Case Report

Development of bilateral chylothorax in a younger female secondary to tuberculosis

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ABSTRACT

Chylothorax is a rare clinical entity characterized by a milky white aspirate with increased triglyceride levels. The commonest etiology is malignancy and trauma, and bilateral chylothorax, secondary to tuberculosis, is an extremely rare cause, as observed in the present case.

KEY WORDS: Chylothorax, tuberculosis, analysis

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INTRODUCTION

Chylothorax is a relatively rare cause of a pleural effusion and it occurs when chyle, characterized by high-triglyceride and low-cholesterol concentrations, is found in the pleural space and is usually associated with neoplasms or trauma to the thoracic duct.¹ ² The development of bilateral chylothorax secondary to tuberculosis is a very uncommon clinical entity.³ Hereby we describe a case of bilateral chylothorax secondary to tuberculosis with cervical lymphadenopathy, in a 15-year-old female.

CASE REPORT

A 15-year-old female was admitted to our department with the complaints of breathlessness, and off and on fever for 1 month. She came from a nonendemic zone of filariasis in Uttar Pradesh. The resting pulse rate was 92/ min and blood pressure was 112/74 mmHg. There was no history of contact with a tuberculosis patient. Her physical examination revealed hard, mobile lymph nodes of size 2 × 2 cm approximately, present bilaterally in the cervical region, and pallor. On chest examination, there was stony dull note localized to the bilateral infrascapular, lower axilla. Rest of the systems were within normal limits.

Her blood examination revealed anemia, and hypoalbuminemia but normal total and differential leukocyte counts. Her chest x-ray revealed bilateral pleural effusion [Figure 1]. The pleural fluid was aspirated (about 2.0 l from left and 1.2 l from right) on both sides that revealed a milky white fluid. Then we thought about the chylothorax. Clearing of the pleural fluid by adding ethyl-ether into it leads to the exclusion of pseudochylothorax. The pleural fluid of both sides was sent for examination that revealed, for the right side, protein 4.2 g%, sugar 44 mg%, and total leukocyte count 3400 cells/mm³; differential leukocyte count was neutrophils 20, lymphocytes 80, pleural fluid triglyceride 535 mg%, and pleural fluid cholesterol 24.8 mg%; pleural fluid of the left side revealed protein 4.0 g%, sugar 40 mg%, and total leukocyte count 3280 cells/mm³; differential leukocyte count was neutrophils 34, lymphocytes 66, pleural fluid triglyceride 535 mg%, and pleural fluid cholesterol 24.0 mg% [Table 1]. Serum triglyceride and serum cholesterol was 72.7 mg% and 71.9 mg%, respectively. The Ziehl–Neelsen stain of the pleural fluid was negative but Mycobacterium tuberculosis was isolated on the Lowenstein–Jensen culture. The pleural fluid culture for pyogenic organisms was sterile in nature on both sides. PPD showed no indurations. Her biopsy of the cervical lymph node revealed caseating granuloma, and the Bactec culture for M. tuberculosis was also positive in the cervical lymph node biopsy specimen. Her abdomen
ultrasound also revealed multiple retroperitoneal and para-aortic lymphadenopathy. Thus a diagnosis of bilateral chylothorax secondary to tuberculosis with cervical lymphadenopathy was established.

To confirm the exact site of the thoracic duct tear, lymphangiography was planned but her parents refused for further investigations.

She was put on standard 6-month antitubercular treatment: a combination of isoniazid, rifampicin, pyrazinamide, and ethambutol was started for 2 months followed by isoniazid and rifampicin for a further 4 months. Following this, she showed clinical as well as radiological improvement and chylothorax resolved after 2 months of treatment [Figure 2], and on regular follow-up she had no further symptoms.

**DISCUSSION**

Chylothorax was recognized in the seventeenth century but it is still a rare enough entity to be viewed by most physicians as a clinical curiosity. In a historical review by Jolisman, Bartolet is credited with the initial description of chylothorax in 1633, and Quincke reported the first case in 1875. Sassion et al. divided the causes of chylothorax into four major categories: trauma, tumor, idiopathic, and miscellaneous.

