

Localized Malignant Mesothelioma of the Pleura

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Because malignant mesothelioma is commonly seen as a diffuse neoplasm, a localized tumor is an extremely rare form of presentation. Only 45 cases have been reported, and little is known about their behavior. We report a new case of localized malignant mesothelioma with the microscopic appearance of diffuse malignant mesothelioma, but without any evidence of diffuse spread. A 54-year-old man, a former smoker, with a brief history of asbestos exposure for 3 months, presented with a severe right chest pain and a swelling in the same area. Chest-computed tomography (CT) showed a 4.5 cm extra pleural tumor with a smooth surface, located in the right anterior chest wall, and destruction of the 5th rib. A CT-guided needle biopsy revealed malignant mesothelioma. Detailed examinations revealed a resectable solitary localized mass with no distant metastasis. The patient underwent operation, a tumorectomy, plus a combined resection of the chest wall and part of the right middle lobe. A complete en bloc resection was achieved. Pathology revealed localized malignant mesothelioma, biphasic type. Immunohistochemical findings confirmed the mesothelial feature. Localized malignant mesothelioma should be distinguished from diffuse malignant mesothelioma because of its different biological behavior, and in the former complete resection it is associated with a good prognosis. (*Ann Thorac Cardiovasc Surg* 2007; 13: 262–266)

Key words: localized malignant mesothelioma, asbestos exposure, complete resection

Introduction

Localized malignant mesotheliomas are uncommon sharply circumscribed tumors of the serosal membranes with the microscopic appearance of diffuse malignant mesothelioma, but without any evidence of diffuse spread.¹⁾ Little is known about their behavior, and only 45 cases have been reported in the English literature. The relationship between carcinogenicity and asbestos exposure is also unclear. In this paper, we report a case of malignant mesothelioma with complete en bloc resection.

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Furthermore, we attempt to clarify the history of asbestos exposure of the patient and to measure asbestos bodies inside the lung.

Case

A 54-year-old man had been suffering from palpitations and chest discomfort since October 2002. Severe right-side chest pain occurred in July 2003, and he found a swelling in the chest wall in the same area. He consulted a cardiologist in October and was found to have atrial fibrillation. An abnormal shadow in the right middle lung field was detected on chest X-ray (Fig. 1), and chest-computed tomography (CT) showed pleural thickening (Fig. 2A). He was followed for a while with a diagnosis of benign pleural tumor. The CT was taken on May 12, 6 months after the initial appearance, and the tumor size had slightly increased (Fig. 2B). A follow-up chest CT 14 months later showed an increased tumor mass 4.5 cm in diameter in the right anterior chest wall with invasion

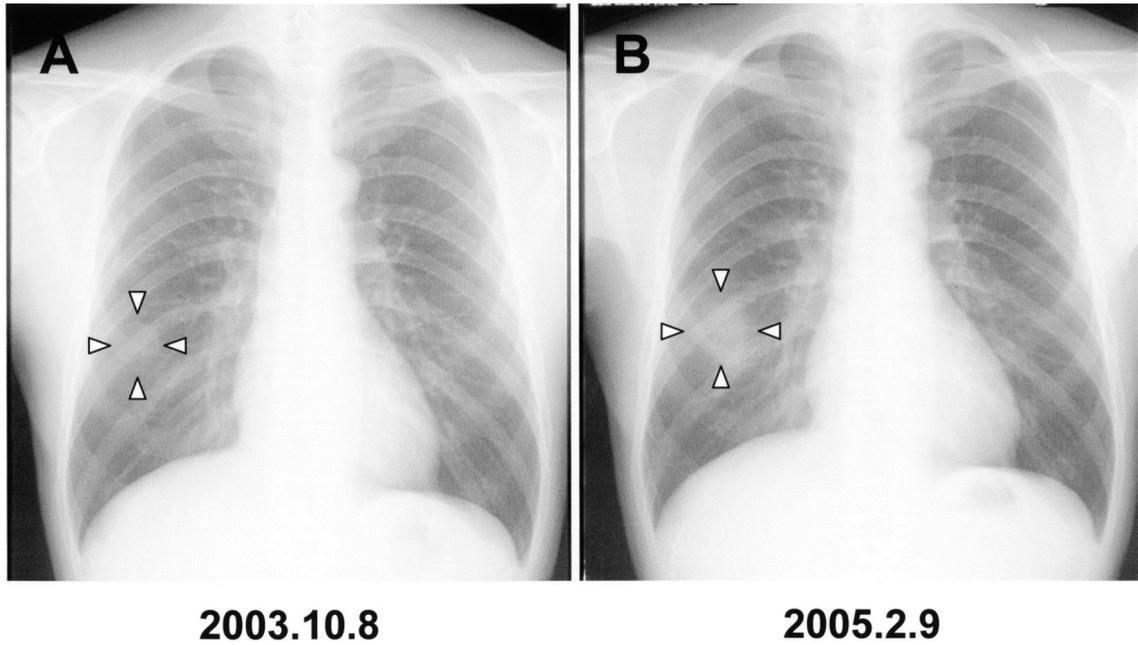


Fig. 1. A chest X-ray taken on the first medical examination (A) and just before surgery (B).

