Case Report

Notable Visualization of the Gallbladder on a 99mTc-MDP SPECT/CT Bone Scintigraphy in a Case of Brucellosis

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Abstract

Comprehension of the typical distribution pattern of 99mTc-methylenediphosphonate (MDP) is crucial for precise interpretation of bone scintigraphy. The presence of nonskeletal activity is predominantly confined to the kidneys and bladder, attributed to the standard renal excretion of 99mTc-MDP. We discuss a 70-year-old woman with a known case of brucellosis using rifampin, doxycycline, trimethoprim/sulfamethoxazole (co-trimoxazole), and ciprofloxacin for the past 8 months. Anterior and posterior aspects of the whole-body bone scan showed diffuse increased uptake in the bodies of L2 and L3 vertebrae and related intervertebral disks. However, unexpected uptake is noted in the right upper quadrant in the region of the gallbladder. Radiochemical impurities did not show during radiopharmaceutical (MDP) quality control, and the other patients showed normal distribution. This gallbladder uptake may be attributed to the altered distribution of the radiotracer and/or gallbladder injury caused by the administration of antibiotic therapy.

Keywords: *Antibiotic distribution, antibiotic therapy, artifacts, brucellosis, gallbladder, nonosseous uptake*

Introduction

Understanding the typical distribution pattern of 99mTc-MDP is essential for accurately interpreting bone scintigraphy results. Non-skeletal activity is mainly seen in the kidneys and bladder due to the usual excretion of 99mTc-MDP through the kidneys. Some studies have noted non-bone uptake in bone scans, with suggested mechanisms including hormonal, neoplastic, inflammatory, ischemic, traumatic, excretory, and artificial factors.[1] Gallbladder uptake in bone scans is rare unless there are issues like radiotracer impurity, generator problems, or underlying pathologies. Instances of gallbladder visualization have been documented in cases involving chemotherapy and cholecystic conditions.[1]

Case Report

A 70-year-old woman with a known case of brucellosis using rifampin, doxycycline, trimethoprim/sulfamethoxazole (co-trimoxazole), and ciprofloxacin for the past 8 months. Whole-body skeletal scintigraphy was performed following the intravenous administration of 20 mCi of 99mTc-methylenediphosphonate (MDP) to visualize any bone abnormalities. The whole-body bone scan [Figure 1] revealed heightened uptake in the L2 and L3 vertebrae and associated intervertebral disk, as well as unexpected uptake in the right upper quadrant in the region of the gallbladder. Radiochemical impurities did not show during radiopharmaceutical (MDP) quality control, and the other patients showed normal distribution. Several mechanisms were explained for

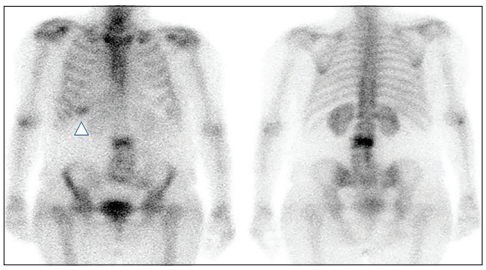

Figure 1: Anterior and posterior aspects of the whole-body bone scan showed diffuse increased uptake in the bodies of L2 and L3 vertebrae and related intervertebral disks. However, unexpected uptake is noted in the right upper quadrant in the region of the gallbladder

