

Bilateral Middle Cerebral Artery Stroke: Stroke Chameleon—Diagnostic and Management Challenges

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Abstract

The middle cerebral artery (MCA) territory is the most frequently affected area in stroke patients, and its neurological deficit depends on the extent of the infarct and hemispheric dominance. However, bilateral occlusion of the MCA is exceedingly rare, occurring in less than 1% of stroke cases. Bilateral MCA infarction is an exceptionally rare condition that often leads to poor outcomes, with patients often experiencing diffuse cerebral oedema, brain herniation, decerebral posturing, and, in some cases, death. We present a case of a 30-year-old gentleman who presented to a district hospital with status epilepticus, was transferred to a tertiary hospital for brain CT and was found to have bilateral MCA infarction. This case demonstrates that stroke can present with atypical or subtle symptoms, making it difficult to diagnose and treat, as symptoms may not follow the usual patterns and present with severe symptoms.

Keywords: *bilateral MCA infarct, atypical stroke presentation, stroke chameleon, diagnostic challenges*

INTRODUCTION

Bilateral middle cerebral artery (MCA) infarction is an exceptionally rare and severe form of stroke that accounts for less than 1% of all cases^{1,2}. Unlike other typical unilateral MCA strokes, which commonly present with focal deficits such as hemiparesis, aphasia, or hemispatial neglect, bilateral MCA infarctions can manifest with atypical or diffuse neurological symptoms, leading to diagnostic ambiguity³. This “stroke chameleon” presentation often includes subtle cognitive changes, generalised weakness, or altered mental status, symptoms that overlap with numerous other neurological and systemic conditions^{1,2,4}.

The atypical presentation of bilateral MCA infarcts complicates the diagnostic process and may result in delays in recognition and treatment, potentially worsening patient outcomes. Given its high risk of complications, including diffuse cerebral edema, brain herniation, and a significantly increased mortality rate, early detection and intervention are critical^{1,2,4}. This case report explores the clinical challenges associated with bilateral MCA infarction and highlights the importance of advanced imaging and clinical vigilance in accurately diagnosing this rare yet life-threatening pathology.

CASE PRESENTATION

A 30-year-old gentleman with a known case of chronic rheumatic heart disease with mitral stenosis and valvular atrial fibrillation on warfarin (defaulted treatment) presented to a district hospital with sudden onset of seizures at 3.30 PM while talking to his wife. He was well with no history of trauma prior to the seizure. This is the first episode of seizure, and the wife described it as generalised tonic-clonic movement of the upper limb and lower limb with drooling of saliva for a duration of more than 30 minutes and with no regain of consciousness after the seizure stopped.

Upon arrival at the district hospital, the patient had a low GCS score (4/15) and was experiencing respiratory distress. Owing to the patient's critical condition, intubation was performed, and the patient was planned for transfer to a tertiary hospital for computed tomography (CT) brain imaging. The initial impression was status epilepticus, to rule out intracranial bleeding. No specific clues or neurological findings were obtained at that time.

The patient was transferred to the nearest tertiary hospital, arriving at 8:30 PM. CT brain imaging revealed cerebral edema, hypodensity in both the anterior cerebral artery (ACA) and MCA territories, and loss of gray-white differentiation but no midline

shift. A follow-up CT angiography and CT venography confirmed bilateral MCA infarction. Given the diffuse neurological symptoms and radiological findings, neither intravenous thrombolytic therapy nor mechanical thrombectomy was performed on this patient, but the patient was referred to neurosurgical team for a potential decompressive craniectomy.

However, owing to the poor prognosis and other considerations, the family declined surgical intervention and chose conservative management. During the hospital stay, the patient developed aspiration pneumonia and unstable atrial fibrillation. Sadly, on the third day of hospitalization, the patient could not survive and passed away 72 hours after the initial insult.

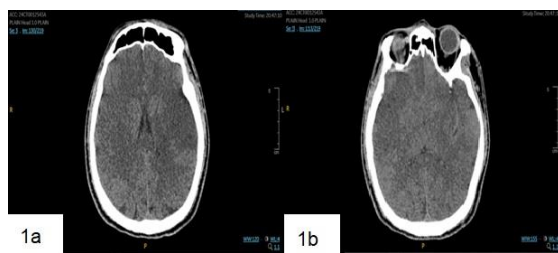


Figure 1a & 1b – Ill-defined hypodensity at the bilateral frontoparietotemporal, bilateral insular ribbon, internal capsule and left lentiform nucleus.

