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Spontaneous large volume hemothorax managed with a small-bore chest tube

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Consent for publication: The patient gave his written consent to use his personal data for the publication of this case report and any accompanying images. All information regarding the patient has been de-identified.

Abstract

A 67-year-old male with metastatic lung cancer presented with acute shortness of breath and increasing oxygen requirements. He had a decreasing hemoglobin for which he required red blood cell transfusions. His chest x-ray showed near complete white-out of the left lung.

Bedside ultrasound (Handheld Sonostar C4PL) showed a large pleural effusion with swirling echogenic material suggestive of plankton sign. The pleural effusion was aspirated and showed frank blood, after which a small-bore chest tube (SBCT) was inserted. A total of 3200ml of blood was drained with the SBCT. There was complete clearance of the pleural space, and no further blood product transfusions were needed. This case highlights that conservative management can be considered in patients with spontaneous hemothorax due to metastatic disease.

Keywords: Hemothorax, lung cancer, small-bore chest tube, pleural effusion

Introduction

Spontaneous hemothorax occurs without any traumatic event or procedure that led to blood accumulation in the pleural space [1]. Spontaneous hemothoraces may occur due to coagulopathies or malignancies involving the pleura [1]. Hemothorax is defined by a pleural fluid hematocrit to serum hematocrit ratio greater than 50% [1,2]. For traumatic hemothoraces, large bore chest tubes should be placed, and surgical management may be indicated. However, spontaneous hemothoraces have different pathophysiology, and thus different management strategies may be considered. We present a case of a spontaneous hemothorax that was managed with a different strategy.

Case Report

A 67-year-old male presents to the emergency room with complaints of shortness of breath. He reports progressively increasing shortness of breath on exertion for the last 1 week. He has a past medical history of metastatic lung adenocarcinoma for which he is currently receiving erlotinib.

On examination, he is in mild respiratory distress. He is on 5 liters nasal cannula with an oxygen saturation of 92%. His heart rate is 123 beats per minute (bpm), respiratory rate of 25, blood pressure of 125/80 and a temperature of 37.3 C. On initial lab testing, his hemoglobin is 9.3 gm/dL, white blood cell count of 15.3 x 10^9/L and platelets of 144 x 10^9/L.

His prothrombin time was 14.9 seconds, partial thromboplastin time is 27.8 seconds with an International Normalized Ratio of 1.4.

His Chest x-ray (CXR) (figure 1) showed a large left pleural effusion. Bedside ultrasound (Handheld Sonostar C4PL) showed a large volume pleural effusion (figure 2) with multiple echogenic swirling densities that were floating in the pleural fluid at high speed. This was consistent with 'plankton sign' which can represent a hemothorax.

Given these findings, a Small-Bore chest tube (SBCT) - 10 French pigtail catheter with Seldinger technique under ultrasound guidance was placed. On initial aspiration, the fluid was bloody – appearing like a venous blood sample.

The SBCT was connected to a pleuro-evac drainage system at -20 cm H_2O suction. In the first 24 hours, 2000 ml was drained of bloody pleural fluid, and after 48 hours the total fluid drained was 3200 ml. On pleural fluid analysis, the pleural fluid hematocrit to serum hematocrit ratio was 88, consistent with a hemothorax.

After 48 hours, the pleural fluid drainage decreased to 100 ml/day. His hemoglobin initially dropped to 6.7 gm/dL and he was given 2 units packed red blood cells, after which he remained stable around 10 gm/dL with no further decline. After 48 hours of the SBCT insertion, his oxygen requirements were weaned off to room air from 5 liters, his heart rate improved to 90 bpm, and his tachypnea resolved. His CXR 48 hours after pigtail insertion (figure 3) showed significantly improved effusion with lung expansion. He was stable and discharged home with the SBCT in place. One week later his pleural fluid color had significantly improved to a serosanguinous color.

Discussion

We describe a case of a spontaneous hemothorax in a patient with metastatic lung cancer, which was successfully managed with a SBCT. Our patient likely had a spontaneous hemothorax from tumor seeding on the pleural surface which can erode and cause venous bleeding into the pleural space. This is usually a slow accumulation but can lead to a large collection over days, and a slow drop of 1-2 gm/dL of hemoglobin in 24 hours.

Malignancy associated spontaneous hemothorax is rare, but the often-reported tumors are sarcomas, neurofibromas, renal carcinoma, hepatocellular carcinoma [3-5]. Our case represents a spontaneous hemothorax due to lung cancer. There are limited reports of spontaneous hemothorax caused by lung cancer.

In our case, we placed a SBCT that was a 10 French pigtail. The tube did not clog throughout the drainage process and did not require flushing. It is important to note that draining 3.2 liters of bloody fluid does not necessarily indicate continuous bleeding. Rather this is most likely old blood that had been slowly oozing from the pleural surface over many days that led to 3 liters of blood collecting in the pleural space. One prior report showed success with a 16 French indwelling pleural catheter draining a spontaneous hemothoraces [2]. It is important that if a SBCT pigtail is placed for a complicated effusion or hemothorax, it should be directed by ultrasound into the largest collection, to be able to drain the dependent fluid successfully.

