

Management of Acute Ischemic Stroke with Large Vessel Occlusion in an Extreme Age Patient: Case Report

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Abstract

Ischemic stroke, the most common type of stroke, is an emergent condition caused by cerebral arterial blood supply disruption as blood clot occlusion. Management for restoration of blood circulation can be medical therapy with thrombolytic agent and/or mechanical thrombectomy. With possible side effects of both methods, most randomized clinical trials often excluded patients age > 80 years old. This has led to limit data on efficacy and safety of ischemic stroke management in very elderly patients. In this article, we report an extreme age patient who received both medical and surgical interventions. Complete resolution of angiographic defects (mTICI 3) and excellent clinical outcome (no neurological deficit at 90 days) were achieved. Data from literature review of case report studies, guideline recommendation for management, selective indications, efficacy, safety and side effects of each treatment are also presented.

Keywords: Cerebral infarction, elderly, treatment (J Thai Stroke Soc. 2023;22(2): 34–40)

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การรักษาโรคหลอดเลือดสมองตีบหรืออุดตันเฉียบพลัน ในผู้ป่วยสูงอายุ: รายงานผู้ป่วย

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บทคัดย่อ

โรคหลอดเลือดสมองตีบหรืออุดตันเป็นโรคที่พบได้บ่อย เป็นภาวะฉุกเฉินที่ต้องการการรักษาเพื่อให้เลือดกลับไปเลี้ยงสมองได้อย่างทันเวลาที่ การรักษาทำได้โดยการให้ยาละลายลิ่มเลือด และ/หรือการสวนหลอดเลือดเพื่อนำเอาลิ่มเลือดออกมา การวิจัยส่วนใหญ่จะไม่ได้ทำในกลุ่มผู้ป่วยอายุมากกว่า 80 ปี ทำให้มีข้อจำกัดในการตัดสินใจพิจารณาการรักษาผู้ป่วยกลุ่มนี้ รายงานฉบับนี้แนะนำเสนอผู้ป่วยสูงอายุที่เป็นโรคหลอดเลือดสมองอุดตันเฉียบพลัน และได้รับการรักษาด้วยการให้ยาละลายลิ่มเลือด และโดยการสวนหลอดเลือดเพื่อนำเอาลิ่มเลือดออกมา ซึ่งมีผลการรักษาที่ดีมาก ผู้ป่วยกลับมาเป็นปกติที่ 90 วัน หลังเกิดอาการ

คำสำคัญ: โรคหลอดเลือดสมองตีบหรืออุดตันเฉียบพลัน, ผู้สูงอายุ, การรักษา (J Thai Stroke Soc. 2023;22(2): 34-40)

Introduction

Stroke is the leading cause of severe disability and mortality¹. Approximately 85% of strokes have ischemic cause whereas the remaining is from hemorrhage. Up to 46% of ischemic strokes result from large vessel occlusion (LVO). Patients aged 65 years and over comprised more than two-thirds of the stroke patients in the hospital². Intravenous thrombolysis within 4.5 hours after onset is the current standard of care. Its efficacy in patients with LVO is low with only 4–32% recanalization rate with occlusion in M1 or M2 segment of middle cerebral artery (MCA), internal carotid artery (ICA), or basilar artery (BA)³. Combination of thrombolytic agent and mechanical thrombectomy shows significantly improved outcome over one modality of treatment⁴.

However, the role of thrombolysis and mechanical thrombectomy in very elderly population are not clearly established⁵. Data from a meta-analysis, the HERMES study, reported superior benefits of mechanical thrombectomy over standard medical treatment, even in elderly patients > 80 years old⁶. Most clinical trials in their analysis excluded older population who tend to have frailty and multiple co-morbidities. We described successful treatment outcome from thrombolytic agent combined with mechanical thrombectomy using catheter device in a very elderly patient with acute ischemic stroke (AIS).

Figure 1. Axial brain non-contrast enhanced CT image showed an acute clot in distal M1 and proximal M2 segments of the right MCA



This report obtained an informed consent from the patient/ her legal representative and an approval of the Institutional Review Board (COE 002/2021).

