

Docetaxel (Taxotere®)-induced cavitory change of pulmonary metastatic lesions complicated by bilateral spontaneous pneumothoraces in a patient with primary adenocarcinoma of the lung

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ABSTRACT Pneumothorax is a complication that rarely occurs after chemotherapy for lung cancer. We report the chest computed tomography findings of a case of spontaneous pneumothorax complicating docetaxel (Taxotere®) treatment for pulmonary metastasis in a 70-year-old woman with pulmonary adenocarcinoma. The patient developed bilateral pneumothoraces, which was induced by changes in the cavitory pulmonary metastatic lesions, after systemic chemotherapy with docetaxel. The chest computed tomography findings and possible mechanisms of this unusual complication are discussed in this report.

Keywords: cavitory change, docetaxel, lung adenocarcinoma, pulmonary metastatic lesions, spontaneous pneumothorax

INTRODUCTION

Spontaneous pneumothorax as a complication of cancer is uncommon, accounting for only 0.05% of all pneumothoraces.⁽¹⁾ It is rarely encountered in cancer patients after chemotherapy,^(1,2) and the mechanism by which pneumothorax develops in lung cancer has yet to be elucidated. Herein, we describe a case of bilateral spontaneous pneumothoraces after administration of docetaxel for primary lung adenocarcinoma with metastases. A series of computed tomography (CT) findings that demonstrate the interval change in the pulmonary metastatic lesions before and after docetaxel administration is described, and possible mechanisms underlying this rare chemotherapy-related complication are discussed.

CASE REPORT

A 70-year-old woman presented with a two-week history of cough with blood-streaked sputum. Chest radiography revealed a well-defined solitary pulmonary nodule in the upper lobe of her left lung. Histopathology of the specimen obtained via CT-guided lung biopsy was indicative of adenocarcinoma. The patient refused treatment in our clinic, and instead received traditional herbal medicinal therapy from another clinic over the next five months. Repeat chest radiography showed interval enlargement of the nodule in the upper lobe of her left lung and she returned to our clinic for further treatment.

Chest CT revealed multiple metastatic nodules in both lungs and enlarged mediastinal lymph nodes. Follow-up chest CT after the patient had completed six courses of chemotherapy with cisplatin and gemcitabine (Gemzar®), revealed disease



Fig. 1 Axial CT image performed prior to treatment with docetaxel shows several nodular metastatic lesions (arrows) in both lungs, and bilateral pleural effusions.

progression and bilateral pleural effusions (Fig. 1). The patient was thus administered a course of chemotherapy with docetaxel to control the progression of the cancer. However, follow-up CT done after the course of chemotherapy with docetaxel revealed that some of the previously seen pulmonary metastatic lesions had undergone interval cavitory change to become thin-walled cysts and subpleural blebs (Fig. 2a). Furthermore, bilateral spontaneous pneumothoraces were also observed (Fig. 2b). As the pneumothoraces were small, the patient recovered within several days without chest tube drainage. She attended regular follow-up sessions at the hospital and remained in stable condition at the time of this writing.

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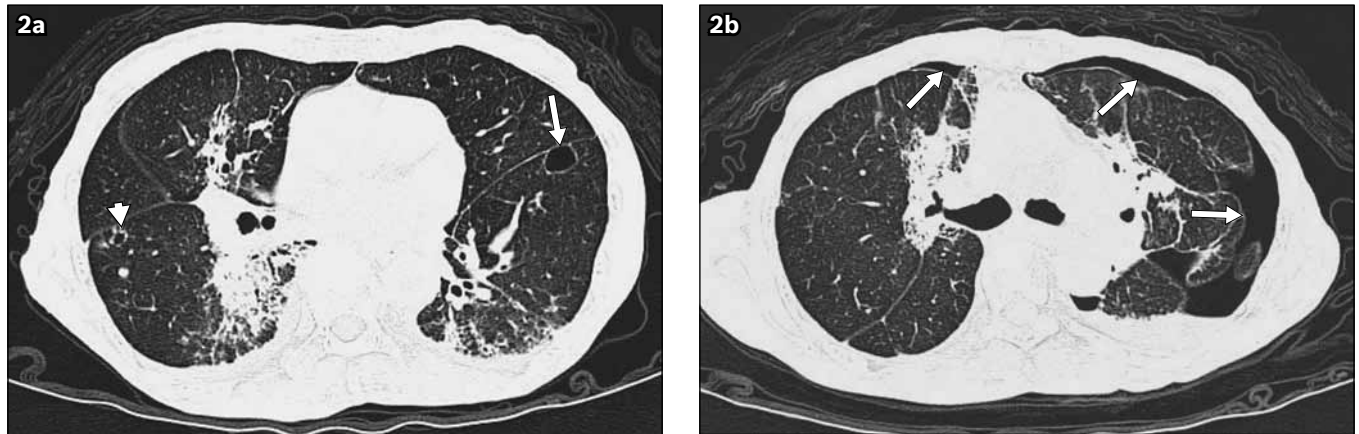