Ultrasound chest findings can help guide interventions in such cases. In our patient, ultrasound findings showed swirling echogenic material (plankton sign) at high speed in the pleural cavity. This finding represents highly proteinaceous material such as protein or blood in the pleural space, which can suggest a hemothorax. The ultrasound chest can help prepare the pulmonologist for necessary planning such as placing a chest tube instead of doing a thoracentesis [6,7]. This strategy would also confirm that this is not a traumatic hemothorax due to a thoracic procedure, but rather this was a spontaneous hemothorax present prior to any interventions.

Patients with metastatic disease to the pleura may have limited survival of a few months [8]. These patients may have limited respiratory reserve, high oxygen requirements, poor nutritional status and are immunocompromised. For these patients, undergoing video-assisted thoracostomy (VATS) may add to morbidity, and increased length of hospital stay. Such patients with metastatic disease are at higher risk for general anesthesia, and a non-intubated VATS may provide a solution without increased morbidity.

We recommend that for patients with spontaneous hemothorax who have a short life-expectancy; a SBCT may provide palliation and sufficient drainage of the pleural space. If the bleeding volume remains high after 2-3 days and there is a continued need for blood transfusion, then VATS should be considered.

Conclusion

Spontaneous hemothoraces can occur due to malignancy or coagulopathies. Ultrasound chest findings can guide the physician towards the underlying pathologies. An echogenic swirling pleural effusion represents a highly proteinaceous pleural effusion which could be due to malignancy or hemothorax. Spontaneous hemothoraces can be sufficiently managed with small bore chest-tubes, especially in patients with malignant spontaneous hemothorax.

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Figure 1: Initial chest x-ray showing a large left pleural effusion

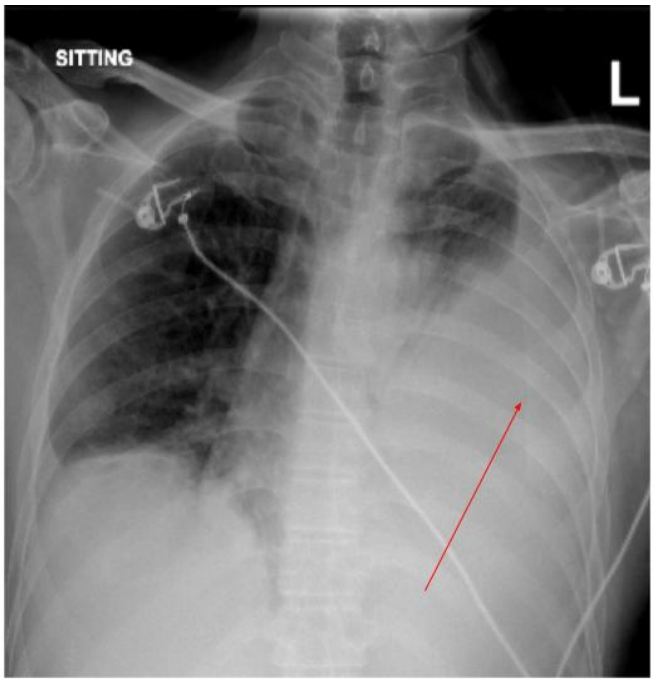

Figure 2: Thoracic ultrasound showing echogenic material floating in the pleural space - consistent with plankton sign

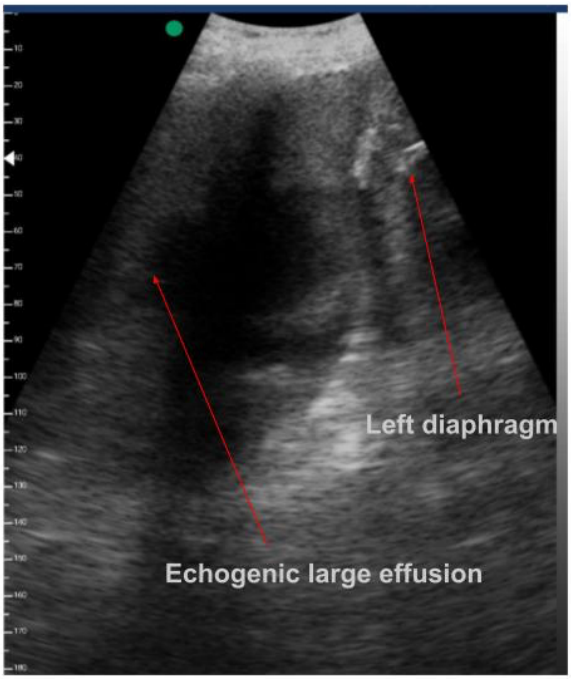

Figure 3: Chest x-ray 48 hours after chest tube insertion