

Pattern of Skeletal Metastasis in Breast Cancer Patients Referred in INMAS, Barishal

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ABSTRACT

Objective: Skeletal scintigraphy is highly sensitive and widely used for the detection of metastatic disease especially in breast cancer. The study was aimed to evaluate the pattern of skeletal metastasis in breast cancer patients with whole body bone scan using ^{99m}Tc -Methyl Diphosphonate (^{99m}Tc -MDP) to aid proper diagnosis, staging, management and prognosis.

Study design: Single center based retrospective study.

Patients and methods: The study was conducted among the histopathologically proven breast cancer patients referred to INMAS, Barishal for ^{99m}Tc -MDP bone scintigraphy between March 2016 and March 2017. Bone scan was done with SPECT digital dual head gamma camera (Siemens S series) 3 hours after intravenous bolus injection of 20 mCi ^{99m}Tc -MDP.

Results: Out of total 96 patients, 47(49%) were found positive for skeletal metastases and among them 31(66%) had only axial skeletal metastases. Appendicular skeletal metastases were seen in 5 (11%) patients. Both axial and appendicular skeletal metastases were found in 11(23%) patients.

Conclusion: For equivocal lesions SPECT is better than planar scintigraphy alone to characterize and comment confidently. Metastatic lesions detected by bone scintigraphy in breast cancer patients keep a significant impact on patient management.

Key words: Breast Cancer, Skeletal Metastasis ^{99m}Tc -MDP.

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INTRODUCTION

Breast cancer is one of the most common cancers among women, and one of the leading causes of death among females with significant genetic predisposition (1). In our country, many patients do not visit the doctors at early stage of the disease due to social stigma. When reported to doctors many cases already reach its late stage. So, metastasis is common in breast cancer patients who attend Nuclear Medicine (NM) departments and we find that bone is a favorable site for

metastasis. Usually the patients present with bone pain in skeletal metastasis cases (2). Whole body radioisotope bone scintigraphy is a commonly used and sensitive investigation for detecting skeletal metastasis in breast cancer patients and an excellent modality for staging these group of patients before starting treatment, to assess the ongoing treatment response and for future follow up. This is especially beneficial for patients living in remote areas with limited access to other investigation modalities.

Radioisotopes are accumulated based on the bone vascularity and osteoblastic activity. The sites with metastasis will have more vascularity and osteoblastic activity, so more uptake (3). ^{99m}Tc Technetium- bound to MDP is a common radiopharmaceutical used in this purpose. Aim of this study was to see the pattern of skeletal metastasis in breast cancer patients in whole body skeletal scintigraphy using ^{99m}Tc -MDP.

PATIENTS AND METHODS

The study was a single center based retrospective study. It was based on the findings of whole body scan of the 96 breast cancer patients referred to Institute of Nuclear Medicine and Allied Sciences (INMAS), Barishal from March, 2016 to March, 2017. Bone scan was done with intravenous bolus injection of 20 mCi (740 MBq) ^{99m}Tc -MDP using SPECT digital dual head gamma camera (Siemens, Symbia S series). Images were taken three hours after injecting the radiotracer and the scan time was about 15 minutes (or for >1.5 million counts). Anterior and posterior projections were obtained in a whole body scan using low energy high resolution parallel-hole collimator with energy window centered at 140 keV and window width set at 15%. Matrix size was 256 X 256.

RESULTS

Out of total 96 patients, 49(51%) were found negative for skeletal metastasis. Skeletal metastases were positive in 47(49%) patients (Figure 1).

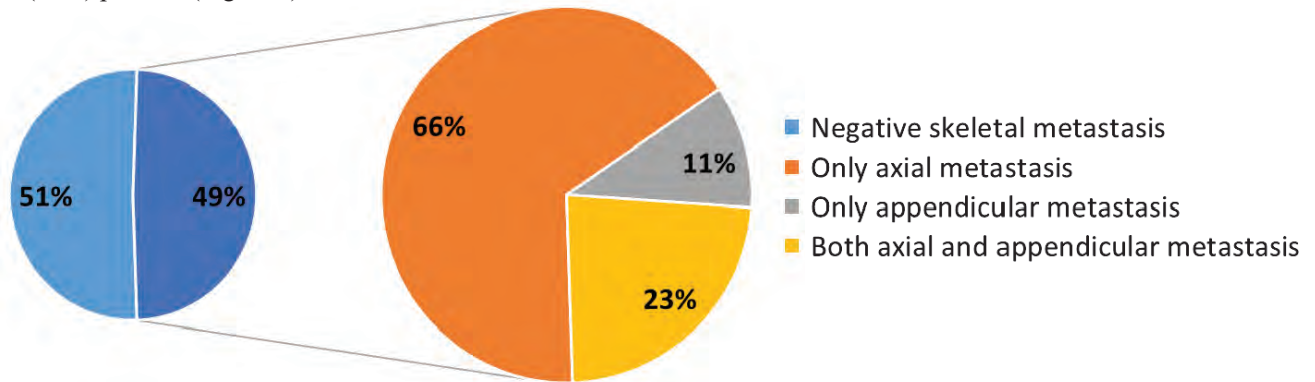


Figure 1: Pie of pie plot showing percentage distribution of breast cancer patients based on skeletal metastasis and the percentage distribution of the patterns of skeletal metastasis.

Among the skeletal metastasis positive cases, 31(66%) had only axial skeletal metastasis, 5(11%) were seen positive for only appendicular skeletal metastasis. Both axial and appendicular skeletal metastases were seen in 11(23%) patients (Figure 2).

