

# A case of malignant mesothelioma detected hydropneumothorax

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**Abstract:** A 61-year-old man was admitted to the emergency room because of sudden right chest pain and dyspnea. A chest X-ray and chest computed tomography (CT) revealed severe right pneumothorax with massive pleural effusion. Chest drainage was performed and approximately 1.2 L of pleural fluid was removed. Hemothorax was suspected based on the imaging findings, but the pleural effusion was serous. Active air leakage continued for 4 days after chest drainage, thus we decided to surgically control the air leakage and performed video-assisted surgery. A thoracoscopic examination revealed a large number of nodule parietal pleural and epiphrenic pleural nodule lesions. A pathological examination of frozen sections of the nodules indicated malignant pleural mesothelioma (MPM). Continuous air leakage was observed from the pleural surface of the right lower lobe. The air leak developed from the visceral pleura and the point of visceral pleura had a normal macroscopic appearance. The patient was treated with wedge lung resection and pleurodesis.

**Keywords:** Pneumothorax; hydropneumothorax; malignant mesothelioma; pleural effusion

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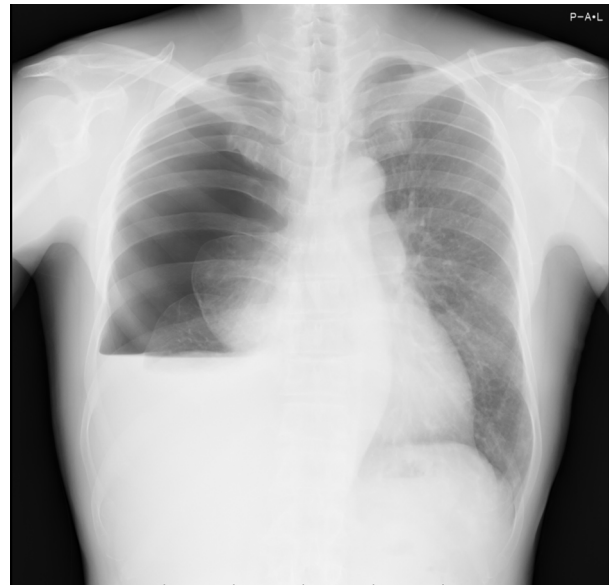
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## Introduction

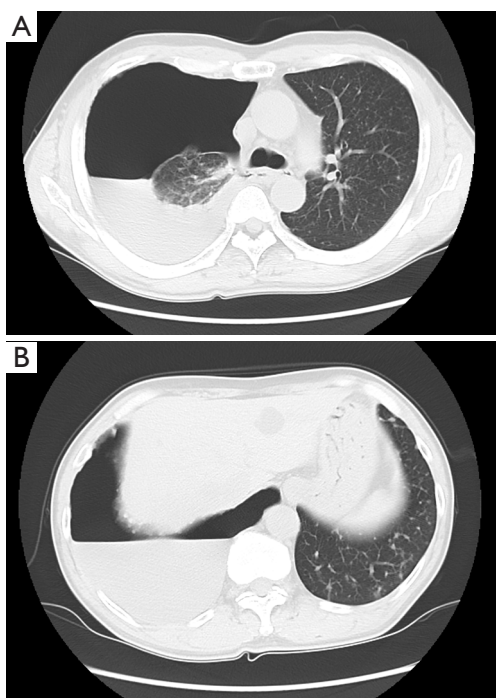
Malignant pleural mesothelioma (MPM) is characterized by its association with asbestosis and typically presents with pleural effusion and pleural thickening. Merged pleural mesothelioma and pneumothorax is rare. We herein report a case of malignant mesothelioma that presented with hydropneumothorax.

## Case presentation

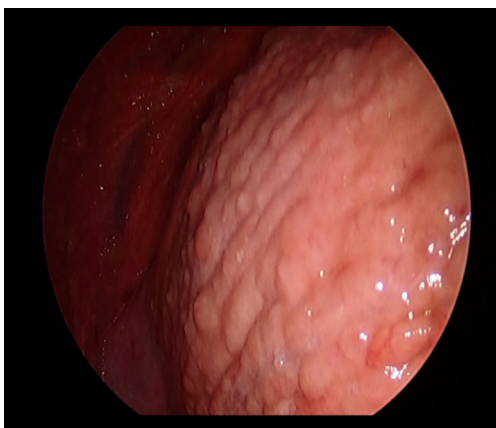
A 61-year-old man was admitted to the emergency room due to sudden right chest pain and dyspnea. He had a history of asbestos exposure and was a previous smoker with a 120 pack-year history. The past history of the patient included appendicitis and old myocardial infarction. Right-sided severe pneumothorax with pleural effusion was detected on a chest X-ray film (*Figure 1*). Computed tomography (CT) of the chest showed that the right lung



