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## Case Report

# Direct percutaneous embolization of intestinal lymphatic trunk for chylous ascites management following liver transplant

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## ABSTRACT

Chylous ascites can be caused by infection, trauma, malignancy, or maybe a complication after major abdominal surgery including liver transplantation. We present a case of a patient who developed chylous ascites following his liver transplantation. He was subsequently treated with direct embolization of lymphatic trunk efferent branches with a mixture of N-butyl cyanoacrylate and lipiodol after the identification of a localized leak on a fluoroscopic lymphangiogram. To our knowledge, this is the first reported case of chylous ascites following liver transplantation that was treated with direct embolization of intestinal lymphatic trunk branches.

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## Introduction

The leakage of triglyceride rich fluid within the peritoneum can lead to chylous ascites. This can be secondary to congenital abnormalities, infection, trauma, cancer, or as a postoperative complication of major abdominal surgery such as liver transplantation [1]. While malignancy and cirrhosis are the most common causes of chylous ascites in developed countries, infectious etiologies remain the leading cause in developing countries [2,3]. In some cases, chylous ascites occurs as a rare complication of liver transplantation with the highest reported rate of 4.7% in a single study [1]. The treatment of chylous ascites is dependent on the underlying

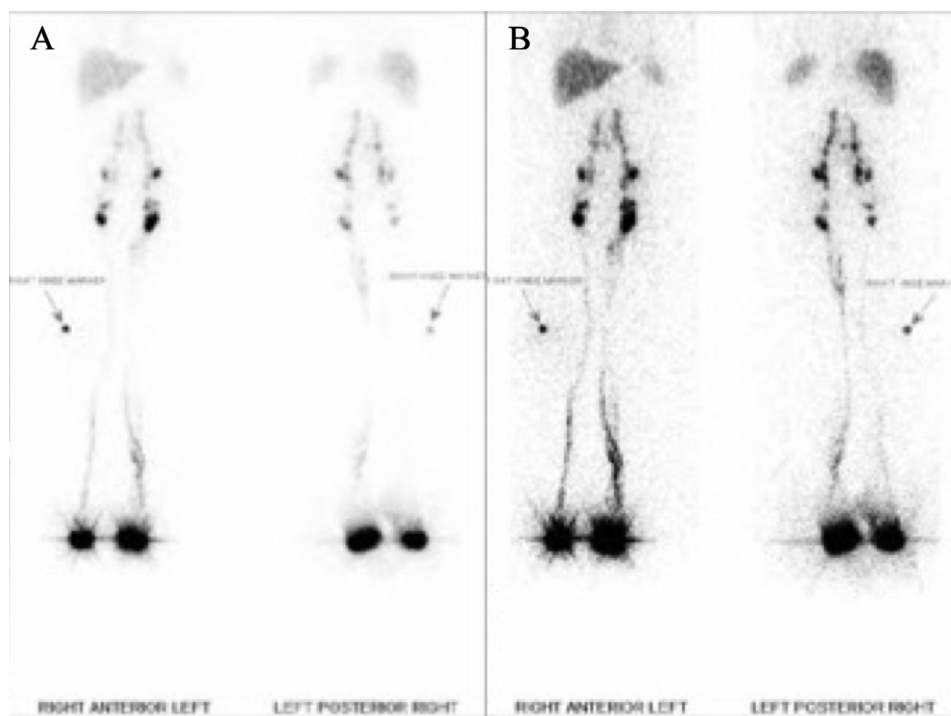
cause. Our report sheds light on chylous ascites secondary to a lymphatic leak following liver transplantation treated with direct embolization of the offending intestinal lymphatic vessels via direct percutaneous access into these vessels.

