World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(CASE REPORT)

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Malignant Pleural Mesothelioma: A Case Report

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World Journal of Advanced Research and Reviews, 2025, 27(01), 926-930

Publication history: Received on 30 May 2025; revised on 05 July 2025; accepted on 08 July 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.27.1.2581

Abstract

Malignant pleural mesothelioma (MPM) is a rare and aggressive tumor that develops from the mesothelial cells of the pleura, primarily caused by exposure to asbestos. The diagnosis is based on imaging (chest X-ray, CT scan), biopsy, and immunohistochemical analysis. Treatment relies on surgery, chemotherapy (cisplatin, pemetrexed), and radiotherapy. The prognosis is generally unfavorable, with a median survival of 12 to 18 months.

We report the case of a 63-year-old patient who worked as a mason and had a history of chronic smoking (40 pack-years) and professional exposure to asbestos. Clinical signs of severe dyspnea, accompanied by chest pain and a productive cough, led to further examinations. The chest X-ray revealed a significant pleural effusion, and the CT scan showed diffuse pleural thickening. A pleural biopsy confirmed the diagnosis of mesothelioma.

The prognosis for patients with mesothelioma is generally poor, with 5-year survival rates often below 10%. Management of this disease requires a multidisciplinary approach, including surgery, chemotherapy, and potentially radiotherapy, but outcomes remain limited.

Prevention is crucial and relies on reducing exposure to asbestos, the primary identified risk factor. Laws prohibiting the use of asbestos have been enacted, and efforts to raise public awareness about the dangers of this substance are essential. Research is also ongoing to explore new therapies, including immunotherapy, to improve outcomes for patients with this disease.

Keywords: Asbestos Exposure; Pleural Effusion; Diffuses Pleural Thickening; Mesothelioma; Poor Prognosis.

1. Introduction

Malignant pleural mesothelioma is a rare cancer that affects the membrane covering the lungs. Primarily caused by exposure to asbestos, this type of cancer is often diagnosed at an advanced stage due to its nonspecific symptoms. It manifests as respiratory difficulties, chest pain, and a persistent cough. Management of this disease requires a multidisciplinary approach, but the prognosis remains generally unfavorable. Prevention, particularly through reducing exposure to asbestos, is crucial to decrease the incidence of this condition.

2. Case Report

This is a case of a 63-year-old patient, a mason by profession, with a history of chronic smoking (40 pack-years), diabetes managed with oral hypoglycemic agents for the past four years, and no prior treatment for tuberculosis or recent tuberculosis exposure. He presented with Stage IV dyspnea according to Sadoul, associated with a productive cough yielding whitish sputum occasionally streaked with blood, along with left-sided lower thoracic pain that inhibited inspiration and worsened in the right lateral decubitus position. This occurred in the context of fever and deterioration

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of general health. Clinical examination found the patient alert, with vital signs: 15/15, WHO performance status of 4, respiratory rate of 24 breaths/min, SpO2 at 90% on ambient air, heart rate of 92 bpm. Pleuropulmonary examination revealed signs of right pleural effusion with the presence of digital clubbing. The rest of the examination was unremarkable.

Chest X-ray showed a dense homogeneous opacity with a watery tone occupying the entire right lung field, obscuring the right diaphragmatic dome and corresponding recesses, with displacement of mediastinal structures toward the opposite side (Figure 1).

