

Chylothorax: A Postoperative Complication of Right Sided Pleuro-Pulmonary Surgery

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Abstract: A crucial role is played by the thoracic duct in the human body in the lymphatic system. Majority of the duct lies in the right hemithorax and can get damaged in cases of trauma or after major surgeries of the thorax. An X-ray would reveal effusion, however, the content of the effusion can only be confirmed after thoracentesis and further lab investigation. Chylothorax is the term given if the aspirate has a high triglyceride level. The nature and appearance of the aspirate cannot rule out its diagnosis as a majority of the time a milky white appearance may not be present. We report a case of 84-year-old man who underwent right lower lobar lobectomy after being diagnosed with adenocarcinoma. Postoperative symptoms were that of pleural effusion. Thoracocentesis revealed a serosanguinous fluid. He was diagnosed as having parapneumonic effusion and was started on a course of antibiotic. Not much thought and investigatory effort were put to look into chylothorax as it was low on the differential. A month later he presented with similar features and thoracocentesis revealed a milky white effusion, Labs were then done to check triglyceride which came out high suggesting chylothorax. Chylothorax in most cases will be a delayed finding, presenting approximately 10 days after surgery. Thus we want to apply the importance of mandatory investigations to check for chylothorax in all cases of effusion as it has high mortality and on the contrary, has effective and simple treatment options.

Keywords: thoracic duct, trauma, hemithorax, Thoracocentesis, parapneumonic effusion.

INTRODUCTION

Disruption or obstruction of the thoracic duct leads to leaking of chyle into the pleural space and is called Chylous pleural effusion and has high morbidity and mortality. Cisterna chyli which drains lymph from the peritoneum ascends to continue as thoracic duct. Embryologically, the lower portion of the thoracic duct is formed after cisterna chyli disconnects from the surrounding veins. In 65% of the population thoracic duct typically courses through the aortic hiatus of the diaphragm (T12) moving towards the posterior mediastinum, and crosses the mediastinum on the right side at the fifth vertebral body and ends as a single or multiple lymphatic venous channels at the junction of the left internal jugular vein and left subclavian vein, other embryological variants are multiple thoracic duct branches which can be damaged during surgery.

As the majority of the thoracic duct lies in the right hemithorax it can be damaged easily due to stretching and can complicate into right sided effusion, a condition called chylothorax. Injuries either traumatic or nontraumatic can cause chylothorax. Patients present with symptoms similar to pleural effusion such as dyspnea, fatigue and a decreased tolerance to exercise

within ten days of the traumatic event. However, fever is not a symptom as there is no inflammatory response. With radiological examinations such as X-ray or CT, effusion can be detected, milky white fluid is aspirated but the serosanguinous fluid is not uncommon on thoracentesis. Thus, in patients who have had recent surgery chylothorax should be investigated with a high degree of suspicion. Albumin, total protein, LDH, pleural fluid analysis checking for WBC's, triglycerides, cholesterol, cytology, and culture should all be done as part of a laboratory investigation. A triglyceride level of greater than 110 mg/dl strongly supports the diagnosis of chylothorax in view of a typical presentation and history. Most patients with traumatic chylothorax improve with conservative management which includes chest tube drainage and dietary intervention. Those that do not improve, pleurodesis or thoracic duct embolization may be necessary which has a higher success rate.

CASE PRESENTATION

An 84-year old man, chronic smoker came for follow up after elective right lower lobe lobectomy for a well differentiated T1N0M0 adenocarcinoma. Past surgical history included transurethral transection of

bladder carcinoma and cardiovascular history of mitral valve repair for a valvular prolapse, paroxysmal atrial flutter, hyperlipidemia, and hypertension. He was a smoker of one pack of day for 30 years and occasionally takes alcohol.

The initial postoperative course was uncomplicated, however, after a week he began to have low-grade fever, chills, fatigue, anorexia and weight loss. During his monthly follow-up, he was found to have a weight loss of 20 pounds, decreased exercise tolerance and difficulty in breathing. Initial Chest X-ray revealed right-sided pleural effusion. Thoracentesis was completed yielding around 200 ml of serosanguinous fluid. The fluid was sent for culture however the culture returned negative however was still treated as having a parapneumonic effusion and thus was started on antibiotics. He had improved during his hospital stay and was discharged accordingly.

