

Multiple brown tumors in a patient with parathyroid adenoma depicting affinity for both ^{99m}Tc -pertechnetate and ^{99m}Tc -MIBI: Evaluation with hybrid SPECT/CT

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ABSTRACT

Parathyroid adenoma involving a single parathyroid gland is the underlying cause of 80-85% of primary hyperparathyroidism (PHPT). Skeletal system is significantly affected by PHPT. Brown tumors are known to have affinity for ^{99m}Tc -MIBI. We report a rare case of PHPT presenting with diffuse bony pain, high calcium level and significantly elevated alkaline phosphatase level. ^{99m}Tc -pertechnetate/ ^{99m}Tc -MIBI subtraction, performed as a part of routine protocol, showed several brown tumors showing affinity for both ^{99m}Tc -pertechnetate and ^{99m}Tc -MIBI. They were further characterized using hybrid SPECT/CT. To the best of our knowledge, ^{99m}Tc -pertechnetate affinity in brown tumors has not been previously described.

Key words: ^{99m}Tc -MIBI, Brown tumor, SPECT/CT, ^{99m}Tc -pertechnetate, Parathyroid adenoma, Primary hyperparathyroidism

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CASE REPORT

A 40 year old male patient presented with diffuse bony pain. Clinically, he had bony pain and tenderness over multiple bones. Biochemically, his alkaline phosphatase was elevated to 4 times of normal. His calcium was high and his phosphorus levels were low. With a clinical suspicion of hyperparathyroidism, parathyroid scintigraphy was performed. As part of routine protocol, ^{99m}Tc-pertechnetate/^{99m}Tc-MIBI subtraction scintigraphy and hybrid SPECT/CT were performed.

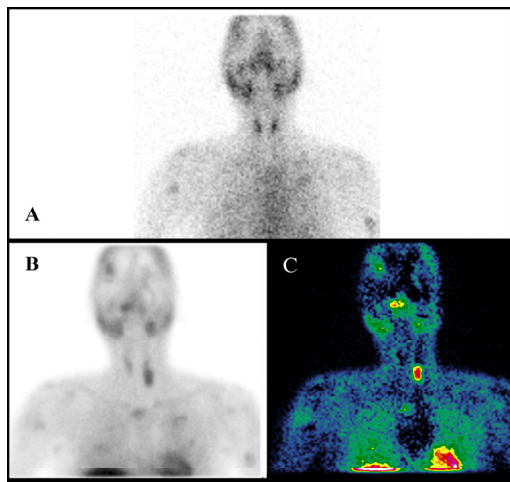


Fig 1. ^{99m}Tc-pertechnetate (A), ^{99m}Tc-MIBI (B) and subtraction (C) static planar images of parathyroid.

Fig 1 shows static planar image was acquired in anterior view 20 minutes after intravenous injection of 74 MBq (2 mCi) of ^{99m}Tc-pertechnetate (A). Both lobes of thyroid were visualized. In addition, several foci of ^{99m}Tc-pertechnetate uptake were noted in the skull, mandible, distal end of right clavicle, bilateral humeri, sternum and multiple ribs. In the same position, 740 MBq (20 mCi) of ^{99m}Tc-MIBI was

injected intravenously. Static image of the neck was acquired at 10 minutes (B). Subtraction image (C). Intense tracer uptake was noted in the inferior part of the left lobe of thyroid gland with minimal washout at delayed image indicative of hypermetabolic lesion, likely to be parathyroid adenoma. Several other foci of tracer uptake were also noted involving skull, mandible, distal end of right clavicle, bilateral humeri, sternum and multiple ribs.

Hybrid SPECT/CT (**Fig 2**) performed showed ^{99m}Tc-MIBI uptake in multiple bones involving the right orbital margin (A), lateral end of the right clavicle (B), right humeral shaft (C), multiple ribs (D) and sternum. Corresponding CT showed expansile lytic lesions suggestive of brown tumors which were further confirmed on biopsy. Patient underwent neck exploration and the left inferior parathyroid adenoma was resected.

