Metastatic Lung Adenocarcinoma: Unusual Presentation with Focal Neurological Deficit

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Financial support: None declared
Conflict of interest: None declared

Patient: Male, 63-year-old
Final Diagnosis: Metastatic lung adenocarcinoma
Symptoms: Headache • weakness
Medication: —
Clinical Procedure: Abdomen CT • brain CT • bronchoscopy • chest computed tomography • chest x-ray • endobronchial ultrasound • fine needle aspiration • MRI brain
Specialty: Critical Care Medicine • General and Internal Medicine • Oncology • Radiology
Objective: Unknown etiology
Background: Sudden focal neurologic deficits have a high index of suspicion of stroke. It is crucial to investigate potential underlying causes of sudden neurological deficit in the Emergency Department (ED) to enhance better recognition and proper care.
Case Report: A 63-year-old man presented to the ED with left-sided weakness and headache of a 2-week duration. Ischemic stroke was preliminarily diagnosis in the ED. Brain computed tomography (CT) showed an abnormality in the right parietal lobe. A chest X-ray showed right lung opacity, suggesting a mass in the right upper lobe of the lung. Subsequently, malignancy was suspected. Brain magnetic resonance imaging (MRI) showed lesions in the right temporal and right parietal region. CT scans of the chest, abdomen, and pelvis were ordered to identify the primary source of malignancy. Multiple nodules within the lungs and liver were found; a biopsy was taken from the nodules and sent to the Pathology Laboratory. Final impression made after the results was primary lung adenocarcinoma with brain and liver metastasis. The patient was referred to Palliative Care team by the Oncology team after malignancy workup to get the proper attention.
Conclusions: A hypodense area in CT/MRI with unilateral weakness and headache does not necessarily mean that there is an underlying stroke. However, it can represent brain metastasis. In this case report, we aim to increase awareness that hypodensity in the brain could represent brain metastasis, not necessarily simple ischemic stroke. Therefore, further workup should be done to avoid missed diagnoses, as the approach is different.

Keywords: Adenocarcinoma • Diagnosis, Differential • Emergency Medical Services • Ischemic Strok

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/936342
**Background**

Brain metastasis is the most common type of brain cancer. The clinical manifestations of brain metastasis include increased intracranial pressure, headache, alteration of the level of consciousness, seizures, and focal neurological deficits. Left-sided weakness is one of the recognized symptoms of brain metastasis; however, it is uncommon as the first presentation of lung adenocarcinoma [1]. The presentation of sudden focal weakness in the Emergency Department (ED) is more likely to be associated with stroke. We are herein reporting a unique case report of a patient with left-sided weakness and headache as a first presentation of lung adenocarcinoma with brain metastasis.

**Case Report**

A 63-year-old Saudi man, with no medical history and a 30-pack-year smoking history, presented to the ED with weakness involving the left upper and lower limbs as well as a headache for the previous 2 weeks. He reported unintentional weight loss of 6 kg in the previous couple of weeks, associated with lack of appetite, and gave a history of subjective fever and night sweats. He had no cough, chest pain, shortness of breath, dysphagia, or hemoptysis. He denied other neurological symptoms, including loss of consciousness, convulsions, dysarthria, dysphasia, or memory loss, according to his son. The patient’s brother died from laryngeal cancer. On the clinical examination, the patient was vitally stable, conscious, and coherent. He scored 15 of 15 on the Glasgow Coma Scale. The pupils were bilaterally equally reactive, at 3 mm. The cranial nerves were intact. On the hand examination, clubbed fingers were identified. The patient had left-sided weakness in the upper and lower limbs, with grades 4 of 5 and 3 of 5, respectively. The results of his complete blood count, liver function tests, renal function tests, amylase, lipase, and serum calcium all were within the normal range. A non-contrast computed tomography (CT) scan of the brain showed lesions with vasogenic edema in the right parietal lobe (Figure 1). A chest X-ray showed right lung opacity, suggesting a mass in the right upper lobe of the lung (Figure 2). A CT scan of the chest showed a mass in the anterior segment of the right upper lobe (Figure 3), and CT scan of the abdomen showed multiple hypodense liver lesions, indicating metastasis (Figure 4). The impression was a primary lesion in the lung with brain and liver metastasis. Magnetic resonance imaging (MRI) of the brain showed evidence of 2 ring-enhancing lesions within the right temporal and right parietal region, with extensive perifocal edema showing mild diffusion restriction and midline shift towards the left side (Figure 5). A bronchoscopy was unremarkable. Endobronchial ultrasound-guided fine-needle aspiration was done, and the biopsy was taken from the 4R lymph node; a total of 6 specimens were taken. Three specimens were stained with Diff-Quik stain and 3 were prepared unstained. The slides were fixed by Spray-Cyte and sent to the Pathology Laboratory, which showed that the patient’s sample was positive for malignancy, since there were clusters of malignant epithelial cells with enlarged hyperchromatic pleomorphic nuclei with coarse chromatin. Cell-block immunostaining showed positive reactivity of the malignant cells to CK-7, TTF-1, and focally for Napsin-A. These findings indicated primary lung adenocarcinoma. The patient had stage IV metastatic lung adenocarcinoma. The patient was admitted to the hospital for a malignancy workup with weakness in the left side of the body. Dexamethasone was started at a loading dose of

