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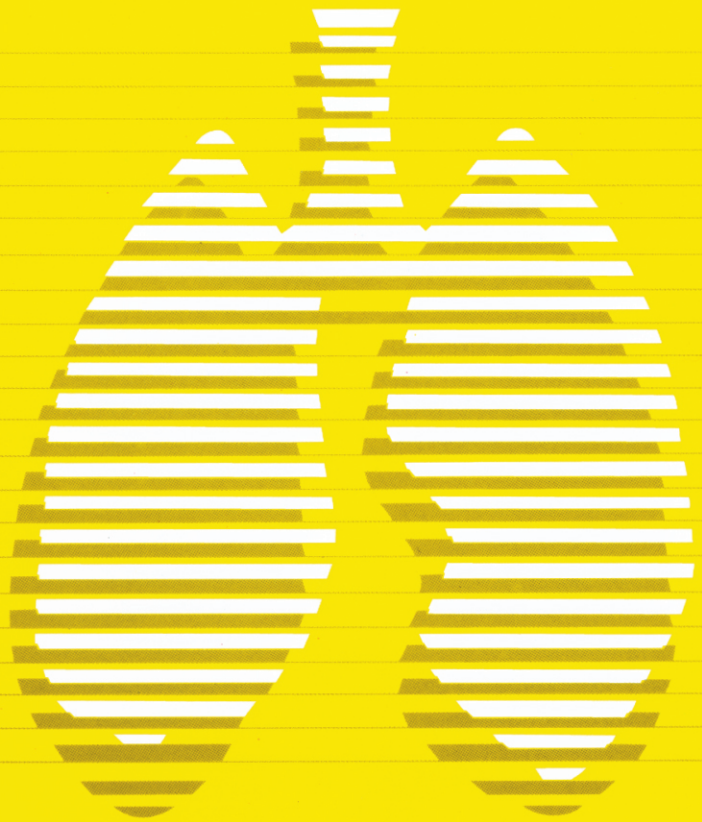

台灣胸腔暨重症加護醫學會

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Case Reports

Intrapulmonary Solitary Fibrous Tumor

Yu-Chen Yeh, Ching-Hsiung Lin, Ying-Ming Shih, Jeng-Hung Tsai, Pei-Yi Chu*, Jing-Lan Liou*, Kun-Tu Yeh*

Solitary fibrous tumors (SFTs) are neoplasms that usually arise from the pleura, especially the visceral pleura. SFTs can also develop in the lung, mediastinum, abdominal cavity, pericardium, ovary and liver. Intrapulmonary SFTs are extremely rare and little is known about the clinical behavior of this kind of tumor.

We report a 56-year-old woman with an intrapulmonary SFT presenting as a left lower lung mass lesion on chest radiographs. Thoracoscopic excision was performed and no recurrence or distant metastasis was noted within 1 year of follow-up.

Intrapulmonary fibrous tumors should be considered in the differential diagnosis list of well-defined solitary pulmonary parenchymal tumors. Complete surgical resection has both diagnostic and therapeutic value. Long-term follow-up is needed due to the recurrence potential. ***(Thorac Med 2010; 25: 56-61)***

Key words: solitary fibrous tumor

Introduction

Solitary fibrous tumors (SFTs) are neoplasms that arise from the pleura, especially the visceral pleura [1-3]. SFTs can also develop in the lung, mediastinum, abdominal cavity, parotid gland, pericardium, ovary, liver, orbit, bladder and periosteum [3-5]. The histogenesis of SFTs is controversial, but a mesenchymal origin is preferred [6].

Most SFTs behave like a slowly growing mass, but approximately 10-15% of such tumors behave in a malignant fashion [4]. Intrapulmonary SFTs are extremely rare and little is known about the clinical behavior of this type of tumor. We report a case of SFT of the lung and review the related literature.

Case Report

A 57-year-old woman visited our chest outpatient department complaining of intermittent chronic non-productive cough for 2 weeks. The symptoms were not associated with fever, dyspnea or chest pain. During the preceding month, she had been asymptomatic. and she denied alcohol consumption and tobacco use.

On physical examination, her temperature

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was 36.5°C, pulse rate was 98/minute, respiratory rate was 18/minute, and blood pressure was 125/68 mmHg. The oxygen saturation of the room air was 98% and the pulmonary function test results were within normal limits. This patient had not been previously exposed to asbestos and there was no family history of malignancy.

Routine chest roentgenogram (Figure 1) incidentally revealed an infiltrative lesion within the lower lobe of the left lung incidentally at this visit. A subsequent contrast-enhanced computed tomography scan (CT) showed an ovoid, homogenous soft tissue attenuation lesion in the left lower lung field with some gas bubbles (Figure 2). The differential diagnosis included pulmonary sequestration, lung cancer, solitary fibrous tumor, or subacute lung infection such as tuberculosis or cryptococcosis. Bronchoscopy and aortography were later performed to exclude any endobronchial extension or possible pulmonary sequestration, but the results were unremarkable.

Thoracoscopic wedge resection of the lesion was performed and the tumor was found to be elastic, ovoid and red with fibrosis, measuring 9x8x2cm in size and 59 gm in weight (Figure 3). There was no evidence of invasion of the tumor through the visceral pleura or chest wall structures. Histologically, the sections showed a picture of a SFT consisting of spindle cells, arranged in short, ill-defined fascicles or

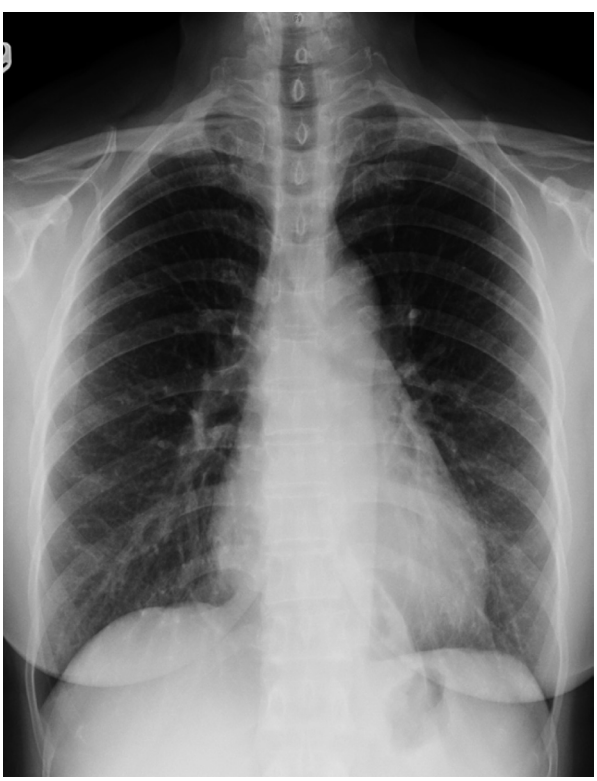

Fig. 1. Routine chest roentgenogram revealed an infiltrative lesion within the lower lobe of the left lung.

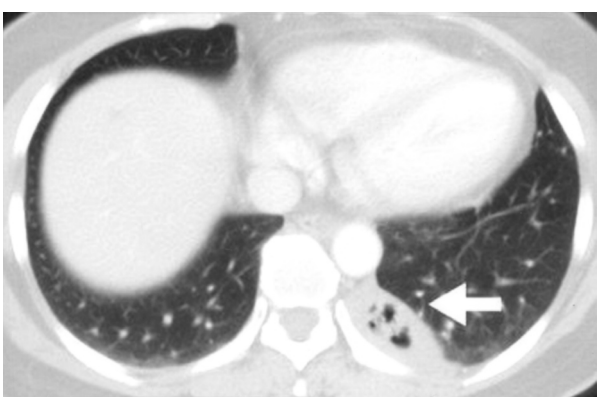

Fig. 2. Computed tomography scan (lung window) showing an ovoid low-density lesion in the left lower lung field with gas bubble (short arrow).

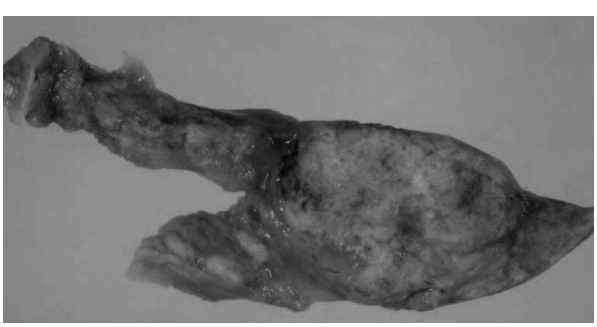

Fig. 3. Pulmonary wedge-resected tissue fragment measuring 9x8x2 cm in size and 59 gm in weight, in a fresh state. Grossly, it is red and elastic with fibrosis.

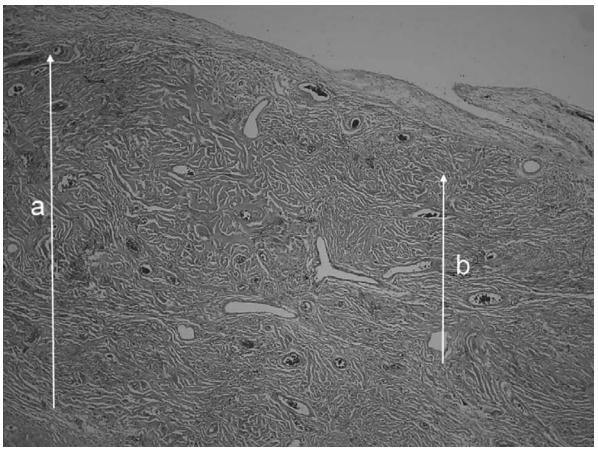

Fig. 4. Photomicrography shows proliferative spindle cells arranged in short, ill-defined fascicles or a pattern-less pattern with hyalinization (area: a) and entrapped with bronchioles and alveoli (area: b). (H&E x100)

a pattern-less pattern with hyalinization. Areas of pseudoangiectatic spaces lined by spindle or multinucleated mesenchymal tumor cells with hyalinized vessels of varying sizes, entrapped with bronchioles and alveoli, were also noted (Figure 4). The immunohistochemical study showed positive vimentin, CD-34 and Bcl-2 reactions, but consistently failed to reveal muscular and neural markers such as SMA, myogenin and calretinin (Figure 5).

The patient's postoperative course was uneventful and she was discharged 1 week after surgery. She maintained regular follow-up for 1 year and was found to be healthy without any recurrence or metastasis.

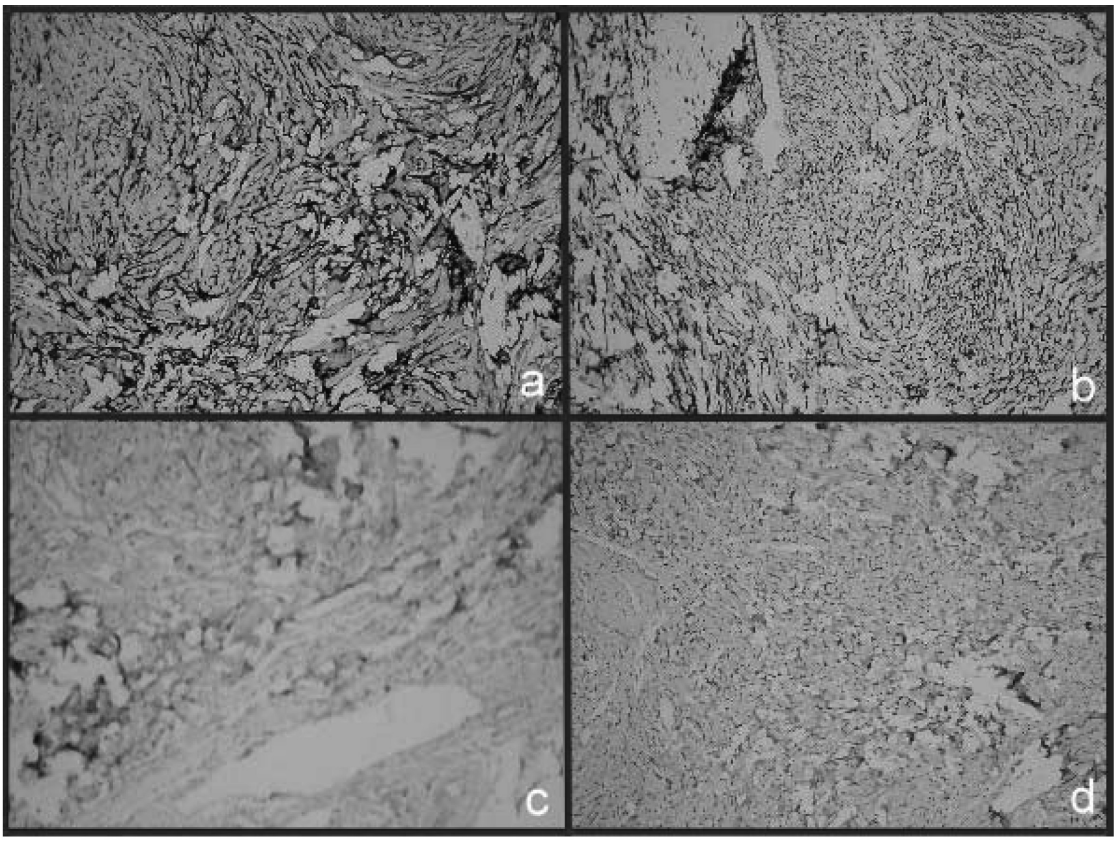

Fig. 5. The section of intrapulmonary immunohistological stain section included (a) strong immunoreactivity for CD34 (X40), (b) strong immunoreactivity for vimentin (X40), (c) negative immunoreactivity for calretinin (X40) (d) negative immunoreactivity for myogenin (X40).

Discussion

Solitary fibrous tumor of the lung is a rare neoplasm and resembles pleural fibrous tumor. Such tumors are common in patients during their fifth and sixth decades, without a male or female predominance [5]. The cause of this type of tumor is still unknown and no association with exposure to asbestos has been documented [6-7]. Most intrapulmonary SFTs are asymptomatic [8]. Larger tumors may cause compression symptoms such as chest pain, cough or dyspnea. Hypoglycemia and seizure may be encountered due to the production of an insulin-like growth factor [6]. In our reported case, the patient only had a chronic cough only, despite the large tumor size. There are 2 theories regarding the origin of intrapulmonary SFTs. The first is that they arise from the subpleural mesenchyma in continuity with the interlobular septa, and the second is that they come directly from the submesothelial lung parenchyma [7-10].

Chest radiography of intrapulmonary SFTs usually reveals a well-defined round or oval mass [11]. Chest CT features of intrapulmonary SFTs reveal intense and heterogeneous enhancement; they ranged in size from 3.5 to 6 cm in 2 previous reports [11-12]. However, our case presented with an ovoid, homogenous soft tissue attenuation lesion in the left lower lung field with some gas bubbles.

Definite diagnosis of pulmonary SFTs depends on the histological examination, because no reliable radiographic features allow for the differentiation of SFTs from other lung tumors [11-13]. The histological patterns and the cytological features of SFTs are relatively nonspecific and, as a result, immunohistological examinations are very important after complete surgical excision. SFT samples are all immunoreactive for vimentin, CD34, and Bcl-2, but not for keratin, desmin, S-100 protein, and alfa-smooth muscle actin, which is helpful in differentiating these tumors from mesothelioma, neurofibroma, and other spindle-cell lesions [14].

The clinical behavior of SFTs of the pleura or lung is unpredictable. Chang stated that some SFTs of the pleura that appear histologically benign may behave aggressively [14]. The incidence of aggressive behavior has been reported to vary, and was found in 13% to 23% of cases in most large series [14]. Pleomorphism, mitotic activity, invasive growth, or presence of necrosis is consistent with their malignant variant. In our present case, none of the above findings was reported.

All previous reports have proposed the efficacy of the therapeutic strategy depends on the completeness of the tumor resection [14-15]. Adjuvant therapy seems to play a role in recurrent or systemic disease, but its benefit is currently undefined [14-15]. Mediastinal lymph node recurrence is rare and hilar or mediastinal lymph node dissection has never been reported as part of the surgical approach in these patients [16]. Recurrence may appear several years after excision of the primary tumor and long-term follow up is mandatory.

In conclusion, intrapulmonary fibrous tumors should be considered as well-defined solitary pulmonary parenchymal tumors. Complete surgical resection has both diagnostic and therapeutic value. Long-term follow up is needed due to the recurrence potential.

References

1. England DM, Hochholzer L, McCarthy MJ. Localized benign and malignant fibrous tumors of the pleura: a clini-

copathologic review of 223 cases. Am J Surg Pathol 1989; 13: 640-58.
2. Klemperer P, Rabin CB. Primary neoplasm of the pleura: A report of five cases. Arch Pathol 1931; 11: 385-412.
3. Cardillo G, Facciolo F, Cavazzana AO, *et al*. Localized (solitary) fibrous tumors of the pleura: an analysis of 55 patients. Ann Thorac Surg 2000; 70: 1808-12.
4. Aufiero TX, McGary SA, Campbell DB, *et al*. Intrapulmonary benign fibrous tumor of the pleura. J Thorac Cardiovasc Surg 1995; 110: 549-51.
5. Shields TW, Yeldandi AV. Localized fibrous tumors of the pleura. In: Shields TW, Locicero III J, Ponn RB, Rusch VW, eds. General thoracic surgery, 6th ed. Philadelphia, PA: Lippincott Williams and Wilkins 2005: 889-900.
6. Baliga M, Flowers R, Heard K. Solitary fibrous tumor of the lung: a case report with a study of the aspiration biopsy, histopathology, immunohistochemistry, and autopsy findings. Diagn Cytopathol 2007; 35(4): 239-44.
7. Sakurai H, Tanaka W, Kaji M. Intrapulmonary localized fibrous tumor of the lung: a very unusual presentation. Ann Thorac Surg 2008 Oct; 86(4):1360-2.
8. Sagawa M, Ueda Y, Matsubara F, *et al*. Intrapulmonary solitary fibrous tumor diagnosed by immunohistochemical and genetic approaches: report of a case. Surg Today 2007; 37(5): 423-5.
9. Yousem SA, Flynn SD. Intrapulmonary localized fibrous tumor. Intraparenchymal so-called localized fibrous mesothelioma. Am J Clin pathol 1988; 89: 365-9.
10. Aufiero TX, McGary SA, Campbell DB, *et al*. Intrapulmonary benign fibrous tumor of the pleura. J Thorac Cardiovasc Surg 1995; 110: 549-51.
11. Cardinale L, Ardissone F, Cataldi A. Solitary fibrous tumor of the lung: three rare cases of intraparenchymal nodules. Acta Radiol 2009; 50(4): 379-82.
12. Patsios D, Hwang DM, Chung TB. Intraparenchymal solitary fibrous tumor of the lung: an uncommon cause of a pulmonary nodule. J Thorac Imaging 2006; 21: 50-3.
13. Cardinale L, Ardissone F, Cataldi A. Solitary fibrous tumor of the lung: three rare cases of intraparenchymal nodules. Acta Radiol 2009; 50(4): 379-82.
14. Chang YL, Lee YC, Wu CT. Thora-cic solitary fibrous tumor: clinical and pathological diver-sity. Lung cancer 1999; 23: 53-60.
15. Brisselli M, Mark EJ, Dickersin GR. Solitary fibrous tumor of the pleura: eight new cases and review of 360 cases in the literature. Cancer 1981; 47: 2678-89.
16. Suter M, Gebhard S, Boumghar M, *et al*. Localized fibrous tumors of the pleura: 15 new cases and review of the literature. Eur J Cardiothorac Surg 1998; 14: 453-9.

