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LETTER TO THE EDITOR

# Successful double mechanical thrombectomy in bilateral M1 middle cerebral artery occlusion

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## Introduction

Multivessel occlusion (MVO) is not uncommon in patients with acute ischemic stroke (AIS) and arises most commonly from thromboembolic sources such as atrial fibrillation (AF). Acute bilateral middle cerebral artery (MCA) M1 segment occlusion is, however, rare, but raises significant issues for stroke neurologists and interventional radiologists regarding which lesion should be treated first. We describe a case of acute bilateral MCA M1 segment occlusion successfully treated with bilateral thrombectomy.

## Case presentation

An 84-year-old woman with history of atrial fibrillation and arterial hypertension was admitted to the Emergency Department at 11.10 p.m. At 8.50 p.m., she presented an aphasia and a right faciobrachial palsy. The initial National Institutes of Health Stroke Scale (NIHSS) score was 11. She was intubated and sedated before admission due to seizures. Brain computed tomography (CT) demonstrated bilateral hyperdense MCA and CT angiography confirmed bilateral acute focal occlusion of M1 segments (Fig. 1a–c) as well as occlusion of a distal P2 segment of the left posterior cerebral artery (PCA) (not illustrated). Intravenous (IV) recombinant tissue plasminogen activator (r-tPA) was delivered within 3 h of stroke onset. The patient was then directed to the angiography suite for mechanical thrombectomy which was started at 00.54 a.m. Tortuosity of the extracranial internal carotid arteries (ICA) hindered the catheter-driven procedure. Digital subtracted angiography of ICA confirmed complete bilateral M1 occlusion (Fig. 1d, f). Right side was treated first because of an easier access and, consequently, an expected faster recanalization. Suction thrombectomy of the right M1 clot was attempted twice with a 3 MAX microcatheter (Penumbra Inc, California, USA) but failed. Procedure was switched to a combined use of a stent Retriever (Trevo XP, 4 × 20 mm, Stryker, Michigan, USA) and suction with ACE64 catheter (Penumbra Inc, California, USA). Cerebral arteriography revealed a residual right distal M2 occlusion, which was partially recanalized by suction (3MAX microcather) at 01.31 a.m., 5.5 h after stroke onset (Fig. 1e). The same technique (combined use of mechanical thrombectomy with stent retriever and suction) leaded to a complete recanalization of the left MCA at 02.01 a.m., 6 h after stroke onset (Fig. 1g). A decision was made not to attempt recanalization of the left P2 segment (judged too risky). Brain CT at 24 h excluded hemorrhagic transformation but revealed a small left PCA territory infarct. Brain magnetic resonance imaging (MRI), performed 6 days later, showed right insular ischemic area, small infarcts in the left MCA, and left PCA territories (Fig. 2). Oral apixaban 2.5 mg twice daily was started. NIHSS score of 0 and modified Rankin scale score of 1 the day after thrombectomy, maintained at 90 days, attested of the success of the treatment with the excellent functional outcomes.

