Non-invasive Management of Chylothorax Secondary to Liver Cirrhosis -- Report of a Case

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Chylothorax is a rare event that occurs when milk-like lymphatic fluid accumulates in the pleural space. The common causes of chylothorax are tumors, trauma, or other unknown etiologies. Liver cirrhosis has been classified as one of the uncommon etiologies of chylothorax with a worse prognosis than other etiologies. Patients often die from malnutrition or an immunocompromised status. This report describes a patient who suffered from chylothorax with initial presentations of dyspnea and generalized edema. After a series of work-ups, decompensated liver cirrhosis was found to be the only possible etiology. Generally, chylothorax secondary to liver cirrhosis is hard to manage and the prognosis is poor. Many invasive or expensive therapies have been introduced to manage chylothorax secondary to liver cirrhosis, but successful management with noninvasive conservative therapy has not been reported. Our patient was successfully treated with diuretics, and the chylothorax did not recur during the following 12 months under a sodium-restricted diet. ***(Thorac Med 2008; 23: 125-131)***

Key words: chylothorax, pleural effusion, thoracic duct, triglyceride

Introduction

Chylothorax is a rare condition that involves the accumulation of milk-like lymphatic fluid in the pleural space. Chylomicrons, formed from long-chain triglycerides, enter the intestinal lacteal vessels and are transported to the cisterna chili. The thoracic duct leaves the cisterna chili and ascends to the thorax. Finally, it terminates in the left jugular and subclavian veins. Chylothorax develops when the thoracic duct or one of its major divisions is obstructed or disturbed. It is usually caused by tumors, trauma, including surgery, or idiopathy, including congenital anomalies [1]. However, other rare etiologies of chylothorax exist, including pulmonary lymphangiomyomatosis, intestinal lymphangiectasis, superior vena cava thrombosis, filariasis, mediastinal tuberculosis, congestive heart failure, nephrotic syndrome, liver cirrhosis, and others [1]. These rare etiologies accounted for 8% of all chylothoraces, with only 1% caused by liver cirrhosis, in one study [2].

Chylothorax secondary to liver cirrhosis is

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hard to manage and the prognosis is poor [3-5]. These patients usually succumb to malnutrition or sepsis due to compromised immunity caused by the massive loss of protein and immunoglobulin after drainage. This report presents a case of chylothorax caused by liver cirrhosis successfully managed by noninvasive conservative treatment.

Case Report

A 45-year-old man was a patient with chronic hepatitis C and decompensated liver cirrhosis, Child's criteria C. He had no history of other systemic disease, such as diabetes, hypertension or congestive heart failure. He had suffered from progressive dyspnea and cough with scanty sputum 2 days before he was admitted. At the Emergency Department (ED), physical examination revealed generalized edema without fever. In addition, no lymphadenopathy or jugular vein engorgement was detected in the neck, and no lymphadenopathy was palpable in the axillary or inguinal area. On auscultation, crackles were identified in the bilateral lower lung fields, and a decreasing breathing sound was heard in the right lower lung field. Chest radiography revealed pulmonary congestion with a moderate amount right side pleural effusion (Figure 1A). Liver echogram showed liver cirrhosis and splenomegaly without ascites. Echocardiography revealed a normal cardiac chamber size without regional wall motion abnormality and an ejection fraction of 78.8%. A total blood cell count showed hemoglobin of 8.5 g/dL, a leukocyte count of 16.9×10^9/L (82% granulocytes, 17% lymphocytes, and 1% eosinophils), and a platelet count of 130×10^9/L. A biochemical study showed blood glucose of 96 mg/dL, aspartate aminotransferase of 43 U/L, total bilirubin of 5.6 mg/dL (direct forms 0.8 mg/dL), total serum protein of 8.1 g/dL (albumin 3.5 g/dL), triglyceride of 144 mg/dL, lactic dehydrogenase (LDH) of 472 U/L, and prothrombin time prolongation of 5.4 seconds. Thoracentesis yielded a milk-like fluid, and chylothorax was confirmed by analysis of the fluid (Table 1). Biopsy of the right pleura revealed neither granulomatous inflammation nor malignancy. A chest and abdominal computed tomography (CT) scan was performed later which excluded the existence of lymphadenopathy or a solid tumor (Figure 1D). A lymphangiogram was performed 3 days after admission and showed no obstruction or leakage from the thoracic duct.

