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Case report

Simultaneous mechanical thrombectomy for bilateral acute internal carotid artery occlusion ☆☆☆

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ABSTRACT

Acute bilateral internal carotid occlusion was a very rare disease with a very poor prognosis. Clinical case reports according to the literature showed that mechanical thrombectomy was the most optimal treatment. We reported a clinical case of successful treatment with simultaneous thrombectomy in both occluded carotid arteries. A 62-year-old woman was admitted at our hospital within three hours of stroke onset secondary to an acute simultaneously bilateral carotid artery occlusion. On admission, her NIHSS (National Institutes of Health Stroke Scale) was 32. Non-contrast computed tomography right after that showed hyperacute infarction lesions in both hemispheres with right inferior temporal and insular cortex (Alberta Stroke Program Early CT Score – ASPECTS 8) and left putamen (ASPECTS 9). Her medical history included paroxysmal atrial fibrillation, prior ischemic stroke, pacemaker due to sick sinus syndrome. Her pre-stroke modified Rankin Scale score was 0 that she was fully recovered from previous stroke 4 months ago thanks to successful thrombectomy of the right internal carotid arteries (ICA). This time, the patient underwent again the simultaneous bilateral mechanical thrombectomy of both occluded ICA. The complete recanalization achieved on both sides with recanalization level of TICI-3 (thrombolysis in cerebral infarction) only in 38 mins after the groin puncture. She showed dramatic recovery and was discharged on day 28 with a Rankin Scale score of 2. Mechanical thrombectomy on bilateral ICA performed simultaneously will help shorten the reperfusion time compared to the alternative one and thus, provides a better prognosis in acute ischemic stroke.

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Background

Acute bilateral ICA occlusion is a rare disease with a very poor prognosis. The clinical course is normally very aggressive and severe, so the indication for intravenous thrombolysis is often contraindicated. The only option if the patient arrives early in the first 6 hours is mechanical thrombectomy [1]. In the latest American Heart Association/American Stroke Association guidelines, endovascular intervention within 6 hour received level IA recommendation for acute ischemic stroke patients secondary to a large vessel occlusion in the anterior circulation [2]. However, reports show that even patients who have been treated with endovascular intervention have very high mortality, or very severe sequelae [3]. We present a clinical case of acute bilateral ischemic stroke due to simultaneous occlusion of both internal carotid arteries and indicated for simultaneous mechanical thrombectomy on both sides at the same time.

Case report

A 62-year-old woman was brought to the stroke center after a sudden onset of quadriplegia, and decreased consciousness 165 minute earlier. Her past medical history was noted for paroxysmal atrial fibrillation, sick sinus syndrome who had a dual-chamber pacemaker implanted 2 years ago. Four months ago, she had the first acute ischemic stroke due to an occlusion of the right ICA but totally recovered (Rankin Scale score 0) after treated with intravenous rt-PA + mechanical thrombectomy (TICI-3 recanalization achieved). She was taking rivaroxaban 20 mg/d but stopped a week before admission. On examination, her blood pressure was 130/80 mm Hg, heart rate was regular at 70 bpm, oxygen saturation was 96% on room air, respiratory rate was 22 times/min, and blood sugar was 8.2 mmol/l. Her Glasgow Coma Scale (GCS) was 9 (E2M5V2) with severe aphasia, quadriplegia, with a NIHSS score 32. Computed tomography was performed at 20 minutes after arrival at the hospital. NCCT brain then revealed no hemorrhage with discreet hypodense lesion of the right

