Metastatic osteosarcoma to the breast

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Section: Breast imaging
Area of Interest: Breast Musculoskeletal bone Lung Adrenals
Procedure: Education
Procedure: Imaging sequences
Procedure: Comparative studies
Technique: Mammography
Technique: MR
Technique: CT
Technique: Ultrasound
Special Focus: Metastases Neoplasia Case Type: Clinical Cases
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Patient: 19 years, female

Clinical History:

19-year-old woman with a mass in the left leg diagnosed with biopsy as osteogenic sarcoma of the tibia. It was treated with neoadjuvant chemotherapy and surgical resection of the mass.
Eleven months after surgery she attended our center for follow-up chest CT.

Imaging Findings:

The first study was a MRI of the leg (Fig. 1) in which a bone tumour with periosteal reaction was observed.
Note the absence of metastatic disease in the chest CT images performed before treatment (Fig. 2A, Fig. 3A and Fig. 4A).
In the follow-up chest CT (Fig. 2B) the presence of a calcified mass in the right lung and a calcified pretracheal adenopathy is evident. At lower levels we can observe a mass with a central calcification on the right adrenal gland (Fig. 3B).
In the same CT study at mammary glands level (Fig. 4B) we find a rounded calcified mass in the right breast. For academic purposes we decided to make a MLO view mammography and ultrasound focused on the right breast.
Mammography (Fig. 5) shows a round hyperdense mass with a calcification. Ultrasound (Fig. 6) reveals a round hyperechoic mass with a central calcification with posterior acoustic shadowing.

Discussion:

Background
Metastases in the breast are relatively uncommon and account for 0.5-2% of all malignant breast diseases [1]. The most frequent source is the contralateral breast, but they can also originate from leukaemia, lymphoma, malignant melanoma, bronchogenic carcinoma and carcinoid tumour [2].

Clinical Perspective
Osteosarcoma is the most frequent primary malignant bone tumour in childhood. Metastatic disease spreads mostly
through the blood and the most common sites of distant metastases are: lung, bones, brain and liver [2, 3]. The pattern of metastases of osteosarcoma has changed since the introduction of neoadjuvant chemotherapy, observing more cases of extrapulmonary metastases than were seen previously [4]. Metastases from osteosarcoma in the breast are extremely rare [2, 3].

Imaging Perspective
There is limited information regarding the imaging appearance of metastases from osteosarcoma in the breast. Roebuck described the ultrasound findings in a 15-year-old female patient, in which he found a right breast mass, hypoechoic and slightly lobulated [5]. In our case we found calcified metastatic lesions in the lung, adrenal gland and breast. Regarding the breast lesion our findings differ from those reported by Roebuck. We found a breast lesion with similar appearance as metastatic disease in the lung and adrenal gland. We observed in mammography a rounded nodule with indistinct margins, hyperdense with an important central calcification, whereas in the ultrasound it appears as a rounded mass with indistinct margins, mostly echogenic due to calcification and with significant posterior acoustic shadowing.

Outcome
The presence of extrapulmonary metastasis of osteosarcoma is associated with a very poor prognosis [5].

Take Home Message
For this reason, in patients with osteosarcoma treated with neoadjuvant chemotherapy it is important to look for extrapulmonary metastases in surveillance imaging studies.

**Differential Diagnosis List:** Metastasis from osteosarcoma in the breast, Breast carcinoma, Fibroadenoma

**Final Diagnosis:** Metastasis from osteosarcoma in the breast

**References:**


Figure 1

Description: T1-weighted coronal MRI after injection of intravenous contrast shows an irregular and thinned cortex of the anterior aspect of the left tibia, with intramedullary invasion, periosteal reaction and intense enhancement of soft tissue involvement. Origin: Facultad de Medicina y Hospital Universitario UANL, Radiology Department, Monterrey, México
Description: A) Chest CT before treatment shows a normal lung parenchyma. B) Chest enhanced CT follow-up shows a mass with lobulated borders, coarse central calcifications in the right lung and calcified mediastinal adenopathy. Origin: Facultad de Medicina y Hospital Universitario UANL, Radiology Department, Monterrey, México
Description: A) Pretreatment chest CT without evidence of masses in the mammary glands. B) Enhanced CT follow-up shows a round mass with central coarse calcification on right breast. Origin: Facultad de Medicina y Hospital Universitario UANL, Radiology Department, Monterrey, México
Figure 4

Description: A) Right MLO view of mammography presents a calcified mass in the posterior third of the breast. B) Zoom of the right MLO view shows a hyperdense mass, rounded, indistinct margins with coarse central calcifications. Origin: Facultad de Medicina y Hospital Universitario UANL, Radiology Department, Monterrey, México
Description: A) Gray scale ultrasound shows a hyperechoic mass, rounded, indistinct margins and central calcification with posterior acoustic shadowing. B) No vascular flow was demonstrated in the examination with colour Doppler. Origin: Facultad de Medicina y Hospital Universitario UANL, Radiology Department, Monterrey, México
Figure 6

**Description:** A) CT before treatment shows a normal right adrenal gland. B) Enhanced CT follow-up shows a mass with central calcification on right adrenal gland.

**Origin:** Facultad de Medicina y Hospital Universitario UANL, Radiology Department, Monterrey, México