

Osteogenic Sarcoma Presenting with Skip, Lymph Nodal, Pulmonary, Pleural Metastases and Malignant Effusion: An Unusual Appearance on Bone Scan

Abstract

Osteogenic sarcoma is an aggressive malignant bone tumor arising from primitive mesenchymal bone-forming cells. Ossification is the characteristic feature of the metastases in osteosarcoma which aids their detection on ^{99m}Tc -MDP bone scintigraphy. Although lung is the most common site of metastasis in osteogenic sarcoma, pleural involvement with effusion and skip metastases are rare. Herein, we report a case of osteogenic sarcoma of distal femur with diffuse calcified pleural thickening leading to malignant pleural effusion, calcified lung, lymph node, and bone metastases illustrated on bone scan.

Keywords: Bone scan, osteogenic sarcoma, pleural nodules, skip metastases

Case Summary

A 14-year-old female presented with a history of pain and swelling in the right thigh for 1-month duration. Her MRI of the right knee revealed T1-weighted hypointense lesions in the distal right femur and proximal right tibia with provisional differentials of osteosarcoma and Ewing's sarcoma. Histopathology from the lesion in the distal right femur established the diagnosis of osteogenic sarcoma. In the meantime, the patient developed right-sided chest pain, fever, and dyspnea. She underwent contrast-enhanced computed tomography of the thorax, which revealed diffuse calcified right pleural thickening, massive right-sided and mild left-sided pleural effusion, and calcified left pleural based and bilateral parenchymal lung nodules. ^{99m}Tc -methylene diphosphonate bone scan acquired subsequently demonstrated intense tracer uptake in the primary site in the distal right femur, skip metastases, and distant skeletal metastases in the pelvic bone [Figure 1]. In addition, there were increased tracer uptake in the calcified pleural, pulmonary, and lymph nodal metastases [Figure 2a-d], giving the bone scan a very peculiar appearance.

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Discussion

Osteosarcoma is a high-grade primary skeletal malignancy most commonly seen in children and adolescents. It is characterized by spindle cells of mesenchymal origin which deposit immature osteoid matrix and has a predilection for metaphysis of long bones. Metastasis is an important predictor of prognosis in osteosarcoma with >75% of metastases occurring the lungs.^[1] Although lung micrometastases are usually present in most of the patients at the time of diagnosis, radiologically detectable metastases are seen in approximately 15% of the patients.^[2,3] Pleural metastases are rare and are usually associated with concomitant lung parenchymal nodules. Diffuse pleural thickening with ossification and pleural effusion at the initial presentation is extremely rare as in the index case and only few such cases are reported in the literature.^[2,4] Pleural metastases can either result from direct extension from lung parenchymal lesions or through hematogenous spread.^[5]

Skip metastases are also very unusual, occurring only in 1.5%–6.5% of the patients. Patients with skip metastasis are more likely to have associated distant metastasis with lower survival rate. Mineralized lymph node metastases are seen in <10% of the patients.^[6]

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**Neeraja Bollampally,
Venkata
Subramanian
Krishnaraju,
Ashwani Sood,
Sameer Aggarwal¹,
Bhawant Rai Mittal**

Departments of Nuclear
Medicine and ¹Orthopaedics,
Post Graduate Institute
of Medical Education and
Research, Chandigarh, India

Address for correspondence:

Dr. Ashwani Sood,
Department of Nuclear
Medicine, Post Graduate
Institute of Medical Education
and Research, Sector-12,
Chandigarh - 160 012, India.
E-mail: sood99@yahoo.com

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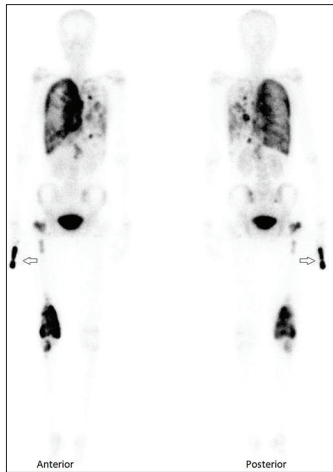


Figure 1: Anterior and posterior views of whole-body bone scan showing tracer avid lesions in the condyles, and distal third of the shaft of right femur; skip metastases in the proximal shaft and trochanters of right femur, distant skeletal metastases in proximal end of right tibia, bilateral iliac bones near the sacroiliac joints. Diffuse increased tracer uptake in the right hemithorax, areas of patchy tracer uptake in the left hemithorax and in the epigastric region of abdomen (arrows showing extravasated tracer activity)

Osteosarcoma with multiple sites of skeletal involvement in the absence of lung metastasis is multifocal osteogenic sarcoma. One lesion has features of primary and most of the other lesions mimic skeletal metastasis on radiology. Multifocal variant has a poorer prognosis when compared to unifocal variant.^[7]

Whole-body bone scan is routinely recommended for the evaluation of osseous metastases. In addition, it also provides the extent of the disease.^[8] The prognosis and management of the patient with metastatic osteosarcoma depend on number, size, and site of metastases. Complete resection of the primary with metastatic lesions can be considered as curative of osteosarcoma. Although lung metastases carry a poor prognosis, resection of localized pleural and pulmonary metastatic disease has shown to improve the survival, whereas unresectable metastases are treated with systemic chemotherapy.^[1,3]

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Durfee RA, Mohammed M, Luu HH. Review of osteosarcoma and current management. *Rheumatol Ther* 2016;3:221-43.

