Early Experience in the Management of Postoperative Lymphatic Leakage Using Lipiodol Lymphangiography and Adjunctive Glue Embolization

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ABSTRACT

Purpose: To evaluate the safety and efficacy of Lipiodol lymphangiography and 3 adjunctive *N*-butyl cyanoacrylate (NBCA) glue embolization techniques for the management of postoperative lymphatic leakage.

Materials and Methods: This retrospective study included 27 patients with postoperative lymphatic leakage (17 with ascites, 3 with chylothorax, 6 with lymphoceles, and 1 with a skin fistula) who underwent Lipiodol lymphangiography for diagnostic and therapeutic purposes in 3 tertiary referral centers between August 2010 and January 2016. Adjunctive glue embolization was performed as needed by using 3 different techniques: "lymphopseudoaneurysm" embolization, closest upstream lymph node embolization, or direct upstream lymphatic vessel embolization.

Results: Sixteen patients were observed to determine the therapeutic effect of lymphangiography, and 8 patients (50%) recovered without further embolization. In 16 patients, including 11 who underwent immediate embolization after lymphangiography and 5 who underwent delayed embolization, a total of 28 embolizations (12 lymphopseudoaneurysms, 14 lymph nodes, and 2 lymphatic vessels) were performed. The technical and clinical success rates of the adjunctive embolizations were 89% (25 of 28) and 94% (15 of 16), respectively. The overall clinical success rate was 85% (23 of 27). The median time from initial lymphangiography to recovery was 5 days. No procedure-related major complications were reported.

Conclusions: Lipiodol lymphangiography and adjunctive glue embolization techniques appear safe and provide promising efficacy for the management of postoperative lymphatic leakage.

ABBREVIATIONS

D5W = dextrose 5% in water, NBCA = *N*-butyl cyanoacrylate

Postoperative lymphatic leakage can manifest in various forms, from clear lymphoceles to chylous ascites or chylothorax (1). The common initial event is the inadvertent transection of lymphatic vessels during the original surgery, even though the reason is unclear why it persists with clinical symptoms in some patients but spontaneously resolves without the development of symptoms in the majority of patients (2).

The standard treatment of choice is conservative treatment, which consists of percutaneous catheter drainage and parenteral nutrition to decrease the production of lymphatic fluid until the damaged lymphatic channel spontaneously heals. However, there are some refractory cases that require more aggressive methods, including surgery.

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Lipiodol (Guerbet, Villepinte, France) lymphangiography, which was originally used to visualize leakage points or cisterna chyli during thoracic duct embolization, is currently in the spotlight for its potential therapeutic effects on refractory lymphatic leakage (3–8). However, it takes a few days to weeks to be effective, and a significant proportion of patients do not show a response. Unlike chylothorax, for which thoracic duct embolization has been established as a minimally invasive treatment option (9), there have been only a few case reports of embolization for chylous ascites or lymphocele because of the difficulty of catheterizing the fine lymphatic vessels below the cisterna chyli (10–12).

In the present study, we evaluated the safety and efficacy of Lipiodol lymphangiography and adjunctive embolization techniques using *N*-butyl cyanoacrylate (NBCA) glue for the management of postoperative lymphatic leakage.

MATERIALS AND METHODS

The obligation to obtain informed consent was waived by the institutional review boards of the three tertiary referral centers (Seoul National University Hospital, Asan Medical Center, and National Cancer Center) in view of the retrospective nature of the study. All patients who underwent Lipiodol lymphangiography for postoperative lymphatic leakage at the three study centers between August 16, 2010, and January 26, 2016, were included in the study. Figure 1 describes the enrollment of the patients and timing of the introduction of new techniques during the study period. The electronic medical records and picture archiving and communication systems were retrospectively reviewed to determine the type of original surgery, duration of lymphatic leakage, daily drainage amount, triglyceride content of the leakage, and conservative management methods before lymphangiography. The imaging findings on lymphangiography, interventional radiologic procedures, and computed tomography (CT), and the daily drainage amount after the interventional procedure were also carefully reviewed.

