CASE REPORT

A left MCA territory infarction during intravenous recombinant tissue plasminogen activator therapy for right MCA territory ischaemic stroke

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An 81 year old man with a history of hypertension received intravenous recombinant tissue plasminogen activator (tPA) for right middle cerebral artery (MCA) infarction. He had not had stroke or arrhythmia previously. The initial National Institute of Health Stroke Scale (NIHSS) score was 8. However, a left MCA territory infarction developed 2 minutes after the full course of tPA therapy was completed, and 24 hours after tPA infusion, NIHSS score was 17. The subsequent magnetic resonance imaging scan confirmed an extensive left MCA territory infarction and a small right MCA territory infarction. Although the intracerebral haemorrhage after tPA therapy is relatively more common, tPA infusion may result in an ischaemic cerebral stroke in rare cases.

In recent years, intravenous tissue plasminogen activator (tPA) has been widely administered for ischaemic stroke of new onset within 3 hours. It is the only effective therapy for acute ischaemic stroke approved by the US Food and Drug Administration and the Taiwan Bureau of National Health Insurance. However, it may result in high risk of intracerebral haemorrhage (ICH). Based on the consensus of the Taiwan Stroke Society, tPA is indicated for the patients with acute onset of cerebral infarction and a score on the National Institute of Health Stroke Scale (NIHSS) of 6–25, and without current use of anticoagulation agents, recent operations, and very high blood pressure (>185 mmHg in systolic pressure).¹ When clinical worsening occurs, either ICH or the natural course of the evolving stroke should be considered. We present a rare case of left middle cerebral artery (MCA) territory ischaemic stroke soon after tPA infusion for strongly suspected evolving right MCA territory infarction.

CASE REPORT

An 81 year old man with a history of hypertension was sent to the emergency department (ED) because of left hemiplegia, left sided facial palsy, and drowsiness. On examination, his blood pressure was 160/95 mmHg and Glasgow Coma Scale (GCS) was E3V5M6. He had no history of stroke and did not have an arrhythmia. The initial NIHSS was 8, and the ECG showed regular sinus rhythm. The bleeding and coagulation times were both within normal limits. Brain computed tomography (CT) scan showed no evidence of haemorrhage (fig 1A), therefore, 5 mg tPA was given intravenously as a bolus and 45 mg infusion for 1 hour immediately after the bolus therapy. This procedure began within 2 hours of symptoms onset under the diagnosis of right MCA territory infarction, and the neurological deficits dramatically improved, with NIHSS dropping to 4 while tPA therapy was being completed. However, a sudden onset of unconsciousness (GCS: E1V1M5) and right hemiparesis

developed 2 minutes after tPA therapy, and in the interval, he had gum and nasal bleeding. A brain CT scan was performed immediately, which showed no haemorrhage, but a left MCA territory infarction was suspected (fig 1B). Blood pressure ranged from 150/90 to 185/95 mmHg during the first 24 hours after tPA treatment, and NIHSS score was 17 at 24 hours after tPA infusion (table 1). An MRI scan 1 day later confirmed an extensive left MCA territory infarction and a simultaneous small right MCA territory infarction (fig 1C). Lower molecular weight heparin (Fraxiparin) therapy was administered for 7 days during the hospitalisation. Transient atrial fibrillation with a rapid ventricular response was found, and spontaneous restoration of sinus rhythm was soon achieved on the fourth day of hospitalisation. Transthoracic echocardiogram showed only mild aortic regurgitation and mild mitral regurgitation without evidence of valvular diseases or intracardiac thrombus. Carotid Duplex study showed no occlusion or significant stenosis at the bilateral carotid arteries. No atheroma was detected at the carotid arteries.

