

The Contribution of SPECT Imaging to Planar Bone Scintigraphy for Anatomic Localization:Two Cases

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Abstract

Radioisotopes plays an important role in the diagnosis of benign and malignant bone lesions. Bone scintigraphy is mainly used in the investigation of bone metastasis in patients with malignancy. It can provide information about the location and extent of bone metastases, prognosis and treatment efficacy. Full-body scans and earlier identification of the lesions are the advantages compared to other methods. Bone scintigraphy has high sensitivity, but low specificity. The addition of SPECT imaging to planar scintigraphy increases the sensitivity and specificity of bone scintigraphy.

Key Words: Tc-99m MDP, Bone scintigraphy, SPECT

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Introduction

Bone scintigraphy has been known as one of the most sensitive non-invasive method to detect focal bone lesions (1) for more than 30 years. Planar bone scintigraphy may not provide enough information for lesion detection or anatomical localization in both major bones and complex bone structures. When SPECT (single photon emission computed tomography) imaging is compared with planar scintigraphy, it enhances image contrast, improves the detection and localization of the lesions (2). We also aim to provide the benefits of



SPECT imaging added to planar bone scintigraphy in terms of the anatomical localization in our patients.

Case 1

A 67-year-old female patient operated for breast cancer underwent bone scintigraphy with Tc-99m MDP (technetium-labeled methylene diphosphonate) in order to screen. Increased radioactivity involvement in the focused style in the left sacral area of the pelvic region was observed in the whole-body planar imaging. Radioactivity involvement was detected in the left sacrum segment in SPECT imaging. sclerotic lesions suspected to be metastatic showing increased FDG involvement were observed in the left half of the sacrum in FDG-PET/CT scan made in order to restage (SUVmax: 3.75). (Figure 1.)



Figure 1. a) Whole-body bone scintigraphy. b) Bone SPECT section. c) FDG PET / CT section.



Case 2

In a 69-year-old male patient underwent operation and followed-up for gastric carcinoma, increased radioactivity involvement in the focused style in the right sacral area of the pelvic region was observed in the whole-body planar bone scintigraphy performed with Tc-99m MDP. Radioactivity involvement in the focused style was detected localized in the pelvic cavity in SPECT imaging. Since it was considered that the appearance could be due to radioactivity stasis in the lower end of ureter, intravenous (IV) diuretics injection was performed and after a while additional static image was taken from the pelvic region. In the additional imaging, the disappearance of radioactivity involvement was observed in this area. (Figure 2.)



Figure 2. a) Whole-body bone scintigraphy. b) Bone SPECT section. c) Additional static image (after intravenous diuretic).



Discussion

The contribution of SPECT to planar bone scintigraphy is valuable and allows examination with more contrast and anatomical clarity with its tomographic procedure. The abnormalities detected in Planar bone scintigraphy are defined in a more convincing manner and better localized by SPECT scan (3). Bone SPECT performed routinely is practical and costeffective and increases the sensitivity of bone scintigraphy (4). Compared with planar scanning, SPECT scans have better anatomical localization advantages and also provide 50% to 20% increase in the detection of lesions (5). Detecting lesions improved with SPECT have been reported for mainly lesions localized in the lower thoracic and lumbar spine (6-10). Also in our cases, SPECT imaging has been shown to be a helpful transaction in terms of the anatomical localization. As a result, in the detection of lesion localization in the presence of an abnormal finding especially in the vertebrae, pelvic area, large and complex bone structures with planar bone scintigraphy, SPECT imaging leads to more accurate results.

References

1. Horger M, Bares R. The role of singlephoton emission computed tomography/computed tomography in benign and malignant bone disease. Semin Nucl Med 2006;36(4):286-94

2. Sarikaya I, Sarikaya A, Holder LE. The role of single photon emission computed tomography in bone imaging. Semin Nucl Med 2001;31(1):3-16

3. Collier BD Jr, Hellman RS, Krasnow AZ. Bone spect. Semin Nucl Med 1987;17(3):247-66

4. Uematsu T, Yuen S, Yukisawa S et al. Comparison of FDG PET and SPECT for detection of bone metastases in breast AJR 2005;184:1266-73 cancer. 5. Collier BD, Fogelman I, Brown ML. Bone scintigraphy: Part 2. Orthopedic bone scanning. J Nucl Med 1993;34:2241-46 Jacobson AF, Fogelman I. Bone 6. scanning in clinical oncology: does it have a future? Eur J Nucl Med 1998:25:1219-23 7. Gates GF. SPECT bone scanning of the spine. Semin Nucl Med 1998;28:78-94 8. Even-Sapir E, Martin RH, Barnes DC, Pringle CR, Iles SE, Mitchell MJ. Role of SPECT in differentiating malignant from benign lesions in the lower thoracic and lumbar vertebrae. Radiology

1993;187:193-8

9. Savelli G, Maffioli L, Maccauro M, De Deckere E, Bombardieri E. Bone scintigraphy and the added value of SPECT (single photon emission tomography) in detecting skeletal lesions. Q J Nucl Med 2001;45(1):27-37

10. Sudhakar P, Sharma AR, Bhushan SM, Ranadhir G, Narsimuhulu G, Rao VV. Efficacy of SPECT over planar bone scan in the diagnosis of solitary vertebral lesions in patients with low back pain. Indian J Nucl Med 2010; 25(2): 44-8.