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Case Report

Percutaneous embolization of hepatic lymphorrhea post-hepatectomy ☆,☆☆

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ABSTRACT

Abdominal effusion due to hepatic lymphorrhea post-hepatectomy is an extremely rare and complex complication in clinical practice. No standard treatment method has been established for this condition to date. We report a case of complicated intra-abdominal lymphatic leakage in a patient following hepatectomy to treat hepatocellular carcinoma. The patient underwent percutaneous embolization of the hilar hepatic lymphatic system, combined with intensive medical treatment. Percutaneous embolization represents a safe and effective method that should be considered as a first-line treatment for this complication.

Introduction

The liver is one of 3 known lymphatic sources, in addition to the lumbar lymphatic system and the intestinal lymphatic system, which join to form the cisterna chyli that is responsible for 25%-50% of lymphatic drainage through the thoracic duct [1]. Injury to the liver lymphatic system can occur following major liver surgery, such as hepatectomy or liver transplant. To date, hepatic lymphorrhea has only been described in a number of case reports [2–5], and diagnosis is typically based on the clinical presentation of abdominal effusion and laboratory testing of the fluid composition, which often features a high protein concentration equivalent to that of serum [6]. Imaging diagnosis is based on direct needle puncture with contrast injection to visualize the lymphatic route and the fistula, followed by the injection of embolization material to block the injured lymphatic branches.

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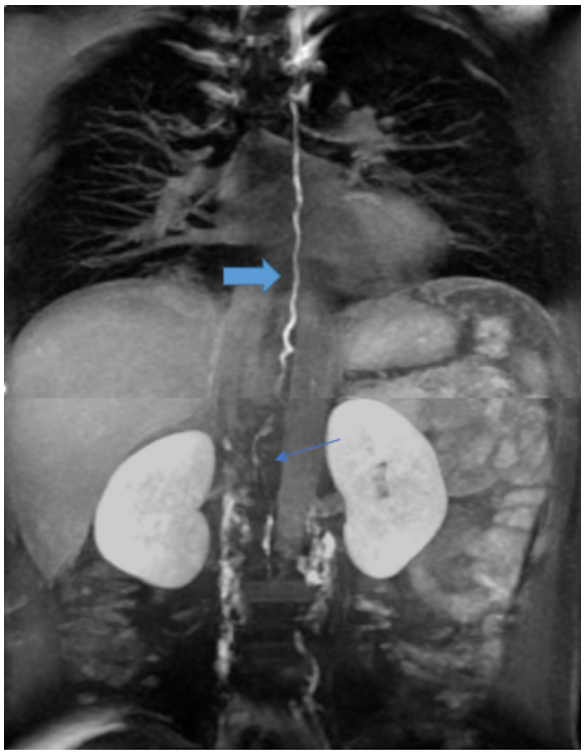

Fig. 1 – – MRI lymphangiography through the inguinal lymph nodes revealed no damage to the cisterna chyli (thin arrow) or thoracic duct (block arrow).

Case report

A 49-year-old man with a history of hepatitis B and hepatocellular carcinoma (measuring 30 × 40 mm) in segment IV was treated with hepatectomy by left medial sectionectomy and the dredging of lymph node groups 8, 12, and 13. On the fourth day after surgery, fluid drainage under the liver was approximately 2000 mL every 24 hours, with a clear yellow appearance. Fluid drainage increased continuously, reaching up to 3000 mL in 24 h on the tenth day. The patient was transferred and admitted to Hanoi Medical University Hospital in a state of exhaustion. The patient weight decreased from 67 kg before surgery to 58 kg 10 days postsurgery, and the patient's body mass index decreased from 23.2 to 19.8. The patient had no fever, a soft abdomen, no distention, and the maximum abdominal fluid drainage volume was 5000 mL in 24 hours. Blood tests showed a decrease in serum albumin (25.8 g/l) and protein (38.1 g/l) levels. The serum amylase, bilirubin, aspartate transaminase, alanine transaminase, and creatinine levels were within the normal range. Laboratory tests of the drainage fluid showed elevated protein (23.8 g/l) and triglyceride levels (0.49 mmol/l); however, bilirubin levels were normal. Based on the clinical symptoms and laboratory testing results, lymphatic leakage was suspected. The patient underwent lymphatic magnetic resonance imaging (MRI), including the injection of contrast agent through the bilateral inguinal lymph nodes, which revealed no leakage of the contrast agent from the cisterna chyli into the abdomen (Fig. 1). After multispecialty consultation, we considered a diagnosis of postoperative hepatic lymphorrhea.