DISCUSSION

Visualisation of brown tumors on ^{99m}Tc-MIBI scintigraphy has been previously described [1-4]. Brown tumors have also been confused as malignant or metastatic lesions [5]. Brown tumors usually present as expansile lytic lesion with minimal reparative changes. Brown tumor represents a reparative cellular process rather than a neoplastic process. Limited studies have also emphasized on the role of SPECT/CT [6]. Till date no published article has reported ^{99m}Tc-pertechnetate uptake in brown tumors. Brown tumors are known to be significantly vascular [7]. Technetium uptake in brown tumors might represent increased blood pooling at the sites of brown tumors and hence be entirely non-specific. It is also not clear if all the brown tumors show ^{99m}Tc-pertechnetate uptake. Further evaluation is required to understand the uptake of ^{99m}Tc-pertechnetate in brown tumors. ^{99m}Tc-pertechnetate uptake has also been previously reported in thyroid cancer metastases [8].

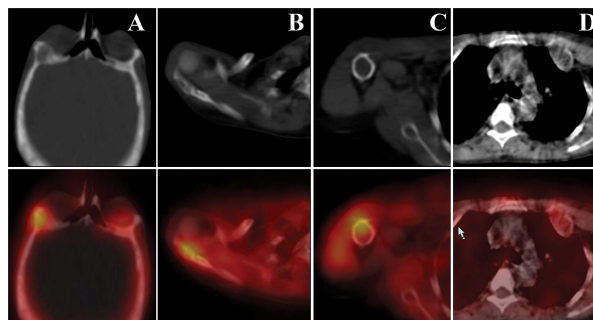


Fig 2. Hybrid SPECT/CT images: right orbital margin (A), lateral end of the right clavicle (B), right humeral shaft (C), multiple ribs (D).

REFERENCES

1. Gayed IW, Elshazly SM, Vang RS, Barron BJ, Lamki LM. Technetium-99m sestamibi uptake in a maxillary brown tumor. *Clin Nucl Med.* 2001 Jan;26(1):65-7.
2. Ginsberg I, Federman A, Kim H, Freeman LM. Sestamibi uptake in brown tumor simulating a lung mass. *Clin Nucl Med.* 1997 Nov;22(11):798-9.
3. Dinauer PA, Balingit AG, Rivera JE. Tc-99m sestamibi imaging of brown tumors of primary hyperparathyroidism. *Clin Nucl Med.* 1996 Mar;21(3):192-6.
4. Miyakoshi M, Kamoi K, Takano T, Nishihara M, Kawashima T, Sudo N, Togashi K, Emura I, Williams D. Multiple brown tumors in primary hyperparathyroidism caused by an adenoma mimicking metastatic bone disease with false positive results on computed tomography and Tc-99m sestamibi imaging: MR findings. *Endocr J.* 2007 Apr;54(2):205-10.
5. Kalambokis G, Economou G, Kamina S, Papachristou DJ, Bai M, Tsianos EV. Multiple brown tumors of the ribs simulating malignancy. *J Endocrinol Invest.* 2005 Sep;28(8):738-40.
6. Treglia G, Dambra DP, Bruno I, Mulè A, Giordano A. Costal brown tumor detected by dual-phase parathyroid imaging and SPECT-CT in primary hyperparathyroidism. *Clin Nucl Med.* 2008 Mar;33(3):193-5.
7. Doppman JL, Marx S, Spiegel A, Brown E, Downs R, Brennan MF, Aurbach G. Differential diagnosis of brown tumor vs. cystic osteitis by arteriography and computed tomography. *Radiology.* 1979 May;131(2):339-40.
8. Yamamoto Y, Nishiyama Y, Ono Y, Satoh K, Ohkawa M, Kawasaki Y, Tanabe M. Accumulation of technetium-99m pertechnetate in a patient with metastases of thyroid carcinoma. *Ann Nucl Med.* 1999 Oct;13(5):357-9.