Letter to the Editor

Ultrasound-guided percutaneous hepatic puncture for hepatic lymphangiography: a case description

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Introduction

Hepatic lymphorrhea is a rare and serious complication of surgery for abdominal surgery, especially for digestive cancers (1). Given the developments in ultrasound-guided procedures, it is possible to locate perihepatic lymphatic leakage with ultrasound-guided hepatic lymphangiography and clarify the etiology of unexplained abdominal ascites (2).

Case presentation

Five months after cholecystectomy, a 56-year-old female patient with a 30-year history of hepatitis C presented with unexplained abdominal ascites and daily drainage of approximately 1,500 mL of clear yellow fluid in the days leading up to admission. No significant reduction in ascites was observed after anti-infective treatment. Therefore, she was admitted to the Department of Lymphatic Surgery 3 months later. Lymphoscintigraphy revealed clear visualization of the lower limb lymphatic vessels; moreover, the reflux of the imaging agent was unobstructed, and the left venous angle did not develop. In addition, the nuclear imaging revealed a slightly faint hepatic image and diffuse abdominal filling indicative of chylous ascites (*Figure 1*). Direct lymphangiography identified the main trunk of the thoracic duct at the L2 level, revealing rapid contrast medium reflux and a tortuous course beyond the sternoclavicular joint with terminal dilation. No abnormal reflux of contrast medium in the abdominal segment or leakage of contrast medium into the abdominal cavity was observed. Subsequent thoracic duct dilation surgery relieved the obstruction, resolving the need for daily abdominal drainage. However, persistent abdominal distension led to a reevaluation after 2 months. Physical examination revealed abdominal distension with positive shifting dullness. Biochemical analysis of the abdominal fluid revealed a triglyceride concentration of 0.73 mmol/L, a total cholesterol concentration of 2.53 mmol/L, a total protein at concentration of 52.8 g/L, and an albumin concentration of 28.7 g/L. Blood tests indicated triglyceride levels of 1.58 mmol/L, total cholesterol at levels of 4.41 mmol/L, total protein levels of 70.7 g/L, and albumin levels of 34.9 g/L. Ultrasound confirmed diffuse hepatic lesions and abdominal ascites.

Despite a moderate degree of liver cirrhosis, the absence of preoperative ascites and the nature of the ascitic fluid (high protein and low chyle content) suggested that the ascites was not due to cirrhosis or portal hypertension. Instead, it was attributed to intractable abdominal ascites resulting from lymphorrhea postcholecystectomy. After multidisciplinary team discussion, the decision was made to perform ultrasound-guided percutaneous hepatic puncture for hepatic lymphangiography in an attempt to locate the site of lymphatic leakage precisely.

