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Case Report

Thoracic duct stent treatment for chyle leak after nephrectomy ☆☆☆★

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ABSTRACT

Chyle leak is a rare and serious condition caused by damaged lymphatic vessels. It can occur after retroperitoneal surgery involving extensive lymphadenectomy for kidney cancer. Besides lymphatic channel damage, the obstruction of the thoracic duct worsens the leakage. Managing patients with thoracic duct obstruction and postsurgical chyle leakage is challenging due to limited data on how to handle this condition. In this case report, a 28-year-old female patient underwent left nephrectomy for left kidney cancer. Three days after the surgery, milky fluid drained from the left renal fossa. Conservative treatment failed, and further examination through magnetic resonance lymphangiography revealed the absence of the thoracic duct and contrast extravasation at the left renal fossa. Lymphangiography confirmed distal thoracic duct obstruction. The patient's condition was successfully managed by using thoracic duct stenting.

This report contributes to the understanding that thoracic duct obstruction can lead to lymphatic collateral circulation within the abdomen, thereby increasing the risk of postoperative chylous leak.

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Abbreviations: CL, Chyle leak; TD, thoracic duct; MRL, magnetic resonance lymphangiography; MTCs, medium-chain triglycerides.

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Introduction

Chyle leak (CL) is a potential complication of abdominal surgery associated with significant mortality. The diagnosis of CL is based on the presence of milky-colored fluid with a triglyceride content of ≥ 110 mg/dL (≥ 1.2 mmol/L) in the drain [1]. Although uncommon, thoracic duct (TD) obstruction can cause lymphatic flow disorders such as chylothorax and chylous ascites, resulting from trauma or non-trauma causes [2–5]. Most cases can be managed conservatively, but some require more intensive treatment such as surgery or lymphatic embolization, depending on the location and type of lymphatic lesion and the physician's experience. Here, we present a case of chyle leak following nephrectomy for left renal carcinoma, which was successfully treated with thoracic duct stenting.

Case report

A 28-year-old female patient was diagnosed with stage 2 left kidney cancer. She was undergone a left nephrectomy. On the third day after surgery, milky fluid started coming out from the drain of left renal fossa with an amount of 300–500 mL per day. The fluid then was found to be chylous fluid. She was treated conservatively with parenteral nutrition and somatostatin infusion, but the output did not decrease. After 20 days of unsuccessful conservative treatment, the patient was referred to our hospital for intervention treatment to occlude the chyle leakage. Her magnetic resonance lymphangiography (MRL) showed no thoracic duct imaging but revealed extravasation of contrast at the left renal fossa (Fig. 1).

During intranodal lymphangiography, the contrast agent flowed very slowly. After 60 minutes, only the cisterna chyli at the level of the vertebrae L2 was visible, and there was no flow into the thoracic duct. Extravasation of contrast was noted in the left renal fossa, but the lymphatic vessel leading to it was not clearly visible (Fig. 2A). Based on these findings, we concluded that the patient had occlusion of thoracic duct or

TD was absent leading to collateral retroperitoneal lymphatic vessels in the lumbar region. We hypothesized that the left nephrectomy procedure may have caused damage to these lymphatic vessels, resulting in the chyle leak.

We then decided to puncture the cisterna chyli to investigate the thoracic duct and retroperitoneal lymphatic vessels. A 21-gauge needle (Chiba, Cook, USA) was punctured into the cisternal chyli, and a 0.014" guidewire (Trancend 300, Boston, USUSA) was smoothly passed up the thoracic duct. Through the guidewire, a 1.7-french microcatheter (Tokai, Camelian Japan) was inserted. After contrast injection through the microcatheter, the proximal end of the TD was dilated without flow of contrast into the subclavian vein (Fig. 2B). The guidewire was then passed into the left subclavian vein through the obstruction, and the junction of the thoracic duct and the subclavian vein was dilated and then stented using a technique described in the literature [6]. A drug-eluting coronary bare stent with a size of 3 mm x 15 mm was used in this patient (Fig. 3).

