Case Report

Fatal Multiple Systemic Emboli after Intravenous Thrombolysis for Cardioembolic Stroke

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Our objective is to present a case of fatal multiple systemic emboli after intravenous thrombolysis for cardioembolic stroke. A 64-year-old woman with atrial fibrillation was admitted for evaluation of sudden consciousness disturbance, right hemiplegia, and aphasia. Diffusion-weighted imaging showed no early ischemic changes of the brain, and magnetic resonance angiography (MRA) showed occlusion of the left middle cerebral artery (MCA). One hour after initiation of 0.6 mg/kg of intravenous alteplase, the MCA was partially recanalized. Her symptoms disappeared the following day. We began intravenous heparin for secondary prevention of cardioembolic stroke. However, on the third day (52 hours after thrombolysis), she suddenly developed a coma and left hemiplegia. MRA showed acute occlusion of the right internal carotid artery (ICA). She developed acute kidney injury and sudden shock and then died of fatal cardiorespiratory arrest on the fourth day.

Autopsy revealed occlusion of the mitral valve orifice by a spherical fresh red thrombus that led from the left atrial appendage. Acute embolic infarcts were identified in the spleen and right kidney, the latter secondary to occlusion of the right renal artery with fresh red thrombus.

Intravenous thrombolysis and subsequent anticoagulation therapy may destabilize pre-existing intracardiac thrombus, potentially leading to recurrent stroke, multiple systemic embolisms, and the fatal "hole-in-one" effect. **Key Words:** Acute stroke—autopsy—cardioembolism—ischemic stroke—systemic embolism—thrombolysis. © 2014 by National Stroke Association

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Figure 1. MRA, CT, and pathological findings. (A) MRA on admission showed left MCA occlusion. (B) MRA on day 3 showed right ICA occlusion and left MCA recanalization. (C) CT on day 4 showed large infarcts in the right MCA territory (arrows). (D) Fresh red thrombus retrieved from the right ICA by mechanical thrombectomy (Masson's trichrome staining). (E) "Hole-in-one" effect; mitral valve (MV) occluded by a spherical fresh red thrombus (T) with a stalk (arrows) adhered to the LAA. (F): Fresh red thrombus (*) in the occluded right renal artery (Masson's trichrome staining). Abbreviations: CT, computed tomography; ICA, internal carotid artery; MCA, middle cerebral artery; MRA, magnetic resonance angiography; MV, mitral valve; LAA,

Case Report

A 64-year-old woman with atrial fibrillation (AF) was admitted for evaluation of sudden consciousness disturbance, right hemiplegia, and aphasia. She was taking warfarin and her international normalized ratio on admission was 1.10. Diffusion-weighted imaging showed no early ischemic changes of the brain, and magnetic resonance angiography (MRA) showed occlusion of the left middle cerebral artery (MCA) (Fig 1A). Transthoracic echocardiography showed no visible thrombus in the left atrium. One hour after initiation of 0.6 mg/kg of intravenous alteplase, the MCA was partially recanalized. Her symptoms disappeared on the following day. We began intravenous heparin (10,000 U daily) for secondary prevention of cardioembolic stroke. However, on the third day (52 hours after thrombolysis), she suddenly developed a coma and left hemiplegia. MRA showed acute occlusion of the right internal carotid artery (ICA) (Fig 1B). Her activated partial thromboplastin time was 36 seconds (29 seconds at baseline). Because of recent intravenous thrombolysis, emergent endovascular thrombectomy using Merci Retrieval System was performed for ICA occlusion. Although a fresh red thrombus was retrieved by the procedure, complete recanalization was not achieved (Fig 1C, D). She developed acute kidney injury and sudden shock and then died of fatal cardiorespiratory arrest on the fourth day.

Autopsy revealed occlusion of the mitral valve orifice by a spherical fresh red thrombus that led from the left atrial appendage (Fig 1E), showing pathological findings similar to those of the thrombus retrieved from the right ICA. Acute embolic infarcts were identified in the spleen and right kidney, the latter secondary to occlusion of the right renal artery with fresh red thrombus (Fig 1F). Ischemic changes were also identified in the small intestine.

Discussion

Early recurrent ischemic stroke after intravenous thrombolysis is an uncommon complication of thrombolysis. Early recurrent ischemic stroke was associated with AF and has been presumed to occur mainly because of the disintegration of pre-existing intracardiac thrombus by thrombolysis.¹ Early embolism to other vascular beds after thrombolysis, including coronary arteries and peripheral arteries, has also been reported.^{2,3,4} This is the first report to demonstrate fatal multiple systemic emboli after thrombolysis in autopsy.

left atrial appendage.

Although thrombus was not shown in the left atrium by transthoracic echocardiography on admission in this case, intravenous thrombolysis and subsequent anticoagulation therapy may destabilize pre-existing intracardiac thrombus, leading to recurrent stroke, multiple systemic embolisms, and the fatal "hole-in-one" effect.⁵ A previous study reported that the presence of intracardiac thrombus was not associated with a high risk of recurrent embolism in acute stroke patients treated with intravenous thrombolysis.⁶ Therefore, thrombolysis should not be withdrawn simply because of the risk of recurrent embolism in patients with AF who have a high potential for intracardiac thrombus. However, clinicians should pay attention to early embolic events after thrombolysis, especially in patients with AF.

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