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Lymphoscintigraphy for Imaging of the Lymphatic Flow Disorders

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Lymphoscintigraphy has introduced with the great advantage for diagnostic imaging of the lymphatic flow disorders. Lymphoscintigraphy can be performed in patients of any age, including neonates, and even in patient in critical conditions. The procedure is quite simple, and it needs only subcutaneous injection of small amounts of radiotracers. From subcutaneous tissue the radiotracer is taken by the lymphatic vessels and gives off energy in the form of gamma radiation detected by a gamma camera. Radiotracers rarely cause the allergic reaction and can be administered to the patients with allergy to iodine contrast media. Comparing with the Lipiodol, radiotracers cannot cause pulmonary embolism; therefore, it is safe for the patients with respiratory dysfunction. The objective of this article is to describe the indication, technique, equipment, pitfalls, safety, and effectiveness of lymphoscintigraphy for imaging of the lymphatic flow disorders.
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KEYWORDS Lymphoscintigraphy, Tc-99m albumin, Lymphatic flow, Lymphedema, Lympatic leakage, Chylothrax

Introduction

Lymphoscintigraphy has been initially described by Threefoot et al[1] in 1963, and it has introduced with the great advantage for diagnostic imaging of the lymphatic flow disorders since then[2-5]. The traditional imaging for the lymphatic imaging has been lympangiography[6-10]. Lympangiography is performed by injection of iodized oil directly into the lymphatic vessels and needs the specialized technique and time.

Lymphoscintigraphy could reflect the physiological lymphatic flow using small amounts of radioactive materials called radiotracers that are typically injected subcutaneously and get into the lymphatic flow. Radiotracers behave the same flow as lymphatic fluid because it has the water-soluble nature unlike lipiodol which is oil-soluble material used for lymphangiography. Comparing with the lipiodol, radiotracers cannot cause pulmonary embolism; therefore, it is safe for the patients even with respiratory dysfunction (Fig).

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Clinical Evaluation of the Patient

There are 2 main groups of clinical presentation of the patients with lymphatic pathology: symptoms that are associated with lymphatic obstruction and presenting with lymphedema and symptoms that are associated with lymphatic leaks, presenting as chylothorax or chylous ascites. The main clinical presentation of chylothorax and chylous includes dyspnea or tachycardia caused by pleural effusion, distention of the abdomen by ascites. Patients with lymphatic obstruction show unilateral or bilateral swelling of lower or upper extremities. Loss of the lymphatic fluid can result in malnutrition or immunodeficiency or both. Lymphedema may present months to years after surgery because of gradual deterioration in intrinsic contractile force of lymphatic wall and lymphatic valves incompetence.

On physical examination, we check vital sign, body weight, height, and examine the lungs and the abdomen. We also record medical history, especially of surgical, previous intervention, cancer that was treated with chemotherapy, venous ligation, or repeated infection.

Typical laboratory data include complete blood count, C-reactive protein, blood level of total protein, and albumin level. The lymphatic fluid collected during

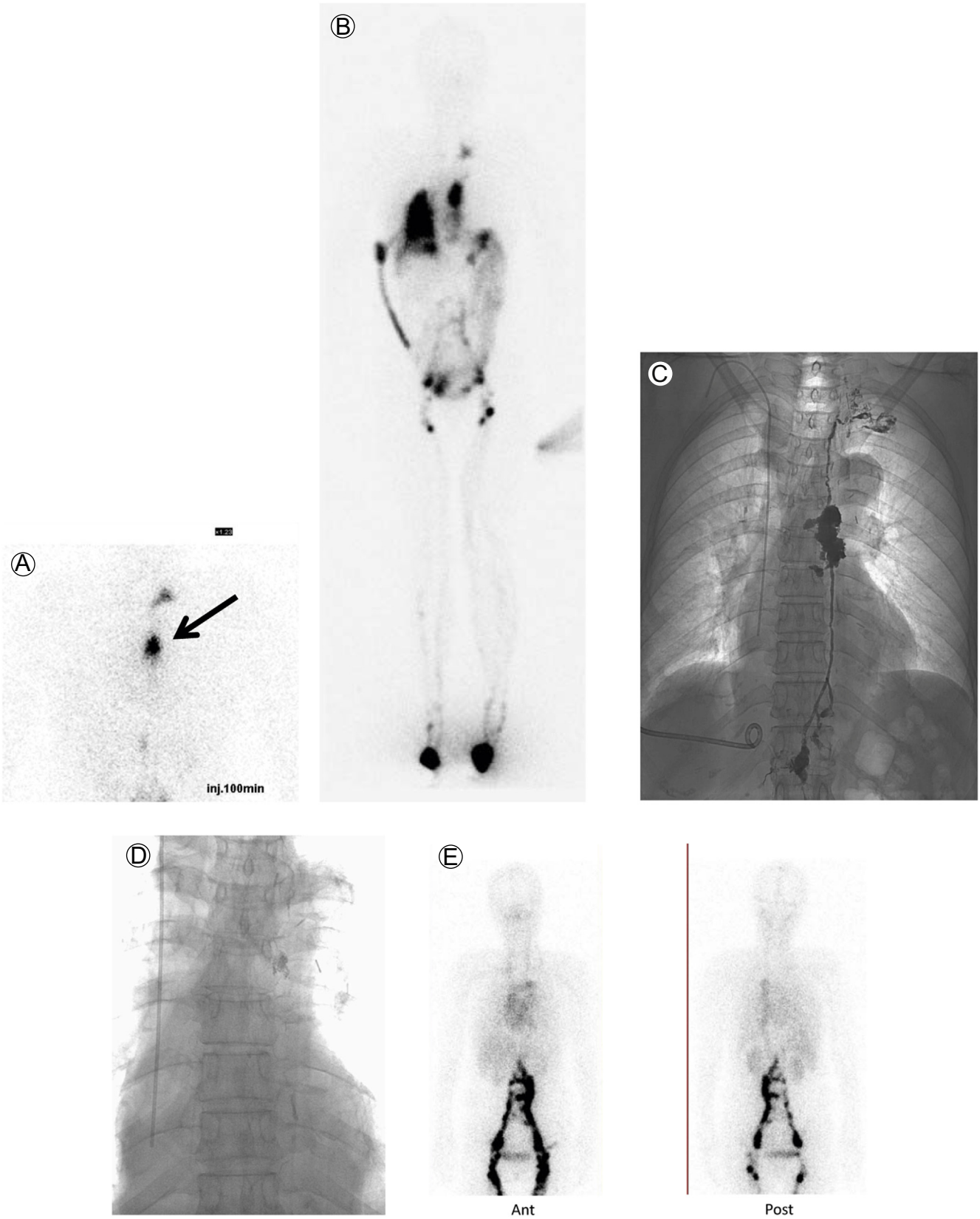

Figure A 61-year-old Japanese woman presented with severe chylothorax 8 days after esophagectomy for esophageal cancer. Lymphoscintigraphy was taken in the active stage of onset. (A) Anterior view of the thorax in initial lymphoscintigraphy shows massive lymphatic leakage into the mediastinum [Arrow] 100 min after injection. (B) Whole body anterior view after 3 hours injection demonstrates extensive pooling in the right thoracic cavity and also spot findings in the left. (C) The lymphatic leakage was treated by thoracic duct embolizatrion (TDE) using NBCA (Histoacryl B; B. Braum, Melsugen, Germany) following lymphangiograpgy. (D) Postprocedural chest-X-ray shows the presence of NBCA at the site. (E)Lymphoscintigraphy demonstrates the cessation of the leakage of the lymphatic flow, which is well consistent with the clinical course after TDE.