Fig. 2 Axial CT images performed three months after treatment with docetaxel show (a) one of the previously solid metastatic lesions in the left lung, which had transformed into a thin-walled cavitating nodule (arrow) and another in the right lung which had transformed into a cavitary lesion (arrowhead); and (b) small-sized bilateral pneumothoraces (arrows).

DISCUSSION

Spontaneous pneumothorax as a complication of pulmonary metastasis is uncommon, and presumably due to metastatic involvement of the visceral pleura, disruption of the pleura, or obstruction of the airway with air-trapping. Pneumothorax is most typical of metastatic sarcoma,⁽³⁾ while other causes include germ cell tumour, uterine leiomyosarcoma, endometrial carcinoma, synovial cell carcinoma, lymphoma, Wilms' tumour, thymoma, breast cancer and small cell lung cancer.⁽²⁾

Spontaneous pneumothorax is a rare complication during and after chemotherapy in patients with metastatic lung cancer. The mechanism by which pneumothorax develops during chemotherapy has yet to be elucidated, but several hypotheses have been postulated. One hypothesis suggests that spontaneous pneumothorax occurs due to increased intrathoracic pressure following emetogenic chemotherapy.⁽²⁾ Formation of bronchopleural fistula due to cytotoxic chemotherapy can cause tumour lysis or necrosis, which can also lead to spontaneous pneumothorax.⁽⁴⁾ Cavitory change of solid metastatic lung lesions may also occur after sequential chemotherapy,^(5,6) resulting in thin-walled cysts that may accidentally rupture and form pneumothoraces.

In our case, the CT images taken after chemotherapy with docetaxel demonstrated cavitation in some of the previously solid metastatic lesions, which were present in both lungs. Bilateral spontaneous pneumothoraces were also simultaneously observed. Thus, the phenomenon of pneumothoraces in our patient was likely due to the rupture of the cavitory metastatic lesions and pleural disruption. Since our patient did not complain of any discomfort such as nausea or vomiting during treatment with docetaxel, the possibility of spontaneous pneumothoraces due to increased intrathoracic pressure was unlikely. The visualisation of cavitory change in pulmonary metastatic lesions before and after administration of docetaxel, using CT, has not been previously reported in the literature.

Drugs other than docetaxel may induce spontaneous pneumothorax. According to a previous report, gefitinib

caused a similar complication.⁽⁴⁾ Our case illustrates that the presentation of spontaneous pneumothorax can be subclinical. Hence, we speculate that there may be more cases of patients with pulmonary metastases who develop spontaneous pneumothorax after chemotherapy, but these cases go unreported as patients may recover without displaying any symptoms.

In conclusion, patients undergoing chemotherapy for pulmonary metastatic lesions, particularly those with cavitation of their pulmonary metastatic lesions, have a risk of developing spontaneous pneumothorax. Several reports in the literature have described more severe sequelae of spontaneous pneumothorax, which required interventions such as closed chest tube drainage and chemical pleurodesis.^(2,7) We therefore recommend that patients with cavitory changes in their pulmonary metastatic lesions after chemotherapy be informed of the risk of developing pneumothorax, and that regular follow-up chest radiography be performed on these patients. Patients should be also informed to alert their physicians if they experience chest pain or shortness of breath during the course of chemotherapy.

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