Trauma is the leading cause of chylothorax. This trauma is usually a cardiovascular, pulmonary, or esophageal surgical procedure.

Another leading cause of chylothorax is malignancy. The most common malignancy to cause chylothorax is a lymphoma, followed by bronchogenic carcinoma, and rarely leukemia. Very few cases of chylothorax secondary to acute lymphoblastic leukemia (ALL) are reported.

The third category of chylothorax is idiopathic, including most cases of congenital chylothorax. Most cases of idiopathic chylothorax in adults are probably due to minor trauma, such as coughing or hiccupping after the ingestion of fatty meals.

The fourth category of chylothorax is the miscellaneous category and causes are thrombosis of superior vena cava or subclavian vein, cirrhosis, lymphangioleiomyomatosis, Gorham’s syndrome, Kaposi sarcoma, Castleman disease, filirasis and familial lymphedema, sarcoidosis, radiation-induced mediastinal fibrosis, and hypothyroidism.

Tuberculosis is described as a possible cause of chylous effusion but only a single case, described by Brandt in 1917, appears to have been recorded. Cakir et al. reported the concurrence of chylothorax and endobronchial tuberculosis in a 4-month-old boy.

Grobbelaar et al. reported one case of bilateral and other case of unilateral chylous effusions associated with extensive mediastinal and hilar lymphadenopathy secondary to pulmonary tuberculosis, in children.

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**Table 1: Characteristics of the pleural fluid on both sides of the cavity**

| Pleural fluid                  | Right pleural cavity | Left pleural cavity |
|-------------------------------|----------------------|---------------------|
| Protein                       | 4.2 g%               | 4.0 g%              |
| Sugar                         | 44 mg%               | 40 mg%              |
| TLC                           | 3400 cells/mm³       | 3280 cells/mm³      |
| DLC                           | P20, L80             | P34, L66            |
| Pleural fluid triglyceride    | 535 mg%              | 188 mg%             |
| Pleural fluid cholesterol     | 24.8 mg%             | 24 mg%              |
| Pleural fluid culture         | Sterile              | Sterile             |

Pleural fluid triglyceride 72.7 mg%; serum cholesterol 71.9 mg%; Ziehl–Neelsen stain of the pleural fluid was negative but *Mycobacterium tuberculosis* was isolated on the Lowenstein–Jensen culture. Biopsy of the cervical lymph node revealed caseating granuloma, and the Bactec culture for *M. tuberculosis* was also positive.

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**Figure 1:** Chest X-ray revealed bilateral pleural effusion

**Figure 2:** Revealed radiological clearing of the bilateral chylothorax after 2 months of antitubercular treatment

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**Table 1**
secondary to disseminated tuberculosis complicated by massive pulmonary embolism.\[32]\n
Tan et al. reported a patient with persistent chylothorax and generalized lymphadenopathy who was subsequently diagnosed to have concurrent tuberculosis and malignant lymphoma.\[33]\n
Very few cases of bilateral chylothorax have been reported in the literature.\[34\] Chylothorax has no predilection for age and sex. Symptoms of chylothorax mostly depend upon the amount of fluid in the pleural cavity.

The exact pathogenesis for the development of chylothorax secondary to tuberculosis remains controversial. Fraser et al.\[35\] and Yunis et al.\[36\] reported that the enlarged lumbar and iliac group of lymph nodes produced obstruction of the cisterna chyli and thoracic duct, as a result of which there was dilatation of the lumbar channels; this was followed by the opening up of collateral anastomoses, many lymphaticovenous anastomoses existing between the thoracic duct system and the azygos, intercostal, and lumbar veins. The increased pressure in the system resulted in the transudation of chyle into the pleural space. Grobbelaar et al. reported that the possible explanation for the development of a chylothorax in our patients is the obstruction of the thoracic duct by tuberculous lymphadenopathy with subsequent increase in pressure in the surrounding lymphatic system and leaking of chyle into the pleural space.\[31\]

