

CASE REPORT

Endovascular treatment of an acute left middle cerebral artery >6 h post stroke in a patient presenting with dysphasia and dense right hemiplegia

Kenny Chan,¹ Dennis J Cordato,¹ Elias E Kehdi,¹ Glen Schlaphoff² and Alan McDougall¹ Departments of ¹Neurology, and ²Radiology, Liverpool Hospital, Sydney, New South Wales, Australia

Abstract

This paper describes the case of a 32-year-old man presenting with dense right hemiplegia and global aphasia caused by an acute left middle cerebral artery infarct that underwent successful endovascular therapy after being determined ineligible for intravenous tissue plasminogen activator. Clot traversion and balloon disruption followed by intra-arterial Alteplase resulted in successful re-canalization of his middle cerebral artery at 7 h 30 min. At 3 months post stroke, the patient had moderately severe expressive dysphasia but was mobilizing independently with normal right upper and lower limb strength. In conclusion, the 3 month outcome suggests that the therapeutic time window for endovascular therapy might exceed 6 h post stroke.

Key words:

cerebrovascular accident, intra-arterial, thrombolytic therapy.

Introduction

Recombinant tissue plasminogen activator (t-PA) is approved as an effective treatment of acute ischaemic stroke presenting within 3 h and results in improved 3 month functional outcomes.¹ However, the time window for treatment is small. Consequently, the treatment rate in local and international centres that offer i.v. thrombolysis is relatively low,² although treatment rates of 15% or more have been achieved.³⁴

Endovascular therapies for acute stroke are rapidly evolving as adjuncts or alternatives to patients deemed ineligible for i.v. thrombolysis.⁵⁻⁸ A significant limitation of endovascular therapy in Australia is that very few centres have the infrastructure to offer this form of intervention. Nevertheless, endovascular therapies might significantly increase the number of patients suitable for acute stroke intervention.

The present paper reports a 32-year-old man presenting with an acute left middle cerebral artery (MCA) infarct who underwent successful endovascular therapy after being determined ineligible for i.v. t-PA.

Case report

A 32-year-old man presented to Liverpool Hospital, Australia, in October 2006 with a 1 h history of aphasia

Correspondence: Dr Dennis Cordato, Department of Neurology, Liverpool Hospital Locked Bag 7103, Liverpool BC 1871, NSW, Australia. Email: dennis.cordato@sswahs.nsw.gov.au

Kenny Chan, MB BS; Dennis J Cordato, PhD, FRACP; Elias E Kehdi, MB BS, M Optm; Glen Schlaphoff, FRANZCR; Alan McDougall, PhD, FRACP.

and right hemiplegia . Clinically, he was drowsy but easily rousable, but not verbalizing or obeying simple commands. He had a right upper motor neurone facial weakness, complete right hemiplegia and a positive Babinksi response. His eyes were deviated to the left. He was not responding to visual stimuli on the right consistent with a right homonymous hemianopia. His National Institute of Health Stroke Scale score was 24. His BP was 125/75 mmHg. He was in sinus rhythm. His cardiovascular examination is normal. His past medical history was unremarkable. He was on no regular medications, smoked 10 cigarettes per day and did not drink alcohol regularly.

A cerebral CT scan demonstrated a small area of hyper-intensity in the parenchyma of the left frontal lobe, which was most probably calcification (Fig. la). However, it raised the possibility of a small area of haemorrhage. An urgent MRI brain was performed which confirmed a large left MCA infarct without evidence of haemorrhage. Magnetic resonance angiography identified occlusion of the left internal carotid artery (ICA) 1 cm distal to its bifurcation. The extent of infarction was similar on diffusion and perfusionweighted sequences (Fig. 1b–d).

At the time of completion of the MRI, the 3 h time window for t-PA had elapsed. Hence, the patient was deemed ineligible for i.v. thrombolysis. After discussions with the hospital's interventional neuroradiologist, it was decided to perform endovascular thrombolysis and angioplasty of the lesion. Informed consent was obtained from the patient's family.

The procedure was performed under general anaesthesia. At 5 h 30 min post stroke, cerebral angiography confirmed left MCA occlusion (Fig. 2a). It was determined that stenting of the vessel at the occlusion site was not possible. Using a coaxial technique (Envoy 6F

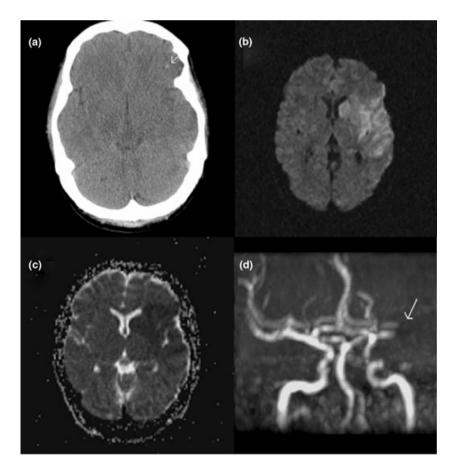


Figure 1. (a) CT brain scan showing area of increased signal in the parenchyma of the left frontal lobe (white arrow). (b and c) MRI brain showing diffusion and perfusion-weighted abnormalities in the left left middle cerebral artery (MCA) territory. (d) MR angiogram showing occlusion of left MCA (white arrow).

