DOI: 10.7860/JCDR/2026/77979.22291

Solitary Long Bone Metastasis in Patients with Breast Cancer: Imaging Findings

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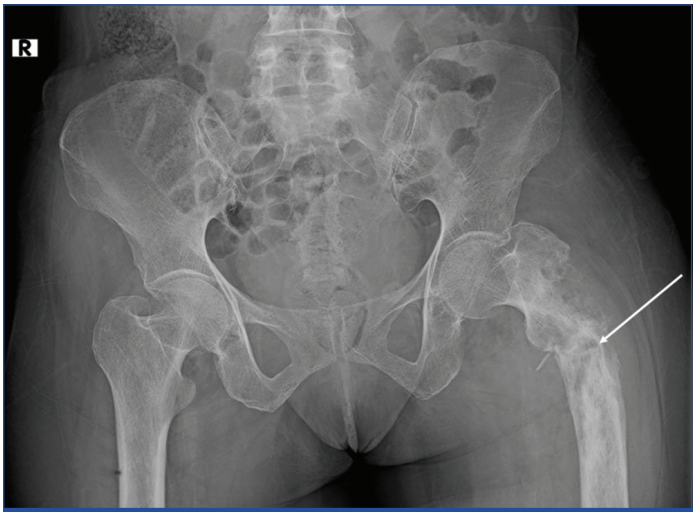
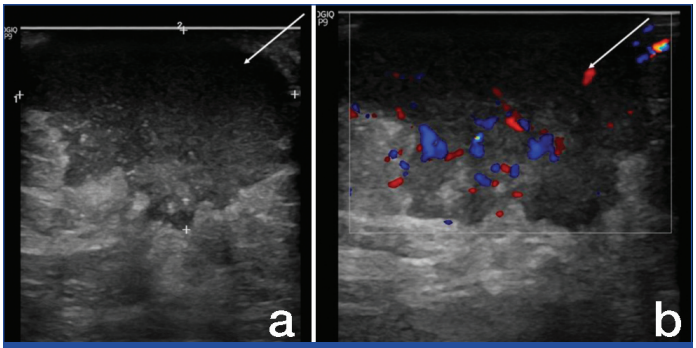
Keywords: Breast lump, Pathological fracture, Ultrasound

A 63-year-old female presented with constant left hip pain for one week, aggravated by walking. There was no history of trauma. Local examination revealed the limb in an externally rotated position. A shortening of the limb was evident, with tenderness over the anterior and lateral joint lines.

Pelvic X-ray revealed irregular lytic destruction involving the cortex in the metaphyseal region of the left femur, with a pathologic fracture of the lesser trochanter of the left femur. Associated soft-tissue swelling was noted [Table/Fig-1]. The right hip joint was unremarkable. On further enquiry, the patient reported pain, swelling, and discharge in the left breast for the past three months. The swelling measured approximately 3×2 cm, and she had not consulted elsewhere for it. Ultrasound of both breasts showed an ill-defined oval lesion, wider than tall, hypoechoic with irregular margins and prominent vascularity in the 12-2 o'clock position, involving the left breast- BI-RADS 5 lesion [Table/Fig-2]. Ultrasound Sonography (USG) of the right breast was unremarkable.

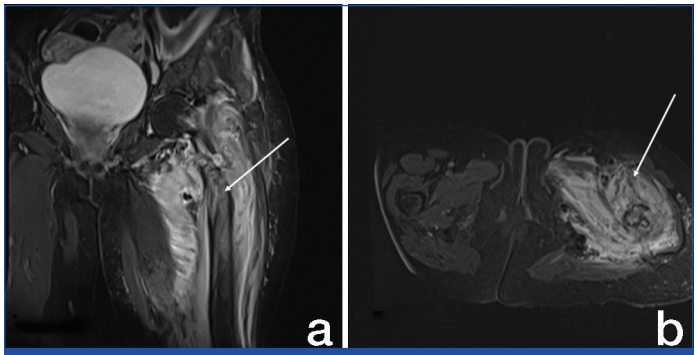


[Table/Fig-1]: Preoperative X-ray bilateral hip joint Anteroposterior (AP) view showing irregular lytic destruction involving the cortex in the metadiaphyseal region of left femur (white arrow) with pathological fracture of lesser trochanter.



[Table/Fig-2]: USG of left breast showing an ill-defined oval, wider than taller hypoechoic lesion (white arrow) with irregular margins and prominent vascularity in 12 to 2'o clock position involving circles II and III of left breast.

To further characterise the lytic destruction in the left femur, MRI of both hips was performed. MRI showed an ill-defined Short Tau Inversion Recovery (STIR)-hyperintense area involving the neck, proximal and midshaft of the left femur, with a mildly displaced fracture of the proximal femoral shaft and significant surrounding intra and intermuscular oedema [Table/Fig-3]. The right hip joint was unremarkable and the joint spaces of both hips were normal.

