

Chylothorax Caused by Acupuncture

Mami Inayama¹, Tsutomu Shinohara², Hiroyuki Hino³,
Mitsuteru Yoshida³ and Fumitaka Ogushi¹

Abstract

Chylothorax, the accumulation of fatty fluid within the chest cavity, is associated with multiple etiologies including surgical injuries. A rare complication of acupuncture in a 37-year-old woman who developed left pneumothorax and pleural fluid collection after acupuncture was performed on the neck and upper back is described. Chest tube drainage resulted in complete lung expansion, and analysis of the milky fluid revealed chyle leakage. Conservative treatment with a diet low in lipids and rich in medium-chain triacylglycerols allowed extubation. Acupuncture-induced thoracic duct injury, although extremely rare, should be considered as a cause of chylothorax.

Key words: Chylothorax, acupuncture, pneumothorax

(Intern Med 50: 2375-2377, 2011)

(DOI: 10.2169/internalmedicine.50.5779)

Introduction

Acupuncture is regarded as a safe treatment method for many conditions, if it is performed according to established safety rules at appropriate anatomical regions. Critical injuries resulting from acupuncture are seldom reported; however, the range of such adverse events is wide (1). Knowledge of anatomy is essential for safe practice.

Chylothorax is a pleural effusion caused by leakage of fatty fluid (chyle) with increased triglyceride levels into the pleural cavity. The common causes of chylothorax are thoracic duct injury, which can be iatrogenic or accidental, and mediastinal neoplasm. Chylothorax must be treated promptly because the mortality rate approaches 50% without proper control of the leak (2).

Pneumothorax developing secondary to acupuncture is fairly common (1). However, to the best of our knowledge, this is the first reported case of chylothorax occurring after acupuncture treatment. All acupuncturists should be aware of the possible and sometimes life-threatening adverse effects of their treatments.

Case Report

A 37-year-old woman without any history of chest disease presented with left back pain shortly after having acupuncture, in which 4-cm-long needles were inserted into the neck and upper back by an experienced acupuncturist from behind. After 2 days, she was hospitalized with complaints of continuous chest pain and shortness of breath. On admission, her height was 165 cm and her weight was 54 kg. Physical examination showed slightly reduced respiratory sounds in the left lung. The laboratory data were within normal limits. X-ray and pulmonary computed tomography (CT) showed a small left pneumothorax and moderate fluid collection (Fig. 1 and 2a, b). Chest tube drainage resulted in complete lung expansion, and the triglyceride concentration in the milky fluid was 3,030 mg/dL. Sudan III staining of the fluid was positive, and lipoprotein electrophoresis indicated that chylomicrons were the main component. From these findings, the diagnosis of chylothorax was established. On day 1, 440 mL of chylous fluid was drained, and a diet low in lipids and rich in medium-chain triacylglycerols was started. These management strategies appeared effective, and the volume of chyle drained decreased gradually. The pa-

¹Division of Pulmonary Medicine, National Hospital Organization National Kochi Hospital, Japan, ²Department of Clinical Investigation, National Hospital Organization National Kochi Hospital, Japan and ³Division of Thoracic Surgery, National Hospital Organization National Kochi Hospital, Japan

Received for publication May 8, 2011; Accepted for publication July 25, 2011

Correspondence to Dr. Tsutomu Shinohara, shinoharat@kochi2.hosp.go.jp

tient was discharged after recovery on the 12th day after admission.

Discussion

The mechanisms of chylothorax may be divided into two major categories: rupture and obstruction of the thoracic duct. Rupture of the duct provokes direct leakage of chyle into the pleural space. On the other hand, obstruction of the duct prevents centripetal drainage of lymphatic flow from the peripheral lung parenchyma and pleural surfaces. This leads to diffuse extravasation or oozing of chyle into the pleural space (2).

The common cause of ductal rupture is trauma, including surgical procedures and penetrating stab wounds. Sudden hyperextension of the spine, severe vomiting, or violent coughing may tear the thoracic duct. In addition, several reports have been published showing inadvertent puncture of the thoracic duct during attempted central venous catheter placement (3, 4). However, the present patient had no such episodes before admission.

The leading cause of chylothorax is extrinsic obstruction of the thoracic duct due to local tumor or lymphadenopathy (5). Lymphangioliomyomatosis (LAM), characterized

by an abnormal proliferation of smooth muscle in the lungs, lymph nodes, and thoracic duct, is another cause of refractory chylothorax due to lymphatic obstruction (2). In the present case, CT of the thorax revealed a left pneumothorax and fluid collection, with no mediastinal tumor, but it could not detect the thoracic duct. In addition, diffuse multiple cystic lesions in the lung, which are characteristic of LAM, were not observed.

Since the thoracic duct generally crosses the mediastinum at the level of the fifth to sixth thoracic vertebral body, lymphatic injury or obstruction below this level leads to a right pleural effusion. In contrast, disease above this level usually results in left or bilateral chylothorax (2). The present case is in accord with this theory. The patient received acupuncture at the neck and upper back, but not the lower back, and developed left chylothorax.

Although a case of chylothorax after pressure pneumothorax was reported in Norway (6), the present patient did not develop tension pneumothorax.

