

Case Report

Sequential mechanical thrombectomies in acute bilateral middle cerebral artery strokes: A case report and review of literature

Subash Phuyal¹, Baburam Pokhrel², Ritesh Lamsal³ , Biswamohan Mishra⁴, Manoj Kumar Nayak⁵

Departments of ¹Neuroimaging, Interventional Neuroradiology and ²Neurology, Upendra Devkota Memorial National Institute of Neurological and Allied Sciences, Kathmandu, Nepal, ³Department of Anaesthesiology, Tribhuvan University Teaching Hospital, Kathmandu, Nepal, ⁴Department of Neurology, All India Institute of Medical Sciences, New Delhi, India, ⁵Department of Radiodiagnosis, All India Institute of Medical Sciences, Bhubaneswar, Odisha, India.

ABSTRACT

Simultaneous occlusion of both middle cerebral arteries (MCAs) is very rare and usually devastating. Few case reports are available in the literature where bilateral thrombectomy was done simultaneously to remove the clot. High NIH stroke scale with a low level of consciousness can be a clue for the diagnosis. Timely intervention is necessary to decrease morbidity and mortality in these patients. We also reviewed the existing literature where mechanical thrombectomies were done for bilateral MCA stroke in PubMed, Google Scholar, Cochrane, and Embase. Herein, we report a case of 47-year-old female having rheumatic heart disease presented with simultaneous bilateral MCAs occlusion, treated with mechanical thrombectomies successfully.

Keywords: Bilateral middle cerebral artery occlusion, Stroke, Atrial fibrillation, Mechanical thrombectomy

INTRODUCTION

Simultaneous occlusion of both middle cerebral arteries (MCAs) is uncommon, with an incidence of <1% incidence of total stroke.^[1] Bilateral MCA occlusions usually have a poor prognosis leading to coma and death, resembling basilar artery stroke. Cardioembolic stroke can have higher in-hospital mortality compared to atherothrombotic and lacunar strokes.^[2] Very few case reports of bilateral vessel occlusions (LVOs) were published in the literature, and the optimal management strategies are still unknown. Herein, we report a case of a middle-aged female, who presented to our hospital with bilateral MCA strokes and atrial fibrillation (AF), managed successfully with bilateral mechanical thrombectomy.

CASE REPORT

A 45-year-old female with a previous history of rheumatic heart disease (RHD) presented to emergency with decreased responsiveness and right-sided weakness for the past 3 h. On examination, power in the right upper and lower limbs was 1/5 and 3/5, and the left side was 4/5. The initial NIH stroke scale (NIHSS) was 25, with a heart rate of 166/min. Ten minutes after arriving at the hospital, her sensorium

deteriorated to E1V1M5. Magnetic resonance imaging (MRI) brain and magnetic resonance angiography of neck and cranial vessels showed acute infarcts in both corpus striatum with non-visualization of the left M1 MCA, right Internal carotid artery, MCA, and its branches [Figure 1a-e]. She was taken up for mechanical thrombectomy, which was completed within 108 min of presentation to the hospital. In the interventional laboratory, after placing the guide in the bilateral internal carotid arteries, left followed by right, mechanical thrombectomy was done using the aspiration device (ACE68, penumbra). After the first pass on each side, complete recanalization (TICI3) flow was achieved [Figure 1f-i]. We tried thrombectomy on the left side first due to the dominant hemisphere. There were no technical complications, and the time taken from the onset of symptoms to recanalization was approximately 168 min. After the procedure, the patient was extubated, E4V5M6 and power in all four limbs was 5/5, without any apparent neurological deficits. The patient was noted to have AF and was started on metoprolol (50 mg OD) and warfarin (3 mg OD) after thrombectomy. Echocardiography revealed RHD with moderate mitral stenosis, mitral regurgitation, and tricuspid regurgitation. No clot or mass with the left

*Corresponding author: Manoj Kumar Nayak, Department of Radiodiagnosis, All India Institute of Medical sciences, Bhubaneswar, Odisha, India. tuna.manoj@gmail.com