insula and inferior temporal cortex (ASPECTS 8) and the left putamen hypodensity lesion (ASPECTS 9). Another old infarct lesions from previous stroke also seen on bilateral basal ganglia. CT angiography (CTA) showed a complete bilateral occlusion of the ICA (Fig. 1) in combination with very poor collateral due to 2 major LVO. She was immediately taken to the angiography suite and underwent general anesthesia for stable operation and better management. An interventional team consisted of 3 neuro-interventionalists and 2 radiographers. We decided to do the bilateral thrombectomy to save the “brain time” for both hemispheres. Therefore, bilateral superficial femoral artery punctures were conducted with both 8F sheath (Terumo) placed in position (2500 UI Heparin bolus) – it was 50 minutes from hospital arrival. Each ICA was accessed by a co-axial system of NeuronMax 8F straight guide catheter 90 cm (Penumbra) with JB2 5F diagnostic catheter (Microvention) and 0.035” wire (Terumo). Two angiographies performed simultaneously by 2 neuro-interventionalists revealed a complete occlusion of the both ICA at petrous (C2) segment (Fig. 2). While the 3rd neuro-intervention prepare the microcatheter, we advanced 2 aspiration catheters (Sofia-plus 6F – Microvention) for ADAPT (A Direct Aspiration First Pass Technique). Bilateral ICA manual aspiration in 30 seconds then resulted in some small clots taken out but still occluded in both T-occlusions post 2nd angiography. We again came back with 2 Sofia-plus approaching the terminal segment co-axial with 2 microcatheters Rebar 18 and Avigo 0.014” (Medtronic). The 2nd aspiration in the left showed good recanalization (TICI 3) with multiple black thrombi sucked out meanwhile the right one still occluded. It was 30 minutes from femoral puncture (Figs. 2 and 3) so that we decided to perform combined technique to maximize the effect of the next passes. With Sofia-plus placed at the proximal part (T-segment), Solitaire stent 4/20 (Medtronic) deployed via Rebar 18, the Solumbra method performed 02 times to remove many thrombi. Completed recanalization of the right ICA finally achieved 8 minutes later than the left one. Total procedural time was 38 minutes from femoral puncture (Fig. 4). Twenty-four hours later, the follow-up NCCT and CTA showed the bilateral cerebral parenchymal lesion not enlarged, including the established infarct brain injury in the right insular cortex and in the left putamen. Additionally, no intracranial hemorrhage seen. The bilateral

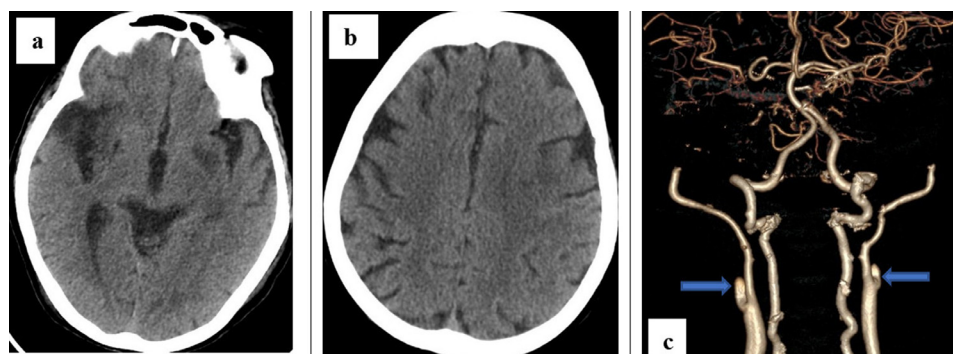


Fig. 1 – Non-contrast CT image revealed no hemorrhage, hypodense lesions in the inferior temporal as well as insular cortex on the right (ASPECTS 8 point) and in the putamen on the left (ASPECTS 9 points), old infarct lesions of bilateral basal ganglia (A) and no regional infarcts on supraganglionic level (B), complete bilateral internal carotid artery occlusion on CTA-3D reconstruction (green arrow) (C). (Color version of figure is available online.)



Fig. 2 – Initial angiogram from bilateral common carotid artery showing a complete bilateral internal carotid occlusion (green arrow). (Color version of figure is available online.)

internal carotid arteries were completely recanalized (Fig. 5). The patient continued to be treated at the stroke center. After 30 days of treatment, the patient recovered clinically with a modified Rankin Score of 2.