Best way to establish the diagnosis of chylothorax is to determine the concentration of triglycerides in the pleural fluid. The triglyceride concentration greater than 110 mg/dl (in our case it was 289.3 mg/dl), a ratio of pleural fluid to serum triglycerides of greater than 1.0 (in our case it was 3.77), and a ratio of pleural fluid to serum cholesterol of less than 1.0 (in our case it was 0.344) usually confirm chylothorax. Chylothorax will be excluded if the pleural fluid triglyceride concentration is less than 50 mg/dl. However, in the case of levels from 50 to 110 mg/dl, a lipoprotein analysis of the pleural fluid should be performed, and the demonstration of chylomicrons in the fluid confirms the diagnosis of chylothorax [Table 2].\[37\]

Primary treatment in the case of chylothorax should be directed toward the correction of malnutrition and compromised immunologic status which is due to repeated pleural fluid aspirations of chyle with its high levels of protein, fat, electrolytes, and lymphocytes. The defect in the thoracic duct often closes spontaneously in the case of traumatic injury. In the case of severe dyspnea, the placement of the pleuroperitoneal shunt or chest tube drainage is mandatory.\[39\] If the chylothorax persists for more than 4 weeks, consideration should be given to surgical exploration with ligation of the thoracic duct.\[40\]

In our case, diagnosis of chylothorax was established on typical pleural fluid color, high pleural fluid triglyceride level, high ratio of pleural fluid to serum triglyceride, and low ratio of pleural fluid to serum cholesterol. She responded well to antituberculous treatment.

**Table 2: Differential points of chylothorax, pseudochylothorax, and empyema, and parental nutrition entering the pleural space via the subclavian line**

| Parameter                        | Chylothorax                                      | Pseudochylothorax | Empyema thoracis | Parental nutrition entering the pleural space via the subclavian line |
|----------------------------------|-------------------------------------------------|-------------------|------------------|---------------------------------------------------------------------|
| **Definition**                   | Presence of chyle in the pleural cavity; chyle contain chylomicrons, triglycerides, and lymphocytes’ | Caused by high-lipid levels (cholesterol/lecithin–globulin complexes) in the pleural fluid | Pleural effusion due to bacterial pneumonia | Presence of high triglyceride levels in the pleural cavity |
| **Color**                        | Milky white                                     | Milky white       | Milky white      | Milky white                                                         |
| **Odor**                         | Odorless                                        | Odorless          | Foul smelling    | Odorless                                                           |
| **Clinical onset**               | Acute                                           | Chronic           | Acute            | Acute                                                              |
| **Most common cause**            |                                                 |                   |                  |                                                                    |
| **On centrifugation**            | Remain opalescent                               | Remain opalescent | Supernatant part clear | Remain opalescent                                                   |
| **Diagnostic criteria**          |                                                 |                   |                  |                                                                    |
| **PF TG**                        |                                                 |                   |                  |                                                                    |
| **PF Cho/serum Cho ratio**       | >110 mg/dl                                      | >1.0              | Usually negative | >110 mg/dl                                                         |
| **Pleural fluid culture**        | <1.0                                             | Usually negative  | Usually negative |                                                                    |
| **PCR of the pleural fluid**     | Usually negative                                | Usually negative  | Usually negative |                                                                    |
| **Addition of 1–2 ml of ethyl ether to the pleural fluid** | Remain opalescent | Cleared as cholesterol dissolved | Most specific to detect DNA of various bacterial various populations | Remain opalescent |
| **Ingestion of a fatty meal with lipophilic dye (drug and cosmetic green no. 6, a coal tar dye), followed by thoracentesis 30–60 min later and if color changed to green fluid, then it also confirms chylothorax** | | | | |

PF TG = pleural fluid triglyceride; PF Cho/serum Cho ratio = pleural fluid cholesterol/serum cholesterol ratio. In the case of levels 50–110 mg/dl, a demonstration of chylomicrons in lipoprotein analysis confirms chylothorax. Levels below 50 mg/dl virtually exclude chylothorax.
CONCLUSION

Thus, we should remember that while treating any patient with chylothorax, the probable diagnosis of tuberculosis should be kept in mind.

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