Received: 19 January 2024 Accepted: 09 February 2024 Epub ahead of print: 12 March 2024 Published: 07 May 2024 DOI: 10.25259/JNRP_26_2024
Supplementary material available on: https://doi.org/10.25259/JNRP_26_2024

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, transform, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms. ©2024 Published by Scientific Scholar on behalf of Journal of Neurosciences in Rural Practice

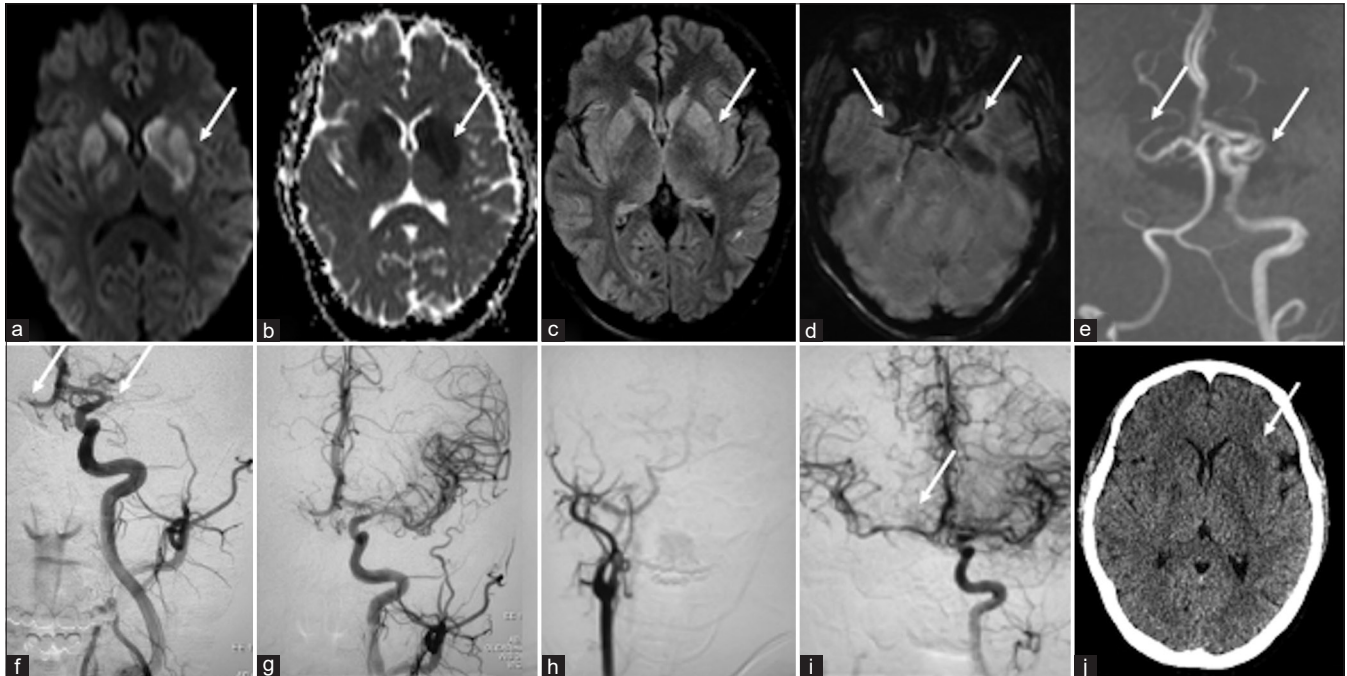


Figure 1: Magnetic resonance imaging (MRI), digital subtraction angiography (DSA), computed tomography (CT) images of the patient with bilateral middle cerebral artery (MCA) stroke. (a) MRI of brain axial diffusion-weighted imaging, (b) apparent diffusion coefficient, (c) fluid-attenuated inversion recovery showed acute infarcts (white arrows) in bilateral basal ganglia with (d) susceptibility weighted image showed blooming within bilateral MCA (white arrows). (e) Magnetic resonance angiography and (f) DSA image showed both M1 MCA cutoff (white arrows). (g-i) DSA image showed complete recanalization (white arrow) of both MCAs post-thrombectomy. (j) Follow-up CT scan after 48 hours established infarcts in both corpus striatum (white arrow).

ventricular ejection fraction was 60%. Post-procedure computed tomography on day one showed infarct in both basal ganglia with no new-onset infarcts in the brain parenchyma [Figure 1j]. She was discharged from the hospital on day 4 without having any neurological deficit.