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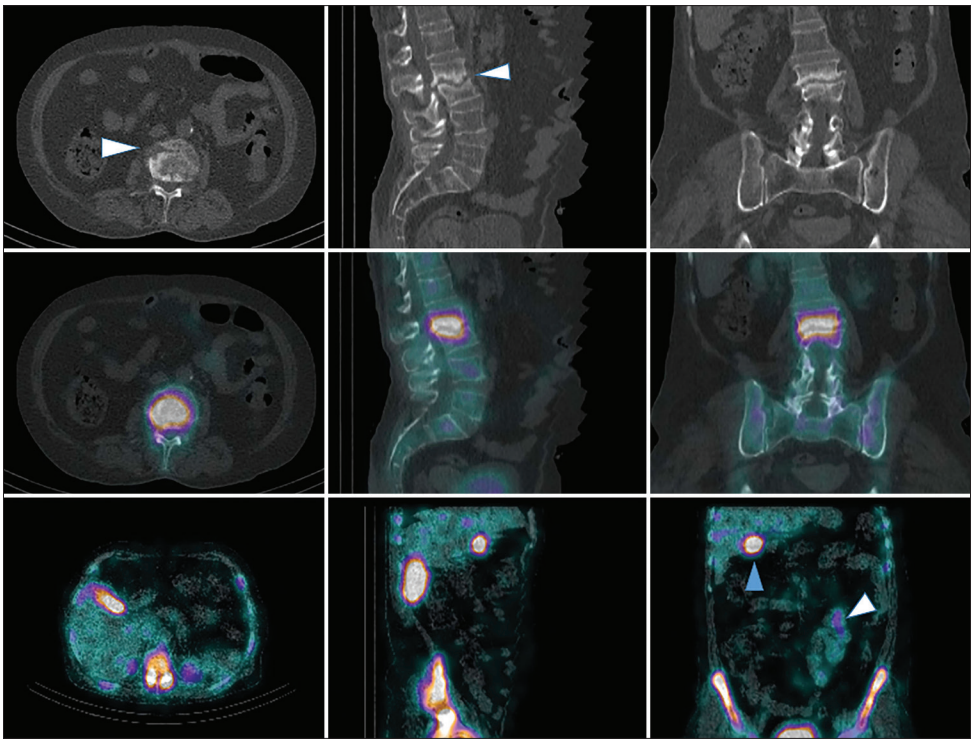

Figure 2: Single-photon emission computed tomography/computed tomography (SPECT/CT) images established spinal brucellosis with diffuse tracer uptake in bodies of L2 and L3 vertebrae and collapsed intervertebral disk. A CT scan shows endplate defects, an irregular anterior surface of the vertebral body, and a vacuum phenomenon (upper row, white arrows). Fused SPECT/CT images showed intense and homogeneous uptake within the gallbladder (lower row, blue arrow) and serendipitous small intestine uptake due to gallbladder depletion (lower row, white arrow)

nonosseous uptake in bone scans.[1-5] Single-photon emission computed tomography/computed tomography (SPECT/CT) imaging [Figure 2] was performed to precisely identify and characterize planar irregularities. The images confirmed the presence of spinal brucellosis, as evidenced by widespread tracer uptake in the L2 and L3 vertebral bodies and a collapsed intervertebral disk. A CT scan shows endplate defects, an irregular anterior surface of the vertebral body, and a vacuum phenomenon (upper row, white arrows). No additional areas of abnormal uptake of 99mTc-MDP were observed in the remaining skeletal regions. Subsequently, the fused SPECT/CT images revealed a concentrated and uniform uptake in the gallbladder (indicated by the blue arrow in the lower row) and incidental uptake in the small intestine due to gallbladder depletion (indicated by the white arrow in the lower row).

This case report has received approval from the Ethics Committee (IR.SUMS.MED.REC.1402.398) and the Institutional Review Board of Shiraz University of Medical Sciences (No.29629). In addition, informed consent forms were duly signed by the patient participating in the study.

Discussion

In the field of nuclear medicine, a physiologic uptake in an ectopic organ can be misreported as a dangerous metastasis,[6] so possible false-positive results always should be kept in mind. In this case, radiochemical impurities did not show during radiopharmaceutical (MDP) quality control, and the other patients showed normal distribution. Several metabolic pathways for the accumulation of 99mTc-MDP in the gallbladder were explained, such as chemotherapy and chronic lithiasis.[7,8] In this regard, Bozzetto *et al*. report a case of gallbladder visualization due to chemotherapy.[8] Liver injury from rifampin is well documented but is rare. Doxycycline has been related to uncommon cases of hepatic injury. Ciprofloxacin has been related to uncommon but rarely serious acute liver injury. Typical idiosyncratic liver injury can be caused by co-trimoxazole.[9] The patient did not exhibit any signs of toxicity from antibiotic treatment. Imaging of the abdomen using CT did not reveal any evidence of liver metastasis or inflammation, nor did it show any calcification of the gallbladder wall. The excretion of 99mTc-MDP in the gallbladder is an uncommon occurrence and its underlying mechanism is not fully understood.[10] Liver metastasis has been recommended as a mechanism for increased liver interstitial pressure by some studies, which is impossible in this case because of no liver metastasis.[11]

Conclusion

This gallbladder uptake may be attributed to the altered distribution of the radiotracer and/or gallbladder injury caused by the administration of antibiotic therapy.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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