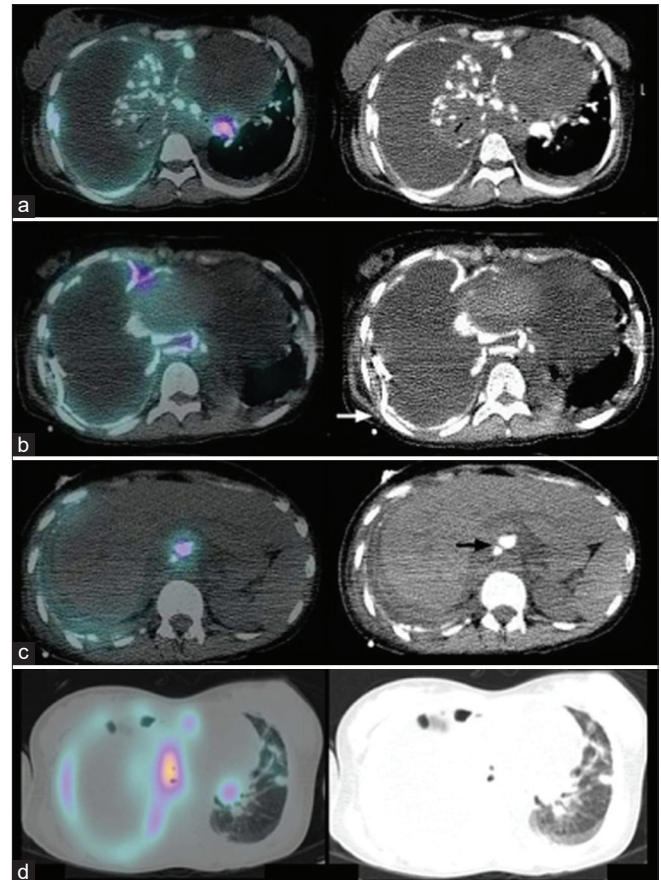


Figure 2: Serial transaxial sections of hybrid single-photon emission computed tomography/computed tomography and corresponding computed tomography images of the thoracic region (a-d) showing tracer avid diffuse calcified thickened parietal and visceral pleurae, calcified parenchymal nodules, massive right pleural effusion associated with complete collapse consolidation. Abnormal tracer uptake in the calcified pleural and pulmonary nodules in the left lung along with mild left pleural effusion and few calcified retroperitoneal lymph nodes (black arrow; c) and right Intercostal drain Intercostal drain tube-in-situ (white arrow; b)

2. Marchiori E, Menna Barreto M, Zanetti G. Pleural metastasis of osteosarcoma. *Ann Thorac Surg* 2018;105:e87-e88.

3. Krishnamurthy K, Alghamdi S, Kochiyil J, Bruney GF, Poppiti RJ. Osteosarcoma presenting with malignant pleural effusion in a 55 year old. *Respir Med Case Rep* 2018;25:314-7.

4. Rastogi R, Garg R, Thulkar S, Bakhshi S, Gupta A. Unusual thoracic CT manifestations of osteosarcoma: Review of 16 cases. *Pediatr Radiol* 2008;38:551-8.

5. Mori T, Yoshioka M, Iwatani K, Kobayashi H, Yoshimoto K, Nomori H. Kissing pleural metastases from metastatic osteosarcoma of the lung. *Ann Thorac Cardiovasc Surg* 2006;12:129-32.

6. Zwaga T, Bovée JV, Kroon HM. Best cases from the AFIP: Osteosarcoma of the femur with skip, lymph node, and lung metastases. *Radiographics* 2008;28:277-83.

7. Gupta MM, Bahri NU, Parekh HP, Watal P, Chudasama SL. Synchronous multifocal osteogenic sarcoma on multimodality imaging including bone scintigraphy. *Indian J Nucl Med* 2014;29:185-8.

8. Basu S, Mahajan A. Extensive 99 m Tc-MDP uptake in metastasis to contralateral pleura from osteosarcoma of femur: An indirect measure of extent of disease involvement at diagnosis. *J Cancer Res Ther* 2012;8:655-6.