DISCUSSION

Simultaneous occlusion of the bilateral MCAs can be attributed to cardiac etiology, such as AF with clot, cardioembolism, aortic dissection, and COVID-19.^[3,4] In a clinical study, cardioembolism was found to cause infarcts in the anterior cerebral artery (ACA) territory in up to 45.1% of patients. In addition, cardioembolism as a stroke mechanism was identified as an independent variable associated with ACA stroke compared to posterior cerebral artery infarction.^[5] Clinically, these patients can present as bilateral paresis, decerebrate rigidity or coma with intact brainstem reflexes. Higher NIHSS is usually associated with multivessel occlusion leading to higher morbidity and mortality in these patients. A timely intervention is required for early restoration of cerebral perfusion to achieve a good outcome, and it also depends on collateral status within the brain parenchyma. Intravenous thrombolysis using recombinant tissue-type plasminogen activator is more effective in managing distal artery occlusion within 4.5 h of

stroke onset; however, it is less effective in LVO strokes.^[6] The CT perfusion (CTP) is required for assessment of the core and penumbra in stroke patients, who presented with a late window (6–24 h). The CTP is essential for assessing core and penumbra in stroke patients presenting within the late window period (6–24 h). In a meta-analysis, patients selected for mechanical thrombectomy using CTP demonstrated higher rates of successful reperfusion and lower rates of mortality compared to patients assessed with non-contrast CT alone in the late window period.^[7] Endovascular therapy has shown promising results in patients with LVO stroke in the past few years. However, the optimal endovascular treatment of simultaneous occlusion of bilateral MCA has not yet been optimized. So far, only ten case reports have been published in the literature where endovascular treatment was performed for bilateral ICA and/or MCA occlusions using aspiration catheters and stent retrievers described in Supplementary Table 1.^[3,4,8–13] Both stent retriever and aspiration techniques were equally effective in treating acute ischemic stroke; however, lesser procedure times can be observed with the aspiration technique, and their outcomes depend upon age as evidenced by a recent meta-analysis.^[14] Sequential thrombectomies were commonly done for both side strokes in most of the above studies except by Larrew *et al.* and Khanna *et al.*, where

two neurointerventionists did simultaneous bilateral thrombectomies.^[4,15] The main limitation of this procedure is that it requires two neurointerventionists and human resources for simultaneous bilateral thrombectomies to decrease the time to recanalization. In addition, a limited number of case studies are available in the literature regarding the outcomes of these patients and the optimization of the techniques. The team must coordinate to achieve a good outcome, as it is a challenging procedure. Managing multivessel occlusion (MVO) poses significant challenges, and there is currently limited published data regarding the optimal approach for treatment sequencing. Potential options include prioritizing treatment based on the dominant hemisphere or large penumbra (as determined by fluid-attenuated inversion recovery/diffusion mismatch on MRI or CTP), the symptomatic ischemic side, the occlusion that is easier to treat or prioritizing based on expected faster recanalization. Therefore, further studies are necessary to determine the best sequence for the endovascular management of MVO.

