Lymphaticovenous anastomosis (LVA) is designed to reestablish lymph drainage from the interstitial spaces to the venous circulation, anastomosing a lymphatic duct with a subdermal vein. LVA is recognized as a surgical technique that is important for the treatment of lymphedema. It is performed mainly for lymphedema of the lower extremities after surgical treatment of gynecologic cancer and lymphedema of the upper extremities after surgical resection of breast cancer; however, LVA for lymphedema due to malignant lymphoma has not been reported to date. We herein present a patient with severe lymphedema of the lower extremities due to refractory malignant lymphoma, which markedly improved with LVA. LVA could contribute to improve quality of life in patients with end-stage disease with lymphedema of the lower extremities due to refractory malignant lymphoma.

We performed indocyanine green (ICG) lymphography; in short, we injected 0.2 mL of ICG (0.5% Diagnogreen; Daiichi Pharmaceutical, Tokyo, Japan) subcutaneously into each interdigital space of the feet and visualized it with an infrared camera system (Photodynamic Eye; Hamamatsu Photonics, Hamamatsu, Japan). We observed dermal backflow with a widespread stardust pattern in the lower legs and in the lymphatic duct of the dorsal foot with a linear pattern. Additionally, we confirmed the patency of the bilateral great saphenous veins by ultrasound examination.

Bilateral LVA was performed under local anesthesia. We chose the incision sites according to the findings of ICG lymphography and ultrasound examination; these included a site 10 cm distal to the inguinal lymph node swelling and a site near the great saphenous vein to attempt to obtain a vein for anastomosis. On the left side, 2 lymphatic ducts above the superficial fascia (diameter, 0.5 and 0.5 mm) and a large lymphatic duct under the superficial fascia (diameter, 1.2 mm) were identified. A subcutaneous vein was identified under the superficial fascia, which was a branch of the great saphenous vein (diameter, 2.2 mm). Then, we anastomosed a large lymphatic duct under the superficial fascia with a

**CASE PRESENTATION**

A 74-year-old man was diagnosed with diffuse large B-cell lymphoma in September 2008 and received chemotherapy and radiotherapy. He achieved remission; however, his lymphoma recurred in the pelvic and inguinal regions in February 2011, surrounding the external iliac vessels, and did not respond to chemotherapy. From September 2012, he had difficulty walking, could not maintain a standing position for a prolonged time, and developed phlegmon several times due to severe lymphedema of the lower extremities (Fig. 1). His lymphedema was classified as International Society of Lymphology stage II. His physician, the director of the department of hematology, reported that his life expectancy would be longer than 6 months, and therefore, treatment of his lymphedema would be indicated if the patient desired such therapy.

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On the left side, 2 lymphatic ducts above the superficial fascia (diameter, 0.5 and 0.5 mm) and a large lymphatic duct under the superficial fascia (diameter, 1.2 mm) were identified. A subcutaneous vein was identified under the superficial fascia, which was a branch of the great saphenous vein (diameter, 2.2 mm). Then, we anastomosed a large lymphatic duct under the superficial fascia with a
branch of the great saphenous vein in an end-to-end fashion using 10-0 nylon (Fig. 2). Patency after anastomosis was good. On the right side, 2 lymphatic ducts were identified, both above the superficial fascia (diameter, 0.5 and 0.6 mm). A subcutaneous vein was not identified; therefore, we anastomosed the 2 lymphatic ducts above the superficial fascia with the great saphenous vein in an end-to-side fashion using 11-0 nylon. Patency after anastomosis was good.

The circumference of the bilateral lower extremities decreased markedly beginning early after the operation, and the patient’s activities of daily living improved (Fig. 3). Five months postoperatively, the circumference measured 10 cm distal to the knee increased 3 cm on the right side and 3.5 cm on the left side compared with that 1 month postoperatively, and the circumference measurement at the dorsal foot increased 1.5 cm on the right side and 1.5 cm on the left side compared with 1 month postoperatively. However, his lymphedema remained mild. He wore an elastic stocking when possible and had no phlegmon after the operation. He died 8 months postoperatively.
DISCUSSION

Lymphoma is a malignant disease of neoplastic lymphocytes resulting in multiple tumors, and treatment and prognosis vary according to the type of lymphoma. Diffuse large B-cell lymphoma, as in our case, accounts for 30–40% of all lymphoma cases and represents an intermediate-grade malignancy. The standard treatment for diffuse large B-cell lymphoma is R-CHOP therapy, which includes antibody therapy (rituximab) and chemotherapy (cyclophosphamide, doxorubicin, vincristine, prednisolone). Lymphedema associated with malignant lymphoma was identified with 11 cases reported in the literature; however, no case reporting LVA for lymphedema due to malignant lymphoma has been reported to date. When inguinal lymph node swelling is progressive, the lymphatic ducts distal to the swelling become occluded; thereafter, lymphedema in the lower extremities may occur. Our case demonstrates that lymphedema markedly improved with anastomosis of dilated lymphatic ducts to a patent vein.

The primary treatments for malignant lymphoma are antibody therapy, chemotherapy, and radiotherapy; therefore, patients with lymphedema of the lower extremities due to enlarged inguinal lymph nodes, pelvic lymph nodes, and external iliac lymph nodes do not routinely receive any treatment or have refractory swelling lesions. They can develop difficulty walking and phlegmon several times, resulting in poor quality of life with advanced stages of lower extremity lymphedema; however, no case of LVA for improvement in quality of life in end-stage disease has been reported. In our case, LVA for lymphedema of the lower extremities due to refractory malignant lymphoma was useful for improving the patient’s quality of life during end-stage disease.

In our case, we do not suspect that lymphedema was present for a prolonged period of time before treatment; therefore, degeneration of the lymphatic ducts and increases in collagenous fibers were not found, and LVA was effective. Our report represents findings obtained from 1 patient; therefore, accumulation of data from similar cases is needed. LVA is a less invasive surgery with the use of local anesthesia, and we suppose that it may be performed early for patients with lymphedema of the lower extremities due to refractory malignant lymphoma for the purpose of improving their quality of life during end-stage disease.

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