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**Title**

Distal Thrombectomy for Acute Anterior Circulation Stroke with Chronic Large  
Vessel Occlusion

**Running head**

Chronic occlusion: the trap during thrombectomy

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**Declarations of interest**

None

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**Abstract**

**Background:** Endovascular therapy has been increasingly recommended for the treatment of acute ischemic stroke with large vessel occlusion of the anterior circulation. However, occlusions of the distal cerebral artery are not uncommon and may cause clinical deficits, especially when combined with ipsilateral chronic large vessel occlusion. Therefore, in this patient population, the recognition of chronic occlusion and recanalization of the distal occlusive artery might be of great value for flow compensation.

**Case description:** A 59-year-old male with a history of stroke was transferred to the emergency room with a severe right hemiplegia and aphasia syndrome. Head computed tomography demonstrated an old infarction focus of the left basal ganglia, and digital subtraction angiography revealed an occlusion of the left middle cerebral artery (MCA). After careful attempts, the microguidewire could not pass through the left MCA. Upon consideration of the patient's previous stroke history and the angiographic neovascularization, the left MCA was recognized as a chronic occlusion and its territory was supposed to be partly compensated by the ipsilateral anterior cerebral artery (ACA). A super-selective angiography of the left ACA demonstrated an occlusion of the callosomarginal artery. After a mechanical thrombectomy with a stent retriever, an angiogram showed complete recanalization and good antegrade reperfusion of the ACA supplying the partial MCA territory. The patient had a positive prognosis.

**Conclusions:** The recognition of chronic occlusion is crucial during acute mechanical thrombectomy, and distal thrombectomy may be beneficial after a careful full-scale assessment.

**Keywords:** ischemic stroke; mechanical thrombectomy; distal occlusion; chronic

occlusion

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## Introduction

Growing evidence has demonstrated the efficacy of mechanical thrombectomy with stent retrievers for acute stroke patients with large vessel occlusion in the anterior circulation.<sup>1-5</sup> However, few reports are available for thrombectomy of distal cerebral artery occlusions, which have highly pleomorphic clinical presentations. When specific branches of the primary or supplementary motor areas are affected, they can lead to severe clinical deficits.<sup>6</sup> The effect is magnified when combined with ipsilateral chronic large vessel occlusion, which is attributed to a significant compromise in the collateral flow. However, the recognition of chronic occlusion is sometimes difficult, especially when it is located in the same territory as the culprit vessel. For this patient population, the selective recanalization of distal artery occlusion may be critical for a good prognosis. This study presents a case of acute ischemic stroke successfully treated with mechanical thrombectomy of the callosomarginal artery with ipsilateral chronic middle cerebral artery (MCA) occlusion and a good outcome.

## Case report

A 59-year-old male with a history of atrial fibrillation, mitral valve replacement, and ischemic stroke (modified Rankin Scale [mRS] 1) was transferred to the emergency room with a severe right hemiplegia and aphasia syndrome. His National Institutes of Health Stroke Scale (NIHSS) score was 15. A non-contrast computed tomography (CT) demonstrated an old infarction focus of the left basal ganglia and no hemorrhage (Figure 1A). The time from symptom onset to emergency room admittance was nearly 5 hours. Under local anesthesia, an angiogram demonstrated an occlusion of the left middle cerebral artery (MCA) and a slow antegrade flow of the ipsilateral anterior

cerebral artery (ACA) with the presence of the anterior communicating artery (ACoA) (Figure 1B). After careful attempts, the microguidewire could not pass through the left MCA. Considering the patient's previous stroke history, the old infarction focus on the CT, and the angiographic neovascularization, the left MCA was recognized as a chronic occlusion and its territory was supposed to be partly compensated via the ipsilateral ACA. After a super-selective angiography, the callosomarginal artery of the left ACA was found to be occluded (Figures 1C and D). Therefore, for this patient, the recanalization of the callosomarginal artery was of vital importance for flow compensation. A 4 × 15 mm Solitaire AB stent retriever (Covidien, Irvine, CA, USA) was exactly positioned through a Rebar-18 microcatheter (EV3, Irvine, CA, USA) (Figure 1E). After a mechanical thrombectomy, an angiogram showed the complete recanalization and good antegrade reperfusion of the ACA (TICI grade 3), which as expected supplied the partial MCA territory (Figures 1F-H). The post-procedure NIHSS was 3, and no parenchymal hemorrhage was observed via follow-up CT scanning. With subsequent medication therapy, the patient completely recovered to pre-stroke at discharge. His 90-day mRS was 1.