肺內單發性纖維瘤

葉育誠　林慶雄　施穎銘　蔡政宏　朱旆億*　劉淨蘭*　葉坤土*

單發性纖維瘤為一多數常起源於臟層肋膜之腫瘤。但是它可以發生於肺部、縱膈、腹腔、心包膜、卵巢及肝臟。而肺內單發性纖維瘤至今極為罕見，所以關於其臨床表現所知有限。

我們報告一位56歲女性左下肺單發性纖維瘤之個案胸部X光影像顯示有一左下肺腫瘤。作完胸腔鏡切除後，追蹤一年後並無發現復發或遠處轉移。

就我們所知，單發性纖維瘤應列入邊緣明確的肺實質腫瘤之鑑別診斷。完整的外科切除具有診斷及治療之價值，由於潛在的復發可能性，需要須長時間追蹤。*(胸腔醫學 **2010; 25: 56-61**)*

關鍵詞：單發性纖維瘤

彰化基督教醫院　內科部胸腔內科　*病理科
索取抽印本請聯絡：林慶雄醫師，彰化基督教醫院　胸腔內科，彰化市南校街135號

Benign Primary Pulmonary Meningioma with Malignant Behavior

Chih-Ling Ko*,**, Ming-Ching Lee*,***, Chung-Ping Hsu*,**

Primary pulmonary meningioma (PPM) is an uncommon and usually benign tumor. Only 2 cases of PPM presenting with malignant behavior were reported prior to 2001. An additional case of PPM was reported in 2001 at our hospital [1]. We reported the case of a 78-year-old man who had undergone complete resection of the original lesion in 1999, and then presented with advanced tumor recurrence and distant metastasis in 2006. ***(Thorac Med 2010; 25: 62-66)***

Key words: primary pulmonary meningioma

Introduction

Meningiomas are common benign brain neoplasms. Meningioma outside the central nervous system is rare and primary pulmonary meningioma (PPM) is even rarer. It has seldom been reported in the literature. Although most PPM have presented as benign lesions, there were 2 case reports of PPM with malignant features in our review of the literature [2-3]. We report herein an additional case of PPM with malignant behavior. This patient was found to have PPM at the right upper lobe (RUL) of the lung in 1999. At that time, he underwent RUL wedge resection for complete resection of the pulmonary lesion. Unfortunately, multiple intrapulmonary recurrent tumors with chest wall invasion and bone metastasis were found 7 years later.

Case Report

A 78-year-old, non-smoking, asymptomatic male patient was noted to have a lung mass at the right upper lung field by chest radiograph in September 1999. The chest computed tomography (CT) revealed a mass lesion 5cm in diameter located at the right upper lung field close to the hilum area (Figure 1A). The patient underwent RUL wedge resection by conventional thoracotomy to remove the tumor at that time. There was no pleural seeding or pericardial invasion during operation. The resection margin was free of tumor. The pathology finding was

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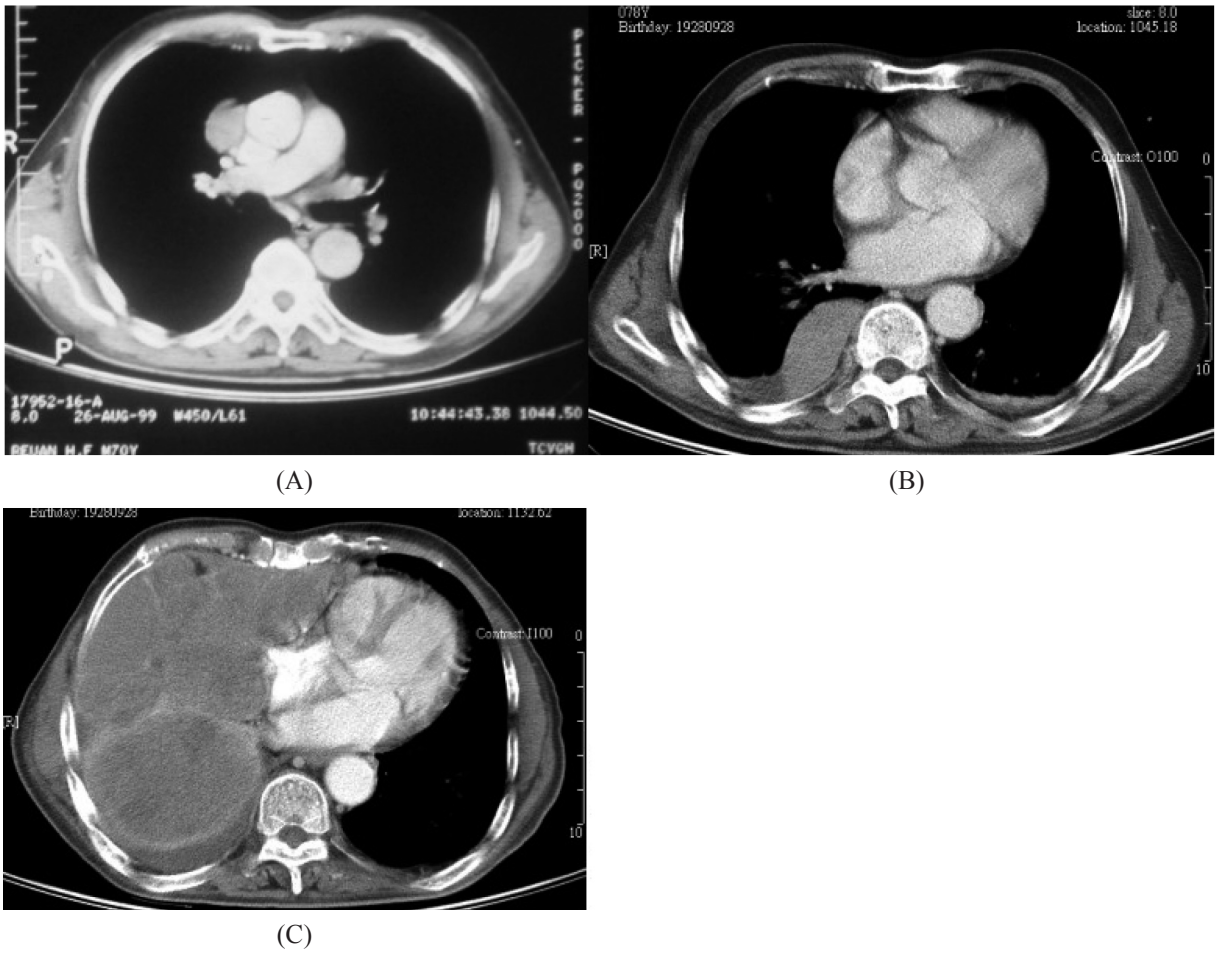
pulmonary meningioma without invasion of the resection margin. Primary PPM was confirmed after negative findings in the post-operative brain CT. The patient was discharged from our hospital without further therapy. During the following period, from September 1999 to February 2004, there was no recurrence detected by chest radiograph.

In December of 2006, the patient returned to our hospital for surgical intervention of benign prostate hyperplasia. Unfortunately, a pulmonary mass lesion in the right-side infrahilar area was found by chest radiograph incidentally in the pre-operative period. Chest CT revealed a 6cm lung mass located in the right lower lobe (RLL) of the lung and multiple pre-tracheal and subcarinal lymphoadenopathies (Figure 1B). The pathologic report revealed metastatic meningioma, using sono-guided cutting biopsy. In addition, the whole body bone scans showed multiple bony metastases at the left parietal, acromion, and 2nd to 8th ribs. During this period, in March 2007, he also received vertebroplasty performed by our neurosurgeon in order to re-



(A) (B)

(C)

Fig. 1. Tumor lesion on chest CT. (A) CT performed in September 1999 showing the tumor location; (B) CT performed in December 2006 showing a pulmonary mass at the right infrahilar area of the RLL; (C) CT performed in November 2008 showing advanced tumor recurrence in the whole chest cavity.

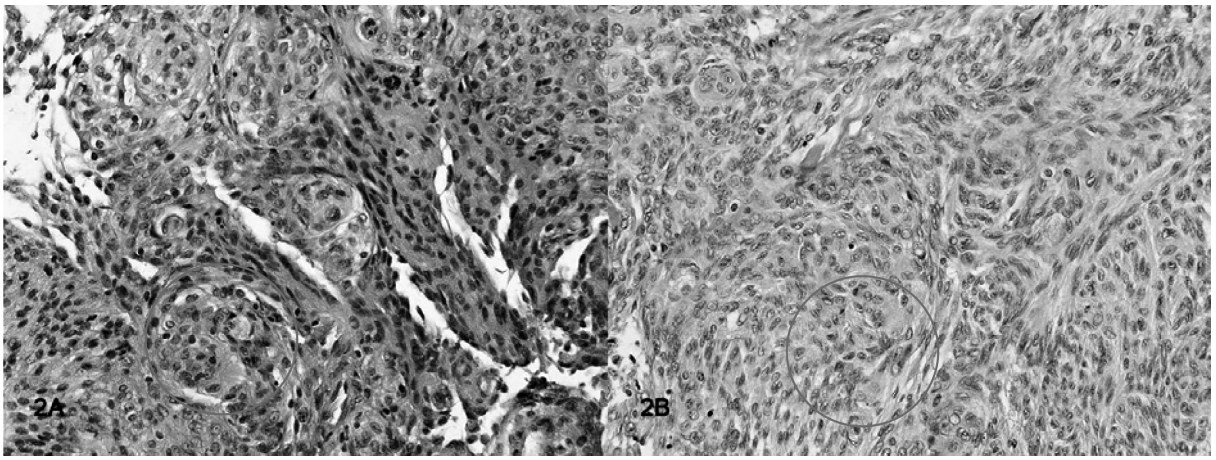


Fig. 2. Two photographs taken under high magnification showing similar tumor cell features. (2A) The specimen in 2006. The tumor lesion presented with ovoid-shaped cells with focally increased mitosis (Circled area); (2B) The specimen in 1999. Compared with Fig. 2A, presenting as similar ovoid-shaped cells and focally increased mitosis.

lieve the symptoms of pathologic compression fracture in the first lumbar vertebral body. Aspiration cytology was also performed during this operation, and it revealed metastatic malignant meningioma.

Under the impression of malignant PPM with multiple bony metastases, chemotherapy was performed using cyclophosphamide, vincristine, and adriamycin, instead of surgery, which had been planned initially. After 3 courses of chemotherapy, a progressively enlarged tumor in the RLL of the lung was noted by follow-up chest CT in June 2007. The patient refused further chemotherapy and underwent tumor debulking surgery at another hospital. However, he returned to our hospital in August 2008 with tumor recurrence. The chest CT in November 2008 revealed advanced tumor recurrence in most of the chest cavity with mediastinum and heart deviation (Figure 1C). Biopsy was performed and the pathology finding revealed meningioma.

Discussion

Although meningiomas are the most common type of benign brain tumor, they rarely occur in the extracerebral area [4]. PPM is even rarer, and less than 30 cases have been reported in the literature.

Histologically, these lesions presented with spindle- or ovoid-shaped cells. Focally, the cells were arranged in a whorled configuration with mitoses (Figure 2A). Immunohistochemical findings showed strong positive staining for vimentin, epithelial membrane antigen (EMA), cytokeratins AE1/AE3, and progesterone receptor. We compared the pathological specimen of the case in 2006 with that in 1999 (Figure 2B), and found a similar tumor cell arrangement and stains positive for EMA and AE1/E3 [5-6]. There were no definite malignant criteria to apply by histology. The malignant behavior could only be determined by focally increased mitotic activities.

Most of the PPM in the literature presented as solitary, peripheral, small, and circumscribed lung nodules [7]. They revealed a benign pro-

cess and had a good prognosis without recurrence after complete surgical resection. Our review of the literature revealed that there were only 2 cases with malignant behavior. The first was a 41-year-old woman with PPM at the right lung field. After resection, adjuvant radiotherapy was performed and there was no evidence of disease after 9 years of follow-up. The second was a 51-year-old man with PPM at the RUL of the lung. The patient underwent RUL lobectomy without further therapy. Recurrence was noted 6 months after surgery, and he then received complete pneumonectomy for recurrent tumor of the right lung and adjuvant radiotherapy. However, he returned 4 months later with recurrent tumor and chemotherapy was performed. He was still alive at 10 months' follow-up. In our case, a 78-year-old man with PPM at the RUL of the lung had undergone complete resection of PPM by RUL wedge resection in 1999. He presented with advanced tumor recurrence with distant multiple bony metastases 7 years later.

PPM is thought to be a benign neoplasm with a good prognosis after complete surgical resection. However, as in our present case, PPM has the potential to become malignant several years after complete resection of the tumor. The malignancy could only be identified by its clinical presentation with recurrence of the tumor and distant metastasis. Therefore, limited wedge resection without lymph node dissection may not be enough for PPM. In addition, regular long-term follow-up, including chest radiograph and chest CT, are necessary for early detection of recurrence.

In conclusion, PPM is rare and is usually treated as a benign neoplasm. However, it can recur after several years with invasion into peripheral tissue and multiple bony metastases even after complete surgical resection. The diagnosis of its malignant potential is difficult both histologically and radiologically. Therefore, regular long-term follow-up is necessary.

References

1. Chin CS, Liou TC, Chiang CD, *et al*. Primary pulmo-nary meningioma. Thorac Med 2001; 16: 244-9.
2. Erlandson RA. Diagnostic transmission electron microscopy of human tumors. New York: Masson Publishing, 1981; 125-6.
3. Prayson RA, Farver CF. Primary pulmonary malignant meningioma. Am J Surg Pathol 1999; 23(6): 722-6.
4. Stoller JK, Kavuru M, Metha AC, *et al*. Intracranial meningioma metastatic to lung. Cleve Clin J Med 1987; 54: 521-7.
5. Bosch X, Ramirez J, Font J, *et al*. Primary intrapulmonary benign schwannoma: A case with ultrastructural and immunohistochemical confirmation. Eur Resp J 1990; 3: 234-7.
6. Drlicek M, Grisold W, Lorber J, *et al*. Pulmonary meningioma: Immunohistochemical and ultrastructural features. Am J Surg Pathol 1991; 15: 455-9.
7. Lockett L, Chiang V, Scully N. Primary pulmonary meningioma: Report of a case and review of the literature. Am J Surg Pathol 1997; 21: 453-60.

良性原發性肺部腦膜瘤具有惡性病變特質

柯志霖*, ** 李明璟*, *** 徐中平*, **

原發性肺部腦膜瘤是很少見而且通常是良性的腫瘤。文獻上僅有兩例以惡性腫瘤表現的病例。在2001年本院曾發表過另一例原發性肺部腦膜瘤。這位78歲的男性在1999年接受手術完整切除病灶後，在2006年以局部復發及遠處轉移呈現。*(胸腔醫學* ***2010; 25: 62-66)***

關鍵詞：原發性肺部腦膜瘤

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Giant Hemangiomas Concomitantly in the Chest Wall and Mediastinum – An Unusual Presentation

Wei-Chih Liao, Hung-Jen Chen, Chih-Yen Tu, Chuen-Ming Shih, Wu-Huei Hsu, Chia-Hung Chen

Hemangiomas concomitantly involving the chest wall and mediastinum are a very rare presentation. We report a case of hemangioma with concomitant chest wall and mediastinal involvement in a 57-year-old man. Computed tomography (CT) showed a chest wall and anterior mediastinal mass with no enhancement effect. The lesions demonstrated intermediate signal intensity on T1-weighted magnetic resonance images and marked hyperintensity on T2-weighted magnetic resonance images. Phleboliths, the specific findings in hemangioma, were seen in the chest radiography and chest CT. ***(Thorac Med 2010; 25: 67-72)***

Key words: hemangiomas, mediastinal tumor

Introduction

Hemangiomas of the chest wall are relatively uncommon and account for only 0.7% of all reported hemangiomas [1]. Hemangiomas of the mediastinum are rare tumors, with an incidence of 0.5% among mediastinal masses [2]. We report the skin appearance photographic findings, computed tomography (CT) and magnetic resonance (MR) findings of a 57-year-old man with hemangiomas concomitantly involving both the chest wall and mediastinum. This phenomenon has not been previously reported.

Case Report

A 57-year-old man had suffered from slowly enlarging masses in the left lateral portion of his chest wall for 15 years, following a cholecystectomy. There were no other associated symptoms. Physical examination showed purplish-red discoloration, similar to a port-wine stain, on the left chest wall. The masses were firm, but lacked discrete margins (Figure 1). Chest radiography demonstrated subtle soft-tissue masses with calcification and a smooth margin at the left lateral chest wall (Figure 2). Ultrasonography of the left chest wall demonstrated well-circumscribed, solid masses containing several anechoic channels (Figure 3). Chest CT

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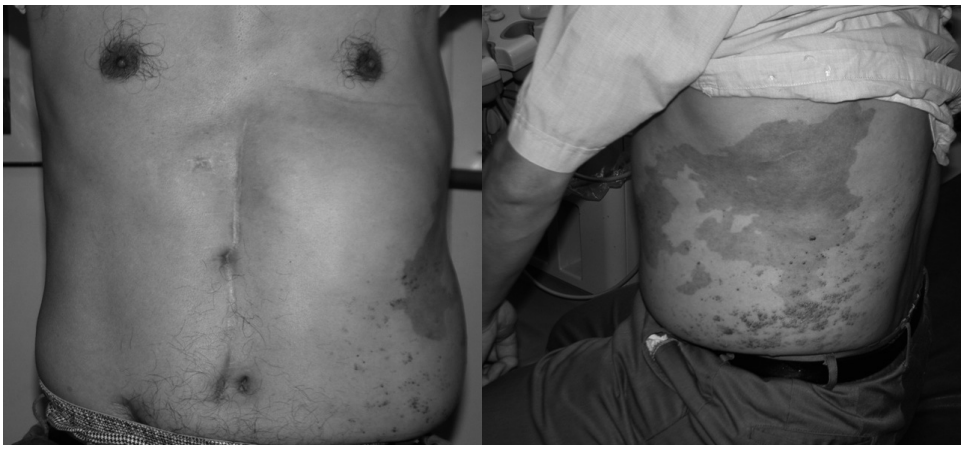

Fig. 1. Photograph of a 57-year-old man with left chest wall purplish-red discoloration.