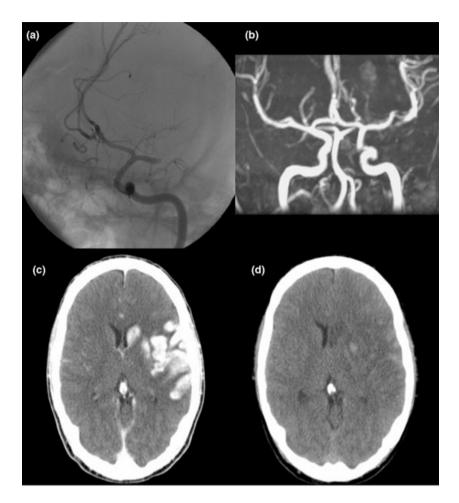


Figure 2. Cerebral angiography confirming (a) occlusion of left MCA. (b) MRA showing successful re-canalization of left MCA. (c) Post-angiography CT brain showing cortical contrast uptake. (d) Subsequent resolution of contrast uptake on repeat CT imaging 48 h later.

guiding catheter, Cordis; Excelsior SL10 Microcatheter and Transcend EX platinum wire combination; Boston Scientific, Natick, MA, USA), 2 mg of Abciximab was administered intra-arterially through the microcatheter just proximal to the occlusion in the distal ICA over 5 min. Clot traversal and balloon disruption was performed (Hyperglide Occlusion Balloon; Micro Therapeutics Inc., Irvine, CA, USA). Intra-arterial Alteplase 1.5 mg was subsequently given followed by angioplasty of the occluded lesion. The left MCA was successfully re-canalized at 7 h 30 min post stroke. Intra-arterial nimodipine was given to protect against vasospasm. A repeat MRA confirmed patency of the left MCA (Fig. 2b). A post-angiogram cerebral CT scan (Fig. 2c) showed striking hyper-intensity changes caused by re-perfusion and cortical uptake of contrast.

He was commenced on low-dose subcutaneous heparin 5000 units bid and aspirin 150 mg the following morning. At day one post stroke, he was observed to have spontaneous movements of his right arm and foot. Repeat cerebral CT imaging demonstrated a left MCA infarct with the post-contrast hyper-intensity largely resolved (Fig. 2d).

Investigations did not identify the aetiology of his stroke. Plasma homocysteine level was mildly raised at 15 mmol/L (n < 12). A urine drug screen and procoagulant studies were otherwise normal. Carotid ultrasonography, *trans*-thoracic and *trans*-oesophageal echocardiography were normal. At day 10 post stroke, he was obeying simple commands but could not verbalize. He was mobilizing independently with mild right upper motor neurone facial weakness and normal

upper and lower limb power. At 3 months post stroke, his modified Rankin score (mRS) was \leq 3. His comprehension had significantly improved, but he still had moderately severe expressive dysphasia.

Discussion

Recent studies indicate that intra-arterial re-canalization is a safe and effective alternative to patients who cannot undergo 'standard' i.v. therapy.⁵⁻⁹ The PROACT II study found that intra-arterial pro-urokinase given within 6 h of MCA occlusion significantly improved clinical outcome at 3 months.¹⁰ The 3 h time window for t-PA in this patient had elapsed after his MRI. His NIHSS score was >22, which is typically associated with a poor prognosis. The decision to proceed with endovascular therapy was in the hope that reperfusion might salvage some ischaemic penumbra. His MCA was not re-canalized until 7 h 30 min post stroke.

The alternatives to i.v. thrombolysis for acute ischaemic stroke include intra-arterial thrombolysis with agents such as Alteplase and Pro-urokinase, mechanical thrombolysis with the recently FDA-approved Mechanical Embolus Removal in Cerebral Ischaemia retriever thrombectomy device and stent-assisted re-canalization.¹¹ The MERCI retriever device might potentially minimize distal embolization, but was unavailable at the time of this patient's procedure. The patient underwent balloon inflation of the thrombus after administration of Abciximab and a low dose of Alteplase. Abcimixab has been recently used in several studies prior to intra-arterial urokinase and/or mechanical thrombolysis for MCA occlusion with favourable outcome.^{12,13} Ikushima and colleagues have recently reported successful balloon disruption of thrombus followed by urokinase similar to the technique used in this case (but without abciximab) in seven patients with MCA occlusion, six of which recovered to a mRS $\leq 3.^{14}$

The major complication of endovascular therapy is intracerebral haemorrhage. Symptomatic haemorrhage occurs in less than 10% of patients.^{6,8,10} The post-procedure CT findings illustrate the difficulty in distinguishing haemorrhage from contrast extravazation. A repeat CT scan 24 h later confirmed clearance of the contrast and absence of underlying haemorrhage.

In conclusion, this case report illustrates the potential benefit of endovascular therapy in patients not suitable for tPA. The patient's 3 month outcome also suggests that the therapeutic time window for endovascular therapy might exceed 6 h post stroke.

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