Spontaneous Recanalization after Complete Occlusion of the Common Carotid Artery with Subsequent Embolic Ischemic Stroke

Abstract

Introduction: Acute carotid artery occlusion carries a high morbidity and mortality. Acute angioplasty and stenting is a feasible option with little known about the long term outcome. Limiting factor for this approach is hyperperfusion syndrome or hemorrhagic infarction. Spontaneous early or late recanalization for extracranial vessel is in the range of 5% -30%, with no well defined clinical outcome data. We describe a case of spontaneous common carotid recanalization.

Case Report: An 88 year old man presented with right sided weakness, global aphasia and visual field loss and was discovered to have common carotid occlusion at its origin. Within 12 hours of symptom onset patient improved neurologically to his baseline exam and repeat imaging demonstrated spontaneous recanalization. This was followed symptomatic occlusion of left middle cerebral artery The patient was treated with multimodality approach resulting in complete revascularization of the middle cerebral artery and angioplasty and stent placement of the internal carotid artery. Patient had a good neurological outcome at 3 months followup.

Conclusion: The present case report demonstrates the risk of spontaneous recanalization acutely in patients presenting with common carotid artery occlusion and associated risk of embolic strokes. In such a patient,concomitant treatment for intracranial occlusion and extracranial high grade stenosis may be performed safely after 30 hours from the initial symptom onset.

Keywords: Carotid artery occlusion, Recanalization, Acute Stroke

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Acute carotid occlusion with stroke symptoms carries a high morbidity and mortality (45%-75%).[1] Acute angioplasty and stenting is feasible with unclear long term outcome. One of the limiting factor is hyperperfusion syndrome or hemorrhagic infarctions after revascularization.[2, 3] Spontaneous recanalization is common after intracranial vascular occlusion. Little is known about spontaneous recanalization after extracranial vessels and its clinical outcome.[4] Thus knowledge about early or late spontaneous recanalization gives a unique opportunity for further treatment. We describe a case report of a patient, who presented with acute common carotid occlusion at its origin with spontaneous recanalization. This was followed by acute M1 occlusion and recurrence of full middle cerebral artery syndrome. The patient was treated with multimodality approach with complete revascularization of the middle cerebral artery and angioplasty and stent placement of the internal carotid artery.

Case report

An 88 years old man with past medical history significant for hypertension, hypercholesterolemia and prostate cancer, was admitted after an acute onset of right sided weakness, global aphasia and visual field loss. National Institute of Health Stroke Scale (NIHSS) score was 16. He was not given intravenous tissue plasminogen activator (rt-PA) as the time of onset exceeded 3 hours. Computed tomography angiography and computed tomography perfusion scan (CTA/CTP) (Figure 1) demonstrated complete occlusion of left common carotid artery with preserved cerebral blood volume (CBV), decreased cerebral blood flow (CBF), and elevated mean transit time (MTT) in the left middle cerebral artery distribution (Figure 2a, 2b, 2c). Patient was emergently intubated for the intervention and taken to the angiography suite. Aortic arch injection confirmed the finding of CT angiogram with complete occlusion of left common carotid artery (Figure 3). Several attempts were made to identify the stump of the left common carotid artery without success and atient was then sent back to the intensive care unit. Within 12 hours from the symptom onset there was complete reversal of neurological symptoms, with only minimal residual right leg weakness (NIHSS 2). He was sent for a planned magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) and during the study developed an acute onset of similar symptoms but this time more

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severe deficits (NIHSS 24). MRI/MRA head and neck demonstrated recanalization of the left common carotid artery, with underlying high grade stenosis of the left internal carotid artery at its origin (Figure 4a). There was complete occlusion of left middle cerebral artery (M1 segment) (Figure 4b). Diffusion weighted image (DWI) demonstrate a small left parietal infarction (Figure 4c). Since there was a large clinical mismatch, patient was taken back to the angiography suite. A Clopidogril loading dose of 600mg was given via enteral route. A catheter was advanced and positioned in the left common carotid artery

