

## POST-LYMPHANGIOGRAPHIC COMPUTED TOMOGRAPHY IN CHYLOTHORAX AFTER ESOPHAGOGASTRECTOMY: A CASE REPORT

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### ABSTRACT

*Chylothorax is a rare complication of thoracic surgery. Lymphangiography has long been considered to be the standard of reference for diagnosis and post-treatment evaluation while the role of post-lymangiographic CT is debated. We report a case of chylothorax in a 68-year-old male following esophagogastrectomy for which conservative treatment and thoracic duct ligation failed. Lymphangiography performed after these attempts revealed persistent thoracic duct leakage into the right pleural space. Subsequent non-contrast CT and reformatted images clearly depicted the sources of leakage, and this documentation targeted direct percutaneous treatment. Unfortunately, the lack of access precluded the planned percutaneous CT-guided embolization of the thoracic duct. Nevertheless, this case suggests that post-lymphangiographic CT can serve as a value-added modality in the evaluation and potential treatment of chylothorax.*

**Keywords:** chylothorax, CT, lymphography, thoracic duct, esophagogastrectomy

Chylothorax or chylous effusion is an abnormal accumulation of lymphatic fluid in the pleural space that is characterized by a triglyceride level greater than 110 mg/dL. It is estimated that thoracic duct injury leading

to chylothorax occurs in 0.6 to 2% of patients following esophagectomy and is most often right-sided (1,2).

Although infrequently performed in current practice, lymphography is considered the gold standard for evaluating the lymphatic system (3). Sachs et al found that CT without IV and oral contrast performed after lymphography does not contribute additional diagnostic information (3). In contrast, Guermazi et al suggest that post-lymphangiographic CT can be complementary to lymphography by enabling more precise localization of thoracic duct leakage (4).

Although a rare complication, chylothorax has a reported mortality rate of 50% if untreated. Initial treatment of chylothorax consists of conservative management, which includes thoracentesis, nutritional supplementation, pleurodesis, and other measures for reducing chylous output (5). Once a trial of conservative management is ineffective, minimally invasive interventions such as video-assisted thoracic duct ligation and CT-guided lymphatic disruption should be attempted without delay. These techniques yield satisfactory results (6,7).

### CASE REPORT

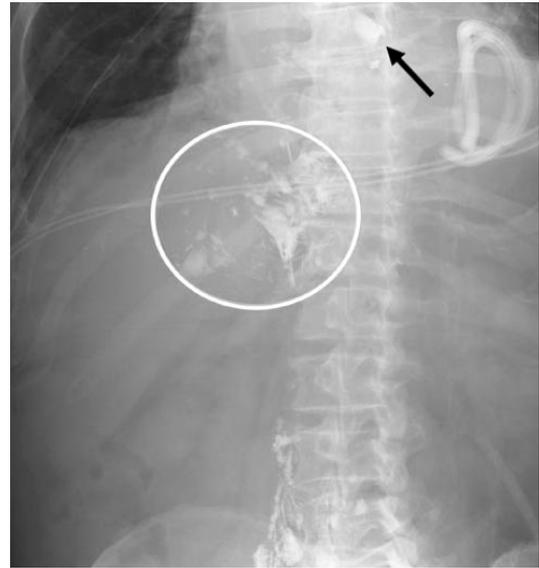
A 68-year-old man presented with a diagnosis of distal esophageal adenocarcinoma status post-neoadjuvant chemotherapy. He

subsequently developed high-output drainage from his Blake drains. Laboratory analysis of the pleural fluid revealed a triglyceride level of 225mg/dl, compatible with chylous effusion.

On the tenth post-operative day, the patient underwent right video-assisted thoracoscopic exploration and thoracic duct ligation. Nevertheless, the chylous effusion was unremitting. Subsequently, two thoracic duct re-ligations were performed, yet high-output chylous drainage persisted.

Further evaluation with lymphography was performed after the re-ligation attempts. This study consisted of injecting 5 cc of methylene blue into the soft tissue between the toes of both feet. After 30 minutes, cutdowns on the dorsum of the feet were performed in order to isolate and cannulate the lymphatic collectors with a 27-gauge lymphography needle (Cook, Inc., Bloomington, Indiana) by freehand technique. A total of 12 ml of Ethiodol (Savage laboratories, Melville, New York) was infused slowly into the lymphatics bilaterally.

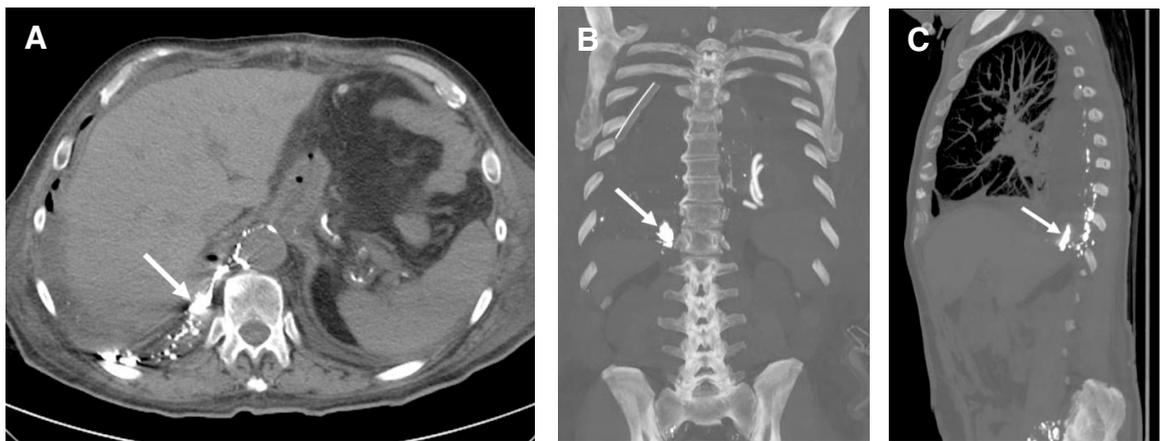
Delayed images revealed Ethiodol filling into the right chest from the lymphatic leak (Fig. 1). Although a large duct was not visualized, the area of leak was well-defined in the chest inferior to the staples from prior