Patient

A 90-year-old woman was brought to the emergency room of our hospital for her alteration of consciousness, incapable of verbal communication, eye deviation to the right, and left hemiplegia. These symptoms were detected by her daughter approximately 2 hours prior to admission. She had underlying hypertension and osteoporosis. Her previous modified Rankin scale (mRS) was 1.

Physical examination revealed a National Institutes of Health Stroke Scale (NIHSS) scores of 28 (unresponsive 2, questions right 2, performs both tasks 2, forced gaze palsy 2, partial hemianopia 1, partial facial palsy 2, left arm weakness 4, left leg weakness 4, sensation loss 2, mute 3, dysarthria 2, neglect 2). A cerebral plain computed tomography (CT) demonstrated a clot in distal M1 segment, and proximal superior and proximal inferior divisions of M2 segment of right MCA (Figure 1). Without any contra-indications for thrombolysis, intravenous tissue plasminogen activator (tPA) 0.9 mg/kg was promptly prescribed, with 10% bolus and 90% intravenous drip in 60 minutes.

Figure 2. Brain and neck reconstructed CTA image showed a kink of proximal part of the right CCA and total occlusion of distal M1 segment of the right MCA

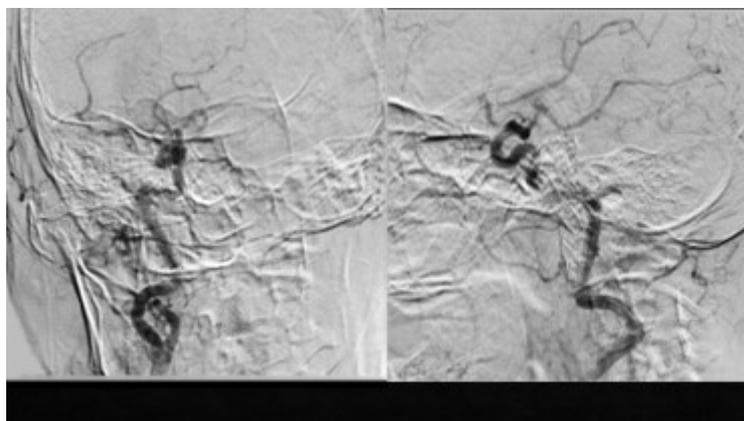


The aortic arch was type II.

A subsequent contrast enhanced CT angiogram of head and neck revealed total occlusion of distal M1 segment of right MCA and kinking right common carotid artery (CCA). After counseling with acquisition of informed consent from her legal authorized representative, cerebral angiography under local anesthesia was performed. In brief, an 6F 90 cm destination sheath was positioned in the proximal segment of right ICA. Only partial recanalization of distal

M1 segment and superior division of M2 segment of right MCA was demonstrated, but no filling of inferior division of M2 segment of right MCA was evidenced. A 6F Sofia Plus catheter[®] preloaded with a 0.035 Terumo guidewire was advanced through the sheath to the occluded site. Thrombus aspiration using a 20-cc syringe was performed. Heterogenous blood clot, measured 1 cm in aggregation, was obtained.

Figure 3. Anteroposterior and lateral views of right ICA angiography showed total occlusion of proximal inferior division of M2 segment of the right MCA, and partial revascularization of distal M1 segment and superior division of M2 segment of the right MCA (A, AP view; B, lateral view)



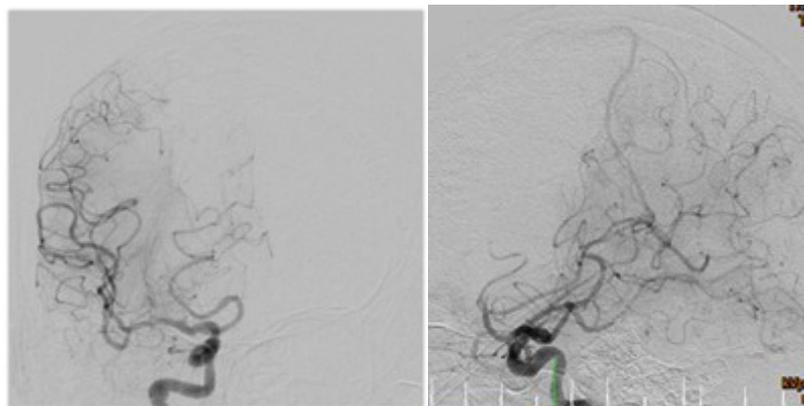
A

B

A control angiography of right ICA demonstrated complete resolution of angiographic defects flow in distal right MCA territories with a modified Thrombolysis in Cerebral Infarction

(mTICI) score of 3. In summary, a door to needle time was 55 minutes, puncture to revascularization was 52 minutes, and overall door to revascularization time was 162 minutes.

