Diffuse Lung Uptake on ^{99m}Tc-MDP Bone Scintigraphy-Case Report

Muhammad Iqbal, Muhammad Babar Imran, Muhammad Naeem, Owais Bin Qadeer, Rafshan Sadiq, Muhammad Saeed Akhtar

Abstract

A ^{99m}Tc-methylene diphosphate (MDP) bone scan of a 35 years old female patient performed for possible skeletal metastasis from carcinoma breast. Diffuse ^{99m}Tc-MDP uptake was seen in both the lung fields on ^{99m}Tc-MDP bone scintigraphy. Biochemical and radiological evaluation excluded all the known causes of the diffuse ^{99m}Tc-MDP lung uptake. Raised serum ferritin levels of 1226ng/ml (normal range for adult female = 13 – 15 ng/ml) was the only abnormal biochemical finding and attributed as the possible cause of lung uptake.

Key Words: ^{99m}Tc-MDP bone scintigraphy, Diffuse ^{99m}Tc-MDP lung uptake, Raised ferritin

INTRODUCTION

Extra-osseous soft tissue uptake of ^{99m}Tc-MPD bone scintigraphy is occasionally seen on bone scan in various benign and malignant conditions. Most widely accepted mechanism for this is adsorption of ^{99m}Tc-MDP to hydroxyapatite crystals of abnormal soft tissue calcifications. Though in areas of no abnormal extra-osseous calcifications, this mechanism cannot be postulated. ^{99m}Tc-MDP Lung uptake on bone scintigraphy reported in literature includes Wegner' vasculitis, metastatic calcifications, sarcoidosis, pleural effusion, alveolar microlithiasis, pulmonary calcifications in hemodialysis patients, vitamin D intoxication, primary amylodosis and interstitial lung disease[1, 2, 3]. We are reporting a case with diffuse ^{99m}Tc-MDP uptake in both lungs which could not be attributed to any of the above known diseases.

Corresponding Author:
Dr. Muhammad Iqbal
Nuclear Medicine Physician
PINUM Cancer Hospital, Faisalabad
Ph:-0092-41-9210171-77
Cell:-0092-0345337063
E-Mail: driqbal_pieas@yahoo.com

CASE REPORT

A 35 year old female patient referred to nuclear medicine department of our hospital with ulcerating wound of the left breast. She had a history of lump in the left breast for the last 02 years, which increased in size with ulceration during past 07 months. She was bed ridden for the last 20 days. On general physical examination her blood pressure was 160/110 mmHg, pulse of 86/min, no fever and chest was clear on auscultation. She was pregnant for 17 weeks of gestation. She under went trucut biopsy for breast lump. Her histopathology showed in situ lobular carcinoma with local invasion. Her chemotherapy regime in neo-adjuvant settings was planned. She underwent induced abortion. During routine work up her blood tests showed low hemoglobin of 9.6 gm/ml (normal range = 12-16gm/ml), TLC of 8200, normal random blood sugar of 111 mg/dl, raised urea of 125 mg/dl (normal range = 10-50mg/dl), raised creatinine of 1.5 mg/dl (normal range = 0.6-1.3mg/dl), non-reactive HbsAg/ Anti-HCV. Her serum ferritin was markedly raised

1226 ng/ml (normal for adult female = 13-15ng/ml). On retrospective questioning she had 03 pints of blood transfusion during past 10 days. She was advised ^{99m}Tc-MDP bone scan, which was performed with Infinia dual head gamma camera equipped with low energy high resolution collimators at 140 keV peak with 20% energy window. Apart form skeletal metastatic lesions, bone scan showed an academically interesting finding of diffuse ^{99m}Tc-MDP uptake in both the lungs. Patient was subjected to further clinical investigation which showed upper limits normal serum calcium 10.0 mg/dl (normal range = 8.5-10.5mg/dl), normal inorganic phosphates of 3.34 mg/dl, raised alkaline phosphatase of 1441 U/L (normal range = 80-360 U/L), normal serum Iron of 69 microgram/dl (normal range = 60-160 microgram/dl), normal liver function tests and serum electrolytes. Her parathyroid hormone (PTH) was <3 pg/ml (normal range = 11-67 pg/ml). Her chest X-ray showed metastatic lytic lesions in the right 5th, 6th & 8th ribs posteriorly and reticular markings in the basal lung fields.

