

Bone scintigraphy findings which lead to diagnosis ectopic (mediastinal) parathyroid adenoma

türkçe başlık????

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Abstract

Primary hyperparathyroidism is a disease characterized by hypercalcemia due to overproduction of parathyroid hormone by one or more parathyroid glands. With widespread use of laboratory tests, bone lesions are less encountered in primary hyperparathyroidism. A woman with cystic lesion in left ulnar bone on plain radiographs was diagnosed with mediastinal parathyroid adenoma on parathyroid scintigraphy that was performed due to findings suggesting metabolic bone disease and brown tumor on bone scintigraphy. Herein we aimed to highlight the utility of bone scintigraphy in depicting metabolic bone disease and importance of dual phase Tc99m-MIBI parathyroid scintigraphy in ectopic localization of parathyroid lesions.

Key words: Bone scintigraphy, brown tumor, parathyroid scintigraphy, primary hyperparathyroidism, ectopic parathyroid adenoma

Giriş

Primary hyperparathyroidism is a disease characterized by hypercalcemia caused by over secretion of parathyroid hormone (PTH) by one or more parathyroid glands. It is usually asymptomatic. In symptomatic cases, findings are usually related to renal, gastrointestinal and musculoskeletal systems as well as psychiatric symptoms. Muscle weakness, generalized bone pain, arthralgia, pathologic fractures, bone cysts and brown tumors are most common findings however, bone cysts and brown

Özet

Anahtar sözcükler: ???

tumors are extremely rare findings of advanced hyperparathyroidism. They may be presented as single or multiple lesions and are usually localized on metaphyses of long bones, facial and pelvic bones and costae.

Due to widespread use of routine laboratory tests, bone lesions are less frequently encountered in primary hyperparathyroidism. Parathyroid scintigraphy is a highly sensitive imaging modality in the localization and detection of parathyroid adenomas as well as ectopic lesions. Recently, routine SPECT and SPECT/CT hybrid imaging in addition to conventional planar imaging has

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Başvuru tarihi | Submitted on: 20.05.2013

Kabul tarihi | Accepted on: 28.08.2013



Figure 1. Expansive cystic lesion at left forearm on plain radiograph.

led to metabolic detection of adenomas together with anatomic localization.

In this case we emphasize the value of bone scintigraphy in the detection of metabolic bone diseases and the utility of dual phase ^{99m}Tc -MIBI SPECT/CT in the detection and preoperative localization of parathyroid lesions particularly for ectopic lesions.

Case Report

A 59 years old woman had left arm pain following trauma and plain radiograph of the arm revealed an expansive cystic lesion at distal left ulnar bone with accompanying reduction of cortical thickness (**Figure 1**). Non ossifying fibroma and aneurismal bone cyst were considered in differential diagnosis however, 3-phase bone scintigraphy was performed since a possible malignancy could not be excluded. Scintigraphic images revealed increased activity at the cystic left ulnar bone lesion and bilateral carpometacarpal bones on perfusion, blood pool and delayed images. Focal increased activity in bilateral costochondral joints and tibial bone, diffuse periosteal increased activity in bilateral femoral and tibial bones with concomitant modest deformity and diffuse increased uptake in the cranium was evident on whole body images (**Figure 2**).

Metabolic bone disease was considered in differential diagnosis and following evaluation of the increased activity at the left arm with the cystic lesion at the left arm, clinical and biochemical verification was recommended for differential diagnosis of a cystic lesion or brown tumor secondary to hyperparathyroidism. Laboratory findings revealed increased blood PTH (891 pg/mL) and calcium (12 mg/dL) levels but decreased phosphor (1.9 mg/dL) level. An ultrasound of the neck was performed as primary hyperparathyroidism was

highly suspected however, no pathologic findings were observed. The patient underwent dual phase ^{99m}Tc -MIBI scintigraphy for the detection of a possible parathyroid lesion. Planar and SPECT/CT images revealed an increased ^{99m}Tc -MIBI uptake in a 2.0x1.4 cm soft tissue lesion located anterior to arcus aortae which was reported to be significant of ectopic parathyroid tissue (**Figure 3**). The lesion was removed by video assisted thoracic surgery (VATS) and histopathological examination revealed a 3 x 2.4 x 1 cm parathyroid adenoma.

Discussion

Bone scintigraphy is a widely used imaging modality in routine daily nuclear medicine practice. ^{99m}Tc methylene diphosphonate is a bone specific tracer which binds to calcium hydroxi apatite crystals in the organic bone matrix and thus, its deposition in areas with increased osteoblastic activity is reflected as increased uptake on scintigraphic images. Indications are bone metastases, primary bone tumors, bone-soft tissue and prosthetic infections and unexplained bone pain as well as metabolic bone disease.

