

# Bilateral Hypoglossal Nerve Palsy Due to Breast Cancer Skull Base Metastases

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## Abstract

Despite advances in endocrine therapy and chemotherapy, metastatic disease ultimately develops in about 30% of women diagnosed with early-stage breast cancer. Critical locations of bone metastases may result in specific symptoms. Metastases to the calvarium have the potential to cause cranial nerve palsies. While there have been isolated case reports of unilateral cranial nerve XII palsy, bilateral hypoglossal nerve palsy has never been reported. We report the first known case of bilateral hypoglossal nerve palsy in a 49-year-old woman with estrogen receptor-positive/progesterone receptor-positive, HER2/neu-negative metastatic breast cancer. The patient underwent palliative radiation therapy with near complete resolution of symptoms. When a patient with metastatic cancer develops unusual neurological symptoms, a high index of suspicion for skull base disease must be maintained, and local therapy can improve quality of life.

fuse bone metastases 2 years prior. She had not responded to first-line hormonal therapy with tamoxifen and zoledronic acid, and so was switched to albumin-bound paclitaxel and bevacizumab with zoledronic acid. Bevacizumab was discontinued due to proteinuria and hypertension 4 months prior to her current presentation, at which time she was receiving only albumin-bound paclitaxel and zoledronic acid.

The patient had developed the sensation of a swollen tongue approximately 1 week prior and was treated with fluconazole, dexamethasone, and nystatin for presumed thrush. She returned with persistent tongue swelling and dysarthria. She denied dysphagia. On examination, the uvula was midline, and the tongue was flaccid and not edematous. Gag reflex was intact. Cranial nerves II through XI were intact, but the patient was unable to protrude and laterally move her tongue in either direction, indicating bilateral hypoglossal nerve palsy. The remainder of her neurological exam was normal. The patient was admitted to the hospital for expedited workup and management.

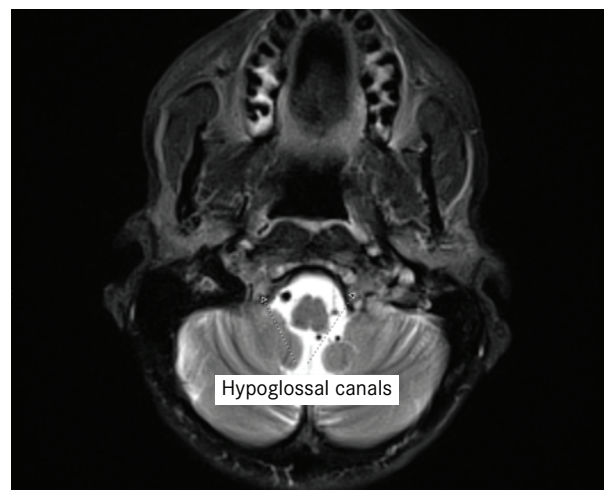
## Introduction

Despite advances in endocrine therapy and chemotherapy, metastatic disease ultimately develops in about 30% of women diagnosed with early-stage breast cancer.<sup>1</sup> The most common sites of metastasis, beyond regional lymph nodes, are bone, lungs, liver, and brain.<sup>2</sup> Critical locations of bone metastases may result in specific symptoms. Metastases to the calvarium have the potential to cause cranial nerve palsies. The most common cranial nerves affected in metastatic breast cancer are V and VII, although there have been isolated case reports of unilateral cranial nerve XII palsy. We report the first known case of bilateral hypoglossal nerve palsy in a 49-year-old woman with estrogen receptor-positive/progesterone receptor-positive (ER+/PR+), HER2/neu-negative metastatic breast cancer.

## Case Report

A 49-year-old woman with stage IV, pT4 pN1 cM1, ER+/PR+, HER2/neu-negative breast cancer presented with subacute onset of a swollen tongue and difficulty speaking. The patient had been diagnosed with de novo stage IV breast cancer with dif-

**FIGURE 1.** MRI T2 Axial Image Showing Metastatic Disease Involving the Bilateral Basiocciput



**Practical Application**

- Management of patients with metastatic cancer requires a multidisciplinary team approach.
- Clinicians must maintain a high index of suspicion in patients with metastatic cancer that atypical symptoms may be related to malignancy.
- Selection of the optimal imaging study will aid in diagnosis.
- Recognition of abnormal cranial nerve examination findings [AUTHORS: SHOULD MAKE COMPLETE SENTENCE TO BE PARALLEL WITH OTHERS.]

The patient had been taking prochlorperazine for chemotherapy-induced nausea. To rule out a dystonic reaction to compazine, benztropine was administered without relief of symptoms. An MRI of the brain with and without gadolinium subsequently revealed extensive calvarial metastases involving the skull base, including the clivus, bilateral occipital condyles, and C1 vertebra. Tumor was thought to be compressing the hypoglossal nerves as they traversed the hypoglossal canals at the skull base bilaterally. **Figure 1** includes a T2 axial image showing metastatic disease involving the left and right basiocciput. **Figure 2** shows a coronal post-contrast view of the hypoglossal canals, and **Figure 3** demonstrates the skull base metastases on bone scan.

