CASE REPORT

An unusual presentation of brain metastasis: Multiple skull and parenchymal lesions masquerading as infective etiology

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Abstract: Brain metastasis is a common occurrence in many solid malignancies. The radiological diagnosis is often determined with magnetic resonance imaging (MRI). We report a case of a 60-year-old lady who had headaches for two months, followed by seizures. Her MRI showed multiple skull and brain parenchymal lesions simulating an infective etiology. Further investigations revealed a primary carcinoma of the right lung. The patient showed improvement in symptoms once chemotherapy was started. Brain metastases can masquerade as infective lesions and delay the diagnosis of malignancy. A high index of suspicion is required to allow a prompt diagnosis and treatment.

Keywords: brain metastasis; infective etiology; lung carcinoma


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Introduction

Brain metastasis is a common feature with several malignancies. Eighty percent of all brain tumors are secondaries from lung cancer, renal cell cancer, breast cancer, melanoma and gastrointestinal tract cancer[1]. Around 20% of lung cancers present with brain metastasis at diagnosis[2]. They may present with headache, nausea, vomiting, seizures and/or neurodeficit depending on the location of the lesion(s). The first suspicion is often raised upon the imaging of the brain; multiple ring-enhancing lesions of the brain are one of the most commonly encountered abnormalities on neuroimaging. The differential diagnosis in such cases would include infective lesions such as tuberculosis and neurocysticercosis (NCC)[3]. Although the co-existence of NCC and intracranial neoplasms is uncommon, it has been reported in literature[4]. We present a case where the etiology was initially considered infective, but after a detailed workup, it was found to be a lung malignancy with secondary dissemination to the brain.

Case report

The patient is a 60-year-old diabetic and hypertensive lady. She presented with occasional frontal headaches of waxing and waning nature, which over a period of two months gradually progressed to continuous pain, relieved only with medication. She then developed sudden weakness in the right upper limb that was proximal at onset and the patient was not able to move her hand above her head or hold objects. Five days after the onset of the weakness, she had an episode of generalized tonic-clonic seizures (GTCS) with loss of consciousness for six hours and subsequent altered sensorium for four days. There was no history of trauma, although the patient did report having an intermittent low-grade fever for 15 days preceding the seizure episode, along with occasional breathlessness.

Non-contrast computed tomography (NCCT) of the head at this point showed hyperdensities at right occipital, left frontoparietal cortex and right high parietal cortex,
with perifocal edema and enhancement in right parietal cortex. The impression was of an inflammatory granuloma (neurocysticercosis) with focal calcified granuloma. Contrast-enhanced computed tomography (CECT) of the thorax showed consolidation involving apicoposterior segment of left upper lobe and apical segment of left lower lobe with necrotic mediastinal lymph nodes. The inference was infective etiology/carcinoma lung (Figure 1).

The patient was advised for an anti-tubercular therapy and was referred to a pulmonologist[5]. Further workup included cerebrospinal fluid (CSF) biochemistry, serology and microscopy (suggestive of partially treated septic meningitis and negative for acid-fast bacilli, bacteria, cryptococcal antigens and malignant cells), CSF culture and sensitivity (sterile) and a magnetic resonance imaging (MRI) of the brain that showed multiple ring- and nodular-enhancing lesions in cerebral, cerebellar, basal ganglia, thalamus and brainstem. The lesions were hyperintense on T2-weighted (T2W), with perilesional edema. A few lesions showed positive magnetization transfer (MT) effect with no restriction on diffusion-weighted imaging (DWI). The right parieto-occipital lesion showed T1-weighted (T1W)

Figure 1. CECT thorax coronal film (A and B) and axial films (C and D) showing lesions in left middle and upper lobe
hyperintensity. Additionally, there were multiple lesions in the scalp. There was, however, no evidence of an acute infarct. The impression was either metastasis or infective etiology (Figure 2 and Figure 3).

Upon presentation to us, the general examination was unremarkable except for mild pallor; her Glasgow Coma Scale was 11/15 (E4V2M5) with an Eastern Cooperative Oncology Group performance status of 3. There were

Figure 2. Skull lesions in MRI of the brain in axial sections

Figure 3. MRI of the brain showing multiple brain parenchymal lesions along with skull lesions without surrounding edema
several hard nodules over her scalp (~1 cm in size). Systemic examination revealed decreased motor power in all four limbs (grade 3) and spastic rigidity in right upper limb; diffuse coarse crepitation in the left lung with reduced air entry were also noted. There was no palpable lymphadenopathy. The systemic examinations were within normal limits. Given the large number of lesions on MRI (of varying sizes with a few perilesional edema), our differential diagnosis included both brain metastases and infectious etiologies. Routine blood investigations were normal except for a raised random blood sugar.

