

Intranodal Embolization for Groin Lymphocele

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Abstract

Purpose: Intranodal embolization using n-butyl cyanoacrylate glue is an emerging treatment option for persistent lymphatic leakage. This report describes the procedure details of intranodal embolization for groin lymphocele and evaluates the efficacy of intranodal embolization at our institution via retrospective chart review.

Material and Methods: Nine consecutive patients (six men and three women; median age, 77.4 years; range, 43-95 years) who underwent intranodal embolization for groin lymphocele between January 2017 and December 2019 were included as study subjects. Intranodal lymphangiography with iodinated contrast was performed to confirm lymphatic leakage, followed by intranodal embolization using n-butyl cyanoacrylate glue mixed with iodized oil for all nine patients. The etiologies of lymphocele, technical and clinical success rates of intranodal embolization, duration of treatment, follow-up period, and acute and chronic complications were retrospectively investigated.

Results: The etiologies of groin lymphoceles were the cutdown access of inguinal vessels (n = 7), lymph node biopsy (n = 1), and trauma (n = 1). The technical and clinical success rates of both lymphangiography and subsequent intranodal embolization were 100%. For intranodal embolization, 16.7%-33.3% n-butyl cyanoacrylate glue was used. The median duration of treatment was 2 days (range, 1-13 days). The follow-up period lasted 0-895 days (median, 9 days). No acute or chronic complications were observed.

Conclusions: In this study, intranodal embolization showed promising results for groin lymphocele with a short duration of treatment with a median of 2 days. Intranodal embolization using n-butyl cyanoacrylate glue could be a treatment option for persistent groin lymphocele. However, further research is warranted to further evaluate the efficacy of intranodal embolization.

Key words: Groin lymphocele, Lymphatic intervention, Lymphatic embolization

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Introduction

Groin lymphocele is a common complication that occurs after surgery and vascular catheterization procedures in the inguinal region, with a reported incidence of 2%-15% [1-3]. Most are asymptomatic, but lymphocele may be complicated due to infection or continuous expansion [4]. Conventionally, percutaneous drainage, chemical sclerotherapy, and surgery have been chosen to manage groin lymphocele. Percu-

taneous drainage is chosen as the first step of treatment in many cases and has a relatively high success rate of 84% [5]. Although percutaneous drainage is less invasive, its treatment period tends to be long, with an average duration of 18.2 days (range, 1-93 days) [5], and in cases wherein it fails, chemical sclerotherapy can be a choice. Although chemical sclerotherapy has a high success rate of 77%-90% and a low recurrence rate of 3%-7% [6] for groin lymphocele, it may fail in cases of large lesions despite repeated sessions [4]. Traditionally, only the surgical option remains

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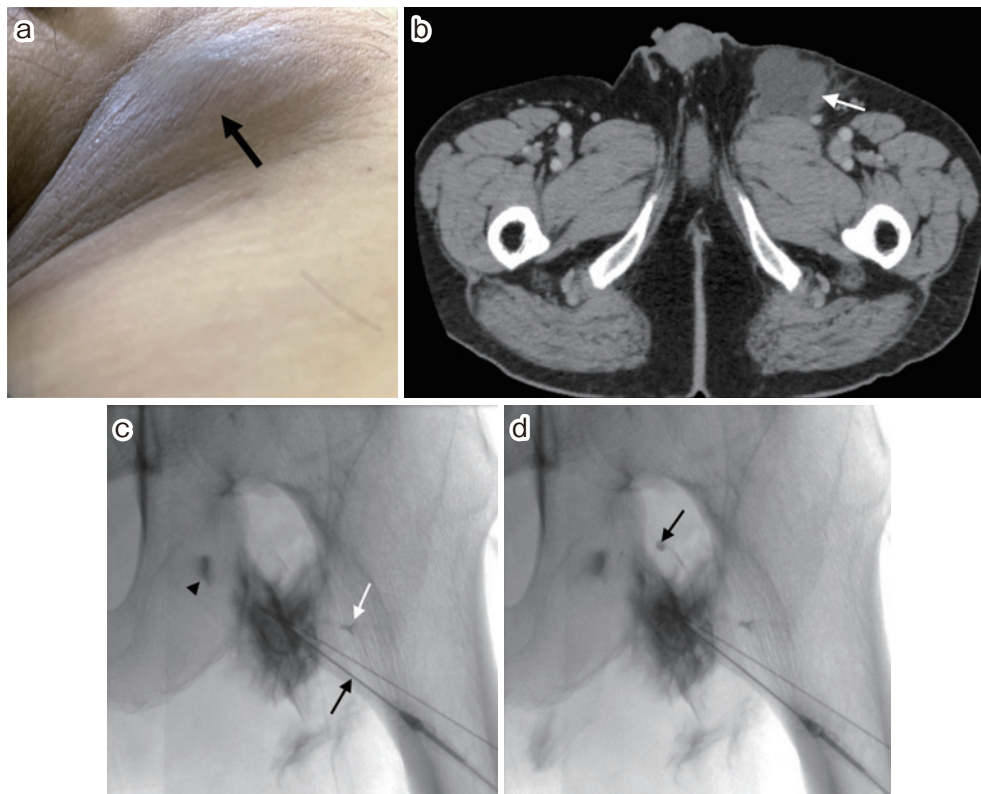