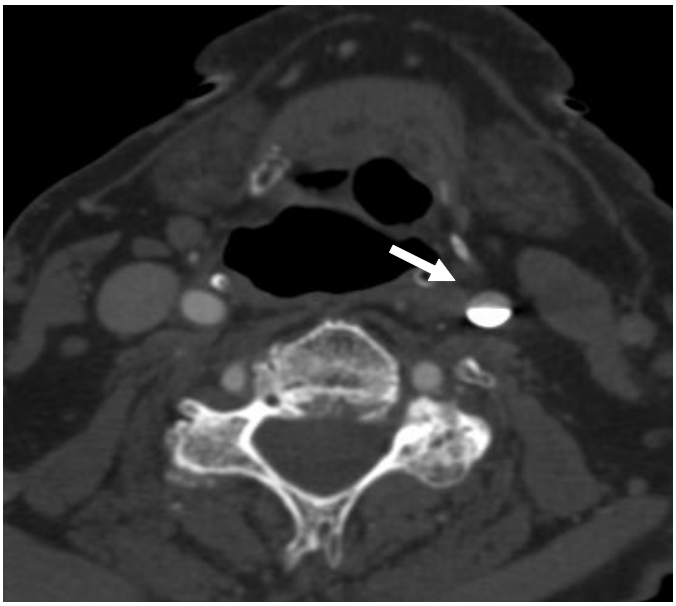

Figure 1: CT angiogram, Axial enhanced images through the neck, demonstrating no flow through left common carotid artery. Arrows pointing to the area where LCCA should be seen.

Figure 3: Digital subtraction angiography, Left anterior oblique projection of the aortic arch, demonstrating a complete occlusion of left common carotid artery at its origin (arrow)