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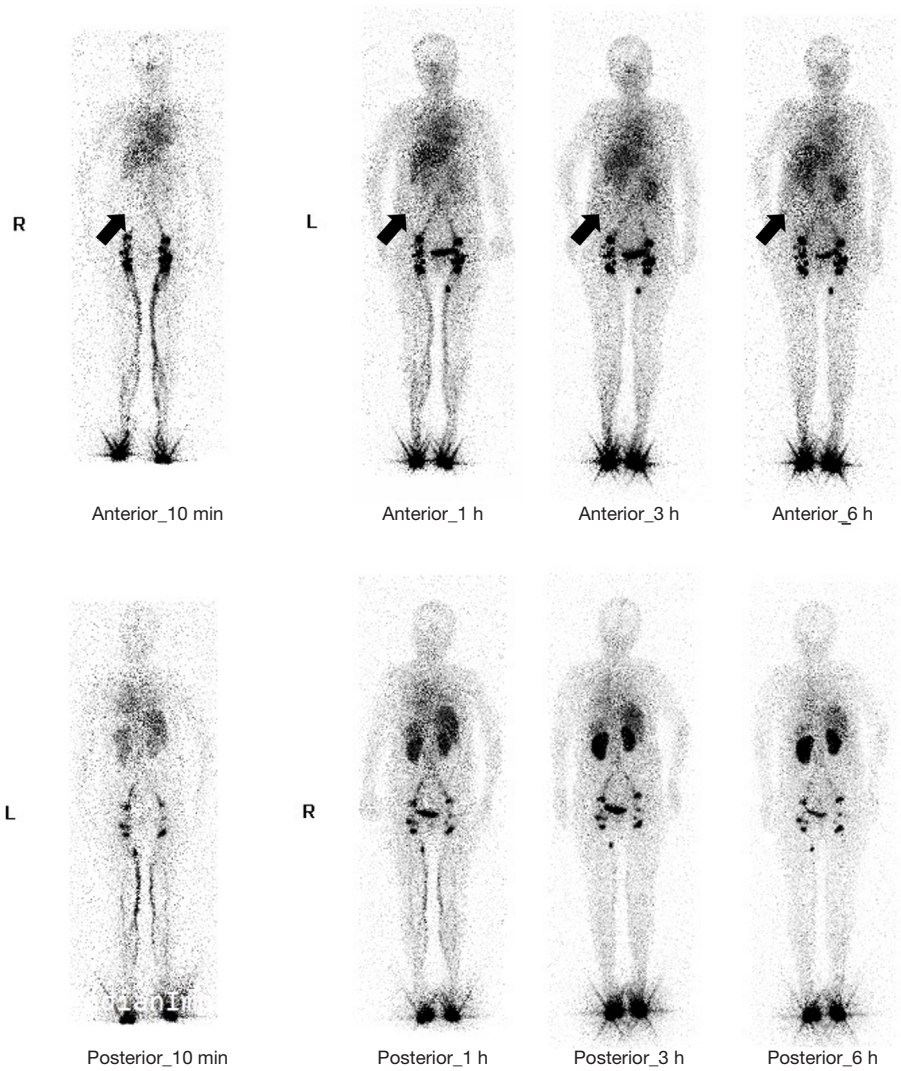

Figure 1 Lymphoscintigraphy. No focal activity in the left venous angle was observed at 10 minutes, 1 hour, 3 hours, or 6 hours after the injection of the radionuclide imaging agent. Mildly increased radioactivity in the abdomen was observed at 3 hours, and increased radioactivity was observed at 6 hours, which was consistent with the appearance of chylous ascites (black arrows).

Under general anesthesia and ultrasound guidance, a 21-gauge needle was inserted into the Glisson system around the main branch of the right hepatic portal vein (*Figure 2*). Subsequently, 10 mL of a water-soluble contrast medium, iohexol (Omnipaque 350, GE HealthCare, Chicago, IL, USA) was injected into the liver parenchyma through the needle sheath. Intraoperative digital subtraction angiography (DSA) combined with computed tomography (CT) imaging demonstrated reflux into the duodenum via the hepatic portal vein and was followed by visualization of the abdominal thoracic duct and chylous cistern. Moreover, contrast leakage into the gallbladder bed confirmed multiple points of lymphorrhea (*Figure 3*). Subsequent laparotomy confirmed lymphatic fluid leakage points on the gallbladder bed surface, and embolization of the leak was performed. Postoperatively, the patient received parenteral nutrition and exhibited improvement, with no significant amount of abdominal fluid on ultrasound at the 3-month follow-up.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent

was obtained from the patient for publication of this article and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

The liver, which is the primary lymphatic organ in the human body, typically accounts for up to 50% of thoracic duct reflux, with 80% of hepatic lymph fluid travelling along the portal vein and hepatic vein and connecting with the mesenteric lymphatic vessels and the cisterna chyli (3,4). Hepatic lymphangiography serves various purposes, including visualization of the lymphatic ducts in patients with cirrhosis, imaging and treatment of abdominal lymph node metastasis, and assessment of postoperative hepatic lymphatic leakage. Under normal circumstances, ultrasound cannot be used to identify hepatic lymphatic vessels; however, aqueous contrast medium penetrates the interstitial spaces of the Glisson system, facilitating lymphatic vessel visualization (5). Harigane *et al.* (6) reported minimal occurrences of hepatic lymphatic leakage, primarily as a complication of lymph node dissection in gastric cancer surgery, whereas chylous leakage is a more common cause of postoperative abdominal fluid accumulation. Laboratory analysis aids in differentiation: hepatic lymph fluid contains protein concentrations akin to those of plasma, whereas chylous ascites contains elevated levels of triglycerides. Laboratory tests of the patient's abdominal fluid revealed triglyceride levels close to normal and protein concentrations similar to those of plasma, thereby excluding chylous ascites and raising suspicion of hepatic lymphatic leakage. Itkin *et al.* (4) used needle localization around the portal vein's "thickened" structures, followed by contrast medium visualization of the lymphatic duct structures. Similarly, in this case, contrast medium was injected into tissues surrounding the hepatic portal vein with this method and was followed by observation of contrast medium

