

Case Report

Spontaneous pneumothorax after chemotherapy for sarcoma with lung metastases: Case report and consideration of pathogenesis

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ABSTRACT

Spontaneous pneumothorax is a rare complication of chemotherapy for lung neoplasm. Herein, we report a case of right spontaneous pneumothorax occurring in a patient in whom lung metastases from synovial cell sarcoma were treated with combination chemotherapy. Chest tube alone was unable to attempt the resolution of air leaks. Thus, it was connected to gentle suction set at minus 15 cm of water which achieved complete re-expansion of the lung with reduction of air leaks. In closure, chemical pleurodesis was attempted using 5 gram of talc diluted in 50 ml normal saline solution instilled into the right pleural cavity via chest tube. The connecting tube was suspended at 30 cm above the level of the patient's chest for one hour and the patient's position was changed at 15 minutes intervals to ensure uniform distribution. At three months of follow-up, the patient had no-recurrence of pneumothorax.

KEY WORDS

spontaneous pneumothorax; chemotherapy; lung metastasis; sarcoma; chest drainage

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Introduction

Spontaneous pneumothorax (SP) is a rare complication of chemotherapy for lung neoplasm. Dyspnoea and chest pain suddenly appearing during successful chemotherapy for metastatic chemosensitive tumors should alert the physician to the possibility of SP. The treatment is directed toward lung re-expansion. Closed chest tube is usually ineffective in preventing recurrence of pneumothorax while surgical treatment is a high risk procedure in these neoplastic patients whose general condition is usually poor. Herein, we report a case of SP occurring in a patient in whom lung metastases from synovial cell sarcoma were treated with combination chemotherapy. Lung re-expansion was obtained with chemical pleurodesis via chest tube.

Case report

A 47-year-old man was admitted to other hospital for evaluation

of acute respiratory failure dyspnoea. The patient was a non smoker and did not demonstrate clinical and/or radiological evidence of obstructive lung disease. He denied any recent trauma or chest diagnostic procedure. Fifteen months prior to admission, he underwent the excision of synovial cell sarcoma from his right arm. Five months later, follow up chest computed tomography (CT) revealed multiple and bilateral pulmonary metastatic nodules (Fig 1). Thus, he was administered six cycles of systemic combined chemotherapy by Dacarbazine and Doxorubicin which showed no effect. Then, administration of Ifosfamide and Urometixan, as a second-line chemotherapy, was started with complete regression of the pulmonary metastases. However, during the administration of the third cycle of Ifosfamide, he developed tachypnea, pleuritic pain in the chest, and tachycardia and was recovered to other hospital for the treatment of acute respiratory failure. A chest X-ray revealed a right pneumothorax confirmed by CT scan. Chest tube was inserted in the right side but there was no-complete re-expansion of the lung due to large air leaks (Fig 2). Following three days, the patient was referred to our unit for the treatment of the persistent pneumothorax. First, we performed bronchoscopy examination that revealed no-abnormalities. Second, the tube was connected to gentle suction set at minus 15 cm of water which achieved complete re-expansion of the lung with reduction of air leaks. Third, chemical pleurodesis was attempted using 5 gram of talc diluted in 50 ml normal saline solution instilled into the right pleural cavity via chest tube. Fourth, the connecting tube was suspended at 30 cm above the level of the patient's chest for one hour and the patient's position was changed at 15 minutes

No potential conflict of interest.