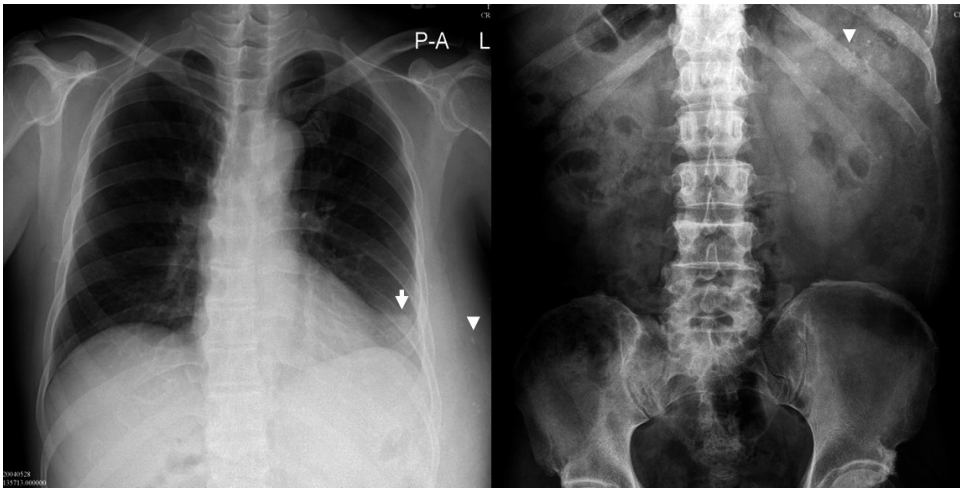

Fig. 2. Posterior to anterior radiographic view of the chest and kidney, ureter, and bladder (KUB) shows subtle soft-tissue masses (arrow) with calcification (arrowheads) in the left lateral chest wall.

showed masses in the left chest wall and mediastinum, with heterogeneous attenuation (Figure 4). The masses showed no gross invasion of the mediastinal structures and osseous structures of the chest wall. Multiple small, round and punctate calcifications could be seen within the soft-tissue masses. T1-weighted spin echo (SE) MR imaging of the chest wall and mediastinum demonstrated heterogeneous masses with intermediate signal intensity. T2-weighted single-shot fast spin echo (SSFSE) MR imaging demonstrated predominantly hyperintense masses, which corresponded to the areas of low signal intensity seen on the T1-weighted images. There were also interspersed areas of high signal intensity which produced a lacy appearance (Figure 5). Based on the classic MR imaging findings, a definite diagnosis of hemangiomas concomitantly involving both the chest wall and mediastinum could be established without the use of more invasive diagnostic techniques, such as open or percutaneous biopsy [3].

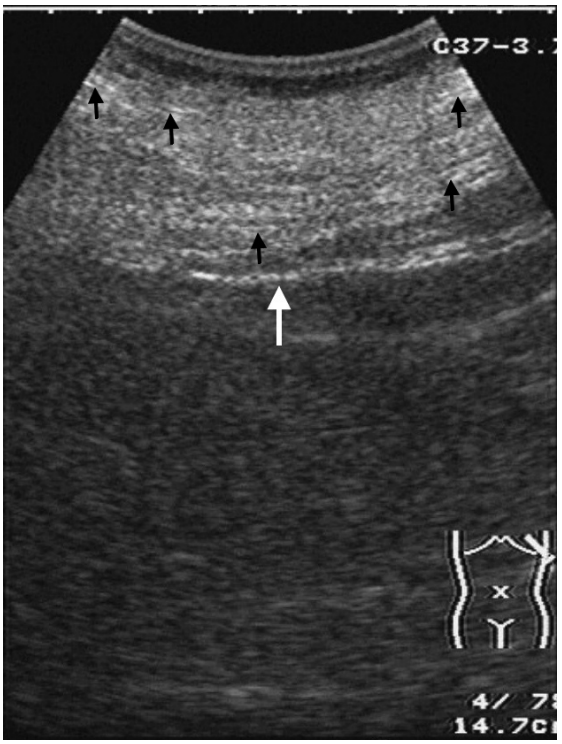

Fig. 3. Left chest wall ultrasonography demonstrated a well-circumscribed, solid mass (white arrow) containing several anechoic channels (black arrows).

proliferation of normal vascular elements with interspersed fatty overgrowth, and can be classified according to the size of their vascular space as capillary, cavernous, venous, arteriovenous, or mixed [4]. Over 90% are cavernous or capillary hemangiomas [5].

In 1914, Shennan reported the first case of mediastinal hemangiomas [6]. They most commonly occur in the anterior mediastinum, with fewer arising in the posterior mediastinum. Hemangiomas are usually well-circumscribed and unencapsulated. They are commonly detected by the 4th decade of life and are usually asymptomatic. However, patients may suffer from cough, stridor, dyspnea or chest pain as a result of the mass effect or invasion of adjacent structures.

Chest wall hemangiomas are soft-tissue hemangiomas which originate within skeletal muscle. They are usually detected by the 3rd decade of life. Clinical manifestations include a palpable mass, subtle soft-tissue bulging, or pain.

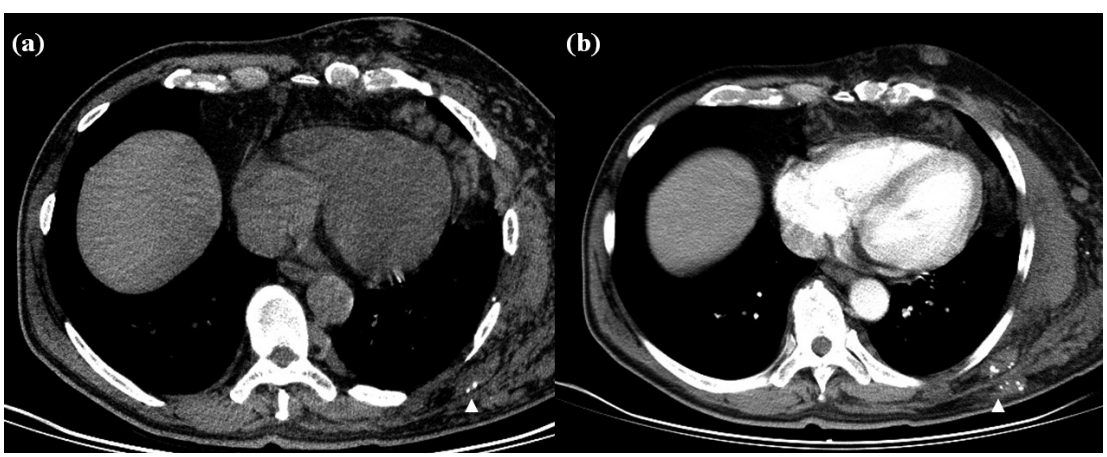

Fig. 4. (a) Transverse non-enhanced chest CT showing left chest wall and mediastinal masses with heterogeneous attenuation. (b) The lack of central enhancement of the mass after injection of a bolus contrast material may be related to the timing of the bolus. Small round calcifications (white arrowheads) that represent small phleboliths can be seen.

Discussion

Benign chest wall and mediastinal hemangiomas are rare tumors. They are usually a

The ultrasonographic features of heman-

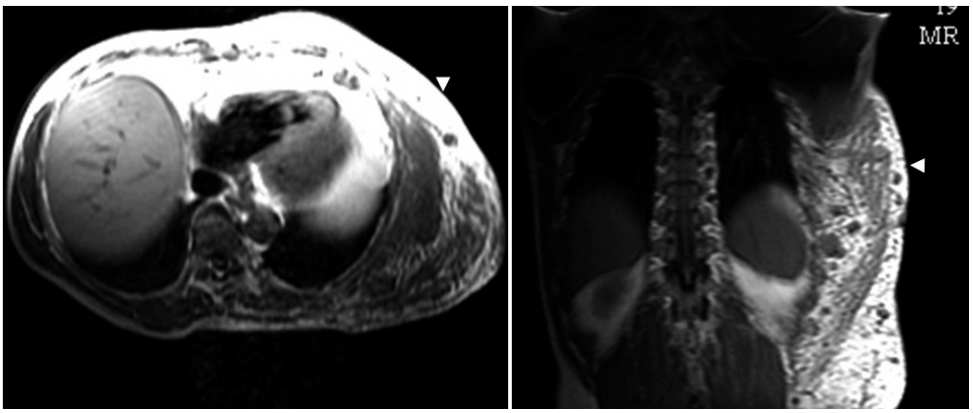

Fig. 5a. Transverse and coronal T1-weighted MR images of the left chest wall reveal a heterogeneous mass (white arrowheads). The intermediate signal intensity corresponds to the soft-tissue mass, and interspersed areas of high signal intensity correspond to fatty proliferation.

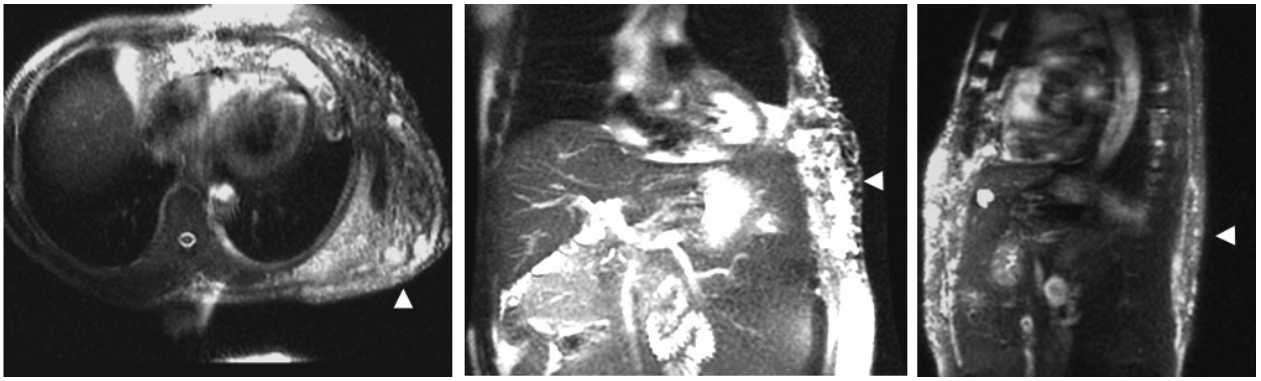

Fig. 5b. Transverse and coronal fat-suppression T2-weighted images reveal a predominantly hyperintense lobulated mass with interspersed areas of serpiginous low signal intensity (white arrowheads) involving the left chest wall and pericardiac space of the mediastinum.

giomas include a solid tissue mass with hypoechoic echogenicity, a central or peripheral vessel with high echogenicity and a relatively low mean resistive index and mean venous peak velocity. Although ultrasonography is a useful initial screening procedure in patients with soft-tissue lesions, it still has limitations, such as the small field of view, and the restricted depth of penetration and ability to detect tiny vessels with low flow. Thus, this technique cannot always substitute for CT and MR images [7].

CT of soft-tissue or mediastinal hemangiomas reveals a well-circumscribed mass which is heterogenous in an unenhanced phase and shows central enhancement when using a bolus contrast material [8]. However, central enhancement is not observed in all patients. The presence of intratumoral thrombi, varying vascular flow patterns, or the rate of infusion of contrast material and time delays may all influence the enhancement pattern, such as in our patient [9].

Phleboliths, as focal calcifications which are visible in only 10% of cases on chest X-ray or CT, may indicate the vascular nature of the mass, and are believed to be a specific finding of soft-tissue or mediastinal hemangiomas. However, this pattern of calcification must be

carefully differentiated from teratomas or cartilaginous lesion [8].

Classic MR findings can be used to reach a definite diagnosis of hemangioma. In soft-tissue or mediastinal hemangioma, T1-weighted images typically show an intermediate signal intensity of the soft-tissue or mediastinal mass. Interspersed areas of high-signal intensity correspond to areas of fatty proliferation. T2-weighted images typically reveal a hyperintense mass which is thought to be due to slow flow or stagnant blood within dilated vascular channels. A lacy appearance can be seen due to interspersed areas of low to intermediate density which are representative of thrombus, hemosiderin deposition, fat, fibrous tissue or smooth muscle [3].

Biopsy of hemangiomas may lead to bleeding complications, since there is no true capsule or other compressive structures around the tumors. Given that, imaging is often sufficient to diagnose hemangiomas.

In our case, the hemangiomas could be differentiated from arteriovenous malformations because no direct arteries in the tumors could be seen in the MR images. Slow blood flow, large venous pooling, and tortuous feeding vessels were also noted. MR images showed fatty tissue in the right chest wall, and reflected muscular atrophy secondary to chronic vascular insufficiency caused by a Steal phenomenon.

Our patient had chest wall hemangiomas with a typical skin appearance, typical ultrasonography findings, and typical CT and MR images. However, this unusual presentation of hemangiomas concomitantly involving the chest wall and mediastinum has not been previously reported. Recognition of the CT and MR features of this rare tumor can give us important clues for diagnosis.

References

1. Watson WL MW. Blood and lymph vessel tumors: a report of 1,056 cases. Surg Gynecol Obstet 1940; 71: 569-88.
2. Cohen AJ, Sbaschnig RJ, Hochholzer L, *et al*. Mediastinal hemangiomas. Ann Thorac Surg 1987; 43: 656-9.
3. Ly JQ, Sanders TG. Case 65: hemangioma of the chest wall. Radiology 2003; 229: 726-9.
4. Murphey MD, Fairbairn KJ, Parman LM, *et al*. From the archives of the AFIP. Musculoskeletal angiomatous lesions: radiologic-pathologic correlation. Radiographics 1995; 15: 893-917.
5. Abe K, Akata S, Ohkubo Y, *et al*. Venous hemangioma of the mediastinum. Eur Radiol 2001; 11: 73-5.
6. Shennan T. Histologically non-malignant angioma with numerous metastases. J Pathol 1914; 19: 139-54.
7. Paltiel HJ, Burrows PE, Kozakewich HP, *et al*. Soft-tissue vascular anomalies: utility of US for diagnosis. Radiology 2000; 214: 747-54.
8. McAdams HP, Rosado-de-Christenson ML, Moran CA. Mediastinal hemangioma: radiographic and CT features in 14 patients. Radiology 1994; 193: 399-402.
9. Seline TH, Gross BH, Francis IR. CT and MR imaging of mediastinal hemangiomas. J Comput Assist Tomogr 1990; 14: 766-8.

巨大血管瘤同時在胸壁與縱隔腔—一個罕見的表現

廖偉志　陳鴻仁　涂智彥　施純明　徐武輝　陳家弘

同時生長在胸壁與縱隔腔的血管瘤是很罕見的。我們報告一位五十七歲男性患有同時侵犯胸壁及縱隔腔的血管瘤。在電腦斷層檢查中，此胸壁與縱隔腔的腫瘤未被顯影劑加強顯示。此外，磁核造影顯示這些病灶在T1-weighted影像有中度訊號強度與T2-weighted影像有明顯高度訊號強度。血管瘤特有的靜脈石，在胸部X光與電腦斷層也都被發現。*(胸腔醫學* ***2010; 25: 67-72)***

關鍵詞：血管瘤，縱隔腔腫瘤

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Difficult Weaning Due to Guillain-Barre Syndrome: A Case Report and Literature Review

Chi-Li Li, Jia-Horng Wang

Guillain-Barre syndrome is an acute, symmetric, ascending paralysis disorder caused by demyelinating polyradiculoneuropathies. The diagnosis of Guillain-Barre syndrome is established by the presence of clinical findings and the results of electrophysiological studies. However, in critically ill patients, the manifestations of their acute illness may obscure the progressive paralysis, and it is difficult to recognize the onset and evolution of this syndrome. Herein, we report the case of a 50-year-old woman who required ventilatory support due to pneumonia and respiratory failure. After her pneumonia subsided, difficult weaning was noted. Her history revealed ascending paralysis. Cerebrospinal fluid analysis and electrophysiological study showed typical findings, and Guillain-Barre syndrome was diagnosed. After plasma exchange, the weakness of the limbs improved and the patient was successfully weaned from the ventilator. ***(Thorac Med 2010; 25: 73-77)***

Key words: Guillain-Barre syndrome, respiratory failure, difficult weaning, plasma exchange

Introduction

Guillain-Barre syndrome is an acute-onset, usually symmetric, and typically ascending paralysis disorder caused by demyelinating polyradiculoneuropathies. The diagnosis of Guillain-Barre syndrome is based on clinical presentation and electrophysiological studies (nerve conduction velocity and electromyography). However, in critically ill patients, it is difficult to recognize the onset and evolution of this syndrome. We report a patient with wasting of the extremities and difficulty in weaning from the mechanical ventilator. After a systematic approach to the diagnosis and appropriate treatment with plasma exchange, the patient was weaned from the ventilator.

Case Report

A 50-year-old woman with a 12-year history of type 2 diabetes mellitus had general weakness, anorexia, and intermittent disorientation 1 month prior to admission. At first, she was brought to a local hospital, where hypotension was noted. The blood leukocyte count was 26380/mm^3 with a differential count of band forms at 53%, and segments, 41%. Chest radiograph showed left lower lobe radiopacity with air bronchograms. Left lower lobe pneumonia

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with septic shock was diagnosed. Antibiotics were given and she was transferred to the intensive care unit (ICU). Three days later, progressive dyspnea and paradoxical respiratory movement developed, so endotracheal intubation was performed. Since the patient's condition did not improve, her family transferred her to our hospital for a second opinion and further management.

In our hospital, after the use of antibiotics, serial chest radiographs showed that the left lower lobe pneumonia had subsided gradually. However, repeated attempts to wean the patient from the ventilator resulted in respiratory distress and hypercapnia. She had a history of progressive weakness and paresthesia of both legs 2 months prior to this admission, and pneumonia with respiratory failure ensued. Neurological examination revealed weakness, paresthesia, and complete absence of deep tendon reflexes in both of her lower extremities. There was no facial palsy. The acetylcholine receptor antibody level was within normal limits (0.25 nmol/L). Cerebrospinal fluid analysis showed elevated protein (201.8 mg/dL) with a normal cell count. The nerve conduction study showed slow velocity in all peripheral nerves. Electromyography showed active denervation in all the sampled muscles in the 4 limbs. Guillain-Barre syndrome was diagnosed. Plasma exchange was initiated with an exchange of about 2.5 liters of plasma every other day. The weakness of her lower limbs improved slowly. Finally, she received a total of 6 courses of plasmapheresis and was weaned from the ventilator successfully. When she was transferred to the general ward, she did not require further oxygen therapy (SpO_2: 99% in room air). A rehabilitation program was then arranged for the patient. Two months after admission, she was discharged, and was able to walk with a quadricane.

Discussion

The incidence of typical Guillain-Barre syndrome has been reported to be from 0.6-4 cases per 100,000 population per year throughout the world [1]. Most cases are sporadic. In typical cases, the patient presents with pain, numbness, par aesthesia, or ascending weakness in the limbs for days to weeks, usually symmetrical and accompanied with depressed or absent reflexes. The weakness may initially be proximal, distal, or a combination of both. Autonomic involvement is common and approximately 50% of patients presented with urine retention, ileus, sinus tachycardia, hypertension, cardiac arrhythmia, and postural hypotension [2].

Respiratory failure occurs in 25% of patients [1]. At least 4 factors contribute to respiratory failure: upper airway compromise, inspiratory muscle weakness, expiratory muscle weakness, and secondary pulmonary complications such as lobar collapse or pneumonia. These complications can occur without warning and progress rapidly. Moreover, in critically ill patients, it is more difficult to recognize the onset and evolution of this syndrome. Impaired ventilatory mechanics and inspiratory muscle fatigue may be attributed to nutritional depletion, the myopathic effects of steroids, use of sedatives or an electrolyte imbalance. The presence of coma due to sepsis, electrolyte imbalance, and the use of sedatives interferes with the recognition of progressive paralysis in critically ill patients. In our patient, the initial presentation of sepsis and drowsy consciousness obscured the manifestation of Guillain-Barre syndrome and we did not recognize that weaning failure was due to an acute neuromus-

cular syndrome until detailed history-taking and physical examination were performed. The differential diagnoses are listed in Table 1 [3]. The diagnosis of Guillain-Barre syndrome is supported by albuminocytologic dissociation in the cerebrospinal fluid and nerve conduction studies showing delayed conduction velocity, prolonged distal latencies, and dispersion of evoked responses reflecting peripheral nerve demyelination.

