ACTA MEDICA LITUANICA. 2011. Vol. 18. No. 2. P. 53–55

Malignant pulmonary neoplasms predisposing to pneumothorax

Saulius Cicėnas[1,2],

Vladislavas Vencevičius[1]

[1] *Department of Thoracic Surgery and Oncology, Institute of Oncology, Vilnius University, Vilnius, Lithuania*

[2] *Vilnius University, Medical Faculty, Institute of Rehabilitation, Sport Medicine and Nursing, Vilnius, Lithuania*

Bachground. The main purpose was to point out pneumothorax (P) as the first symptom of thoracic malignancy. The mechanisms by which pneumothorax occurs in lung cancer are not clear.

Materials and methods. From 1970 to 2009, 42 cases of pneumothorax as the initial symptoms of lung cancer were diagnosed at the Department of Thoracic Surgery and Oncology, Institute of Oncology, Vilnius University. In 27 patients (64.3%), pneumothorax occurred in primary lung carcinoma (LC) and 15 patients (35.7%) in metastatic LC. The mean age was 53.7 years. The morphology of LC was as follows: squamous cell carcinoma 17 cases (40.4%), adenocarcinoma 6 cases (14.3%) and small cell carcinoma 5 cases (11.9%). Morphology in the group of 15 metastatic cases (35.7%): 2 cases of metastatic angiosarcoma, 3 cases of chondrosarcoma, 4 cases of seminoma, 4 cases of renal cancer and 2 cases of metastatic synovial sarcoma.

Results. Pleural drainage with chemotherapy was used for 16 patients (38.0%), 21 patients (50.0%) underwent thoracotomy, and 5 patients (11.9%) video-assisted thoracic surgery (VATS). Complications were noted in 10 patients (23.8%). Pneumothorax was cured in 41 patients (97.6%), and 1 patient (2.4%) died. In 16 patients (38.0%) the lung was expanded by drainage, 21 (50.0%) underwent surgery and 5 patients (11.9%) minimal invasive surgery (VATS), 14 patients (33.3%) underwent chemoradiation after lung recovery. Median survival of the patients was 31 months.

Conclusions. Pneumothorax as the first manifestation of LC appears not often but may have dangerous complications.

Key words: lung cancer, pneumothorax, pneumothorax as an initial symptom of malignant pulmonary neoplasms, diagnostics and treatment of lung cancer, lung metastases

INTRODUCTION

Pneumothorax (P) as the first sign of bronchial carcinoma is a rare complication with a poor prognosis. The estimated rate of joint occurrence varies between 0.03 and 0.05% of primary lung cancer (1). The main factor in the etiology of SP could be related to tumour lysis and a rapid rupture, or a subpleural metastasis into the pleural cavity, thus leading to a bronchopleural fistula (2).

Pneumothorax in primary lung cancer is rare, and its prognosis is poor. Lung cancer should always be considered as a possible cause of pneumothorax, and it is important to diagnose cancer as early as possible.

MATERIALS AND METHODS

In 1970–2009, 42 cases of P as the first manifestation of lung cancer were diagnosed at the Department of Thoracic Surgery and Oncology, Institute of Oncology,

Correspondence to: Saulius Cicėnas, Department of Thoracic Surgery and Oncology, Institute of Oncology, Vilnius University, Santariškių 1, LT-08660 Vilnius, Lithuania.
E-mail: saulius.cicenas@vuoi.lt

Vilnius University. In 27 patients (64.3%), P occurred in primary lung carcinoma (LC) and in 15 patients (35.7%) in metastatic LC. Patients' distribution by sex: 30 (71.4%) males and 12 (28.6%) females. Their mean age was 53.7 years.

X-ray, bronchoscopy, thoracoscopy (VATS), chest CT and morphology methods were used for the diagnosis. Pneumothorax in 25 patients (59.5%) was found on the right and in 17 patients (40.4%) on the left side; 35 patients (83.3%) had partial P, 7 patients (16.6%) total P; 23 patients (54.7%) had fluid in the pleural space, of them 8 (39.1%) were bleeding into the pleural space. Central type LC was confirmed in 20 (47.6%) and peripheral type in 22 patients (52.1%). LC morphology: squamous cell carcinoma 17 cases (40.4%), adenocarcinoma 6 cases (14.3%) and small cell carcinoma 5 cases (11.9%). The morphology in the group of metastatic disease: 2 cases of metastatic angiosarcoma, 3 cases of chondrosarcoma, 4 seminomas, 4 renal cancers and 2 cases of metastatic synovial sarcoma.

