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INSTRUCTIVE CASE

2-YEAR OLD BOY WITH SPONTANEOUS CHYLOTHORAX

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A 2-year old male, from Guadalupe, Makati was admitted at a tertiary government hospital for further management of pleural effusion. Since one month prior to admission, the patient was noted to have intermittent productive cough associated with colds. Neither consult was done nor medications taken. Three weeks prior to admission, he was noted to have low-grade fever (T37.7-38°C) and cough persisted. He was given Paracetamol 250mg/5ml ½ tsp every 4 hours affording temporary relief. Condition continued which prompted consult at a private hospital where he was assessed to have an Upper Respiratory Tract Infection. He was prescribed to take at home Amoxicillin, Ambroxol and Ascorbic Acid.

Nine days prior to admission, he was admitted to the same hospital due to difficulty of breathing. Fever, cough and vomiting accompanied the dyspnea. He was assessed to have community-acquired pneumonia. Chest x-ray revealed pleural effusion. PPD test was done and showed positive result. Patient was given Cefuroxime, Oxacillin and Amikacin. Triple anti-TB drugs were also started. Thoracentesis was done revealing a white milky fluid. Pleural fluid analysis, serum LDH, sugar and protein showed abnormal results.

One day prior to admission, a repeat chest x-ray was done revealing persistence of pleural effusion on the right lung field. Chest tube thoracostomy was done evacuating 150 cc of non-foul smelling, white milky pleural fluid. Analysis of the pleural fluid revealed pH of 7.5, WBC of 54,000/mm^3, protein ratio higher than 0.5, LDH ratio higher than 0.6, pleural fluid LDH of 565 U/L, pleural fluid protein of 48.5 g/L. (These findings based on Light's criteria define the effusion as an exudate). Immunophenotyping was done. At this time, patients relatives opted to transfer patient to a tertiary government hospital.

The past medical history was unremarkable. Family history showed that the eldest sister had pulmonary TB for which she was treated for 6 months with good compliance. The birth, maternal, immunization, nutritional, developmental milestones, personal and social histories were unremarkable.

What is your diagnosis?

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DENOUEMENT

We have a 2-year old boy with a one month history of cough and colds, fever and later presented with difficulty of breathing. Chest x-ray showed pleural effusion. Thoracentesis and chest tube insertion revealed pleural fluid that was milky white and with non-foul smelling.

The most common causes of pleural effusion in children are bacterial pneumonia and heart failure. Rheumatologic causes and metastatic intrathoracic malignancy have also been reported to cause pleural effusion. Tuberculosis effusion is uncommon in developed countries due to improved screening and antituberculous therapy.

With the above salient features and exudative characteristic of the pleural fluid, differentials at this point are: empyema, chylothorax and pseudochylothorax. Empyema can be considered because of the following reasons: [a] milky pleural fluid on thoracentesis; [b] exudative characteristic of the pleural fluid; [c] pleural effusion seen on plain radiography and [d] it is more common than chylothorax and pseudochylothorax. However, after centrifugation the supernatant was still milky white with red button in appearance making the diagnosis of empyema unlikely. Most of the time when the pleural fluid is milky or opalescent, the patient is mistakenly treated for empyema. This mistake is not made if the fluid is centrifuged. In empyema, the supernatant becomes clear after centrifugation. In chylothorax and pseudochylothorax, the supernatant remains turbid or milky even after centrifugation..

Pseudochylothorax is a pleural effusion that is turbid or milky from high lipid content not resulting from disruption of the thoracic duct[1]. The precise mechanism behind this condition is not known. It is associated with chronic pleural effusion with a mean average of 5 years. Pleuropulmonary tuberculosis and rheumatoid arthritis (RA) are typically said to be the most frequent etiologies of pseudochylothorax followed by syphilis, diabetes or some neoplastic diseases[15]. This can be ruled out in our patient because of the following reasons: [a] acute onset of the disease; [b] pleural fluid cholesterol of <250mg/dl (patient – 93mg/dl); [c] pleural fluid triglyceride level of >100mg/dl (patient – 548 mg/dl); and [d] ratio of the pleural fluid cholesterol and serum cholesterol was <1.0 which was only 0.49. Patient's pleural fluid cholesterol and triglyceride are compatible with chylothorax.