Early intubation and ventilator therapy for Guillain-Barre syndrome are beneficial [4]. Plasma exchange has been the gold standard treatment for Guillain-Barre syndrome for more than 20 years. The indications are respiratory failure, medullar paralysis and immobility. In the Cochrane review, plasma exchange led to greater improvement after 4 weeks, decreased from 27% to 14% the proportion of patients requiring ventilator support after 4 weeks, and increased the proportion of patients who recovered full strength within a year, from 55% to 68% [5]. The possible mechanism could be that the total plasma exchange allowed rapid elimination of autoantibodies and proinflammatory cytokines.

Table 1. Differential diagnoses of Guillain-Barre syndrome

Transverse myelitis
Myasthenia gravis
Acute anterior poliomyelitis
Diphtheritic polyneuropathy
Cord compression
Botulism
Tick paralysis
West Nile virus
Hypokalemia
Porphyric neuropathy
Complications of HIV/AIDS
Hypothyroidism

The efficacy of intravenous immunoglobulin (IVIg) is equal to that of plasma exchange. In the Cochrane review of IVIg, there was no difference between IVIg and plasma exchange in the improvement of disability after 4 weeks, duration of mechanical ventilation, death or residual disability [6-7]. The mechanism of the action of IVIg is probably multi-factorial, possibly involving blockade of Fc receptors, provision of anti-idiotypic antibodies, interference with complement activation, and T-cell regulation [8].

In the Cochrane review, corticosteroids were found to be ineffective and may even have slowed down recovery in Guillain-Barre patients. The possible explanation was that corticosteroids adversely affected the recovery process by inhibiting macrophage clearance of myelin debris, thereby hampering remyelination or aggravating the damage of denervated muscle fibers [1].

Recovery begins with the return of proximal, then distal strength during a period of weeks or months. Between 4% and 15% of patients die, and up to 20% are left disabled after a year, despite modern treatment [9]. Even in those who recover well, residual weakness and loss of motor units can usually be detected on clinical and electrophysiological examination, perhaps due to permanent loss of axons [2]. Further research is needed to prevent this poor outcome.

Conclusion

Guillain-Barre syndrome is an acute onset of a usually symmetric and typically ascending paralysis disorder caused by demyelinating polyradiculoneuropathies. The diagnosis

of Guillain-Barre syndrome is primarily based on clinical presentation and electrophysiological studies. However, in critically ill patients, the manifestations of their acute illness may obscure the progressive paralysis, and it is difficult to recognize the onset and evolution of this syndrome. A systematic approach and consideration of this syndrome as 1 of the causes of weaning difficulty may prevent misdiagnosis from occurring.

References

1. Hughes R AC, Cornblath DR. Guillain-Barre syndrome. Lancet 2005; 366: 1653-66.
2. Visser LH, Schmitz PIM, and Meulstee J, *et al*. Prognostic factors of Guillain-Barre syndrome after intravenous immunoglobulin or plasma exchange. Neurology 1999; 53: 598-604.
3. McGillicuddy DC, Walker O, Shapiro NI, *et al*. Guillain-Barre syndrome in the emergency department. Annals of Emergency Medicine 2006; 47: 390-3.
4. Ropper AH. The Guillain-Barre syndrome. NEJM 1992; 326: 1130-6.
5. Raphael JC, Chevret S, Hughes RAC, *et al*. Plasma exchange for Guillain-Barre syndrome. Cochrane Database Syst Rev 2002; 2: CD001798.
6. van der Meche FGA, Schmitz PIM, Dutch Guillain-Barre Study Group. A randomized trial comparing intravenous immune globulin and plasma exchange in Guillain-Barre syndrome. NEJM 1992; 326: 1123-9.
7. Hughes RA, Raphael JC, Swan AV, *et al*. Intravenous immunoglobulin for Guillain-Barre syndrome. Cochrane Database Syst Rev 2001; 2: CD002063.
8. Dalakas MC. Intravenous immunoglobulin in autoimmune neuromuscular disease. JAMA 2004; 291: 2367-75.
9. de la Cour CD, Jakobsen J. Residual neuropathy in long-term population-based follow-up of Guillain-Barre syndrome. Neurology 2005; 64: 246-53.

基安-巴瑞症候群造成的困難拔管案例：病例報告及文獻回顧

李其澧　王家弘

基安-巴瑞症候群（Guillain-Barre syndrome）是一種以急性發作，對稱性，上行性肌肉無力表現的脫髓鞘多神經病變。診斷基-巴瑞症候群主要靠臨床表現及電生理檢查結果。但在重症病人身上，他們的急性病症的表現會使我們不易觀察到漸進性麻痺的表現，因而不易確認此病症的發生或變化。在此，我們要報告一位50歲女性一開始因肺炎及呼吸衰竭需要呼吸器支持，待肺炎痊癒後卻遇到脫離呼吸器困難。經過我們回顧病史，發現有上行性肌無力情形，腦脊髓液及電生理檢查亦呈現典型表現，我們診斷為基安-巴瑞症候群。經血漿交換後，肢體無力的情形改善，病人很快就可以成功拔除氣內管並脫離呼吸器。
(胸腔醫學 ***2010; 25: 73-77)***

關鍵詞：基安-巴瑞症候群，呼吸衰竭，困難脫離呼吸器，血漿交換

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Pyothorax-Associated Lymphoma: A Case Report

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Pyothorax-associated lymphoma (PAL) is a disease entity that occurs in patients who have undergone therapeutic artificial pneumothorax or treatments for pulmonary tuberculosis (TB). PAL was first recognized in Japan, and large series of reports were published by Japanese clinicians. Sporadic cases have been reported in Western countries and in Asian countries other than Japan. We are not aware of any PAL case that has been reported in Taiwan, where pulmonary TB is still a major public problem, particularly among Taiwanese aboriginal peoples that live in the mountains. We report a patient with a history of old pulmonary TB presenting with progressive right lower back pain. The chest radiography and computerized tomography revealed right-sided pleural effusion with a hypo-dense lesion with formation of a localized abscess in the postero-lateral aspect of the right pleural cavity. The pleural lesion had destroyed the 11th rib and invaded the chest wall. Under the impression of right pleural tumor with pyothorax, the patient underwent limited right thoracotomy with decortication and resection of the destroyed rib. The pathologic study turned out to be large B cell lymphoma with invasion of the rib. This final diagnosis was confirmed immunohistochemically and the clinicopathologic diagnosis of PAL was established on the basis of lymphoma in conjunction with pyothorax. To the best of our knowledge, this is the first report of a case of PAL in Taiwan, and it is our belief that other PAL cases have been unrecognized by the medical community. We anticipate that more cases of PAL will be reported in the future when clinicians become aware of this disease entity and become alert to the possibility of a diagnosis of PAL whenever they come across a patient with back pain, a mass in the chest wall, and ongoing chronic inflammation in the pleural cavity. ***(Thorac Med 2010; 25: 78-84)***

Key words: lymphoma, pyothorax, tuberculosis

Introduction

Pyothorax-associated lymphoma (PAL) is a clinicopathologic disease entity related to patients who have undergone therapeutic artificial pneumothorax (AP) for pulmonary tuberculosis (TB). This condition was first reported in Japan where AP was a common therapeutic modality for pulmonary TB between 1930 and 1950. Hence, large series of PAL cases with molecu-

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lar biological studies were reported by Japanese clinicians; in Western countries, however, only a few cases have been reported in the literature. To the best of our knowledge, no case of PAL has been reported in Taiwan.

Case Report

A 79-year-old male Taiwanese aborigine, who lived in the mountainous area of Taipei County and who had a history of hypertension and coronary artery disease was diagnosed with pulmonary TB at the age of 67. He was treated at the TB center, receiving a complete course of anti-TB treatment and was claimed to have been cured. Eight months before this admission, a chest radiograph was taken and showed blunting of the right costophrenic angle, but no further investigation was pursued due to coronary artery disease necessitating cardiac catheterization with stent implantation. Six months prior to this admission, he started to have pain in the right lower back, which progressively worsened in terms of duration and severity. His general condition deteriorated due to poor appetite and malnutrition, with a 6.5 kg loss of body weight during the 1 month before this admission.

He was afebrile with normal vital signs on admission, but his body temperature rose to 37.8^{o}C within 48 hours. The pertinent finding on physical examination was a mass protruding from his right lower back. The chest radiography revealed right-sided pleural effusion (Figure 1a), which was the same as the radiographic findings 8 months previous (Figure 1b). The chest and upper abdomen computerized tomography showed right pleural effusion (Figure 2a), and a hypo-dense lesion with localized abscess formation in the posterolateral aspect of the right pleural cavity. The pleural tumor had

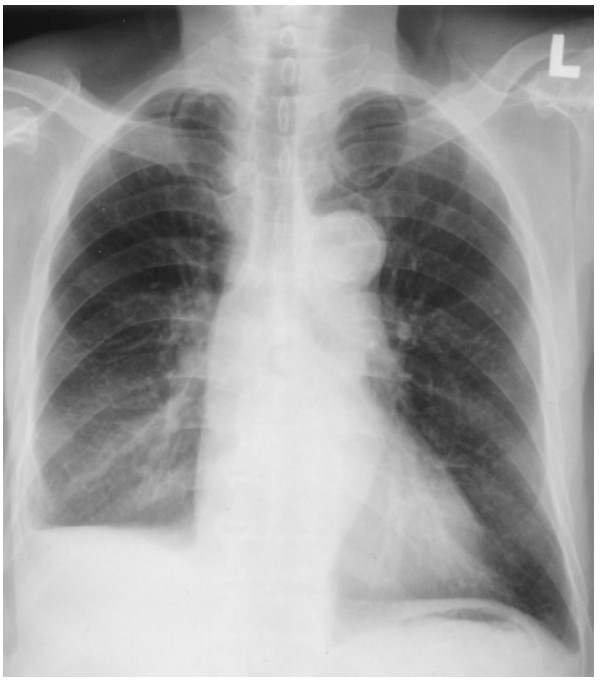

Fig. 1a. Persistent blunting of the right costophrenic angle (April 6, 2004)

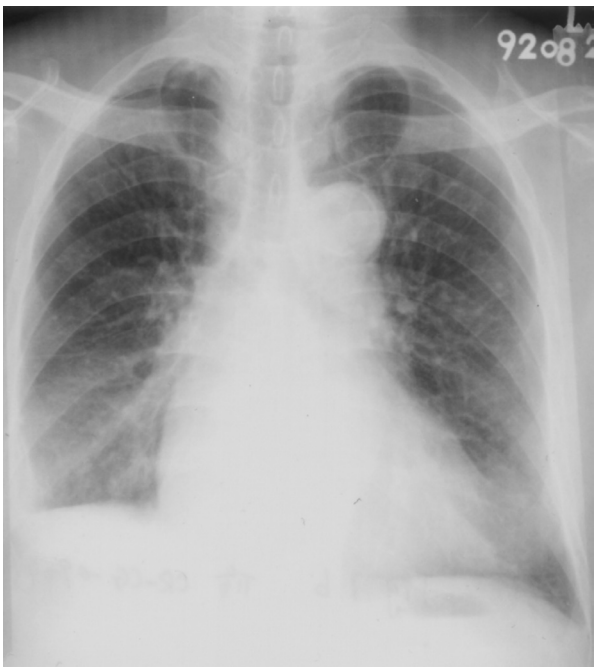

Fig. 1b. Right costophrenic angle blunting (August 26, 2003)

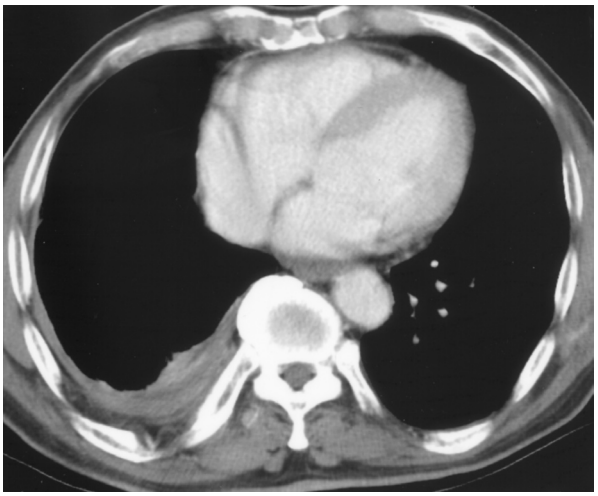

Fig. 2a. Pleural thickening and minimal amount of effusion in the right pleural space (April 9, 2004)

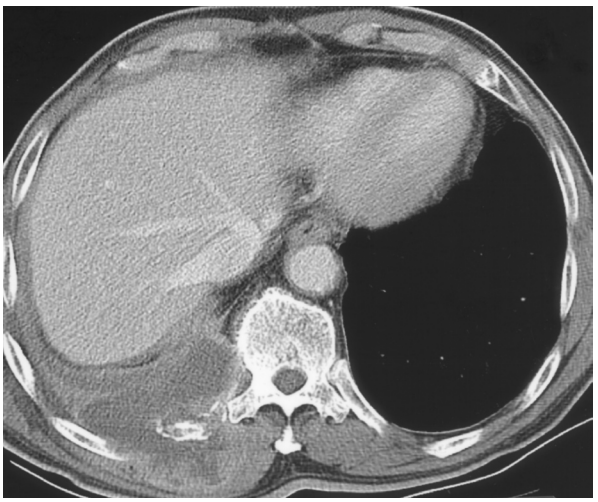

Fig. 2b. A hypodensity lesion in the right pleural space with localized abscess formation. The tumor destroyed the 11th rib and invaded the chest wall

invaded and destroyed the 11th rib on the right side, and extended to the chest wall (Figure 2b). The significant laboratory findings included elevation of serum lactic dehydrogenase to 219 U/L (reference normal range, 100~190), and C-reactive protein to 10.71 mg/dl; however, the white blood cell count was within the normal limit (8230/ul). The patient then underwent a fine needle aspiration biopsy of the mass, which showed only necrotic tissue. Under the impression of an intrapleural tumor with pyothorax, a limited thoracotomy was performed. A large amount of fragile, cheese-like necrotic tissue was identified and evacuated from the pleural space. The tumor-invaded 11th rib was resected (Figure 3). Purulent fluid was collected for bacteriological study, but there was no growth of bacteria. The pathologic examination turned out to be large B-cell lymphoma with rib involvement. Immunohistochemical studies showed positive staining for CD20 (B-cell marker) (Figure 4) and negative for CD3 (T-cell marker) (Figure 5). Acid-fast stain could not demonstrate a microorganism within the necrotic tissue. A consultation with the hemato-oncologist was then requested to arrange chemotherapy.

Discussion

Aozasa *et al*. [1] in Japan documented 3 cases of pleural lymphoma that had developed in patients with chronic pyothorax in 1985, and Iuchi *et al*. first described PAL in 1987 [2]. Since then, more PAL cases have been reported

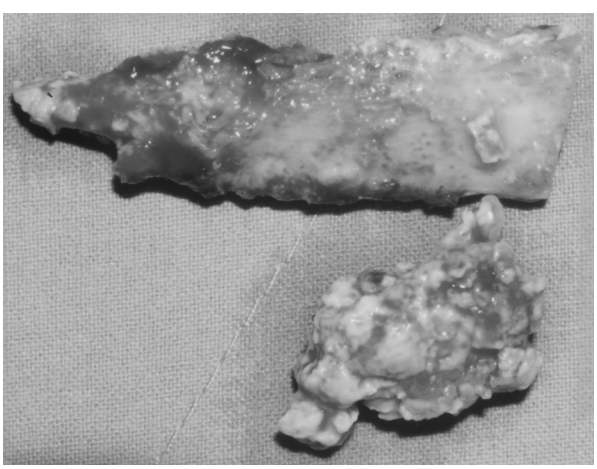

Fig. 3. The destroyed rib (above) and partial tumor tissues

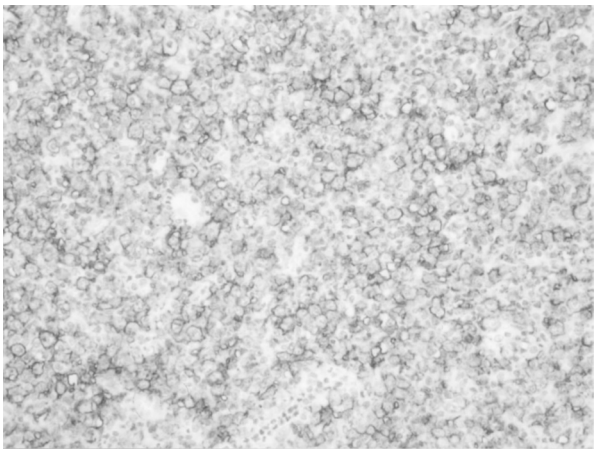

Fig. 4. Positive staining of CD20

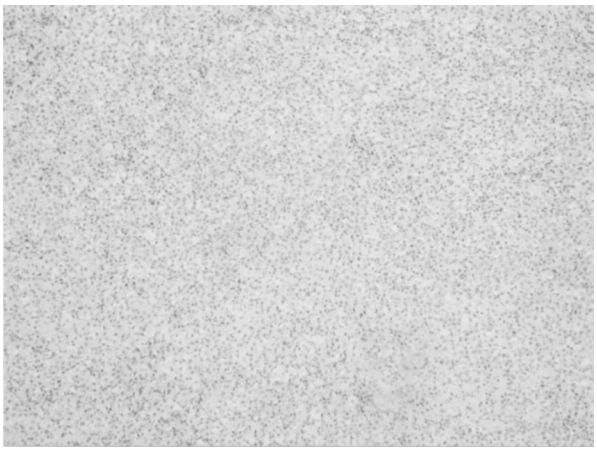

Fig. 5. Negative staining of CD3

by Japanese investigators, but only a few cases have been reported in Western and other Asian countries. To the best of our knowledge, no case of PAL has ever been reported in Taiwan.

The patient presented in this report was a Taiwanese aborigine, who lived in the mountainous area of Taipei County and had raised deer as an occupation in the past. The records of the other medical institute had documented that the patient had had possible animal-transmitted pulmonary TB in the past. His old pulmonary TB had been treated and was considered to be cured. Over a period of 8 months, the blunting of the right costophrenic angle remained unchanged, suggesting a chronic pleural inflammation. The patient underwent surgery for the long-standing mass in his right lower back. Surgical specimens contained a large amount of necrotic tissue and a tumor-eroded rib. Purulent fluid in the pleural space was collected for bacterial culture during this operation. The negative result was believed to be due to the administration of broad spectrum antibiotics before this surgery. The pathology showed malignant lymphoma with CD20 positive (B cell marker), and regional granulation with fibrotic change histologically. Therefore, we concluded that this was a case of PAL.

Most of the cases reported in the literature showed that PAL resulted from more than 20 years of chronic pyothorax due to a history of previous therapeutic AP for TB or TB pleuritis [3, 5-6, 10, 15-16]. Although pyothorax is a common complication of pulmonary TB, the relationship between lymphoma and long-standing pyothorax is not clear. We suspected that this patient had a chronic inflammatory process in the right pleural space, in view of the chronic pain in the right lower chest and the long-existing blunting of the right costophrenic angle.