CONCLUSION

Bilateral simultaneous MCA occlusions are rare, which can cause severe neurologic deficits. High NIHSS with a low level of consciousness can be a clue for the diagnosis of this devastating condition. Timely intervention is necessary to reduce morbidity and mortality in these patients. As only a few case reports are in the literature, more studies are required to assess simultaneous and sequential thrombectomy outcomes.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Kwon SU, Lee SH, Kim JS. Sudden coma from acute bilateral internal carotid artery territory infarction. *Neurology* 2002;58:1846-9.
2. Arboix A, Vericat MC, Pujades R, Massons J, García-Eroles L, Oliveres M. Cardioembolic infarction in the Sagrat Cor-Alianza hospital of Barcelona stroke registry. *Acta Neurol Scand* 1997;96:407-12.
3. Dietrich U, Graf T, Schäbitz WR. Sudden coma from acute bilateral M1 occlusion: Successful treatment with mechanical thrombectomy. *Case Rep Neurol* 2014;6:144-8.
4. Khanna O, Hafazalla K, Saiegh FA, Tahir R, Schunemann V, Theofanis TN, *et al.* Simultaneous bilateral mechanical thrombectomy in a patient with COVID-19. *Clin Neurol Neurosurg* 2021;206:106677.
5. Arboix A, García-Eroles L, Sellarés N, Raga A, Oliveres M, Massons J. Infarction in the territory of the anterior cerebral artery: Clinical study of 51 patients. *BMC Neurol* 2009;9:30.
6. Bhatia R, Hill MD, Shobha N, Menon B, Bal S, Kochar P, *et al.* Low rates of acute recanalization with intravenous recombinant tissue plasminogen activator in ischemic stroke: Real-world experience and a call for action. *Stroke* 2010;41:2254-8.
7. Kobeissi H, Ghozy S, Adusumilli G, Bilgin C, Tolba H, Amoukhteh M, *et al.* CT perfusion vs noncontrast CT for late window stroke thrombectomy: A systematic review and meta-analysis. *Neurology* 2023;100:e2304-11.
8. Pop R, Manisor M, Wolff V, Habashy M, Rouyer O, Kehrlı P, *et al.* Endovascular treatment in two cases of bilateral ischemic stroke. *Cardiovasc Intervent Radiol* 2014;37:829-34.
9. Braksick SA, Robinson CP, Wijdicks EFM. Bilateral middle cerebral artery occlusion in rapid succession during thrombolysis. *The Neurohospitalist* 2018;8:102-3.
10. Storey C, Lebovitz J, Sweid A, Tjoumakaris S, Gooch R, Rosenwasser RH, *et al.* Bilateral Mechanical thrombectomies for simultaneous MCA occlusions. *World Neurosurg* 2019;132:165-8.
11. London D, London F, Vandermeeren Y, Deprez FC. Successful double mechanical thrombectomy in bilateral M1 middle cerebral artery occlusion. *Acta Neurol Belg* 2020;120:211-3.
12. Heyworth PB, Peterson M, James W, Lyons D. Bilateral middle cerebral artery occlusions: Case report detailing successful treatment with timely mechanical thrombectomy. *Radiol Case Rep* 2020;15:362-6.
13. Wu K, Yaeger KA, Kellner CP, Shoirah H. Bilateral middle cerebral artery occlusions treated with simultaneous bilateral thrombectomy: An approach to multivessel occlusions. *BMJ Case Rep* 2021;14:e237965.
14. Zafar M, Mussa M, Memon RS, Nadeem S, Usman MS, Siddiqi J, *et al.* Aspiration thrombectomy versus stent retriever thrombectomy alone for acute ischemic stroke: A systematic review and meta-analysis. *Cureus* 2020;12:e8380.
15. Larrew T, Hubbard Z, Almallouhi E, Banerjee C, Moss M, Spiotta AM. Simultaneous bilateral carotid thrombectomies: A technical note. *Oper Neurosurg (Hagerstown)* 2020;18:E143-8.

How to cite this article: Phuyal S, Pokhrel B, Lamsal R, Mishra B, Nayak M. Sequential mechanical thrombectomies in acute bilateral middle cerebral artery strokes: A case report and review of literature. *J Neurosci Rural Pract.* 2024;15:381-3. doi: 10.25259/JNRP_26_2024