



## Case Report

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# Solitary Intra-cerebral Metastasis of Breast Malignancy-A Case Report

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## Abstract

Usually 10-15% of breast cancer patients have clinically symptomatic metastasis to the CNS (1). Breast cancer metastasis to the neurocranium is seen to involve the bone, the dura or the brain parenchyma (1-2). The latter involvement is seen in advanced cases and is second most common location for brain metastasis (3). We present a case of isolated brain parenchymal metastasis of breast carcinoma without meningeal and skull involvement. Clinico-radiological correlation with 'gold standard' histopathological report was done.

**Keywords:** Breast cancer, brain parenchymal metastasis.

## Introduction

80% of brain metastasis is by the following: [2-5]

- 1.Lung cancer,
- 2.Renal cell carcinoma,
- 3.Breast cancer,
- 4.Melanoma,
- 5.Gastrointestinal adenocarcinoma (mostly colorectal carcinoma).

The exact incidence of brain metastasis is not known but estimated to be around 2,00,000 cases per year in USA alone, with a peak age group of 55-65 years range (4)

60-75% of patients can be asymptomatic at the time of imaging, which is a significant number for brain metastasis (5-6). Amongst the rest of 25-40% of symptomatic cases, proper work-up and

imaging helps, (7) however histopathology is the 'gold standard' diagnostic tool, as in our case.

We present a rare case of solitary intra-cerebral metastasis of breast carcinoma.

## Case report

A 40-year-old female, operated case of intra-ductal left breast carcinoma presented to our multi-speciality hospital with a one year follow-up history of headache, vision loss from left eye and new onset episode of seizures triggered by a flash or flicker stimulation while watching television. She also complained of slowly progressing altered mental status. She had no nuchal rigidity, vomiting, fever. On general examination, she had pallor and no organomegaly.

Her ophthalmic examination revealed a diagnosis of homonymous hemianopsia vision loss of left eye. Her Karnofsky score was 80%.

Her blood counts revealed Hb-9g%, reduced Packed cell volume- 29%, normal RBC indices, TLC-6700/cu mm, platelets-4,00,000/cu mm. Peripheral smears depicted normocytic normochromic anemia. Liver function tests and renal function tests were within normal limit. Her coagulation profile, serum electrolyte tests were within normal range. Her chest X-ray showed no abnormality. Her USG abdomen showed no organomegaly. Her CSF analysis was normal. On review of earlier reports, her stage III primary breast carcinoma was triple receptor negative tumor.

MRI brain (plain+contrast) revealed in known case of operated breast carcinoma, homogeneously

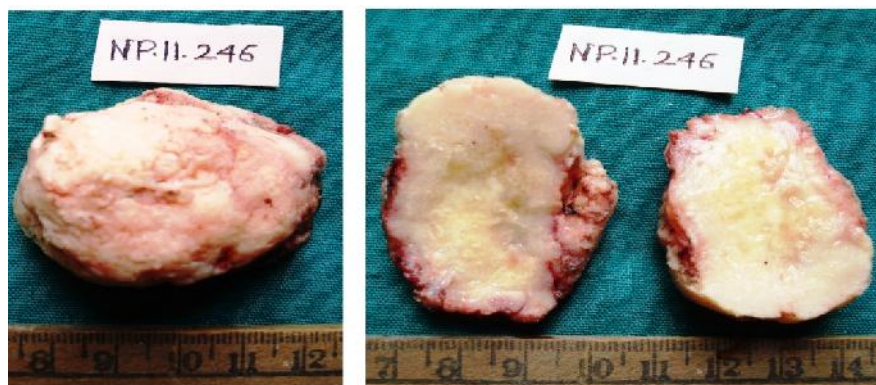
enhancing mass lesion of size 3x3.3 cms of altered signal intensity in left occipital region (Figure 1). It appears iso to hypointense on T1 and iso to hyperintense on T2 and isotense on FLAIR images. Perilesional oedema is noted. On post-contrast study, the above mentioned lesion shows strong homogenous enhancement with few non-enhancing areas within (necrotic areas). Rest of brain parenchyma appeared normal. Ventricular system appeared normal. Basal ganglia and thalami appeared normal. Basal cisterns were normal. Posterior cranial fossa structures appeared normal. No shift of mid-line structures and extra-axial collection. Skull cap appeared normal. Lepto-meningeal involvement was not seen. MRI-brain was suggestive of brain lesion metastatic in origin. CT-scan brain and PET-scan was not done, considering it must have been a smaller brain lesion.



**Figure 1:** MRI brain contrast study shows homogeneously enhancing mass lesion of 3x3.3 cm of altered signal intensity in left occipital region with few non-enhancing areas within (necrotic areas). Inset shows the measurement of the same.

