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Case Report

Successful treatment of chylous ascites by superselective embolization of the inflowing lymphatic vessels using a steerable microcatheter: a case study☆

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ABSTRACT

Background: Chylous ascites resulting from postoperative lymphatic leaks are uncommon but difficult to treat in cases with unsuccessful conservative treatment.

Case report: We report the case of an 80-year-old woman who had previously undergone multiple procedures for peritoneal dissemination 3.5 months after a laparoscopic bilateral salpingo-oophorectomy for ovarian cancer. After hospital discharge, she gradually gained weight, and examination findings indicated lymphatic leakage. We performed drainage using an 8.5-French Dawson–Mueller catheter, but more aggressive treatment was deemed necessary. We determined that it would be difficult to fill the large space, in which the leaking lymph fluid was accumulating, with embolic materials. Therefore, we performed superselective embolization of these inflowing lymphatic vessels to allow control of the chylous ascites. To overcome the technical difficulty associated with the insertion of a microcatheter from a large leakage cavity into a small inflow lymphatic vessel, we adopted a triple coaxial system that utilizes a steerable microcatheter. Successful embolization resulted in marked decrease in drainage. Follow-up computed tomography revealed no evidence of reaccumulation of chylous ascites. A three-month follow-up revealed no recurrence of lymphatic leakage.

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Conclusions: To our knowledge, this is the first report on the treatment of large retropenitoneal chylous leakage by superselective embolization of the inflowing lymphatic vessels using steerable microcatheters. This method allows large lymphatic leaks to be treated with only a small amount of N-butyl 2-cyanoacrylate mixture and without the use of coils, and we firmly believe that it should be considered for the treatment of large refractory chylous ascites.

Introduction

Lymphatic leaks that occur after surgical procedures can cause many complications, including lymphocele, chylous thorax, and chylous ascites. Chylous ascites is uncommon but difficult to treat in cases with unsuccessful conservative treatment, which has been reported to occur in 0.3%-11% of cases after abdominal or pelvic surgery [1].

The first treatment attempts for chylous leakage are conservative therapies, such as diet, but more aggressive interventions are needed in refractory cases. In recent years, lymphangiography and thoracic duct embolization have become the primary treatment for chylous thorax [2]. Nonetheless, lymphangiography with respect to chylous ascites often fails to diagnose and treat the disease due to its anatomy [3].

Recently, the percutaneous puncture of chylous ascites and direct embolization with the insertion of a catheter have been reported [4,5]. Notably, it is technically challenging to insert a catheter into thin lymphatic vessels, via the wide space of the lymphatic leak.

We report a case of successfully treating refractory chylous ascites with percutaneous drainage, followed by selective embolization of the inflowing lymphatic vessels by adopting a steerable triaxial system.

Case report

Written consent for publication of this report was obtained from the patient.

An 80-year-old woman underwent abdominal total hysterectomy and omentectomy, pelvic lymphadenectomy and para-aortic lymphadenectomy for peritoneal dissemination 3.5 months after a laparoscopic bilateral salpingo-oophorectomy, for ovarian cancer. After discharge from the hospital, the patient gradually gained weight, and an examination revealed a large fluid collection in extensive contact with the aorta and iliac arteries, suggestive of lymphatic leakage from the injured lymphatic vessels (Fig. 1).

Consent forms for each of the procedures were obtained and the following interventions were performed. For drainage, an 8.5-French Dawson–Mueller catheter was inserted percutaneously via the iliopsoas muscle into the fluid, with CT guidance in the prone position, resulting in sustained chylous drainage of 2000-3000 mL per day. Since the effects of conservative therapy, mainly nutritional therapy, were insufficient, and the patient was unable to resume eating for more than 3 weeks, more aggressive treatment was deemed necessary.

Bilateral intranodal lymphangiography was unsuccessful in detecting leaks, depicting only a network of thin lymphatic vessels in the pelvis.

