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Large pulmonary metastasis or primary lung cancer? Management particularities of an osteosarcoma case

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Abstract

English:

Osteosarcoma is the most frequent malignant tumor of the bone which is diagnosed most frequently in children or young adults, with a high possibility of metastasis, especially in the lung. We report a case of 39-year male patient with a history of an above-the-knee left limb amputation after tibial osteosarcoma with no follow-ups in the last two years and with an expansive apical and left paramediastinal mass found on chest X-ray. We performed a bronchoscopy and the histopathological diagnosis of swabbed samples was fibroblastic type of classic osteosarcoma with focal areas of telangiectatic osteosarcoma and areas showing giant cells. The particularity of the case consisted in the challenge of establishing the origin of pulmonary mass. Whilst increased dimensions militated for a primary pulmonary neoplasm, the histological examination ascertained the metastatic etiology of the tumor.

Keywords

sarcoma • lung metastasis • imunohistochemistry • risk factors • multidisciplinary

Metastază pulmonară cu dimensiuni mari, sau cancer pulmonar primar? Particularități de management al unui caz de osteosarcom

Rezumat

Romanian:

Osteosarcomul este cea mai frecventă tumoră malignă a osului care este diagnosticată cel mai frecvent la copii sau adulți tineri, cu o mare posibilitate de metastazare, în special la nivelul plămânului. Raportăm cazul unui pacient de 39 de ani, sex masculin, cu antecedente de amputație a membrului stâng deasupra genunchiului pentru osteosarcom tibial fără urmărire în ultimii doi ani, care a fost diagnosticat la o radiografie toracică cu o masă expansivă apicală și paramediastinală stângă. Am efectuat o bronhoscopie iar diagnosticul histopatologic al probelor bioptice a fost de osteosarcom clasic de tip fibroblastic cu zone focale de osteosarcom telangiectatic și zone cu celule gigantice. Particularitatea cazului a constat în provocarea de a stabili originea masei pulmonare. În timp ce dimensiunile crescute au militat pentru un neoplasm pulmonar primar, examenul histologic a stabilit etiologia metastatică a tumorii.

Cuvinte-cheie

sarcom • metastaze pulmonare • imunohistochimie • factori de risc • multidisciplinar

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Introduction

Sarcoma represents a heterogeneous group of malignant neoplasms derived from mesenchymal cells, located in different parts of the body, including bone tissue, known as osteosarcoma [1,3]. Along with mesenchymal cells, it can also contain osteogenic progenitor cells: osteoid or immature bone. Significant interest and effort in this cancer led to the identification of numerous etiologic agents such as previous irradiation, Paget's disease of the bone, and inherited syndromes caused by abnormalities in DNA repair mechanisms such as Li-Fraumeni syndrome (LFS), Wermer's syndrome, Rothmund Thompson syndrome, and familial retinoblastoma syndrome [2,4].

According to a meta-analysis which incorporated all 27 EU countries, the incidence of the sarcoma is 5.6 per 100,000 per year with an estimated 27,908 new cases per year, of which 84% were soft tissue sarcomas and 14% were bone sarcomas [1].

Moreover the incidence of the cases has a bimodal age distribution with the first peak between 10 and 14 year age group and the next one after 65 years. Concerning ethnic groups, afro-american are the ones more affected with an incidence rate of 6.8 cases per year per million people [5].

Osteosarcoma has a high disseminating pattern, which is the most important factor for the outcome of these patients. The most frequently affected organ is the lung and to a lesser extent bone and lymph nodes. The underlying mechanism of this particular organotropism it is not elucidated yet [6].

It is known that about 25 % of osteosarcoma patients already have metastases at presentation and treatment options for them include chemotherapy, surgery and radiotherapy. Complete surgical resection of primary and metastatic sites continuest to be fundamental for survival [7].