In metabolic bone diseases, lesions are usually located on metacarpal, costal and pelvic bones. Pathological fractures, ground glass or salt and pepper appearance of the cranium, subperiosteal bone resorption may be presented on plain radiographs. In patients with advanced disease, bone cysts may emerge and cysts that contain serous or mucoid brown fluid as a result of hemosiderin deposition are called brown tumors. Brown tumors are usually localized in long bones, costae and trabecular jaw bone. It is not distinguishable from metastasis, aneurismal bone cysts and giant cell tumors on conventional radiographic imaging¹⁻³. On plain radiographic images of our case, left ulnar cystic lesion was

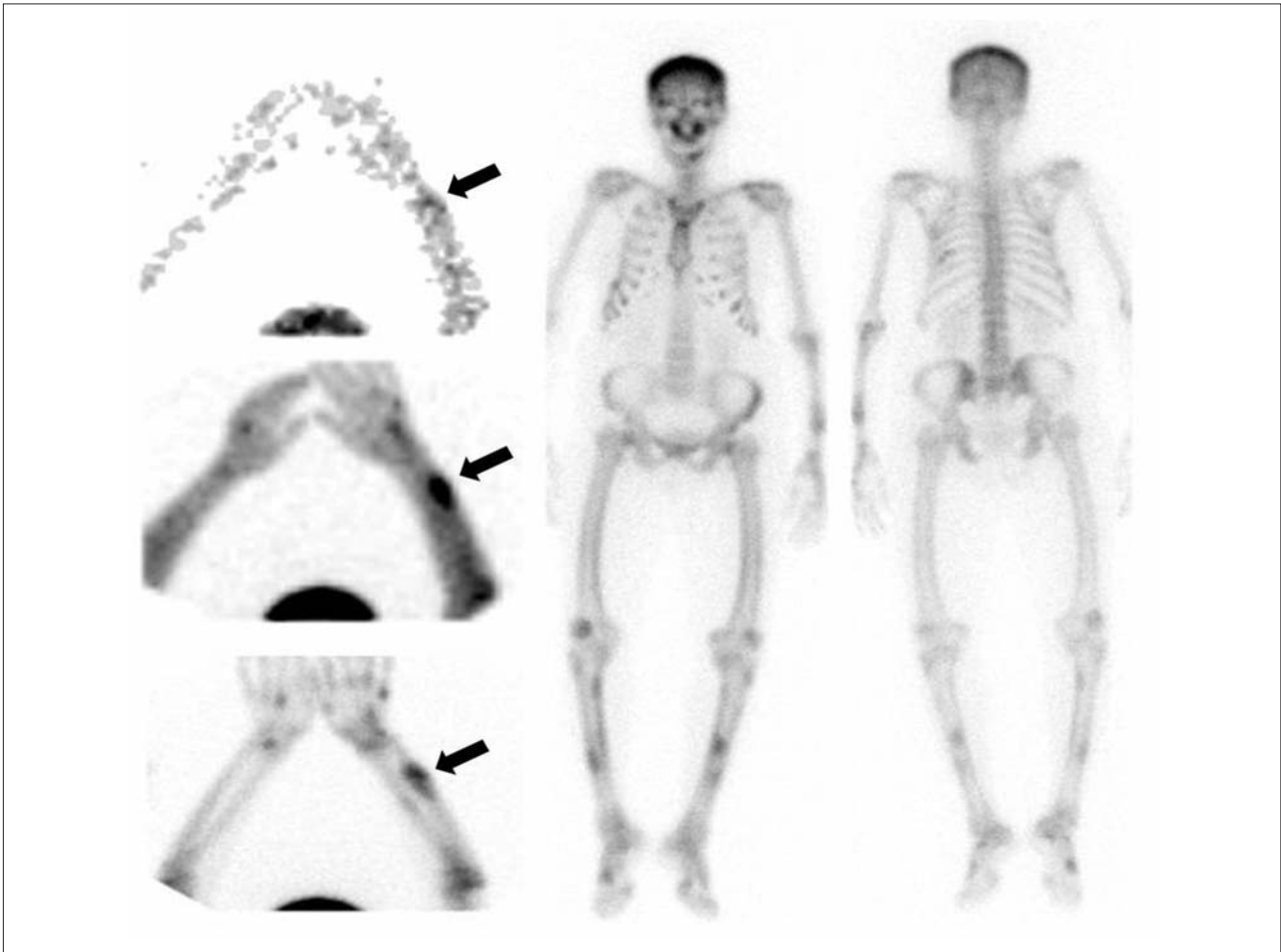


Figure 2. Phase bone scintigraphy. Increased activity on perfusion and blood pool images and increased osteoblastic activity on delayed images. Diffuse and focal increased activities suggesting metabolic bone disease on whole body images.

considered to be a non-ossifying fibroma or an aneurismal bone cyst but the patient underwent scintigraphic evaluation since malignancy was not ruled out.

Due to Bone resorption and increase in bone turnover, increased tracer uptake occurs in axial skeleton, long bones, periarticular areas, costochondral joints, sternum, calvarium, and mandible in metabolic bone diseases⁴. Bone scintigraphy findings in primary hyperparathyroidism vary in a broad range. It may demonstrate increased activity on multiple sites or be completely normal. Bone scintigraphy findings of brown tumors are also variable. Peripheral bone activity at the lesion is evident as reactive changes develop.