Of the 29 patients with postoperative lymphatic leakage who were referred to the interventional radiology department for Lipiodol lymphangiography, 27 patients were finally enrolled after the exclusion of two patients whose ascites were at least partly caused by underlying portal hypertension, with a serum/ascites albumin level gradient > 1.1 mg/dL.

Among the patients included in the study, 63% (n = 17) had ascites, 11% (n = 3) had pleural effusion, 22% (n = 6) had lymphoceles, and 4% (n = 1) had a cutaneous fistula. The mean duration of leakage at the time of the initial lymphangiography was 31 days (range, 3–128 d). The mean drainage amount was 1,171 mL/d (range, 100–2,700 mL/d) in 24 patients who had drainage catheters. Fluid analysis revealed that 11 patients (41%) had chyle leakage with triglyceride levels >250 mg/dL; three patients underwent sclerotherapy and four patients underwent surgical ligation before lymphangiography, all of which were unsuccessful (Table 1).

Lipiodol Lymphangiography

Lipiodol lymphangiography was performed by using two different methods: intranodal or pedal lymphangiography. Intranodal lymphangiography has been the basic technique used for lymphangiography since

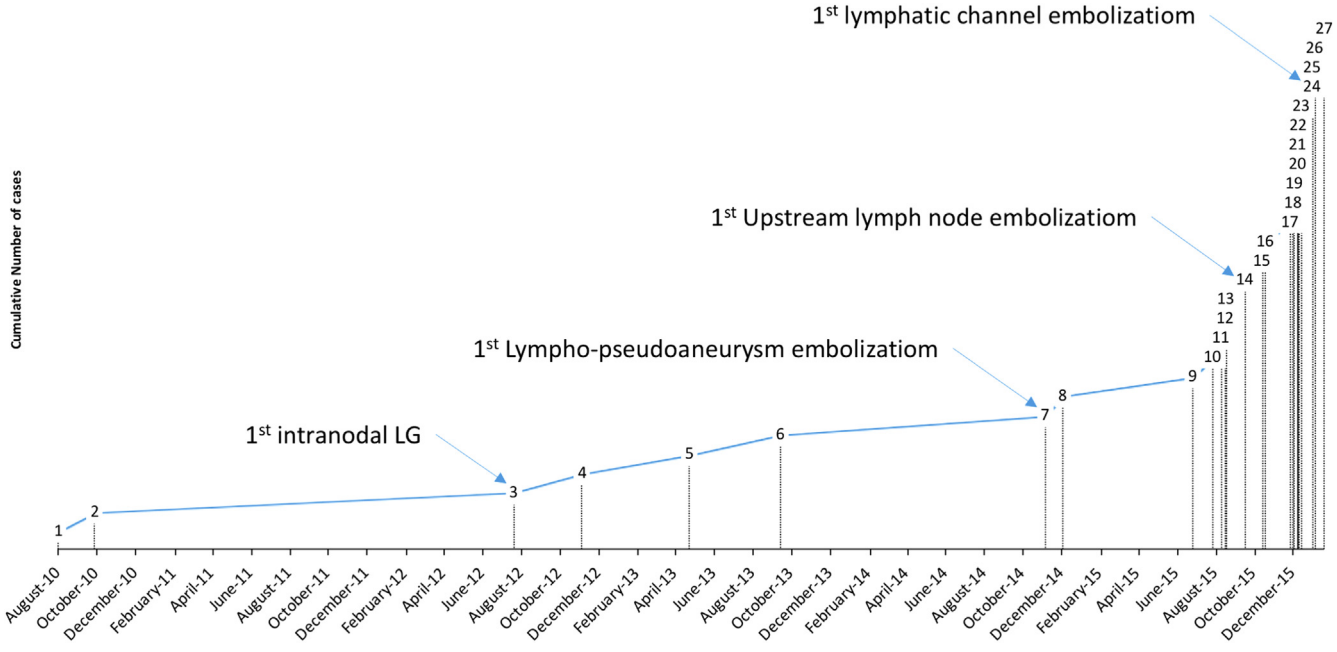

Figure 1. Timeline of patient enrollment and the introduction of new lymphangiography or embolization techniques during the study period.