The patient underwent percutaneous hepatic lymphangiography, in which 25G Chiba needle was directly inserted into the portal space adjacent to the right anterior segmental branch of the portal vein, followed by the injection of Xenetic 350 water-soluble contrast agent (Guerbert, France) to visualize the lymphatic branches that drain toward the hepatic hilum and into the peritoneal cavity (Fig. 2A). We injected Histoacryl and Lipiodol, at a ratio of 1:8 in 1 mL Lipiodol, through the needle to block the identified lymphatic branches. The monitoring process showed no change in the drainage volume . The injection process was, therefore, repeated at lymphatic sites around the left branch, the posterior segmental branch of the portal vein, and the falciform ligament (Figs. 2B–2D). The lymphatic fluid volume decreased significantly following the fourth embolization procedure, from 5000 mL in 24 hours to <2000 mL in 24 hours. At 25 days after the initial operation, the fluid volume was <500 mL in 24 hours (Fig. 3), and we opted to remove the drainage system. During these treatments, the patient was fed with a fat-free diet, intravenous nutrition, and electrolyte regulation. After 1 month of follow-up at home, the patient weight stabilized at 59.5 kg, without edema. On computed tomography imaging, 1 month after discharge from the hospital, only a small amount of peritoneal fluid could be detected (Fig. 4).

Discussion

The lymphatic system collects fluid, known as lymph, from tissues in the body and drains this fluid from the lower extremities and pelvis through the right and left lumbar trunks, intestinal, and hepatic lymphatic systems. These systems join to form the cisterna chyli, which drains upward through the thoracic duct, ending in the left subclavian vein. The hepatic lymphatic system consists of both superficial and deep components [1]. The deep lymphatic system originates from the liver, gradually separates into branches surrounding the portal veins on both sides and the falciform ligament, forming a network that empties into the cisterna chyli, accounting for approximately 25%-50% of all lymphatic drainage through the thoracic duct [1]. The superficial lymphatic system of the liver forms confluent branches around the hepatic veins, passing through Glisson's capsule to the regional lymph nodes above the diaphragm, accounting for less than 20% of the lymphatic volume of the liver.

Abdominal lymphatic leakage has only been previously described by authors due to damage to the thoracic duct long ago, and other causes of hepatic lymphatic leakage reported in the literature include damage to the hepatoduodenal ligament [2]. Lymphatic leakage can occur following surgery, such as extrahepatic cholangiocarcinoma resection [2], liver transplant [3], gastrectomy with nearby lymph node removal [4,7], or pancreatectomy [8]. Another study reported lymphatic leakage following hepatectomy [5].

A diagnosis of intra-abdominal lymphatic fistula can easily be determined through the use of laboratory tests and imaging studies to exclude other causes of peritoneal effu-

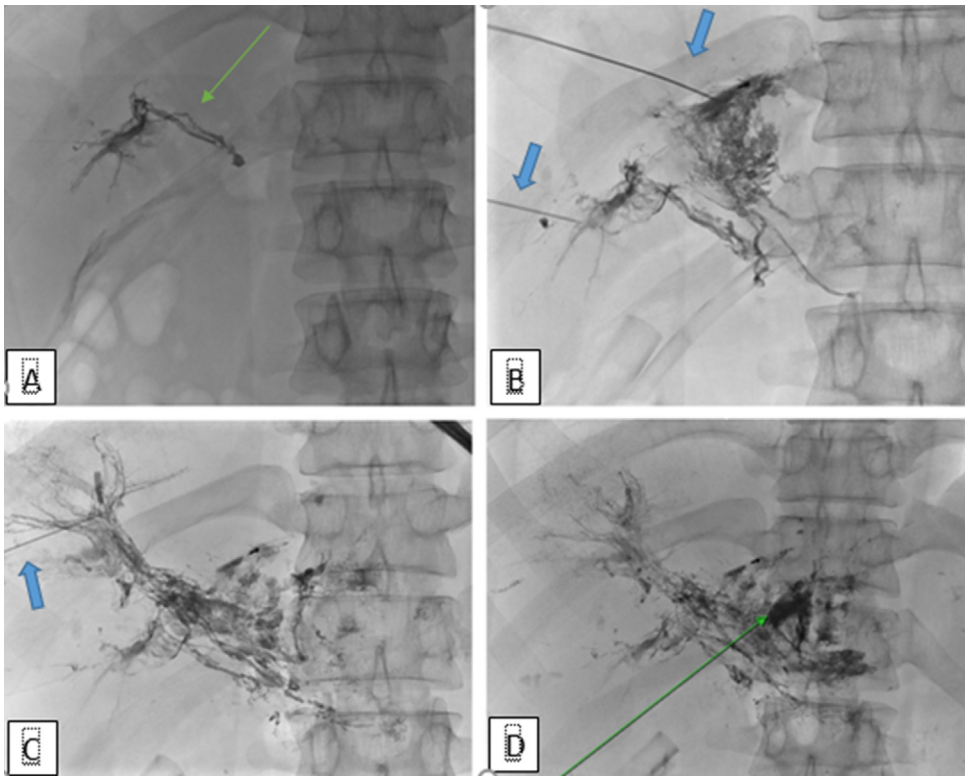

Fig. 2 – – Percutaneous hepatic lymphangiography and embolization with Histoacryl. Green arrow in A: Lymphatic branches of the hepatic hilum. Blue arrows in B and C: 25G Chiba needle. Green arrow in D: Lymphatic fistula in the hepatic hilum.