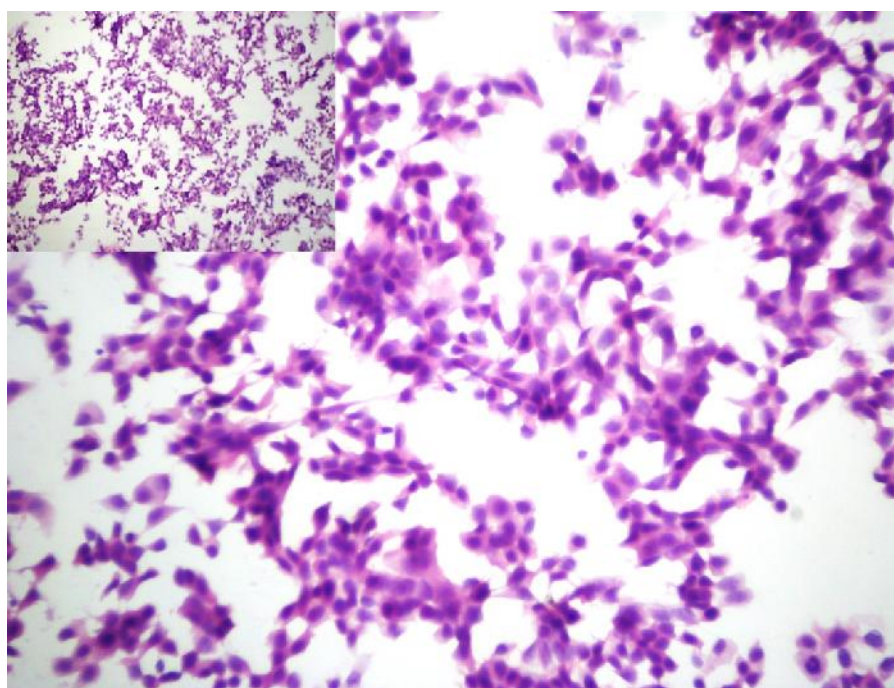
The patient was operated after two packed red cells transfusion. She underwent craniotomy with gross total resection of the tumor. The tumor was then sent to histopathology department for

excisional biopsy opinion. It was a solitary, well-circumscribed, globular, 3x3 cm, grey-white tumor, firm to hard (Figure 2).



**Figure 2:** Gross specimen (left) and cut section (right) of brain metastasis showing a solitary, well-circumscribed, globular, 3x3 cm, firm to hard, grey-white tumor.

Histopathological analysis revealed metastasis of poorly differentiated epithelial malignancy (Figure 3).



**Figure 3:** Microphotograph – Section shows a metastasis of poorly differentiated breast epithelial malignancy with sheets, clusters and singly dispersed cells. (H&E, x400). *Inset* shows the same under scanner view (H&E, x40).

The patient's symptoms improved post-operatively. She is currently responding well to chemotherapy and whole brain radiation therapy.

### **Discussion**

As cerebrum is most perfused part in CNS and because of its larger volume, it's the favored site for brain metastasis. CNS metastases constitute a

difficult clinical problem that is feared by clinicians and patients' alike. These cases are associated with neurological complaints and are main cause of death in more than half of cases (8). At autopsy, one fourth of cancer patients have intra-cranial metastases (5). Thus signifying the importance of diagnosing the same.



These patients present commonly with seizures, ataxia, nausea, vomiting, headaches, visual disturbances and mental status disturbances (6). Seizures denote extensive disease with multiple metastases and/or leptomeningeal involvement (5). Our case had seizures, headache, visual loss with single space occupying brain lesion.

The pathogenesis of intra-cerebral metastasis reveals hematogenous spread because lymphatic drainage is absent in the brain (5, 9). Metastasis produces angiogenic factors enabling the tumor to become visualized and open to blood-brain barrier locally (5,9). Metastases have stem cells like property originating from cancer initiating cells seldom making them therapy resistant. These tumor cells are also known to recruit marrow derived cells to modify the micro-environment of distant sites (1, 5).

MRI is useful for smaller brain lesions. It's superior to CT-scan of brain. CT is useful for larger brain lesions, for knowing the skull-cap destruction, secondary to metastasis from dura or brain parenchyma. Ideally CT-scan must be followed by MRI-brain for such cases (7,9). In a 2005 study, 14% patients had solitary intra-cerebral metastasis, 78% had multiple intra-cerebral metastases, remaining 8% has leptomeningeal dissemination (1). A solitary brain metastasis is defined as the only known brain metastasis of a tumor in the whole body which happens to be localized in the CNS (5). Metastases are usually spherical and well-demarcated from adjacent brain tissue, usually found at grey-white matter junctions in watershed areas of brain (5,9). We only did MRI-brain to find a solitary brain metastasis in occipital lobe without leptomeningeal and skull involvement. Skull involvement is commonly seen in brain metastases of breast malignancy (7), unlike our case.

Breast malignancy is second most common solid tumor that causes brain metastases, occurring in 10-15 % of patients (9). Median age at the time of diagnosis of primary breast carcinoma is 47 years. Brain metastases are usually detected after mean latency period of two to three years, after diagnosis of the primary breast malignancy (7).

Triple receptor negative breast tumors (ER, PgR and HER2) have more frequency of CNS metastases (8,9), like in our case. This signifies dismal prognosis and early brain metastasis. Cytological analysis of CSF is useful to exclude or establish the lepto-meningeal involvement which is common in breast malignancy (1,5). The CSF analysis was normal in our case.

Treatment includes surgery and medical management (1,5,8,9). Solitary brain lesions of more than three cm in largest dimension, limited or no systemic spread, Karnofsky score more than 70 are treated by surgical resection like in our case. Medical treatment consists of systematic symptomatic treatment. Also radio-chemotherapy, experimental therapy, integrated therapy can help (1,5,8).

Improved prognosis in such cases is due to age less than 70 years, female sex, no or controlled systemic disease, no systemic metastases within one year of diagnosis of primary breast malignancy (1,5,8,9). Our patient fits in this category.

The clinical course of patients with breast cancer is determined by the tumor stage. Stage III/ IV breast cancer patients are at risk for brain metastasis. CT-brain followed by MRI-brain are the initial diagnostic modalities but histopathology is still the 'gold standard' for diagnosis. Surgical resection of the metastatic tumor helps along with chemo-radiotherapy to prolong survival.

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