

Case Report

Splenic Absorption of Radiopharmaceutical in Systemic Bone Scans Performed after Liver Transplantation

Sang-Hyeong Kil, Kyung-Nam Jo and Yung-Hyun Lim

Department of Nuclear Medicine, Pusan National University Yangsan Hospital, Yangsan, Korea

Abstract

Technetium-labeled phosphate bone scan was shown to detect bone fractures and bone metastasis in early stage than general radiographs. Therefore, bone scan has become one of the most frequently performed nuclear medicine imaging examination. However, non-osseous radiopharmaceutical uptake on the bone scan are unusual findings. We report a case of diffuse splenic absorption of Tc-99m dicarboxypropane diphosphonate in patients who undergo liver transplantation.

Key Words Tc-99m Dicarboxypropane Diphosphonate, Bone Scan, Splenic Absorption, Liver Transplantation

Introduction

Bone scan using technetium-labeled phosphate was shown to detect bone fractures and bone metastasis in early stage than general radiographs[1]. Therefore, bone scan is a commonly used modality in the evaluation of musculoskeletal lesions[2]. However, non-osseous radiopharmaceutical uptake on the bone scan are often an unexpected findings. In this case report, we report a case of diffuse splenic uptake of Tc-99m dicarboxypropane diphosphonate (DPD) resembling nuclear medicine spleen scan.

Case Presentation

A 47-year-old female presented with a history of alcoholic liver cirrhosis and splenomegaly who received liver transplantation and embolization of splenic artery. The patient was complaining of lower backache and whole skeletal pain so that

bone scan were performed for evaluation of generalized osseous pain. Three hours after the 925 MBq Tc-99m DPD intravenous injection, whole body images were recorded using low energy high resolution collimator of the dual-head gamma camera (Symbia E, Siemens, USA)(Fig. 1).

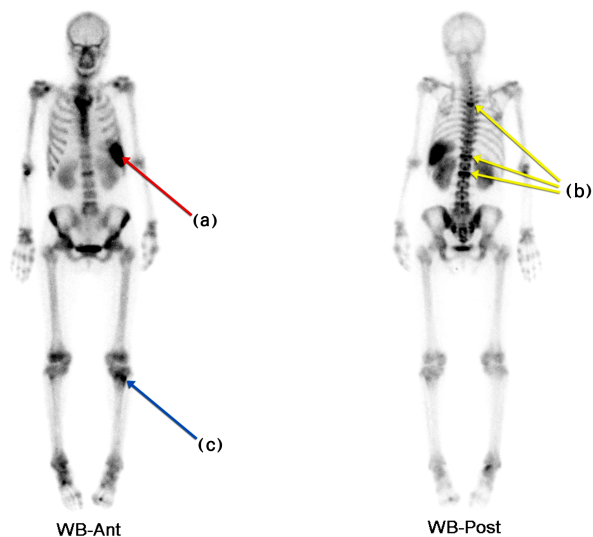


Fig. 1. Bone scan images show increased abnormal osseous uptake (a) on T4, T12, L2 level (compression fractures) and (b) left proximal tibia (suggestive traumatic bone lesion). Furthermore, show increased (c) diffuse splenic uptake of radiopharmaceutical resembling nuclear medicine spleen scan.

• Corresponding Author : Sang-Hyeong Kil
• Department of Nuclear Medicine, Pusan National University Yangsan Hospital 20, Geumo-ro, Mulgeum-eup, Yangsan-si, Gyeongsangnam-do, 50612, Rep. of Korea
Tel: +82-55-360-1909, E-mail: rlf1007@naver.com

Bone scan images show increased diffuse splenic absorption of Tc-99m DPD (Fig. 2-a.). Therefore, the contrast enhanced computed tomography (CT) was performed for the patient. In this study, we showed the contrast enhanced CT which was multiple poorly marginated hypo-enhancing splenic lesions corresponding to the infarction in the arterial and portal venous phase, as show in Fig. 2-b.

