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Intracranial Internal Carotid Artery Dissection Caused Acute Ischemic Stroke in an Old Person: Case Report and Literature Review

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ABSTRACT

Carotid Artery Dissection (CAD) is an uncommon cause of Acute Ischemic Stroke (AIS) in the elderly. Inadequate management might cause deterioration of the dissecting vessel, decreasing the blood supply and worsening the clinical symptom. Except emergent endovascular thrombectomy, medications, and possible balloon angioplasty with stenting should be considered in treatment. We report a case of 80 years old male with various risk factors of embolic stroke, suffering from AIS caused by CAD unidentified before the surgical procedures. We describe the history and management of the patient followed by a further discussion.

Keywords: Carotid artery dissection; Endovascular; Medication; Angioplasty; Treatment

INTRODUCTION

An 80 years old male suddenly suffered from a right side weakness and inability to produce words at night, which was relieved after a 5 minute onset. The symptoms occurred five times a ter the irst attack. He was admitted to our emergency department with a negative COVID-19 PCR result. A diagnosis of AIS was established according to the history taking. The patient had a history of arterial fibrillation and hypertension under regular medications, including bokey and antihypertensive drugs [1-3]. Previous brain Magnetic Resonance Imaging (MRI) revealed a pre existing left Middle Cerebral Artery (MCA) middle segment with 80% stenosis and right Anterior Cerebral Artery (ACA) A1 segment hypoplasia (**Figure 1**).

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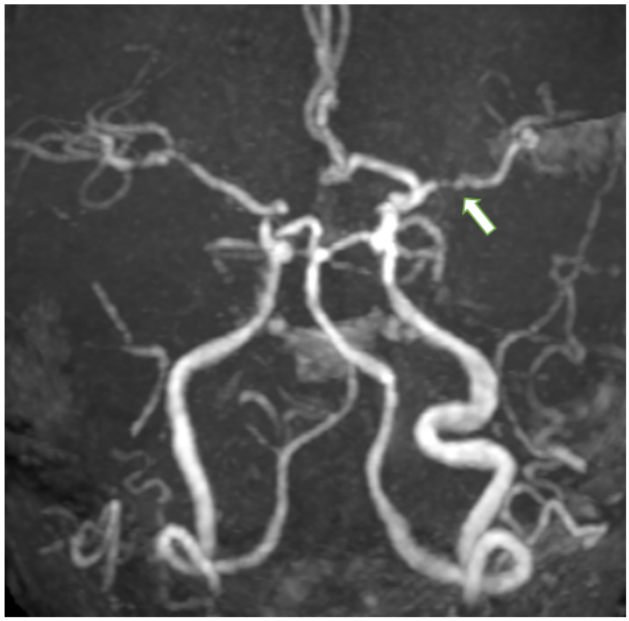

Figure 1: Old brain MRI demonstrated pre-existing le t MCA middle segment 80% stenosis and right ACA A1 segment hypoplasia (white arrow).

The brain MRI on the next day morning revealed increasing Diffusion Weighted Imaging (DWI) bright up area, and the brain Computed Tomography Angiography (CTA) revealed a le t ICA total occlusion (**Figure 2**).

