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The role of radiopharmaceutical Tc99m MIBI in the evaluation of parathyroid adenoma and osteoporosis in young patients - a case report supporting its integration into standard clinical practice

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INTRODUCTION:

Parathyroid scintigraphy imaging is a valuable method for identifying parathyroid adenomas and ectopic parathyroid glands. It can also detect parathyroid glands in primary hyperparathyroidism (pHPT).

Early identification of adenomas using Tc99m MIBI radiopharmaceutical and subsequent surgical removal can prevent bone metabolic diseases such as osteoporosis. Tc99m MIBI, known for its high sensitivity, accumulates in mitochondria, enabling the detection of hyper functioning parathyroid glands, whether located at typical sites or ectopically.

Osteoporosis, characterized by decreased bone mineral density and mass or changes in bone structure and strength, increases the risk of fractures.

Although rare in the young, early detection and diagnosis of parathyroid adenomas with Tc99m MIBI can help prevent fractures and improve osteoporosis treatment.

PURPOSE:

This study aims to evaluate the sensitivity and specificity of Tc99m-MIBI as a radiopharmaceutical and parathyroid scintigraphy as a diagnostic tool for identifying parathyroid adenomas.

The patient presented in this paper as a case report can serve as confirmation of the effectiveness of the implementation of this method and supports its integration into our standard clinical practice.

METHODS:

Data were obtained from a 32-year-old male patient reported to our department with generalized skeletal pain using a SPECT gamma camera and after injection of 99mTc-MIBI radiopharmaceutical at a dose of 555 MBq

The patient was first referred to our department for a bone scan. A full body scan showed multiple foci suggestive of metabolic bone disease. A parathyroid scintigraphy was performed which revealed suspected adenoma which with biopsy-confirmed parathyroid adenoma.

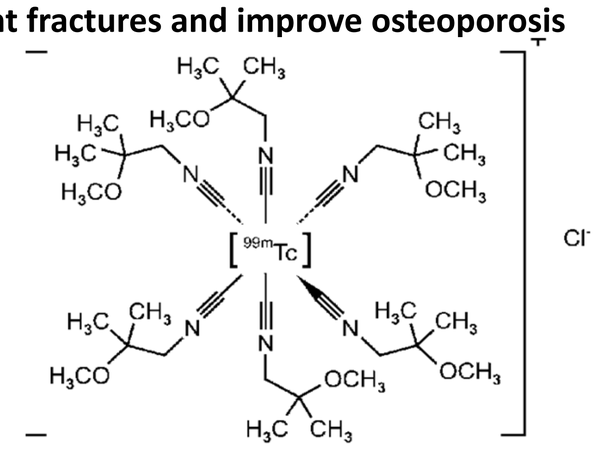

Fig. 1. Structure of ^{99m}Tc-SESTAMIBI ((OC611) hexakis [1 (isocyanokC)2methoxy2methylpropane] [^{99m}Tc] technetium (I) chloride)

RESULTS:

The parathyroid scintigraphy revealed the intensive focal accumulation of the Tc99m MIBI in the left distal lobe of thyroid grand. The patient undergo surgery-lobectomiam gl. thyroidea lat sin et parathyroidectomiam lat. sin. HP findings were: adenoma glandula parathyroides lat. sin.

