

IMAGING GAMUT

Vanishing sternum on ^{99m}Tc -MDP Bone Scan

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Key words: Bone scan, ^{99m}Tc -methylene diphosphonate, breast cancer, sternal metastasis, internal mammary nodal mass.

Background A 37-year-old female diagnosed with breast cancer and treated with mastectomy followed by neo-adjuvant chemotherapy, presented with a recent history of a stony hard pre-sternal mass. Her baseline bone scan was unremarkable. Follow-up skeletal scintigraphy was indicated to investigate osseous involvement.

Procedure Bone scan was performed after an intravenous injection of ^{99m}Tc -MDP (750 MBq) using a dual-headed gamma camera fitted with low-energy high-resolution (LEHR) collimators. Delayed 3-hour whole-body bone scan together with oblique spot views of the chest were acquired. Bone scan findings were correlated with diagnostic contrast-enhanced CT of the chest.

Findings The The baseline bone scan (Figure 1) showed uniform and symmetrical distribution of radiotracer throughout the skeleton including the sternum. The follow-up

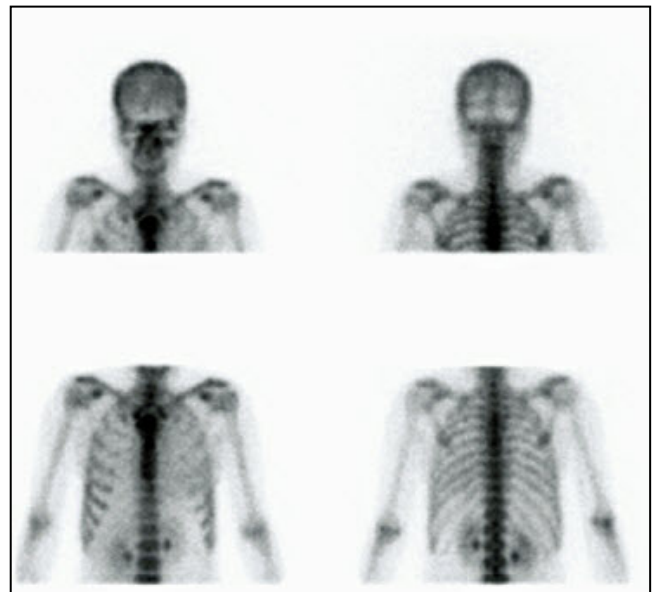


Figure 1 Baseline ^{99m}Tc -MDP bone scan: anterior and posterior spot views of chest

whole-body scan and spot views over the chest (Figure 2) showed relative photopenia in the manubrium and the proximal sternal body region (arrows marked in both panels) whilst the rest of scan showed uniform tracer distribution. On correlation with diagnostic CT (Figure 3), the sternal lesion was seen to correspond to a destructive, expansile presternal and intra-thoracic soft-tissue mass invading the proximal sternum, likely representing internal mammary nodal metastasis from the primary breast cancer. The patient was treated with radiotherapy to sternal region and the mass regressed.

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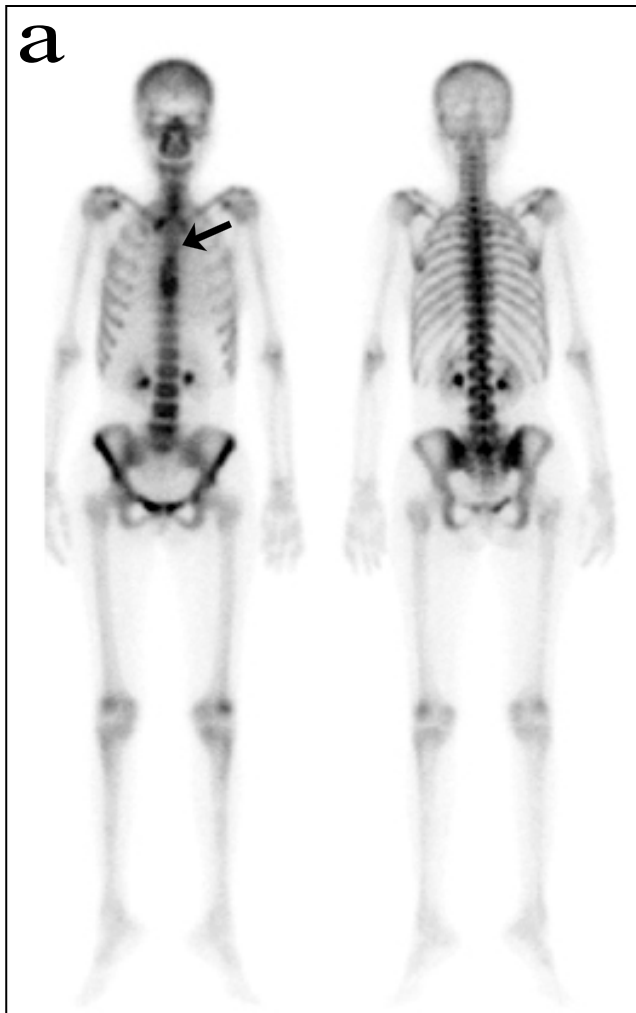