Chylothorax is defined as the accumulation of chyle within the pleural space secondary to a disruption in the thoracic duct or derangement of lymphatic flow in the thorax[16]. There are three main mechanisms involved: [1] chyle leak from the thoracic duct; [2] extravasation from pleural lymphatics; and [3] transdiaphragmatic flow of chylous ascites[16]. The initial symptoms of chylothorax are usually related to the presence of the space-occupying fluid in the thoracic cavity and therefore, patients have dyspnea[11]. Pleuritic chest pain and fever are rare because chyle is not irritating to the pleural surface[1,16,17].. With traumatic chylothorax, a latent period of 2 to 10 days usually occurs between the trauma and onset of the pleural effusion. Lymph collects extrapleurally in the mediastinum after the initial thoracic duct disruption, forms a chyloma, and produces a posterior mediastinal mass. The mediastinal pleura eventually ruptures, chyle gains access to the pleural space, and dyspnea is produced by the chyle compressing the lung. With nontraumatic chylothorax, the onset of symptoms is usually gradual[1,17].

On plain radiography and computed tomography, chylous effusion cannot be distinguished from other types of pleural effusion[16]. Pleural fluid analysis still plays a very important role in the diagnosis of chylothorax. Measurement of the triglyceride and cholesterol levels must be done when chylothorax is highly considered. The diagnosis of chylothorax is best made by measuring the triglyceride levels in the pleural fluid that is usually more than 200 mg/dl[1]. Levels less than 50 mg/dl exclude chylothorax and those in between 50 mg/dl and 100 mg/dl makes the diagnosis uncertain. In cases like this, lipoprotein analysis should be ordered[1]. The demonstration of chylomicrons in the pleural fluid is diagnostic of chylothorax[2,16].

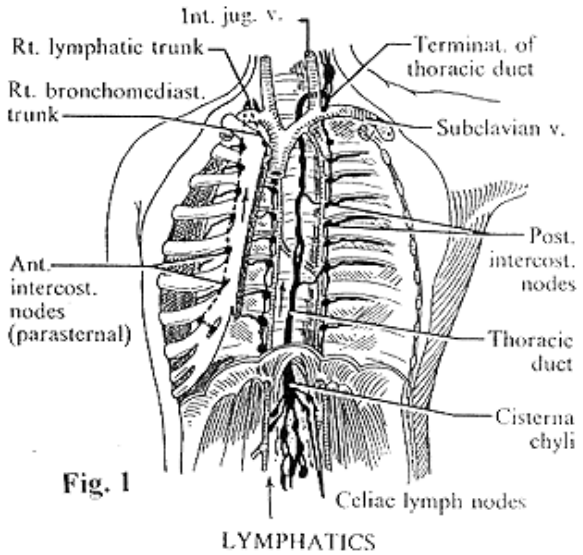

Fig. 1

In children, chylothorax is usually a postoperative complication[6]. In older children and adults, nontraumatic chylothoraces are secondary to fibrosis or tumors[6]. Based on Light chylothorax is divided into four major categories: tumor (50%), trauma (25%), idiopathic (15%) and miscellaneous (10%)[1]. However, it did not mention any incidence rate in the pediatric age group.

Idiopathic cases are commonly seen in the neonatal age group where 50% of affected newborns develop symptoms within 24 hours. The exact cause of congenital chylothorax is unknown. Finally the miscellaneous group includes diaseases such as sarcoidosis, congestive heart failure, Gorham's syndrome, Castleman's disease, lymphangioleimyomatosis (LAM), lymphangomatosis, yellow nail syndrome, radiation therapy to the mediastinum, thoracic aortic aneurysm, multiple myeloma, Waldenstrom's macroglobulinemia, chronic lymphocyte leukemia, Kaposis sarcoma, and infections such as tuberculosis, histoplasmosis or filariasis. In some cases, chylothorax occurs secondary to a primary abdominal process like nephritic syndrome, hypothyroidism, cirrhosis of the liver, abdominal operations and pancreatitis.

In our patient, there was no history of trauma nor surgery prior to the onset of chylothorax making trauma an unlikely etiology. Considerations then are lymphagiomatosis, lymphoma and tuberculosis. Unlikely considerations are nephritic syndrome, hepatic cirrhosis and heart failure since chylous effusion in these conditions has a distinctive transudative characteristic[18].