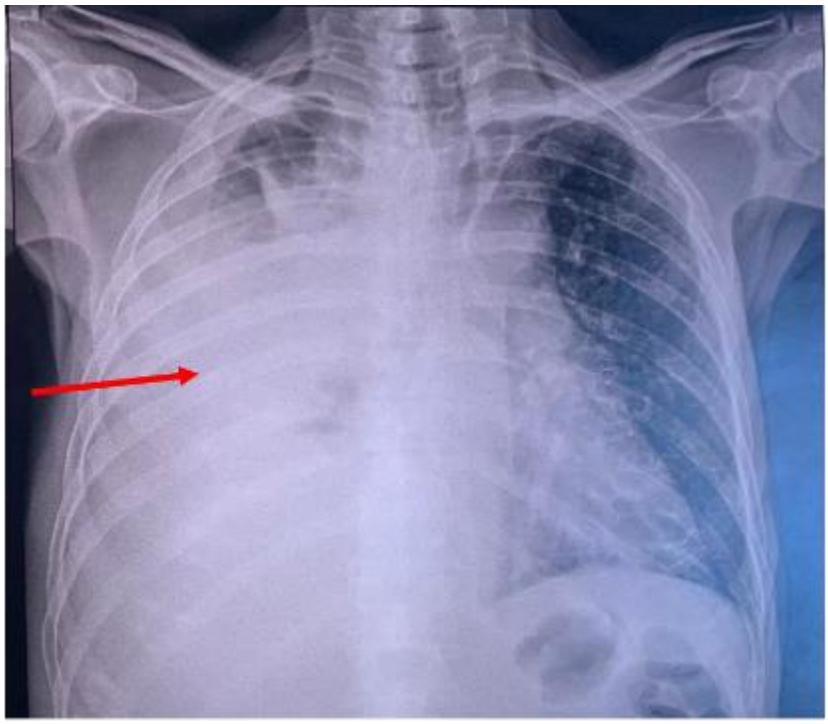

Figure 1 A dense homogeneous opacity with a watery tone occupying the entire right lung field, obscuring the right diaphragmatic dome and corresponding recesses, with displacement of mediastinal structures toward the opposite side

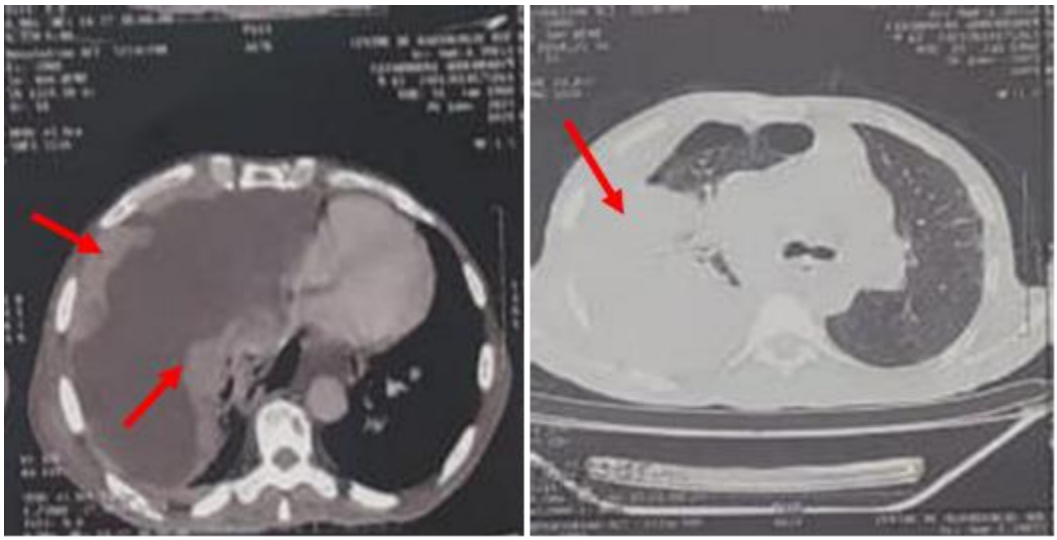

Figure 2 Mediastinal (left) and parenchymal (right) sections showing diffuse and heterogeneous pleural thickening, associated with a large-volume right pleurisy, all on an emphysematous lung

An abdominopelvic ultrasound shows significant nodular pleural thickening on the right, with abundant pleural effusion, as well as coelio-mesenteric lymphadenopathy.

The chest CT scan reveals diffuse and heterogeneous pleural thickening, associated with a large right pleural effusion, all on an emphysematous lung (Figure 2).

The biological assessment showed no significant abnormalities. An exploratory puncture was performed, yielding an exudative serohemorrhagic fluid with a protein concentration of 37.7 g/L. Hyaluronic acid levels in the pleural fluid were elevated.

The patient was deemed inoperable due to his deteriorated general condition, which prevented the performance of thoracoscopy. However, a pleural biopsy was conducted, confirming the presence of malignant tumor proliferation. Immunohistochemistry was consistent with malignant pleural mesothelioma of the biphasic type. An extension workup was requested, but the patient passed away shortly after the diagnosis.

3. Discussion

Malignant pleural mesothelioma is a rare and aggressive form of cancer, primarily caused by asbestos exposure. Although advances have been made in understanding and diagnosing this disease, it remains difficult to diagnose early and treat effectively. This disease primarily affects the pleura (the membranes covering the lungs and thoracic wall) and often presents at an advanced stage, which explains its extremely poor prognosis.