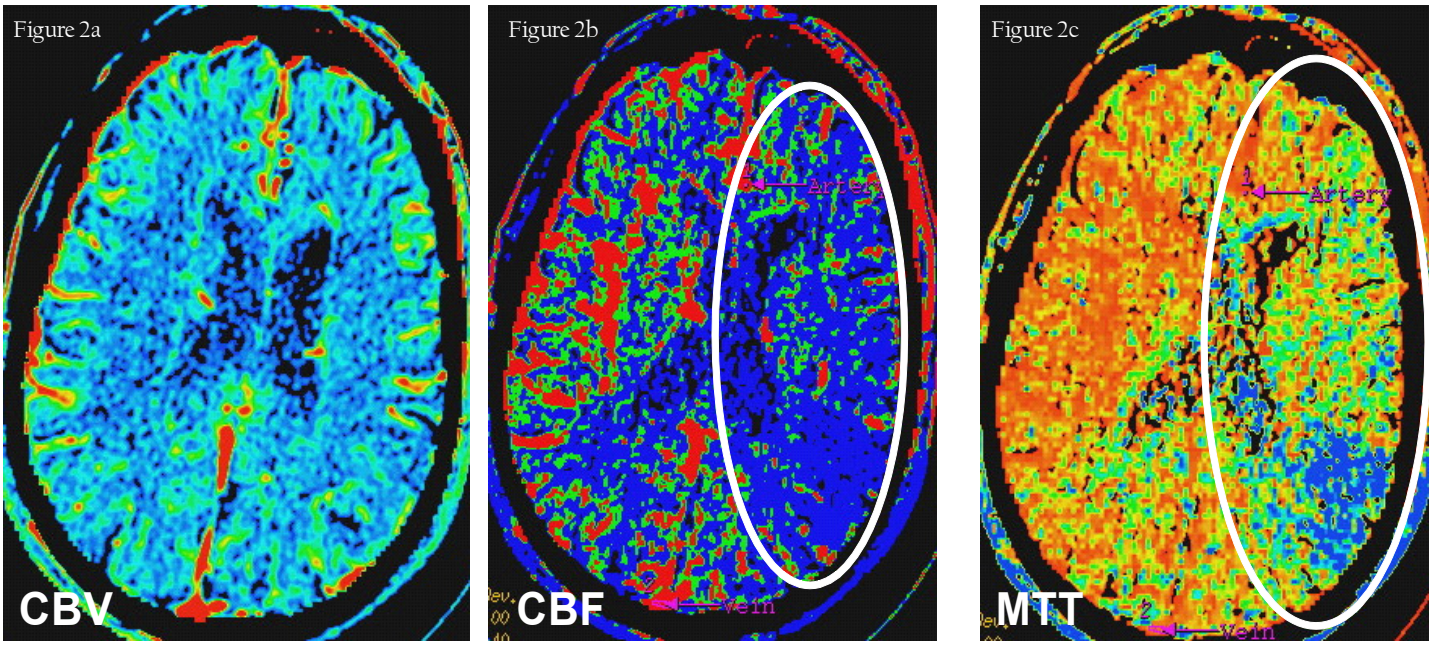

Figure 2a: Cerebral blood volume (CBV), demonstrating preserved volume, consistent with no infarction
Figure 2b: Cerebral blood flow (CBF), demonstrating significant decrease in blood flow in the left hemisphere (circle)
Figure 2c: Mean transit time (MTT), demonstrating increase in MTT in the left hemisphere more pronounced in the parietal region (circle)

