

Case Report

Toxic multinodular goitre identified at vascular and late phase of Tc99m MDP bone scan

Sadıç M*, Akbulut A, Aydinbelge FN, Koca G and Korkmaz M

Department of Nuclear Medicine, University of Health Sciences, Ankara Training and Research Hospital, Ankara, Turkey

Abstract

An 82-year old female patient was referred to our department for Bone Scan (BS) for differential diagnosis of soft tissue infection at amputation site. Vascular phase and whole body BS revealed focally increased thyroid uptake in the left neck. Multinodular goiter with internal micro and macrocalcifications were apparent in neck ultrasonography. ^{99m}Tc pertechnetate scintigraphy confirmed focally increased uptake with hypoactive areas probably due to cystic/necrotic field in toxic nodules. The patient's thyroid function tests were as follows; TSH <0.003 μ IU/mL, sT3 3,23 μ g/mL, sT4 0,88 ng/mL. The history of patient and thyroid function tests supported diagnosis of toxic multinodular goiter.

Introduction

^{99m}Tc Methylene Diphosphonate (MDP) uptake in extraosseous areas is unexpected but it is clinically important. MDP acts as ligand adsorbing onto tissue calcium, localizing the ^{99m}Tc in the mineral phase with no significant organic substrate interaction. The general mechanism of ^{99m}Tc MDP uptake is binding to hydroxyapatite crystals and calcium salts causing the skeletal accumulation and uptake in the other of calcium deposition in the body. In this case, we presented an 82-year old female patient who was referred to our department for Bone Scan (BS) and had focally increased thyroid uptake in the left neck at vascular phase and whole body BS.

Case presentation

An 82-year old female patient was referred to BS for diagnosis of soft tissue infection and osteomyelitis at amputation site. After regional dynamic and blood pool images at amputation site, vascular phase of the whole-body scan has shown incidental hyperemia and whole body Bone Scan (BS) presented thyroid uptake at the left lower neck. Vascular phase and whole body BS revealed focally increased thyroid uptake in the left neck.

Thyroid ultrasonography showing the nodule in the left lobe which fills left lobe nearly complete (34×22 mm in size) with cystic, necrotic field with internal multiple micro and macrocalcification within highly increased vascularity of the nodules. Multinodular goiter with internal micro and macrocalcifications were apparent in neck ultrasonography. The findings were consistent with toxic multinodular goiter.

^{99m}Tc pertechnetate scintigraphy confirmed focally increased uptake with hypoactive areas probably due to cystic/necrotic field in toxic nodules. The patient's thyroid function tests were as follows; TSH <0.003 μ IU/mL, sT3 3,23 μ g/mL, sT4 0,88 ng/mL. The history of patient and thyroid function tests supported diagnosis of toxic multinodular goiter.

Discussion

In our case, it was the vascular phase of the whole-body scan showing focally intense hyperemia in the toxic nodules even though

MDP uptake in thyroid in bone phase was also apparent. In our department, we obtain whole body scan of BS patients in vascular phase to evaluate the alterations in bone modeling profoundly and for any incidentally information about the patient that might be important without any additional radiation dose. MDP uptake in extraosseous areas is unexpected but it is clinically important. Recent research indicated that MDP acts as ligand adsorbing onto tissue calcium, localizing the ^{99m}Tc in the mineral phase with no significant organic substrate interaction [1,2]. The general mechanism of ^{99m}Tc MDP uptake is binding to hydroxyapatite crystals and calcium salts causing the skeletal accumulation and uptake in the other of calcium deposition in the body [3,4]. In our case, increased ^{99m}Tc MDP uptake in the thyroid nodules was possibly caused by calcifications of the nodules (Figure 1). ^{99m}Tc pertechnetate scintigraphy confirmed focally increased uptake with hypoactive areas probably due to cystic/necrotic field in toxic nodules (Figure 2). Regarding Kurooka *et al.*, classification of thyroid cartilage uptake in BS, our case has slight inhomogeneous accumulation in thyroid cartilage, which was the most common pattern in BS [5] (Figure 3).

Conclusion

Vascular phase whole body screening should be complementary to regular BS which may be very useful and give additional information about diagnosis of other diseases and allow early detection [6]. Clinician especially nuclear medicine physicians should be aware that incidental thyroid nodules may demonstrate ^{99m}Tc MDP accumulation probably due to calcification in nodular area on BS [7].

