

# Therapeutic Lymphangiography and CT-guided Sclerotherapy for the Treatment of Refractory Lymphatic Leakage

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## ABSTRACT

**Purpose:** To evaluate therapeutic lymphangiography and computed tomography (CT)-guided sclerotherapy for the treatment of refractory inguinal, pelvic, abdominal, and thoracic lymphatic leakage.

**Materials and Methods:** Between January 2008 and April 2011, 18 patients with refractory lymphatic leakage were treated with therapeutic lymphangiography. Additionally, 10 of these 18 patients underwent CT-guided sclerotherapy with injection of ethanol at the site of the leakage. In the delayed sclerotherapy group (n = 5), the sclerotherapy procedure was performed when the leak persisted after therapeutic lymphangiography. In the immediate sclerotherapy group (n = 5), sclerotherapy was performed on the same day as lymphangiography. The sites of the lymphatic leakage were as follows: inguinal leakage in 8 patients, pelvic leakage in 4 patients, abdominal leakage in 2 patients, and thoracic leakage in 4 patients. Data collected included technical success, clinical success, and procedural complications.

**Results:** Lymphangiography was technically successful in all patients. In eight patients undergoing therapeutic lymphangiography alone, the clinical success rate was 75%, and the drainage catheter could be removed in six patients after the treatment. Lymphangiography followed by immediate sclerotherapy was clinically successful in four of five patients. Lymphangiography combined with delayed sclerotherapy was clinically successful in three of five patients. Overall, the clinical success rate was 72% (13 of 18 patients). One minor complication occurred.

**Conclusions:** Therapeutic lymphangiography alone or in combination with CT-guided sclerotherapy is a promising treatment option for the management of refractory lymphatic leakage.

Lymphatic leakage is a rare but severe complication that can occur after various surgical procedures, such as pancreaticoduodenectomy, abdominothoracic esophagectomy, inguinal lymph node resection, and renal transplant (1). Additionally, lymphatic leakage can result from trauma or lymphoma. Regardless of the underlying cause, lymphatic leakage can induce local complications, such as infections or delayed wound healing, or cause severe malnutrition in patients with chylous ascites or

chylothorax (1). Initial therapy is usually conservative with drainage of the lymphatic fluid and parenteral nutrition. In patients with lymphocele, further therapeutic options include sclerotherapy with injection of a sclerosing agent (eg, doxycycline or ethanol) through a drainage catheter into the lymphocele (2). If these treatments fail, reoperation is another option, but it might be associated with significant morbidity (1). It is difficult to identify the exact leakage site during surgery.

Lymphangiography with pedal injection of the oily contrast agent Ethiodol is a well-known radiologic method for the diagnosis of lymphatic diseases, but it has been widely replaced by modern cross-sectional imaging (3). In addition to its application to diagnostic imaging, lymphangiography is a therapeutic option in patients with lymphatic leakage (3). After lymphangiography, closure of the lymphatic leakage has been reported in 51%–55% of patients (3,4). At our hospital, therapeutic lymphangiography was performed in patients with refractory lymphatic leakage. As an additional treatment option, a puncture

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needle was placed close to the leaking lymphatic vessels, and the sclerosing agent ethanol was injected under computed tomography (CT) guidance. The purpose of our study was to evaluate therapeutic lymphangiography and CT-guided sclerotherapy for the treatment of lymphatic leakage.