## Case report

A 51-year-old man with history of chronic kidney disease, nonalcoholic steatohepatitis cirrhosis, status postorthotopic liver transplant presented (on post-transplant day 51) with 2 days duration of stabbing abdominal pain, increased abdominal swelling, and nausea. Prior to his hospital admission, the patient had undergone 3 paracenteses with drainage of

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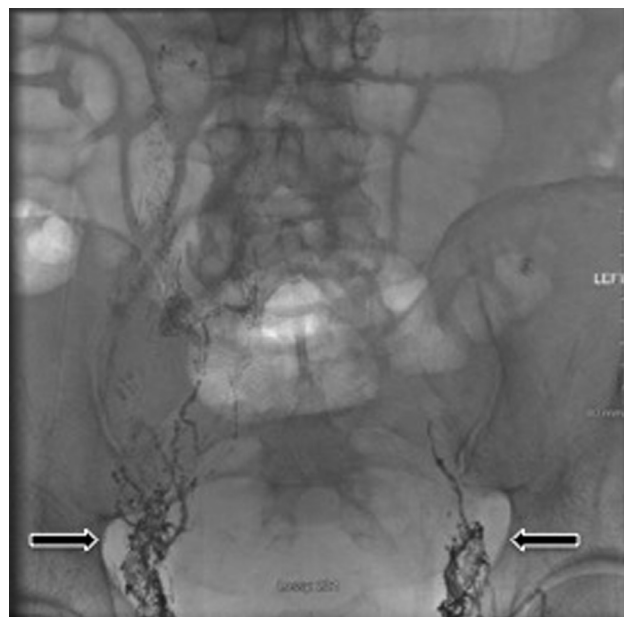
**Fig. 1 – Planar images of Tc-99m lymphoscintigraphy scan 6-hour delay (A) and 22-hour delay (B) demonstrating unremarkable physiologic uptake of radiotracer in the lymphatic system with normal dynamics. No lymphatic leak or obstruction was visualized.**

chylous fluid. The triglyceride content of fluid had decreased from 455mg/dL on the earliest paracentesis (on post-transplant day 21) to 228mg/dL (on post-transplant day 31) on the most recent one. There were 2 additional paracenteses that were performed after the patient was admitted to the hospital. The first paracentesis was performed with drainage of 1200 mL of chylous fluid that had a triglyceride level of 155 mg/dL (on hospital day 1). The patient was started on empiric valganciclovir and broad-spectrum antibiotics due to concern for opportunistic viral infection.

On hospital day 4, a second paracentesis was performed and it yielded 1500 mL of chylous fluid. Fluid cultures remained negative with no organisms identified. In addition, no leak or obstruction was identified on lymphoscintigraphy study that was performed on hospital day 6 (Fig. 1).

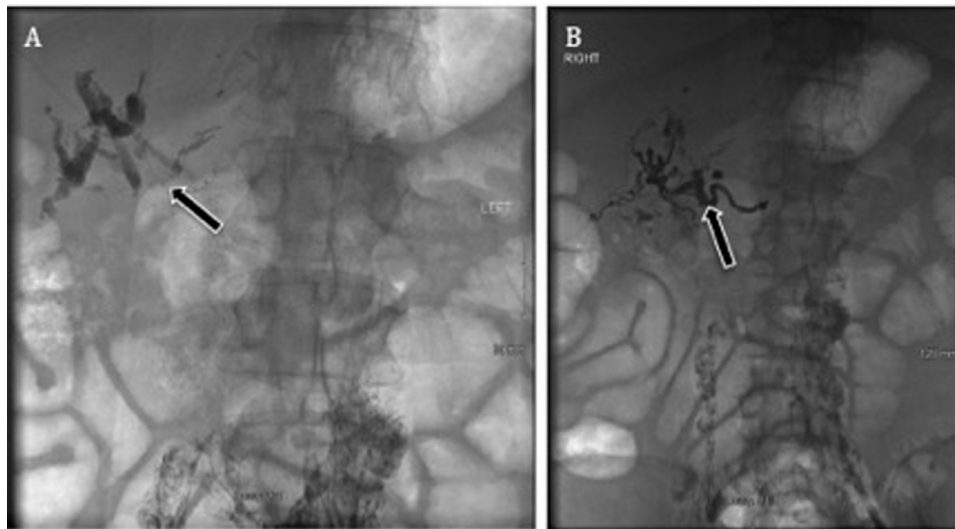
An ultrasound and fluoroscopy guided lymphangiogram of the abdomen and pelvis was performed to further evaluate the source of chylous ascites on hospital day 16. The procedure was performed using intranodal inguinal lymph node injection of lipiodol with 25 gauge needles under ultrasound guidance while monitoring the cephalad progression of contrast under fluoroscopy guidance (Fig. 2). Lymphangiography demonstrated filling of lymphatic ducts to the level of the superior endplate of L3 with nonvisualization of the cisterna chyli or the thoracic duct. Furthermore, a focus of contrast pooling was identified adjacent to a cluster of dilated vessels to the right side of T12-L1 level representing a lymphatic leak arising from the intestinal lymphatic trunk vessels (Fig. 3).