Figure-1

^{99m}Tc-MDP Bone Scan. Anterior (A) and posterior (B) whole body views showing bilateral diffuse lung uptake

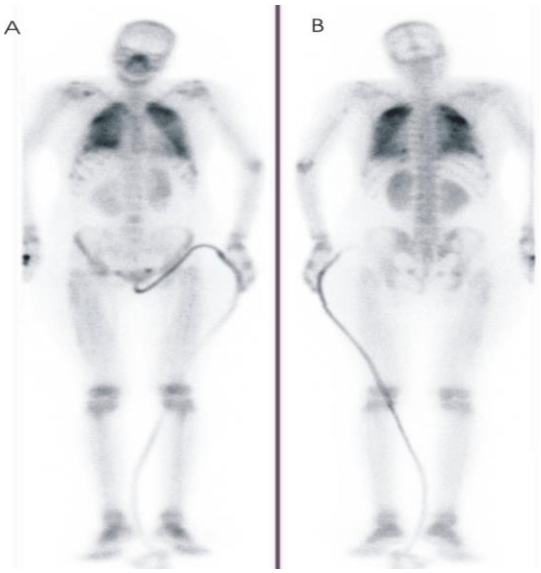
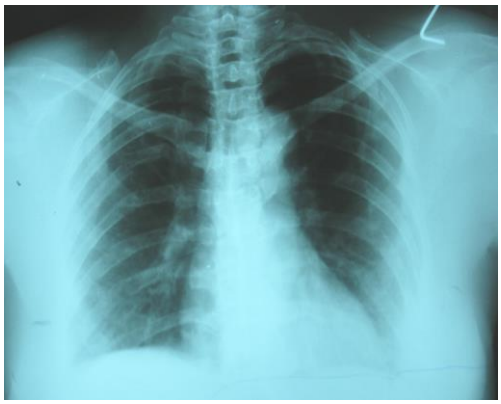


Figure-2

Chest X-Ray (PA View) showing lytic lesions in right 5th, 6th & 8th ribs posteriorly (probably metastatic) and reticular markings in the basal lung fields.



DISCUSSION

Diffuse lung uptake on ^{99m}Tc-MDP bone scintigraphy can be due to a number of causes previously reported in the literature. Common causes include metastatic lung calcifications, diffuse lung metastasis, fibro-thorax, pleural effusions, interstitial lung diseases and alveolar-microlithiasis. Others rather uncommon causes include sarcoidosis, wagner's vasculitis, idiopathic pulmonary ossifications and radiopharmaceutical preparation [1, 2, 3, 4]. All these known causes were excluded one by one on the basis of bio-chemical and radiological investigations. Metastatic lung calcifications, diffuse lung metastasis, fibro-thorax, pleural effusions, alveolar-microlithiasis and sarcoidosis were excluded on the basis of chest X-ray, normal PTH, normal calcium, phosphorus & Creatinine. Quality control of ^{99m}Tc-MDP kit was performed with thin layer chromatography for the levels of free (^{99m}TcO4) pertechnetate. Other bone scans done with the same preparation were also evaluated, making radiopharmaceutical cause for lung uptake unlikely. The only abnormal finding was markedly raised serum ferritin levels of 1226 ng/ml (normal for adult female = 13 – 15 ng/ml) and reticular markings in the basal lung fields on

chest X-ray. High serum ferritin levels (with or with out iron over load) may be due to a number of causes including chronic hepatitis, chronic inflammatory conditions (rheumatoid arthritis, inflammatory bowl diseases), malignant hematological diseases, excessive iron intake, chronic transfusion therapy, hyperferritinemia, cataract syndrome, alcohol excess and thyroid disorders i.e. thyrotoxicosis [5]. It has been suggested in literature that high ferritin levels predicts the development and course of acute/ sub-acute interstitial lungs diseases [6, 7]. As ferritin is stored in the mitochondria and there is high mitochondrial activity in inflammatory conditions e.g. interstitial lung diseases [8]. High mitochondrial ferritin levels in the lungs may be responsible for ^{99m}Tc-MDP deposition in the lungs. Although definitive relation of diffuse ^{99m}Tc-MDP lung uptake with the raised serum ferritin levels remained a mystery. We recommend that in future in cases of diffuse ^{99m}Tc-MDP lung uptake on bone scintigraphy, serum ferritin levels may be taken into account.

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AUTHORS

- **Dr. Muhammad Iqbal**
  Nuclear Medicine Physician
  PINUM Cancer Hospital, Faisalabad
- **Dr. Muhammad Babar Imran**
  DCMO, Nuclear Medicane Physician
  PINUM Cancer Hospital, Faisalabad
- **Dr. Muhammad Naeem**
  General Surgeon
  PINUM Cancer Hospital, Faisalabad
- **Dr. Owais Bin Qadeer**
  Senior Medical Officer,
  PINUM Cancer Hospital, Faisalabad
- **Dr. Rafshan Sadiq**
  Principal Medical Officer, PINUM, Faisalabad
  PINUM Cancer Hospital, Faisalabad
- **Dr. Muhammad Saeed Akhtar**
  Director,
  PINUM Cancer Hospital, Faisalabad

Submitted for Publication: 26-10-2013

Accepted for Publication: 17-12-2013
After minor revisions