The gold standard in the treatment of osteosarcoma is chemotherapy used in monotherapy or as a part of neoadjuvant therapy before the metastasectomy [9,11].The survival rate after pulmonary metastasectomy ranges from 15 to 52% [12]. Osteosarcoma is allocated to the average mortality group of neoplasms, which depends on the patient age and the cancer stage [13,14].

Case presentation

We report a case of 39-year male patient, active smoker (15 packs/year index) with a history of left tibial osteosarcoma (diagnosed in 2015), who underwent an above-the-knee left limb amputation, chemotherapy and radiation therapy. Our patient was periodically reevaluated until 2020 and referred to our department in 2022 with laterothoracic pain, persistent dry cough, chronic fatigue and weight loss (approximately 10 kg in the last 2 months).

Considering the oncological history of the patient and the left lung mass, the main challenge of the differential diagnosis was to establish whether or not the tumor was a primary or a secondary one.

The Chest, abdominal, pelvic and partial low extremities x-ray was perform on the presentation at the Pulmonary Service and revealed a large left paramediastinal mass of about 12x8 cm without any signs of mediastinal distortion (Figure 1).

The contrast-enhanced chest computed tomography (CT) scan described an expansive apical and left paramediastinal mass (12 x 8,5 x 4,7 cm), with multiple intratumoral necrosis. This tumoral process did not have a plane of clivage from arch and descending aorta, as well as from left the pulmonary artery and was adherent to the left main bronchus, without any signs of its stenosis (Figure 2).

Bronchoscopy was performed and the investigation revealed a proliferative process, with minimal necrosis at the level of culmen, in the first and secondary segments, collecting biopsies from both of them (Figure 3).

A lung biopsy is performed via bronchoscopy and the tissue sample is sent to the Pathology Department for the histopathological diagnostic. Microscopically, the tissue samples were represented by bronchial mucosae covered partially by respiratory epithelium which presented squamous metaplasia. On some fragments, at the level of the chorion, a tumoral cell proliferation was observed, composed of large cells, with round, oval and polygonal shape, with pale eosinophilic cytoplasm. The cells were multinucleated, and the nuclei had various forms and hyperchromasia. In between the tumoral cells a discreet polymorphic inflammatory infiltrate

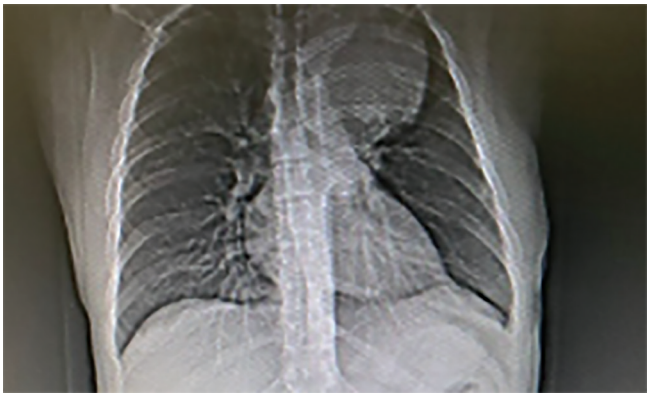

Figure 1. Chest X-ray. A paramediastinal left tumor, clearly contured, 120x80 mm.