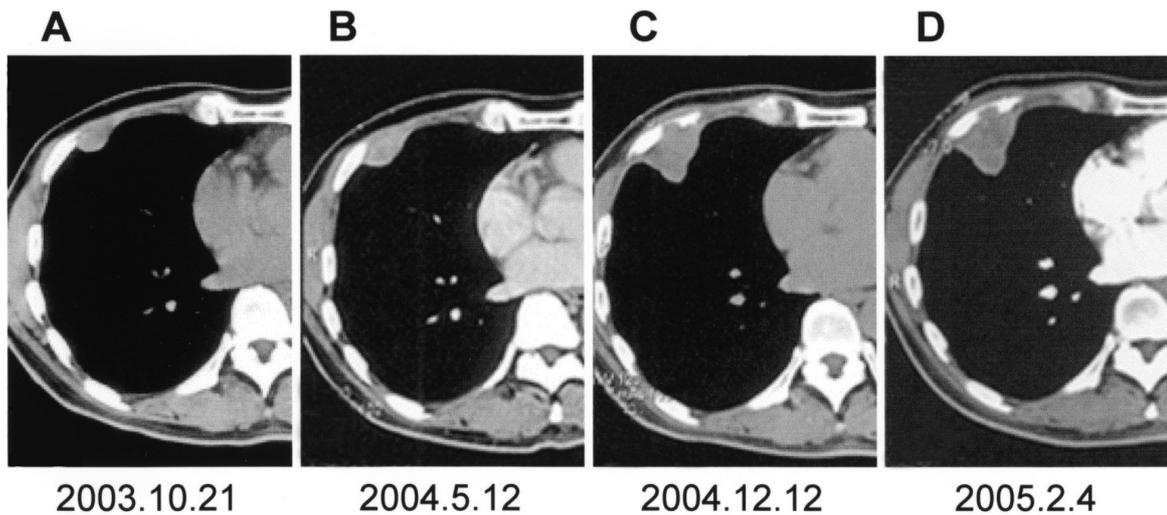


Fig. 2. A chest CT showing an extrapleural mass located on the 5th anterior rib with a smooth surface and thickened parietal pleura surrounding the mass (A, B). A tumor invaded the rib 14 months later (C). Size increase was seen just before surgery (D).

to the 5th rib (Fig. 2C). He was referred to a pulmonologist on January 19, 2005, and a CT-guided needle biopsy revealed malignant mesothelioma. Although the tumor size had increased to 4.9 cm in diameter by February (Figs. 1B and 2D), detailed examinations revealed localized malignant mesothelioma with no distant metastasis. On February 8, he was referred for surgery.

Surgical resection was performed on February 14, 16

months after the initial consultation. A thoracotomy was performed through an anterolateral incision in the 5th intercostal space. No pleural effusion or dissemination was found. A hard tumor of about 5 cm was located in the anterior chest wall (5th rib) and appeared to have a direct invasion to the right middle lobe. A resection of the primary tumor and chest wall (4th and 5th ribs) with a 3-cm surgical margin and a combined resection of part

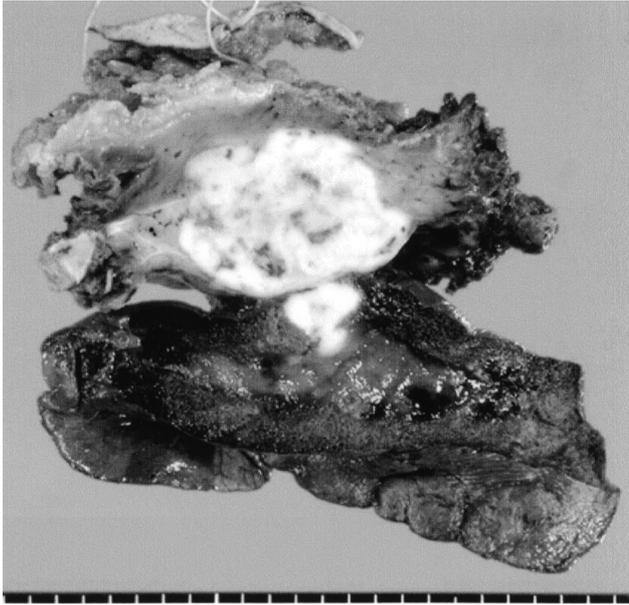


Fig. 3. Gross appearance of the resected tumor, which extends into the chest wall and 5th rib and invades the lung tissue beyond the visceral pleura. The skin around the punctured area was resected together to prevent local recurrence resulting from skin seeding of malignant cells.