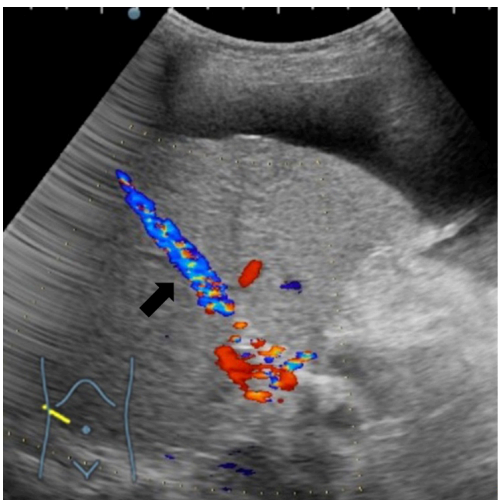

Figure 2 Color Doppler ultrasound. An intercostal approach with a standard abdominal transducer (2–5 MHz) facilitated the insertion of the needle into the Glisson system around the main branch of the right hepatic portal vein. Contrast-enhanced ultrasound combined with color Doppler ultrasound revealed that the contrast medium was injected into the liver parenchyma (black arrow).

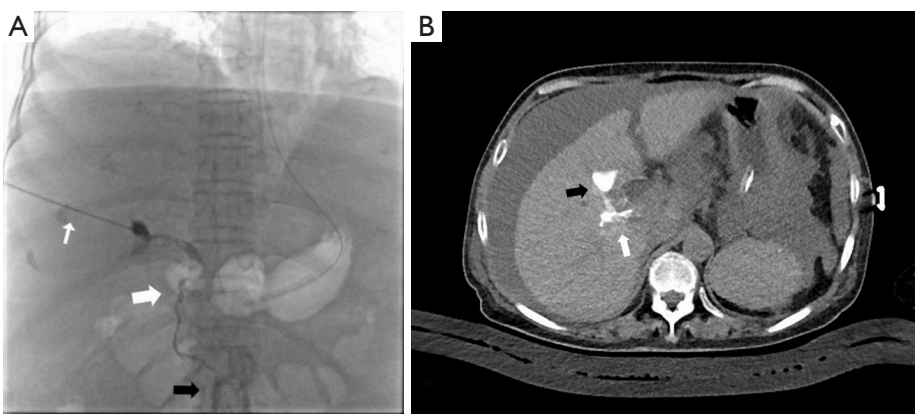

Figure 3 Angiography and CT. (A) The image of percutaneous transhepatic lymphangiography showed the inflow of contrast medium inserted via a 21-gauge needle (thin white arrow) into the cisterna chyli (black arrow) through the periportal lymphatic network (thick white arrow). (B) A CT image at the level of the gallbladder showed the leakage of contrast agent from the gallbladder fossa (black arrow) after the injection of contrast agent (white arrow). CT, computed tomography.

distribution via DSA to determine the suitable puncture sites. In this case, the site of hepatic lymphatic leakage was preliminarily located via aqueous contrast medium, providing clear visualization of the hepatic lymphatic vessel trajectories, thus confirming the diagnostic and therapeutic utility of ultrasound-guided percutaneous hepatic puncture for hepatic lymphangiography and facilitating targeted intervention for the treatment of intractable abdominal ascites.

Conclusions

We report a case of ultrasound-guided percutaneous hepatic puncture for hepatic lymphangiography. Following operation, the patient had unexplained abdominal ascites with daily drainage but was not considered to have cirrhosis or portal hypertension. The etiology of postoperative hepatic lymphatic leakage was accomplished via ultrasound-guided percutaneous hepatic puncture for lymphography. Hence, given its success in the case described, this method is suggested in similar situations for qualitative and localized diagnosis so as to guide the subsequent treatment. Further studies should be conducted to explore its other potential applications.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://qims.amegroups.com/article/view/10.21037/qims-24-1181/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this article and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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