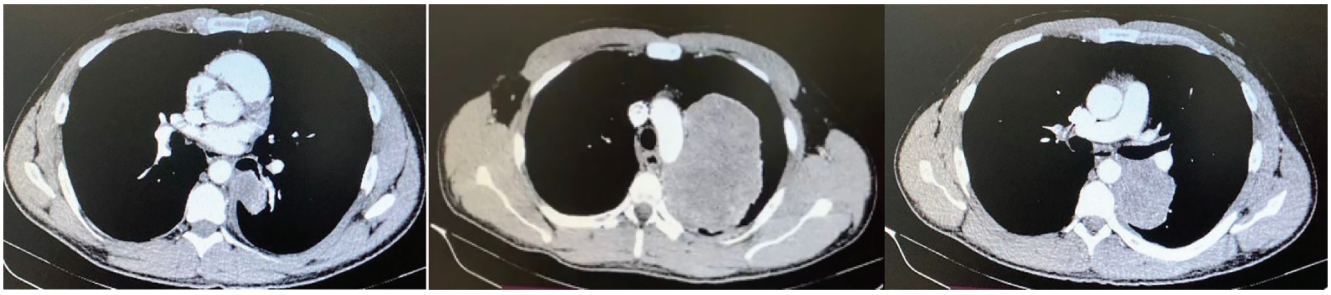

Figure 2. Chest CT scan. A large mass in the left upper lobe which did not have a plane of clivage from arch and descending aorta, as well as from left the pulmonary artery.

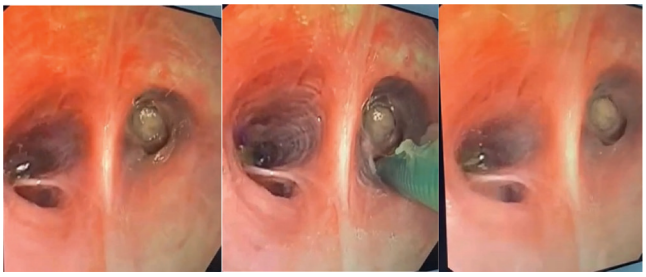

Figure 3. Endobronchial aspect of the tumor.

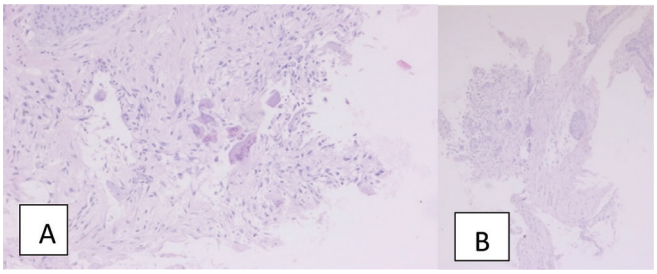

Figure 4. (A,B). Histological aspect of the tumor. A- HE 20x. B- HE 10x.

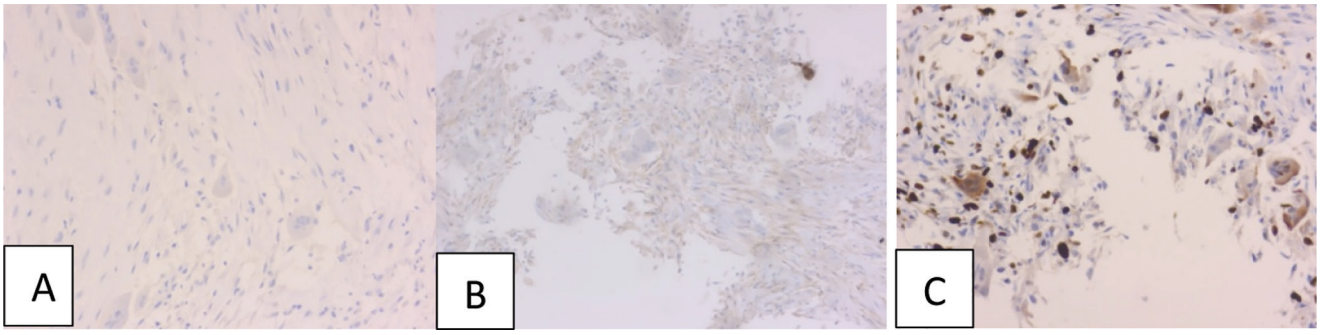

Figure 5. Immunochemistry (IHC). A. IHC S100 20x. B. IHC CD99 20x. C. IHC Ki67 20x.

was observed, represented by granulocytes, lymphocytes, plasmacytes and histocytes (Figures 4A,B).

