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Pleural and Pulmonary Metastases of A Fibroblastic Femoral Osteosarcoma

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Abstract

The lung represents the predominant site for thoracic metastases of osteosarcoma. Pleural involvement occurs less frequently, while endobronchial, interstitial, endovascular, and parietal metastases are rare.

We report the case of a 23-year-old male patient, with no history of toxic exposure, who sustained a fall onto his right lower limb during sports activity five months prior to hospitalization, resulting in persistent inflammatory pain localized to the right knee.

One month before admission, the patient presented with respiratory symptoms characterized by stage I dyspnea according to the modified Medical Research Council (mMRC) scale, left-sided chest pain, and a dry cough, accompanied by a decline in general condition.

Thoracic computed tomography revealed multiples pulmonary nodules with left pleural effusion. Magnetic resonance imaging of the right knee identified a locally advanced tumor involving the diaphyseal, metaphyseal, and epiphyseal regions. Histopathological examination of pleural biopsy specimens confirmed pleuro-pulmonary metastases originating from a femoral fibroblastic osteosarcoma.

Keywords: Thoracic metastases, Fibroblastic femoral osteosarcoma, Multiples pulmonary nodules, Pleural effusion, Pleural biopsy.

INTRODUCTION:

Thoracic metastases from osteosarcomas are frequently, and the predominant site of metastatic spread is the lung. Pleural involvement is comparatively less common, whereas endobronchial, interstitial, endovascular, and parietal metastases are rare. Approximately 20% of thoracic metastases are present synchronously at the time of initial diagnosis, and 30 to 40 % of patients with localized osteosarcoma subsequently develop pulmonary metastases.

Patient and Observation

A 23-year-old male patient with no history of toxic habits or comorbidities experienced a fall onto his right lower limb during sports activity five months prior to hospitalization, resulting in persistent inflammatory right knee pain.

One month before admission, he presented for the first time with respiratory symptoms including stage I dyspnea (mMRC scale), left-sided chest pain, and a dry cough, accompanied by general health decline.

Clinical examination revealed a patient in relatively good general condition (Performance Status 1), signs of pleural effusion occupying the lower two-thirds of the left hemithorax and cardiac sounds shifted to the right.

Musculoskeletal examination identified a fixed, circumferential, firm, and tender swelling in the lower third of the right thigh, without vascular or neurological compromise. Flexion-extension of the right knee was limited (Figure 1).

A frontal chest radiograph demonstrated a dense, homogeneous opacity occupying the lower two-thirds of the left hemithorax, lacking an air bronchogram, with obscuration of the left diaphragmatic dome and cardiac silhouette. This was overlain by a less dense, heterogeneous opacity. Multiple diffuse, low-density nodular opacities with ill-defined margins were observed in the right lung field, in the inter-hilar-axillary, retrocardiac, paracardiac, and supradiaphragmatic regions. The heart and trachea were displaced to the right (Figure 2).

Thoracic ultrasound revealed a moderately abundant anechoic pleural effusion on the left side. Diagnostic thoracentesis confirmed the fluid as sero-fibrinous.

Computed tomography of the thorax revealed a multiple pulmonary nodules with pleural effusion (Figures 3 and 4).

Bronchoscopy showed diffuse second-degree inflammation with extrinsic compression at the orifices of the left lower lobe bronchial pyramid, with no visible endobronchial lesion or tumor growth.

Magnetic resonance imaging of the right knee revealed an extensive tumor process involving the diaphyseal, metaphyseal, and epiphyseal regions, extending into periarticular soft tissues (Figure 5).

Histopathological analysis of pleural biopsy specimens demonstrated tumor cells expressing cytokeratin AE1/AE3 antibodies, without expression of CK5/6 or calretinin, and heterogeneous expression of smooth muscle actin and desmin. Morphological and immunohistochemical features supported the diagnosis of pleural metastasis of a fibroblastic osteosarcoma.

The final diagnosis was pleural and pulmonary metastases originating from a fibroblastic osteosarcoma of the right femur.