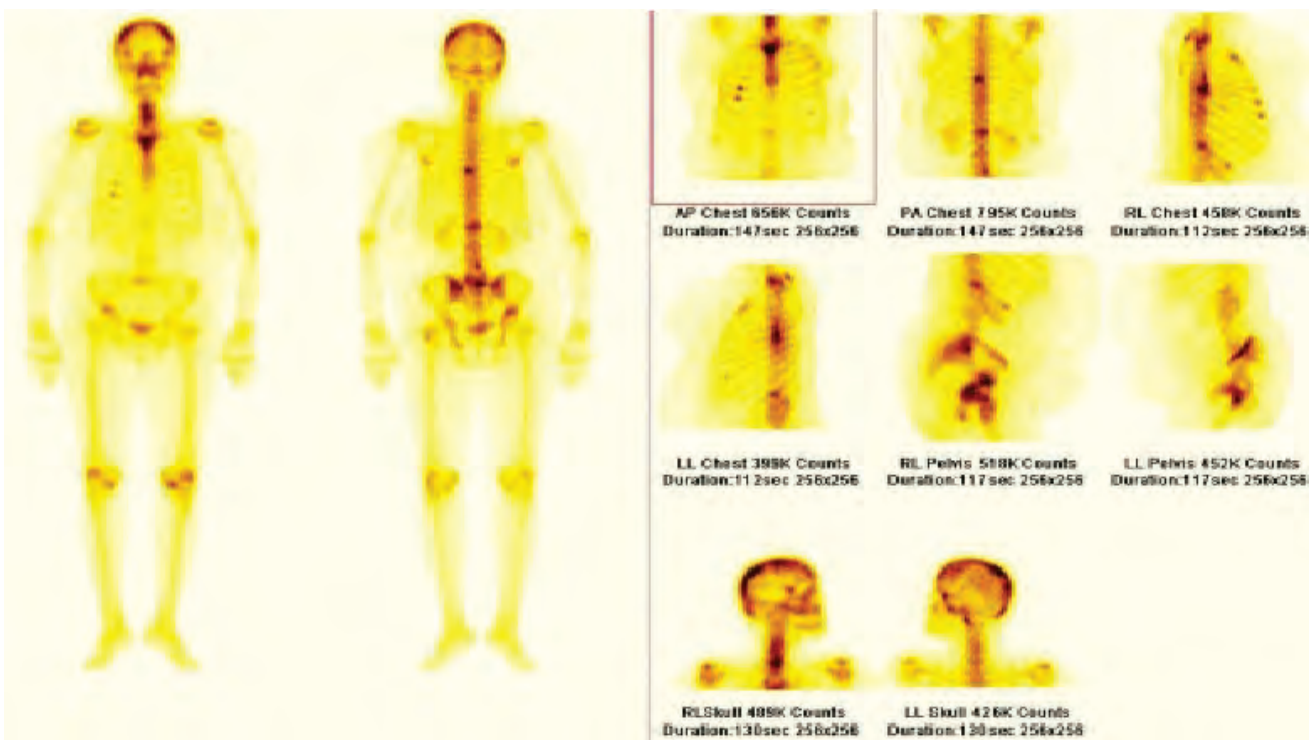


Figure 2: Representative image of multiple osteoblastic metastases involving the axial and appendicular skeleton in a patient with breast cancer; anterior and posterior whole body sweep images and regional spot views from 99m Tc-MDP whole body planar scan.

DISCUSSION

In our study, out of total 96 patients, 47(49%) were found positive for skeletal metastasis. 49 (51%) patients had no bony metastasis. To see the pattern of skeletal metastasis then we classified the skeletal metastasis positive patients based on the site of metastasis, that is axial skeleton (including skull bones, spine, ribs and sternum) and appendicular

skeleton (including shoulder girdle, pelvic girdle and extremities). We found that out of 47 skeletal metastasis positive cases 31(66 %) patients had only axial skeletal metastasis, 5(11 %) patients were positive for only appendicular skeletal metastasis and 11(23%) patients were positive for both axial and appendicular skeletal metastases. In a similar study, Afzal M S et al. found positive skeletal metastasis in 38% of total breast cancer patients (4).

Breast cancer cells spread from primary site of lesion to distant sites either by direct extension, hematogenous spread or lymphatic spread. Bone is the most common site (51%) for metastasis in breast cancer patients (5). Metastases to bones usually occur through hematogenous route. Whole body scan with radiopharmaceutical is a fairly sensitive and cost effective investigation for detection of bony metastasis (6).

Sensitivity of whole body scan for detection of bony metastasis ranges between 62%-100% and specificity of 78% - 100% (7). Though bone scan is not much reliable in detecting metastasis in early stage (Stage-1 & 2) of breast cancer. In clinical stage-1, abnormal bone scan percentage varied from 0%-18% with a mean value of 4.4% and in case of stage-2 this percentage varied from 0%- 32% (mean value 7.2%). But the percentage of abnormal bone scans increases with more advanced stage of breast cancer with a mean value of abnormal scans at 27.6% (8). Bone metastases may present as osteolytic, osteoblastic or combination of both.

Radiopharmaceuticals deposit to bone tissue on the basis of blood flow and osteogenic activity or bone turnovers. So, many benign lesions like osteoarthritis may give false positive results for a bony metastasis (9). Invasion of tumor cells to bone depends on adhesion mechanisms, interaction with the extracellular matrix, stromal cells, osteoblasts, osteoclasts, and endothelial cells (10).

CONCLUSION

Skeletal Metastasis is quite common among breast cancer patients. Axial skeleton is more commonly involved than appendicular skeleton. Whole body scan with ^{99m}Tc-MDP is a cost effective, fairly sensitive investigation for detection of skeletal metastasis and more sensitive in detecting bony metastasis in later stages.

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