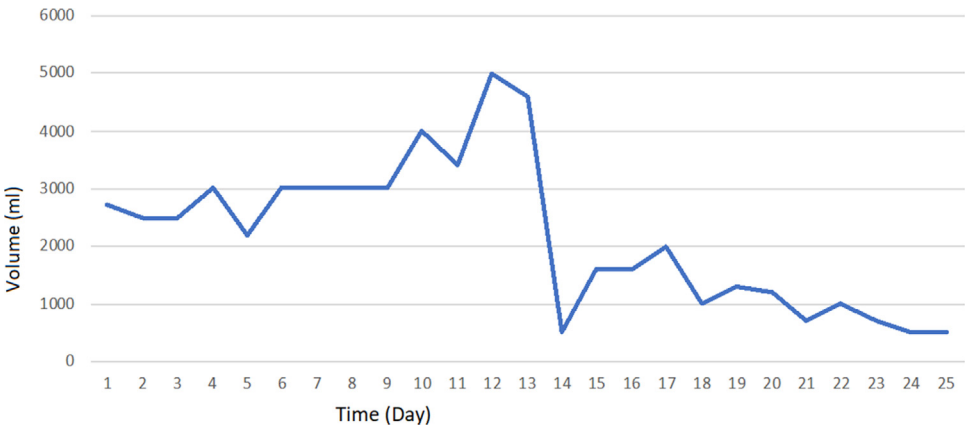

Fig. 3 – – Line graph showing the amount of lymphatic fluid drainage each day after hepatectomy.

sion, such as biliary fistula, exudate effusion due to peritoneal metastases, tuberculosis, and transudative effusion [3,4]. In this case, the patient had peritoneal fluid characterized by a high protein concentration (23.8 g/l), which is similar to the serum concentration, in addition to low triglycerides. The fluid was clear, which is also consistent with lymphatic fluid rather than chylous ascites. However, diagnosing the source of lymphatic leakage can be challenging. MRI lymphangiography was necessary to exclude lesions from the lumbar trunk and thoracic duct. A diagnosis of lymphatic fistula from the liver is currently made through the direct needle puncture to hepatic lymphatic branches and the injection of contrast material to determine the leakage position [1,4]. In our case, the anatomy had altered somewhat following the hepatectomy, which increased the difficulty of accurately determining the needle puncture position.

Currently, liver lymphatic leakage is treated by the administration of a fat-free diet combined with intravenous nutrition to reduce lymph volume secreted from the liver and prevent exhaustion, in combination with lymphatic intervention or surgery [3,6]. Under the guidance of ultrasound and digital subtraction angiography, contrast injection can be used to

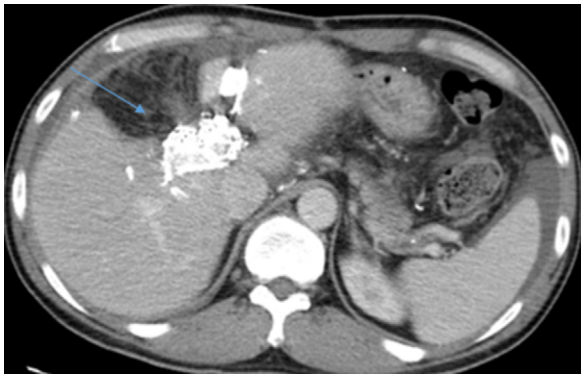

Fig. 4 – – Computed tomography image after 1 month showed embolic material deposited in the hilar hepatic lymphatic system (arrow).

determine the location of leakage into the peritoneal cavity, and these branches can be occluded using embolization material. The embolization materials that can be used include Histoacryl (n-butyl 2- cyanoacrylate) diluted with Lipiodol [1], lauromacrogol (Aetoxisclerol) [4], or OK-432 [2]. In our case report, we opted to use a Histoacryl/Lipiodol mixture at a 1:8 ratio because the lymphatic branches in the liver are very small. Computed tomography images after 1 month showed that the embolization material remained in place, indicating it's suitable for hepatic lymphatic embolization. We do not use other sclerosing agents because they do not immediately occlude the fistula, by contrast with Histoacryl, and other embolization materials are radiolucent, making their injection difficult to control. The available literature on hepatic lymphatic embolization primarily describes lymphatic leakage from a small branch. In our case, we conducted multiple interventions due to underlying cirrhosis, which results in a more diverse liver lymphatic system, leading to leakage from many branches.

Conclusion

Lymphorrhea after hepatectomy is a very rare entity, and diagnosis is based on the composition of the drainage fluid. Percutaneous intervention with lymphatic fistula embolization is a minimally invasive technique for effective lymphorrhea treatment.

Data availability statement

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Patient consent

Appropriate informed consent for patient information to be published in this article was obtained.

Authors' contributions

Le VD, Nguyen TB, and Nguyen MD contributed equally to this article as co-first authors. All authors read and approved final version of this manuscript.

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