DISCUSSION

A few cases of bilateral MCA infarction have been reported where patients initially presented with symptoms on one side, which later worsened or progressed to involve the other side^{2,4,5}. This pattern highlights the dynamic and evolving nature of bilateral infarcts, where initial neurological deficits may obscure the true extent of the condition and are easier to diagnose than atypical manifestations. In atypical cases, patients may present with symptoms that do not fit classic stroke criteria, such as generalised weakness, confusion, or nonspecific cognitive changes^{1,2,4}. This can lead to diagnostic uncertainty, as these symptoms overlap with other neurological conditions, including metabolic disturbances, seizures, and encephalopathy.

In this case, the patient presented at the district hospital with status epilepticus, but the absence of neurological findings and lack of advanced imaging delayed a definitive diagnosis of bilateral MCA infarction. Patients with conditions such as valvular AF should be flagged for immediate stroke evaluation if they present with neurological symptoms and should implement stroke pathways for rapid assessment and transfer to tertiary care. Advanced imaging, such as magnetic resonance imaging and CT angiography, is essential for confirming bilateral MCA involvement when initial clinical symptoms are ambiguous^{3,6}. This

consideration is important for planning appropriate interfacility transfers to hospitals with CT imaging facilities, thus facilitating proper patient care. Acknowledging the potential risk of deterioration during transfer will also allow the referring team to allocate a proper escort team (ideally with a senior doctor) via appropriately equipped ambulances (i.e., Type A ambulances that equipped with advanced life support equipment).

Patients with bilateral MCA infarction also have a high probability of poor outcomes, including severe complications such as diffuse cerebral oedema, increased intracranial pressure, and herniation, often leading to a decreased posture or death^{2,4}. This prognosis underscores the importance of early detection and prompt management. To our knowledge, six reported cases of mechanical thrombectomy of the acute bilateral MCA infarction have been published (Table 1) over the past five years.

In 2019, Storey et al. successfully performed mechanical thrombectomy in simultaneous MCA occlusion; only slight neurological deficits remained⁷. In the same year, Jeromel et al. reported a case of aggravated symptoms during intravenous thrombolytic therapy, and the patient became comatose. The patient ultimately underwent mechanical thrombectomy, but the procedure did not lead to improved functional outcomes⁸. London et al. (2019) and Govindappa et al. (2022) reported a case of bilateral MCA occlusion in which bilateral thrombectomy was performed following the failure of intravenous thrombolysis. The patient ultimately recovered without residual deficits^{5,6}. In another case report by Heyworth et al. (2020) and White et al. (2023), they successfully performed bilateral mechanical thrombectomy and achieved a complete recovery in patients whose symptoms progressed from one side to bilateral symptoms during transportation to a tertiary hospital^{2,4}.

Unfortunately, in this patient, the presence of diffuse neurological symptoms and significant hypodense lesions in the bilateral MCA territories, along with cerebral edema on CT imaging, indicated a poor prognosis. As a result, the patient was offered a decompressive craniectomy rather than intravenous thrombolysis or mechanical thrombectomy. While aggressive interventions, such as surgical decompression, are effective in managing intracranial pressure and improving functional outcomes in many cases of unilateral malignant MCA infarction, to our knowledge, no studies have reported that decompressive craniectomy is performed for bilateral MCA infarction with diffuse cerebral edema to compare the significant improvements in functional

outcomes⁹. The decision to proceed with decompressive craniectomy in bilateral MCA infarctions is complex and depends on various factors,

including the patient's neurological status, the extent of brain injury and the overall prognosis.

Table 1: Six reported cases of mechanical thrombectomy in acute bilateral MCA infarction

No	Aurthor(s), year	Age	Presentation	Management	Prognosis
1	Storey et al. 2019	64	Hemiparesis/hemiplegia	Aspiration + stent-retriever	Minor deficit
2	Jeromel et al. 2019	77	Hemiplegia/dysarthria, progressing to coma	Aspiration	Severe deficit
3	London et al. 2019	84	Aphasia/faciobrachial palsy/seizures	Aspiration + stent-retriever	No deficit
4	Heyworth et al. 2020	69	Hemiplegia progressing to bilateral/aphasia	Aspiration	Minor deficit
5	Govindappa et al. 2022	65	Hemiparesis/aphasia post TAVI	Aspiration + stent-retriever	No deficit
6	White et al. 2023	70	Hemiparesis/aphasia, progressing to bilateral	No data	Minor deficit

CONCLUSION

The occurrence of bilateral MCA infarction with atypical presentation highlights the need for clinicians to maintain a high index of suspicion for stroke, even when symptoms are subtle or nonspecific. Early detection and timely intervention are critical, and advanced imaging, such as MRI and CT angiography, remains essential for accurate diagnosis and guiding therapeutic decisions. While mechanical thrombectomy has shown promise in a few cases of acute bilateral MCA occlusions with favourable outcomes, its effectiveness is highly case dependent. The multidisciplinary approach, timely imaging, and individualised care are paramount in optimising the management and prognosis of bilateral MCA infarctions.

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