The patient underwent thoracic drainage and talc pleurodesis. Bone biopsy was deferred due to clinical deterioration (Performance Status 2). The patient succumbed two weeks post-discharge following acute respiratory distress.

This case is notable for the simultaneous diagnosis of femoral osteosarcoma and its pleuro-pulmonary metastases.

Discussion:

Osteosarcoma is a malignant tumor characterized by the mandatory production of bone or osteoid substance by tumor cells. It accounts for 20–30% of primary malignant bone tumors and primarily affects young individuals between 10 and 20 years old, with a second incidence peak in the sixth decade of life. There are several histological subtypes of osteosarcoma [1].

According to the study by Silva et al., patients with thoracic metastases were more often male (61% of cases) and had a femoral tumor location in 52% of cases and tibial in 22%. In 81% of cases, the tumor size exceeded 10 cm. The case of our patient aligns with these findings, as he is male with a femoral tumor location [2].

Axial localization, the presence of lymph node, bone, or brain metastases are factors associated with a high risk of developing pulmonary metastases [3].

These metastases may be paucisymptomatic or may present with dyspnea, hemoptysis, chest pain, or stridor.

Computed tomography (CT) is more sensitive than standard radiography for detecting and evaluating these lesions [4]. Pulmonary parenchymal metastases typically present as solid nodules, which are unilateral in 35% of cases. These often show diffuse or eccentric calcifications. Cavitated (excavated) nodules are considered an atypical presentation. According to the study by Silva et al., involving 127 patients, pulmonary nodules were the most common finding (96%), with calcifications observed in 32% of cases. The most frequent CT scan appearance of pleural metastases consists of pleural nodules associated with parenchymal nodules. Pleural effusions, thickening, or calcifications may also be present [2].

Regarding mediastinal metastases, calcified mediastinal lymphadenopathy is very rare (3%) and occurs mainly in the course of osteoblastic osteosarcoma. Their presence is associated with a reduced 5-year survival rate [5]. Anterior mediastinal masses are also rare [6].

Interstitial metastases, such as carcinomatous lymphangitis, are very rare and carry a poor prognosis [7]. Endobronchial metastases are also rare and are primarily diagnosed by bronchoscopy [8].

In about 10% of patients, costal (rib) metastases can be observed and are associated with a poor prognosis [9]. Endovascular metastases are also rare.

Pulmonary metastasectomy appears to be the most effective treatment option and has been shown to improve survival.

According to the study by Salah et al., patients who underwent surgical treatment of pulmonary metastases had better overall survival and better recurrence-free survival compared to those treated with chemotherapy alone. The latter group had a fivefold increased risk of local progression and a fourfold increased risk of death [10]. Lymph node dissection is rarely indicated.

The selection criteria for patients eligible for surgical resection of pulmonary metastases include: a controlled or eradicated primary tumor, a technically feasible complete resection, absence of extra-pulmonary metastases with sufficient predicted postoperative respiratory function [11].

Conclusion

Pleuro-pulmonary metastases of osteosarcoma are common, and thoracic CT remains the best tool for detecting them. The prognosis of patients with synchronous or metachronous metastatic osteosarcoma has improved over the last two decades, thanks to advances in systemic therapy, which supports the role of complete surgical resection of metastases.

Conflict of Interest: None declared.

