When in Doubt, Add SPECT/CT: A Case of Mistaken Identity

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A 63-y-old woman with a history of breast cancer presented with concerns of osseous metastasis. Initial whole-body planar bone scintigraphy revealed a focus of concern overlying the sternum. SPECT/CT images revealed the anomaly—localized activity in the needleless hub attached to the chemotherapy port. If not for the precision of SPECT/CT, such a rare artifact could have led to a false-positive diagnosis, particularly impactful in breast cancer patients. This case emphasizes the critical role of SPECT/CT in accurate diagnoses.

Key Words: SPECT/CT; breast cancer; bone scintigraphy

Bone scintigraphy is commonly used to assess osteoblastic metastases in cancer patients. Whole-body planar imaging conducted with bone scintigraphy often results in nonspecific findings that lead to additional imaging, procedures, testing, and patient angst (1,2). The addition of SPECT/CT imaging to planar imaging can improve the sensitivity and specificity for detecting true metastatic disease in these patients (1,3,4). We present an important teaching case demonstrating the importance of adding SPECT/CT to exclude pathology in a breast cancer patient with a suspected solitary sternal lesion on planar bone scintigraphy.

FIGURE 1. (A) Suggestive distal sternal focus on whole-body anterior planar bone scintigraphy. In addition to degenerative and physiologic uptake, intense focus is seen overlying distal sternum. (B) Intense distal sternal focus overlying distal sternum, possibly external to patient, on right anterior oblique imaging. (C) Unmasking of identity of sternal focus on axial SPECT/CT, which reveals that focus of radiopharmaceutical is external to patient, overlying needleless hub lying on chest of patient. This finding confirmed possible external uptake seen on right anterior oblique imaging.
CASE REPORT

A 63-y-old woman with a history of breast cancer and bone pain was referred to us for bone scintigraphy. We administered 555 MBq (15 mCi) of $^{99m}$Tc-methylene diphosphonate through an accessed chemotherapy port for the whole-body bone scan.

After 3 h, the initial whole-body scan was performed (Fig. 1A), and the technologist noticed a focus of intense uptake overlying the distal sternum. The technologist then took additional static spot images to try to localize the lesion (Fig. 1B). As the focus was not readily distinguished from the distal sternum, thoracic SPECT/CT was performed to clarify the possible sternal lesion. After performing the SPECT/CT of the chest (Fig. 1C), the team discovered that the radiopharmaceutical activity did not localize to the distal sternum; rather, it localized to the needless hub attached to the patient’s port. Because the port had not been adequately flushed, the hub, which rested on the patient’s chest during the examination, led to erroneous radiopharmaceutical localization to the distal sternum on planar imaging.

DISCUSSION

Though solitary sternal lesions are rare in breast cancer patients (3.1% in a large study) (5), they were found to represent metastatic disease in 76% of those patients. If a solitary sternal lesion is seen on bone scintigraphy, it is important to conduct further evaluation to determine the cause (5,6). Same-day SPECT/CT was able to resolve the benign cause of the localization in this case and prevent unnecessary concern and additional testing. If the SPECT/CT had not been performed, the patient might have received repeat imaging and testing and experienced unclarified concerns, because the focus was external to the patient.

The artifact most likely resulted from an inadequate flush of the port. The needless port is more difficult to flush than other forms of vascular access. The general guidance is to flush with at least 30 mL of saline. After this study, our clinic instituted corrective actions, including replacing the needless hub on every port-accessed patient after injection to reduce erroneous radiopharmaceutical foci and to prevent dose attenuation due to these foci.

In this case, alternatives to the SPECT/CT that would have led to less dose to the patient could have included flushing the port and reimaging. Alternatively, right or left lateral imaging may have revealed the focus to be external to the patient.

CONCLUSION

Solitary sternal lesions in breast cancer patients have a high likelihood of representing cancer metastases. Fortunately for our patient, this solitary focus represented radiopharmaceutical activity in a needless port external to the patient. Added SPECT/CT resolved this erroneous finding, reducing potential unnecessary imaging tests, procedures, cost, and patient concern.

DISCLOSURE

No potential conflict of interest relevant to this article was reported. The opinions and assertions expressed here are those of the authors and do not necessarily reflect the official policy or position of the Uniformed Services University or the Department of Defense.

REFERENCES