

# Conus Medullaris Metastasis in a Patient with Triple-positive Breast Cancer

Arif Akyildiz<sup>1</sup>, Hasan Cagri Yildirim<sup>1</sup>, Rashad Ismayilov<sup>2</sup>, Ahmet Ilkay Isikay<sup>3</sup>, Neyran Kertmen<sup>1</sup>

<sup>1</sup>Hacettepe University Faculty of Medicine, Department of Medical Oncology, Ankara, Turkey

<sup>2</sup>Hacettepe University Faculty of Medicine, Department of Internal Medicine, Ankara, Turkey

<sup>3</sup>Hacettepe University Faculty of Medicine, Department of Neurosurgery, Ankara, Turkey

## ABSTRACT

Although brain metastasis is usual in breast cancer, metastasis of the conus medullaris is extremely infrequent. Herein, we present the first case of triple-positive subtype breast cancer with conus medullaris metastasis. The patient admitted with paraplegia and neurological dysfunction improved after the removal of the mass, followed by radiotherapy. We also discuss the clinical characteristics and available therapies for conus medullaris metastases.

**Keywords:** Breast cancer, conus medullaris, metastasis

## INTRODUCTION

As a result of the increasing cancer prevalence, more spinal metastases are encountered in cancer patients [1,2]. Intramedullary spinal cord metastases (ISCM) are uncommon and affect only 0.1%-0.4% of cancer patients [3]. Conus medullaris metastases are rare compared with spinal cord metastasis because of their small spatial extent and lower tissue perfusion. It is most commonly reported in patients with lung cancer. Second on the list is breast cancer [4]. Estrogen receptor (ER)-negative and human epidermal growth factor receptor 2 (HER2)-positive breast cancers are more prone to liver, lung, and brain metastases than the triple-positive type [5]. Similar data are available for ER-negative/HER2-positive patients with conus medullaris metastasis [6]. In this study, we report the first case of ER-positive/HER2-positive subtype breast cancer that spread to the conus medullaris.

## CASE PRESENTATION

A 61-year-old woman was referred with a left breast mass in 2015. Ultrasound showed a 6x5 cm irregular hypoechoic mass. Tru-cut biopsy revealed grade-II HER2-positive (score 3+), ER 90%, and progesterone receptor (PR) 80% positive invasive ductal carcinoma with 25% Ki-67 proliferation index. Following this, an axillary dissection and a left modified radical mastectomy

were performed, and the tumor was staged as T3N2M0. The patient's refusal of treatment precluded the application of adjuvant or neoadjuvant chemotherapy and radiotherapy (RT). In 2018, the patient experienced an epileptic episode and numbness in the left arm. Cranial magnetic resonance imaging (MRI) revealed a metastatic lesion in the right frontal convexity along the cortical-leptomeningeal face, accompanied by dural thickening, cerebral edema, and two points of cortical-subcortical diffusion restriction suspected for metastasis (Figure 1). After 30 Gy whole brain RT in 10 fractions, 6 cycles of docetaxel and trastuzumab plus pertuzumab were administered. Trastuzumab plus pertuzumab and anastrozole were started as maintenance therapy. With RT and anti-HER2 therapy, the patient's headache disappeared, numbness in the left arm improved, and she did not have epileptic seizures again.

In 2021, the patient presented with paraplegia and bowel dysfunction while receiving maintenance treatment. She complained of constipation, abdominal pain, spasm, and urinary retention. Muscle strength in the bilateral lower extremities was 3/5 in the distal and 3/5 in the proximal; in the upper extremities, it was 4/5 in the distal and 5/5 in the proximal. The lower extremities were bilaterally hypoesthetic and deep tendon reflexes were hypoactive. An intramedullary-enhancing metastatic lesion measuring 1.4 x 2.6 x 1.2 cm in



**Address for Correspondence:** Rashad Ismayilov MD, Hacettepe University Faculty of Medicine, Department of Internal Medicine, Ankara, Turkey

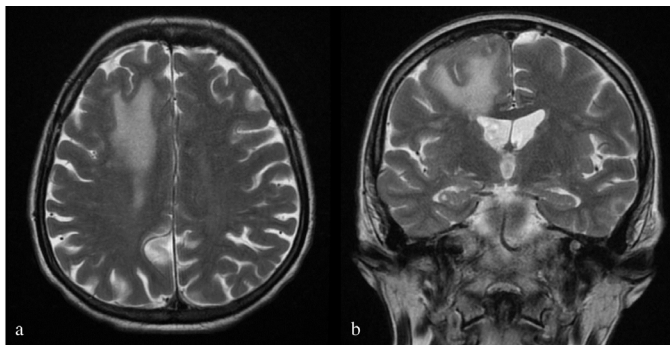
Phone: +90 507 033 19 95 E-mail: ismayilov\_r@hotmail.com ORCID ID: 0000-0002-7093-2722