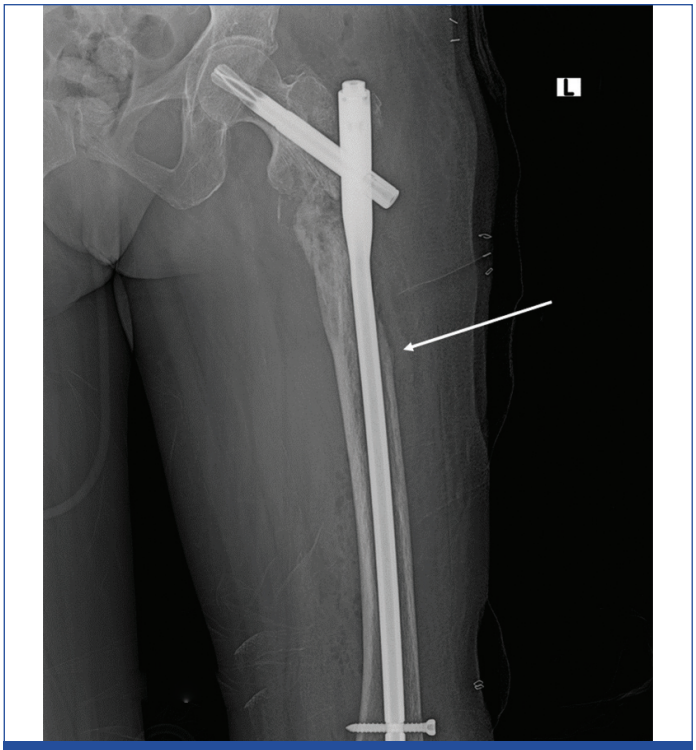


[Table/Fig-3]: Coronal and axial STIR images showing ill-defined STIR hyperintense lesion (white arrow) involving the neck, proximal and mid shaft of left femur with significant intra and intermuscular oedema.

Excision biopsy from the left breast swelling revealed invasive breast carcinoma- Nottingham histological grade II, based on tubule formation, nuclear pleomorphism, and mitotic activity. Immunohistochemistry demonstrated Estrogen Receptor (ER)/Progesterone Receptor (PR) positivity with an Allred score of 8, and HER2/neu positivity with a Ki-67 index of 35-40%. Following this, closed reduction internal fixation of the left femur was performed with a Proximal Femoral Nail Anti-rotation (PFNA-II) under local anaesthesia [Table/Fig-4]. Biopsy results from the left femur obtained during the internal fixation confirmed metastatic carcinomatous deposits in the left femur. Positron Emission Tomography-Computed Tomography (PET-CT) showed no other metastases. The patient underwent chemotherapy and is on follow-up. Radiotherapy was not given.

Breast cancer is the most common cause of cancer-related deaths in women and has a high degree of osteotropic involvement [1]. Autopsy findings in nearly 70% of women with breast cancer reveal evidence of metastatic bone disease [1,2]. Bone metastases are frequently observed in the pelvis, ribs, thoracic and cervical vertebrae, skull, and long bones, which are rich in bone marrow, while the femur is the most common long bone involved [1,2].

Oligometastatic is a term described first by Weichselbaum RR and Hellman S to refer to an intermediate state between locoregional and widespread disease in which the full metastatic potential is not expressed and circulating tumour cells have metastasised to limited and suitable sites. In this context, oligometastatic bone disease refers to more than one and up to five bone metastases [3]. Zengel et al., in their study, analysed the risk factors, prognosis, and survival rate of oligometastatic bone disease in breast cancer patients to determine whether oligometastasis and single bone metastasis are



[Table/Fig-4]: Postoperative X-ray of left femur showing proximal femoral nail antirotation 2 implant insitu (white arrow).

different entities [3]. Patients with oligometastatic bone disease were found to have a shorter median survival than those with a single bone metastasis [3]. Although the oligometastatic potential of breast carcinoma has been well described, isolated femoral metastasis is relatively rare, with only a few reported cases [1,3-5]. It is important to differentiate oligometastatic breast carcinoma from a single bone metastasis as they have different prognoses, mortality rates, and treatment approaches. Breast cancer, like prostate cancer, can have both osteoblastic and osteolytic metastases; in our case it was predominantly osteolytic destruction involving the metadiaphyseal region of the left femur.

In a study by Karataş M et al., solitary bone metastasis developed in 8.1% of patients who underwent mastectomy [4]. Cubitt C et al. reported a case of breast cancer with solitary osseous metastasis presenting as a multiloculated cystic lesion with a fluid-fluid level. Although this is similar to the present case of solitary bone metastasis, there was a fluid-fluid level in our case [5].

In conclusion, patients with isolated bone metastasis have a better prognosis than those with oligometastatic breast carcinoma or disseminated disease. Timely diagnosis with appropriate treatment can prevent subsequent development of metastases at skeletal or soft-tissue sites and improve survival.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Jan 11, 2025
- Manual Googling: May 13, 2025
- iThenticate Software: May 15, 2025 (4%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jan 10, 2025**
Date of Peer Review: **Apr 23, 2025**
Date of Acceptance: **May 17, 2025**
Date of Publishing: **Jan 01, 2026**