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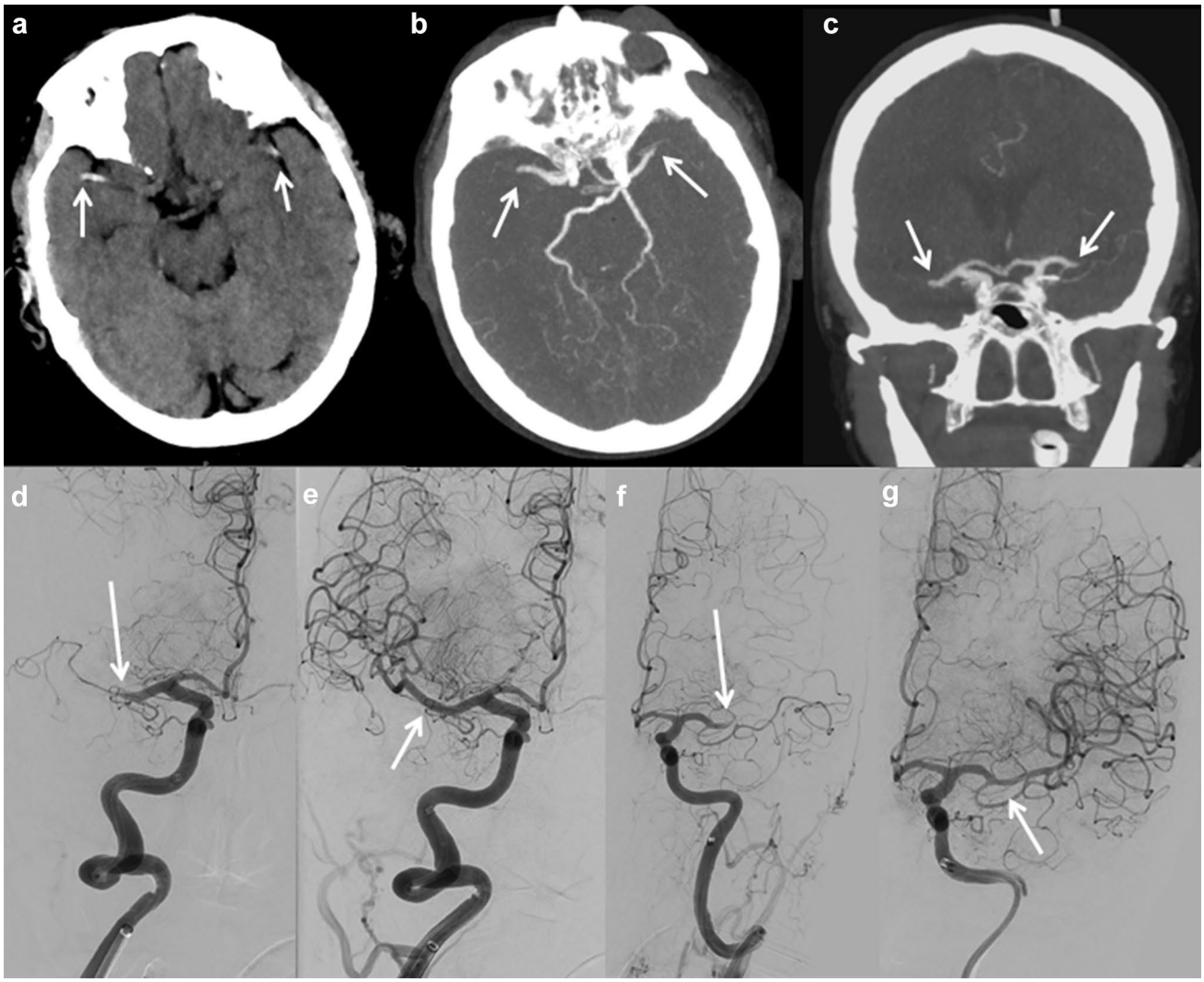


**Fig. 1** Nonenhanced brain CT showed bilateral hyperdense MCA (**a** arrows) with no apparent ischemic changes. Acute bilateral focal occlusion of M1 segments is confirmed by CT angiography (**b, c** arrows). Right (**d**) and left (**f**) M1 occlusion (arrows) demonstrated by angiography of the ICA. Observe the successful recanalization of MCA after mechanical thrombectomy (**e, g** arrows). *CT* computed tomography, *MCA* middle cerebral arteries, *ICA* internal cerebral arteries

## Discussion

Proximal large-vessel occlusion (LVO) strokes can be devastating and cause a significant patient morbidity and mortality, which is especially true in case of bilateral M1 occlusion. The early restoration of the cerebral blood flow is the corner stone of treatment of AIS and onset-to-reperfusion time has emerged as a major determinant factor of good clinical outcome. Despite its good effectiveness in the acute management of distal arterial occlusion when administered up to 4.5 h after stroke onset, IV thrombolysis using r-tPA has low rates of response in LVO strokes [1]. Over the past few years, endovascular therapy has evolved as the gold standard treatment for patients with AIS secondary to LVO stroke [2, 3]. However, the optimum endovascular treatment sequence for bilateral proximal MCA occlusion has not yet been established. In a study including 720 patients with AIS, 10.7% patients had MVO on the initial diagnostic workup, but none had bilateral MCA occlusion [4]. The authors also observed that patients with MVO had a lower recanalization rate and a worse 90-day functional outcome in comparison to patients with single-vessel occlusion [4]. We found only one reported case discussing the acute endovascular management of bilateral M1 occlusion [5]. This patient was successfully treated with mechanical thrombectomy. Given that the most acute occlusion seemed to be on the right side, it was treated first [5]. In the current case, the interventional radiologist had to deal with anatomical

