Proximal Tibial Bone Metastases in Patient with Breast Carcinoma: A Rare Case Report

Chaudhary Amardeep[1], Raymajhi Asmita[2], Sapkota Sulav[3], Afroza Akhter[4], Adhikari Ganga D[5], Yadav Birendra[1], Yadav Om Prakash[1], Yadav Ajay Kumar[1]

[1]Nuclear Medicine and Molecular Imaging Centre, [2]Department of Radiation Oncology, [3]Department of Medical Oncology Birat Medical College Teaching Hospital, Birat Cancer Institute, Tankisinuwari, Budhiganga-2, Morang, Nepal, [4]Institute of Nuclear Medicine & Allied Sciences (INMAS), Dhaka, Bangladesh, [5]Department of Radio-diagnosis, Imaging & Nuclear Medicine, BP Koirala Memorial Cancer Hospital, Bharatpur, Chitwan, Nepal.

Abstract

Background: Bone metastases from any carcinoma below elbow and knee are rare, those to tibia are even rarer. Diagnosis sometimes may defer and often confused with primary bone carcinoma, osteomyelitis or arthritis. Management depends on extent of disease and severity of symptoms. Both radical and palliative treatment are possible, depending on the overall clinical severity. ***Case Presentation:*** We present a case of a 41-year female patient with a history of right breast carcinoma. Previously, the patient was misdiagnosed as right breast fibroadenoma with sebaceous cyst, a mass measuring 13.1x9.5x6.7 mm^3. The patient was then advised to have an excisional biopsy of whole solid mass and mass was sent for histopathology examination to get clear opinion. The histopathology report revealed that there was cribriform ductal carcinoma in situ intermediate nuclear grade. Before starting any treatment, the patient is advised to have all the required laboratory examinations, CECT chest abdomen and ^{99m}Tc-MDP whole body bone scan. Whole body bone scan revealed that there is osteoblastic lesion in shaft of right proximal tibia suggestive of bone metastases. Later it was confirmed with histopathology report. *Conclusion:* Proximal tibial bone metastasis in a patient with breast carcinoma is a relatively very uncommon, but challenging, site for bone metastasis.

Keywords: Bone metastases; Tibia; Breast Carcinoma; Bone Scintigraphy; Acrometastases

Introduction

Tibial bone metastasis from breast cancer is considered a relatively rare presentation, as breast cancer metastases most commonly affect the axial skeleton (spine, ribs, pelvis, skull, and proximal long bones like the femur and humerus). However, there are few case reports and studies that include patients with tibial involvement [1-2]. Metastases in the bones below the knee, including the tibia and fibula, are uncommon. One large study of 984 patients with bone metastases from breast cancer found that the tibia was involved in only 0.3% of cases [3]. Patients typically present with pain in the lower leg, which can lead to difficulty walking or a limp. This pain may be the presenting symptom leading to the diagnosis of metastasis or a pathological fracture. The metastasis can weaken the bone, leading to a pathological fracture of the tibia. This is a common and serious complication, often presenting with sudden, severe pain. Diagnosis of bone metastases is typically confirmed with imaging studies such as X-ray, Contrast Enhanced Computed Tomography (CECT) scan, Magnetic Resonance Imaging (MRI), and ^{99m}Tc-MDP whole body bone scintigraphy (bone scan). A biopsy of the lesion may be performed to confirm the breast cancer origin, especially if it is the first or only site of metastasis.

The management of tibial bone metastasis from breast cancer is multidisciplinary and typically includes a combination of: 1. *Systemic Therapy:* This is crucial and depends on the molecular subtype of the breast cancer (e.g., hormone receptor status, HER2 status). It may involve: Endocrine therapy (for hormone-receptor-positive cancer), Chemotherapy, Radiotherapy and Targeted therapy (e.g., for HER2-positive cancer). 2. *Bone-Modifying Agents (BMAs):* Drugs like bisphosphonates (e.g., zoledronic acid) or denosumab are used to reduce bone resorption, alleviate pain, and prevent or delay skeletal-related events (SREs), including pathological fractures. 3. *Local Treatment (for the tibia lesion): a) Surgery:*

Correspondence: Yadav Ajay Kumar, Nuclear Medicine and Molecular Imaging Centre, Birat Medical College Teaching Hospital, Tankisinuwari, Budhiganga-2, Morang, Nepal, Email Id: ajay.yadav@bmcteachinghospital.com, Cell No - +977-9745936940

Often required for impending or actual pathological fractures to stabilize the bone, relieve pain, and improve mobility. Common procedures include open reduction and internal fixation (ORIF), or sometimes prosthetic replacement for extensive joint involvement. Curettage and bone cement may also be used. b) *Palliative Radiotherapy (RT):* Used to manage pain and potentially prevent fracture in high-risk lesions that are not immediately surgically fixed. RT is highly effective for pain control in bone metastases [2].

We report a unique case of right breast cancer presenting with isolated bone metastases involving proximal shaft right tibia. The matters in finding and proposed management are deliberated.