Immunohistochemically, the tumour cells were negative for anti-S100 antibodies and anti-SMA antibodies and showed focal positivity for anti-CD99 antibodies. The Ki67 proliferation index was 20-30% in the tumour cells (Figure 5A-C).

The diagnosis received from histopathological evaluation of bioptic samples collected during bronchoscopy was fibroblastic type of classic osteosarcoma with focal areas of telangiectatic osteosarcoma and areas showing giant cells.

The histological aspect and the immunohistochemical profile suggested a malignant tumour proliferation. Because of the anterior histopathological diagnostic of osteosarcoma, we have orientated the diagnosis to an osteosarcoma lung metastasis.

After obtaining these results, the case was sent for a thoracic surgery consultation, within the multidisciplinary team. The patient did not present to this consultation, so the therapeutic solution was to resume oncological treatment. Although initially compliant, when the side effects associated with chemotherapy appeared, the patient interrupted the treatment schedule, contrary to the medical opinion and is currently no longer under the oncologist's supervision.

Table 1. Subtypes of chondromas and sarcomas.

Conventional chondrosarcoma	Fibrosarcoma	Malignant fibrous histiocytoma
Chondroma	Giant cell tumor osteosarcoma	Mesenchymal chondrosarcoma
Clear cell chondrosarcoma	Hemangiopericytoma	Neurofibroma of Bone (Schwangomul)
Classic osteosarcoma	High-grade surface osteosarcoma	Osteoclastoma
Ewing sarcoma	"Intraosseous" Osteosarcuma	Osteosarcoma in Paget's Disease of Bone
Periosteal osteosarcoma	Peripheral neuroendocrine tumor	Small cell osteosarcoma
Periosteal condroma	Primitive neuroendocrine tumor	Telangiectatic osteosarcoma

Differential Diagnosis

There are different subtypes of osteosarcoma, with different clinical presentation and prognosis [8,10] (Table 1).

Discussions

The particularity of the case consisted in the challenge of establishing the origin of pulmonary mass without a multidisciplinary approach and also by the distance of metastasis diagnosis from when the primary tumour was diagnosed. Whilst increased dimensions militated for a primary pulmonary neoplasm, the histological examination ascertained the metastatic etiology of the tumor. Due to the late presentation of our patient and the lack of follow-ups we had to deal with an advanced stage of the tumor which considerably restricted the possibilities of the treatment.

Even though the opption of chemotherapy was still available, it was demanding to choose the right combination given the mixt type of histological diagnose. Chemotherapy continues to be the standard treatment for metastatic osteosarcoma, but when it is the only treatment modality, it still results in poor survival rates [15,16]. In order to improve the outcome, a combination of chemotherapy followed by surgical resection of the metastases has been advocated for selected cases [17]. However surgical approach of this particular case was doubtful because of the anatomical position and due to the patient's low compliance.

Early diagnosis of metastasis, especially micrometastasis will significantly innovate therapeutic modality and doubtlessly improve the prognosis of patients [6].

Morover, in order to ensure a good management of osteosarcoma cases a multidisciplinary team with specialists from pneumology, radiology, surgical, medical oncologist and orthopedics is mandatory.

Patients with osteosarcoma and metastatic disease have an unfavorable prognosis with a long-term survival of only 20-30%, compared with about 70% in those with localized disease. Although a standard protocol for monitoring and treating these patients is not established, surgical resection of metastases seems to increase the survival rate [18]. In the presented case, the surgical intervention was not practiced, which considerably decreases the patient's chances of survival.

Conclusions

Continuous follow-up of the patient is the key factor for an early diagnose of the metastasis and consequently for increasing the survival rate. The personalised approach of each case and the multidisciplinary team are important factors that increase the quality of life of these patients.

Funding

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Institutional Review Board Statement

The presented case is from a patient admitted to the Pneumology Department of the Mures Clinical County Hospital. Informed consent was obtained from the patient involved in the study. This study was conducted in accordance with the Declaration of Helsinki.

Informed Consent Statement

- Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

Data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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