RESULTS

Pneumothorax treatment tactics may be very different, depending on P etiology and pathogenesis and also on P clinical process. Pleural drainage with chemotherapy was used for 16 patients (38.0%), 21 patients (50.0%) underwent thoracotomy (9 – wedge resections, 7 – lobectomies, 5 – pneumonectomies) and 5 patients (11.9%) VATS surgery. Complications occurred in 10 patients (23.8%).

Pneumothorax was cured in 41 patients (97.6%), and one patient (2.4%) died. The median survival of patients was 31 months. Fourteen patients (33.3%) underwent chemoradiation after lung recovery (Table).

Table. **Results of SP treatment**

Methods and treatment	Number of patients	Recovery	Died
Pleural drainage + chemotherapy	16 (38.0%)	16 (38.0 %)	–
Surgical treatment	21 (50.0%)	20 (47.6%)	1
VATS surgery	5 (11.9 %)	5 (11.9%)	–
Total	42	41 (97.6%)	1 (2.4%)

The association between pneumothorax and lung cancer is very rare, expecially in the abscence of other radiological disorders suggesting neoplasia after pulmonary reexpansion. In these cases, the diagnosis is extremely difficult and must be always suspected in patients with P and at risk of pulmonary cancer.

DISCUSSION

Pneumothorax can be classified as primary and secondary. Primary P is usualy characterized by a rupture of a bleb in the lung, while secondary P mostly occurs due to chronic obstructive pulmonary disease (COPD) with emphysematous bullae, tuberculosis, pneumonia, asthma, cystic fibrosis, lung cancer, interstitial lung disease, lymphangioleiomyomatosis (1–3).

Pneumothorax as the initial manifestation of bronchial carcinoma is a rare complication with a poor prognosis. Considering that only 2% of all P coexist with malignant lung diseases (either primary or secondary), this tumour complication must be especially suspected in older patients. Their prognosis may be improved entirely by a rapid diagnosis and therapy (4).

The mechanism of pneumothorax from lung cancer is not well understood, but several theories have been advanced. One concept is that it may be a result of tumor necrosis – a rupture of the necrotic neoplastic tissue in the pleural cavity (9).

Rupture of a necrotic tumour nodule or necrosis of subpleural metastases produce a bronchopleural fistula which results in pneumothorax (5). The next theory, cancer of the check valve mechanism tumor at the lung periphery can obstruct bronchioles and lead to a local overdistention and rupture of the lung (10).

Most patients with lung cancer have chronic bronchitis or emphysemic bullae, and these bullae may rupture following the disturbance of lung architecture due to bronchial cancer (11).

Pneumothorax related to therapy has been reported in patients receiving chemotherapy and / or radiotherapy for lung cancer (12). There is a possibility that P and lung cancer are two independent and incidental processes. These conceptions suggest that lung cancer should always be considered as a possible cause of P in older patients.

CONCLUSIONS

Pneumothorax as the first manifestation of lung cancer appears not often, but has dangerous complications.

Received 26 April 2011
Accepted 26 May 2011

References

1. Bauman MH, Noppen M. Pneumothorax. Respirology. 2004; 9: 157–64.
2. Sahn SA, Heffner JE. Spontaneous pneumothorax. N Engl J Med. 2000; 342: 868–74.

