

Neuroimaging findings: Head CT scan and MRI in multiple cerebral infarctions mimicking cerebral abscesses: A case report and literature review

Muhammad Yunus Amran, Muhammad Fajrin Hidayah

ABSTRACT

Introduction: A stroke is defined by the American Heart Association (AHA) and the American Stroke Association (ASA) as the sudden onset of neurological deficits lasting over 24 hours or resulting in death, without an apparent cause other than of vascular origin and one of the leading causes of death in developed countries. Acute stroke is diagnosed based on clinical characteristics and radiographic imaging. Acute ischemic stroke and acute intracranial infection can be difficult to distinguish.

Case Report: A 37-year-old male patient presented with a 5-day history of impaired verbal responsiveness. Additionally, he reported a 5-month history of right-sided hemiparesis accompanied by headaches, with a noted exacerbation of symptoms over the past two weeks. The patient had uncontrolled hypertension. He had no history of diabetes or cardiovascular disease. He was admitted to the hospital with a blood pressure of 150/80 mmHg. On physical examination, the patient was found to be compos

mentis. Motor assessment revealed reduced movement in the right extremities, with muscle strength rated at 4/5, increased muscle tone, and hyperreflexia (3+) in the right extremities. The Babinski reflex was positive on the right side. Sensory evaluation was inconclusive. The computed tomography scan (CT-scan) image without contrast showed bilateral cerebral abscesses; however, magnetic resonance imaging (MRI) of the head without contrast revealed a chronic infarction in the right temporal area and multiple subacute infarctions in the left temporoparietal area. Cerebral digital subtraction angiography (C-DSA) revealed a complete occlusion of the M1 segment of the left middle cerebral artery (MCA). The therapeutic intervention for these patients included the administration of piracetam, aspirin (aspilet), clopidogrel, atorvastatin, and amlodipine. The patients were administered piracetam, aspilet, clopidogrel, atorvastatin, and amlodipine.

Conclusion: Patients with cerebral infarction may develop clinical and radiological characteristics that are similar to those of a cerebral abscess. Cerebral abscesses may cause abrupt focal “stroke-like” symptoms, and MRI may show brain lesions with limited diffusion and little contrast enhancement, mimicking an acute infarction.

Keywords: Cerebral abscess, Cerebral digital subtraction angiography (C-DSA), Neuroimaging finding, Subacute infarction

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INTRODUCTION

A stroke is defined by the American Heart Association (AHA) and the American Stroke Association (ASA) as the sudden onset of neurological deficits lasting over 24 hours or resulting in death, without an apparent cause other than of vascular origin and one of the leading causes of death in developed countries. It occurs when a cerebral blood vessel is occluded by a thrombus (ischemic stroke) or ruptures (hemorrhagic stroke), precipitating an acute interruption of cerebral blood flow and oxygen supply. This ischemic insult triggers rapid neuronal injury or death, highlighting the urgent need for timely medical intervention to minimize neurological sequelae. Acute stroke is typically diagnosed using clinical characteristics and neuroimaging findings. However, distinguishing acute ischemic stroke from acute intracranial infection can be challenging [1–4]. In this case report, we present a unique instance where initial clinical presentation and neuroimaging findings suggested a cerebral abscess. However, further investigation revealed sub-acute ischemic stroke with multiple infarcts. This highlights the diagnostic complexities and underscores the critical role of thorough investigations, including MRI of the head, in differentiating between stroke and other potential differential diagnoses when confronted with stroke-like symptoms. Such detailed evaluations are essential in refining treatment strategies and enhancing our comprehensive understanding of stroke-related pathophysiology.

