Case Report

Asymmetrically increased rib cage uptake on bone scintigraphy: Incidental detection of pleural mesothelioma on single photon emission computed tomography/computed tomography

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ABSTRACT

Follow-up bone scintigraphy (BS) in a patient of carcinoma left breast, who was treated with surgery followed by radiotherapy 12 years back, revealed asymmetrically increased radiotracer uptake in left-sided ribs. Since, this pattern was atypical for metastatic rib involvement, single photon emission computed tomography/computed tomography (SPECT/CT) of thorax was done in the same setting which revealed circumferential nodular left-sided pleural thickening. Biopsy confirmed it to be pleural mesothelioma. Left-sided ribs showed no abnormality on CT, thus suggesting the rib uptake as reactive in nature. This pattern of asymmetric rib uptake on BS should be kept in mind and warrants further investigation for determining underlying pathology.

Keywords: ^{99m}Tc-methylene diphosphonate, bone scintigraphy, BS, Pleural mesothelioma, single photon emission computed tomography/computed tomography, rib uptake

INTRODUCTION

Pleural mesothelioma is a rare condition associated with exposure to asbestos in around 70% of the cases. Other risk factors include SV40 virus, genetic alterations, and exposure to radiotherapy generally for cancer treatment. The relationship between exposure to radiotherapy and pleural mesothelioma has been documented in the literature.[1-3] Also, metastatic skeletal involvement is common in carcinoma breast. Follow-up ^{99m}Tc- methylene diphosphonate (MDP) bone scintigraphy (BS) helps in early detection of skeletal metastases especially in high-risk patients. Here, we present the case of 50-year-old female of carcinoma left breast treated with modified radical mastectomy, followed by radiotherapy who underwent BS on follow-up which was negative for the skeletal metastases but showed abnormally increased left rib cage uptake that led to the incidental detection of malignant pleural mesothelioma.

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CASE REPORT

A 50-year-old female patient of carcinoma left breast underwent modified radical mastectomy, followed by radiotherapy 12 years back. She now presented with left-sided chest pain since 3 months. Suspecting the pain to be of musculoskeletal origin, the treating oncologist referred the patient for ^{99m}Tc-MDP BS to rule out skeletal metastases. BS was done 3 h, following intravenous injection of 20 mCi of ^{99m}Tc-MDP. It revealed diffusely increased radiotracer uptake involving all the left-sided ribs thus giving the appearance of asymmetrically increased left rib cage uptake [Figure 1a and b; arrows]. The remaining skeleton showed normal radiotracer distribution. Because this pattern was atypical for rib metastasis, single photon emission computed tomography/computed tomography (SPECT/CT) of the thorax was done in the same setting. Transaxial SPECT and SPECT/CT images [Figure 1c and e; arrows] revealed diffusely increased radiotracer uptake in all the left-sided ribs. Using bone window on CT [Figure 1d], all the left-sided ribs showed regular cortical outlines with no apparent abnormality. Transaxial CT in soft tissue window revealed circumferential nodular left-sided pleural thickening [Figure 1f; arrow, arrow head]. The increased uptake of tracer in the ribs was likely secondary to the increased vascularity in underlying pleural pathology and was interpreted as reactive in nature. Biopsy from the pleural-based nodular lesion

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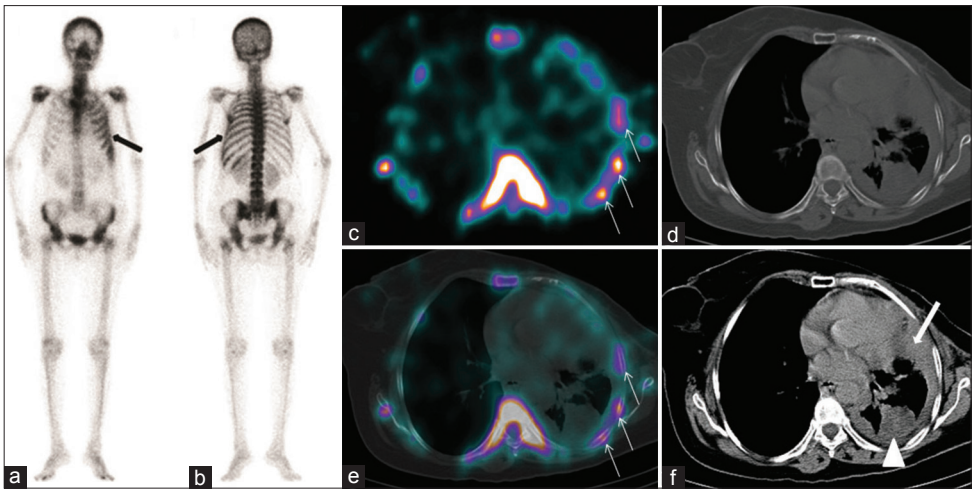