3. Takashi I, Kiyotoshi I, Ryuhei M. Acute nonbacterial pleuritis caused by spontaneous rupture of metastatic pulmonary adenocarcinoma. Gen Thorac Cardiovasc Surg. 2008; 56: 347–50.
4. Smevik B, Klepp O. The risk of spontaneous pneumothorax in patients with osteogenic sarcoma and testicular cancer. Cancer. 1982; 49: 1734–7.
5. Steinhäuslin CA, Cuttat JF. Spontaneous pneumothorax. A complications of lung cancer. Ann Thorac Surg. 2005; 79: 716.
6. Galbis CJM, Mafé MJJ, Baschwitz GB, Pérez CA, Rodríguez PJM. Spontaneous pneumothorax as the first sign of pulmonary carcinoma. Arch Bronconeumol. 2001; 37(9): 397–400.
7. O'Connor BM, Ziegler P, Spaulding MB. Spontaneous pneumothorax in small cell lung cancer. Chest. 1992; 102(2): 628–9.
8. Pohl D, Herse B, Criée CP, Dalichau H. Spontaneous pneumothorax as the initial symptom of bronchial cancer. Pneumologie. 1993; 47(2): 69–72.
9. Tsukamoto T, Satoh T, Yamada K, Nagasawa M. Primary lung cancer presenting as spontaneous pneumothorax. Jpn J Thorac Dis. 1995; 33(9): 936–9.
10. Kai-Yiu Y, Bonnet JD. Bronchogenic carcinoma presenting as spontaneous pneumothorax. Case report with review of literature. Cancer. 2006; 39(5): 2286–9.
11. Okada D, Koizumi K, Haraguchi S, Kawamoto M, Mikami I, Tanaka S. Pneumothorax manifesting primary lung cancer. Jpn J Thorac Cardiovasc Surg. 2002; 50(3): 133–6.
12. Nishioka M, Fukuoka M, Nakagawa K, Matsui K, Nakajima T. Spontaneous pneumothorax following partial resolution of total bronchial obstruction. Chest. 1993; 104(1): 160–3.
13. 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.

Saulius Cicėnas, Vladislavas Vencevičius

PIKTYBINIAI PLAUČIŲ NAVIKAI, SUKELIANTYS PNEUMOTORAKSĄ

Santrauka

Darbo tikslas: Įvertinti šiuolaikinių diagnostikos metodų reikšmę nustatant pneumotoraksą, kuris įvyksta dėl pirminio ar metastatinio plaučių vėžio.

Medžiaga ir metodai. 1970–2009 m. Vilniaus universiteto Onkologijos instituto Krūtinės chirurgijos ir onkologijos skyriuje gydyti 42 ligoniai, kuriems liga pirmą kartą pasireiškė pneumotoraksu (P). P yra reta įvairių plaučių ligų komplikacija, kuri įvyksta staiga ir pakeičia pirminės ligos eigą. Pagrindiniai P diagnostikos metodai: rentgenologinis, bronchoskopinis, torakoskopinis (VATS), kompiuterinė tomografija (KT) ir morfologinis tyrimas. Atsižvelgiant į bendrą ligonio būklę ir proceso išplitimą bei morfologinio tyrimo duomenis yra taikomi ir atitinkami gydymo metodai. Centrinio plaučio vėžys buvo patvirtintas 27 (64,3 %) ligoniams, periferinis – 15 (35,7 %) ligonių. Plokščialąstelinis plaučių vėžys morfologiškai patvirtintas 17 (40,4 %) ligonių, liaukinis – 6 (14,3 %), o smulkių ląstelių – 5 (11,9 %) ligoniams. Metastatinis plaučių vėžys patvirtintas 15 (35,7 %) ligonių, iš jų: angiosarkoma – 2 ligoniams, chondrosarkoma – 3, seminoma – 4, inkstų vėžys – 4, metastatinė synovialinė sarkoma – 2 ligoniams.

Rezultatai. Pleuros ertmės drenažas ir chemoterapija buvo taikyta 16 (38,0 %) ligonių, 21 (50,0 %) atlikta torakotomija, 5 (11,9 %) ligoniams taikytas videotorakoskopinis gydymas. Įvairios komplikacijos pasireiškė 10 (23,8 %) ligonių. P pagydytas, plautis išplėstas 41 (97,6 %) ligoniui. Vienas (2,4 %) ligonis mirė. Po įvairių taikomų intervencijų 14 (33,3 %) ligonių buvo paskirtas chemoterapinis gydymas. Vidutinis pacientų išgyvenamumas siekė 31 mėnesį.

Išvados. P, kaip pirminė plaučių vėžio pasireiškimo forma, yra reta, o šios komplikacijos gydymas sudėtingas.

Raktažodžiai: plaučių vėžys, pneumotoraksas, pneumotoraksas kaip pirminis piktybinių plaučių navikų simptomas, plaučių vėžio diagnostika ir gydymas, plaučių vėžio metastazės