of the right middle lobe was performed. Lymph nodes in the mediastinum were not dissected. The chest wall defect was repaired with a 10.0 by 5.0 cm Maalex mesh. Postoperative course was extremely good, and the patient was discharged 10 days after the operation without complication.

Macroscopically, the resected tumor was pale white with spots of blood and solid, involving chest wall, 5th rib, parietal pleura, and lung tissue (Fig. 3). Histopathologically, the tumor was diagnosed as a localized malignant mesothelioma, biphasic type. Complete en bloc resection was confirmed because all surgical margins were negative. There was a wide spectrum of microscopic finding, including polygonal cells forming sheets, tubules lined by cuboidal cells with large nuclei and prominent nuclei, and complex tubular patterns with flattened monotonous patterns. The sarcomatous components were composed of plump spindle-shaped cells, in some instances with very high-grade cytology (Fig. 4). Immunohistochemical findings supported the mesothelial features, and it was strongly positive for cytokeratin (AE1/AE3) (Fig. 5A), strongly positive for calretinin (Fig. 5B), focally positive for vimentin (Fig. 5C), and a few cells were positive for desmin. In contrast, the tumor cells were con-

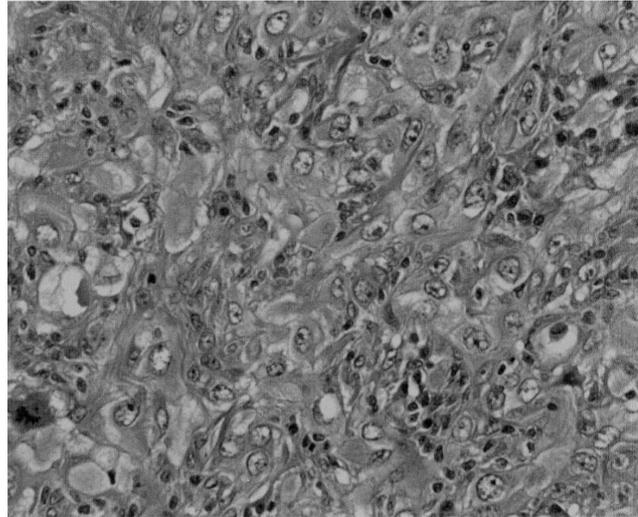


Fig. 4. A high-power image of localized malignant mesothelioma showing a sarcomatous component with high-grade cytology.

sistently negative for carcinoembryonic antigen (CEA), TTF-1, PE-10, and napsin-A.

A quantitative analysis of asbestos inside the normal lung of this patient was performed, using Churg's method.²⁾ There were 1,750 asbestos bodies per gram in the normal dried lung tissue of this patient. According to the Helsinki Criteria,³⁾ more than 1,000 body/g of asbestos bodies inside the lung indicates a strong possibility of having had asbestos exposure.

The patient is alive and well without any recurrence 24 months after the surgery.

Discussion

Since Crotty et al.⁴⁾ first described a series of six localized malignant mesotheliomas in 1994, several additional case reports have been published in the English language literature.⁴⁻¹³⁾ The largest series of 23 localized malignant mesotheliomas was reported by the United States–Canadian Mesothelioma Reference Panel in 2005,¹⁾ and they also reviewed 22 previously reported cases. As far as we know, only 45 (pleura, 39; pericardium, 2; peritoneum, 4) confirmed cases have been reported. Therefore localized malignant mesothelioma is a rare entity.