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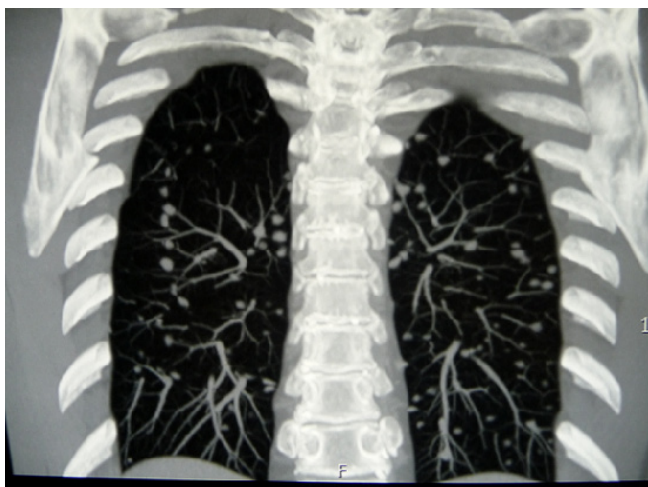


Fig 1. Chest tomography reveals multiple and bilateral pulmonary metastatic nodules.

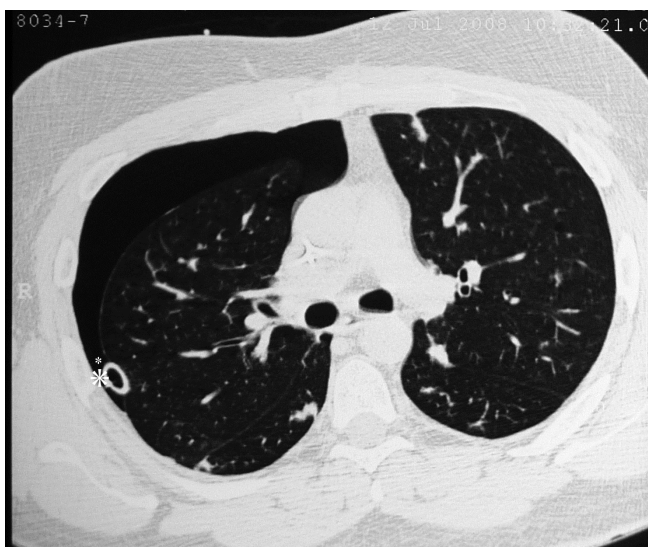


Fig 2. Chest tomography shows chest tube (*) inserted in the right side with no-complete re-expansion of the lung.

intervals to ensure uniform distribution. This technique allowed evacuation of air and prevented rapid evacuation of talc from the pleural cavity. After 24 hours, the lung was completely re-expanded and air leaks stopped. In closure, the tube was removed and the patient discharged (Fig 3). At three months of follow-up, the patient had no-recurrence of pneumothorax.

Discussion

SP is generally observed in healthy young man, as a result of the rupture of apical and/or subpleural blebs. Pneumothorax can also occur secondary to a variety of pulmonary disorders

such as chronic obstructive pulmonary disease (COPD), pneumoconiosis, diffuse interstitial fibrosis, and infection diseases. Iatrogenic factors are continuous positive pressure ventilation, closed-chest cardiac massage, and tracheotomy (1).

SP in primary pulmonary neoplasm or lung metastases is very rare. An experience from Mayo Clinic report that 10 of 1.143 cases with SP are attributed to a malignancy in the general population (2). However, SP seems to occur more often in patients with metastases from sarcomas, especially osteogenic sarcoma, than in patients with primary lung carcinoma.

Lai et al (3) report that 18 of 5.567 (0.003%) patients with lung cancer have a pneumothorax as a complication, and two of them after chemotherapy.

In an analysis of 552 cases of osteogenic sarcoma, McKenna et al (4) identify pneumothorax in 5% of the patients with pulmonary metastases in agreement with data of Smevick et al (5) who report a frequency between 5 to 7%.

Conversely, sporadic case reports describe SP due to lung metastases from teratomas, Wilms' tumors, melanomas, carcinomas of the kidney and pancreas, gynecologic malignancies, lymphomas, choriocarcinomas, and lymphangiomatosis (1).