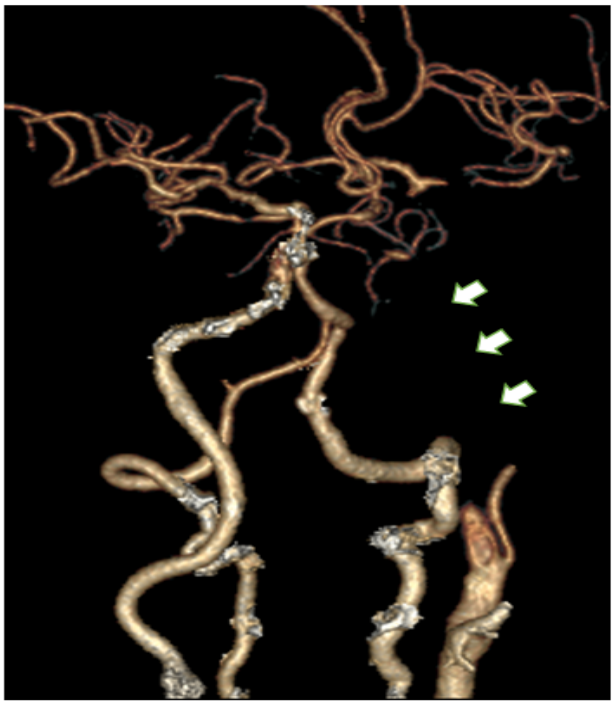

Figure 2: Brain CTA demonstrated acute total occlusion of le t ICA from proximal segment (white arrows).

Dual antiplatelet drugs were given, and adequate hydration was arranged. However, the symptoms attacked again a ter 24 hours of the irst attack and did not recover even a ter advanced medical treatments. His NIHSS score raised from 3 to 15.

CASE PRESENTATION

An emergent Mechanical Thrombectomy (MT) was applied. Le t ICA angiography a ter placing the Neuron Max 088 guiding catheter (Penumbra) in the le t proximal ICA demonstrated complete occlusion from the supraclinoid ICA to the le t ACA and MCA. Headway 021 micro catheter and Traxcess micro wire (microvention) were attempted to pass through the occluded ICA [4,5]. However, the microwire failed to pass through the ICA segment. A ter several trials for about 15 minutes, the microwire tip reached the proximal MCA M1 segment but still, the microcatheter failed to pass through the occluded segment (**Figure 3**).

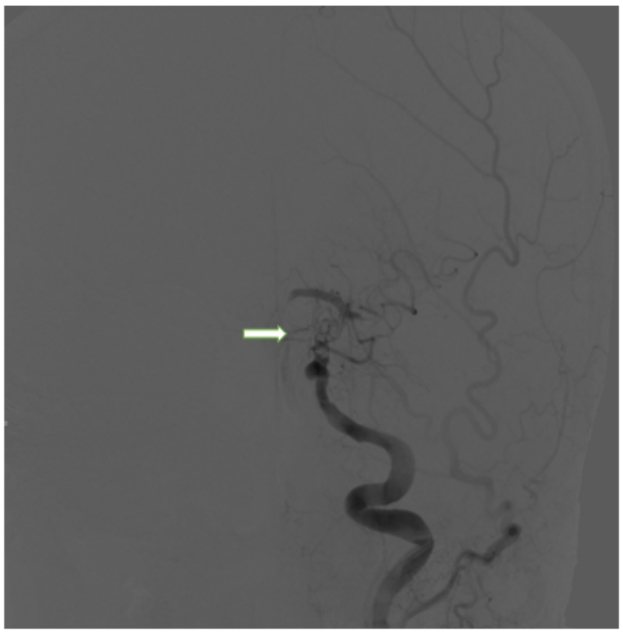

Figure 3: Le t ICA angiography demonstrated complete occlusion from supraclinoid ICA to le t ACA and MCA (white arrow).

Finally, the micro catheter and micro wire were removed for replanting. An immediate follow up showed that the occluded segment had been recanalized without aspiration or stent retriever pass [6]. The low of le t MCA and bilateral ACA territories was patent without signi icant thrombosis occlusion. Except for heparin use in the infusion system, no other anticoagulation drugs, such as IIbIIIa, was used (**Figures 4 and 5**).