Lymphagiomatosis appears to be due to a lymphatic developmental abnormality, but presents at a later age[3]. It has been described in patients ranging from birth up to 81 years old. It most frequently presents in late childhood. The lesions can occur anywhere, but it has a predilection for thoracic and neck involvement. Chylous effusion is common. The coexistence of lytic bone lesions and chylothorax serves as an important diagnostic clue. Lymphangiography in these cases reveals multiple lesions of the thoracic duct, dilated lymphatic channels and lymphagiomas throughout the bones and lungs. It is also useful to exclude the presence of mediastinal mass. Histopathology in lymphagiomatosis demonstrates anastomosing endothelial lined spaces along pulmonary lymphatic routes accompanied by asymmetrically spaced bundles of spindle cells.

Lymphoma was considered because it is the most common cause of nontraumatic chylothorax[1]; and mediastinal lymphadenopathy on Chest CT scan[2]. Immunophenotyping was done in this patient. The report showed numerous small round lymphocytes and many histiocytes but there was no evidence of lymphoma. On the other hand, tuberculosis was considered due to the following reasons: [1] history of TB exposure; [2] positive PPD; [3] pleural fluid showing 100% lymphocytes on cell count; and [4] the chronic inflammatory pattern on cytology report of the pleural fluid. Frozen section of lymph nodes identified intraoperatively were initially read as tuberculosis. The granulomatous inflammation with caseation necrosis and Langhans type giant cells were consistent with tuberculosis.

Management of chylothorax remains to be a therapeutic challenge due to its diversity of causes and severity as well as its relatively uncommon occurrence. The underlying cause, quality and duration; clinical effects of the effusion; patient's cardiopulmonary and nutritional status; other concurrent co-morbid factors are important in determining the optimal regimen of management. Treatment modalities are categorized into nonoperative and operative. The goals of the management are to alleviate the symptoms and to allow the underlying lung to reexpand. Also preventing recurrence of chylothorax is important while minimizing potential morbidity. Associated complication include dehydration, malnutrition and immunodeficiency which are the principal dangers commonly encountered with persistent drainage of chylothorax[16].

Initial management consists of (1) chest tube drainage; (2) medium chain triglyceride enriched formula; and (3) total parenteral nutrition[7]. In a study by Buttiker, involving 39 cases, patients with chylothorax were treated primarily with fat free oral alimentation consisting of protein and starch. If chyle is persistently produced, total parenteral nutrition with total enteric rest can be done. If conservative therapy is not successful, pleurodesis can be performed[6]. With fat-free nutrition, chyle disappeared in 29 of 39 patients. Five patients died and five required pleurodesis.

There is no clear-cut definition as to when surgery should be done. The usual recommendations to do surgery are when (1) effusion persists for >2 weeks; (2) amount of chylous effusion is >100 ml per year age in children; and (3) presence of imminent nutritional complication[1,6,16]. Our patient was referred to TCVS and reinsertion of the chest tube was done.

He was observed for 10 days while on TPN. However, CTT output was persistent hence surgical

intervention was done before patient became too malnourished and immunocompromised. Right posterolateral thoracotomy was done through the 6th intercostal space. Intra-operatively, multiple mediastinal, hilar and periaortic lymph nodes seen. The thoracic duct was ligated as it entered through the hiatus and pleurectomy was done. Frozen section of the mediastinal nodes was consistent with pulmonary tuberculosis.

On the third post-op day, patient was noted to be dyspneic. CXR showed pleural effusion on the left. Chest tube on the left was inserted obtaining milky fluid and >500 cc of chylous fluid was drained. Patient eventually underwent pleurodesis. In 1934, Heppner stated that chylous fistulae close by obliteration of the adjacent pleural space rather than by healing of the lymphatic vessel itself. To accelerate pleural symphysis, various chemical sclerosants have been applied including talc, nitrogen mustard, quinacrine and tetracycline. Pleurodesis performed in the management of chylothorax has most commonly involved talc insufflation with thoracoscopy. However, talc and other sclerosing agents may also be instilled through the chest tube. This was done to our patient. A Brazilian study reported 22 patients who underwent talc pleurodesis for control of nonmalignant pleural effusion. The procedure was successful in 10 of the 22 patients including all of those with chylothorax. However, other authors have reported less favorable experience with chemical pleurodesis and have favored surgical pleurectomy instead.

Our patient tolerated the procedure well with no post-operative complications and was sent home about a week after chemical pleurodesis was performed. He eventually completed a nine month course of anti-TB medications (2 months of Isoniazid, Rifampicin and Pyrazinamide and 7 months of Isoniazid and Rifampicin) with noted clinical improvement. On his last follow-up visit, there was good weight gain and the patient was assessed to be in a healthy condition.

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