Discussion

In our clinical case, the patient was diagnosed with cerebral infarction 5 months ago due to paradoxysmal atrial fib-



Fig. 3 – Roadmap angiogram showing complete recanalization of the left internal carotid artery.

illation. She was on anticoagulation but stopped it because of covid epidemic and she did not go to the doctor. Therefore, we still think a lot about the cardiovascular cause (“red clot”) of acute bilateral internal carotid occlusion for this stroke. The prognosis for bilateral thrombectomy eventually will be more favorable than that of carotid atherosclerosis. This time, instead of performing procedure side by side, we chose direct aspiration simultaneously to achieve recanalization as soon as possible within shortest time to save the brain parenchyma due to severe clinical condition. This needed to be very professional in work-flow so that we mobilized 3 neuro-interventionalists, 2 radiographers, 1 anesthetist and 1 nurse to conduct the procedure even it was very early in the morning (6 a.m). ADAPT was a reasonable technique in

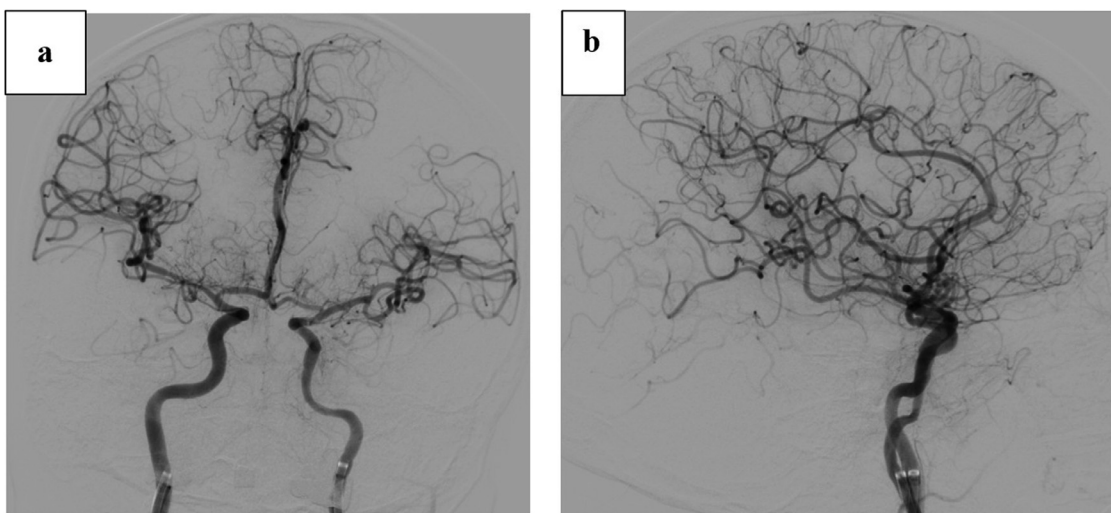


Fig. 4 – Simultaneous bilateral internal carotid angiography achieved TIC1-3 recanalization results on straight (A) and lateral (B) films.

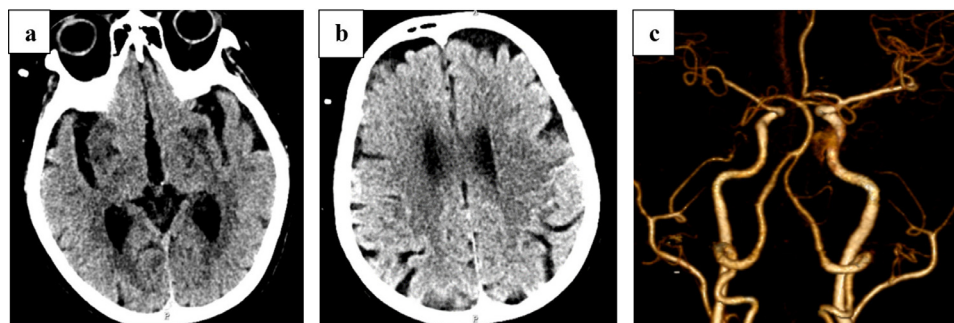


Fig. 5 – Follow-up NCCT and CTA film taken 24 h after the intervention. Non-contrast CT images at gangliotic level (A) and supraganglionic level (B) show infarcts of the right insula cortex, and the left putamen, no intracranial hemorrhage. CTA-3D vascular reconstruction revealed a complete recanalization of the bilateral internal carotid artery (C).