Once chylothorax caused by liver cirrhosis was suspected, the patient received therapy with furosemide at 40 mg/day and spironolactone at 75 mg/day. The patient felt less breathless on the 7th day of hospitalization. After 14 days of treatment, the body weight had declined from 68 kg to 55 kg. Chest radiography taken after 2 weeks' diuretic treatment revealed clear lung fields with only minimal pleural effusions in the bilateral costophrenic angles (Figure 1B). Chest radiography taken at the outpatient clinic 1 week after discharge revealed clear lung fields with sharp bilateral costophrenic angles and a normal cardiothoracic ratio (Figure 1C). He was regularly followed up with a sodium-restricted diet. The chylothorax did not recur during a period of more than 12 months' follow-up.

Discussion

Chylothorax is a relatively uncommon event. Light classified the etiologies of chylothorax into 4 major categories - tumor, trauma

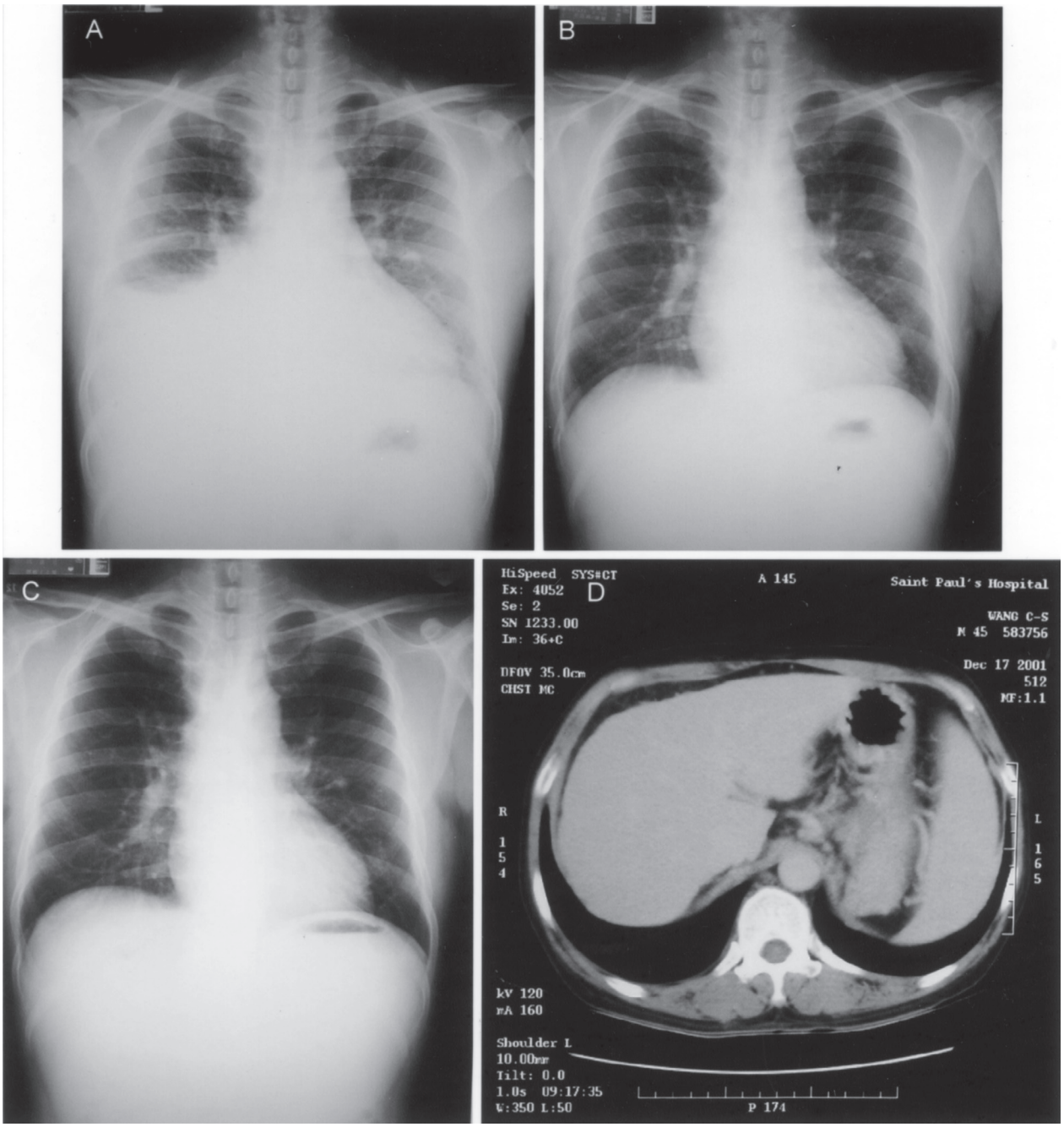

Fig. 1. Chest radiography (A) pulmonary congestion with a moderate amount of right side pleural effusion (B) clear lung fields with only minimal pleural effusions in the bilateral costophrenic angles and a normal cardiothoracic ratio after 2 weeks' diuretic treatment (C) clear lung fields with sharp bilateral costophrenic angles and a normal cardiothoracic ratio 1 week after discharge (D) computed tomography showed no lymphadenopathy or solid tumor.

including surgery, idiopathic including congenital, and miscellaneous [1]. Over 50% of chylothoraces are induced by tumors, especially lymphoma. Trauma due to surgery, most fre-

Table 1. Characteristics of pleural effusions

	Pleural effusion		Plasma
Appearance	Milky		
Odor	None		
Leukocytes (mm^{-3})	430		
Lymphocytes (%)	99		
Culture	No growth		
Cytology	Negative finding		