**Figure 1** Chest radiography shows right-sided severe pneumothorax with pleural effusion.

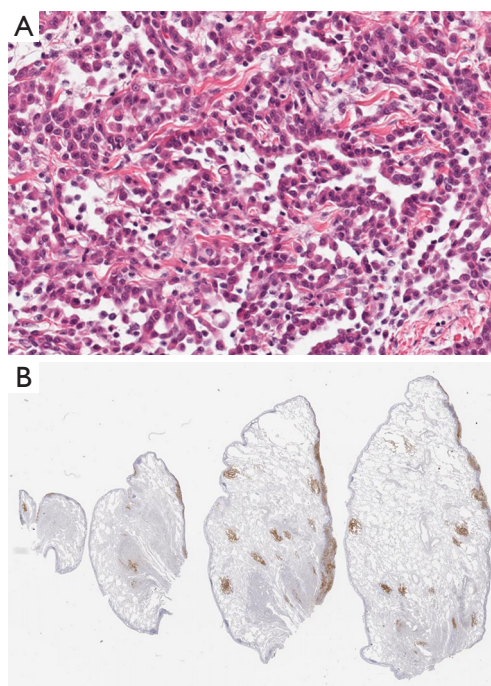


**Figure 2** Chest CT findings. (A) Chest computed tomography (CT) reveals right-sided pneumothorax with massive pleural effusion; (B) CT shows a large number of small nodules on the diaphragm side.



**Figure 3** Intraoperatively, a large number of nodule lesions were observed on the parietal pleura and epiphrenic pleura.

was collapsed, with massive pleural effusion (*Figure 2A*) and a large number of nodules on the side of the diaphragm (*Figure 2B*), but no irregular pleural thickening. We performed chest drainage. Because the patient was treated



**Figure 4** Histological findings. (A) Histological sections revealed the growth of the tumor cells in the parietal pleura specimen, the patient was therefore diagnosed with malignant pleural mesothelioma epithelioid type (magnification 100 $\times$ ; H&E stain); (B) immunostaining of the visceral pleura was positive for calretinin (magnification 5 $\times$ ).

with anticoagulant, so hemothorax was suspected. However, the pleural effusion was serous. Thus, we considered the possibility of a malignant disorder or infectious disease. A cytological examination of the effusion revealed negative findings. Active air leakage continued for 4 days after chest drainage. We therefore decided to control the air leakage surgically and performed video-assisted surgery. Intraoperatively, we found a large number of parietal pleural and epiphrenic pleural nodule lesions (*Figure 3*). A pathological examination of frozen sections of the parietal pleural nodules indicated MPM. The surface of the visceral pleura had a normal macroscopic appearance, and no bullae were observed. We found continuous air leakage from the pleural surface of the right lower lobe; we therefore performed wedge lung resection of the right lower lobe. However, after the wedge resection, we detected air leakage from a site in which the visceral pleura had been touched with surgical cotton and surgical devices. We therefore attached a PGA (polyglycolic acid) sheet to the site of the

aerial fistula, and performed pleurodesis with OK-432 and minocycline. The pathological findings showed the growth of the tumor cells in a specimen of the parietal pleura (Figure 4A). Immunostaining was positive for calretinin and D2-40. Based on these findings, the patient was diagnosed with epithelial MPM. The findings were also observed in the visceral pleura (Figure 4B).

## Discussion

Pneumothorax complicated with MPM was first reported by Eisenstadt (1). Merged MPM and pneumothorax is reported in approximately 10–30% of cases (2). However, there have been few cases in which MPM was diagnosed based on the symptoms of pneumothorax (2–5), and cases diagnosed based on the symptoms of hydropneumothorax are rarer (3). MPM occurs from the parietal pleura and the symptoms of pleural effusion and chest pain typically develop first (3). Thus, pneumothorax due to changes of the visceral pleura rarely occurs in the early stage of the disease, and it is thought that merged pneumothorax often occurs after the progression of mesothelioma, when the lesion extends to the visceral pleura (3). Mannes *et al.* reported that both smaller and larger tumors may be associated with spontaneous pneumothorax, which may be caused by the rupture of necrotic tumor nodules (6). In the present case, the histopathological examination clearly revealed that the invasion of the visceral pleura by the tumor and it was inferred that the pleural failure occurred due to tumor. However, there were no abnormal macroscopic findings in the early stage because the growth of tumor in the visceral pleura was mild. During the operation, we could not find the malignant lesion of visceral pleura. Furthermore, during the operation, the aerial fistula occurred at the site in which the pleura stimulated with surgical cotton or other surgical devices. We hypothesized that the air leakage occurred due to the failure of the visceral pleural lesion, and that it seemed to be a characteristic surgical finding of early-stage MPM (2). Sheard *et al.* reported that they performed pleural resection for recurrent pneumothorax in patients of  $\geq 40$  years of age, and detected MPM in 5 of 45 patients (11%) (7). MPM is itself a rare disease. Even though it is known that pneumothorax can occur throughout the course of the disease, we should recognize that it is still difficult to diagnose mesothelioma with pneumothorax. The characteristics that we observed in the present case, (I) pneumothorax with unexplained pleural effusion; (II) intraoperative findings, air leakage developed from the

visceral pleura had a normal macroscopic appearance, are thought to be important in the diagnosis of this rare condition.

## Conclusions

We experienced a case of MPM that was diagnosed with hydropneumothorax. Malignant mesothelioma presents nonspecifically. The present case was unique in that mesothelioma presented as hydropneumothorax, which made the diagnosis difficult. The present case should be considered in the differential diagnosis of pneumothorax in elderly individuals, and pneumothorax with pleural effusion. It is important to perform a histopathological examination of the pleura when patients undergo surgery for the management of pneumothorax.

## Acknowledgements

None.

## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

*Informed Consent:* Written informed consent was obtained from the patients for publication of this manuscript.

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