Other reports [5-10, 11-13] have shown that PAL is a malignant non-Hodgkin's lymphoma with a mostly B-cell phenotype, and that it develops in the pleural cavity of patients with chronic pyothorax. Japanese investigators also found that PAL patients had elevated serum levels of anti-Epstein-Barr virus (EBV) antibodies, that they had been found to have EBV genomes in the nuclei and the expression of latent infection genes (EB nuclear antigen 2; EBNA2) and latent membrane protein 1 (LMP-1) in the tu-

mor cells, and that EBV plays an important role in developing this disease [3-4, 9-10, 14-16].

Soft tissue tumor in the chest wall in patients with chronic pyothorax may be caused by 1 of several disease entities. Differential diagnoses of PAL include recurrent TB, aspergilloma, lymphoma, mesothelioma, squamous cell carcinoma, soft tissue sarcoma, bony malignancy, metastatic lesion, and so on [17, 20-21]. To distinguish PAL from other diseases through image studies is difficult before the definite diagnosis is made. Percutaneous needle or core biopsy is the simplest way to obtain tumor tissues to avoid unneeded invasive surgery, but the amounts of tissue from biopsy are often inadequate. The final diagnosis is usually confirmed after surgery due to a prior diagnosis of another soft tissue tumor.

Lymphoma usually responds to chemotherapy. The most common chemotherapeutic agents are cyclophosphamide, doxorubicin, vincristine and prednisolone (CHOP), but the response is limited and even ineffective for most PAL patients [6, 19] (Welcker K *et al*. in Thoracic Surgical Science 2004; 1: Doc03). In 2002, Nakatsuka *et al*. reviewed 106 cases of PAL patients collected through a nationwide survey in Japan from 1972 to 2000. Their study results showed that PAL is responsive to chemotherapy, but that the overall prognosis is poor, with the 5-year survival rate being 21.6% [16].

Twelve years had elapsed between the diagnoses of pulmonary TB and PAL in our case, although this length of time was less than that in previous reports. In the absence of epidemiological data, we would need more reports to estimate the duration till the development of PAL. Pulmonary TB is not rare in Taiwan. We believe that the PAL case number may be larger than that revealed by the current data, and suggest that many PAL patients are not diagnosed in time in Taiwan.

Conclusion

We believe that new cases of PAL will probably be reported in Taiwan when clinicians have become more knowledgeable about this clinicopathologic disease entity. We suggest that clinicians keep in mind the possibility of PAL if any patient has the trio of clinical findings of back pain, chest wall mass, and chronic pyothorax.

References

1. Aozasa K, Tsujimoto M, Sakurai M, *et al*. Non-Hodgkin's lymphomas in Osaka, Japan. Eur J Cancer Clin Oncol 1985; 21: 487-92.
2. Iuchi K, Ichimiya A, Akashi A, *et al*. Non-Hodgkin's lymphoma of the pleural cavity developing from long-standing pyothorax. Cancer 1987; 60: 1771-5.
3. Fujimoto M, Haga H, Okamoto M, *et al*. EBV-associated diffuse large B-cell lymphoma arising in the chest wall with surgical mesh implant. Pathol Int 2008; 58: 668-71.
4. Takakuwa T, Tresnasari K, Rahadiani N, *et al*. Cell origin of pyothorax-associated lymphoma: a lymphoma strongly associated with Epstein-Barr virus infection. Leukemia 2008; 22: 620-7.
5. Yamamoto T, Masuda A, Sawada T, *et al*. Pyothorax-associated lymphoma: A case showing transition from T-cell-rich polymorphic lesion to diffuse large B-cell lymphoma. Pathol Res Pract 2007; 203: 605-11.
6. Narimatsu H, Ota Y, Kami M, *et al*. Clinicopathological features of pyothorax-associated lymphoma; a retrospective surgery involving 98 patients. Ann Oncol 2007; 18: 122-8.
7. Aozasa K. Pyothorax-associated lymphoma. J Clin Exp Hematop 2006; 46: 5-10.
8. Riehl G, Aubert A, Sandu C, *et al*. Malignant non-Hodgkin's lymphoma developing late after pneumonectomy. Eur J Cardiothorac Surg 2006; 30: 948-9.
9. Loddenkemper C, Hoecht S, Anagnostopoulos I, *et al*.

A 62-year-old man with chronic pyothorax. Brain Pathol 2005; 15: 371-3.

10. Aozasa K, Takakuwa T, Nakatsuka S. Pyothorax-associated lymphoma: a lymphoma developing in chronic inflammation. Adv Anat Pathol 2005; 12: 324-31.
11. Nakamichi I, Takakuwa T, Tanio Y, *et al*. Pyothorax-associated lymphoma: an unusual case with both T- and B-cell genotypes. Virchows Arch 2005; 447: 888-91.
12. Nishiu M, Tomita Y, Nakatsuka S, *et al*. Distinct pattern of gene expression in pyothorax-associated lymphoma (PAL), a lymphoma developing in long-standing inflammation. Cancer Sci 2004; 95: 828-34.
13. Tamura A, Hebisawa A, Sagara Y, *et al*. Thoracic malignancies in patients with chronic tuberculous empyema. Kekkaku 2004; 79: 301-7.
14. Androulaki A, Drakos E, Hatzianastassiou D, *et al*. Pyothorax-associated lymphoma (PAL): a western case with marked angiocentricity and review of the literature. Histopathology 2004; 44: 69-76.
15. Takakuwa T, Luo WJ, Ham MF, *et al*. Establishment and characterization of unique cell lines derived from pyothorax-associated lymphoma which develops in long-standing pyothorax and is strongly associated with Epstein-Barr virus infection. Cancer Sci 2003; 94: 858-63.
16. Nakatsuka S, Yao M, Hoshida Y, *et al*. Pyothorax-associated lymphoma: a review of 106 cases. J Clin Oncol 2002; 20: 4255-60.
17. Marchioni A, Guicciardi N, Grandi P, *et al*. Occurrence of pleural masses in a chronic pleural pyothorax. J Thorac Oncol 2007; 2: 968-9.
18. Daibata M, Taguchi T, Nemoto Y, *et al*. Epstein-Barr virus (EBV)-positive pyothorax-associated lymphoma (PAL): chromosomal integration of EBV in a novel CD2-positive PAL B-cell line. Br J Haematol 2002; 117: 546-57.
19. Yoshitomi A, Chida K, Suda T, *et al*. Pyothorax associated lymphoma treated by chemotherapy after thoracostomy. Nihon Kokyuki Gakkai Zasshi 1999; 37: 619-22.
20. Kim HY, Song KS, Goo FM, *et al*. Thoracic sequelae and complications of tuberculosis. RadioGraphics 2001; 21: 839-60.
21. Minami M, Kawauchi N, Yoshikawa K, *et al*. Malignancy associated with chronic empyema: radiologic assessment. Radiology 1991; 178: 417-23.

膿胸相關性淋巴瘤—病例報告

曾羽田　李清龍*　白冠壬　余明治　許文憲*

膿胸相關性淋巴瘤在日本有多次報告，這些報告指出此疾病跟人工氣胸及肺結核治療有關。在台灣，雖然有較高的結核病盛行率，卻沒有此疾病的相關病例報告。我們在此報告一位有結核病史之病人，因嚴重背痛而求診，其胸腔X光片及電腦斷層顯示除了右側肋膜腔積液外，另有一個低密度的病灶且合併化膿性反應及肋骨之破壞。在膿胸合併不明腫瘤之臆斷下，此病人接受開刀，術後標本之病理報告為肋膜腔大B細胞淋巴瘤併肋骨侵犯，據此我們診斷此病人為膿胸相關性淋巴瘤。藉此病例經驗，我們認為在結核病仍常見的台灣地區，若病人有慢性膿胸，背痛及胸廓處不明的腫塊，應將膿胸相關性淋巴瘤列入鑑別診斷之考慮。*(胸腔醫學* ***2010; 25: 78-84)***

關鍵詞：淋巴瘤，膿胸，結核

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Two Synchronous Primary Lung Cancers: A Case Report

Pin-Liang Chen, Jiunn-Min Shieh, Shiann-Chin Ko

Synchronous primary lung cancer is found in 0.7-15% of patients, and up to 10% of patients who survive from the first primary lung cancer will develop a second primary tumor. The simultaneous discovery of 2 pulmonary nodules or masses in different lobes gives rise to the clinical dilemma of whether these lesions represent metastases or primary synchronous lung cancers. Differentiation of these clinical entities is important in terms of treatment and prognosis. We presented a 66-year-old woman whose chest radiography showed 2 different lung lesions without lymphadenopathy and distant metastasis. After computed tomography-guided biopsy for left upper lobe and right lower lobe lesions, double primary lung cancer with squamous cell carcinoma and adenocarcinoma was diagnosed, and turned out to be operable. We reviewed the methods of differentiating metastasis from synchronous primary lung cancer. Due to the possibility of operation for multiple primary lung cancers, the tumors should be carefully staged before the treatment. ***(Thorac Med 2010; 25: 85-90)***

Key words: synchronous primary lung cancer, adenocarcinoma, squamous cell carcinoma

Introduction

Multiple primary lung cancers are characterized as either synchronous (detected or resected simultaneously) or metachronous (defined by a time interval between detection of the first lesion and detection of a subsequent primary lesion). A second pulmonary tumor may also represent recurrence of a primary pulmonary tumor after non-curative therapy, or metastatic disease from a non-pulmonary source. Synchronous primary lung cancer is found in 0.7-15% of patients, and up to 10% of patients who survive the first primary lung cancer will develop a second primary tumor. Detection of a second tumor in addition to a primary non-small cell lung carcinoma (NSCLC) raises the question of whether this lesion is a metastasis or a second primary lung cancer [1]. Establishing the diagnosis of multiple primary lung cancer requires a demonstration of histologic, anatomic, or temporal separation of the tumors [2]. Synchronous primary lung cancer and lung cancer with metastasis may each have different treatments and prognoses [3]. We report a 66-year-old woman whose chest radiography (CXR) showed a soft tissue nodule in the left upper lobe and a patchy lesion in the right lower lobe. No lymph

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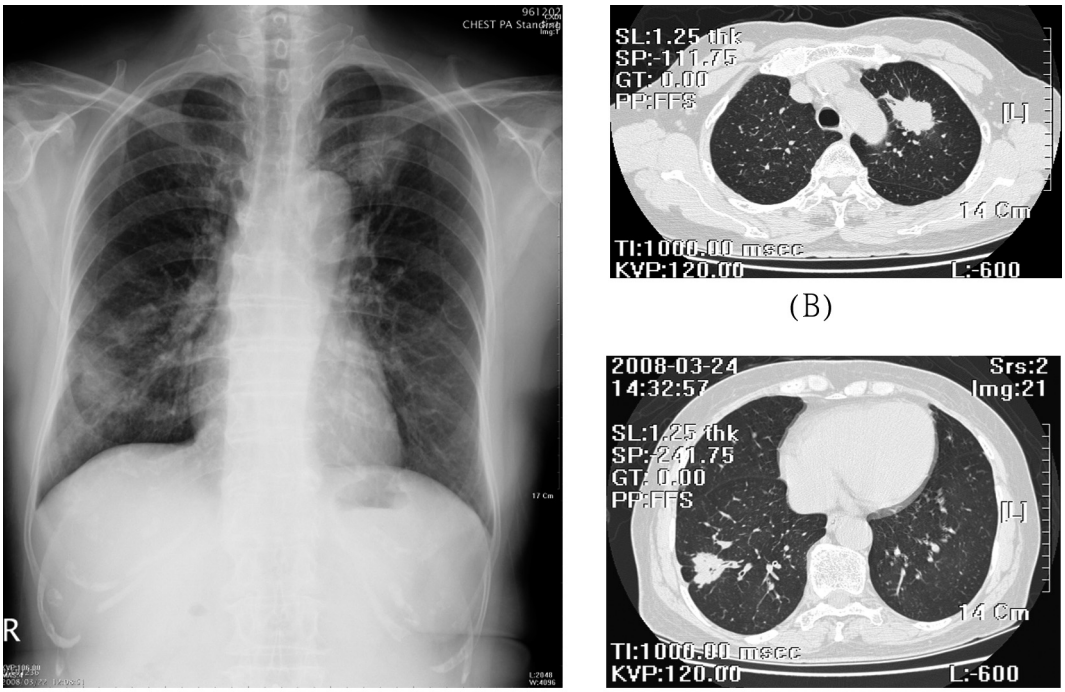

Fig. 1. A. a soft tissue nodule at the left upper lung and another patchy lesion at the right lower lung field; B. Computed tomography of the left upper lobe lesion; C. Computed tomography of the right lower lobe lesion

node metastasis was found. Synchronous primary lung cancer with the histologic types of squamous cell carcinoma and adenocarcinoma was diagnosed and was found to be possibly operable.

Case Report

A 66-year-old female was transferred from a local hospital on 22 March 2008 because of an abnormal CXR that was taken after she had had cough and blood-tinged sputum for several days. The patient had a chronically ill-looking appearance and clear consciousness on admission. Vital signs showed blood pressure 170/80 mmHg, body temperature 36.3°C, and pulse rate 60 breaths per minute.

The chest, heart and abdominal examinations were unremarkable. Laboratory data showed no leukocytosis or anemia (hemoglobin around 12.6 g/dl). There was no peripheral edema or clubbing. CXR at the outpatient department (Figure 1A) showed a pulmonary nodule in the left upper lung and another patchy lesion in the right lower lung field. Due to a suspicion of lung cancer, she was admitted for further evaluation. The chest computed tomography (CT) scan revealed 2 irregularly-shaped soft tissue mass lesions with a heterogeneous enhancement pattern in the left upper lobe (Figure 1B) and right lower lobe (Figure 1C). The widest diameter was around 3.5 cm. Lung-to-lung metastasis was suspected. However, no evidence of lymphadenopathy >1 cm within the mediastinum was noted. There was also no evidence of pleural or pericardial effusion. The visualized

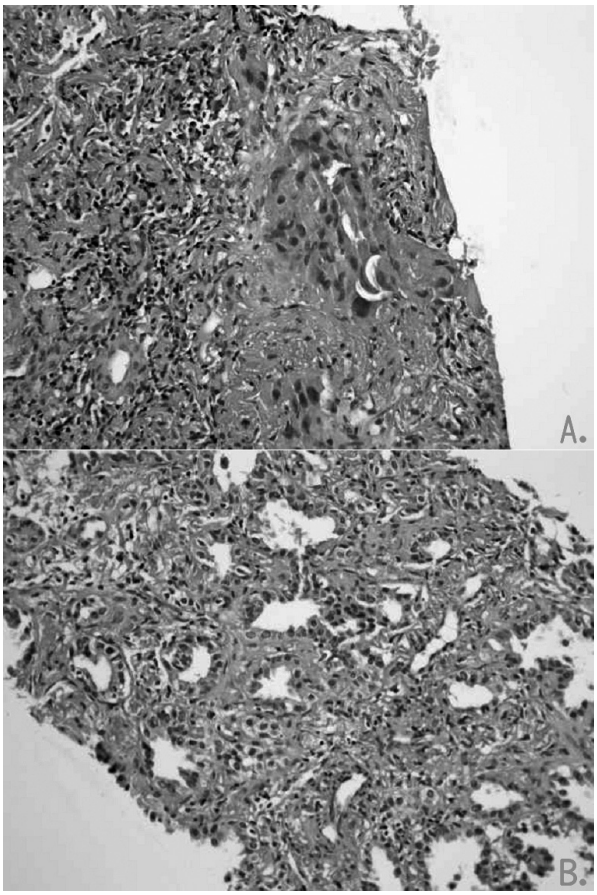

Fig. 2. A. Tissue fragments that are infiltrated by small islands of neoplastic squamous cells in which intercellular bridging is occasionally identified. The surrounding tissue exhibits desmoplastic change; B. Tissue fragments that are replaced by neoplastic tubuloglandular structures lined by columnar cells and that are accompanied by desmoplastic stroma.

portion of the upper abdomen, including the visible liver and bilateral adrenal glands, was unremarkable. Bronchoscopy showed no endobronchial lesion. Blind transbronchial biopsy was done via the orifices of the left bronchus (LB3) and right bronchus (RB8). However, the pathology showed chronic inflammation.

Thus, chest CT-guided biopsy of a left upper lobe lesion was done and the pathology showed squamous cell carcinoma (Figure 2A). Brain CT and bone scan showed no metastatic evidence. Lung-to-lung metastasis was considered during the combined conference on the imaging findings, but multiple primary lung cancers were also considered, since there was no evidence of lymphadenopathy or extrapulmonary metastasis. Therefore, another CT-guided biopsy of the right lower lobe lesion was arranged and, in the end, the pathology revealed primary pulmonary adenocarcinoma (Figure 2B), which was different from the squamous cell carcinoma in the left upper lobe lesion. Unfortunately, she had a poor pulmonary function test (moderately obstructive ventilatory impairment without significant bronchodilator reversibility, forced expiratory volume in the first second (FEV1) 1.24 liters). She did not receive the surgery, but has been undergoing chemotherapy for the last 6 months.

Discussion

In earlier, relatively small studies, multifocal pulmonary tumors with frequencies ranging from 0.2% to 2% were reported [3]. However, several more recent larger studies have found rising frequencies [4-8]. It is not known whether these findings reflect a rising incidence, as has been suggested, or simply better imaging procedures, especially with the widespread use of CT for screening and diagnosis. CT is especially efficient for the detection of small peripherally arising adenocarcinomas and their putative precursor lesions, atypical adenomatous hyperplasias [3]. Fluorodeoxyglucose (FDG) positron emission tomography (PET) may play a role in differentiating between metastatic disease and multiple primary lung cancer [9].

The simultaneous discovery of 2 pulmonary nodules or masses in different lobes raises the clinical dilemma of whether these lesions represent metastases or primary synchronous lung

cancers. However, when a new solitary pulmonary nodule develops 2 to 3 years after curative pulmonary resection, the new lesion may represent a recurrent cancer, a metastatic process, or a second primary lung cancer (SPLC). Differentiation of these clinical entities is important in terms of prognosis [10]. Nearly 30 years ago, Martini and Melamed suggested clinicopathological criteria to help identify the origin of multifocal tumors. However, their criteria are guidelines for making clinical decisions, not definitive proof of origin [3]. Using the Martini and Melamed criteria (Table 1), lung tumors are designated "synchronous" when detected or resected simultaneously and "metachronous" when the second tumor is found some time later [11]. If the lung lesions are thought to be separate lung cancers, they should be staged separately; however, the higher stage should be recorded (may be resected). By contrast, if they are thought to represent metastases, this could be taken as an indication of unresectable disease [3].