A 22-gauge Chiba needle was advanced into these dilated vessels and a 0.018' wire was advanced followed by a 2.7



**Fig. 2 – Fluoroscopic spot image demonstrating progression of inguinal intranodal lipiodol injection (black arrows).**

French microcatheter advanced over the wire (Fig. 4). N-butyl cyanoacrylate was instilled through the microcatheter (1:6 ratio with lipiodol) for embolization. We elected to proceed with the direct embolization of intestinal lymphatic trunk vessels,



**Fig. 3 – Fluoroscopic spot image demonstrating the lymphatic leak (A) and identification of the leaking lymphatic vessels (B).**



**Fig. 4 – Fluoroscopic spot image demonstrating catheterization (black arrow) of the leaking abdominal lymphatic vessels.**

as the thoracic duct and cisterna chyli could not be visualized. No lymphatico-venous anastomoses were identified during the procedure. An abdominopelvic CT was performed 2 days afterwards due to concerns for abdominal pain. These CT images (Fig. 5) demonstrate the embolized intestinal lymphatic vessels seen coursing alongside the right colonic wall. The patient was discharged on postembolization day 4 (hospital day 20).

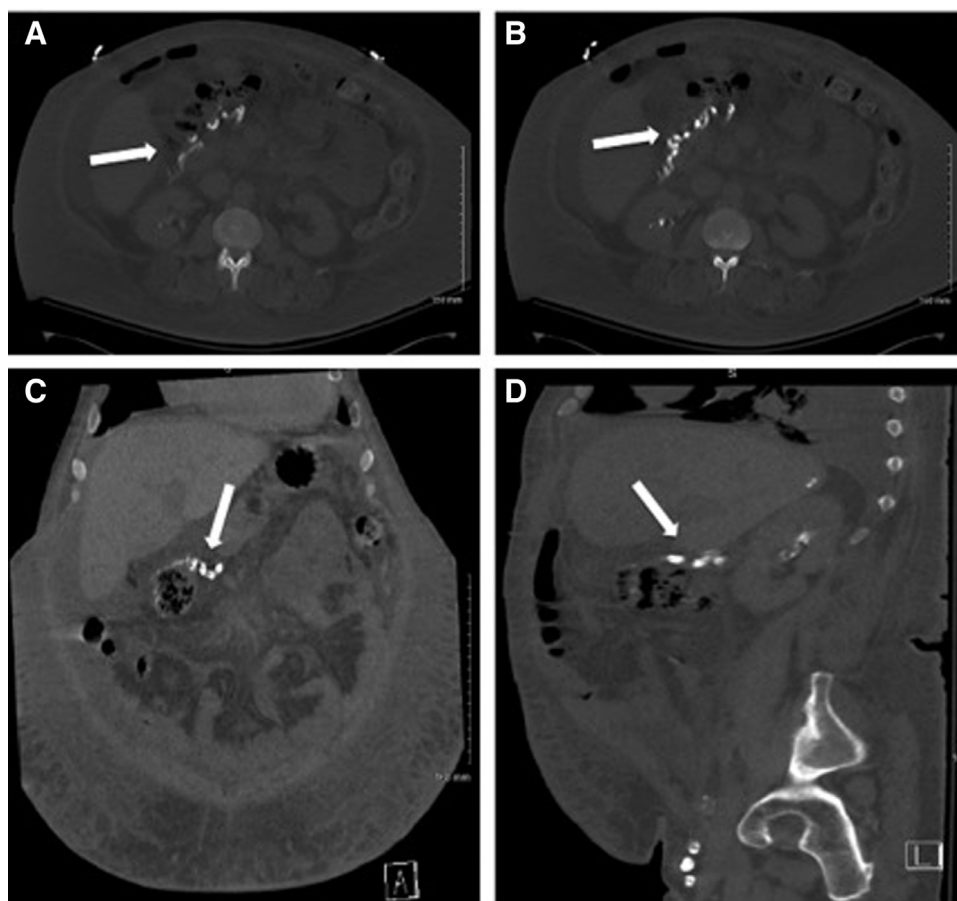
Our patient had complete resolution of his chylous ascites with no associated complication and no recurrence at a 1-year follow-up. The patient is currently pursuing renal transplant for chronic kidney disease.