Figure 4. Anteroposterior and lateral views of right ICA angiography showed complete revascularization of the right MCA and its branches after mechanical thrombectomy (A, AP view; B, lateral view)



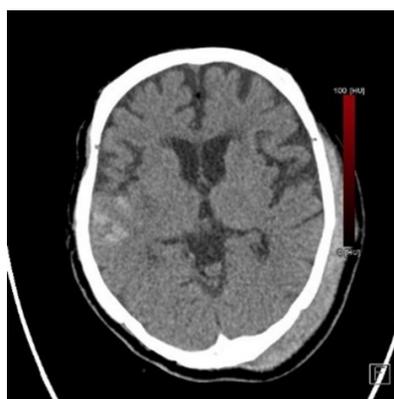
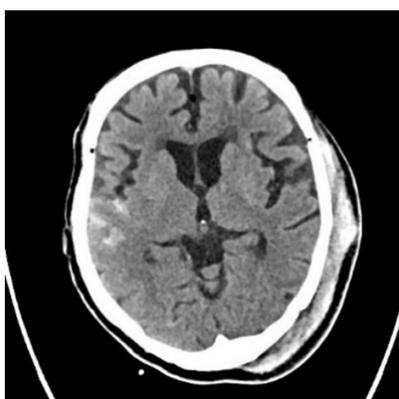
A

B

After treatment, the patient was closely monitored in the intensive care unit. Clinical improvement of neurologic deficits (NIHSS 6) was shown at

12 hour after treatment. A 24-hour follow-up CT scan showed small hemorrhagic transformation at right parietotemporal lobe.

Figure 5. Axial brain non-contrast enhanced CT image (24 hours after treatment) showed newly seen subacute right MCA infarction with hemorrhagic transformation (petechial hemorrhages type 2) (A). Hyperdensity on non-contrast enhanced CT image also appeared hyperdensity on VNC image (B) and was not seen on iodine map CT image (C), indicating real hemorrhage.



Non-contrast enhanced CT image

Virtual non-contrast enhanced CT image (VNC)

Iodine map CT image

A

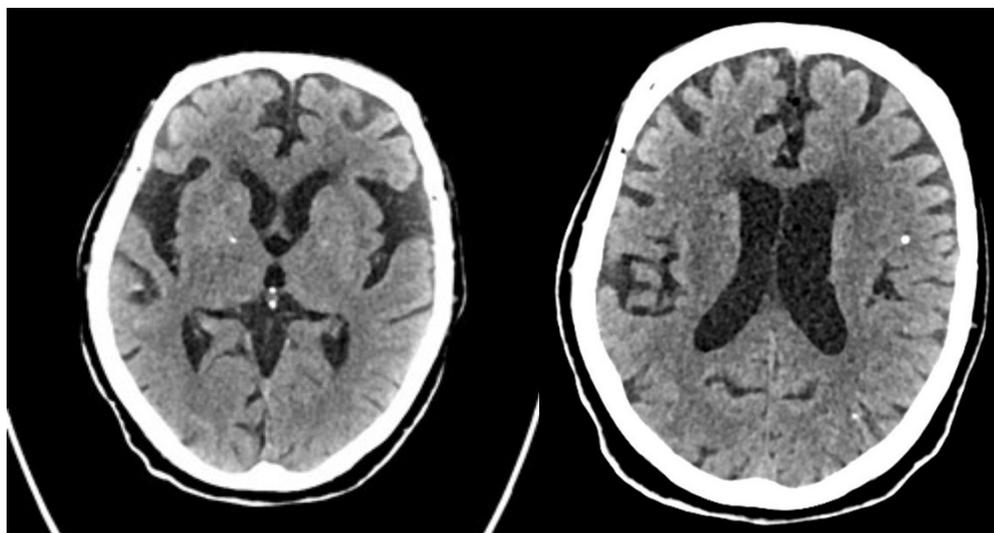
B

C

The patient was in rehabilitation program and had full recovery on Day 6 post-procedure when she was discharged from the hospital.