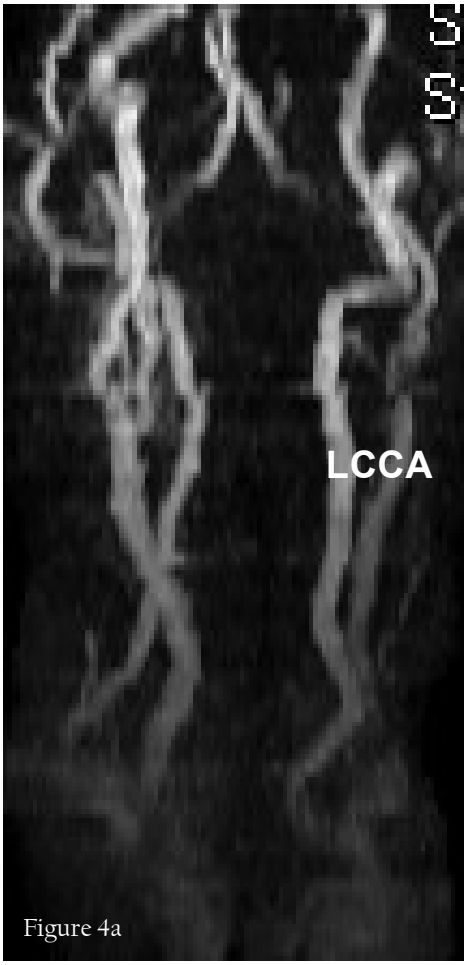

Figure 4a

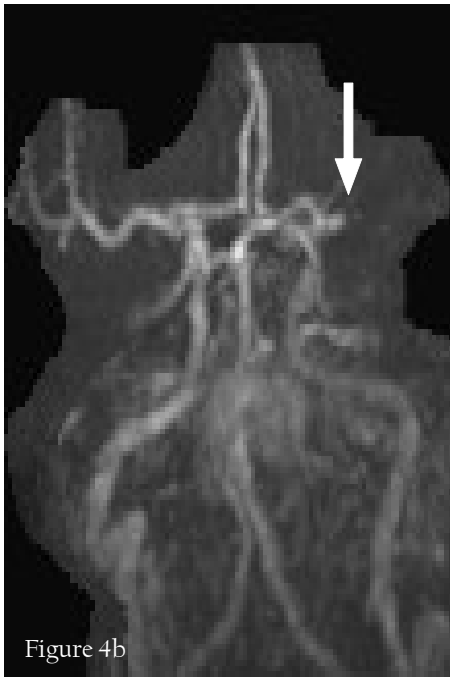

Figure 4b

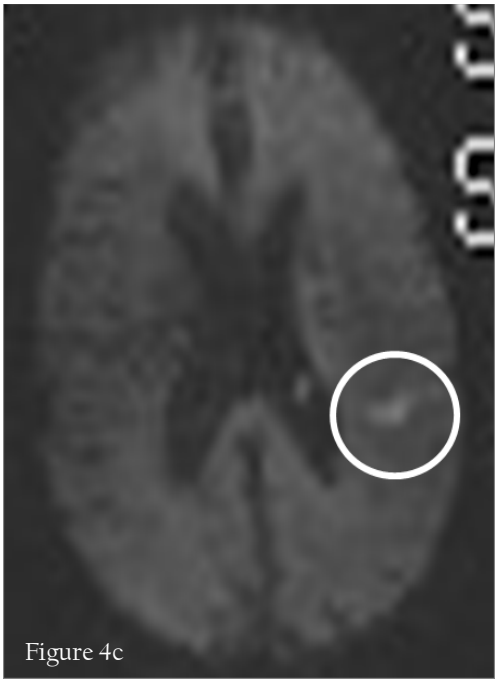

Figure 4c

Figure 4a: MRA without contrast, the images were degraded by motion artifact and demonstrates recanalization of left common carotid artery (labeled)

Figure 4b: MRA without contrast, demonstrating complete occlusion of the proximal left middle cerebral artery (arrow) at M1 segment.

Figure 4c: MRI, diffusion weighted sequence, demonstrating a small area of acute cerebral infarction in the left parietal region (circled)

Digital subtraction angiography demonstrated a high grade stenosis of the left internal carotid artery with an M1 occlusion (Figure 5a, 5b). The catheter was exchanged over an Amplatz (Cook Inc, Bloomington, Indiana) 0.035 inches exchange length wire with a Cook shuttle (Cook Inc) which was positioned in the distal left common carotid artery. Through the shuttle an Excelsior SL-10 (Boston Scientific, Natick, MA) microcatheter was advanced over a Synchro 2 (Boston Scientific, Natick, MA) , 0.014 inches microwire. The microwire and the microcatheter were advanced through the stenosis and positioned in the left middle cerebral artery. Once the desired position was achieved a total of 4.5mg of rt-PA was instituted distal, within and proximal to the clot. Repeat injection demonstrated recanalization of the middle cerebral artery (Figure 6). Then a Transcend (Boston Scientific, Natick, MA) 0.014 inches exchange length microwire was advanced and positioned in the distal internal carotid artery. The microcatheter was exchanged over the wire with an Aviator (Cordis Endovascular, Miami Lakes, FL) 4 mm x 20 mm angioplasty balloon and angioplasty was performed at nominal pressure The balloon was then exchanged with a Precise (Cordis Endovascular, Miami Lakes, FL) 8 mm x 30 mm stent. Post-stent angioplasty was performed with an Aviator 5 mm x 20 mm angioplasty balloon resulting in less than 30% residual stenosis (Figure 7). At the time of discharge (10 days later), his NIHSS score was 10 and his modified Rankin (mRS) was 4. Three months followup demonstrated NIHSS score of 4 (ability to walk with cane, complete normalization of language with some word finding difficulties, weakness in distal right arm with grip, and mild sensory loss) and modified Rankin score (mRS 4), requiring cane for ambulation.

Discussion

The combination of acute complete occlusion of the left common carotid artery at the origin followed by spontaneous early recanalization, with subsequent worsening as a result of middle cerebral artery embolic occlusion has never been described in the literature. Our case was unique in the sense that initial recanalization was not successful as there was a complete occlusion of the common carotid artery at its origin, but spontaneous recanalization within 30 hours from the time of initial symptom onset gave us an opportunity to attempt revascularization with more safety.

