Malignant Pleural Mesothelioma With Cavity Formation in a 16-Year-Old Boy*

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A 16-year-old Japanese boy was admitted to the department of internal medicine of our hospital with complaints of cough, fever, and left-sided pleuritic pain for 1 month. He was a smoker (20 cigarettes per day) and had inhaled paint thinner as antisocial behavior for >1 year. He had neither a history of asbestos exposure nor a family history of malignancies. Laboratory examination findings were unremarkable except for a positive tuberculin skin test result.

Chest radiographs revealed a consolidation-like shadow in the left lower lung field with an obliteration of the silhouette of the left diaphragm (Fig 1). A chest CT scan demonstrated a nodular opacity with cavity formation and a small amount of pleural effusion in the left hemithorax (Fig 2). Diagnostic thoracentesis obtained a bloody and exudative fluid with an adenosine deaminase level of 20.7 U/L, a lactic acid dehydrogenase (LDH) level of 1,043 U/L (serum LDH level at that time, 214 U/L), and a leukocyte count of 51,200 cells/μL, in which the differential cell count of lymphocytes was >90%.

Several examinations of the pleural fluid cytology were negative for malignancy. Although bacteriologic smears and a polymerase chain reaction of the pleural fluid were negative for tuberculosis, the attending physician started a course of empiric chemotherapy with antituberculous agents because of the cavitary lesion found on the initial CT scan (Fig 2), a positive tuberculin skin test result, and the age of the patient. However, the symptoms and pleural effusion did not respond to medication. The patient was referred to our surgical department for treatment of a complicated left pneumothorax approximately 2 months after receiving the medication.

What is the diagnosis?
Figure 1. Chest radiograph showing a left-sided pleural effusion and soft-tissue density in the left lower lung field. Top: the original posteroanterior view. Bottom: lateral view.

Figure 2. Axial view of the chest CT scan showing a nodular opacity with cavity formation (arrow) and a small amount of pleural effusion.
Diagnosis: Malignant pleural mesothelioma with localized left pneumothorax

Diffuse pleural tumors on the left mediastinal and visceral pleura were discovered during video-assisted thoracic surgery for the pneumothorax, while a leak point was not apparent. Because malignant pleural mesothelioma was diagnosed by direct pleural biopsies at that time, the patient underwent an extrapleural pneumonectomy with systematic mediastinal lymphadenectomy approximately 3 months after the hospital admission. The operation included removal of the left part of the pericardium, the left diaphragm, and the chest wall around the previous thoracostomy tube route. However, the surgery resulted in incomplete resection because of aggressive invasion into the intrapericardial space.

We found a nodular lesion including a slight airspace in the resected specimen (Fig 3), where the initial CT scans had demonstrated the cavitary lesion. Further histologic studies revealed a biphasic pattern of malignant pleural mesothelioma. Although the patient was discharged from our hospital, he eventually died of recurrent tumor around the remnant pericardium on postoperative day 54.

**DISCUSSION**

Malignant pleural mesothelioma is uncommon in patients of all age groups, and is extremely rare in both adolescents and children. Only an estimated 2 to 5% of all cases presents in the first 2 decades of life.1 Men are affected more than women among adults, and such a predominance is also true for younger patients.1 Although an etiologic link between the disease and asbestos exposure has been well-documented in adults, no risk factor has been clarified in young patients.2 We wonder whether an inhalation of paint thinner was one of the etiologic causes in our patient, as smoking has not been reported to be a risk factor for the disease.3 Anyway, a confirmative diagnosis of the disease is extremely difficult in such a young patient.

In approximately 20% of cases of exudative pleural effusions, it remains difficult to establish their clear etiology. Several reports have described the diagnostic yield of thoracoscopy, whether it is performed as video-assisted thoracic surgery or medical thoracoscopy, for both benign and malignant pleural diseases, and especially for uncertain pleural effusions.4 The diagnostic sensitivity and specificity of the thoracoscopy for pleural malignancy was reported to be 82 to 89% and 96 to 100%, respectively,4 and for pleural tuberculosis both the sensitivity and specificity were 100%.4 With respect to laboratory data, the trend of pleural fluid LDH level is reported to be informative.5 Diagnostic thoracoscopy may be indicated when the LDH level in pleural fluid is higher than that in the serum because the laboratory finding reflects an unusual severe inflammation in the pleural space.

Early radiologic manifestations of malignant pleural mesothelioma on CT scan include a nodular thickening of the interlobular fissures on high-resolution CT scans.6 In our patient, the interlobular tumor may have caused minimal pneumothorax and then produced a cavitary lesion because of the complicated pneumothorax. The fact that the patient had the complicated pneumothorax despite a leak point was not apparent during the surgery may support this hypothesis.

We have experienced an extremely rare case of malignant pleural mesothelioma in a 16-year-old boy, which was demonstrated with cavity formation on the initial CT scan. Diagnostic thoracoscopy should be included when the diagnosis is not confirmed, even though tuberculosis is highly suspected.

**REFERENCES**


**Figure 3.** Macroscopic findings of the resected specimen show a solid nodule of approximately 2 cm in diameter and a slight airspace (arrow) in the interlobular fissure, where the initial CT scans demonstrated a cavitary lesion.