CASE REPORT

A 37-year-old male patient presented with a 5-day history of impaired verbal responsiveness. Additionally, he reported a 5-month history of right-sided hemiparesis accompanied by headaches, with a noted exacerbation of symptoms over the past two weeks. The patient also suffers from hypertension, but does not take medication regularly. The patient had no history of diabetes mellitus or heart disease. His blood pressure measurement was 150/80 mmHg when he was admitted to the hospital. On physical examination, the patient was found to be compositis. Motor assessment revealed reduced movement in the right extremities, with muscle strength rated at 4/5, increased muscle tone, and hyperreflexia (3+) in the right extremities. The Babinski reflex was positive on the right side. Sensory evaluation was inconclusive. There is no history of fever in this patient, which is consistent with clinical findings suggesting no immunocompromised state and no documented history of contact with individuals affected by infectious diseases.

The CT-scan image without contrast showed a presumed bilateral cerebral abscess (Figure 1); however, MRI of the head without contrast revealed a chronic infarction in the right temporal area and several subacute infarctions in the left temporoparietal area (Figure 2).

Cerebral digital subtraction angiography (C-DSA) demonstrated a total occlusion of the M1 segment of the left middle cerebral artery (MCA) (Figure 3). The patients were administered piracetam, aspilet, clopidogrel, atorvastatin, and amlodipine.

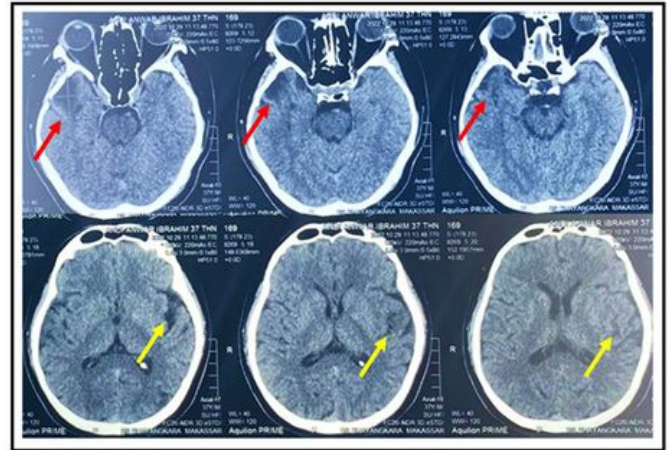


Figure 1: Hypodense lesion with relatively firm boundaries, fluid attenuation in the parenchyma of the right temporal lobe (diameter ±2.5 cm) (red arrow) and in the left temporal lobe (diameter ±1.7 cm) (yellow arrow), Impression: Suspected bilateral cerebral abscess.

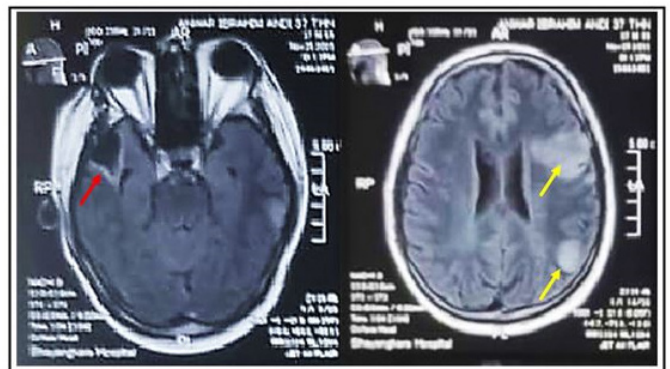


Figure 2: Non-contrast MRI of the patient’s head shows chronic infarction in the right temporal area (red arrow), and multiple subacute infarctions in the left temporoparietal region (yellow arrow).

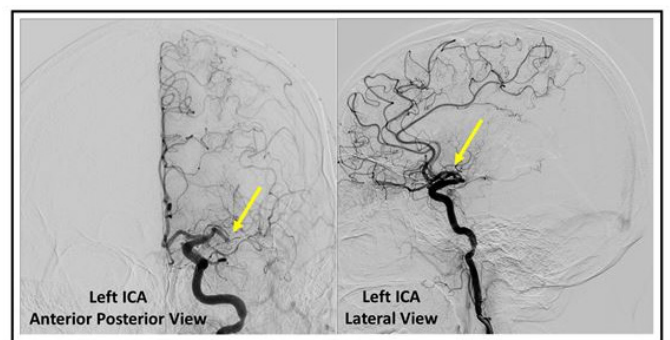


Figure 3: Cerebral angiography shows total occlusion of the M1 segment of the left middle cerebral artery (MCA) (yellow arrow). ICA: internal carotid artery.