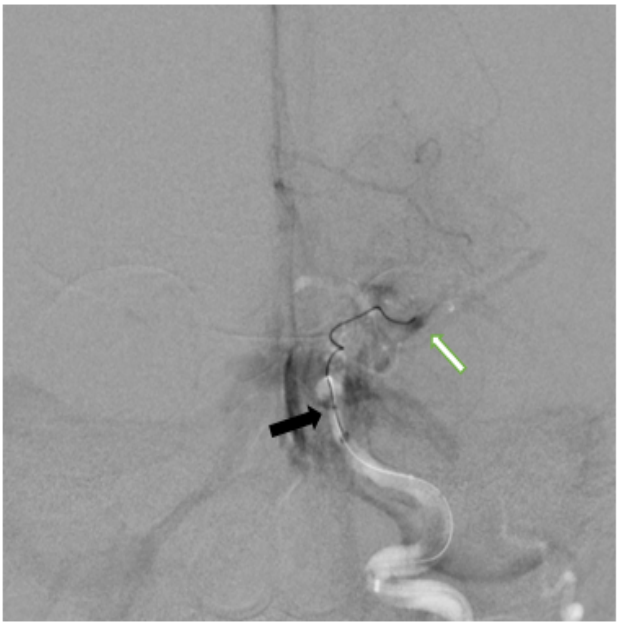

Figure 4: The microwire tip reached the proximal MCA M1 segment (white arrow). The microcatheter can't pass through the occluded segment (black arrow).

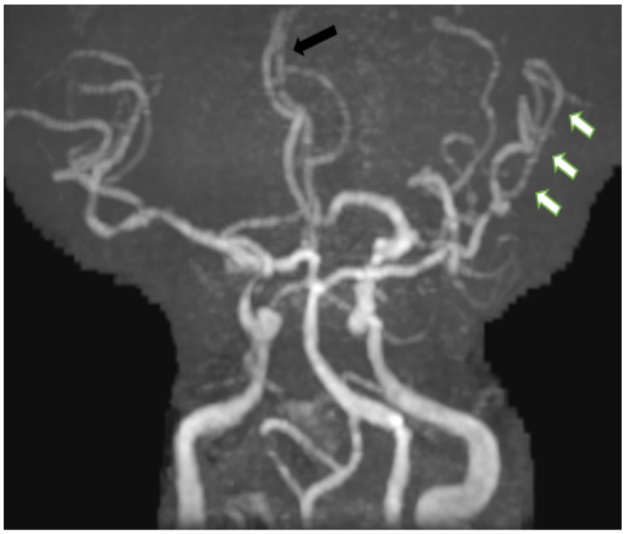

Figure 5: Le t MCA M1 stenosis was remained. Patent le t ACA (black arrow) and MCA (white arrows) distal flow were found.

Follow up

The patient's NIHSS dropped to 3 after the above procedures. We followed up the patient with brain MRI, Magnetic Resonance Angiography (MRA), and perfusion study. In MRA, the le t MCA M1 stenosis remained. Patent le t ACA and MCA distal low were found (**Figure 6**).

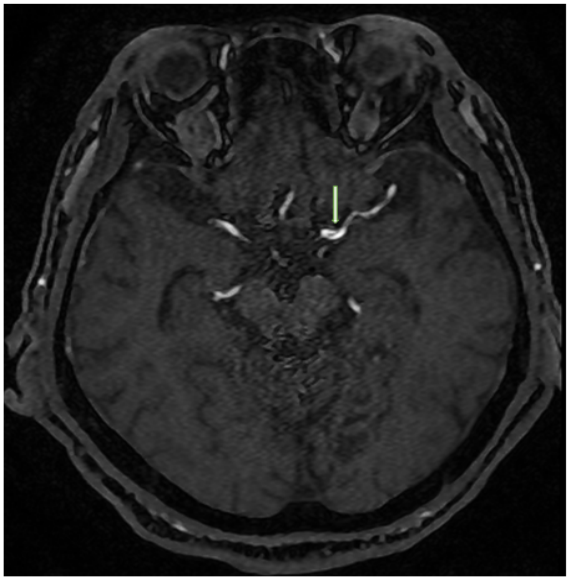

Figure 6: A dissection lap was demonstrated in le t supraclinoid ICA (white arrow).

A dissection lap was demonstrated in the le t supraclinoid ICA (**Figure 7**). Perfusion study revealed bilateral symmetric distribution indicating an establishment of self-collateral flow. Therefore, no further stenting was arranged.