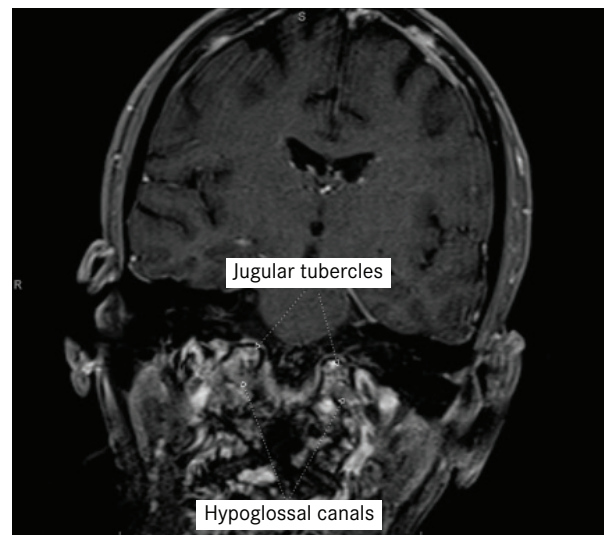
The patient underwent neurosurgical evaluation to ensure stability of the C1/C2 junction and superior cervical spine, which was intact. She subsequently received radiation therapy to the clivus, C1 vertebral body, and adjacent skull base. Prescribed dosage was 3000 cGy in 10 fractions delivered with opposed lateral fields with 6 MV photons. On follow-up approximately 1 month later, the patient reported improved speech and was able to eat all foods. On examination, she was able to protrude the tongue but with persistent deviation to the right. Unfortunately, the patient had rapidly progressive disease, most markedly in the liver and mediastinum. Two weeks after follow-up, she developed a malignant pericardial effusion and expired due to multisystem organ failure.

**Discussion**

Metastatic disease is found in 5% of women at the time of breast cancer diagnosis. For those women with early-stage breast cancer, about 30% will ultimately develop distant metastases.<sup>1</sup> Cranial nerve palsies are rare complications of metastatic cancer, occurring in less than 10% of patients with brain metastases.<sup>2</sup> However, cranial nerves may be compromised due to bone metastases without intracranial lesions. Metastases to the skull base, which occurs in 4% of patients with cancer, with breast cancer being the most common primary site,<sup>3</sup> may cause compression of and damage to cranial nerves as they exit the skull through the basal foramina. The most frequently affected cranial nerves in women with metastatic breast cancer are V and VII, with 70% and 60% of patients, respectively, having involve-

ment of these nerves.<sup>4</sup> Several English-language case reports have been published describing unilateral hypoglossal nerve palsy due to skull base metastasis, but no reports have documented bilateral involvement.<sup>4-8</sup> In the case series by Hall et al,<sup>4</sup> only 4 of 10 patients had involvement of cranial nerve XII, 1 with isolated hypoglossal palsy and all with unilateral involvement. Greenberg et al<sup>8</sup> performed a retrospective analysis of 43 patients with metastases to the skull base. Nine of 43 patients had involvement of the occipital condyle, and all 9 patients had unilateral 12th nerve palsy. Metastases at the basilar part of the occipital bone (basiocciput) and bilateral occipital condyles were likely the cause of our patient's symptoms.

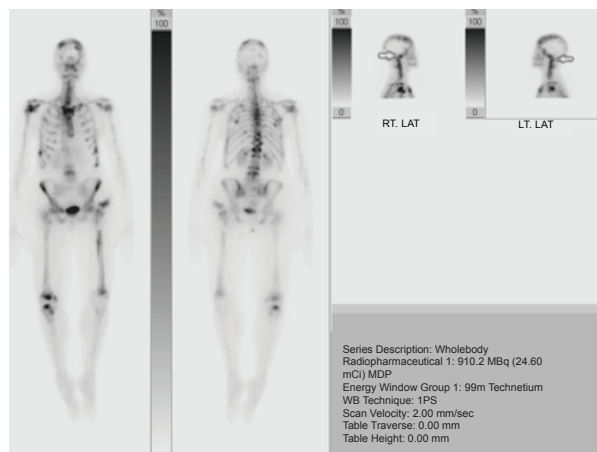
**FIGURE 2.** Coronal Post-Contrast Image Showing Skull Base Metastases Involving the Bilateral Hypoglossal Canals



Our case represents the first report of bilateral hypoglossal nerve palsy due to skull base bone metastases. The diagnosis was made by MRI imaging, the imaging study of choice for skull base involvement, although bone scan with SPECT could be used for this purpose.<sup>9</sup> While the average survival time for patients with cranial nerve palsy due to skull base metastasis can be up to 2 years, those with intracranial metastases have a median survival ranging from 5.6 to 14.4 months, depending on number of lesions, performance status, hormone and HER2 receptor status, and response to systemic treatment.<sup>10,11</sup> Despite a significant clinical improvement following local radiotherapy, our patient ultimately died from her cancer due to systemic progression 3 months after her symptoms developed.

This case indicates that when a patient with metastatic cancer develops unusual neurological symptoms, a high index of suspicion for skull base disease must be maintained, especially in

**FIGURE 3.** Bone Scan Demonstrating Bilateral Skull Base Metastases (white arrows)



the absence of intracranial lesions. Aggressive local therapy can lead to near-complete resolution of symptoms and improvement in quality of life for patients with an otherwise significantly limited life expectancy.

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