Case Presentation

We present a unique case of a 41year female patient with a history of right breast carcinoma. Previously, the patient was misdiagnosed as right breast fibroadenoma with sebaceous cyst, a mass measuring 13.1x9.5x6.7 mm^3 in Ultrasonography (USG) report. The patient was then advised to have an excisional biopsy whole tumor mass and tumor was sent for histopathological examination to get confirmed diagnosis. The histopathology report revealed that there was cribriform ductal carcinoma in situ intermediate nuclear grade with positive margin. Before starting any treatment, the patient is advised to have all the required laboratory examinations, CECT chest-abdomen and ^{99m}Tc-MDP whole body bone scan. CECT revealed breast mass with hepatic solitary lesion. Histopathology slides were again reviewed and report revealed invasive carcinoma with immunohistochemistry (IHC) was TNBC. Whole body bone scan revealed that there is isolated osteoblastic lesion in the shaft of the right proximal tibia suggestive of bone metastases (Figure-1). CT guided Fine Needle Aspiration Cytology (FNAC) performed from the focus present in the proximal 1/3 of the shaft of the right tibia revealed metastatic carcinoma.

Patient underwent for right breast modified radical mastectomy (MRM) followed with chemotherapy and local external field beam radiation therapy (30Gy/10#/ 2weeks). Later, she complained of severe pain below the left knee for which she also received local field radiation (20Gy/5#/1week). The symptoms decreased, allowing her to resume her daily routine. Tamoxifen was continued at 20mg/day.

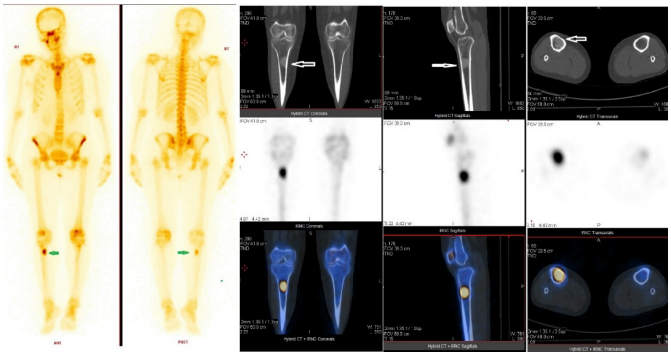

Figure 1: Tc-99m-MDP Whole Body Bone Scintigraphy and SPECT/CT shows there is increased radiotracer in the proximal shaft of right tibia likely metastases.

Discussion

Metastatic bone disease is the most common form of bone cancer found in oncology practice. Its incidence varies from 6% to 85% in several studies, and bone is the third most common site of metastases after lung and liver [4]. The primary cancers most commonly associated with bone metastases are: - Lung, Breast, Prostate, Thyroid and Kidney [5]. The spine appears to be the most affected bony site followed by the pelvis, ribs, skull and the upper arm bones. Breast cancer and lung cancer (which is 20% of cases) are the most common causes of distal or below elbow and below-knee metastases [6]. A literature review shows below-knee and below elbow metastases are found in only about 7% of cases. The tibia alone is affected in 4.4% [6] while the foot and the ankle are involved in 1% each [7]. Most of these cases of acral metastases have been found to arise from bronchogenic carcinoma followed by renal cell carcinoma and breast cancer. The cause of the rarity of acral metastases is the relative lack of active hematopoetic bone marrow in these sites [8]. There have been reports of lung and breast cancers spreading to the thumb, or presenting just as an isolated metastases in the talus, or even to the phalanx [9].

About 70% of cases with bony metastases are detected radiographically and 85% show lytic changes. Bone scans are not done routinely for early-stage breast cancer and is recommended in stage II tumors>3 cm and high histologic grade, and in stage III and IV cancers [10]. On the other hand, stage II patients and stage I should only undergo for bone scans if the patients have bone pains. Hematogenous spread has been documented as the most common and important mechanism of bone involvement [11]. Metastases most often occur in red marrow,

which are present in cancellous bone in vertebrae throughout adult life, hence the high frequency of spinal spread.

Metastases to peripheral skeleton distal to the elbows and knees are uncommon, hence a high index of suspicion needs to be maintained for diagnosis and effective management, especially in patients with prior cancers. Any suspected cases found through physical exams and imaging must be histopathological examination for definitive confirmation. While the general approach is palliative, surgical intervention might be an option for limited disease. In such cases, CT or MRI is essential to map the local extent of the spread. Aggressive management may be beneficial for patients with contained disease who have a favorable prognosis. Radiotherapy is a key tool for managing pain, and the specific systemic therapy regimen is determined by the primary tumor's characteristics.

Conclusion

In summary, a case report of tibial bone metastasis in a breast cancer patient highlights an uncommon site of spread that typically requires aggressive local management (often surgery and/or radiation) in addition to ongoing systemic therapy and bone-modifying agents to manage symptoms, prevent SREs, and maintain the patient's quality of life and function.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her 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.

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