Case report

Monostotic localization of Paget's Disease in thoracic spine mimicking vertebra metastases in a patient with thyroid cancer: A case report

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Abstract: Paget's Disease in the population younger than 50 years is uncommon. We present a 29 year-old male with thyroid cancer and monostotic Paget's Disease of the spine mimicking bone metastases. The patient who was suffering from severe back pain, had increased osteoblastic activity on bone scan consistent with the suspicious lesion defined on MRI and conventional X-ray. Despite the positive radiological studies, he had negative I-131 whole body scan and Tg value, and also normal 18F- FDG PET study. Final histopathological diagnosis revealed Paget's Disease.

Key words: FDG-PET, I-131 whole body, Paget's Disease, Thyroid cancer

Paget's disease of bone is common in the elderly and is associated with increased osteoblastic and osteoclastic activity at affected sites in the skeleton. Paget's disease is a localized disorder that may be monostotic (affecting only one bone), and also may be polyostotic (affecting 2 or more bones). Paget's disease is distinctly rare in patients younger than 25 years and increases in frequency with increasing age [1]. We report a case with monostotic Paget's disease in a patient with thyroid cancer mimicking bone metastasis.

Case Report

A 29 year-old male, initially presented with a metastatic right jugular lymph node, 3 cm in size, in 2003. Although, no definitive thyroid nodule was found on ultrasound, bilateral total thyroidectomy and ipsilateral lymph node dissection was performed. Histopathologic examination revealed multifocal micro papillary thyroid carcinoma (0.2 cm in size in the right lobe, 0.2 cm in size in the left lobe, and 0.1 cm in size in the isthmus). There was only one metastatic lymph node (the one which was clinically presented) out of 20 dissected lymph nodes on histopathologic examination. There was also co-existence of chronic lymphocytic thyroiditis. He was treated with 5550 MBq (150 mCi) Iodine-131 (I-131) according to our institutional therapy protocol [2]. No definitive lymph node or distant metastases were observed on post therapeutic whole-body (WB) iodine scan. The patient readmitted to the hospital with back pain 4 months after the ablation therapy. Plain radiographs of the thoracic spine demonstrated sclerosis and expansion of the Th-10 vertebral body. A subsequent thoracic MRI (Figure 1) revealed most likely metastatic tumor mass and compression fracture potential at the level of Th-10 vertebra. T1W (Fig. 1a) and T2W images (Fig. 1b) of the sagittal thoracic MRI study showed cortical thickening and diffuse signal decreasing in Th-10 vertebra. With the knowledge of MRI findings, the first follow-up WB iodine scan was performed with 185 MBq (5 mCi) I-131 six months after the ablation therapy (Figure 2). The serum Tg was <
0.2 ng/ml and TSH was 45 IU/L at the time of diagnostic WB iodine scanning. To exclude any bone metastases, we performed WB bone scan with 740 MBq (20 mCi) 99mTc-methylene diphosphonate (Figure 3). However, WB bone scan showed markedly focal increased osteoblastic activity at Th-10 vertebra, which was suspicious for bone metastases.

Subsequently, we performed fluorodeoxyglucose (FDG) PET (positron emission tomography) study (ECAT EXACT scanner, Siemens-CTI, Knoxville, TN) after intravenous injection of 555 MBq (15mCi) of [18F] FDG for the detection of probable FDG avid bone metastasis. Coronal (Figure 4a) and sagittal (Figure 4b) [18F] FDG images did not show any abnormal uptake at 10th vertebra, where the lesion was identified on MRI and bone scan. The patient underwent Th-10 surgical biopsy and the pathologic examination of the specimen revealed "Paget's Disease" (Figure 5a and 5b).

**Discussion**

The onset of the Paget's Disease in the population younger than 50 years is uncommon [3]. Therefore, Paget's Disease could be described as
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Figure 3. Whole-body (a) and planar (b) bone scan showed focal increased osteoblastic activity within the Th-10 vertebral body, transverse processes, and posterior elements, which were suspicious for bone metastases, at first glance.

a possible cause of false-positive bone scan, especially in elderly patients who are being assessed for metastatic disease. Paget’s Disease may be monostotic (17%) [4-7], but it is more frequently multifocal, with predilection for the axial skeleton (i.e., spine, pelvis, femur, sacrum, and skull in descending order of frequency). Paget’s Disease has typical “Mickey Mouse” sign on bone scan, which was described by Estrada WN for spinal Paget’s Disease [8]. On retrospective analysis, we recognized this typical MDP uptake pattern, which forms an inverted triangular pattern of three dots.

Although, Paget’s Disease of bone is not associated with abnormal [18F] FDG uptake in the majority of patients [9], low to high grade uptake of [18F] FDG may be seen in some cases [10]. FDG PET study was completely normal in our case. Moreover, routine laboratory evaluation including alkaline phosphates (ALP) activity was normal in our patient. However, it should be emphasized that serum ALP can be normal in patients with a small focus of symptomatic Paget’s Disease [11].

There is a small chance of recurrent or metastatic disease in patients with thyroid cancer, who have low Tg and Tg-Ab levels, both negative I-131 whole body imaging and FDG PET study. Although uncommon, Paget’s Disease should be included in the differential diagnosis of any sclerotic lesion of the spine even in young adults, which may present a diagnostic problem.
Figure 4. Normal coronal (a) and sagittal (b) FDG PET WB slices, with specifically no abnormal FDG uptake at 10th vertebra, where the lesion identified on MRI and bone scan.

Figure 5. Areas of bone formation alternate with areas of bone resorption characterized by the presence of osteoclasts in Haematoxylen-Eosine stain (x200) (a). Irregular ossification lines are also seen in sclerotic areas. However, these lines are more obviously seen in Gomori’s Methanamin Silver stain (b) (x100) than previous figure, which are specific for osteoblastic phase of Paget's Disease.
References