He had presented with similar symptoms again after a month as previous and was reported to have reaccumulation of fluid as seen on X-ray. His symptoms progressively worsened with dyspnea, nonproductive cough and right-sided chest tightness. His exercise tolerance decreased further and he had lost more weight. His labs were sent during which an LDH level was drawn which came back positive. He had a chest tube placed in his right lung for drainage and he was kept on low-fat diet. The patient had improved and was stable. In this case, thoracocentesis was done twice, and chylothorax was diagnosed on the second occasion leading it to be a complication of surgery.

Investigations

After the surgery, there was a drop in albumin level from 3.8g/dL after the surgery to 3.0g/dL, and total proteins from 7.1g/dL to 5.4g/dL rest of the labs were unremarkable. This decreased level of both albumin and protein was constant until the patient was diagnosed and treated for his chylothorax. Chest X-ray revealed obliteration of costophrenic and cardiophrenic angles in the right lung (figure 1) suggesting pleural effusion (grade 3), Left lung was normal. CT scan was opted which revealed posterior loculated pleural effusion on the right lung and sclerosis with focal cortical erosion and a periosteal reaction of the right posterior 8th rib was seen, most likely due to trauma. Image-guided aspiration revealed 1300cc fluid which again was serosanguinous. The fluid was sent for culture, cytology and to check triglycerides level. The culture was negative for any bacteria. Triglycerides were 400 mg/dl, which confirmed the diagnosis of chylothorax.

Differential Diagnosis

When viewing an effusion on an X-ray several differential diagnoses come to mind. Therefore the first step in diagnosis should be thoracentesis during which

LDH and protein levels should also be measured. When viewing the fluid sometimes a diagnosis can be made such as in hemothorax or empyema. If a diagnosis cannot be made then, one should look for if the effusion is exudative or transudative taking into account the pleural to serum protein and LDH ratios. If exudative then further investigations may be warranted such as a CT scan, ADA for tuberculosis, or pancreatic fluid amylase. If still a diagnosis cannot be made then a bronchoscopy or a biopsy should be planned[1].

If upon investigation the triglyceride level is less than 50 mg/dL for a pleural effusion it excludes the diagnosis of chylothorax. Thereby in our case, since the triglyceride level was increased all other differentials were effectively ruled out. Parapneumonic pleural effusion is one main of the differential but it is usually present in cases of bacterial or viral pneumonia as the initial presentation of this patient, can be present in the form of an exudate cloudy to clear in appearance. In complicated cases due to neutrophils, decreased glucose and high LDH level the effusions turns sterile as the bacteria are cleared. Chylothorax can be differentiated from Empyema Thoracis as the fluid aspirate can range in appearance from white to pink or the characteristic ("cream of tomato soup" color) and it is malodorous. Another differential can be that of Pseudochylothorax which are much less common and have a higher cholesterol content. Sometimes it happens such that the effusion occurs because of the chylous ascitic fluid that gets translocated from the abdomen via the diaphragmatic hiatus as seen in some cases of cirrhosis, for our case his LFTs were normal thus ruling out this possibility. Other conditions that can be considered are the ones related to AIDS, malignant effusions and secondary to congestive heart failure[2].

Treatment

At the time of initial diagnosis of pleural effusion patient was discharged on augmentin orally, however, despite this, his health status continued to deteriorate, and he was later admitted to the hospital for necrotizing pneumonia with parapneumonic effusion. He was treated with Unasyn (Ampicillin sulbactam) and showed rapid improvement and thereby he was discharged again with augmentin per orally for 2 weeks. When he presented a month after the initial follow-up, after diagnosis of pleural effusion with aspirated serosanguinous fluid, chest tube drain was inserted by thoracic surgery.

In Summary, initially, the treatment was conservative by following a low-fat diet and drainage by pleural tapping. The intervention was successful in reducing the chylothorax and the patient felt better. If the conservative measures were to have failed then a surgical approach by thoracic duct ligation would have been taken up.