Table 1. Criteria for Diagnosis of Multiple Primary Lung Cardnoma[a]

Synchronous tumors
A. Tumors physically distinct and separate
B. Histology
1. Different
2. Same, but in different segment, lobe or lung if:
a. Origin from carcinoma in situ
b. No carcinoma in lymphatics common to both
c. No extrapulmonary metastases at time of diagnosis
Metachronous tumors
A. Histology different
B. Histology the same, if:
1. Free interval between cancers at least 2 years, or
2. Origin from carcinoma in situ, or
3. Second cancer in different lobe or lung, but:
a. No carcinoma in lymphatics common to both
b. No extrapulmonary metastases at time of diagnosis

[a] According to Martini and Melamed

To classify tumors with an identical histology as multiple lung cancer, it is necessary to exclude extrapulmonary metastasis and carcinoma in lymphatics common to both tumors (Table 1). Although the Martini and Melamed criteria serve as a practical guide to classify multiple lung tumors, it is not known whether all patients with multiple lesions of identical histology are classified properly. For example, patients with unilateral synchronous tumors of identical histology and hilar lymph node metastasis do not meet the criteria of Martini and Melamed, but multiple primary lung cancers cannot be ruled out in these patients. A definite diagnosis of metastatic disease or multiple primary lung cancer in these patients is of clinical interest, because these diseases are treated differently [1].

Multiple lung cancers arise independently and are not caused by migration of either precursor cells or tumor cells with the same *p53* mutation, because we observed different *p53* mutations in different tumors within the same patient. So *p53* mutation analysis could facilitate the diagnosis of multiple primary lung cancer. And especially, in those patients not meeting the criteria of Martini and Melamed, this analysis is of additional value for the definite diagnosis of multiple lung carcinoma and for ruling out metastatic disease [1, 3].

An aggressive surgical approach is justified in patients with synchronous primary lung cancer if the patient can tolerate the procedure [10, 12]. However, the presence of lymph node metastasis is an independent adverse prognostic factor in patients with surgically resected synchronous primary lung cancer. Patients with

lymph node metastasis have a worse prognosis after surgery [12].

Conclusion

Double lung lesions or multiple lung lesions are often found clinically. Synchronous primary lung cancer may be resectable and curable. Due to the possibility of operation for multiple lung lesions, especially those without lymphadenopathy and extrapulmonary metastasis, we must be careful in the staging before treatment.

References

1. Marcel Th. M. van Rens, Erik J. E. Eijken, Johannes R. J. Elbers, *et al*. p53 Mutation Analysis for Definite Diagnosis of Multiple Primary Lung Carcinoma. Cancer 2002 Jan; 94(1): 188-96.
2. Stephen L. Brower, Robert H. Choplin, Hyman B. Muss. Multiple Primary Bronchogenic Carcinomas of the Lung. AJR 1983 Feb; 140(2): 253-8.
3. Adi F. Gazdar, John D. Minna. Multifocal Lung Cancers - Clonality vs. Field Cancerization and Does It Matter? JNCI 2009; 101(8): 541-3.
4. Nakata M, Sawada S, Yamashita M, *et al*. Surgical treatments for multiple primary adenocarcinoma of the lung. Ann Thorac Surg 2004; 78(4): 1194-9.
5. Riquet M, Cazes A, Pfeuty K, *et al*. Multiple lung cancers prognosis: what about histology? Ann Thorac Surg 2008; 86(3): 921-6.
6. Rostad H, Strand TE, Naalsund A, *et al*. Resected synchronous primary malignant lung tumors: a population-based study. Ann Thorac Surg 2008; 85(1): 204-9.
7. Trousse D, D'Journo XB, Avaro JP, *et al*. Multifocal T4 non-small cell lung cancer: a subset with improved prognosis. Eur J Cardiothorac Surg 2008; 33(1): 99-103.
8. Yilmaz A, Ertugrul M, Yagci Tuncer L, *et al*. Multiple primary malignancies involving lung: an analysis of 40 cases. Ups J Med Sci 2008; 113(2): 193-200.
9. Obando JA, Samii JM, Yasrebi M. A case of two synchronous primary lung tumors demonstrated by FDG positron emission tomography. Clin Nucl Med 2008 Nov; 33(11): 775-7.
10. Adebonojo SA, Moritz DM, Danby CA. The Results of Modern Surgical Therapy for Multiple Primary Lung Cancers, Chest 1997 Sep; 112(3): 693-701.
11. Federico Rea, Andrea Zuin, Donatella Callegaro, *et al*. Surgical results for multiple primary lung cancers. Eur J Cardiothorac Surg 2001; 20: 489-95.
12. Chang YL, Wu CT, Lee YC. Surgical treatment of synchronous multiple primary lung cancers: Experience of 92 patients. JTCS 2007 Sep; 134(3): 630-7.

兩個同時期發現的原發性肺癌：病例報告

陳炳良　謝俊民　柯獻欽

在肺癌中，同時期原發的肺癌可被發現約0.7~15%。且高達10%在第一次原發肺癌中存活下來的病人再發展出第二個肺癌。這種同時在不同部位發現的結節或腫塊使人弄不清是轉移或是同時期的原發性肺癌。而區分出這兩種的不同是很重要的因為對於治療和預後有重大影響。

我們將報告一個66歲女人。她的胸部X光發現兩處不同病灶但是卻無淋巴結腫大或是遠端轉移的跡象。在兩次的CT guide biopsy後確認是兩個同發的原發性肺癌而成為了一個可能可以開刀的個案。我們將回顧文獻去看如何區分轉移或是同時發生的原發性肺癌。因為在多重病灶下，仍具開刀的可能性，尤其是無遠端轉移及淋巴結腫大之病人，所以我們在開始治療前必須謹慎的做好分期。*(胸腔醫學* ***2010; 85: 85-90)***

關鍵詞：兩個同時期發現的原發性肺癌

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Pulmonary Mucormycosis in a Diabetic Patient: Case Report and Literature Review

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Mucormycosis is a rare but potentially lethal fungal infection caused by *Zygomycetes*, from the order of *Mucorales*. It commonly affects immunocompromised patients and those with diabetes mellitus. We reported a 63-year-old woman with poorly-controlled type 2 diabetes mellitus who presented with cough, hemoptysis and body weight loss of 10 kgs, from an original weight of 60 kgs, within 6 months. Chest X-ray and computed tomography both showed a cavitary lesion in the left upper lung field with an air-fluid level and obstructive pneumonitis. A large tissue clump, 0.4 x 0.4 x 2.5 cm in size, was aspirated out from the left main bronchus during the bronchoscopic examination, and bronchial biopsy showed extensive tissue necrosis and fungal hyphae characteristic of mucormycosis. After the tissue clump had been removed and there was good blood glucose control, both her clinical symptoms and serial image studies showed rapid improvement. We also reviewed the related literature concerning the epidemiology, pathogenesis, clinical manifestations, diagnosis, and treatment of mucormycosis. ***(Thorac Med 2010; 25: 91-97)***

Key words: mucormycosis, diabetes mellitus

Introduction

Zygomycosis, or mucormycosis, is a life-threatening angio-invasive infection caused by fungi of the class *Zygomycetes*, order *Mucorales*. However, unlike other filamentous fungi, such as *Aspergillus*, that are largely opportunistic in immunocompromised patients, zygomycosis can frequently be a lethal infection in hosts with greater immunocompetency, such as those with diabetes mellitus (DM), those receiving deferoxamine therapy, injected drug users, and those with no apparent immune impairment [1-2]. Pulmonary zygomycosis may present as consolidation, a cavitary lesion or pulmonary nodules. Its diagnosis depends on a histopathological demonstration of tissue invasion by the characteristic hyphae. Treatment of zygomycosis includes early removal of infected tissue, early reversal of the predisposing factors, and antifungal agents.

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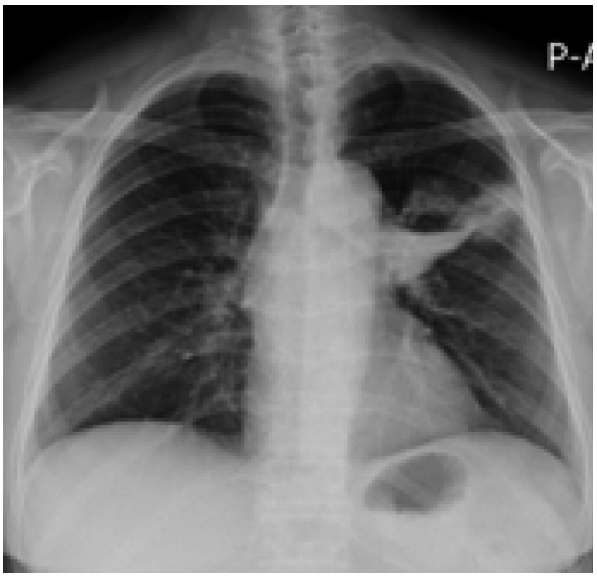
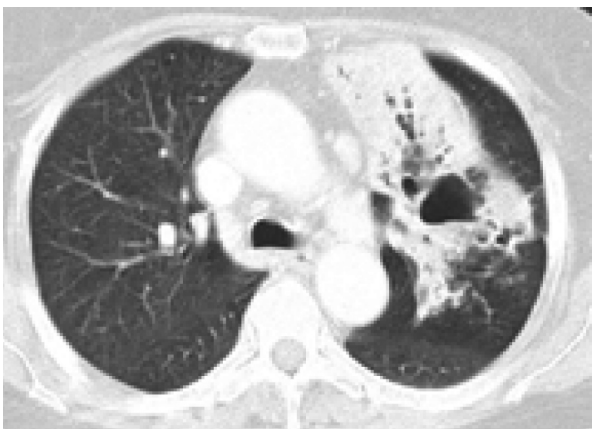
Case Report

A 63-year-old woman was admitted due to intermittent cough for 6 months. An episode of hemoptysis occurred around 3 months previous, and there had been no further hemoptysis since then. The patient had also experienced body weight loss of 10 kgs, from an original weight of 60 kgs, within 6 months. She had a history of diabetes of many years' duration, but not under regular control. Physical examination on admission showed a temperature of 37°C, blood pressure 138/72 mmHg, heart rate 90 beats/min, and respiratory rate 20 breaths/min. Localized rhonchi were heard in the the left upper lung area without significant wheezing. The important laboratory findings were: white blood cell count 12704/cumm with 70% neutrophils, hemoglobin 13.2 g/dL, creatinine 0.7 mg/dL, C-reactive protein 13.3 mg/dL, and HbAlC (glycosylated hemoglobin A1c) 12.8%. The chest X-ray (CXR) (Figure 1A) and chest computed tomography (Figure 1B) both showed a cavitary lesion with an air-fluid level and peripheral consolidation in the left upper field. At that time, the patient was treated for necrotizing pneumonia and lung abscess with cefmetazole 1 gm every 8 hours. In order to rule out pulmonary tuberculosis or other central airway lesions, diagnostic examination with fiberoptic bronchoscopy was arranged with the permission of the patient. The bronchoscopic examination showed a protruding and movable long soft-tissue-like lesion in the left main bronchus. The entire tissue, 0.4 x 0.4 x 2.5 cm in size, was aspirated out. After the tissue was removed, the bronchoscope was inserted again immediately and showed erythematous mucosa change, so a biopsy was performed. The aspirated tissue and biopsy sample were sent for pathology, and



(A)



(B)

Fig. 1. (A) Chest radiography and (B) Computed tomography on admission showing a cavitary lesion in the left upper lung field with an air-fluid level and peripheral consolidation.

suppurative necrosis with broad, wavy, ribbon-like hyphae was seen (Figure 2A). In addition to the hyphae, round sporangia with a flattened base were also found (Figure 2B). A special stain with Grocott's methenamine silver (GMS) (Figure 2C) and periodic acid-Schiff's (PAS) (Figure 2D) disclosed sparsely septated broad hyphae with rectangular branching. All of the above findings were compatible with mucormy-

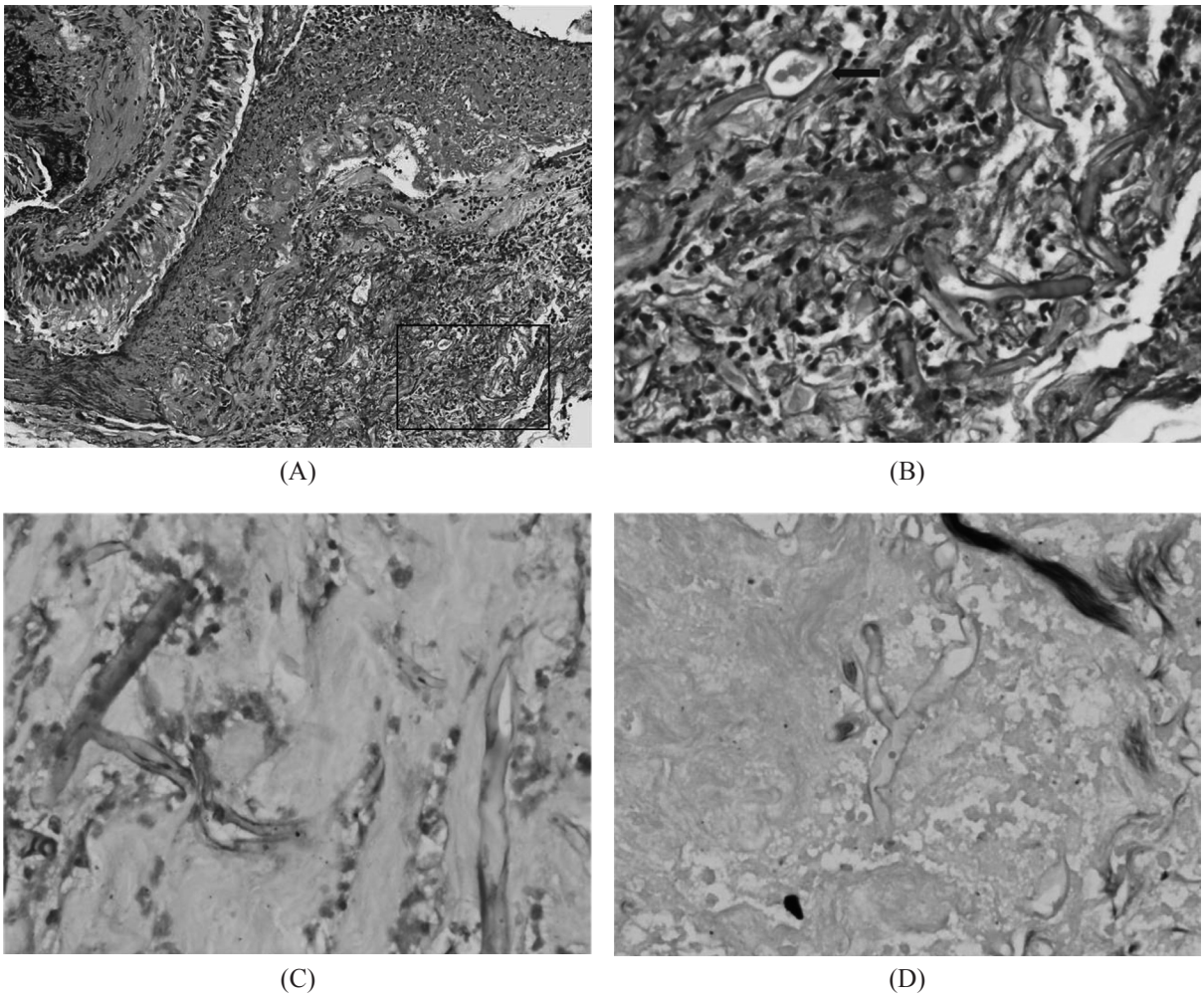


Fig. 2. (A) Histopathology of the tissue from bronchial biopsy, from left to right showing bronchial epithelium, necrotic debris, and fungal colonies. (hematoxylin and eosin stain, original magnification X40); (B) Close-up view of fungus colonies, revealing fungal hyphae and round sporangia with a flattened base (black arrow) (Original magnification X200); (C) Grocott's methenamine silver (GMS); (D) Periodic acid-Schiff's (PAS) stain demonstrating sparsely septated, broad ribbon-like hyphae with rectangular branching. (Original magnification X200)

cosis. After the diagnosis of mucormycosis was made, a sinus X-ray was arranged and sinusitis was excluded. Surgical intervention with lobectomy had been suggested due to the angioinvasive nature of mucormycosis. However, to our surprise, even though no anti-fungal agent was given, her clinical symptoms improved greatly after the bronchoscopic examination, and the follow-up CXR also showed significant improvement. Therefore, after discussion with the patient and her family, the scheduled operation was cancelled. Despite there being no operation, the tight DM control was maintained after administration of 1 course of cefmetazole. Her fasting blood glucose level was controlled at between 100 mg/dL and 130 mg/dL during admission. The follow-up CXR (Figure 3) 1 month after the bronchoscopic examination showed continuous improvement. We thought that her lung lesions were caused not only by

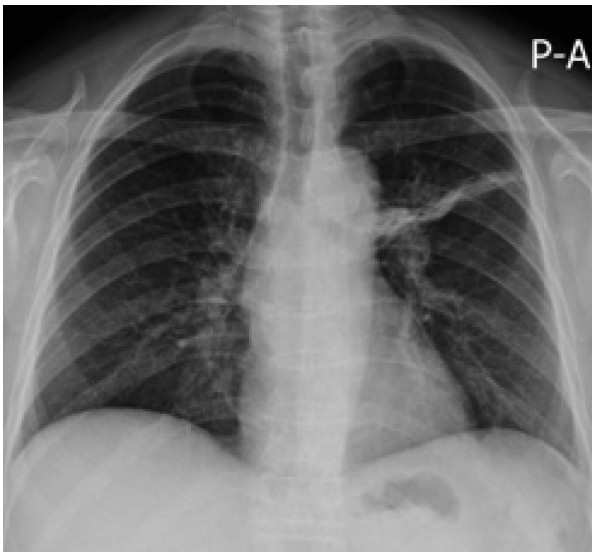


Fig. 3. Follow-up CXR 1 month later demonstrated resolution of the left upper lung cavitary lesion with residual fibrotic change.

poorly-controlled DM-related pulmonary mucormycosis, but also by the tissue clump-related obstructive pneumonitis. So, after antibiotic treatment, tissue clump removal, and good blood glucose control, her lung lesion resolved rapidly.

Discussion

The *Zygomycetes* are a class of fungi that can cause a variety of infections in humans, particularly in immunocompromised patients and those with DM. There is some controversy over the terminology. The older and more common term, "mucormycosis", is familiar to most clinicians. However, most mycologists prefer the term "zygomycosis", since other members of this class of fungi can cause infection, in addition to those in the order *Mucorales* [3].

Pulmonary mucormycosis in DM patients, like this case, is not uncommon in mucormycosis. In a study by Roden, *et al.*, 929 reported mucormycosis cases were reviewed, and the most common types of infection were sinus (39%), pulmonary (24%), disseminated (23%), gastrointestinal (7%) and cutaneous (19%). The researchers further analyzed 337 cases with DM, and the most commonly involved sites were rhinocerebral (43%), followed by pulmonary (16%). In Taiwan, pulmonary mucormycosis is relatively rare; it has been reported in patients with poorly-controlled DM or those taking large-dose steroid because of asthma [4-6].

Mucormycosis agents are ubiquitous and thermo-tolerant organisms that usually grow in decaying matter, including bread, vegetables, fruits, and seeds. Most of the Mucorales can grow and sporulate abundantly on any carbohydrate-containing source, and then spread by airborne transmission. Inhalation of *Mucorales* spores by immunocompetent animals does not result in the development of mucormycosis [7]. The ability of inhaled spores to germinate and form hyphae in the host is critical for establishing infection. Polymorphonuclear phagocytes are the major immune effector cells responsible for inhibiting the hyphal growth of *Zygomycetes*. In addition, both hyperglycemia and acidosis are known to impair chemotaxis and the killing activity of phagocytic cells against *Zygomycetes* by impairing oxidative and non-oxidative mechanisms [8]. So in this case, the poorly-controlled DM was the most important predisposing factor for mucormycosis.