Contrast media injected through the inserted drainage tube revealed lymphatic vessels flowing into the leakage cavity. Therefore, it was determined that superselective embolization of these inflowing lymphatic vessels would allow control of the chylous ascites. The drainage tube was replaced with a 6-French sheath, and a 4-French catheter with a 40° hooked shape (Medikit; Tokyo, Japan) was inserted into its lumen. Inserting a microcatheter from a large leakage cavity into a small inflow lymphatic vessel was technically difficult, but we succeeded by adopting a triple coaxial system that utilizes a steerable microcatheter. The method involves inserting the tip of a 2.9-French steerable microcatheter (LEONIS Mova; Sumitomo Bakelite, Tokyo, Japan) inside the 4-French catheter, adjusting its tip shape to position its tip near the orifice of the inflow lymphatic vessel, and then inserting a 1.9-French microcatheter (Carnelian Marvel; Tokai Medical Products) into the target lymphatic vessel under 0.014-inch guidewire (CHIKAI; Asahi Intec, Aichi, Japan) guidance.

We successfully injected 33% N-butyl 2-cyanoacrylate (NBCA) diluted with lipiodol to embolize the largest inflowing lymphatic vessel (Fig. 2). After embolization, drainage decreased markedly but continued to be around 50 mL per day, so the decision was made to perform additional embolization of the other inflow lymphatic vessel, as an adjunctive procedure. The other, smaller lymphatic vessel had a severely narrowed orifice and a microcatheter could not be inserted. Thus, 1.2 mL of 50% NBCA mixture was injected into the leakage space, with the intention of attaching it to the orifice of the inflowing lymphatic vessel (Fig. 3). After the second embolization, drainage decreased further and follow-up CT with the drainage tube clamped showed no evidence of reaccumulation of chylous ascites. The drainage tube was removed. A CT examination at 3 months follow-up did not show any recurrence of lymphatic leakage (Fig. 4).

Discussion

Several techniques have been proposed to intervene in the treatment of chylous leakage refractory to conservative treatment.

Lipiodol lymphangiography has traditionally been performed for diagnostic purposes, but it is also expected to

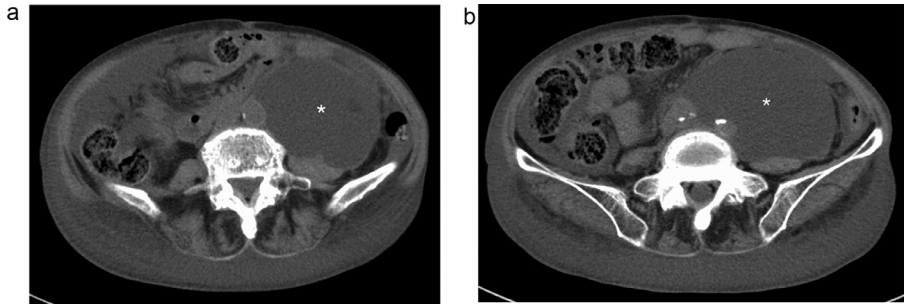

Fig. 1 – CT examination revealed large amount of fluid in extensive contact with the aorta in the retropenitoneal space (asterisk).

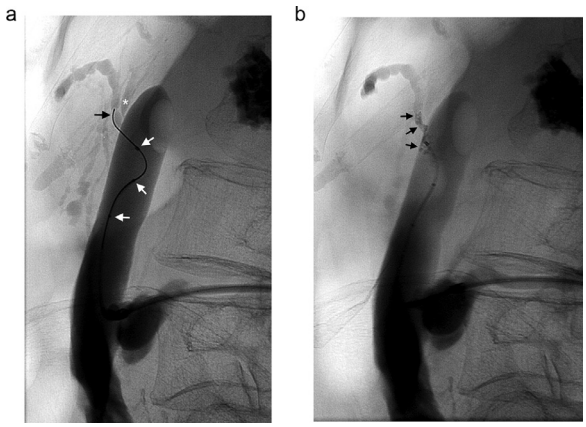

Fig. 2 – Fluoroscopic images. (a) A guidewire was inserted from a steerable microcatheter (white arrows) directed toward the orifice of the largest inflow lymphatic vessel, and the lymphatic vessel was successfully selected (black arrow). A small inflow lymphatic vessel with very narrow orifices is also depicted (asterisk). (b) A small amount of 33% NBCA mixture was injected into the largest inflow lymphatic vessel from the proximal portion to the orifice (arrows), and the 1.9-French microcatheter used for the injection had already been removed.

