

Malignant pleural mesothelioma masquerading as a chest wall soft tissue tumor

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Case Report

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Abstract

Malignant pleural mesothelioma (MPM) typically presents as diffuse pleural thickening accompanied by pleural effusion, whereas cases presenting primarily with a localized chest wall mass are extremely rare and highly deceptive in clinical practice. We herein report the case of a 67-year-old male patient without a definitive history of asbestos exposure, who presented with a right anterior chest wall mass and chest pain. The preoperative needle biopsy merely indicated a poorly differentiated malignant tumor. After undergoing extended resection of the right anterior chest wall malignancy, the patient was definitively diagnosed with biphasic malignant pleural mesothelioma (T4N0M0 IIIB) through detailed pathological and immunohistochemical examinations, and experienced tumor recurrence only two months postoperatively. This case highlights the significant challenges in the preoperative diagnosis of atypical MPM, indicating that when confronting atypical pleural tumors in clinical practice, it is imperative to rely on adequate needle biopsy, extensive immunohistochemistry, and even multidisciplinary team (MDT) discussion to determine the pathological origin. This approach is crucial to avoid therapeutic decision-making errors caused by misdiagnosis and to formulate the most appropriate comprehensive treatment strategy for the patient.

1. Introduction

Malignant pleural mesothelioma (MPM) is a highly aggressive and extremely poor-prognosis rare malignant tumor. Clinically and radiologically, it typically presents as diffuse pleural thickening, frequently accompanied by massive, refractory pleural effusion.¹ However, in a few atypical cases, MPM lacks obvious diffuse intrathoracic lesions and instead grows as a localized mass. When it penetrates the pleura and invades the chest wall soft tissues and skeletal system, it often presents radiologically as a prominent chest wall space-occupying lesion. Such cases of MPM, presenting primarily as a chest wall tumor, are highly deceptive in clinical practice and can be easily confused with primary chest wall bone tumors, mesenchymal tumors, or chest wall metastases. This article reports a rare case of biphasic malignant pleural mesothelioma initially presenting as a hypermetabolic mass in the right anterior chest wall, and thoroughly explores the difficulties and pitfalls in the preoperative diagnosis of MPM with such an uncommon presentation. Furthermore, a literature review (Table 1) is included to provide a reference for clinical practice when managing similar rare pleural tumors.

2. Case report

A 67-year-old male patient presented to our institution with a 3-month history of a right anterior chest wall mass accompanied by chest pain. His past medical history included coronary heart disease and diabetes mellitus, with no history of smoking or definitive asbestos exposure. Upon admission, contrast-enhanced chest computed tomography (CT) (Fig. 1a) revealed a mass measuring 27 mm × 35 mm in the 5th and 6th intercostal spaces of the right anterior chest wall. Positron emission tomography-computed tomography (PET-CT) (Fig. 1b-d) showed a visible hypermetabolic lesion (maximum standardized uptake value = 19.1) with no lymph node or distant metastasis. Preoperative needle biopsy (Fig. 2a, b)

suggested a poorly differentiated malignant tumor, with immunohistochemistry showing CK positivity and focal calretinin positivity. Preoperative pulmonary function tests and echocardiography revealed no significant abnormalities. The preoperative diagnosis suggested a malignant tumor localized to the right anterior chest wall, presenting indications for surgical resection. We performed an extended resection of the right anterior chest wall malignancy, excising the tumor and the adjacent 5th and 6th ribs, and confirmed negative surgical margins via intraoperative frozen section pathology. During intraoperative exploration, we identified an isolated nodule measuring approximately 3 mm on the parietal pleura posterior to the 4th anterior rib, which was concurrently resected for biopsy. The thoracic drainage tube was removed on postoperative day 2, and the patient was discharged on postoperative day 4. Postoperative pathology (Fig. 2c, d) demonstrated strong positive expression of mesothelial markers Calretinin and D2-40, along with the co-expression of CK and the mesenchymal marker vimentin. Combined with the morphological features, a final diagnosis of biphasic malignant pleural mesothelioma was rendered, with a Ki-67 proliferation index > 95% in hot spots. Tumor invasion was observed in the chest wall nodule, resulting in a postoperative stage of T4N0M0 (stage IIIB). A follow-up CT scan at 2 months postoperatively (Fig. 3a, b) revealed multiple nodular changes in the right pleura, indicating tumor recurrence. Following a multidisciplinary team (MDT) discussion, postoperative adjuvant therapy was recommended; however, the patient refused chemotherapy and opted to return to a local medical facility for symptomatic conservative treatment. During a telephone follow-up in the 4th postoperative month, it was reported that the recurrent chest lesions had further enlarged and symptoms of dyspnea had developed.