The clinical manifestations of pulmonary zygomycosis are similar to those of invasive pulmonary aspergillosis. In fact, these 2 entities are almost indistinguishable clinically. Timely diagnosis of pulmonary zygomycosis is challenging because symptoms are subtle and nonspecific, even at the late stage of infection. Angioinvasion results in necrosis of tis-

sue parenchyma, which may ultimately lead to cavitation and/or hemoptysis. In this case, the history of hemoptysis and the cavitary lesion both represented the angioinvasive character of pulmonary zygomycosis. In relatively immunocompetent hosts, atypical presentations, such as constitutional symptoms, may last for several months. In this case, significant body weight loss of 10 kgs within 6 months was noted, and may be explained by the poor blood glucose control or the constitutional symptoms of mucormycosis. Besides, patients with DM have an apparent predilection for the development of endobronchial lesions, accounting for more than 80% of reported cases [9]. As in this case, the endobronchial lesions often lead to obstruction of major airways, and can occasionally erode major pulmonary blood vessels, resulting in fatal hemoptysis.

Timely diagnosis of zygomycosis requires a high index of suspicion and largely depends on the histopathological demonstration of tissue invasion by means of the characteristic hyphae or by isolation of *Zygomycetes* spp. in cultures of sterile tissue [10]. However, culture often yields no growth, and the histopathological results often provide the only evidence of infection. So far, non-culture-based diagnostic methods, such as fungal antigen detection and molecular diagnosis, remain investigational, and no assays with sufficient sensitivity or specificity have been identified [11].

In tissue specimens, *Zygomycetes* appear as broad (10 to 20 um in diameter), sparsely septated hyphae with branches occurring at right angles (Figures 2C and 2D). During the handling of infected tissues, the hyphae may collapse and fold, producing the characteristic ribbon appearance (Figures 2C and 2D). Tissue histology of *Zygomycetes* infection has revealed neutrophil infiltrates, necrosis and invasion of blood vessels with thrombosis, but this is not seen in all cases [10].

Successful treatment of zygomycosis largely depends on a timely diagnosis, reversal of the underlying predisposing factors, and early removal of infected tissue in conjunction with systemic antifungal agents [8]. However, the optimal antifungal treatment is uncertain due to the lack of randomized control trials. The current recommended antifungal therapy for zygomycosis includes intravenous amphotericin B, while oral posaconazole could be used as a step-down therapy. Other azoles, including fluconazole and voriconazole, have no meaningful activity against *Zygomycetes* spp [12-13]. Because zygomycosis is a highly angioinvasive infection with resulting extensive thrombosis and tissue necrosis, antifungal agents often display poor penetration at the site of infection. Therefore, removal of as much of the infected tissue as possible while the infection is localized has the greatest benefit. In this case, fortunately, we were able to remove the large infected tissue clump during the bronchoscopic examination, and the patient had no other complicated underlying predisposing factors, except poorly-controlled DM. So, surgical intervention could be spared, and after the antibiotic treatment, tissue chunk removal, and good blood glucose control, her lung lesion resolved rapidly.

In conclusion, for patients with DM and persistent pulmonary lesions, the possibility of mucormycosis should not be ignored. Prompt bronchoscopic examination with biopsy should be considered for early diagnosis. Timely diagnosis, early reversal of the underlying predisposing factors, and early removal of the infected tissue in conjunction with systemic antifungal agents are crucial for the prognosis.

References

1. Sridhara SR, Paragache G, Panda NK, *et al*. Mucormycosis in immunocompetent individuals: an increasing trend. J Otolaryngol 2005; 34: 402-6.
2. Vazquez JA, Sobel JD. Fungal infections in diabetes. Infect Dis Clin North Am 1995; 9: 97-116.
3. Ribes JA, Vanover-Sams CL, Baker DJ. Zygomycetes in human disease. Clin Microbiol Rev 2000; 13: 236-301.
4. Lee CH, Lee CJ, Hsueh C, *et al*. Pulmonary mucormycosis: the first case with preoperative diagnosis and successful surgical treatment in Taiwan. J Formos Med Assoc 1990; 89: 1096-8.
5. Lee EJ, Lee MY, Hung YC, *et al*. Orbital rhinocerebral mucormycosis associated with diabetic ketoacidosis: report of survival of a 10-year-old boy. J Formos Med Assoc 1998; 97: 720-3.
6. Wu CL, Hsu WH, Huang CM, *et al*. Indolent cutaneous mucormycosis with pulmonary dissemination in an asthmatic patient: survival after local debridement and amphotericin B therapy. J Formos Med Assoc 2000; 99: 354-7.
7. Waldorf AR, Ruderman N, Diamond RD. Specific susceptibility to mucormycosis in murine diabetes and bronchoalveolar macrophage defense against Rhizopus. J Clin Invest 1984; 74: 150.
8. Spellberg B, Edwards J, Ibrahim A. Novel perspectives on mucormycosis: pathophysiology, presentation, and management. Clin Microbiol Rev 2005; 18: 556-69.
9. Turunc T, Demiroglu YZ, Aliskan H, *et al*. Eleven cases of mucormycosis with atypical clinical manifestations in diabetic patients. Diabetes research and clinical practice 2008; 82: 203-8.
10. Frater JL, Hall GS, Procop GW. Histologic features of zygomycosis. Arch Pathol Lab Med 2001; 125: 375-8.
11. Machouart M, Larche J, Burton K, *et al*. Genetic identification of the main opportunistic Mucorales by PCR-restriction fragment length polymorphism. J Clin Microbiol 2006; 44: 805-10.
12. Rogers TR. Treatment of zygomycosis: current and new options. J Antimicrob Chemother 2008; 61: i35.
13. van Burik JAH, Hare RS, Solomon HF, *et al*. Posaconazole is effective as salvage therapy in zygomycosis: a retrospective summary of 91 cases. Clin Infect Dis 2006; 42: 61-5.

肺白黴菌病—病例報告

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肺白黴菌病是相當少見但可能致命的黴菌感染，通常侵犯免疫功能不全以及糖尿病患者。我們報告一位63歲血糖控制不良的糖尿病患者，因慢性咳嗽、咳血及體重減輕入院，胸部X光及電腦斷層檢查發現左上肺有開洞性病灶，入院後安排氣管鏡檢查並於左側主支氣管發現有一塊大小約0.4 x 0.4 x 2.5 cm的長條型組織，我們將該組織塊整個取出並送病理檢查及安排特殊染色，組織學及特殊染色皆符合典型白黴菌病感染表徵，在確診為肺白黴菌之後，我們原先安排左上肺葉切除，但在該組織塊取出之後及良好的血糖控制下，患者臨床症狀及胸部X光追蹤皆大幅改善，因此在和患者討論過後決定暫緩開刀並持續追蹤其後續變化。*(胸腔醫學* ***2010; 25: 91-97)***

關鍵詞：白黴菌，糖尿病

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Lung Collapse Due to Diffuse Tracheomalacia: A Case Report

Kuan-Chun Lin, Chu-Tau Lee*, Ping- Chen Yu*

This report describes a patient with acute respiratory failure who surprisingly presented with dyspnea, and wheezing on auscultation following intubation. Chest computed tomography showed right middle and lower lung collapse without an endobronchial lesion or sputum impaction. Bronchoscopy demonstrated a dynamic collapse of the upper and lower airway. Diffuse tracheomalacia leading to lung collapse is a rare clinical pattern. ***(Thorac Med 2010; 25: 98-103)***

Key words: diffuse tracheomalacia, lung collapse

Introduction

Tracheomalacia is present when tracheal compliance is increased. It is usually a localized rather than a generalized process and may be congenital or acquired. The most important and frequent causes of acquired tracheomalacia are related to endotracheal tubes and tracheostomy. This report describes an 82-year-old male with a history of prostate cancer status post-chemotherapy who presented with dyspnea, paradoxical abdominal movement, and wheezing on auscultation following intubation. Chest radiography revealed homogenous opacities in the right middle and lower lung. Chest computed tomography (CT) showed right middle and lower lung collapse without endobronchial lesion or sputum impaction. Bronchoscopy demonstrated a diffuse dynamic collapse of the upper and lower airway throughout a respiratory cycle. Diffuse tracheomalacia leading to lung collapse is a rare clinical pattern.

Case Report

An 82-year-old man had a history of prostate cancer with bone metastasis status post-chemotherapy. He presented with progressive dyspnea, high fever and much purulent sputum for several days. Obvious orthopnea with severe persistent hypoxemia in room air were found on admission. He was intubated emergently and initially treated for pneumonia. The symptoms and imaging findings showed great improvement following 18 days of intubation. Unfortunately, a sudden onset of dyspnea, use of

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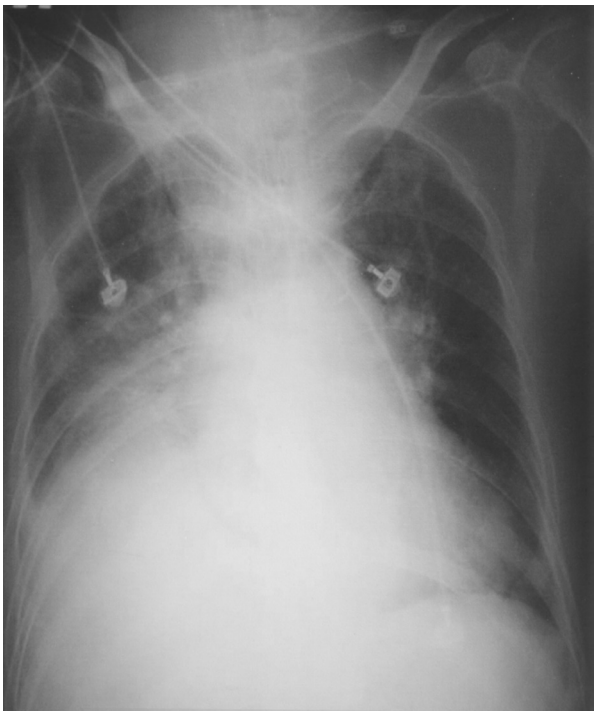


Fig. 1. Chest X-ray showing homogenous opacities in the right middle and lower lung.

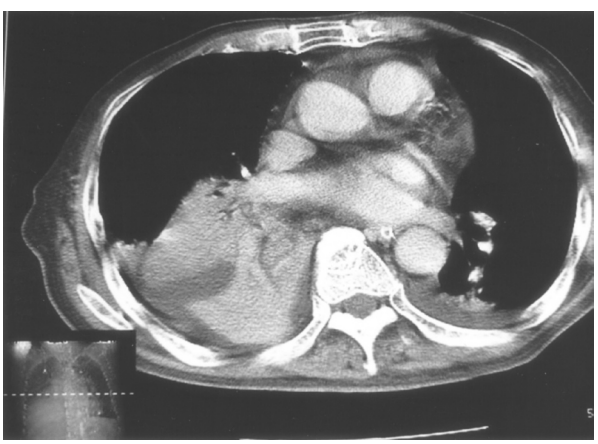


Fig. 2. Chest CT scan demonstrated right middle and lower lung collapse without an endobronchial lesion or sputum impaction.

accessory muscles and paradoxical abdominal movement, and wheezing on examination were found just before the spontaneous breathing trial. Initial CXRs (Figure 1) showed homogenous opacities in the right middle and lower lung. Chest CT (Figure 2) demonstrated right middle and lower lung collapse without an endobronchial lesion or sputum impaction. There was no imaging finding of lymphadenopathy or intra-abdominal metastasis (Figure 3). Bronchoscopy (Figure 4) revealed a diffuse dynamic collapse of the upper and lower airway throughout a respiratory cycle. Neither asthma attack nor chronic obstructive pulmonary disease with acute exacerbation was suspected before this event; however, diffuse tracheomalacia was suspected. Despite this clinical finding, an eventful but successful extubation was undertaken. However, the patient died of unexpected apnea the next morning.

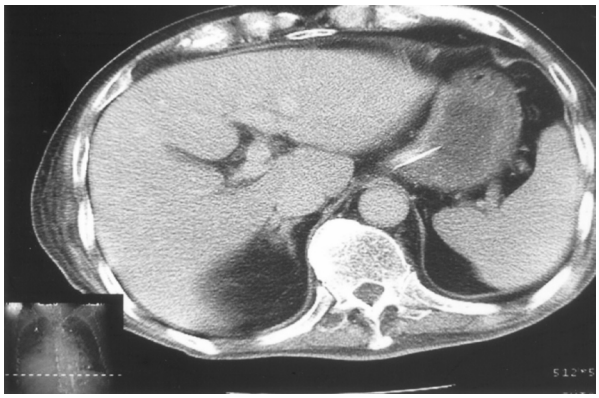
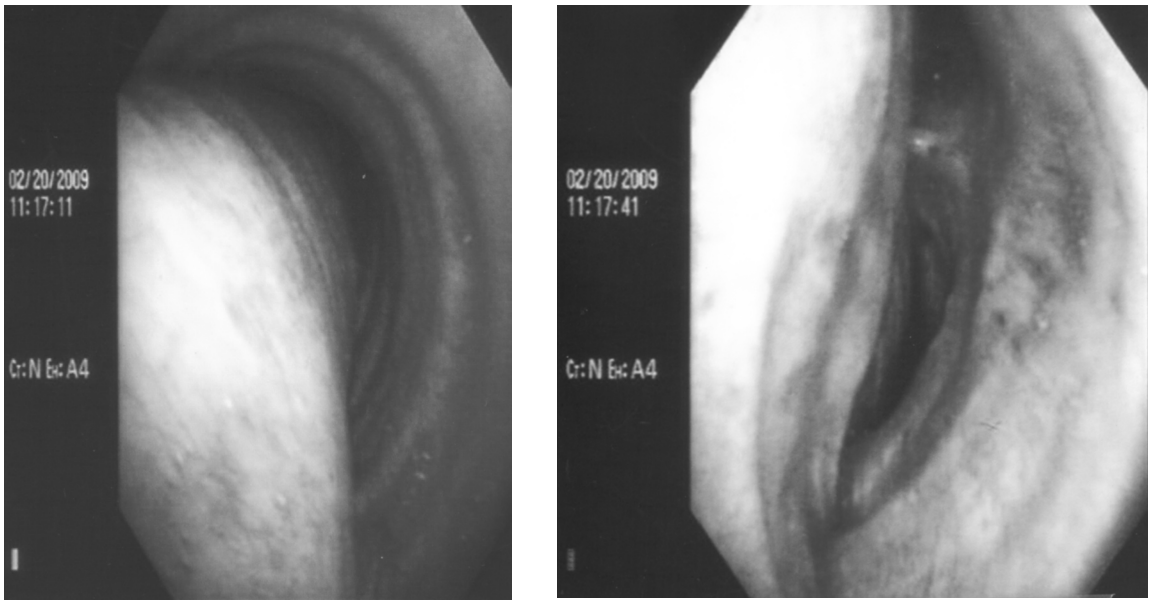


Fig. 3. No imaging finding of lymphadenopathy or intra-abdominal metastasis.

Discussion

Tracheomalacia is present when tracheal compliance is increased. The increase in compliance is due to the loss of integrity in the wall's structural components and is particularly associated with damage to cartilage rings. It is usually a localized rather than a generalized process and may be congenital or acquired. Important causes of tracheomalacia are cartilage deficiency; generalized tracheomalacia;



(A) (B)

Fig. 4. Bronchoscopy revealed a diffuse dynamic collapse of the upper and lower airways.

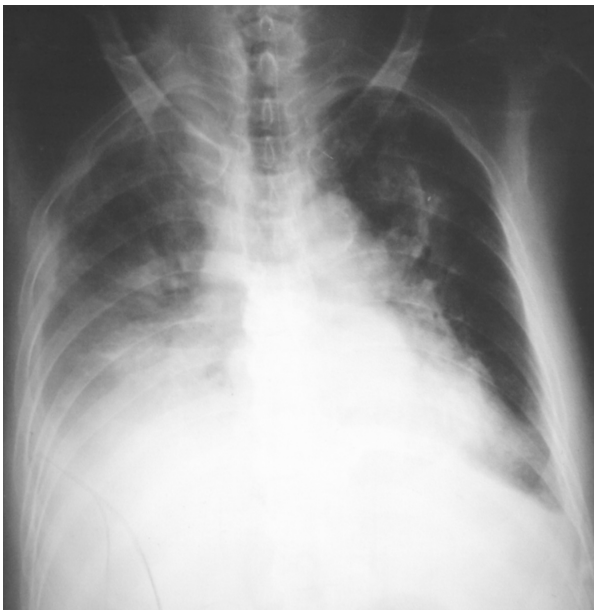


Fig. 5. Chest X-ray showing persistent homogenous opacities in the right middle and lower lung.

tracheoesophageal fistula; compression by an anomalous artery; events following closed chest trauma, lung resection, radical neck dissection, or radiation therapy; COPD; relapsing polychondritis; and lunate trachea. The most common cause is related to endotracheal tubes and tracheostomy. Since the introduction of wide, low pressure cuffs, the problem has largely disappeared. Tracheostomy-related compliant segments may develop at the site of the stoma, at the level of the cuff, or in between. An endotracheal tube cuff lying in a compliant segment appears overinflated, and this may provide an early clue to the presence of tracheomalacia [1]. This patient had no history of intubation or even tracheostomy. The cuff pressure had been kept at less than 25 cmH_2O throughout the hospital course. Surprisingly, diffuse tracheomalacia occurred following 18 days of intubation; the upper and lower airways were involved simultaneously.

During forced expiration or coughing, a normal trachea shows narrowing both coronally and sagittally, the latter caused by in-

vagination of the membranous posterior wall. Some authors consider that caliber changes of >50% indicate increased wall compliance [2-3]. Changes in cross-sectional area and sagittal and coronal diameters in patients with acquired tracheomalacia have been studied with static inspiratory and expiratory CT [4]. They showed a significantly greater diminution in sagittal diameter and cross-sectional area. Normally, the intrathoracic tracheal cross-sectional area varies by 35% ± 18% [5]. Changes in area >70% indicate tracheomalacia. Dynamic studies with CT may be particularly effective in identifying tracheomalacia segments [6-7]. With regard to this patient, not only was diffuse tracheomalacia impressed, but right middle and lower lung collapse without endobronchial lesion, lymphadenopathy, intra-abdominal metastasis or sputum impaction was found accidentally on imaging. Lung collapse accompanying diffuse tracheomalacia is a rare clinical pattern.

Bronchoscopy is probably the mainstay for diagnosis of tracheomalacia. As in our case, it revealed a diffuse dynamic collapse of the upper and lower airway throughout a respiratory cycle. Concurrently, a bronchial polyp located at the orifice of right middle lobe was examined. Pathology demonstrated atypical change in the chondrocytes. Due to this patient's history of prostate cancer with bone metastasis, the correlation between suspected lung metastasis and diffuse tracheomalacia still requires further investigation.