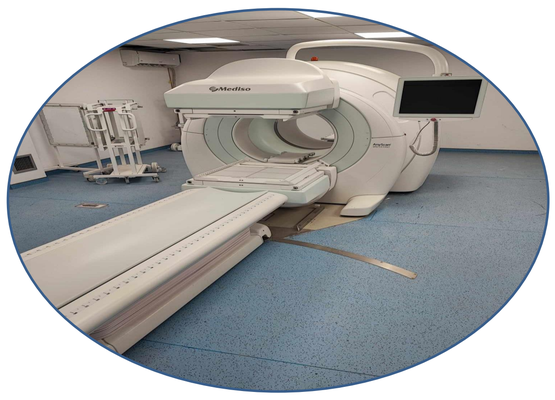

Fig. 2. SPECT/CT/PET in Nuclear Department-Prishtina

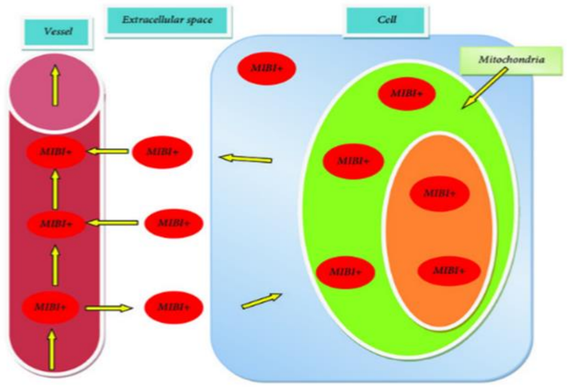

Fig. 3. ^{99m}Tc-MIBI transport kinetic in a cell

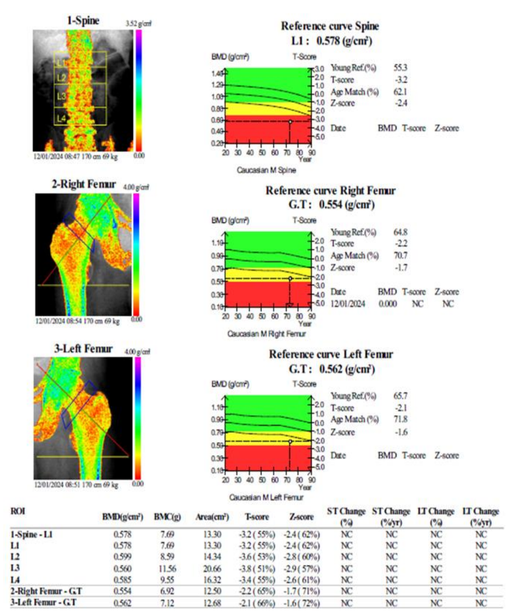

Fig. 4. DEXA scan show severe osteoporosis

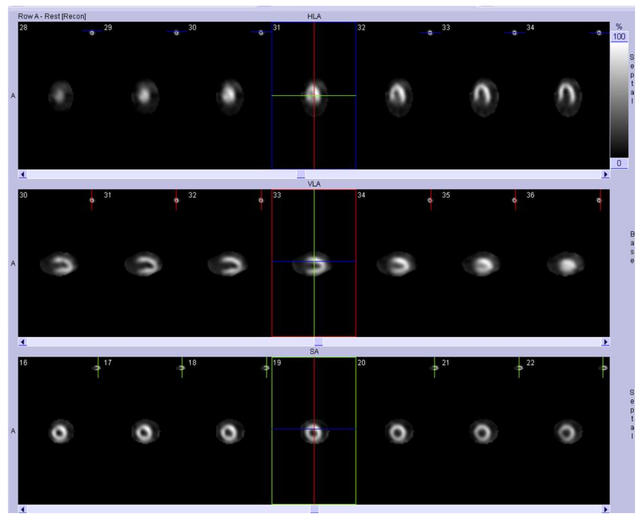

Fig. 5. The HEART SPECT was done after one hour of recieveing MIBI radiopharmaceutical at the same patient during parathyroid scan procedures . The scan show normal perfusion of the heart.