3. Discussion

The typical growth pattern of malignant pleural mesothelioma is diffuse pleural tumor nodules, whereas localized presentations are relatively rare, with an incidence of only 0.5%–1.6%.⁸ MPM presenting solely as a chest wall tumor on imaging is exceptionally rare.

When malignant mesothelioma breaches the pleura and presents primarily as a localized chest wall tumor, preoperative diagnosis becomes challenging. Similar patients in the literature review (Table 1) were all male, mostly without a definitive history of asbestos exposure, presenting on CT as a chest wall mass with or without bone destruction, and in some cases, breaching the pleura to involve the lung. Therefore, for any patient presenting with a chest wall tumor on imaging, it is recommended to confirm the tumor origin via preoperative needle biopsy to formulate the most suitable treatment strategy. However, for biphasic and sarcomatoid mesotheliomas, confirming the diagnosis through needle biopsy is often difficult due to the decreased specificity of mesothelioma markers in the sarcomatoid component.^{3,7,9,10} For chest wall masses suspected to be MPM, determining the tumor origin preoperatively necessitates reliance on a broader panel of antibodies for cross-validation. It is recommended to routinely add highly specific mesothelial markers (such as calretinin, CK5/6, WT-1, mesothelin, D2-40, and HEG1) to confirm the mesothelial origin, while simultaneously co-applying epithelial-specific markers (such as TTF-1, napsin A, CEA, BerEP4, Claudin4, and MOC-31) for a diagnosis

of exclusion. Current guidelines recommend using at least three MPM markers and three epithelial markers for differential diagnosis.^{10,11} If the tissue volume obtained from the initial puncture is insufficient to support extensive immunohistochemistry staining, a repeat needle biopsy should be performed to acquire adequate specimens, provided that it does not compromise the complete resection. If conventional morphology and IHC fail to provide a definitive diagnosis, further molecular testing can be conducted to identify specific gene mutations, such as BAP1, CDKN2A and NF2. Naturally, even if the above diagnostic measures are thoroughly implemented, the tumor origin may still remain undetermined, representing a factor that influences diagnostic and therapeutic decisions in the real world. In this case, the preoperative needle biopsy initially confirmed a malignant tumor, but the tissue origin was unclear. With only CK (pan) positivity and focal calretinin expression, the tumor was considered to possibly have an epithelial or mesothelial derivation. Due to severe pain symptoms, the patient exhibited clear resistance to the trauma and medical expenses associated with a repeat puncture. Meanwhile, given that the CT imaging presented a chest wall tumor and the pathology had already confirmed its malignancy, we considered, based on past experience, that the current pathological diagnosis would not alter the surgical indications and approach. Considering these multiple factors, we did not perform further immunohistochemistry or a repeat needle biopsy.

In summary, for cases suspected of being malignant chest wall or pleural tumors, it is imperative to perform a comprehensive needle biopsy, especially if the initial pathological diagnosis can only confirm the malignancy of the tumor but fails to identify its origin. It is recommended to convene an MDT that includes the pathology department and to take measures such as performing additional immunohistochemistry or a re-biopsy to confirm the diagnosis and staging, thereby serving as a basis for formulating the optimal treatment and follow-up strategies.