## MATERIALS AND METHODS

### Patients

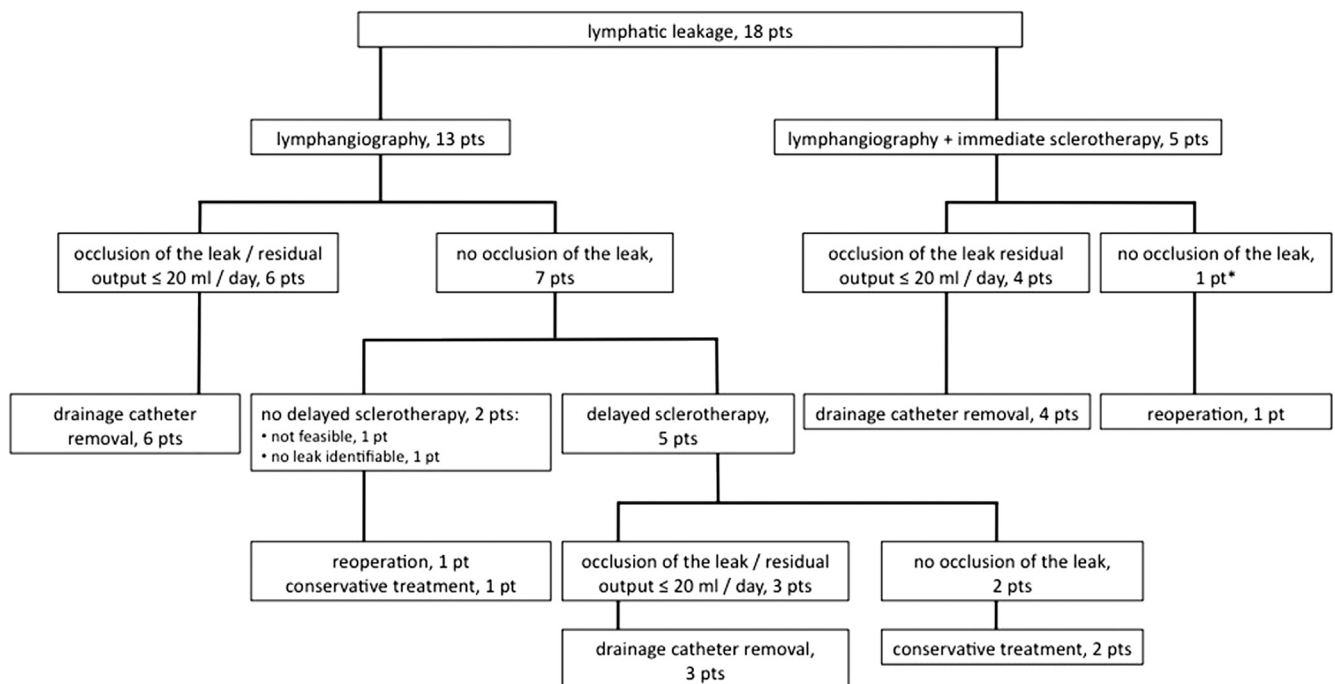
The radiologic database was reviewed to identify patients who underwent therapeutic lymphangiography and, if indicated, additional CT-guided sclerotherapy for the treatment of refractory lymphatic leakage. Institutional review board approval for the conduction of a retrospective study was obtained.

Between January 2008 and April 2011, 18 patients (9 women and 9 men, age  $61 \text{ y} \pm 10$  [range, 39–78 y]) underwent therapeutic lymphangiography for the treatment of refractory lymphatic leakage. Additional CT-guided sclerotherapy was performed in 10 of these patients. Of 18 patients, 8 patients underwent therapeutic lymphangiography alone, 5 patients underwent lymphangiography and immediate CT-guided sclerotherapy, and another 5 patients underwent lymphangiography and delayed CT-guided sclerotherapy (Fig 1). In all patients, conservative treatment, including diet modification, parenteral nutrition, and drainage therapy, had failed. Four patients (22%) had previously undergone reoperation in an attempt to seal the lymphatic leakage, and one patient (6%) had undergone radiotherapy.

In 16 patients (89%), the lymphatic leakage occurred after surgery, and the mean interval between surgery and radiologic treatment was 39 days (range, 9–116 d). The most common surgical procedure was an inguinal lymph node resection (in eight patients) followed by renal transplant (in three patients). Further causes for post-operative lymphatic leakage were liver transplant ( $n = 1$ ), pelvic tumor resection ( $n = 1$ ), esophagectomy ( $n = 1$ ), pericardial biopsy and pericardial fenestration ( $n = 1$ ), and pancreaticoduodenectomy ( $n = 1$ ). In one patient, the lymphatic leakage was caused by trauma. In another patient, the leakage was associated with non-Hodgkin lymphoma. Among 18 patients, 8 patients (44%) had inguinal lymphoceles, 4 patients (22%) had pelvic lymphoceles, 2 patients (11%) had abdominal lymphatic leakage, and 4 patients (22%) had thoracic lymphatic leakage.

### Therapeutic Lymphangiography

Informed consent was obtained from all patients. The technique of lymphangiography has been previously described (5). All patients underwent therapeutic lymphangiography as an inpatient procedure. In patients with abdominal or thoracic lymphatic leakage, either the right or the left foot was used for the preparation of the lymphatic vessel and the injection of Ethiodol (Guerbet LLC, Bloomington, Indiana). In patients with inguinal or pelvic lymphatic leakage, the foot ipsilateral to the site of the leakage was used. Approximately 1 mL of a 1:3 mixture of methylene blue dye and local anesthetic was injected into the interdigital spaces of the foot to delineate



\* sclerotherapy with limited volume of ethanol

**Figure 1.** Overview of treatments. The drainage catheter was removed if the leakage completely resolved or if the residual output volume was  $\leq 20$  mL/day.

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