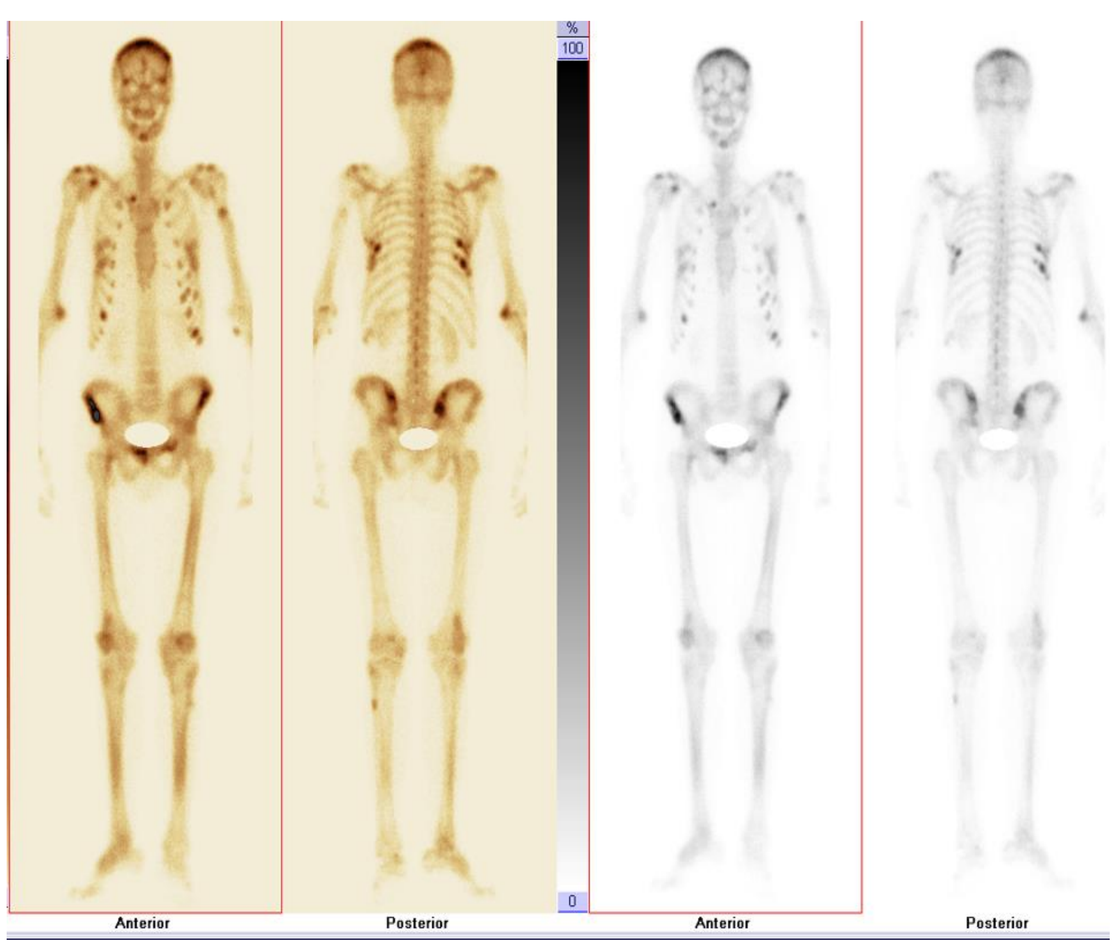

Fig. 6 . A male patient 32 years old with generalized pain in the skeleton, reported in our department for bone scan procedure. The whole body scan shows multiple foci that suggested for metabolic bone disease. The parathyroid scintigraphy was done later which revealed parathyroid adenoma confirmed by biopsy.

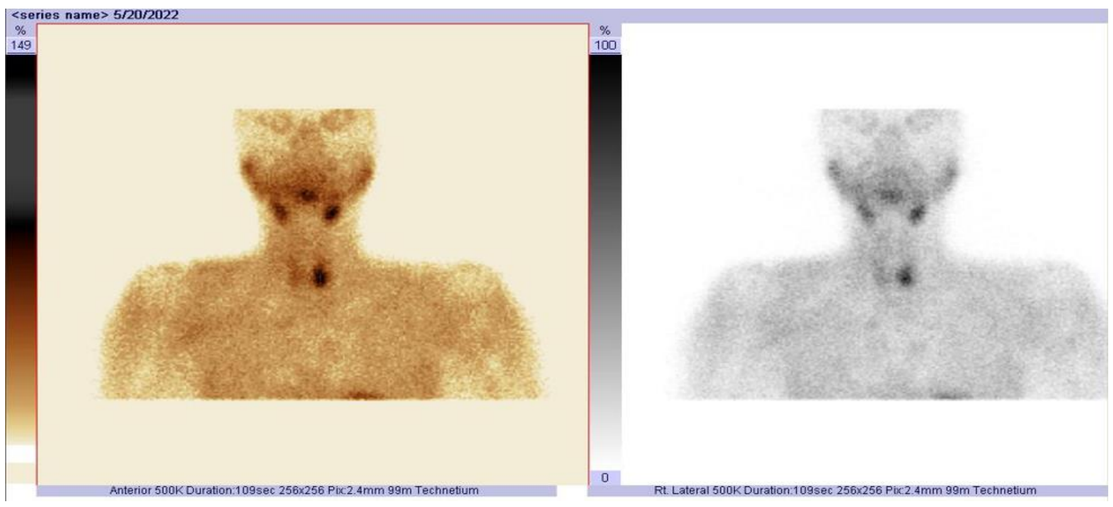

Fig. 7. Same patient after parathyroid scintigraphy procedure show accumulation at the left side (courtesy from Nuclear medicine –Prishtina

CONCLUSION:

The SPECT camera-based evaluation of patients with recurrent or persistent hyperparathyroidism can provide valuable insights to prevent osteoporosis and other complications associated with untreated parathyroid adenoma. The high sensitivity and specificity of 99mTc-MIBI scintigraphy, combined with routine preoperative SPECT localization, are increasingly becoming standard practices.

Acknowledgment: The participant in this case report has been informed and he signed the written consent willingly.