Declarations

Disclosure

No authors report any conflict of interest.

Author Contribution

L: Conceptualization, Data curation, Writing – original draft. W: Conceptualization, Supervision, Funding acquisition, Writing – review & editing.

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Figures

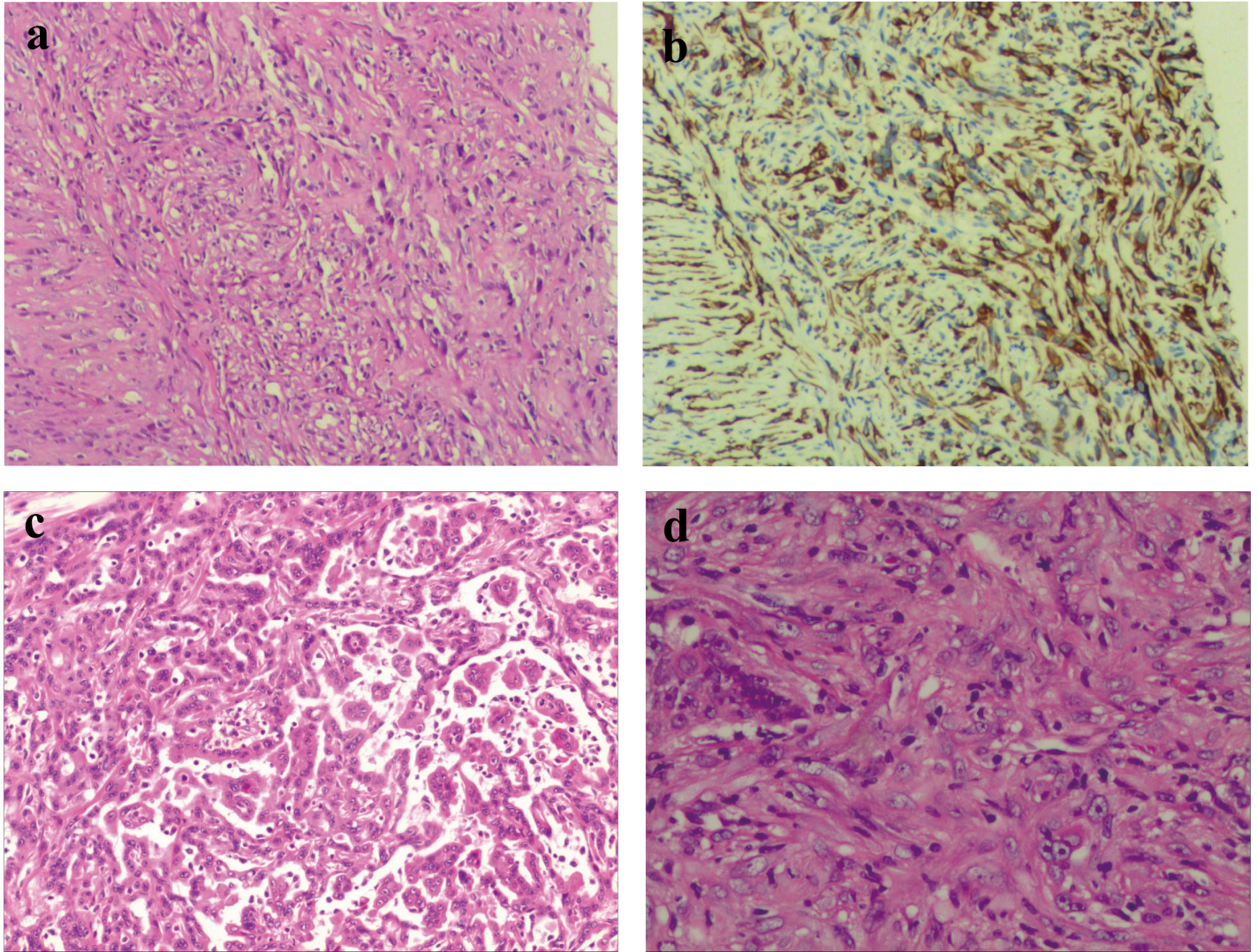


Figure 2 Morphological features and immunohistochemistry results of the biopsy and postoperative tissues: (a) HE staining of the biopsy tissue. (b) CK staining of the biopsy tissue. (c, d) HE