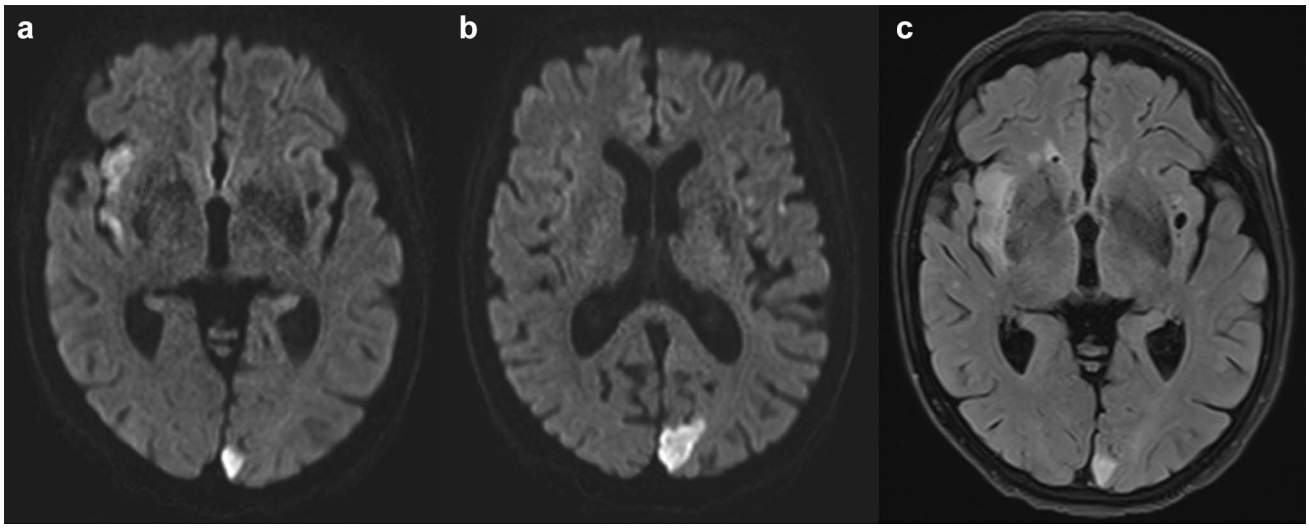


**Fig. 2** Brain MRI performed 6 days after the onset of stroke. Axial diffusion-weighted images (**a, b**) and FLAIR (**c**) revealed minimal acute infarcts of the left ACM territory, a more extensive right insular ischemic area, and a small left posterior cerebral artery territory infarct

challenges. The endovascular approach for recanalization considered ICA tortuosity which may influence ICA access time and delay recanalization. Despite of the acute left cerebral ischemic clinical signs (aphasia and right faciobrachial palsy), a choice was made to start by the fastest accessible side (right MCA) because of the need for speedy recanalization.

In conclusion, MVO is a challenging condition for endovascular treatment, and the optimal sequence has not yet been established: priority to the first symptomatic ischemic side, or priority to the largest penumbra area (based of CT-scan perfusion study or MRI diffusion/FLAIR mismatch), or priority to the expected faster and easier-to-treat occlusion? Prospective studies would be needed to determine the best sequence for the endovascular treatment of MVO, but would be probably difficult to obtain.

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## Compliance with ethical standards

**Conflict of interest** The authors declare no conflict of interest regarding this case report.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

**Informed consent** For this type of study, formal consent is not required.

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