DISCUSSION

Neuroimaging plays a crucial role in the management of stroke patients, especially those with acute ischemic stroke. It serves multiple purposes, including differentiation from stroke mimics, such as migraine headaches, tumors, seizures, metabolic disorders, and peripheral or cranial nerve disorders. Additionally, neuroimaging aids in early detection of hemorrhagic stroke, distinguishing irreversibly damaged tissue from potentially salvageable areas, identifying vascular malformations, and planning interventions, such as intravenous thrombolysis and intra-arterial thrombectomy. Moreover, it helps in predicting final outcomes for stroke patients [3, 5–8].

This case demonstrates how the clinical and radiological symptoms of patients with cerebral infarction can develop and be misinterpreted for cerebral abscesses. Cerebral abscesses may cause acute focal “stroke-like” symptoms, and MRI may reveal brain lesions with limited diffusion and little contrast enhancement, resembling acute infarction. Although cerebral abscess is less common than ischemic infarction, understanding potential parallels in the clinical and imaging aspects of these two conditions allows us to make an accurate diagnosis and initiate with appropriate treatment [3].

Typical symptoms of a cerebral abscess include a slowly developing headache, diminished consciousness, and neurological impairment. Although the specific mechanism of stroke-like symptoms caused by a bacterial cerebral abscess is uncertain, paroxysmal septic embolism or primary cerebral infarction linked with systemic bacteremia is thought to be one possibility. The differential diagnosis of an abscess depends on the stage at which it develops. Early-stage cerebritis is difficult to define since it can mimic a variety of disorders, including cerebral ischemia and neoplasms. In previous reports, brain imaging was mainly restricted to CT, and the authors proposed that having a prompt MRI scan could help minimize misdiagnosis of a cerebral abscess. Despite the use of high-quality MRI, misdiagnosis can still occur [3, 4].

Several MRI characteristics make it difficult to discern between an abscess and an acute stroke. First, acute cerebral ischemia is characterized by a strong DWI signal and a low signal on the associated ADC map. However, this finding is not diagnostic of acute stroke because it can also be found in cerebral abscesses, acute demyelinating disorders, recurrent seizures, and brain tumors that are not associated with these conditions. The strong DWI signal of a cerebral abscess is caused by the high viscosity of the pyogenic exudate, which restricts water diffusion. Cerebral abscesses typically cause DWI signal anomalies in their center location. Cerebritis with unformed abscesses can produce an aberrant diffusion-weighted imaging (DWI) pattern, with more homogeneous diffusion anomalies in isolated or multifocal areas of brain tissue, as seen in acute ischemia infarction. Second,

contrast enhancement is typically seen in cerebral abscesses but not acute strokes. Third, cerebral abscesses are usually associated with severe vasogenic edema, but acute strokes are not [3, 9, 10].

CONCLUSION

Neuroimaging has a critical role in sub-acute ischemic stroke. The case above is a good illustration of how neuroimaging helped to demonstrate that radiographs of patients with cerebral infarction could develop and be misinterpreted as cerebral abscess. Cerebral abscesses may cause acute focal “stroke-like” symptoms, and MRI may reveal brain lesions with limited diffusion and little contrast enhancement, resembling acute infarction. Thus, the authors propose that having a timely MRI scan can prevent misdiagnosis of a cerebral abscess, while it is still crucial to be aware of numerous MRI characteristics that make it difficult to distinguish between an abscess and an immediate stroke.

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Author Contributions

Muhammad Yunus Amran – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Muhammad Fajrin Hidayah – Analysis of data, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Guarantor of Submission

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Consent Statement

Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

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