Another follow-up CT scan at 2 weeks, nearly complete resolution was evidenced.

Figure 6. Axial brain non-contrast enhanced CT image (2 weeks after treatment) showed evolution of the subacute right MCA infarction with marked resolution of the hemorrhagic transformation



Discussion

Our extreme-aged patient had successful treatment of her cerebral infarction with thrombolytic agent and mechanical thrombectomy. Some authors used low-dose tPA (0.6 mg/kg) especially in the patients with long lag period after onset (up to 6 hours) aiming to decrease symptomatic intracranial hemorrhage^{3,7,8}. However, the efficacy of low dose tPA may be reduced⁸. So, we used a standard dose of 0.9 mg/kg of tPA (10% bolus in 1 minute and 90% drip in 1 hour).

After tPA, only partial recanalization of distal M1 segment and superior division of M2 segment of right MCA, and persistent total occlusion of proximal inferior division of M2 segment of right MCA were still evident from right ICA angiography. This suboptimal efficacy of tPA in our patient may be due to the thrombus occurred in large cerebral arteries as had been found in previous report⁴. Our prompt thrombectomy after tPA was in accordance with the 2019 American stroke association guideline which recommends

that thrombectomy should follow medical thrombolysis without waiting for clinical improvement⁹. We evaluated about the proximal arterial passage to the occlusion site and performed the direct aspiration thrombectomy because it can make the procedure faster and less expensive¹³⁻¹⁵. For aspiration thrombectomy, we used a soft tip intermediate catheter rather than a stent because it could be easily reached the thrombus in a shorter time and with a higher negative pressure. After thrombectomy, the cerebral reperfusion restored complete vascular territories. Cause of this cerebral artery occlusion is most likely compatible with embolus from proximal artery or heart. Thrombus formation is commonly associated with sites proximal to the MCA, such as internal carotid plaques, common carotid plaques, and atrial fibrillation, resulting in thrombus formation and embolism.

According to meta-analysis of individual patient data from five randomized trials of endovascular thrombectomy after large-vessel ischemic stroke,

outcomes in patients aged 80 years or older favor endovascular thrombectomy over control (cOR 3.68, 95% CI 1.95–6.92), those randomized more than 300 minutes after symptom onset (1.76, 1.05–2.97), and those were not eligible for intravenous alteplase (2.43, 1.30–4.55)¹². Some advocated mechanical thrombectomy regardless of age¹⁰. Similar rates of revascularization and favorable outcomes (NIHSS, tPA, TICI score) were observed in their studies with 100 elderly patients (80–102 years of age) with ischemic stroke as the younger group¹⁰. However, others might be reluctant to perform a surgical intervention in the elderly patients. One study in 108 elderly patients (> 80 years of age) treated with medical and mechanical thrombectomy found high rate of hemorrhagic transformation in elderly patients¹¹. Thus, careful patient selection based on good baseline functioning (mRS 0–1), with uncomplicating anatomy predicting shorter procedure times and expecting lower number of passes would be indicators for thrombectomy in addition to tPA.

Some authors reported that complete revascularization after thrombectomy was a favorable prognostic factor for recovery after the event¹¹. This was evidenced in our patient whose imaging studies revealed good collaterals before complete revascularization of the occlusion. At the time of following-up this patient (90 days), she was doing well with complete recovery of her functional status (mRS 1). In case of acute ischemic stroke with large vessel occlusion in extreme age patient, the decision making about thrombolytic agent and mechanical thrombectomy trend to treat patients if there are no contraindications.

Conclusion

Extreme age patients with acute large vessel occlusion stroke who are eligible to treat with thrombolytic and mechanical thrombectomy, they should be received both medical and surgical interventions. After treatment, if the results of cerebral angiography show complete revascularization (mTICI 3), they may get the excellent clinical outcome (no neurological deficit at 90 days).

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