Figure 1. Images of a 43-year-old male with a history of trauma.

(a) Swelling of the left groin was observed (black arrow). (b) Axial nonenhanced CT showed a subcutaneous collection of fluid, indicating lymphocele (white arrow) in the left groin. (c) Following percutaneous drainage with an 18-gauge cannula (white arrow) and ultrasound-guided needle access of an inguinal lymph node (black arrow), intranodal lymphangiography revealed lymphatic leakage (black arrow head). (d) Another lymphatic leakage point (black arrow) was revealed during embolization with NBCA glue.

when sclerotherapy fails, but it is generally more invasive compared with the other treatment options. Therefore, the availability of another treatment option would be beneficial in case of failure of conventional treatment.

Recent studies have described the effectiveness of intranodal embolization (INE) in treating groin lymphocele by injecting diluted n-butyl cyanoacrylate (Histoacryl, B. Braun, Melsungen, Germany; NBCA) glue in the lymph node just caudal to the leaking lymphatic duct [1, 7]. In this study, we describe our experience with nine consecutive cases of groin lymphocele treated with INE using NBCA glue.

Material and Methods

Study subjects

Nine consecutive patients (six men and three women; median age, 77.4 years; range, 43-95 years) who underwent INE for groin lymphocele between January 2017 and December 2019 were included in this study. Institutional review board approval was obtained for this study, and the requirement for patient consent was waived.

Procedure details

Aspiration of the lymphocele using an 18-gauge needle with an outer cannula (Surflo, Terumo, Tokyo, Japan) under ultrasound guidance with a linear probe (11 MHz linear probe, GE Healthcare Japan, Tokyo, Japan) was performed as a first step. Then, an inguinal lymph node just caudal to the lymphocele was punctured with a 23-gauge needle under ultrasound guidance with the same linear probe. Three or four lymph nodes over 1 cm around the lymphocele were searched using ultrasound. Lymphangiography using an iodinated contrast medium was performed under fluoroscopy at 0.5-1 mL/min (**Fig. 1**). Once the leakage point was identified, the 23-gauge needle was flushed with 5% dextrose to prevent NBCA glue polymerization in the needle. NBCA glue mixed with iodized oil (Lipiodol 480, Guerbet Japan, Tokyo, Japan) at a ratio of 1:2 (33.3%) to 1:5 (16.7%) was injected into the accessed lymph node to reach the leakage point (**Fig. 1**). For cases that needed multiple treatment sessions, digital subtraction angiography was used to mask past NBCA glue deposition. After the procedure, compression stockings were used to avoid leg edema.

Table 1. Demographics of the Patients.

Patient	Age/Sex	Etiology	Treatment sessions of INE	Pretreatment symptoms
1	77/F	Biopsy	3	Left inguinal lymphatic fistula
2	87/M	Femoral cutdown	1	Right inguinal lymphatic fistula
3	91/F	Femoral cutdown	1	Left inguinal lymphatic fistula
4	88/M	Femoral cutdown	2	Right inguinal lymphatic fistula
5	67/M	Femoral cutdown	1	Right inguinal swelling and heat sensation
6	95/M	Femoral cutdown	2	Right inguinal swelling and tenderness
7	74/F	F-F bypass	2	Right inguinal swelling and tenderness
8	75/M	Femoral cutdown	3	Left inguinal swelling
9	43/M	Trauma	1	Left inguinal swelling

Abbreviations: F-F bypass, femoral-femoral bypass; INE, intranodal embolization

Table 2. Treatment Summary of Intranodal Embolization.