The rate of early or late spontaneous recanalization is in the range of 5%-30%.[4-7] In a study of 177 patients, Paciaroni et al[1] demonstrated spontaneous late recanalization was seen in only 5% of patients with carotid artery occlusion. In another retrospective study of 8 patients with carotid artery occlusion, spontaneous late recanalization was seen in 6 patients with little or no clinical sequelae.[7] In the study done by Meves et al[5], 6 of 20 patients (30%) showed spontaneous late recanalization with 2 patients

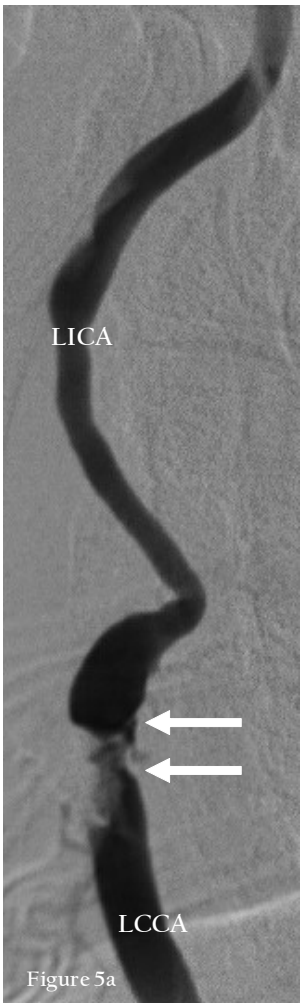

Figure 5a

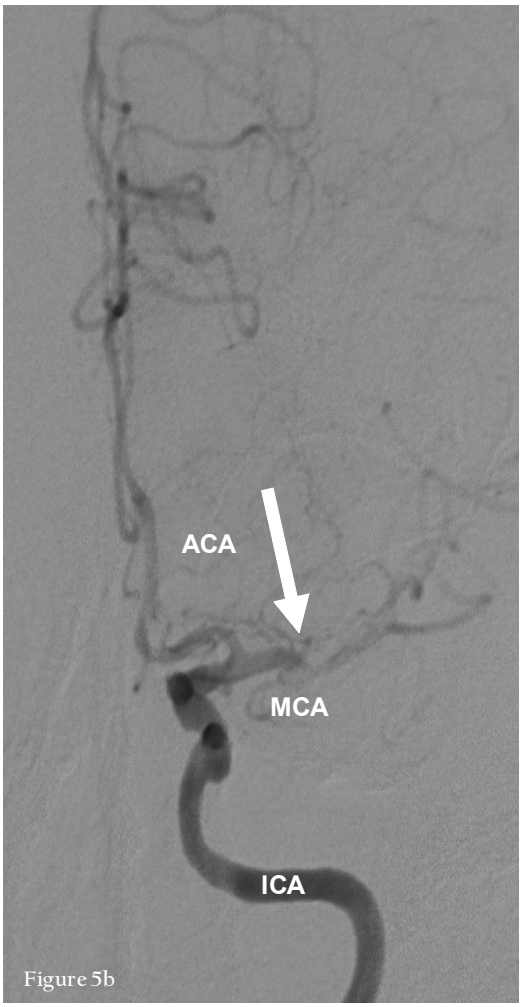

Figure 5b

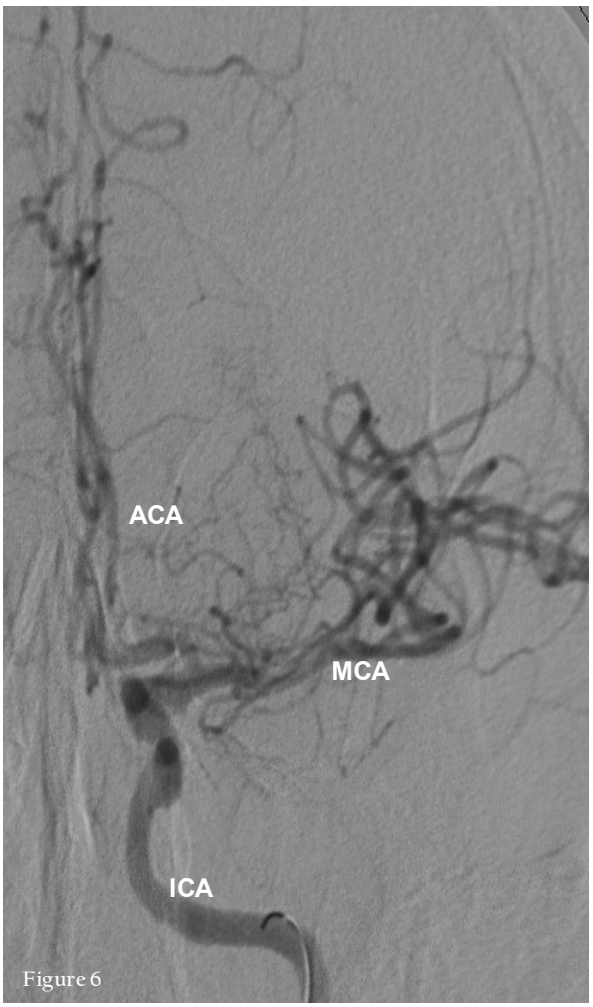

Figure 6

Figure 5a: Catheter angiogram, lateral view of the left common carotid artery. Arrows show a high grade stenosis of the internal carotid artery with ulceration at the origin.

Figure 5b: Angiogram, anteroposterior view. Complete occlusion of left middle cerebral artery (arrows) at the M1 segment.

Figure 6: Angiogram, anteroposterior view. Complete recanalization of the left middle cerebral artery post-thrombolytic therapy, with good filling of the distal MCA branches