The mechanism of pneumothorax following chemotherapy is not clearly understood yet, however, several hypotheses have been considered (6,7): 1) the rupture of a subpleural bulla after chemotherapy; 2) the rupture of an emphysematous bulla in an over expanded portion of the lung which is partially obstructed by a neoplasm; 3) tumor lyses or necrosis due to cytotoxic chemotherapy directly induces the formation of fistula. In the present case, the pathogenesis of the SP may have involved the third mechanism. Our patient is a non smoker, has no previous history of SP and is not manipulated in any way. Attachment of the first mechanism is ruled out because no bulla appeared at CT scan and patient is not affected by COPD according to his medical history. The second mechanism is unlikely, because the bronchoscopy reveals no abnormalities. The likelihood of the third mechanism is strengthened by responsiveness of the tumor to second-line cytotoxic chemotherapy. Probably, rapid lyses of the tumor may have caused necrosis of the tumor and rupture into the pleural space leading to a bronchopleural fistula. This type of complication is not unique, as rapid shrinkage of abdominal lymphoma which is known to lead to perforation of the bowel in some patients (7).

The treatment of SP secondary to chemotherapy is directed toward lung re-expansion. Closed chest tube is usually unable to prevent recurrence of pneumothorax in such patient. Sherman and Bract report that chest tube drainage alone results on only partial re-expansion of the lung (8). Surgical treatment is a high risk procedure in these patients whose general condition is usually poor. Moreover, such surgery is technically difficult and rarely indicated unless conservative procedure fails. Markman and colleagues report a case of bilateral pneumothorax

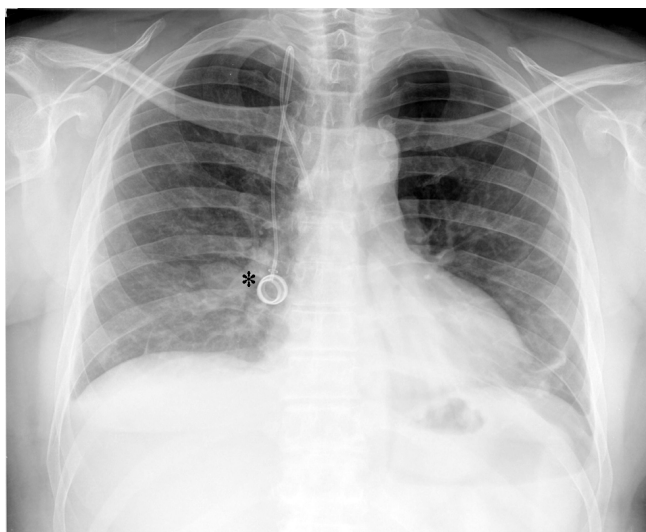


Fig 3. Chest X-ray performed 24 hours after chemical pleurodesis confirms complete re-expansion of the lung. In addition, a port-a-cath (*) for systemic injection of chemotherapy is detectable.

secondary to fibrosarcoma of the thigh where surgical closure of a broncho-fistula is performed with limited success (9). The literature on the effectiveness of chemical pleurodesis in primary SP is well documented (6). In our case, we decide against surgical treatment of pneumothorax because radical dissection of lung metastases is unfeasible. Thus, we attempt chemical pleurodesis through intrapleural instillation of talc. To prevent rapid evacuation of the talc, we suspend the connecting tube 30 cm above the level of the patient's chest. This technique allows evacuation of air from the pleural cavity and lung re-expansion, which is, in our opinion, safer than clamping the chest tube. The treatment is efficacy and at three months of follow-up, the patient has no-recurrence of pneumothorax. We describe this case in order to call attention that dyspnoea and chest pain suddenly appearing during successful chemotherapy

for metastatic chemosensitive tumors should alert the physician to the possibility of SP. With prompt recognition and treatment, morbidity and mortality can be avoided. If tube thoracostomy alone fails, suction drainage and chemical pleurodesis via chest tube may be an efficacy strategy to treatment of pneumothorax. In closure, surgical treatment should be considered if pneumothorax is resistant to convention treatment or in selected patient with controlled or controllable primary disease, absence of or controllable extra-thoracic disease, and adequate pulmonary reserve.

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