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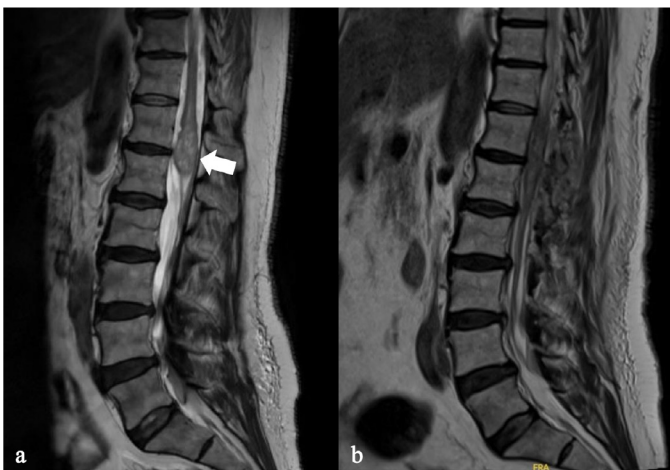


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diameter was detected by spinal MRI (Figure 2). Neurosurgery performed an immediate laminectomy and tumor excision with no postoperative sequelae. Histopathological examination revealed a cellular neoplasm with extensive calcification and an infiltrative pattern consistent with breast carcinoma metastasis. Immunohistochemical staining revealed that cells were diffusely strongly positive for ER, negative for PR, and positive (3+) for HER2. Subsequently, 30 Gy RT was administered to the T11-L2 region in 10 fractions. With the postoperative RT and subsequent physiotherapy program, the patient's muscle strength increased to 5/5 in all four limbs, sensation improved, and bowel functions returned to normal. No recurrence was detected during the 6-month follow-up of the patient on



**Figure 1.** Magnetic resonance imaging of the brain. T2-weighted axial (a) and coronal (b) images showed a metastatic lesion in right frontal convexity along the cortical-leptomeningeal face, accompanied by dural thickening, and white matter edema in the adjacent frontal lobe parenchyma. Two points of cortical-subcortical diffusion restriction suspected for metastasis were observed in the right posterior parietal lobe



**Figure 2.** Magnetic resonance imaging (MRI) of the spine. (a) An enhancing lesion in the conus medullaris (arrow). (b) Postoperative MRI of the spine performed two months after radiation treatment

trastuzumab plus pertuzumab and anastrozole maintenance therapy.

## DISCUSSION

ISCM is underestimated in clinical practice, especially on pre-MRI dates. The incidence of ISCM increases with increasing cancer morbidity and prolongation of patient survival [7]. Conus medullaris metastasis has rarely been reported as a case series in patients with breast cancer of various hormonal and genetic status [8,9]. For the first time, conus medullaris metastasis was detected in our patient with ER-positive, PR-positive, and HER2-positive breast cancer.

Most patients with ISCM usually present with myelopathy as the first sign, such as hemiparesis and hemiparesthesia [10]. Urinary and bowel dysfunctions can also be encountered. Although primary ISCM tumors present with slower progression, metastatic lesions often present with neurological deficits or rapidly developing complete paraplegia [11,12]. Our patient who presented with paraplegia and bowel dysfunction had a clinical presentation similar to that of a case series in the literature [4,7].

Although RT, chemotherapy, and surgical resection are clinically viable options, the management of ISCM remains controversial. RT is the first-line treatment for ISCM for radiosensitive metastases such as small cell lung carcinoma, breast cancer, or lymphoma [13]. However, the response to RT applied after the development of paraplegia was weak. Surgical treatment can be performed in selected patients. Kalayci et al. [7] suggested that early surgical resection resulted in regression of neurological deficits and improved quality of life in these patients. In our patient, surgery was preferred in the early period because of paraplegia. Because patients with ISCM may develop permanent neurological deficits, they should be evaluated promptly. Appropriate treatment should be administered as RT, chemotherapy, or surgery [14]. Otherwise, irreversible neurological damage that affects patients' quality of life may develop.

Compared with other forms of breast cancer, HER2-positive breast tumors typically tend to be more aggressive [14]. Although central nervous system (CNS) metastases are more common in HER2-positive breast cancers, data on conus medullaris metastases are limited. In this case with CNS metastasis, conus medullaris metastasis occurred during follow-up. In the case series of 7 breast cancer patients by Hsu et al. [15], four patients had CNS, bone, or lung metastases at the time of ISCM diagnosis. In our patient, CNS metastasis developed before ISCM. Because most patients are symptomatic, information about the necessity of spinal imaging in asymptomatic breast cancer patients with CNS metastases is limited. However, early diagnosis can reduce morbidity by providing an early treatment. Therefore, it may

be useful to question the neurological symptoms carefully and not skip the neurological examination.

In conclusion, the presented case demonstrates the feasibility and optimal response of surgery and RT in breast cancer patients with conus medullaris metastasis. It should be kept in mind that conus medullaris metastases may develop in addition to CNS metastases in patients with HER2-positive breast cancer. Because this patient presented with neurological symptoms, it was easy to detect conus medullaris metastasis. However, there is a need for case series with large numbers of HER2-positive breast cancers with ISCM detected by imaging in the asymptomatic period.

### Ethics

**Informed Consent:** Written informed consent for publication of their details was obtained from the patient.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: A.A., A.I.I., Concept: A.A., H.C.Y., N.K., Design: A.A., H.C.Y., N.K., Data Collection or Processing: A.A., R.I., A.I.I., Analysis or Interpretation: A.A., R.I., N.K., Literature Search: A.A., Writing: A.A., R.I.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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