Tracheomalacia also leads to serious respiratory distress. Some authors have found the presence of both apnea and hypopnea which were obstructive in nature, with an apnea-hypopnea index of 11 during a sleep study [8]. The use of continuous positive airway pressure has been recommended in patients having respiratory distress and may be successful in patients requiring a short-term intervention as the disorder spontaneously resolves [9]. A case of respiratory failure due to diffuse tracheomalacia has also been reported [10]. However, in this patient, the rapid shadow breathing index and maximal inspiration pressure results were good. Eventful but successful extubation was performed. The follow-up CXR showed long-term existence of opacities (Figure 5). The patient died of unexpected apnea the next morning. Based on evidence from the case reports mentioned above, sleep apnea was highly suspected. Polysomnography should be arranged early to ensure the diagnosis and prevent further serious respiratory distress.

References

1. Ravin CE, Handel DB, Kariman K. Persistent endotracheal tube cuff overdistension: a sign of tracheomalacia. AJR Am J Roentgenol 1981; 137: 408-9.
2. Campbell AH, Young IF. Tracheomalacia collapse, a variant of obstructive respiratory disease. Br J Dis Chest 1963; 57: 174-81.
3. Johnson TH, Mikita JJ, Wilson RJ, *et al*. Acquired tracheomalacia. Radiology 1973; 109: 576-80.
4. Aquino SL, Shepard JA, Ginns LC, *et al*. Acquired tracheomalacia: detection by expiratory CT scan. J Comput Assist Tomogr 2001; 25: 394-9.
5. Stern EJ, Graham CM, Webb WR, *et al*. Normal trachea during forced expiration: dynamic CT measurements. Radiology 1993; 187: 27-31.
6. Hein E, Rogalla P, Hentschel C, *et al*. Dynamic and quantitative assessment of tracheomalacia by electron beam tomography: correlation with clinical symptoms and bronchoscopy. J Comput Assist Tomogr 2000; 24: 247-52.
7. Kao SC, Smith WL, Sato Y, *et al*. Ultrafast CT of laryngeal and tracheobronchial obstruction in symptomatic postoperative infants with esophageal atresia and tracheoesophageal fistula. AJR Am J Roentgenol 1990; 154: 345-50.

8. Joshi JM, Sundaram P. Tracheobronchomegaly associated tracheomalacia: analysis by sleep study. Indian J Chest Dis Allied Sci 2004; 46: 47-9.
9. Ferguson GT, Benoist J. Nasal continuous positive airway pressure in the treatment of tracheobronchomalacia. Am Rev Respir Dis 1993; 147: 457-61.
10. Collard PH, Freitag L, Reynaert MS, *et al*. Respiratory failure due to tracheobronchomalacia. Thorax 1996; 51: 224-6.

瀰漫性氣管軟化症導致肺塌陷：病例報告

林冠群　李秋桃*　余秉真*

支氣管軟化症主要是氣管的彈性增加所致，其原因為氣管壁的結構改變，多半是局部病灶，很少有廣泛性的，後天造成的支氣管軟化症主要是由插管或氣切術後所引起，在影像學上因支氣管軟化症造成肺實質的變化更是少見。本文描述一位因肺炎而插管治療的急性呼吸衰竭患者，在住院過程中突然產生呼吸困難跟喘鳴。胸部X光呈現右中葉及下葉均質性泛白；胸部電腦斷層顯示右側肺中葉與下葉塌陷但是沒有發現氣管內病灶或是痰液阻塞的情形。支氣管鏡檢查呈現廣泛性主支氣管及左右主支氣管隨著呼吸週期有一個動態性的塌陷。瀰漫性氣管軟化症導致肺塌陷在臨床上是一種罕見的型態。*(胸腔醫學* ***2010; 25: 98-103)***

關鍵詞：瀰漫性氣管軟化症，肺塌陷

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Excessive Dynamic Airway Collapse – A Case Report

Tang-Hsiu Huang, Han-Yu Chang

The normal airway lumen exhibits transient and partial narrowing during forceful expiration, which is known as “dynamic airway collapse” (DAC). Excessive DAC (EDAC) results from transient and exaggerated invagination of the membranous posterior tracheobronchial wall, probably due to weakening of the intrinsic elastic tissues, and may impair ventilation and secretion clearance. In this report, we described a female who initially received endotracheal intubation because of severe pneumonia with respiratory failure, during which high cuff pressures and high levels of positive end-expiratory pressure were utilized. Despite having no known history of cigarette smoking, chemical exposure or underlying airway disorder, she subsequently developed frequent expiratory wheeze recalcitrant to inhalational bronchodilators, recurrent low-airway infections, and eventually difficult weaning from mechanical ventilation. Further surveys, including dynamic computed tomographic scan and bronchoscopy, revealed EDAC. The severity of her airway symptoms improved following the use of continuous positive airway pressure. In conclusion, EDAC clinically mimics common obstructive ventilatory disorders. Physicians should remain alert to this disorder, particularly when managing patients with refractory obstructive airway symptoms and difficult weaning. ***(Thorac Med 2010; 25: 104-109)***

Key words: tracheobronchomalacia, tracheobronchial wall, continuous positive airway pressure

Introduction

Excessive dynamic airway collapse (EDAC) results from the exaggerated invagination of the posterior tracheobronchial fibro-membranous wall during expiration, causing an obstructive ventilatory defect. Clinically, EDAC mimics other common obstructive ventilatory disorders and poses a diagnostic challenge. Although much still remains to be clarified regarding its pathophysiology, diagnosis, and optimal management, its significance as a cause of central airway compromise has been increasingly recognized.

Case Report

An 86-year-old female initially presented to our hospital with fever and hypoxic respiratory failure, precipitated by low airway infection and pulmonary congestion due to diastolic heart failure. Subsequent to having difficulty

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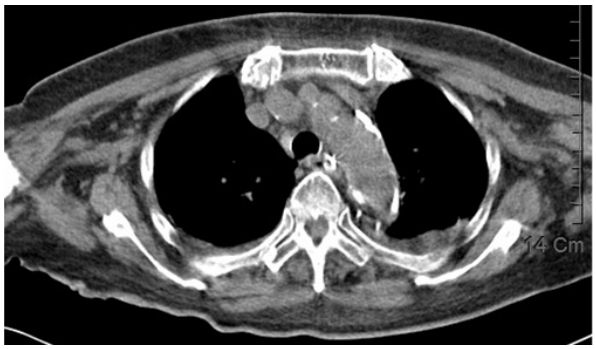
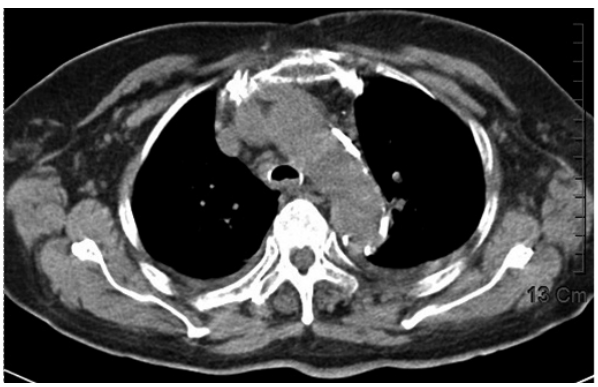
with oral endotracheal intubation, an emergent cricothyroidotomy was performed. After treatment, the patient was successfully weaned from mechanical ventilation and was extubated 9 days later; the cricothyroidotomy was closed smoothly. Since then, frequent wheeze, occasional stridor, and loud nocturnal snoring were noted. Intravenous methylprednisolone, initially at a dosage of 20mg q6h, was then given with a tapering dose to control the suspected laryngeal edema and central airway inflammation. The first bronchoscopy, nevertheless, did not detect evident airway stenosis or collapse. She had never smoked and had no known underlying pulmonary disorder. Her past history was remarkable for hypertension, chronic atrial fibrillation, diabetes mellitus, chronic kidney disease, and localized transitional cell carcinoma of the urinary bladder that had been treated by transurethral resection and intra-vesical chemotherapy. As her condition improved and stabilized, she was discharged to a nursing home. About 3 weeks later, she was sent to our emergency department again, this time exhibiting bilateral upper-lung pneumonia and hypoxic respiratory failure. During the first 3 weeks of this admission, her respiratory distress quickly progressed to ARDS. Since prolonged use of an artificial airway was expected, a tracheostomy was created. Her peak airway pressures were frequently high (range, 26~34 cmH_2O). Higher positive end-expiratory pressure (PEEP) levels (range, 10~12 cmH_2O) were also used, and correspondingly higher endotracheal cuff pressures (range, mostly 30 ~40 cmH_2O, though pressures as high as 50 cmH_2O were intermittently measured) were utilized during this period to prevent air leakage. Despite the control of her infection and improvements in her overall physical condition, the patient consistently failed spontaneous



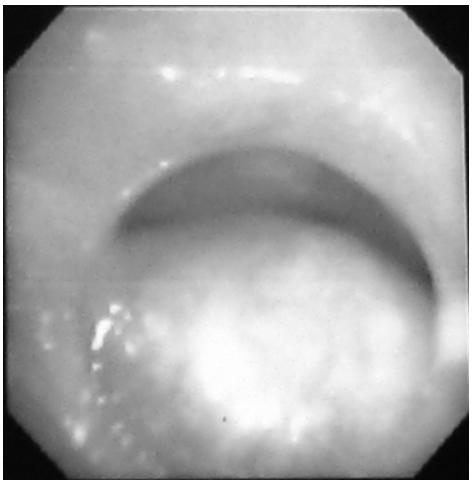
(A)



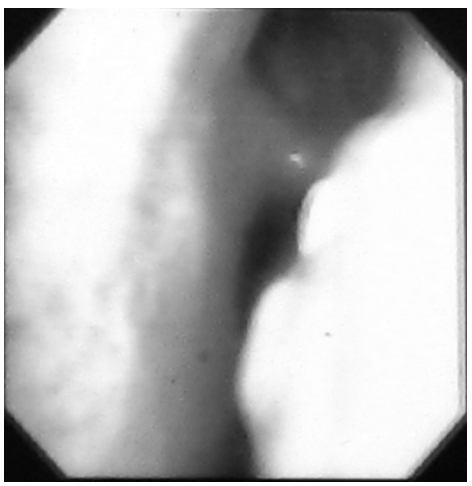
(B)

Fig. 1. Dynamic CT scan images of the trachea taken during inspiration (1A) and expiration (1B).

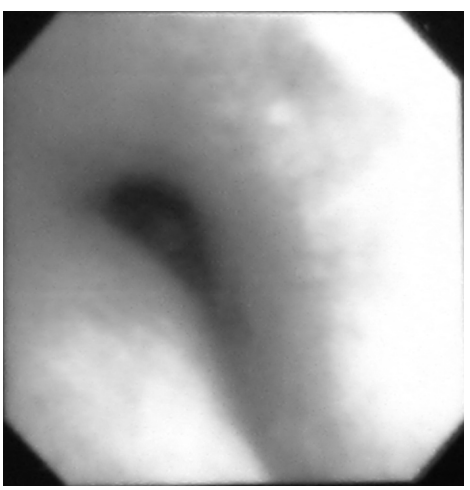
breathing trials during the next few months. The spontaneous breathing trials were usually terminated due to intractable dyspnea, desaturation, and wheezing. These airway manifestations were refractory to inhalational bronchodilator as well as to glucocorticoids. Dynamic chest computed tomography (CT) scans (taken separately during inspiration and expiration, see Figure 1) and a second bronchoscopy (see Figure 2) performed for this patient revealed grossly intact tracheal cartilaginous architecture but excessive invagination of the posterior tracheobronchial wall during expiration. Excessive collapse of her central airway along the sagittal axis during the expiratory phase was identified, thus EDAC was diagnosed. With the application of continu-



(A)



(B)



(C)

Fig. 2. Bronchoscopic images taken during expiration; note the crescent-shaped collapse of the trachea (2A) and significant narrowing of the right (2B) and left (2C) bronchi.

ous positive airway pressure (CPAP), her subjective dyspnea and wheeze decreased, though her weaning process was still very difficult. The patient was still ventilator-dependant at the time of discharge.

Discussion

Patients with EDAC present with symptoms and signs that are characteristic of obstructive central airway disorder, including cough, dyspnea, wheeze, difficulty of secretion expectoration, and recurrent low airway infections [1-3]. For those who are under mechanical ventilatory support, EDAC may contribute to weaning failure [3], as was the case with our patient. The exact incidence and pathophysiology of EDAC remains to be determined. Proposed risk factors include local injury or chronic inflammation of the tracheobronchial wall, and prolonged high central airway pressure, particularly with concurrent glucocorticoid use [1, 3-5, 7]. Through unknown mechanisms, these factors cause "diminishment" in the myo-elastic components of the posterior tracheobronchial membranous wall, increasing the compliance of the wall. Subsequently, during expiration, as the transpulmonary pressure steadily increases and eventually overpowers the intramural pressure, invagination of the posterior tracheobronchial wall becomes excessive [1]. As reported above, all these risk factors were present in our patient.

Direct observation via either bronchoscopy or dynamic dual-phase CT scan of the excessive invagination of the posterior tracheobronchial membranous wall during expiration is crucial for diagnosis [1, 5]. So far, no definite diagnostic criteria exist for EDAC. Nevertheless, a decrease in the cross-sectional area of at least 50% of the tracheobronchial lumen during expi-

ration, as compared with the inspiratory phase, is considered diagnostic, particularly if the narrowing lumen exhibits a crescent-shape morphology [1, 3, 6]. Distinction between EDAC and tracheobronchomalacia is challenging, neither clinical symptomatology nor pulmonary function tests is helpful. Theoretically, cartilaginous destruction or atrophy is present in tracheobronchomalacia and not in EDAC [7-8], but to prove this requires obtaining tissue pathology. Differences in the cross-sectional shape of the narrowing tracheobronchial lumen during expiration, as visualized via bronchoscopy or CT scan, may give clues. While a crescent-shape narrowing can be seen in both EDAC and tracheobronchomalacia, saber-shaped or circumferential narrowing is seen only in the latter [1]. Morgu *et al*. reported the use of endobronchial ultrasound to demonstrate abnormalities in the distribution of central airway cartilaginous components, which may be a promising novel approach to differentiate between the two disease entities [9]. Although no tissue biopsy or EBUS was performed, the diagnosis of EDAC was made with our patient based on her clinical presentation and the bronchoscopic and CT scan findings.

Medical treatment focuses on the avoidance, as much as possible, of further exposure to airway irritants (most notably, cigarette smoke), and on the control of the underlying pulmonary morbidities [1, 7]. Bronchodilator use may aggravate airway collapse due to the decrease in the airway wall-stiffness following smooth muscle relaxation, and thus lead to a further increase in the airway wall compliance [1, 10]. Application of CPAP may serve as a pneumatic stent and thereby decrease the severity and symptoms of airway collapse, but the data on its long-term efficacy and benefit are still lacking [1, 3, 11-12]. There is no definite surgical treatment; many of the current surgical therapeutic strategies have been extrapolations from those that were actually designed for tracheobronchomalacia. Tracheobronchoplasty involving either the placement of silicone stents or the use of mesh to splint the posterior tracheobronchial wall has been reported [3, 13-15], but this procedure is still experimental and is associated with complications. While mesh splinting is associated with all the surgical and anesthesic risks pertaining to thoracotomy, stent placement may be complicated by stent dislodgement, the impairment of "physiological" airway narrowing during cough or forceful expiration, and secretion impaction [13-15]. Large prospective studies are required to formulate the optimal therapy for this disorder.

In conclusion, although EDAC clinically mimics common obstructive ventilatory disorders, it actually involves a distinct pathophysiology and may require different therapeutic strategies. Physicians should remain alert to this disorder, particularly when managing patients with refractory obstructive airway symptoms and difficult weaning.

References

1. Murgu S, Colt H. Tracheobronchomalacia and excessive dynamic airway collapse. Respirology 2006; 11: 388-406.
2. Imaizumi H, Kaneko M, Mori K, *et al*. Reversible acquired tracheobronchomalacia of a combined crescent type and saber-sheath type. J Emerg Med 1995; 13:43-9.
3. Carden KA, Bioselle PM, Waltz DA, *et al*. Tracheomalacia and tracheobronchomalacia in children and adults. Chest 2005; 127: 984-1005.
4. Law JH, Barnhart K, Rowlett W, *et al*. Increased frequency of obstructive airway abnormality with long-term tracheostomy. Chest 1993; 104: 136-8.
5. Lee KS, Sun MRM, Ernst A, *et al*. Comparison of dyna-

mic expiratory CT with bronchoscopy for diagnosing airway malacia. Chest 2007; 131: 758-64.
6. Johnson TH, Mikita JJ, Wilson RJ, *et al*. Acquired tracheomalacia. Radiology 1973; 109: 577-80.
7. Nuutinen J. Acquired tracheobronchomalazia. Eur J Respir Dis 1982; 63: 380-7.
8. Jokinen K, Palva T, Sutinen S, *et al*. Acquired tracheobronchomalacia. Ann Clin Res 1977; 9: 52-7.
9. Murgu S, Kurimoto N, Colt H. Endobronchial ultrasound morphology of expiratory central airway collapse. Respirology 2008; 13: 315-9.
10. Finder JD. Primary bronchomalacia in infants and children. J Pediatr 1997; 130: 59-66.
11. Smith TC, Marini JJ. Impact of PEEP on lung mechanics and work of breathing in severe airway obstruction. J Appl Physiol 1988; 65: 1488-99.
12. Martin JG, Shore S, Engel LA. Effect of continuous positive airway pressure on respiratory mechanics and pattern of breathing in induced asthma. Am Rev Respir Dis 1982; 126: 812-7.
13. Ernst A, Majid A, Kopman-Feller D, *et al*. Airway stabilization with silicone stents for treating adult tracheobronchomalacia. Chest 2007; 132: 609-16.
14. Majid A, Guerrero J, Gangadharan S, *et al*. Tracheobronchoplasty for severe tracheobronchomalacia. Chest 2008; 134: 801-7.
15. Hautmann H, Huber RM. Stent flexibility: an essential feature in the treatment of dynamic airway collapse. Eur Respir J 1996; 9:609-11.

過度動態性呼吸道塌陷—病例報告

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過度動態性呼吸道塌陷臨床上呈現出阻塞型呼吸障礙的相關症狀，容易和其它常見的阻塞性呼吸道疾病或是氣管支氣管軟化症混淆。因此過去文獻上相關的專論並不多，近幾年才逐漸引起重視。我們在此報告一個病例：一位八十六歲的女性，因屢次下呼吸道感染而反覆接受氣管內插管及呼吸器使用，其中第二次住院時併發急性呼吸窘迫症，在接受呼吸器治療期間其呼吸道常暴露於較高之氣道壓力之下，儘管稍後病人整體臨床狀況改善，卻始終無法順利移除呼吸器，且經常產生喘鳴及氣促的情形，經由動態性胸腔電腦斷層掃描及支氣管鏡的檢查，診斷出有過度動態性呼吸道塌陷。我們藉由這樣的病例報告，提醒臨床醫師在診治表現有阻塞性呼吸道症狀乃至於呼吸器依賴的病人時，亦須將過度動態性呼吸道塌陷列入鑑別診斷中考慮。*(胸腔醫學* ***2010; 25: 104-109)***

關鍵詞：氣管支氣管軟化症，氣管支氣管壁，持續呼吸道正壓

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