Glucose (mg/dL)	158		96
Total protein (g/dL)	4		8.1
Total protein E/P		0.49	
LDH (U/L)	253		472
LDH E/P		0.54	
Triglyceride (mg/dL)	216		144
Triglyceride E/P		1.5	
Cholesterol (mg/dL)	38		

E/P = the concentration ratio of effusion to plasma; LDH = lactic dehydrogenase

quently following cardiovascular or thoracic surgery, is the 2nd leading cause of chylothorax. Idiopathic chylothorax is the most common type of neonatal pleural effusion and may be due to thoracic duct trauma during delivery, or to a developmentally abnormal thoracic duct. The incidence of miscellaneous chylothorax is less than 10%, and liver cirrhosis is one of these rare etiologies [1]. Chest and abdominal CT scan and history-taking helped to rule out tumor and trauma-induced chylothorax in this case. Although general edema was found and the ED chest radiography revealed pulmonary congestion, congestive heart failure-induced chylothorax was excluded by echocardiography and the follow-up chest radiographies. Tracing the patient's past history, the most likely cause was liver cirrhosis induced by chronic hepatitis C.

The pathophysiology of chylothorax secondary to liver cirrhosis is not very clear. Liver cirrhosis may increase hepatic capillary pressure and proportionately increase lymph flow in the liver and the thoracic duct. Increased pressure in hepatic lymph vessels and the thoracic duct increases the risk of extravasation of chyle and promotes the development of chylous ascites [6]. However, microscopic anatomical defects are present in the diaphragm and a negative pressure is found in the pleural space. Chylous ascites may move from the peritoneum into the thorax, across these defects of the diaphragm, and accumulate in the pleural space [7]. Accordingly, chylothorax forms with or without chylous ascites.