this emergency scenario to open the temporary flow while Sofia-plus with its advantage of softness helped access easier to proximal part of both thrombus at C2 segment without any microcatheter inside (which was still prepared by the 3rd neuro-interventionalist. After 2nd pass, when the left hemisphere recanalized by TICI-3, we changed to more complex technique (solumbra method) for the right ICA to achieve better effect for the next passes.

In the literature, in 2014, there were 2 documented cases, one of sequential aspiration thrombectomies of right M2 and left ICA thrombi and a second with sequential (in series, not in parallel) stentriever thrombectomies of bilateral M1 occlusions [1]. In 2020, They described the use of simultaneous catheterization and aspiration thrombectomies to treat ICA occlusion and revascularization in only 32 minutes, but the clinical outcome was not as expected [3], after mechanical thrombectomy, the patient was decerebrate posturing. A head CT the next day demonstrates an acute ischemic stroke of the left ACA and loss of gray-white differentiation in bilateral MCA territories. In the following few days, family ultimately decided to withdraw life support given worsening cardiac and neurologic status concurring with their knowledge with his goals of care. In our case, the total time of femoral puncture to complete recanalization of the two internal carotid arteries was 38 minutes, but the patient's clinical results were the best. Another study lists 8 cases of bilateral ICA occlusion due to cardiovascular etiology that were treated with medical therapy, rt-PA reperfusion, and endovascular intervention without good results, 100% of patients died [4]. The clinical case that described with acute bilateral carotid artery occlusion due to cardiac thrombectomy also died 2 days after the intervention [5]. Our clinical case is similar to acute simultaneous bilateral ICA occlusion due to cardiac etiology and thrombectomy was performed simultaneously on both sides of the occlusive vessel with very positive results, the patient recovered after 28 days with Rankin Scale score of 2. Recent studies suggest that endovascular thrombectomy should be performed as early as possible in appropriate candidates; an unfavorable outcome may occur if treatment is delayed [3].

The studies [6–9] suggest that the outcomes of mechanical thrombectomy may depend on the time window from onset, clinical status, collateral circulation, and location of vessel occlusion. One of the factors related to the outcome of recov-

ery is that the shorter the femoral revascularization time is, the more effective it is. To our knowledge, our clinical case is the 3rd case, at the same time, we performed mechanical thrombectomy in both occluded carotid arteries. Larrew et al. [3] presented the first case of simultaneous bilateral thrombectomy with poor collateral circulation, and this case eventually resulted in death, author Huang [6] carried out a bilateral thrombectomy with poor collateral circulation, the total until complete bilateral revascularization duration was 180 minute and the patient's clinical outcome was very poor.

Conclusion

We describe a patient with simultaneous acute occlusion of two internal carotid arteries due to cardiovascular etiology. Simultaneous mechanical thrombectomy of both carotid arteries at the same time shortened the time for femoral angiography-revascularization to only 38 minutes, and gave good clinical results.

Statement of ethics

Ethical approval was not necessary for the preparation of this article.

Patient consent

Written informed consent was obtained from the patient's husband for publication of this case report and any accompanying images.

Author contributions

Duy Ton Mai and Dang Luu Vu contributed equally to this article as co-first authors and writing original draft. Viet Phuong

Dao, and Nguyen, Minh Anh made substantial contributions to collect patient data and clinical data analysis. Dang Luu Vu, Quang Anh and Huu An Nguyen contributed to underwent thromboectomy procedure, collect and interpret the imaging. All authors read, revise and approved the final manuscript. All authors have read and agreed to the published version of the manuscript.

Data availability statement

All data generated or analyzed during this study are included in this article and/or its online suppl. material files. Further enquiries can be directed to the corresponding author.

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