From these findings, acupuncture seemed to be the direct cause of chylothorax in this case. Since lymphangiography was not performed, the accurate site of complete transection or partial laceration of the duct was unknown. In general, it is unlikely that a 4-cm-long needle would injure the thoracic duct located on the anterior surface of the thoracic vertebra. However, the thoracic duct leaves the mediastinum, ascends into the neck for a few centimeters above the clavicle, and turns laterally to enter the junction of the left internal jugular and subclavian veins (5). This terminal region of the thoracic duct, where it is close to the neck skin (less than 4 cm with a normal body size), seems to be most susceptible to injury by acupuncture. Because the parietal pleura, as well as the visceral pleura, was considered to have been penetrated by needles judging from the pneumothorax, leakage of chyle from the terminal region of the thoracic duct might have flowed into the thoracic space drawn by negative pressure. Another possibility is that rupture of the thoracic duct during acupuncture treatment was brought on by variability of the thoracic duct and its tributaries originating from the posterior chest wall, which may coalesce to form a web-like plexus at the lateral side of the upper thoracic vertebra (7).

The literature also contains a few reports of cardiac tam-

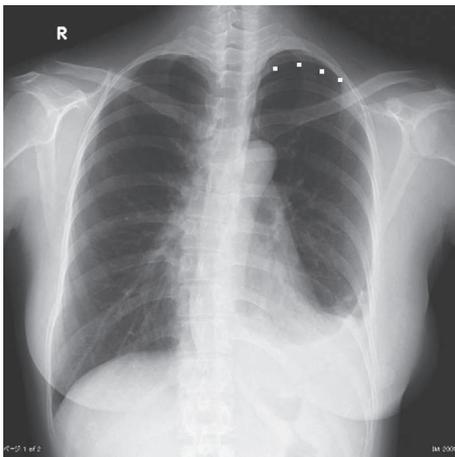


Figure 1. Initial chest radiograph showing a left pleural effusion associated with a small pneumothorax (arrowhead).

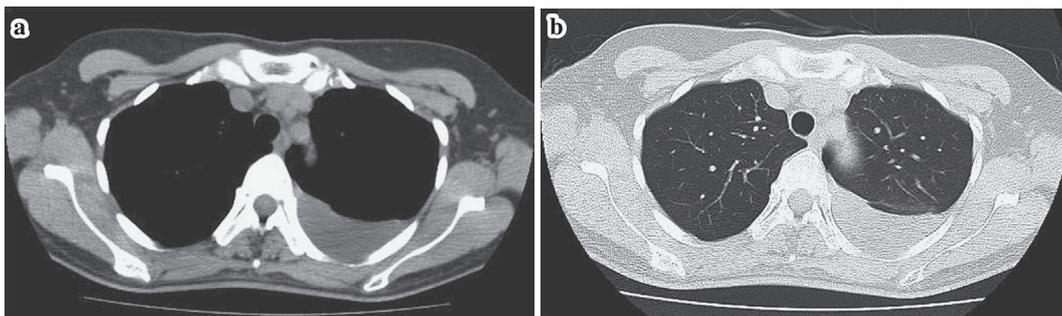


Figure 2. Chest CT images demonstrating a left pleural effusion without intrathoracic lesions. (a) Mediastinal setting. (b) Lung-field setting.

ponade following acupuncture (8, 9). Although acupuncture needles are thin, it is critical to recognize that they can cause life-threatening complications. Chylothorax of unknown cause may account for up to 15% of all cases of chylothorax. Thoracic duct injury caused by acupuncture is extremely rare, but it should be considered as a cause of chylothorax of apparently unknown cause.

The authors state that they have no Conflict of Interest (COI).

References

1. White A. A cumulative review of the range and incidence of significant adverse events associated with acupuncture. *Acupunct Med* **2**: 122-133, 2004.
2. Nair SK, Petko M, Hayward MP. Aetiology and management of chylothorax in adults. *Eur J Cardiothorac Surg* **32**: 362-369, 2007.
3. Teichgraber UK, Nibbe L, Gebauer B, Wagner HJ. Inadvertent puncture of the thoracic duct during attempted central venous catheter placement. *Cardiovasc Intervent Radiol* **26**: 569-571, 2003.
4. Ruggiero RP, Caruso G. Chylothorax--a complication of subclavian vein catheterization. *JPEN J Parenter Enteral Nutr* **9**: 750-753, 1985.
5. Doerr CH, Miller DL, Ryu JH. Chylothorax. *Semin Respir Crit Care Med* **22**: 617-626, 2001.
6. Johansen AM, Haanaes OC. Chylothorax after pressure pneumothorax. *Tidsskr Nor Laegeforen* **117**: 352-353, 1997 (in Norwegian).
7. Akcali O, Kiray A, Ergur I, Tetik S, Alici E. Thoracic duct variations may complicate the anterior spine procedures. *Eur Spine J* **15**: 1347-1351, 2006.
8. Kirchgatterer A, Schwarz CD, Höller E, Punzengruber C, Hartl P, Eber B. Cardiac tamponade following acupuncture. *Chest* **117**: 1510-1511, 2000.
9. Kataoka H. Cardiac tamponade caused by penetration of an acupuncture needle into the right ventricle. *J Thorac Cardiovasc Surg* **114**: 674-676, 1997.