Skull Base Metastasis Revealed by Bone Scintigraphy in a Patient With Hypoglossal Nerve Palsy

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Abstract

Even though different imaging modalities are available in sole or in combination for the optimal detection of bone metastases, whole-body bone scintigraphy (BS) in a single session seems to be advantageous. We present an 80-year-old male with unilateral left hypoglossal nerve palsy (HNP) and no other focal deficits on neurological examination. Initial brain computed tomography (CT) scan revealed no pathological findings, while the subsequent cranial CT and magnetic resonance imaging (MRI) scans uncovered only mild nonspecific sclerotic lesions in left occipital condyle. All laboratory examinations were within normal limits, except for an elevated alkaline phosphatase (170 U/L) and a markedly increased prostate-specific antigen (609 ng/mL). The patient underwent whole-body BS with technetium-99m that revealed increased radiotracer deposition compatible with metastases in multiple foci, including the left occipital condyle. Prostate biopsy confirmed the diagnosis of prostate adenocarcinoma. Our case suggests that a complete and thorough workup for hidden malignancies should be performed in all patients with HNP, even in the absence of a finding in brain neuroimaging. Bone scintigraphy is an essential investigation that should be considered in uncertain cases of HNP, and especially in those with negative CT and MRI scans.

Keywords

skull base metastasis, occipital condyle, bone scintigraphy, hypoglossal nerve palsy

Background

Even though different imaging modalities are available in sole or in combination for the optimal detection of bone metastases, whole-body imaging in a single session seems to be advantageous (Table 1). Whole-body bone scintigraphy (BS) is an imaging examination used to diagnose bone diseases and identify their severance.¹ It is based on an intravenous administration of a radionuclide, usually Tc99m-methylene diphosphonate, and subsequent imaging via a scintillation camera, both in front and rear views. The whole-body images depict the uptake of the tracer to the whole skeleton, and thus, specific areas of increased bone turnover could be identified and characterized accordingly.¹

Case Presentation

An 80-year-old male presented to the emergency department of our institution due to gradually progressive dysarthria over 1 week. On neurological examination, the patient exhibited unilateral left hypoglossal nerve palsy (HNP),

with no other focal deficits. The patient's past medical history was significant for diabetes type II, diagnosed 6 months ago and treated with gliclazide. Initial brain computed tomography (CT) scan revealed no pathological findings, while the subsequent cranial CT and magnetic resonance imaging (MRI) scans uncovered only mild nonspecific sclerotic

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Table I. Advantages and Disadvantages of Whole-Body Bone Scintigraphy in Malignancy Screening.

Advantages	Disadvantages
High sensitivity	Relative lower specificity
Early diagnosis	Effective dose
Staging cancer	
Whole-body evaluation	
Follow therapeutic response	

lesions in left occipital condyle (Figure 1). All laboratory examinations were within normal limits, except for an elevated alkaline phosphatase (170 U/L) and a markedly increased prostate-specific antigen (609 ng/mL). The patient underwent whole-body BS with technetium-99m that revealed increased radiotracer deposition compatible with metastases in multiple foci, including the left occipital condyle (Figure 2). Prostate biopsy confirmed the diagnosis of prostate adenocarcinoma.

Figure 1. Mild nonspecific sclerotic lesions (arrows) in left occipital condyle present in (A) cranial computed tomography (CT) scan, (B) T1-magnetic resonance imaging (MRI), and (C) T1-MRI sequences with gadolinium enhancement. **Figure 2.** Increased radiotracer deposition in the left occipital condyle (arrows) and other multiple foci in bone scintigraphy with technetium-99m.

Discussion

This is the first case reporting a patient with unilateral HNP due to skull base metastasis that was only evident in BS. In a similar case report of unilateral HNP due to ovarian skull base metastasis, MRI scan was diagnostic and revealed the partially necrotic expansive lesion located beneath the unilateral occipital condyle,² while in other several reports, traumatic occipital condyle fractures were easily detected on cranial CT scans of patients with HNPs.³⁻⁵ In a retrospective analysis of 245 cases of HNP, metastatic malignancy was found to be the fourth more common etiology, accounting for 13% of the aforementioned total cases.⁶ Thus, clinical presentation of an isolated HNP should be considered as an ominous sign of malignancy⁷ after excluding other causes of subacute HNP, including demyelination, infection, and cervical or intracranial vessel pathology (aneurysm, ectasia, dissection).⁸

According to the results of a diagnostic accuracy meta-analysis, BS seems to be more sensitive for the diagnosis of bone metastases compared to CT scan (86.0%; 95% confidence interval [CI]: 84.0%-87.8% vs 72.9%, 95% CI: 66.6%-78.6%; $P < .05$).⁹ Moreover, in another diagnostic accuracy meta-analysis, BS was reported to have similar diagnostic performance to whole-body MRI in the detection of bone metastasis.¹⁰ An alternative to BS for the evaluation of skeletal disease, when available, is (18)F-NaF/(18)F-FDG PET/CT which exhibits higher sensitivity and accuracy than only BS or whole-body MRI. In addition, combination of (18)F-NaF/(18)F-FDG PET/CT with either whole-body MRI or BS may further improve the diagnostic results and affect the therapeutic management of patients with underlying malignancies.¹¹

Conclusions

Our case coupled with the findings of the aforementioned meta-analyses^{9,10} suggests that BS is an essential investigation that should be considered in uncertain cases of HNP, and especially in those with negative neuroimaging.

Authors' Note

Dr Katsanos and Dr Sioka contributed to acquisition of data, analysis, and interpretation. Dr Chondrogiorgi contributed to acquisition of data. Dr Papadopoulos and Dr Fotopoulos contributed to critical revision of the manuscript for important intellectual content. Dr Kyritsis contributed to study concept and design, analysis, and interpretation. Dr Ragos contributed to critical revision of the

manuscript for important intellectual content. Informed consent was obtained from the patient prior to the preparation of the current manuscript.

Declaration of Conflicting Interests

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