**Primary presentation of pulmonary adenocarcinoma with spontaneous pneumothorax: A case presentation**

Walid Abu Arab1,2, Dharar Alshehab1, Hassan Jamal Elddin1, Adel Ayed1,3

*1Thoracic Surgery Unit, Chest Disease Hospital, Kuwait*

*2Cardiothoracic Surgery Department, Faculty of Medicine of Alexandria, Egypt*

*3Department of Surgery, Faculty of Medicine, Kuwait University, Kuwait*

**Corresponding Author:**

Prof. Walid Abu Arab

Cardiothoracic Surgery Department

Faculty of Medicine

Middan Al-khartoum

Alexandria

Egypt

Tel. +2 01062335705

E-mail: walidabuarab@yahoo.com

***Abstract:*** *116*

***Word count:****872*

***Key words:*** *Spontaneous pneumothorax, Lung cancer, Adenocarcinoma*

**Abstract:**

Occurrence of spontaneous pneumothorax (SP) in young adults or older patients with chronic obstructive pulmonary disease (COPD) is not uncommon. However, its association with primary lung cancer is rare especially when the SP occurring as a first manifestation. Although some authors stated that if SP present, majority of cancers will be already at an advanced stage, however, other authors found that SP occurred early in the course of the disease. We present a patient in whom the SP occurred as an initial clinical manifestation. During investigation, a primary pulmonary adenocarcinoma was diagnosed (T1bN0M0). Patient had video-assisted lobectomy. We discuss the reported mechanisms of the development of SP in those patients and the prognosis in such patients.

**Introduction:**

Spontaneous pneumothorax (SP) is occurring usually due to rupture of a sub-pleural bleb or emphysematous bulla (1, 2). It can complicate either primary or secondary pulmonary neoplasms (2). The occurrence of SP with primary pulmonary neoplasms or lung metastasis is infrequent.Its incidence is not exceeding 0.05 % with the primary lung cancer (1, 3-5). Literature reported that pneumothorax can be the first presentation of lung cancer or can complicate the lung cancer patients during the disease course (5- 9). Some studies shown that pneumothorax may have resulted from lung cancer through direct or indirect causes (6). We report here a patient who was admitted for SP and primary adenocarcinoma was diagnosed accidently during the management of pneumothorax.

***Case presentation:***

A 57 years old man, heavy smoker (two and halve packs per day); previously healthy, was admitted to a local hospital for right sided SP. A thoracic drain was inserted and was kept under-water seal. Following lung expansion, Chest X-ray (CXR) revealed a small radio-opaque shadow located at the upper right lung zone (Figure 1). Chest computed tomography (CT - Chest) scan showed a peripheral radio-opaque shadow measuring 3.5 X 4 cm; of irregular wall located at the right upper lobe. The right lung was slightly collapsed with no associated enlarged mediastinal lymph nodes (Figure 2). Fibre-optic bronchoscopy was performed, there was no endo-bronchial pathology.Broncho-alveolar lavage was performed for histopathology and for acid fast bacilli (AFB) and both were found negative. The preliminary diagnosis was pulmonary carcinoma (T1N0M0). CT-guided core needle biopsy was performed. Pathology and immuno- histo-chemistry revealed a primary pulmonary adenocarcinoma. Whole body Positron Emission Tomography was done for the patient. It revealed an active mass lesion (SUV = 18.5) at the right upper lobe and no distant metastases nor mediastinal lymph nodes.

Video-assisted thoracoscopic surgery was scheduled for the patient. Right upper lobectomy andmediastinal lymph node dissection was done. Postoperative course was uneventful. Histo-pathological examination revealed adenocarcinoma PT1bN0. Patient did not received either chemotherapy or radiotherapy.

**Discussion:**

Generally, SP occurs due to rupture of sub-pleural bleb or rupture of lung bulla (1, 2). However,it is infrequently associated with lung cancer. There are many theories that tried to explain this rare association. One of the theories stated thepossibility that SP and lung cancer are two independent diseasesand they incidentally presented at same time. Other theory stated that SP is a manifestation of the lung cancer(10, 11).In the majority of the reported cases, the SP was considered as a treatment related complication, which occurred following either chemotherapy (12, 13), or radiotherapy (14, 15). Moreover, SP may manifest itself as a part of natural progression of thelung cancer. However, it still can be the first clinical presentation of lung cancerin few patients (1, 16, 17).

The mechanism by which the pneumothorax is developed in those patient is not clearly settled up to the moment. However, several explanations have been published. One explanation is that the cancerous pulmonary lesion get necrosed and ruptured into the pleural space (1). Another explanation is that the endo-bronchial neoplasm serve as a check valve that leads to dilatation and consequent rupture of the distal distended alveoli (18). Some other authors attributed the occurrence of the SP to the rupture of some of the small sub-pleural blebs accidentally (19). In our patient, the SP could be explained by rupture of one of sub-pleural blebs or lung bulla as the patient has a history of heavy smoking and chronic obstructive lung disease (COPD). This is confirmed during surgery as many small blebs and some large lung bullae were identified and could explain or confirm our opinion.

Prognosis of pulmonary cancer patients who developed SP is documented by some authors to be poor (9, 10). It was stated that by the development of SP, the patients’ survival will not be longer than three months (9).This could be related to the advanced stage of the cancerous disease with extensive pulmonary tissue damage either by the tumor itself or by anti-neoplastic therapies in the form of irradiation or chemotherapy (6, 9, 20).In contrast, Okada *et al.*(21), and other groups of authors (20) had different opinion. Our group think that the prognosis of patients with lung cancer depends mainly on the stage of the lung cancer, general condition of the patient, presence of co-morbidities, and previous chemotherapy or radiotherapy on presentation of the SP. Those patients who did not receive chemotherapy or radiotherapy before during their illness, or have an early stage lung cancer, or those in whom the SP was diagnosed before diagnosis of lung cancer will have better prognosis.