## Discussion

Chylous ascites following liver transplantation is an unusual complication; with the highest reported rate of 4.7% in a single large study [1,4]. There are 2 primary mechanisms through which chylous ascites occurs postoperatively. The first mechanism arises through an increased production of lymphatic fluid caused by the underlying cirrhosis resulting in overflow of the fluid into the abdominal cavity. The second mechanism is due to improper drainage of the lymphatic fluid caused by inadvertent damage to the lymphatic ducts in the periportal and retrohepatic areas during surgical manipulation resulting in a frank lymphatic leak [1].

The diagnosis of chylous ascites is most commonly made following observation of milky intraperitoneal fluid with a leukocyte count of  $\geq 300$  cells/mm<sup>3</sup>—predominantly lymphocytes, cholesterol ratio  $< 1$ , triglyceride ratio  $> 1$  [1]. If a lymphatic leak is present, a lymphangiogram is considered the gold standard imaging technique to precisely identify the location of the leak [4]. Treatment is typically escalated from conservative management with dietary restrictions by implementing high protein, low fat diet to total parenteral nutrition. Other treatment options include therapeutic paracentesis and medical management with octreotide [5]. In addition, the creation of transjugular intrahepatic portosystemic shunts or peritoneal-venous shunts have also been successfully pursued [3]. If a leak is identified through a lymphangiogram, there is an additional benefit of percutaneous embolization of the leaking ducts via the same access [4]. The last resort is surgical treatment if the above-mentioned options fail [5].

There have been numerous reports of identification of a lymphatic leak through lipiodol lymphangiography followed by CT-guided lymphatic duct embolization using N-butyl cyanoacrylate-lipiodol mixture alone or in combination with metallic coils [6–8]. There is only 1 reported case of direct catheterization of leaking lymphatic vessels with subsequent



**Fig. 5 – Axial (A, B) and coronal (C, D) computed tomography images demonstrating the N-butyl cyanoacrylate glue and lipiodol mixture (white arrows) following embolization of the mesenteric lymphatic vessels along the right colon wall at multiple levels.**

embolization for chylous ascites [4]. Dinc et al identified a left lumbar trunk lymphatic leak via a standard intranodal lymph node inguinal injection lymphangiogram and initially performed a CT-guided percutaneous thoracic duct embolization and a left sided retroperitoneal drainage catheter was placed to manage the ongoing leak. However, given the lack of improvement, 20 days later they performed a direct embolization of the leaking lymphatic vessels via the drainage catheter access. The patient required a repeat embolization via the same access 3 months after the initial procedure with no recurrence of chylous ascites of up to 3 months follow-up. The patient expired 6 months after the initial procedure from chemotherapy related complications [4].

Similarly, in our patient, we performed direct embolization of the leaking lymphatic vessels. However, the embolization was successfully accomplished at the same time as the lymphangiogram under fluoroscopy guidance. Although the patient's lymphatic leak could not be identified on lymphoscintigraphy, the leak was evident during lymphangiography as an area of contrast extravasation adjacent to irregularly dilated lymphatic vessels to the right side of L3 level.

Typically, right and left lumbar lymphatic trunks alongside the intestinal lymphatic trunk receive lymph from various nodes throughout the abdomen/pelvis and drain into the cisterna chyli, which in turn drains into the thoracic duct. The

thoracic duct then empties into the venous system into the subclavian vein [2].

In our case, neither the cisterna chyli nor the thoracic duct was visualized, likely because the leak was caudal to the cisterna chyli, which is located around L1-L2 level. Thoracic duct embolization was not an option since it was not visualized under fluoroscopy, however, we do not believe it would have been successful nonetheless since the leakage of lymph is caudal to the cisterna chyli/thoracic duct and could potentially worsen the chylous ascites as seen in Dinc et al's report. This highlights the need for better understanding of lymphatic vessel anatomy and its drainage dynamics.

Thoracic duct embolization for lymphatic leakage in the abdomen may not always be the best option or may not be feasible at all. Direct embolization of intestinal lymphatic vessels visualized via standard percutaneous intranodal inguinal lymph node lymphangiography maybe a good option in the management of chylous ascites.

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