staining of the postoperative tissues, showing tumor cells with partial glandular and papillary patterns, and a predominantly spindle-shaped morphology. [figures magnification: (a–c): 100×; (d):400×].

Figure 2

See image above for figure legend.

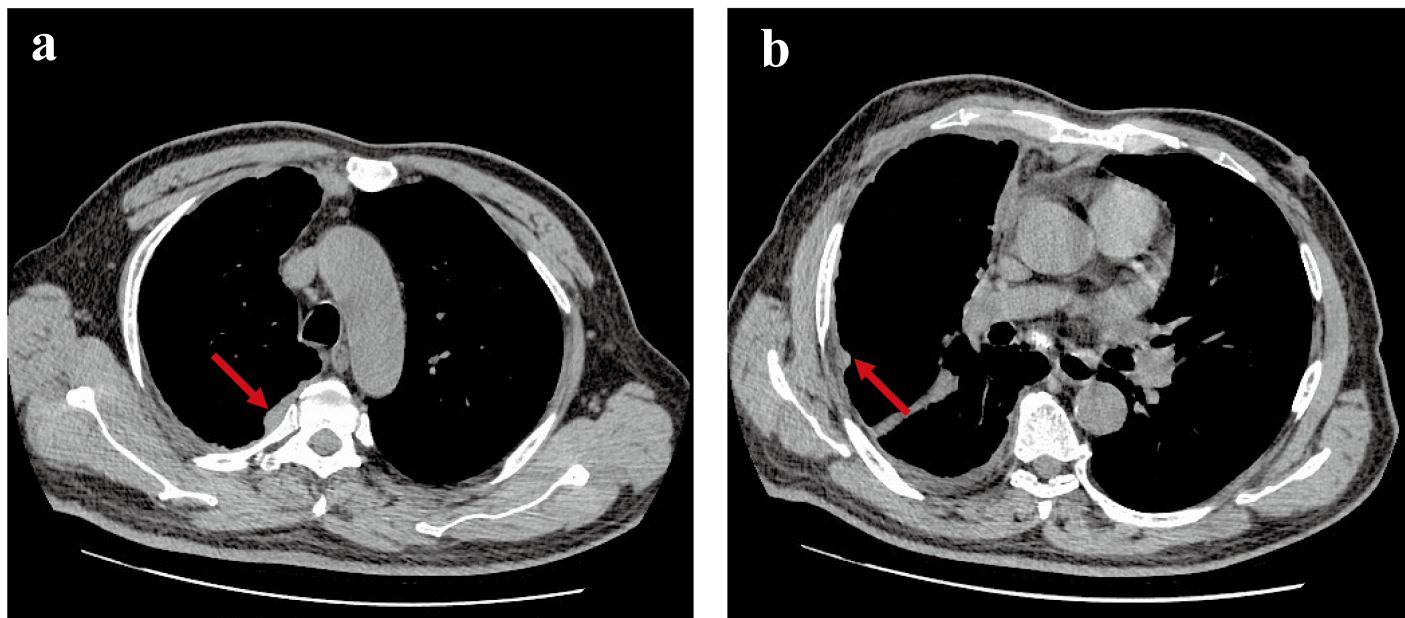


Figure 3 Postoperative follow-up CT images, with red arrows indicating multiple postoperative pleural nodules.

Figure 3

See image above for figure legend.

Supplementary Files

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- [Table1.pdf](#)