The patient was started on dexamethasone, broad spectrum antibiotics (piperacillin-tazobactam and moxifloxacin), anti-epileptics (levetiracetam), insulin and anti-hypertensives (amlodipine). CSF examination was negative for \textit{Mycobacterium tuberculosis} and fungal elements. Adenosine deaminase (ADA) was 0.70 µ/L, sugar 91 mg/dL, protein 79 mg/dL, total leucocyte count (TLC) <5 cells, and human immunodeficiency virus (HIV) was non-reactive. GeneXpert (for \textit{Mycobacterium tuberculosis}) and Cryptococcal Antigen Latex Agglutination System (CALAS) in CSF were also negative, and Toxoplasma IgM Antibody was equivocal. Skull X-ray showed multiple lytic lesions. However, fine-needle aspiration cytology (FNAC) from the scalp nodules showed poorly differentiated metastatic carcinoma.

Over the next seven days, the patient showed symptomatic improvement (GCS 13/15, power grade 4 in bilateral upper limbs) and the viewing of a right lung mass with FNAC proved diffused multiple brain and skull metastasis. She was given whole-brain radiotherapy (WBRT) 2,000 cGy in five fractions over five days. She was also started on weekly paclitaxel (100 mg) + carboplatin (150 mg), which was tolerated well. The patient has currently survived for four months, though her general condition continues to be poor.

\section*{Discussion}

Brain metastasis is the most common intracranial tumor in adults\cite{6}. Approximately 20\%–40\% patients with cancer will develop brain metastases in the course of their disease\cite{7}. Brain metastases occur in 10\%–30\% of adult with solid tumors, including lung cancer patients, consequently shortening the prognosis and survival\cite{2}. The metastases are usually located in the cerebral hemispheres (80\%) and cerebellum (15\%)\cite{8}. Metastatic brain tumors outnumber primary brain tumors by a factor of 10 to 1. Primary brain tumors are rarely multiple. The general findings in MRI is of T1 iso- to hypointense lesions showing ring enhancement with contrast, and T2 and T2-FLAIR hyperintense lesions with perilesional edema, which point to the diagnosis of brain metastasis. They can also be associated with haemorrhage. Magnetic resonance spectroscopy (MRS) and diffusion tensor imaging (DTI) can aid the diagnosis further\cite{9}. Cerebral metastasis can be associated with haemorrhage also. Brain biopsy is not necessary for patients with multiple brain metastases if there is a pre-existing primary cancer known to have a propensity for them\cite{10}.

Rarely, they can present as miliary brain metastasis with calcification or cystic lesions. They can be confused with infective lesions, more so when the lesions are small and multiple in number. Atypical presentation of cerebral NCC may mimic glioma, metastasis or cerebral abscess, or vice versa\cite{5}. The most common differential diagnosis are tuberculosis and neurocysticercosis in lesions <1–2 cm. A high index of suspicion, clinical course of the symptoms and relevant investigations can help in identifying the primary. In this particular case, the patient had both skeletal and intraparenchymal brain lesions, further confusing the diagnosis. Some cases like this have been reported\cite{10}. Although miliary lesions can be seen in tuberculosis and neurocysticercosis, they are usually limited to brain parenchyma. Metastasis in the skull bone has rarely been reported in combination with parenchymal metastasis.

The initial therapy should promptly start with corticosteroids to improve edema and neurological deficits, coupled with anti-epileptics. WBRT is the general standard for treatment, whereas surgery and radio-surgery are indicated for a single or a few brain metastases.

\section*{Conclusion}

In conclusion, in cases where there is a query regarding the diagnosis of infection or malignancy, a proper history, radiological investigations and a multidisciplinary approach can help in arriving at the diagnosis and in starting proper treatment early. Even in cases where infection is the initial differential diagnosis, a high degree of clinical suspicion of malignancy should be there to reach the proper diagnosis.

\section*{Conflict of interest}

The authors declare no potential conflicts of interest with respect to the research authorship, and/or publication of this
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References