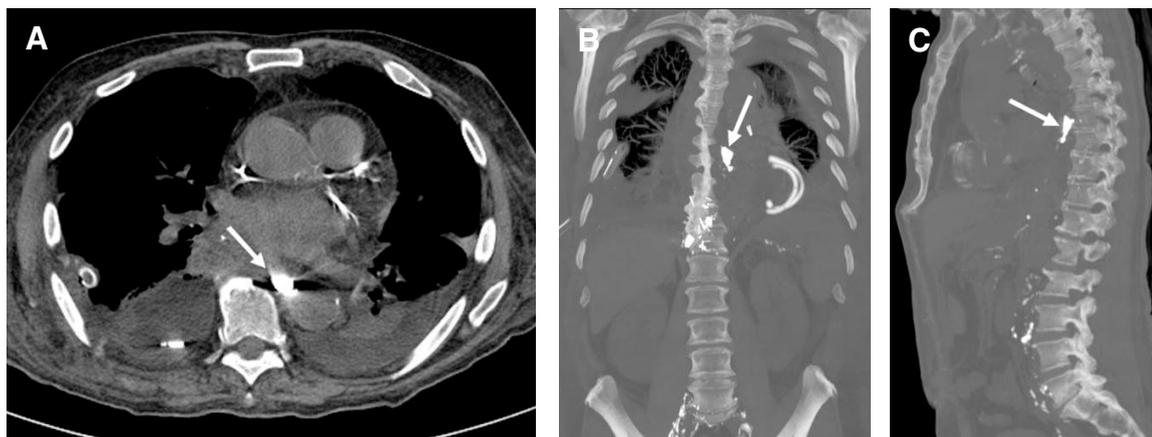
*Fig. 1. Fluoroscopic image of the area of suspected leak from the thoracic duct is at the T12 level (circle). In addition, there is likely a second site of extravasation measuring 1.5 x 0.8 cm postero-medially in the left chest at the T8/T9 level (arrow). The remainder of the thoracic duct is obliterated.*

surgery. Another collection of Ethiodol was also apparent in the left chest.

Non-contrast CT was performed shortly after the lymphography using 2.0 mm contiguous axial sections from the level of the



*Fig. 2. (A) Axial CT using the mediastinum window at the level of T12 vertebral body demonstrates a discrete collection of contrast in the right cardiophrenic angle (arrow) as well as pooling of Ethiodol in the posterior pleural space. Coronal (B) and sagittal (C) reformatted images in the bone window localize the leak to pleural space (arrows).*



*Fig. 3. (A) Axial CT using the mediastinum window at the level of T8/9 vertebral body and coronal (B) and sagittal (C) reformatted images in the bone window demonstrate a discrete collection of contrast in the left pleural space (arrows) as well as pooling of Ethiodol in the posterior pleural space.*



*Fig. 4. Maximum intensity projection formatted imaging (MIP) demonstrates the relative localization of the two thoracic duct leaks.*

iliac crests through the chest. In addition, coronal and sagittal reconstructions, as well as maximum intensity projection reformatted imaging (MIP), were performed. The CT images revealing pooling of the Ethiodol in the right cardiophrenic angle at the level of the T12 vertebral body and posterior pleural space (*Fig. 2*). In addition, a second site of extravasation is apparent posteromedially in

the left chest, at the level of T8/T9 (*Fig. 3*). The MIP provides an additional perspective of the two lesions (*Fig. 4*). Additional attempts towards percutaneous CT-guided embolization on two separate occasions were limited either by poor visualization of the thoracic duct under fluoroscopy due to the rapid spillage of Ethiodol into the chylothorax or failed access related to massive lower extremity edema (9).

#### DISCUSSION

Lymphangiography consists of cannulating and infusing contrast, usually Ethiodol, into the collecting lymphatics of both feet as described above and by Wallace and Clouse (8). The progress of the contrast agent is tracked under fluoroscopic guidance, and a leak is characterized by an enlarging collection of contrast outside the lymphatic system. Lymphography is considered a safe and effective procedure for determining the source of leakage in post-operative patients (8). In addition, non-invasive bipedal lymphangioscintigraphy can also be helpful in this regard (9).

In recent years, the utilization of lymphangiography has declined in favor of more readily available imaging modalities,

such as CT (10). The CT appearance of chylothorax is nonspecific, ranging from low density in association with a predominant fat content to high attenuation secondary to abundant protein composition (11). However, CT can be invaluable for determining the cause of chylous effusions, such as lymphoma. Although the added benefit of postlymphangiographic CT is debated (3), our case illustrates that this modality with its multiplanar reformatting capability can serve as a powerful tool for defining the affected anatomy. Thus, this feature is potentially helpful for treatment planning.

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