Correspondence to: Murat Sadıç, M.D, Department of Nuclear Medicine, University of Health Sciences, Ankara Training and Research Hospital, Turkey, Tel: +903125953608; Fax: +90 312 595 38 56; E-mail: mdmuratsadic@gmail.com

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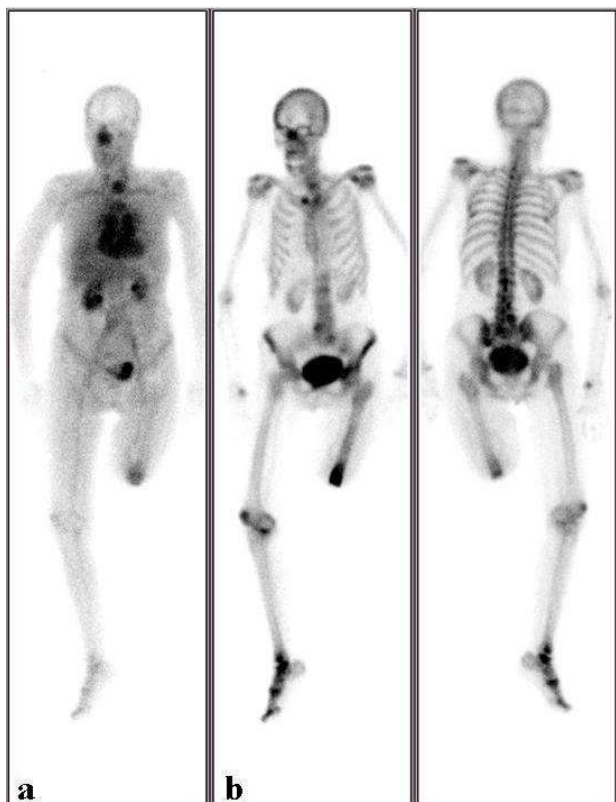


Figure 1. A 82-year old female patient was referred to bone scan (BS) for diagnosis of soft tissue infection and osteomyelitis at amputation site. After regional dynamic and blood pool images at amputation site, vascular phase of the whole-body scan (a) has shown incidental hyperemia and whole body BS (b) presented thyroid uptake at the left lower neck.

References

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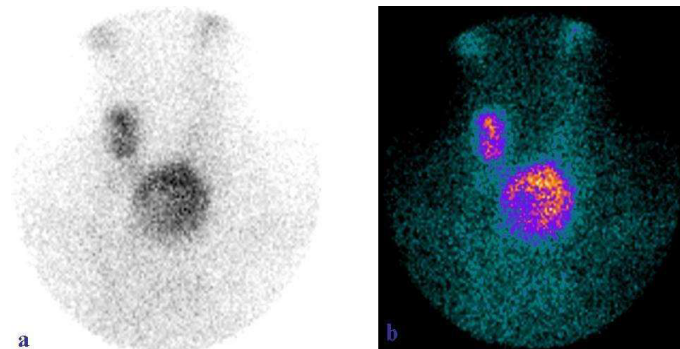


Figure 2. Two nodules have shown focally increased radioactivity uptake on ^{99m}Tc pertechnetate thyroid scintigraphy. The largest one was at the lower pole of left thyroid lobe with hypoactive areas within probably due to cystic/necrotic field, and the other one was in the upper pole of right lobe.

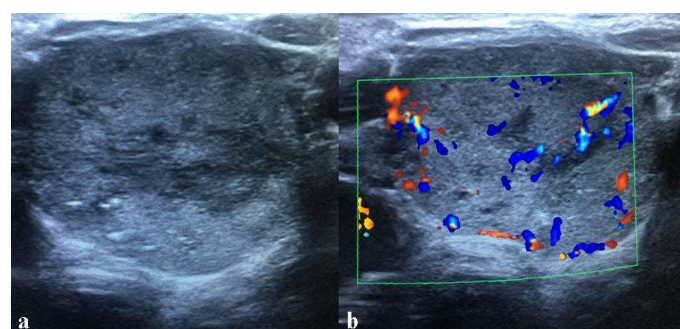


Figure 3. Thyroid ultrasonography showing the nodule in the left lobe (a) which fills left lobe nearly complete (34×22 mm in size) with cystic, necrotic field with internal multiple micro and macrocalcification within highly increased vascularity of the nodules (b). The findings were consistent with toxic multinodular goiter.

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