Patient	Technical/Clinical success	NBCA glue concentration (%)	Treatment duration (day)	Follow-up period (day)	Complication
1*	Yes/Yes	20	13	0	No
2	Yes/Yes	20	1	31	No
3	Yes/Yes	33.3	1	49	No
4	Yes/Yes	16.7	2	7	No
5	Yes/Yes	16.7	1	895	No
6	Yes/Yes	16.7	5	5	No
7	Yes/Yes	20	5	4	No
8	Yes/Yes	20-25	7	565	No
9	Yes/Yes	20	1	9	No

Note: * In patient 1, NBCA glue was not used during the third treatment session, and only lipiodol was used as a follow-up study. No leakage was observed during the third session. Although patient 1 did not come to our hospital after the third treatment session that was done as an outpatient, this case was regarded as clinically successful as there was no report of recurrence from the referral hospital and no leakage during the third session.

Abbreviation: NBCA, n-butyl cyanoacrylate

Assessment of technical and clinical outcomes

The technical success of INE was defined as the successful puncture of the lymph nodes followed by an NBCA glue injection. Clinical success was defined as no symptom of re-expansion of the lymphocele without additional treatment other than INE. Furthermore, the duration from the first treatment to the achievement of clinical success was defined as the treatment period. The location of the culprit lymph node (caudal or cranial to lymphocele) was also investigated. Complications related to INE were assessed via retrospective chart review.

Results

The most frequent etiology of groin lymphoceles was the cutdown access of inguinal vessels (n = 7). Others were inguinal lymph node biopsy (n = 1) and trauma (n = 1). The detailed patient demographics are shown in **Table 1**. The technical and clinical success rates of lymphangiography and subsequent INE were 100% (**Table 2**). No additional treatment was needed after the procedure in all cases. The median number of treatment sessions to achieve clinical success was twice (range, 1-3 times). NBCA/lipiodol ratios are as follows: 1:2 (33.3%), one case; 1:3 (25%) and 1:4 (20%),

one case; 1:4 (20%), four cases; and 1:5 (16.7%), three cases. NBCA glue (1.5 mL) was used for patient 9, and the information on NBCA glue volume was not available in the other eight cases. Lymphatic leakage was detected via lymphangiography from the lymph node that was cranial to the leakage site in two of the nine patients (**Fig. 2**). No lympho-venous shunt was detected. The median treatment period was 2 days (range, 1-13 days). The follow-up period after the procedure lasted 0-895 days (median, 9 days). No patient showed acute complications. Four of the nine patients were followed up for more than a month, and no chronic complications were observed in these patients thereafter.

Discussion

In recent years, INE using NBCA glue has been reported as an effective treatment option for groin and intrapelvic lymphoceles with a high success rate (80%-100%), albeit in small studies [1, 4, 7].

Traditionally, sclerotherapy has been the first choice for the treatment of groin lymphocele as it is a minimally invasive treatment and has a high success rate (77%-90%) in case watchful waiting and percutaneous drainage fail [8]. Although the success rate of sclerotherapy is similar to INE, INE has several advantages over sclerotherapy. The primary

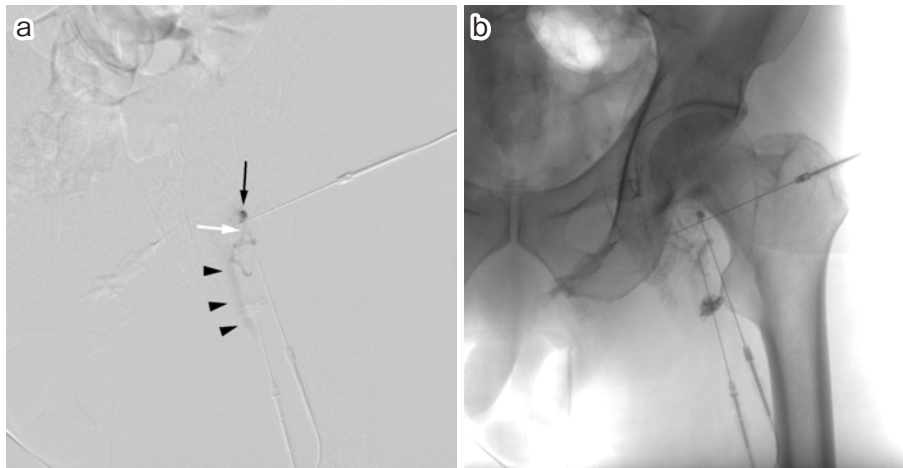


Figure 2. A 75-year-old male after endovascular aortic repair. Left groin lymphocele developed at the site of femoral cutdown access. Intranodal lymphangiography followed by embolization using NBCA glue was performed.

