Successful reperfusion of bilateral middle cerebral artery embolic occlusions using stent retriever thrombectomy

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ABSTRACT

A 40-year-old woman presented to our stroke center for a left middle cerebral artery embolic occlusion. This was successfully treated with mechanical thrombectomy using a stent retriever and balloon guide catheter aspiration. The patient was discharged home in good condition on clopidogrel but returned 2 months later with a contralateral right middle cerebral artery embolic occlusion. This was also successfully treated, this time with a stent retriever and local aspiration (Sol-Arc technique). She was once again discharged in good condition but with warfarin and an implanted loop recorder. This case demonstrates the feasibility of short-term bilateral mechanical thrombectomy for embolic middle cerebral artery occlusions.

KEYWORDS Embolus; ischemia; stent retriever; stroke; thrombectomy

Several recent randomized trials have established mechanical thrombectomy with stent retrievers as the first-line treatment in selected patients.^{1,2} These trials have revolutionized the treatment algorithm for large-vessel occlusion in many institutions. Methods of mechanical thrombectomy include stent retriever alone, stent retriever with local aspiration (Sol-Arc or Solumbra), stent retriever with balloon-guide catheter aspiration, and direct aspiration.^{3–7} There have been no large randomized trials showing one method as superior to another; thus, the technique of choice is usually based on anatomic factors and operator preference. The Sol-Arc technique was employed in this case, because it has been shown to have a high success rate and safety rating.⁸ Using this technique, a large-bore intracranial support catheter is placed just proximal to the embolic occlusion. Coaxially, a stent retriever device is placed across the embolic occlusion with a 0.021-inch or 0.027-inch microcatheter. After waiting 5 minutes, the stent retriever is withdrawn into the support catheter, which is simultaneously aspirated and removed. Here we describe successful mechanical thrombectomy of bilateral middle cerebral artery (MCA) occlusions diagnosed in the same patient over a short time interval.

CASE PRESENTATION

A 40-year-old woman presented to the hospital 40 minutes after acute-onset aphasia. The National Institutes of Health Stroke Scale (NIHSS) was 4. She was known to have systemic hypertension and a history of two remote cryptogenic strokes from which she had fully recovered. The patient was receiving daily aspirin for stroke prevention. A smoking history with cessation at the age of 20 was elicited.

Intravenous tissue plasminogen activator (tPA) was administered without improvement in her neurological status, and the decision was made to pursue mechanical thrombectomy. Upon arrival to the angiography suite, her neurological status declined with development of more pronounced right-sided weakness. Computed tomographic angiography and digital subtraction angiography (*Figure 1a*) revealed occlusion of the distal aspect of the left MCA M1 segment. Mechanical thrombectomy (*Figure 1b*) using a 4 mm × 15 mm Solitaire stent retriever (Medtronic, Irvine, CA) and a Cello balloon occlusion catheter (Medtronic) resulted in complete vessel recanalization. Her neurological status dramatically improved on the angiography table. She was eventually discharged home with an NIHSS of 0 and the addition of daily clopidogrel 75 mg to her medication regimen. Extensive workup in the hospital revealed no arrhythmia or other source of embolus.

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Figure 1. (a) Lateral left internal carotid artery angiographic image from the initial stroke reveals occlusion of the left middle cerebral artery (arrow). (b) Following mechanical thrombectomy with a stent retriever and balloon guide catheter aspiration, the left middle cerebral artery has been successfully recanalized. (c) Frontal right internal carotid artery angiogram showing occlusion of the distal middle cerebral artery M1 segment (grey arrow). Note the severe stenosis of the proximal M2 segment (white arrow) but with excellent backfilling of the distal segments by leptomeningeal collaterals. (d) Following successful thrombectomy with a stent retriever and local aspiration, angiography confirms patency of the M1 segment but with persistent stenosis of the M2 trunk. Despite altered hemodynamics, the patient's neurological status nearly normalized on the angiography table, suggesting a chronic stenosis with excellent collateralization.

Two months later, the patient experienced abrupt onset facial droop, dysarthria, and left-sided weakness. She presented to our emergency department 2 hours and 15 minutes after symptom onset with an NIHSS of 6. Computed tomography angiography revealed occlusion of the right MCA M1 segment (Figure 1c). Due to her recently treated left MCA stroke, she was not a candidate for intravenous tPA and was instead transported to the angiography suite for mechanical thrombectomy.

Catheter angiography of the right internal carotid artery revealed distal M1 occlusion of the right MCA in addition to severe stenosis of the proximal M2 segment just beyond the clot (Figure 1d). Due to differing anatomy of the right MCA relative to the left, the Sol-Arc technique was utilized. A 4 mm × 15 mm Solitaire stent retriever (Medtronic) in conjunction with an Arc large-bore support catheter (Medtronic) resulted in successful vessel recanalization with a single pass. Near-complete resolution of the patient's symptoms occurred on the angiographic table. This improvement despite persistent severe M2 stenosis confirmed the stenosis as chronic and adequately compensated for by robust leptomeningeal collaterals.

Electrocardiography and a complete workup again revealed no arrhythmia or other inciting stimulus for her recurrent stroke. An implantable loop recorder was placed and the patient was started on warfarin in place of clopidogrel. Three days after thrombectomy, the patient was discharged home with an NIHSS of 0 and no residual neurological deficits.

DISCUSSION

Treatment for short-interval recurrent stroke is made complicated by the contraindication to intravenous thrombolysis. No such contraindication exists for the repeat use of mechanical thrombectomy. In our patient, with only 2 months elapsing between bilateral MCA embolic occlusions, we were able to provide mechanical thrombectomy with an excellent outcome. To our knowledge, this is the first description of successful mechanical thrombectomy of bilateral MCA occlusions diagnosed in the same patient over a short time interval. This

suggests that in appropriately selected patients, repeat mechanical thrombectomy can be offered in multiple vascular territories with a chance for excellent outcomes, even when intravenous tPA is contraindicated.

It should be stressed that similar results should not necessarily be expected at low-volume stroke centers (<50 mechanical thrombectomy procedures per year). For example, lower mortality rates have been documented at high-volume stroke centers relative to low-volume centers, even when time to recanalization is prolonged transporting the patient to the more experienced stroke center.^{9,10}

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