## Discussion

Mechanical thrombectomy has become the first-line treatment for acute large vessel occlusion stroke of the anterior circulation.<sup>1-5</sup> In fact, distal smaller cerebral artery occlusions are not uncommon. They can be categorized as primary occlusions or secondary embolic occlusions that either migrate spontaneously or as a consequence of endovascular treatment for proximal large vessel occlusion with a frequency between 3.5% and 11.4%.<sup>7-9</sup> When specific branches of the primary or supplementary motor areas are affected, they can lead to severe clinical deficits.<sup>6</sup> The effect is

magnified when combined with ipsilateral chronic large vessel occlusion, which is attributed to a significant compromise in the collateral flow. For this patient, the left MCA was supposed to be chronically occlusive according to his previous history and imaging presentation, and the ipsilateral ACA branches played a significant role in flow compensation. Therefore, the recanalization of the distal ACA branch was vital and may have been beneficial.

More importantly, the recognition of chronic occlusion is crucial during acute mechanical thrombectomy, especially when it is located in the same territory as the culprit vessel, which can effectively shorten the recanalization time and increase the success rate. Therefore, a careful full-scale assessment should be performed in mechanical thrombectomy.

### **Conclusion**

The recognition of chronic occlusion is crucial during acute mechanical thrombectomy, and distal thrombectomy may be beneficial after a careful full-scale assessment.

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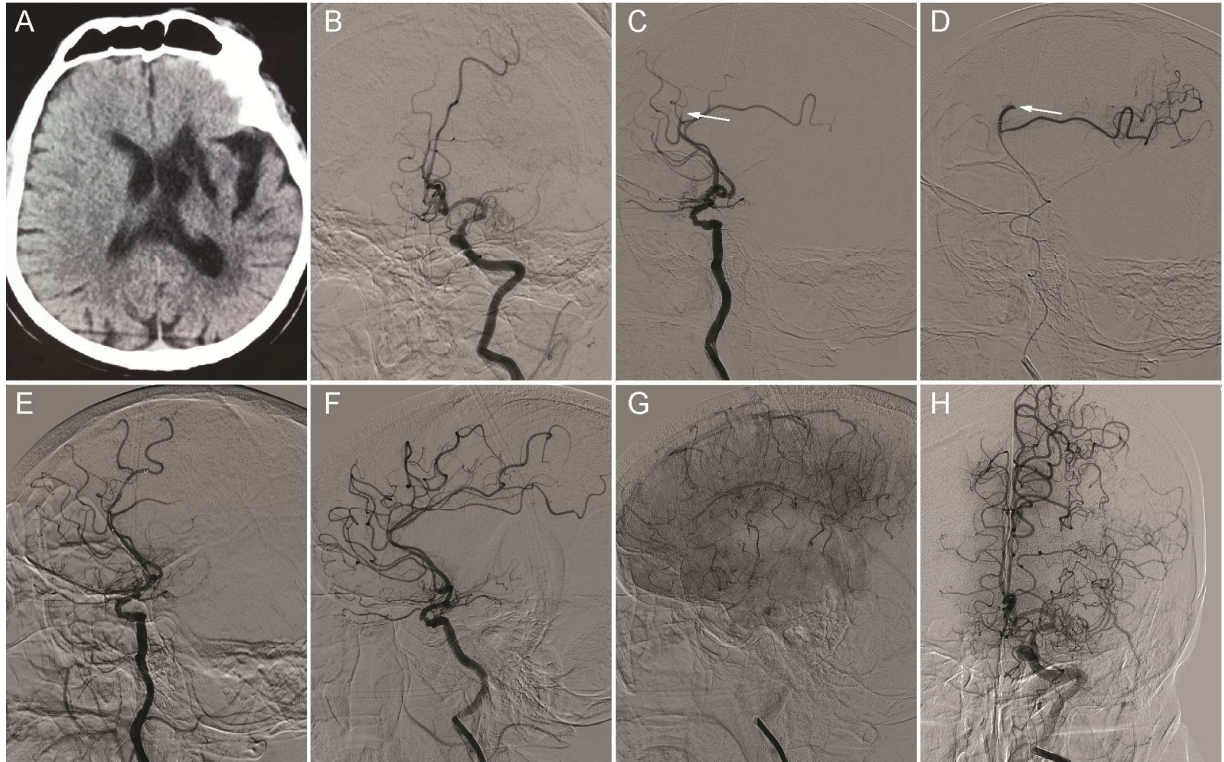
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**Figure legend****Figure 1.** Cerebral imaging of the mechanical thrombectomy

(A) CT showing the old infarction focus of the left basal ganglia. (B) Cerebral angiogram demonstrating the occlusion of the left MCA and the slow antegrade flow of the ipsilateral ACA. (C-D) Cerebral angiogram showing the occlusion of the ipsilateral callosomarginal artery of the ACA. (E) The thrombectomy device was placed at the occlusion site. (F-H) Cerebral angiogram showing the complete recanalization after thrombectomy and good compensatory perfusion.



**Abbreviations list**

ACA= anterior cerebral artery; ACoA=anterior communicating artery; CT=computed tomography; MCA=middle cerebral artery; mRS=modified Rankin Scale; NIHSS=National Institutes of Health Stroke Scale.

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