

Bone Scan “Hot Spot” at the Superior Lateral Orbital Margin Fronto-zygomatic Suture Uptake Characterized with Tc-99m MDP SPECT/CT

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Abstract

Findings of a solitary "hot spot" at the superior lateral orbital margin on bone scan scintigraphy is not uncommonly seen, and is often dismissed as a benign lesion. However, the exact etiology is indeterminate. We present two cases in which hybrid single photon emission computed tomography/computed tomography imaging was able to characterize and localize this uptake, demonstrating correlation to the right fronto-zygomatic suture.

Keywords: Bone scan, fronto-zygomatic suture, SPECT/CT

Introduction

Technetium-99m methylene diphosphonate (Tc-99m MDP) bone scan is one of the most commonly performed nuclear medicine diagnostic procedure worldwide, and is used frequently in cancer staging and assessment for bone injuries and pathologies. We present two patients undergoing bone scintigraphy who demonstrated focal uptakes projected at the superior lateral margin of the right orbit, for which further single photon emission computed tomography/computed tomography (SPECT/CT) imaging was performed to localize and characterize the lesions.

Case Reports

Case 1

A 55-year-old Chinese female with newly diagnosed breast carcinoma presented at the Nuclear Medicine Department for a pre-therapy staging bone scan. The delayed whole body imaging demonstrated a focus of mildly increased

tracer uptake projected over the superior lateral margin of the right orbit on the anterior view [Figure 1]. No other significant finding was appreciated. Further evaluation by SPECT/CT hybrid imaging localized the uptake to the right fronto-zygomatic suture, with no obvious masses or bony destruction seen on CT imaging [Figure 2].

Case 2

A 53-year-old Chinese man presented initially with a non-specific sclerotic bone lesion in the right femur. Further bone scintigraphy was performed to characterize the lesion and to search for any other skeletal abnormality. The delayed whole body imaging revealed only mildly increased tracer uptake at the right femoral neck, corresponding to the lesion seen on the previous radiological imaging. Additionally, a focal area of increased uptake projected over the superior-lateral margin of the right orbit was noted. No other significant findings were seen. Further evaluation via SPECT/CT localized the uptake to the right fronto-zygomatic suture, with no obvious masses or bony destruction appreciated [Figure 3].

Discussion

Bones scans have a generally high sensitivity in detecting bone lesions, but have limited specificity in characterizing such lesions. Typically, the most important distinction to be made is to differentiate malignant from benign

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Figure 1: Technetium-99m methylene diphosphonate bone scan, anterior spot view of the skull and thorax. The scan shows focal tracer uptake projected over the superior lateral margin of the right orbit (black arrow head)

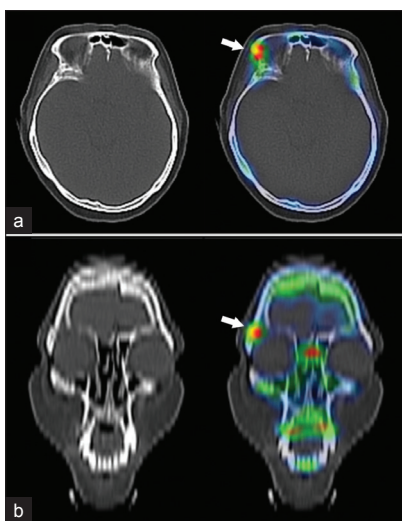


Figure 2: Technetium-99m methylene diphosphonate bone imaging, single photon emission computed tomography/computed tomography (SPECT/CT) of the skull. (a) Axial CT and fused SPECT/CT and (b) coronal reconstructed CT and fused SPECT/CT images demonstrate focal uptake in the right fronto-zygomatic suture. No corresponding bony masses, sclerosis or bone destruction is seen

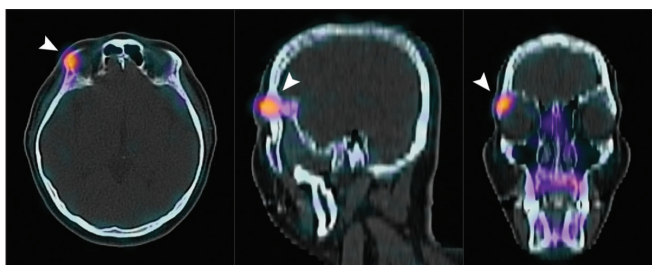


Figure 3: Technetium-99m methylene diphosphonate bone single photon emission computed tomography/computed tomography of the skull in axial, sagittal and coronal views. Images demonstrate focal tracer activity corresponding to the right fronto-zygomatic suture

lesions. In patients with extrasosseous malignancies, approximately one-half of all solitary bone lesions outside of the periarticular regions are found to be metastasis, with the significance depending on the site. For example, approximately 10% of solitary rib lesions are proven

metastasis as compared with approximately 60–70% for solitary lesions in the vertebra or pelvis, and up to 80% for sternal lesions in patients with breast cancer.^[1-4]

For solitary calvarial focal lesions, it is estimated that approximately 20% of such lesions in patients with underlying extrasosseous tumors are metastasis. However, there are several focal areas of uptake that are consistently seen on bone scintigraphy, and are thought to be of benign nature. One such pattern of uptake is seen at the superior lateral margin of the orbit, and various differentials offered for this uptake have included metastasis, dermoid cysts, benign bony lesions (fibrous dysplasias, osteomas, enchondromas and hemangiomas), meningiomas, post-traumatic changes and extrasosseous uptake in the lacrimal gland.

We have utilized hybrid SPECT/CT imaging in these two patients to further characterize and localize this commonly seen pattern of focal calvarial uptake at the superior lateral margin of the orbit, and have found in both patients that the uptake correlates to the fronto-zygomatic suture.

Benign MDP tracer uptake along cranial suture lines is known, and various explanations have included cartilaginous inclusion bodies or “os incae” and bony reactive changes from underlying pacchionian granulations.^[5] In the interpretation of bone scans, it is important to recognize benign patterns of tracer uptake to avoid overcalling of bone metastasis. The pattern of focal tracer uptake at the superior lateral margin of the orbits on planar bone scintigraphy is well known but, to date, we are unaware of any current publications using correlative hybrid imaging in localizing and/or characterizing this uptake pattern.

We hence present two cases in which hybrid SPECT/CT imaging was able to demonstrate and correlate such uptake to the fronto-zygomatic suture.

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