(a) A digital subtraction image during intranodal lymphangiography using iodinated contrast. The leak point (white arrow) was observed caudal to the punctured lymph node (black arrow). Arrowheads indicate iodinated contrast spreading into the lymphocele. **(b)** Same image as (a) but without the subtraction.

advantage of INE is simultaneous diagnosis and treatment, whereas lymphatic anatomy is hard to visualize by other modalities [9]. In addition, according to a previous report, INE may shorten the treatment period compared with sclerotherapy. The mean treatment period of the INE group was shorter than that of the sclerotherapy group (7.1 days versus 12.3 days) [10]. Our results are consistent with this report. Herman et al. reported that the average drainage duration of lymphocele in the extremities, including groin lymphocele, was 18.2 days (range, 1-93 days) [5]. Regarding surgery, Wayne et al. reported 19 consecutive cases treated via direct ligation using intraoperative lymphatic mapping with a success rate of 100% [11]. Shermak et al. reported that they managed 27 patients with groin lymphocele via muscle flap surgery, with a median duration of treatment after a procedure of 9 days [12]. Although the efficacy of surgical management for groin lymphocele is established, surgery is generally more invasive compared with other treatment options. Moreover, the duration of treatment of surgical management tends to be long as compared with INE.

Previous reports used 25%-50% NBCA glue for INE [1, 4]. In our study, NBCA glue with a lower concentration (16.7%-33.3%) than the previous reports was used. Although NBCA glue in low concentration was used, both the technical and clinical success rates were accomplished in all cases. Thus, NBCA glue in both low and high concentrations would be effective. Iodinated contrast was used for diagnostic lymphangiography instead of iodized oil because the inguinal lymphocele is close to the target lymph nodes for intranodal lymphangiography, and thus iodinated contrast can provide sufficient opacification to visualize the leak point. In addition, some patients needed multiple treatment sessions as described in our study. In those cases, the amount of io-

dized oil can be accumulated, and the deposited iodized oil might be an obstacle in image interpretation. In addition, iodized oil is deposited in normal lymph nodes, which may cause swelling of the leg, whereas iodinated contrast can be absorbed or washed out in a couple of days and is safe for nonculprit lymph nodes; moreover, there is no undesired prolonged deposition. It is also noted that lymphatic leakage may originate from a lymph node located at the same level or cranial to a lymphocele, as seen in our study. Therefore, if no leakage is detected by lymphangiography from lymph nodes caudal to the lymphocele, lymphangiography from lymph nodes located at the same level or cranial to the lymphocele should be considered so as not to overlook a culprit lymph node.

As a drawback of this method, suitable lymph nodes to be punctured are essential to perform lymphangiography and INE. In other words, the absence of lymph nodes after lymph node dissection may make this treatment impossible.

This study has some limitations: small sample size; retrospective design; limited etiologies of lymphocele, which may lead to the high success rate of this procedure (no patients underwent radical lymph node dissection and radiation therapy); limited follow-up period for five of the nine patients, which was less than a month; and unavailability of NBCA glue volume information in eight of nine patients (the volume information was available in only one patient).

In conclusion, INE showed promising results for groin lymphocele with a short duration of treatment with a median of 2 days (range, 1-13 days). INE using NBCA glue could be a viable treatment option for persistent groin lymphocele. However, more case accumulation is warranted to further evaluate the efficacy of INE.

Conflict of Interest: None

Disclaimer: Hiroshi Kondo is one of the Senior Editors of Interventional Radiology and on the journal's Editorial Board. Kentaro Yamada is one of the Associate Editors of Interventional Radiology and on the journal's Editorial Board. They were not involved in the editorial evaluation or decision to accept this article for publication at all.

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