In this case diffuse periosteal uptake in calvarium, bilateral femoral and tibial bones, and multifocal uptake in left distal ulna, bilateral tibia, costochondral joints and metacarpal areas was demonstrated. Due to diagnosis of primary hyperparathyroidism, lesion at the distal left ulna was decided to be a brown tumor; therefore

no histopathological examination was performed.

Although bone scintigraphy is not the first choice of imaging in metabolic bone diseases, by the virtue of whole body scanning advantage; it is useful in detecting complications such as brown tumor or fractures. In this case contribution of bone scintigraphy findings has demonstrated extent of metabolic bone disease and led to suspicion of primary hyperthyroidism.

Primary hyperparathyroidism is caused by adenomas (80-85%) and hyperplasia (15-20%). 20% of parathyroid glands are ectopic^{5,6}. Ectopic parathyroid glands cause morbidity and failure in localizing the lesions. Ultrasonography and dual phase ^{99m}Tc-MIBI scintigraphy are routinely used in determining the localization of parathyroid adenomas however, ultrasonography fails to detect ectopic parathyroid adenomas⁷.

Parathyroid scintigraphy has proven its utility in localization of ectopic parathyroid lesions by simultaneous imaging of the neck and mediastinum⁸. In this case

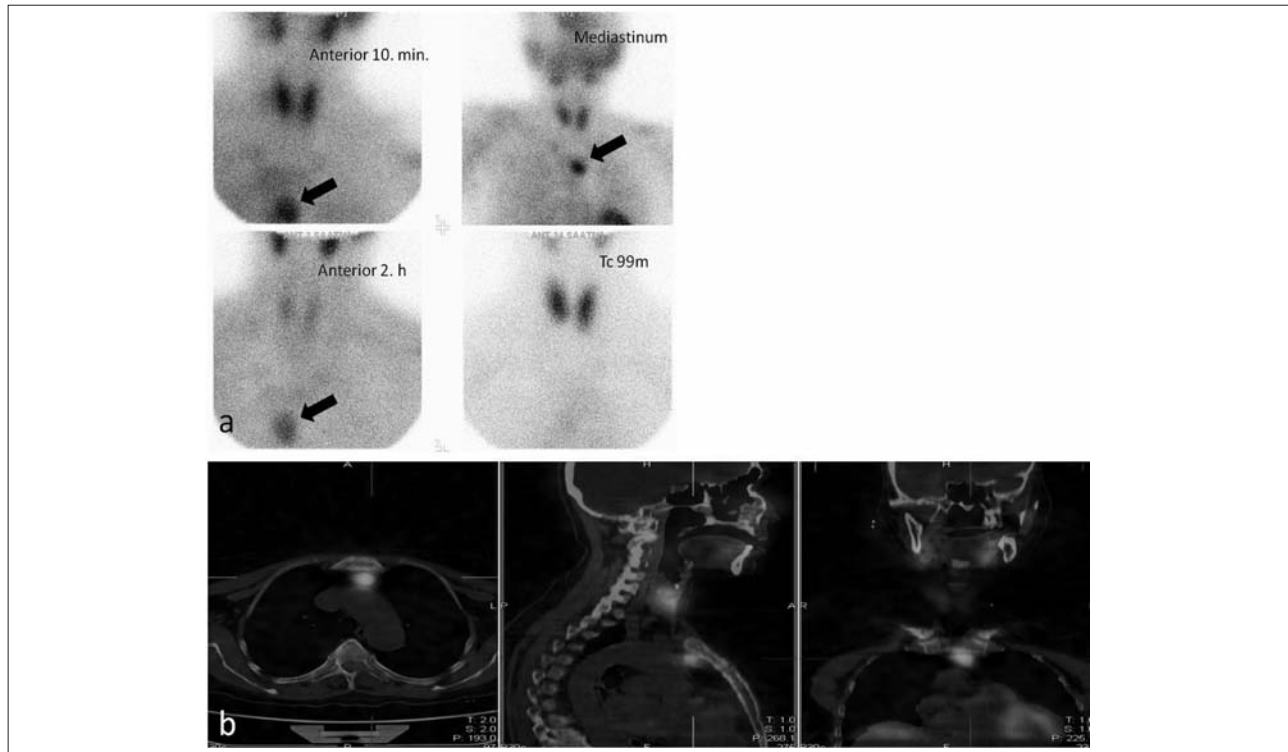


Figure 3. Dual phase Tc99m-MIBI parathyroid SPECT/CT images. Early and delayed images (a) demonstrate intense Tc99m-MIBI uptake which is located anterior to arcus aortae on SPECT/CT images (b).

no pathologic finding was found in the ultrasonographic evaluation of the neck. Also no pathologic finding was found in dual phase 99mTc-MIBI in the neck region however, mediastinal additional imaging demonstrated ectopically localized parathyroid lesion at the anterior of arcus aortae.

In conclusion; bone scintigraphy findings has led to suspicion of primary hyperparathyroidism by detecting metabolic bone disease and its complications.

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