having a good clinical outcome. Twelve out of 76 (15%) patients in Szabo et al[4] study had spontaneous early recanalization. Probably, in our case there was an acute common and internal carotid artery occlusion, limiting its visualization in initial imaging studies (CT angiogram and catheter angiogram). The baseline vascular imaging and subsequent MRA provided us enough information to pursue endovascular revascularization after the second episode. Small infarct size on MRI permitted us to use intra-arterial thormbolytic therapy followed by angioplasty and stent placement safely.

Conclusion

There exists a possibility of spontaneous recanalization with risk of distal embolization among patients who present with complete occlusion of common or internal carotid arteries, If identi-

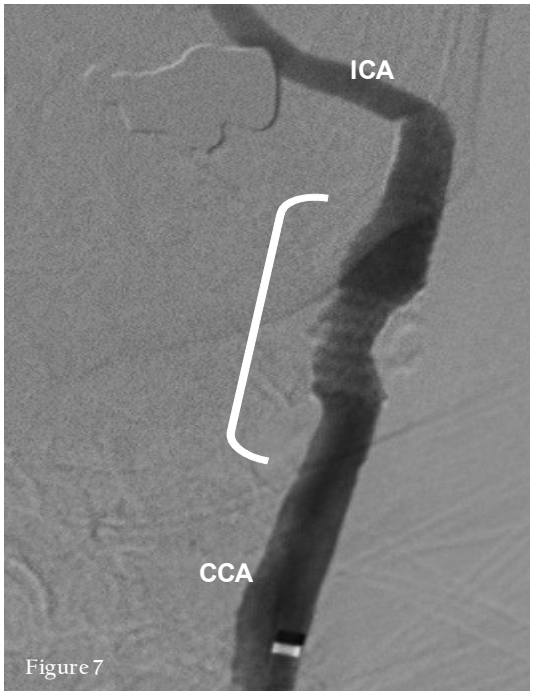

Figure 7

Figure 7: Angiogram, lateral view. Stent placement across the origin of internal carotid artery with <30% residual stenosis

fied early, patient can benefit from endovascular intervention.

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