DISCUSSION

In one study, based on cerebral angiogram performed before and after tPA infusion, recanalisation was found in up to 38% of MCA occlusions,² demonstrating the effectiveness of clot resolution after tPA infusion. Bruckmann and Ferbert never detected distal intra-arterial migration of blood clot during an angiogram study shortly after tPA infusion in a patient.³

Thomas Moore *et al* pointed out that the risk of stroke was highest shortly after an acute myocardial infarction (MI). The risk declined rapidly to the level of the non-MI population within several days. The earliest stroke after MI occurred 2 days after the tPA infusion in the study.⁴ To our knowledge, there has been a single case of an ischaemic stroke occurring in the midst of tPA infusion for an evolving MI.⁵

The pathophysiology of stroke after MI is unclear. Emboli from the left ventricular thrombus might be an important mechanism but in situ thrombosis or artery to artery embolism could also be important. The present case is unique that a fresh left MCA territory infarction occurred soon after the tPA infusion for treatment of the other side MCA territory stroke. Because paroxysmal atrial fibrillation, the most probable mechanism attributed to left ventricular thromboembolism, was found in this case later in his hospitalisation, we speculate that cardiogenic embolus might be a possible cause for the ischaemic stroke. However, artery to artery embolism resulting from floating plaques of left internal

Abbreviations: ED, emergency department; GCS, Glasgow Coma Scale; ICH, intracerebral haemorrhage; MCA, middle cerebral artery; MRI, magnetic resonance imaging; NIHSS, National Institute of Health Stroke Scale; tPA, tissue plasminogen activator

Figure 1 (A) The initial CT scan showing no evidence of haemorrhage and infarction before tPA given; (B) the CT scan still showing no intracranial haemorrhage after the full course of tPA therapy but left MCA territory infarction suspected; (C) MRI scan revealing extensive left MCA territory infarction and a small right MCA territory infarction 1 day after tPA therapy.

carotid artery or MCA after tPA therapy should also be considered.

Although ICH after tPA therapy is relatively more common, the evolutionary progression of an ischaemic stroke is also not very rare. In one study, 6.4% of patients treated with tPA developed symptomatic ICH within 36 hours after the onset of stroke. ICH is the main complication for tPA therapy and there are few data about ischaemic stroke soon after tPA therapy.⁶ Among our small number of patients with tPA therapy, about 20% patients developed ICH. Early arterial reocclusion occurs in about 34% of ischaemic stroke patients

with tPA treatment.⁷ It has even been suggested that more sustained medication using a longer acting lytic drug or coupling lytic therapy with antiplatelet, antithrombin, or other antithrombotic therapy could prevent reocclusion and improve the outcome.⁸

For this case, it is unclear whether we can use an additional dose of tPA for the second attack of ischaemic stroke shortly after first infusion of tPA. The risk of ICH in this situation remains uncertain. Further information and experience are needed to clarify these problems.

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Table 1 Scores on the NIHSS after the onset of stroke

Instructions	Score at:				
	T _{-1h}	T ₀	T _{1h}	T _{1d}	T _{30d}
1a. Level of consciousness (LOC)	1	1	2	2	1
1b. LOC Questions	0	0	2	2	2
1c. LOC Commands	0	0	2	2	1
2. Best gaze	0	0	0	0	0
3. Visual*	2	0	0	0	2
4. Facial palsy	1	1	1	1	0
5. Motor arm					
5a. Left arm	2	1	1	1	1
5b. Right arm	0	2	0	2	4
6. Motor leg					
6a. Left leg	2	1	1	1	1
6b. Right Leg	0	2	0	2	4
7. Limb ataxia					
Right arm	0	0	0	0	0
Left arm	0	0	0	0	0
Right leg	0	0	0	0	0
Left leg	0	0	0	0	0
8. Sensory.	0	0	0	0	0
9. Best language	0	0	2	2	3
10. Dysarthria	0	0	2	2	2
11. Extinction and inattention	0	0	0	0	0
Total score	8	4	17	17	21

T_{-1h}, baseline (before tPA treatment); T₀, the time just finishing tPA treatment; T_{1h}, T_{1d}, T_{30d}: 1 hour, 24 hours and 1 month post-tPA treatment, respectively. *Left hemianopia was noted in the ED, but it subsided after treatment. Right hemianopia was found when consciousness was regained during admission.