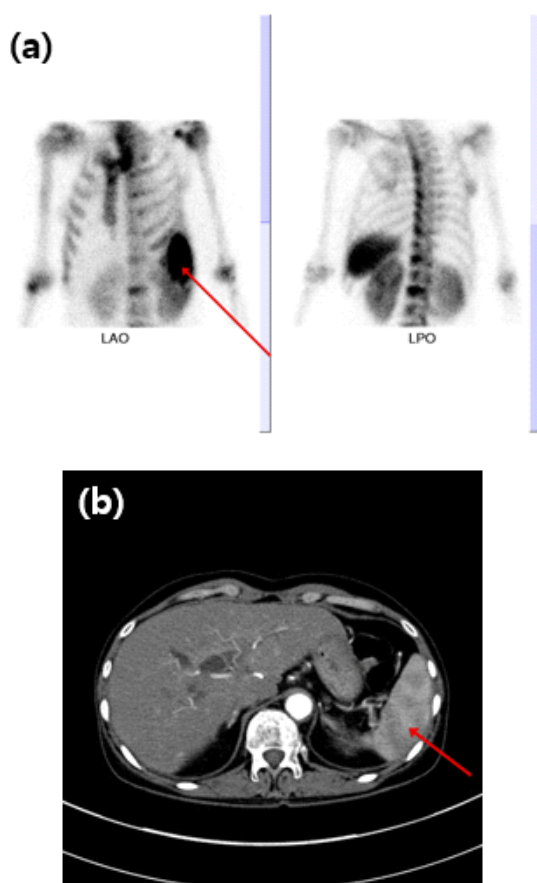


Fig. 2. Diffuse splenic uptake Tc-99m DPD bone scan imaging (a) and the contrast enhanced CT imaging (b) findings were consistent with splenic infarction. Correlative contrast enhanced computed tomography images are located the bone scan images with spleen infarction lesions marked by an arrow.

Discussion

Bone scan images show increased radiopharmaceutical absorption in lesions with increased osteoblastic activity. Table 1 lists reported common clinical

indications for bone scan include.[1].

Table 1. Common clinical indications

- | |
|--|
| <ul style="list-style-type: none"> • Skeletal metastatic disease and staging (e.g., neuroblastoma or cancers of the prostate, breast, lung, or kidney) • Primary bone tumors (benign and malignant) • Occult or stress fractures and shin splints • Osteomyelitis • Avascular necrosis • Arthritides • Complex regional pain syndrome (formerly called reflex sympathetic dystrophy) • Bone infarction • Bone pain that is otherwise unexplained • Accidental and nonaccidental trauma • Further evaluation of skeletal abnormalities incidentally found on other types of imaging studies • Prosthetic hardware complications • Heterotopic ossification • Paget disease • Fibrous dysplasia • Hypertrophic osteoarthropathy • Bone manifestations of sickle cell disease • Temporomandibular joint disorders |
|--|

An unexpected radiopharmaceutical uptake in spleen is occasionally found in the performance of bone scan. The mechanism for spleen uptake of bone-seeking radiopharmaceuticals has been associated with the following finding [3-12]: residual radioactivity from previous colloid scan, misadministration of radiocolloid, excessive aluminum ion from generator, excessive serum aluminum, injection of radioiodinated contrast medium following bone agent injection, unknown metastatic calcification, hepatic necrosis, conditions of iron therapy, and compartmental sequestration. In this case, we expected to explain our findings as spleen uptake of Tc-99m DPD caused by multiple poorly marginated hypo-enhancing splenic lesions corresponding to the infarction and improves the diagnostic value.

REFERENCES

1. Bartel TB, Kuruva M, Gnanasegaran G, Beheshti M, Cohen E J, Weissman A F, et al. SNMMI procedure standard for bone scintigraphy 4.0. *J Med Radiat Sci.* 2018;46(4):398-404.
2. Sanders TG, Parsons III TW. Radiographic imaging of musculoskeletal neoplasia. *Cancer Control* 8.3. 2001;8(3):221-31.
3. Kalimuthu LM, Nazar AH, Pradhan PK. Idiopathic hepatic and splenic uptake of ^{99m}Tc-methylene diphosphonate. *Indian J Nucl Med.* 2020;35(3):238-40.
4. Zuckier LS, Leonard MF. Nonosseous, nonurologic uptake on bone scintigraphy: atlas and analysis. *Semin Nucl Med.* 2010;40(4):242-56.
5. Pierre DM, Annegret L, Julien M, Luc-Matthieu F, Izzie Jacques N. Spleen Uptake on Bone Scan After Frequent Platelet and RBC Transfusions. *Clin Nucl Med.* 2016;41(10):802-3.
6. Shukla LW, Lin DS, Kutka N. Splenic uptake in bone imaging. *Semin Nucl Med.* 1988;18(1):71-3.
7. Koizumi M, Suzuki T, Takahashi S, Ogata E. Transient splenic accumulation of Tc-99m HMDP caused by megaloblastic anemia. *Clin Nucl Med.* 2000;25(12):1024-7.
8. Verma S, Kumar N, Kheruka SC, Gambhir S. Extraosseous ^{99m}Tc-methylene diphosphonate uptake on bone scan: Unusual scenario. *Indian J Nucl Med.* 2016;31(4):280-2.
9. Joanie M. Idiopathic hepatic uptake of ^{99m}Tc methylene diphosphonate: A case report. *J Nucl Med Technol.* 2001;29(1):32-6.
10. Hung JC, Ponto JA, Hammes RJ. Radiopharmaceutical-related pitfalls and artifacts. *Semin Nucl Med.* 1996;26(4):208-55.
11. Zhang W, Chen B, Deng H, Yang T, Ou X. Hepatic and splenic uptake on bone scintigraphy in patients with intravenous administration of ^{99m}Tc methylene diphosphonate prior to gadolinium-containing contrast. *Clin Nucl Med.* 2013;38(3):219-20.
12. Shih WJ, Coupal J. Diffuse and intense Tc-99m HMDP localization in the liver due to hypoxia secondary to respiratory failure. *Clin Nucl Med.* 1994;19(2):116-20.