**Conclusion:**

SP is not infrequent in young patients and is usually primary in nature and due to rupture of sub-pleural blebs. Moreover, it can occur in older patients who have COPD with bullous lung disease due to rupture of lung bulla. Furthermore, one should keep in mind the possibility of occurrence of SP secondary to a primary lung cancer. Prognosis is not usually bad in all patients. It depends mainly on the stage of the lung cancer on presentation, general condition of the patient, and the mechanism by which the SP developed.

**Conflict of interest:** None-declared

**Figure legends:**

**Figure 1:**

Chest X-ray; postero-anterior view (CXR-PA) showed a small radio-opaque shadow located at the upper right lung zone

**Figure 2:**

Chest computed tomography (CT - Chest) scan showed a peripheral radio-opaque shadow of irregular wall located at the right upper lobe. The right lung is slightly collapsed.

**References:**

1. Vencevičius V, Cicėnas S. Spontaneous pneumothorax as a first sign of pulmonary carcinoma. World journal of surgical oncology. 2009 Jun 30; 7(1):57.
2. Bauman MH, Noppen M: Pneumothorax. Respirology 2004, 9:157-164.
3. Iwata T, Inoue K, Morita R, Tsukioka T, Yamoto M, Suehiro S. Acute nonbacterial pleuritis caused by spontaneous rupture of metastatic pulmonary adenocarcinoma. General thoracic and cardiovascular surgery. 2008; 56(7):347-50.
4. Smevik B, Klepp O. The risk of spontaneous pneumothorax in patients with osteogenic sarcoma and testicular cancer. Cancer. 1982; 49(8):1734-7.
5. Steinhäuslin CA, Cuttat JF. Spontaneous pneumothorax: a complication of lung cancer?. Chest. 1985; 88(5):709-13.
6. Lai RS, Perng RP, Chang SC. Primary lung cancer complicated with pneumothorax. Japanese journal of clinical oncology. 1992; 22(3):194-7.
7. Yeung KY, Bonnet JD. Bronchogenic carcinoma presenting as spontaneous pneumothorax. Case report with review of literature. Cancer. 1977; 39(5):2286-9.
8. Gautam HP, Knight EO. Spontaneous pneumothorax due to perforated bronchial carcinoma. British journal of diseases of the chest. 1970; 64(2):110-1.
9. Bouros D, Andrianopoulos E: Spontaneous pneumothorax. A complication of lung cancer. Chest 1986, 90: 926.
10. Jiang H, Ma W, Zhang JP, Zhang L. Spontaneous pneumothorax as the initial manifestation of stage IB primary pulmonary carcinoma: Really early stage cancer?. Journal of cancer research and therapeutics. 2013; 9(5):118.
11. Pototskii V, Kolyarzh M. Spontaneous pneumothorax as a manifestation of lung cancer and pulmonary metastases. Problems of oncology. Voprosyonkologii. 1961; 7:1582.
12. Mori M, Nakagawa M, Fujikawa T, IWASAKI T, KAWAMURA T, NAMBA Y, NIINAKA M, TAKEDA Y, KIMURA H, NAKA N, OKADA T. Simultaneous bilateral spontaneous pneumothorax observed during the administration of gefitinib for lung adenocarcinoma with multiple lung metastases. Internal Medicine. 2005; 44(8):862-4.
13. Ozet A, Yavuz AA, Ozturk B, Komurcu S, Arpaci F, Tuvay E, Tezcan Y. Recurrent spontaneous pneumothorax following high-dose chemotherapy in a patient with non-seminomatous testicular cancer with pulmonary metastases. Tumori. 2000; 86(3):253-5.
14. Song-wen RS, ZHANG LZ. Erlotinib treatment for persistent spontaneous pneumothorax in non-small cell lung cancer: a case report. Chin Med J (Engl) 2010;123:3501‑3.
15. Ohnishi K, Shioyama Y, Nomoto S, Sasaki T, Ohga S, Yoshitake T, Toba T, Atsumi K, Shiinoki T, Terashima H, Honda H. Spontaneous pneumothorax after stereotactic radiotherapy for non-small-cell lung cancer. Japanese journal of radiology. 2009; 27(7):269-74.
16. Moreno Merino S, Gallardo Valera G, CongregadoLoscertales M. Spontaneous pneumothorax as the initial manifestation of medullary thyroid carcinoma. Arch Bronconeumol 2011; 47:615‑6.
17. Galbis CJ, Mafé MJ, Baschwitz GB, Pérez CA, Rodríguez PJ. Spontaneous pneumothorax as the first sign of pulmonary carcinoma. Archivos de bronconeumologia. 2001; 37(9):397-400.
18. Minami H, Sakai S, Watanabe A, Shimokata K. Check-valve mechanism as a cause of bilateral spontaneous pneumothorax complicating bronchioloalveolar cell carcinoma. Chest. 1991; 100(3):853-5.
19. Arab WA, Echavé V, Sirois M, Gomes MM. Incidental carcinoma in bullous emphysema. Canadian Journal of Surgery. 2009; 52(3):E56.
20. Lois M, Noppen M. Bronchopleural fistulas: an overview of the problem with special focus on endoscopic management. Chest. 2005; 128(6):3955-65.