When a patient's diffuse or localized pleural cell proliferation is suspected, an accurate diagnosis is needed. However, this can present many problems for clinicians, radiologists, and surgical pathologists. Regarding localized mesothelial cell proliferations, the nomenclature

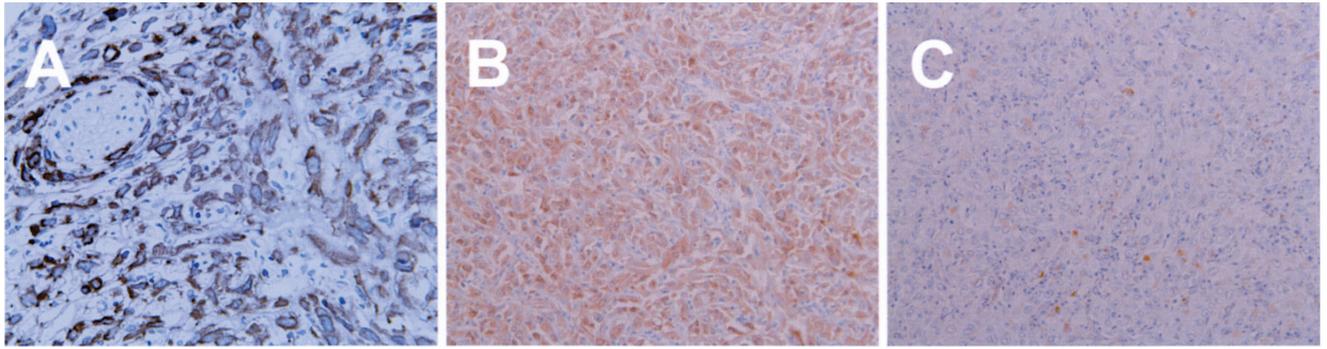


Fig. 5. Immunohistochemical features of the tumor.

A: Cytokeratin was positive in the mixoid area.

B: Both spindle-shaped and polygonal tumor cells showed cytoplasmic immunoreactivity for calretinin.

C: Focal staining for vimentin.

in this area has been a historic problem. The term “localized mesothelioma” has been used in the past to describe a variety of primary localized pleural and peritoneal neoplasms, such as solitary fibrous tumor,^{4,14,15} well-differentiated papillary mesothelioma,¹⁶ diffuse malignant mesothelioma,¹⁷ and, rarely, other neoplasms such as synovial sarcoma¹⁸ and adenocarcinoma.¹⁹ In the past, localized (solitary) fibrous tumors were termed localized fibrous mesotheliomas; however, this term should be avoided in describing solitary fibrous tumors because they are now considered to be of mesenchymal stem cell origin.^{1,20}

This patient presented with nonspecific symptoms, and he was then followed for 14 months without any pathological examination, though a chest CT showed a pleural mass. Since a radiologist diagnosed it as a benign tumor, such as a localized fibrous tumor, on radiographic findings and recommended observation, a pathological examination had been omitted. After the tumor grew to 4.5 cm in size and rib destruction was seen, a CT-guided needle biopsy was performed, yielding a definitive diagnosis of malignant mesothelioma. The pathological examinations could have been too late. Because a crucial feature of localized malignant mesothelioma is that many cases can apparently be cured by surgical excision,¹ clinicians should attempt pathological examination (e.g., NB or VATS) as early as possible to prevent tumor invasion, even when a mass is localized and tiny.

The criteria used to diagnose localized malignant mesothelioma is (i) radiological, surgical, or pathological evidence of a localized serosal/subserosal (but not organ-centered) tumor mass without evidence of diffuse serosal

spread; and (ii) a microscopic pattern identical to that found in ordinary diffuse malignant mesothelioma.¹ According to the literature, localized malignant mesotheliomas should be distinguished from diffuse malignant mesotheliomas because of their localized presentation, different biological behavior, and far better prognosis. These features seem compatible with our patient, who is well and alive without any recurrence 24 months after the complete surgical resection. Although a recurrent spread of localized malignant mesothelioma in the manner of diffuse malignant mesothelioma has been reported,^{9,19} the majority of patients, including patients with metastatic disease, did not develop diffuse serosal recurrent disease. When these tumors recur, they tend to metastasize in the fashion of sarcomas, which underlines their difference from ordinary diffuse malignant mesotheliomas.

The patient presented in this report had a brief history of occupational exposure to asbestos. When he was 20 years old, he was employed as a ceiling tile worker, sometimes spraying asbestos, for only 3 months. Whether he was really exposed to asbestos with such a short history was unclear. Therefore we performed a quantitative analysis of asbestos in the normal lung tissue of this patient, and the results suggested a history of exposure to asbestos. Although it may have been related to the carcinogenic process in this case, we are unable to concretely define the role of asbestos exposure in the causation of localized malignant mesothelioma because only 4 out of 23 patients had such a history in the largest series.¹ However, it is quite important to hear such a trivial episode, and this matter is not to be trifled with.

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