After the intervention, the patient was allowed to eat a normal diet with medium-chain triglycerides (MCTs), and the drainage output was decreased by 100 ml/24 hours. By the third day after the intervention, there was no additional drainage. The patient's drain was removed on the fifth day after the intervention.

Discussion

Chyle leak can be caused by liver cirrhosis, trauma, surgical injury to the lymphatic channels, and congenital lymphatic abnormalities [7]. The incidence of chylous ascites after laparoscopic nephrectomy ranges from 0.6% to 5.9%, and is more common after wide dissection and extensive lymphadenectomy in radical nephrectomy [7]. Patients with thoracic duct obstruction may have plentiful secondary lymphatic channels branching in the lumbar regions and thoracic. Therefore, there is a higher risk of injury to these channels after retroperitoneal surgery, especially nephrectomy.

Thoracic duct obstruction may result of trauma or non-trauma. There are numerous cases reported in the literature

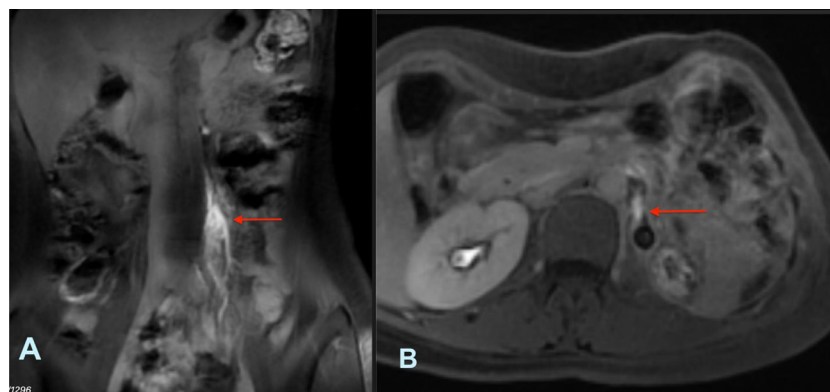


Fig. 1 – MR lymphangiography with injection of contrast into the inguinal lymph nodes. (A) Contrast stopped at the lumbar as dilated interstitial lymphatic vessels (arrow) with no visualization of thoracic duct. (B) Extravasation of contrast material at the left renal fossa (arrow).

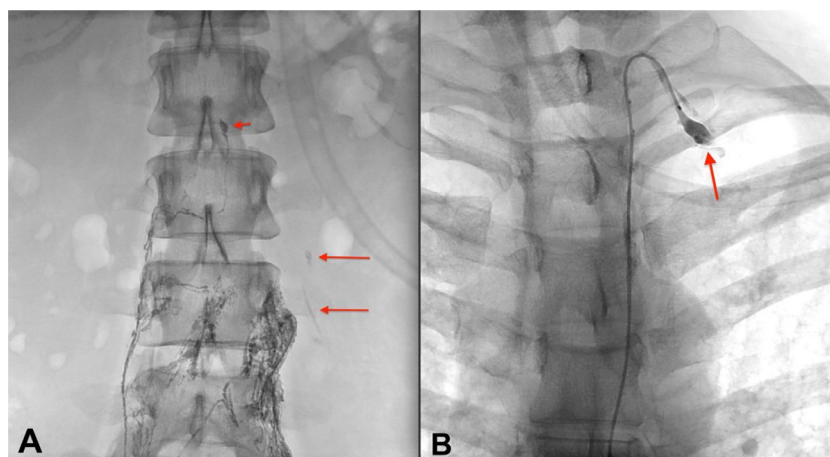


Fig. 2 – Intranodal lymphangiography. (A) Contrast material opacified the lymphatic vessel at the lumbar and no more flow forward. The cisterna chyli (short arrow) and extravasation of contrast (long arrows) at the left renal fossa but no visualization of abnormal lymphatic vessel. (B) Thoracic ductography showed dilated at the terminal part and occlusion of TD (arrow).