**Figure 1.** (A, B) Computed tomography of the brain (non-contrast) showed vasogenic edema at the right frontoparietal lobe, right high parietal lobe, and right basal ganglia associated with a 3-mm of midline shift to the left side.
10 mg intravenously and continued on a regular dose, and levetiracetam 500 mg orally was started for prophylaxis to prevent convulsions. The patient followed up with the Oncology Department for staging and prognosis. Afterward, the patient was referred to the Palliative Care team.

**Discussion**

Brain metastasis is considered the most frequent type of brain cancer. Lung, melanoma, and breast cancer most commonly metastasize to the brain by passing through the blood and crossing the blood-brain barrier [2]. The clinical features vary depending on the involved site of the brain and usually manifest as headache, nausea and vomiting, convulsions, vision disturbances, dysarthria, and weakness [3]. Left- or right-sided weakness is
a less common primary presentation of brain metastasis from lung carcinoma, with a reported incidence of neurological presentations and focal deficits of 61.3% [4]. It is important to note that studies regarding the incidence of focal neurologic deficits in patients with lung cancer are limited, and the true incidence cannot be accurately determined. A lower incidence of primary focal neurologic deficit in patients with undiagnosed lung cancer makes it difficult to relate focal neurologic deficits with the diagnosis of lung cancer, especially in the ED, where more often than not the primary objective is to rule out life-threatening conditions. Ironically, in the present case, the patient had visited a different hospital prior to his presentation, and he was given a diagnosis of headache and discharged.

A case was reported in 2013 of a male patient who was referred from the ED with a history of left-sided weakness, dyspraxia, and dysarthria for a 1-month duration and was diagnosed with primary left-sided lung cancer with extensive metastasis.

Another case was reported in 2002 of a 66-year-old woman who was admitted to the Neurosurgery Department with a history of dizziness, headache, and numbness of the left arm for 1 month before admission. The left arm showed hypesthesia and mild hemiparesis. A diagnosis of lung cancer with multiple brain metastasis was made. Brain lesions were treated using gamma knife radiology. After treatment, the patient was given oral administration of gefitinib.

In our case, the patient presented to the ED with a 2-week history of left upper and lower limb weakness and headache. Primary lung adenocarcinoma with brain metastasis was diagnosed.

In comparison, headache was a common symptom of the cases mentioned. However, treatment was different. The treatment for our case was dexamethasone and levetiracetam, while another case used gamma knife radiology and gefitinib. Our patient was referred to palliative care, and other patients were able to recover.

When lung cancer is suspected, there are some laboratory and radiological investigations to be done to confirm the diagnosis and to exclude possible metastasis. Abnormal laboratory results, such as hypercalcemia, anemia, and electrolyte imbalance, could indicate possible underlying malignancy. A chest X-ray is the initial radiological investigation done, followed by chest CT. Positron emission tomography with fluorodeoxyglucose is used for the detection of metastasis. Also, CT of the abdomen is used to detect liver metastasis. MRI helps in the detection of the invasion of the tumor to the great blood vessels, heart chamber, chest wall, and spinal cord. CT and MRI should be done to rule out brain metastasis. In the present case, all the laboratory investigations were within the normal range. However, CT of the brain, MRI of the brain, chest X-ray, chest CT, and abdominal CT all showed abnormalities, including brain metastasis, lung nodules, and liver metastasis, respectively [5].

MRI with contrast is the criterion standard diagnostic method in patients with suspected brain metastasis. Metastasis can affect any compartment of the central nervous system. However, it most commonly affects the skull or the brain parenchyma. There are different cases reported with the condition. A case was reported in 2013 of a 59-year-old man who presented with headache and problems with balance. A T1-weighted MRI with contrast showed ring enhancement and extensive vasogenic edema. A biopsy was taken from a lung mass and showed non-small cell lung cancer.

In another case of a 44-year-old woman, CT was done and showed left frontal hemorrhage with hyperdense lesions. T1-weighted MRI with contrast showed multiple lesions with enhancement. Also, a biopsy revealed small cell lung cancer [6]. In the present case, a brain MRI showed 2 ring-enhancing lesions within the right parietal and temporal region with perifocal edema, and the biopsy result showed lung adenocarcinoma.

**Conclusions**

A hypodense area in CT/MRI with unilateral weakness and headache does not necessarily mean that there is an underlying stroke. However, it can represent brain metastasis. In this case report, we aim to increase awareness that the hypodensity in the brain could represent brain metastasis, not necessarily simple ischemic stroke. Therefore, further workup should be done to avoid missed diagnoses, as the approach is different.

**Department and Institution Where Work Was Done**

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**Declaration of Figures’ Authenticity**

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.
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