The effusion in this case was a milk-like fluid. The possibility of empyema was excluded because lymphocytes were predominant in the effusions, the level of glucose in the effusion was 158 g/dL, and culture for bacteria or Mycobacterium tuberculosis was negative. The ratio of the concentration of effusion protein to that of plasma (E/P) was less than 50% (4/8.1), and the E/P of the lactic dehydrogenase was less

than 60% (253/472), indicating a transudative effusion according to Light's criteria [1]. However, the triglyceride level in the effusion was greater than 110 mg/dL with an E/P of greater than 1 (216/144), and the cholesterol levels in the effusions were low (Table 1). Thus, the diagnosis of chylothorax was confirmed not to be a false-positive chylothorax in patients with hypertriglyceridemia or pseudochylus. Theoretically, chylothorax should be exudative in nature [2], but our patient's data showed transudative, and were slightly below the criteria for exudates (protein E/P 49%; LDH E/P 54%), perhaps because of the diluting effect of the transudative ascites due to liver cirrhosis.

The management of chylothorax depends on its etiology or the underlying disease. No large, randomized, controlled studies have addressed the management of chylothorax induced by liver cirrhosis, because of the low incidence. Several ways of managing chylothorax or chyloperitoneum induced by liver cirrhosis have been introduced. These include a modified diet with medium-chain triglycerides that are directly absorbed into the portal vein to reduce lymphatic leakage of chyle, total parenteral nutrition with resting of the bowels, tubal thoracotomy, or returning chylous ascites to systemic circulation by peritoneovenous shunting. However, responses to these kinds of management have been poor [4-5, 7-8]. Successful management by transjugular intrahepatic portosystemic shunt has been reported [9], but it was too invasive. Fortunately, in our case, soon after conservative management with 40 mg/day of furosemide and 75 mg/day of spironolactone, the patient felt less breathless, and chest radiography revealed improvement after 2 weeks' medical treatment. The body weight decreased by 13 kg and the edema improved, indicating a decline in the pleural effusion and general tissue edema.

Chylothorax secondary to liver cirrhosis has had a worse prognosis than common causes of chylothorax secondary to malignancy or trauma, or hydrothorax secondary to liver cirrhosis without chylothorax or chyloperitoneum [5, 8]. Early conservative intervention with diuretics for chyloperitoneum induced by liver cirrhosis might yield a good response [8]. To our knowledge, no previous study has reported the successful conservative management of chylothorax secondary to liver cirrhosis. However, we suspected that early intervention might yield a response as effective as that to chylous ascites, because the chylous pleural effusion secondary to liver cirrhosis had moved from the chyloperitoneum. For our patient, management introduced before malnutrition developed might have been a factor for a better prognosis.

In summary, chylothorax is a rare event, and liver cirrhosis is an uncommon etiology of chylothorax. Generally, chylothorax secondary to liver cirrhosis has an unfavorable prognosis. However, in our case, early management by diuretics might have yielded a good response. Therefore, all patients with chylothorax caused by liver cirrhosis should be treated conservatively before invasive or expensive management is performed.

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肝硬化併發乳糜胸的非侵入性治療

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乳糜胸是肋膜腔內聚積乳狀淋巴液的一種罕見疾病，常見的致病因有腫瘤、外傷及其他未知或少見的因素。肝硬化被歸類為罕見的病因之一，並有較差的預後，病患常因營養不良或免疫力差而死亡。本篇病例報告敘述一位乳糜胸的患者，最初以呼吸困難和水腫來表現，經進一步檢查得知肝硬化是其致病因。一般而言，肝硬化併發乳糜胸通常是難以處理且預後不佳。以往，有許多侵入性或昂貴的治療曾被提出，但未曾有過以非侵入性方式成功治療肝硬化併發乳糜胸的病例。此病患成功地以利尿劑治療且合併低鈉飲食的控制下，經一年的追蹤，乳糜胸並未再發生。*(胸腔醫學 **2008; 23: 125-131**)*

關鍵詞：乳糜胸，肋膜積水，胸管，三甘油脂

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