Outcome and follow-up

The patient was told to follow up with his doctor weekly for a month and to report immediately if any similar signs or symptoms reappeared. He was also sent for physical rehab due to his hospital stays. He did not report any abnormalities within the month, so

reaccumulation of chyle was ruled out. The patient was told to follow a strict low-fat diet.

Ethical Committee

Permission was taken from the ethical committee for the case study of the patient, which took place in a university hospital setting.



Fig-1: A) X-ray Chest reveals Right sided Air fluid level (black arrow) indicating Pleural Effusion (Grade 3). B) Decreased effusion after the drain was inserted (white arrow)

DISCUSSION

The thoracic duct is an important vessel which approximately carries 2 L of fluid every day. Any damage to it along its pathway would cause exudation of its lymph which is called chyle. Chyle contains most of the ingested fat which is transported from the intestines to the circulatory system via the thoracic duct. Therefore, chyle contains lymph, cholesterol, chylomicrons, triglycerides and small amounts of other substances such as fat-soluble vitamins[3]. Thereby chyle would demonstrate a characteristic milky white color due to the fat content. On tapping, however, this may not be apparent in some cases. In a study done by Maldonado *et al.* where they studied 74 % with chylothorax, with 51% of the cases being caused by surgical procedures. The chylous milky fluid only appeared in 44% of the cases. The study concluded that the non-milky appearance is common[4].

Chylothorax occurs when the lymph accumulates in thoracic cavity causing symptoms similar to a pleural effusion [5]. Chylothorax can be classified into traumatic (mostly after surgery, central line, and trauma from a seat-belt during accidents) or non-traumatic (lymphomas, metastatic cancer, sarcoidosis, venous thrombosis and superior vena cava syndrome). In cases of post-surgical chylothorax, most cases will occur approximately 10 days after a surgical procedure as lymph will accumulate slowly[6].

This similarity is why many cases of chylothorax are mistreated and misdiagnosed even after a pleuropulmonary operation. The incidence of

chylothorax after pleuro-pulmonary operations, however, is very low as stated by a study done by Terizi *et al* which showed out of 1744 cases only 13 cases developed chylothorax[7]. Traumatic injuries can occur with any surgical procedure near the thoracic duct as it may injure the duct itself or one of its many tributaries. Chylothorax on the right side is predominant due to the thoracic duct crossing over the mediastinum at fifth vertebral body occurring at a rate of 50%. Depending on the site of injury the effusion will be localized to either the left or right side. If the trauma is above the level of 5th thoracic vertebrae it will be on the left side as opposed to below causing a right-sided effusion[8].

Diagnosis of chylothorax may be missed as the presentation of symptoms of an effusion may appear 10 days after the surgery, without signs of fever as there is no inflammatory response to the chyle. Another reason fever will not be present is because the chyle is bacteriostatic, even though the patient will be immunosuppressed due to loss of immunoglobulins, proteins and T lymphocytes into the pleural space[9]. Typical symptoms of a pleural effusion will be present such as decreased exercise tolerance, lethargy, dyspnea, and cough. X-ray and CT will show evidence of an effusion after a surgical procedure, leading to the necessity of thoracentesis. Therefore, the physician must have a high degree of suspicion if any surgery is done near the thoracic duct. In any case of surgery near the lymphatic duct, there should be a pleural fluid analysis done to check for elevated triglycerides or the presence of chylomicrons. A triglyceride level of more than 110 mg/dl strongly supports the diagnosis of

chylothorax, whereas less than 50 mg/dl would rule it out [10]. It is usually an exudate in nature with predominant lymphocytes[11]. The effusions with milky white appearance have a significantly higher level of triglyceride when compared to the serosanguinous effusions, contradicting the fluid biochemistry (high triglyceride, Low cholesterol + chylomicrons) which is similar for both the effusions. Thus leading to misdiagnosis of some cases due to the absence of the classic milky appearance[12].

Depending on the amount of chylous effusion the treatment is decided, 500ml or more would require surgical measures whereas less than 500ml would mandate a conservative treatment [7]. A misdiagnosis of chylothorax will cause the patient to take a long course of unneeded antibiotics with a longer hospital stay and complications. Conservative management with chest tube drainage and low-fat diet are all that is needed in most cases.

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