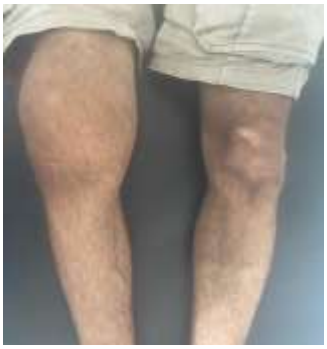

Figure 1: Swelling located in the lower third of the right thigh

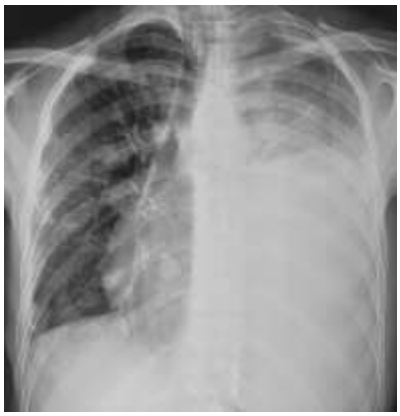

Figure 2: Frontal chest X-ray showing an opacity occupying the lower two-thirds of the left hemithorax, dense and homogeneous, without air bronchogram, with obliteration of the left diaphragmatic dome and the left heart border. This is surmounted by another less dense, inhomogeneous opacity. Multiple diffuse nodular opacities are present in the right lung field, low density, homogeneous, with blurred margins. There is blunting of the right costophrenic angle, especially involving the right inter-hilar-axillary, retrocardiac, paracardiac, and supradiaphragmatic regions, with displacement of the heart and trachea toward the right.

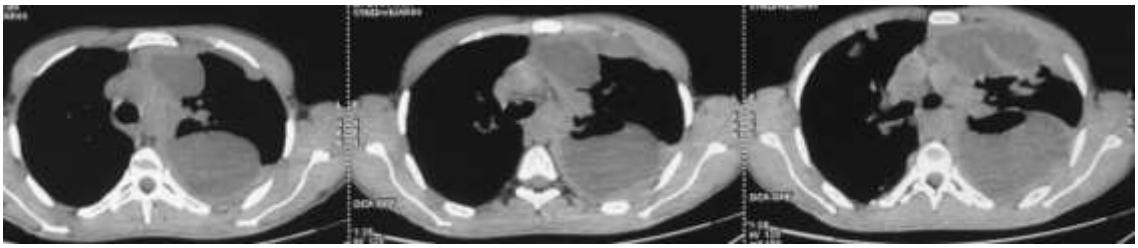

Figure 3: Thoracic CT scan showing a large-volume pleural effusion.

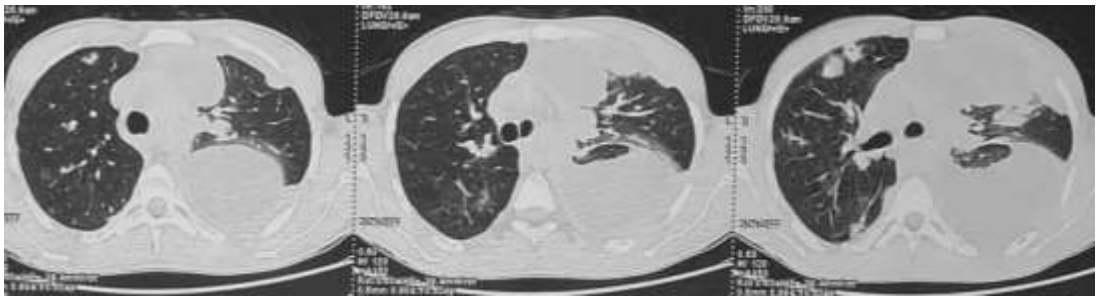

Figure 4: Thoracic CT scan showing a "balloon release" appearance.

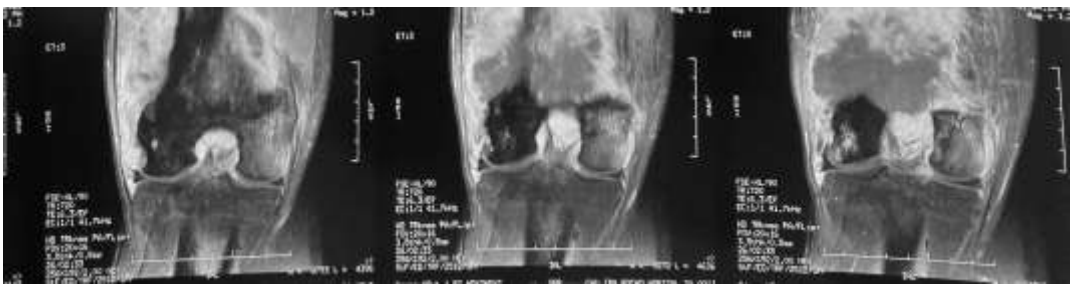

Figure 5: Knee MRI showing a diaphyseal-metaphyseal-epiphyseal tumor process extending into the periarticular soft tissues.

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