Fig. 3 – Fluoroscopic image. NBCA mixture (50%) was injected so that it was preferentially distributed on the walls near the orifices of the inflow lymph vessels (arrows).

have an embolic effect, due to the viscous nature of lipiodol and an obstructive effect on lymphatic vessels, due to its inflammation-inducing effect. Recently, intranodal lymphangiography techniques have been developed and applied in the management of various types of lymphatic leaks [6,7]. Nonetheless, for chylous ascites, leaks are often undetectable by lymphangiography. This is because the intestinal lymphatics that cause the chylous leakage have a different flow pathway than the lymphatic flow from the lower extremities [3]. In addition, our present case had undergone extensive pelvic lymph node dissection during surgery for ovarian cancer. Those factors led to unsuccessful detection and treatment of the leak by intranodal lymphangiography. Lymphangiography could only depict a thin lymphatic network in the pelvis, suggesting that embolization therapy approaching from the lymphatic vessels or lymph nodes was not indicated.

Therefore, we had to adopt a treatment method that utilized the route of a percutaneously inserted drainage catheter.

Fig. 4 – CT examination obtained 3 months after the treatment showed only small hyperdense structures, due to the NBCA mixture in the area where the lymphatic leak was consonant (arrow), with no evidence of a reservoir suggesting recurrence of the lymphatic leak.

Although embolization of the leaked lymph cavity itself with NBCA or coils has been reported [3,5], the original leak cavity in this case was too large to be filled with embolic material. Fortunately, we were able to visualize the lymphatic vessels entering the lymphatic leak by contrast from the drainage catheter, so we adopted a method of superselective embolization of the lymphatic vessels. It was technically challenging to access the small vessels through the large space, but the treatment was successfully achieved by using a steerable microcatheter. The steerable microcatheter is a recently developed device that allows the tip shape to be changed to the desired angle by steering a dial in the handgrip and has been reported to be more useful than conventional pre-shaped catheters in various situations where cannulation is difficult [8,9].

Although it was not possible to embolize all the inflow lymphatic vessels, embolization of the largest inflow lymphatic vessel dramatically reduced the amount of chylous ascites draining through the drainage catheter.

Due to their characteristics as embolizing substances, coils cannot completely fill the space. Therefore, unlike blood, spontaneous coagulation by coil embolization may not be expected because lymphatic fluid does not have a self-coagulation function. In this regard, NBCA, which can fill the space lumen, is a suitable embolic material for embolization of lymphatic leaks. Notably, the chylous leakage in this case was too large to fill the entire area with NBCA. Although the benefit of treatment with sclerotherapy for refractory lymphatic leakage has been reported [10], chylous leakage in current case was widely adjacent to the abdominal aorta and iliac arteries, which made us hesitant regarding sclerotherapy because of the potential for injury to the vessel wall.

The superselective embolization we applied in this study allows large lymphatic leaks to be treated with only a small amount of NBCA mixture and without the use of coils. The use of a steerable microcatheter made this treatment possible. To our knowledge, there are no reports on the treatment of large retropenitoneal chylous leakage by superselective embolization of the inflowing lymphatic vessels using steerable microcatheters. We believe it is worthwhile to consider the treatment method we used in this study for the treatment of large refractory chylous ascites.

It should be considered as a limitation that this method cannot be applicable if the inflow lymphatic vessels cannot be visualized by injecting contrast media from the inserted drainage tube.

Patient consent statement

We have obtained and kept a written consent for publication of this case report from the patient.

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