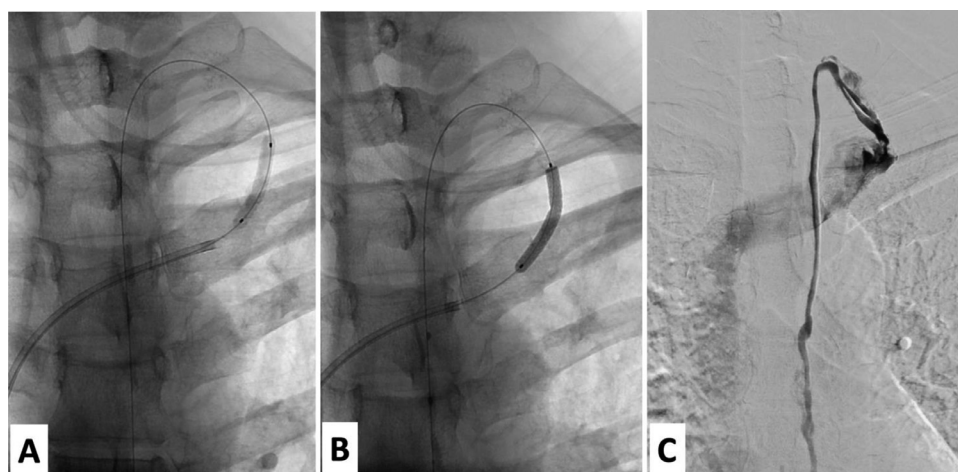


Fig. 3 – Thoracic duct plasty. Thoracic duct subclavian vein junction was inflated by balloon (A); placed by balloon expanding stent (B) and was controlled by thoracic ductography (C).

about thoracic duct injury are following blunt force trauma, penetrating trauma, or fractures [4]. Obstruction was secondary to extrinsic compression, ligation, or fibrosis of the right thoracic duct [3,5]. The most common site of obstruction was at the lympho-venous junction [5]. In our case, the cause of obstruction is unknown, however, patient had renal cancer, so we must rule out of metastasis. On neck ultrasound, the duct outlet wall was smooth, and there was no abnormal cervical lymph node.

Patients with thoracic duct obstruction may be managed nonoperative management such as conservative treatment, interventions with balloon dilation, massive lymphatic malformation drainage the sclerotherapy, stenting [5,6]. Lympho-venous anastomosis is an alternative when conservative managements fail [8]. Thoracic duct stenting to solve the obstruction the outlet of TD has been described in few re-

ports [6,9]. In these report, vascular bare stents with diameters ranging from 2.5 mm to 8 mm were used and placed at the lympho-venous junction. After 6 months to 1-year follow-up, the symptoms completely resolved without any recurrence. Additionally, besides using vascular bare stents, stent-graft was employed in patients who had idiopathic chylothorax and stenosis at the terminal of TD [10,11].

This report describes the placement of a stent within the thoracic duct in a single patient to resolve the obstruction. Additionally, chyle leak resulting from lymphatic channel disruption at the left renal fossa improved spontaneously without the need for further treatment. The procedure had no minor or major complications. Short-term follow-up shows initial effectiveness, but long-term follow-up is necessary to assess patency of the TD stent.

Conclusion

The placement of a thoracic duct stent can be a minimally invasive and effective intervention to improve chyle leak caused by lymphatic branch rupture in patients with thoracic duct obstruction. However, further studies are required to determine the long-term efficacy of this procedure.

Author contributions

NNC engaged in treatment, created the initial draft and contributed to editing and submitting the revised manuscript. LTL, DTL performed the procedure and edited the revised manuscript. TTTM, TQH obtained the images and edited the revised manuscript; contributed to the content of the discussion. HL, LH, NH and NCH provided edits and improvements to the revised manuscript. All authors read and approved the final manuscript.

Availability of data and materials

The data used the study are available from corresponding author on request.

Ethics approval and consent to participate

Not applicable.

Patient consent

Patient was informed that her documents (without personal information) including diagnosis and treatment information might be published for science purpose. She agreed and signed in the consent form.

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