Figure 2 Follow up ^{99m}Tc- bone scan whole-body bone scan in anterior & posterior views [a] and oblique sternal spot view (b)

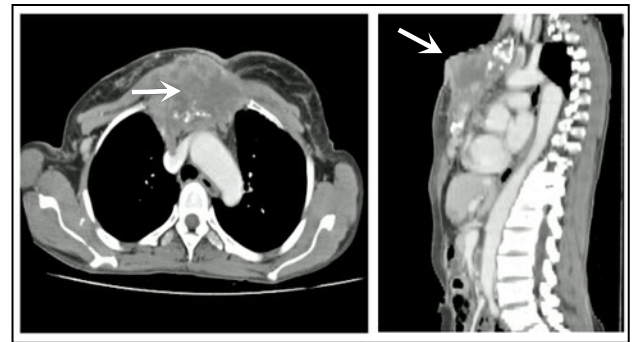


Figure 3 Diagnostic CT chest images showing an expansile soft-tissue internal mammary nodal mass invading the overlying sternum (arrow)

Conclusions Interval development of destructive invasion of the sternum by the internal mammary lymph node metastasis, can present as a 'vanishing' sternum on serial bone scans.

Comment Isolated sternal involvement or a solitary sternal metastasis from breast cancer is relatively uncommon with reported incidences of 5.2% and 1.9%-2.4% respectively [1]. However, in patients with established internal mammary lymph node metastasis, the reported frequency of sternal erosion is as high as 64.7% [2]. Sternal involvement may occur either from direct invasion by the enlarged internal mammary lymph nodes or from haematogenous spread. Consequently, patients with breast cancer presenting with a solitary sternal metastasis require thorough restaging evaluation to rule out other foci of metastatic disease. Treatment should be based on a multimodality approach. With an isolated recurrence, local therapy with radiation would be appropriate. In the presence of distant disease, systemic options are frequently offered [3, 4]. Also, as illustrated in this case, the use of complimentary anatomical imaging (CT scan) in confirming and further characterizing the absent radiotracer uptake in manubrio-sternum may be helpful. Introduction of SPECT-CT has made characterization of solitary lesions on MDP bone scans much easier and conclusive in oncological patients [5, 6].

References

1. Zhang Y-J, Julia LOH, Whitman GJ, et al. Clinically apparent internal mammary nodal metastasis in patients with advanced breast cancer: incidence and local control. *Int. J. Radiation Oncol Biol. Phys.* 2010;15:1131-9.
2. Chen L, Gu Y, Leaw S, Wang Z, Wang P, Hu X, Chen J, Lu J, Shao Z. Internal mammary lymph node recurrence: rare but characteristic metastasis site in breast cancer. *BMC Cancer* 2010, 10:479
3. Lee L, Kellar A, Clemons M. Sternal resection for recurrent breast cancer: a cautionary tale. *Curr Oncol.* Aug 2008; 15(4): 193-195.
4. Ohtake E, Murata H, Maruno H. Bone scintigraphy in patients with breast cancer: malignant involvement of the sternum. *Radiation med* 1994, 12(1):25-28]-europepmc.org.
5. Kakhki VR1, Anvari K, Sadeghi R et al. Pattern and distribution of bone metastases in common malignant tumors. *J Nucl Med Rev Cent East Eur.* 2013;16(2):66-9.
6. Sharma P, Singh H, Kumar R, Bal C, Thulkar S, Seenu V et. al. Bone scintigraphy in breast cancer: added value of hybrid SPECT-CT and its impact on patient management. *Nucl Med Commun* 33:139-147.