascites resulting from portal venous thrombosis. Though not as effective as replacing shunt, urokinase has been reported to be able to restore shunt patency [8]. Other treatment options for recurrent hydrothorax besides thoracentesis are transjugular intrahepatic portosystemic shunt (TIPS), pleurodesis, and thoracoscopic surgery to repair the diaphragmatic defect [9, 10].

A. Y. Yang · Y. Lu (✉)
Department of Radiology (M/C 931), University of Illinois Hospital
& Health Science System, 1740 West Taylor Street, Chicago,
IL 60612, USA
e-mail: yanglu@uic.edu

Y. Lu
e-mail: yang.lu630@gmail.com

Fig. 1 After the intraperitoneal injection of 5.2 mCi Tc-99m MAA, anterior images of the chest and abdomen were obtained at 30 min (a) and 4 h (b). A chest X-ray obtained after 2 h (c)

Fig. 2 CT of the chest obtained 2 weeks later demonstrated persistence of large ascites (a, dashed white arrow), and progression of hydrothorax into bilateral pleural spaces (a, block white arrows) despite replacement of a new Denver shunt (a, dashed black arrows). In addition, portal venous thrombosis was also noted (b, solid white arrow)

Conflict of Interest Albert Y. Yang, and Yang Lu declare that they have no conflict of interest.

Informed Consent The manuscript does not contain clinical studies. There is no identifiable patient information in this manuscript. It is merely a case report. Based on our institutional policy, neither IRB approval, nor patient's informed consent is needed for such a publication.

References

- Kim JK, Maynulet R, Goldfarb A. Use of Denver shunt in recurrent hepatic hydrothorax. *Postgrad Med*. 1982;71:236–7.
- Kinasewitz GT, Keddisi JJ. Hepatic hydrothorax. *Curr Opin Pulm Med*. 2003;9:261–5.
- Kakizaki S, Katakai K, Yoshinaga T, et al. Hepatic hydrothorax in the absence of ascites. *Liver*. 1998;18:216–20.
- Mentes BB, Kayhan B, Gorgul A, et al. Hepatic hydrothorax in the absence of ascites: report of two cases and review of the mechanism. *Dig Dis Sci*. 1997;42:781–8.
- Huang PM, Chang YL, Yang CY, et al. The morphology of diaphragmatic defects in hepatic hydrothorax: thoroscopic finding. *J Thorac Cardiovasc Surg*. 2005;130:141–5.
- Zenda T, Miyamoto S, Murata S, et al. Detection of diaphragmatic defect as the cause of severe hydrothorax with MRI. *Am J Gastroenterol*. 1998;93:2288–9.
- Rajnish A, Sudhakar P. Diagnosis of hepatic hydrothorax by Tc-99m sulfur colloid peritoneal scintigraphy. *Clin Nucl Med*. 2001;26:888.
- Balon H, Fink-Bennett D. Scintigraphic demonstration of restored Denver peritoneovenous shunt patency using urokinase. *Clin Nucl Med*. 1989;14:310–1.
- Cerfolio RJ, Bryant AS. Efficacy of video-assisted thoracoscopic surgery with talc pleurodesis for porous diaphragm syndrome in patients with refractory hepatic hydrothorax. *Ann Thorac Surg*. 2006;82:457–9.
- Gordon FD, Anastopoulos HT, Crenshaw W, et al. The successful treatment of symptomatic, refractory hepatic hydrothorax with transjugular intrahepatic portosystemic shunt. *Hepatology*. 1997;25:1366–9.