Figure 1: 99mTc-methylene diphosphonate bone scintigraphy showing diffusely increased left rib cage uptake (anterior a, posterior b; arrows). Transaxial single photon emission computed tomography (SPECT) and SPECT/CT images (c, e; arrows) show diffusely increased radiotracer uptake involving the left-sided ribs. Transaxial CT (bone window, d) shows normal left-sided ribs with regular cortical outlines. Transaxial CT (soft tissue window, f) shows a pleural-based soft tissue density lesion in the left lung lower lobe (f, arrow head) with diffuse circumferential pleural thickening (f, arrow)

was suggestive of pleural mesothelioma [Figure 2a-d]. Patient was referred to the oncology department for further work up.

DISCUSSION

During the course of their disease, about one third of patients with breast cancer are at risk of developing recurrence. Therefore, early diagnosis and treatment of recurrent breast cancer is important to define therapeutic strategies to enhance the duration of survival.[4] Metastatic skeletal involvement is common in patients with breast cancer and has been demonstrated by postmortem studies in up to 70% of the patients.[5,6] Detection of these lesions has a prognostic as well as therapeutic significance as the mean survival in patients with bony metastases is only 2 years.[7] Rib involvement is common in patients with multiple metastases but an uncommon site for solitary metastases.[8]

Malignant pulmonary and pleural disease usually heralds poor prognosis, the manifestation of which can be either solid disease or a malignant pleural effusion, or a combination of both. CT is the workhorse of pleural imaging, able to achieve specificity of close to 100%.[9] The latency period for developing pleural mesotheliomas may vary depending upon the type of etiology. Our extensive literature search revealed few cases of carcinoma breast who later on developed pleural mesothelioma attributed to radiotherapy given for the treatment of breast cancer.[1-3] In patients of carcinoma breast treated with radiotherapy, the time interval between the radiation and the appearance of the mesothelioma ranges from 10 to 30 years. This is in contrast to asbestos-related mesotheliomas, where there is a greater time interval (usually 30-40 years) and patients are also much older (usually >60 years).[1]

In the present study, the patient had no other relevant history such as environmental or occupational exposure. Therefore, we hypothesized that radiotherapy given for the treatment of

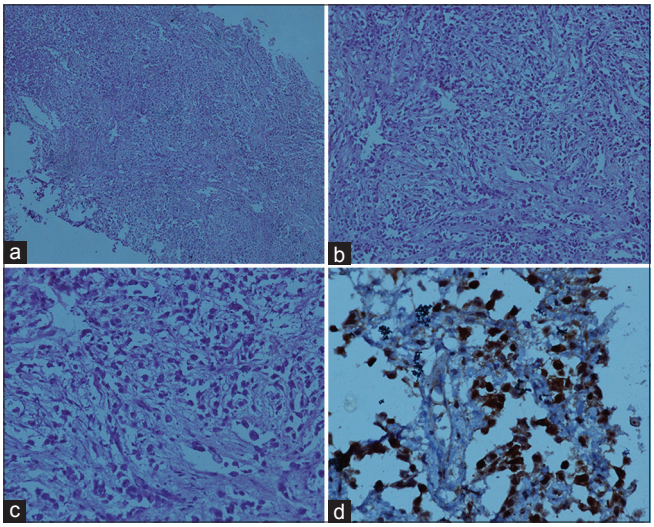

Figure 2: Histological evaluation (×4, a; ×10, b; ×20, c) shows hematoxylin- and eosin-stained sections showing round to oval cell with moderate amount of cytoplasm with mild nuclear pleomorphism. Calretinin positivity (×40, d) is suggestive of malignant pleural mesothelioma

primary breast cancer could have played a role in the development of pleural mesothelioma. Although there was no evidence of skeletal metastasis, the demonstration of pleural pathology by SPECT/CT played an important role in the patient management as timely treatment increases the survival of the patients. Therefore, this pattern of asymmetrical hemithoracic rib cage uptake on BS should be kept in mind as an indirect indicator of underlying pleural involvement warranting further investigation for documenting the same.

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