Malignant pleural mesothelioma is a rare tumor, representing about 10 to 20% of pleural cancers, but approximately 90% of malignant mesotheliomas are of pleural origin [1]. The incidence of mesothelioma varies depending on geographic regions, and the disease is more common in countries where asbestos exposure was widespread, particularly during the 20th century. The global incidence rate of mesothelioma is estimated at between 1 and 2 cases per 100,000 people, but it varies significantly between countries. In France, the prevalence is higher due to the extensive use of asbestos in the past [2].

The primary risk factor is occupational asbestos exposure, which remains by far the most significant, but exposure to other environmental carcinogens such as ionizing radiation also contributes. Smoking, although mainly associated with lung cancer, may also play a role in the development of mesotheliomas, particularly in cases of biphasic mesothelioma [3].

Malignant pleural mesothelioma develops from the mesothelial cells of the pleura, which line the thoracic cavity and cover the lungs. Asbestos exposure causes DNA damage in these cells, leading to malignant transformation [4]. Asbestos fibers, when inhaled, can settle in the lungs and induce chronic inflammation, thereby increasing the risk of genetic mutations that favor carcinogenesis. Mesothelioma is typically diagnosed at an advanced stage due to the slow progression of symptoms and the difficulty in making an early diagnosis.

Histopathologically, mesothelioma can present in three main forms: epithelioid, sarcomatoid, and biphasic. The biphasic form, which combines epithelial and sarcomatoid elements, is often more aggressive and harder to treat [5]. This form is often associated with a less favorable prognosis, as it tends to be more resistant to conventional treatments like chemotherapy and radiotherapy.

Malignant pleural mesothelioma presents with a range of respiratory and systemic symptoms, often nonspecific. Dyspnea, cough, and chest pain are the most common symptoms, accompanied by signs of systemic involvement, such as fever and weight loss [6].

Diagnostic investigations typically begin with a chest X-ray, which may reveal signs of pleural effusion. Thoracic computed tomography (CT) is a more precise tool for assessing the extent of the disease, particularly the thickness of the pleura and the presence of mediastinal lymphadenopathy or metastases [7].

Pleural puncture is a crucial step in the evaluation of pleural effusions. Malignant pleural fluid is often characterized by a high protein concentration (>30 g/L), elevated LDH levels, and low glucose concentration. The fluid may be serohemorrhagic, indicating the presence of tumor cells or micro-hemorrhages. The presence of specific markers, such as hyaluronic acid, may also suggest mesothelioma, though these tests are not always conclusive [8].

Immunohistochemical analysis of pleural biopsy is essential for making a definitive diagnosis. The markers typically positive in pleural mesothelioma are calretinin, WT1, and D2-40. The diagnosis may also be confirmed by molecular techniques, such as the identification of specific mutations [9]. However, it is important to note that the results can be nonspecific, particularly in cases of biphasic forms, where histopathological analysis may be more complex.

The prognosis of malignant pleural mesothelioma is generally very poor, with a median survival of 12 to 21 months after diagnosis, due to the late detection of the disease and its resistance to traditional treatments [10]. Factors influencing prognosis include the patient's age, histopathological type (epithelioid vs biphasic), and the presence of distant metastases or mediastinal lymphadenopathy.

The treatment of pleural mesothelioma relies on a multimodal approach. In localized cases, surgery may be considered, but it is rarely possible as most patients present with advanced disease. Chemotherapy, often based on cisplatin or carboplatin in combination with pemetrexed, is the first-line treatment for advanced forms [11]. Radiotherapy may also be used to alleviate symptoms, such as pain and dyspnea. In many cases, treatment is primarily palliative, aiming to improve the patient's quality of life and relieve symptoms [12].

4. Conclusion

Malignant pleural mesothelioma remains a difficult cancer to diagnose and treat, with an overall unfavorable prognosis due to the aggressive nature of the tumor and late detection. Asbestos exposure remains the primary cause of the disease, although other risk factors such as smoking and occupational exposures contribute to its development. Diagnosis relies on a combination of imaging methods, pleural puncture, and biopsy, while treatment remains primarily palliative in advanced stages. Better prevention, early diagnosis, and more effective treatment strategies are needed to improve outcomes for patients with this disease.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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