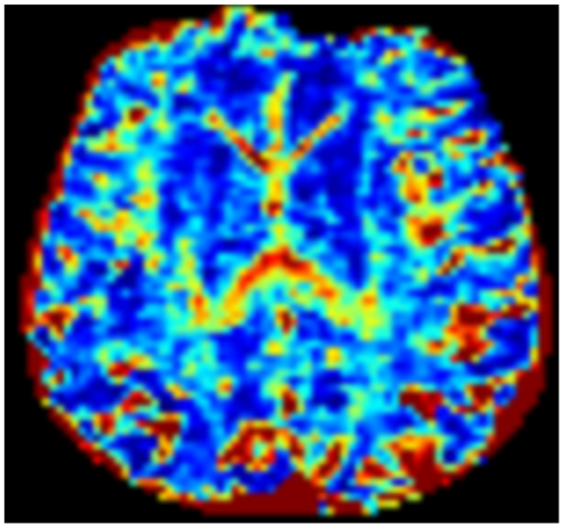

Figure 7: Perfusion study revealed bilateral symmetric Cerebral Blood Flow (CBF) distribution.

RESULTS AND DISCUSSION

- The case report demonstrated a case suffered from Transient Ischemic Attack (TIA) to AIS, which caused by ICA spontaneous dissection undiagnosed before the treatment. Initially, we discussed the TIA to AIS condition was caused by dissection related acute thrombosis or

simple acute thrombosis. There was some evidence to prove it's a dissection related thrombosis: A) We can observe a clear intima flap in follow-up MRI. B) Recanalization was found after the procedure, even we did not use the aspiration catheter or stent retriever to remove the clot. There is pre-existing left MCA high grade stenosis. Therefore, if the thrombosis was pushed to distal segment, we would observe in immediately follow-up angiography. But no distal occlusion was noted in both left ACA and MCA. According to these reasons, we establish the diagnosis in this case.

- **Incidence**: Carotid artery dissection was one of the causes of AIS. It mainly attacks in the fifth decade of life and accounts for a proportion of AIS causes in younger people. Older age, atherosclerosis, pre-existing arterial stenosis, and atrial fibrillation were all risk factors of thrombosis related AIS. In our case, all risk factors were found in the history and previous MRI images. The age and history confused the clinicians and neuroradiologists in the initial interpretations, and the correct diagnosis was established after recanalization of the left ICA by microwire manipulation. There were only a few case reports in the literature describing arterial dissection related cerebral infarction in the elderly. Ludwig reported 2.4% of patients in MT for AIS with Large Vessel Occlusion (LVO) in Germany's stroke registry.
- **Mechanisms**: Hematoma of the arterial wall could lead to rapid occlusion or recanalization in the manipulation was uncommon in the arteriosclerotic lesion. We made the diagnosis of arterial dissection because (1) Rapid recanalization was found after microwire manipulation only, and there was no sign of thrombosis migration in follow-up angiography, and (2) Post-procedure follow-up MRA demonstrated a dissection flap in the previous occluded segment.
- **Image appearances of CAD**: A diagnosis of CAD could be made with supporting evidence from ultrasound, CTA, and MRA. The dissection flap of the left ICA in our case was observed in the post-management follow-up MRA. Vessel wall imaging may provide further evidence supporting the diagnosis. However, post-intervention imaging enhancement may interfere with the diagnosis in dissecting or non-dissecting arteries.
- **Outcome**: The prognosis of arterial dissection varies from asymptomatic condition to cerebral infarction. The prognosis of the median time delay between the symptom onset and flow restoration is longer in CAD patients and associated with worse outcomes.
- **Management**: Anticoagulation or antiplatelet therapy should be given first to avoid thromboembolic complications from dissection in non-hemorrhagic cases.

CONCLUSION

We report a rare case of spontaneous CAD with acute cerebral infarction and its management. The possibility of CAD should not be overlooked, although it is uncommon in the elderly with AIS.

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This work received no financial support. 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 declaration of Helsinki and its later amendments or comparable ethical standards. All protocols were under the supervision of the institutional review board of the Taipei Medical University–Shuang-Ho Hospital (N202205051).

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