Is It Safe to Proceed with Thrombolytic Therapy for Acute Ischemic Stroke in a Patient with Cardiac Myxoma? Case Report and Review of the Literature

Ivan Rocha Ferreira da Silva^a Gabriel R. de Freitas^b

^aNeurocritical Care Unit, Cerebrovascular Center, Cleveland Clinic Foundation, Cleveland, Ohio, USA; ^bService of Neurology, Hospital Quinta D'Or/Instituto D'Or, Institute for Research and Education (IDOR), Rio de Janeiro, Brazil

Dear Sir,

Acute cerebral ischemia can be the first manifestation of an atrial myxoma [1, 2]. Myxomas are the most common primary cardiac tumors and can present as mitral valve dynamic obstruction, constitutional symptoms or embolic phenomena.

We currently present the case of a 69-year-old woman with a history of hypertension who presented with sudden left-sided hemiparesis, drowsiness, and left hemineglect, with a National Institutes of Health Stroke Scale (NIHSS) score of 12. She reported having experienced the same symptoms 1 h earlier, with prompt recovery after a few minutes. Magnetic resonance imaging (MRI) of the brain was performed at the emergency department, showing an acute ischemic infarct in the right basal ganglia and semi-oval white matter, and a MR angiography disclosed an occlusion of the right middle cerebral artery (MCA). The stroke team decided to proceed with thrombolytic treatment using intravenous recombinant tissue plasminogen activator (rtPA). The medication was infused uneventfully within 120 min from the beginning of her symptoms. The patient presented some clinical improvement after the infusion, with a decrease of her NIHSS score of 7 points, sustained throughout the next 24 h. A transcranial Doppler and a digital cerebral angiography were performed, confirming the reperfusion of the right MCA, with only minimal slowing of the distal flow. The next morning, she was started on aspirin 100 mg/daily and enoxaparin 40

mg/daily for stroke and deep venous thrombosis prevention. Later that day, the patient presented a worsening of her clinical status secondary to an embolic occlusion of her left femoral artery. Moreover, a transthoracic echocardiogram disclosed a 2 × 2 cm mass inside the left atrium, raising suspicion of an atrial myxoma. She underwent urgent peripheral vascular and cardiac surgeries, which confirmed the finding of a left atrial myxoma. The blood pressure fluctuated throughout the lengthy surgery, with reported episodes of hypotension, and blood loss was estimated at approximately 1 liter. During the postoperative period, her neurological status deteriorated and an urgent computerized tomography scan was performed, showing diffuse parenchymal edema over the right MCA distribution, with associated midline shift. Urgent decompressive craniectomy was performed, but no clinical improvement was achieved. The patient evolved to brain death within the next 24 h.

Review of the Literature

Eight previous reports presented patients with acute ischemic strokes and associated cardiac myxoma treated with thrombolytic therapy [3–10]. The majority of those patients (6) were treated with alteplase, 4 of which received it intravenously [3–6], and 2 intra-arterially [7, 8]. The 2 remaining reports used intra-arterial uroki-

nase [9, 10]. All but 1 patient were treated within 270 min [9]. The clinical improvement was described as positive in 7 reports [3–9], though NIHSS score was not reported in most of them, and only 1 patient suffered a major bleeding (cerebellar hemorrhage and mild parietal subarachnoid bleeding), but still with a positive outcome [3]. The definition of improvement was obtained from each report according to the definition of its authors (most authors did not report pre- and/or post-treatment NIHSS scores). Table 1 summarizes the reports, showing their main characteristics.

Discussion

Treatment of acute ischemic strokes caused by embolic atrial myxoma is controversial, largely because the embolus could be composed of the tumor itself, adhered thrombotic material or a combination of both. It is reasonable to argue for the possible mechanism of action of rtPA depending on the composition of the emboli; however, the current guidelines for acute ischemic stroke do not address this question. Moreover, previous autopsy studies showed the presence of aneurysms in the cerebral vessels of these patients, probably secondary to tumoral invasion and inflammation of the arterial layers, raising concern about the occurrence of subarachnoid hemorrhage during chemical thrombolysis [11].

Table 1. Descriptive compilation of reported cases of patients with acute ischemic stroke secondary to atrial myxoma treated with thrombolysis

Report	Age	Artery	Gender	Via	Drug	Time to infusion	NIHSS on arrival	Clinical improvement	Hemorrhage	Time to surgery
Chong et al. [3]	74	left MCA	female	IV	rtPA	180 min	6	mild improvement of aphasia (no second NIHSS score provided) in 2 weeks	cerebellar ICH and SAH	7 days
Ibrahim et al. [4]	51	left MCA	male	IV	rtPA	84 min	22	complete resolution of deficits in 48 h	no	early (not specified)
Nagy et al. [5]	26	right MCA	male	IV	rtPA	105 min	10	NIHSS score of 2 in 24 h	no	2 days
Ong et al. [6]	22	left MCA	female	IV	rtPA	125 min	12	NIHSS score of 5 at 3 months	no	early (not specified)
Present case	69	right MCA	female	IV	rtPA	90 min	12	NIHSS score of 5 in 24 h (worsening after surgery)	no	2 days
Yamanome et al. [7]	62	left MCA	female	IA	rtPA	120 min	not reported	marked improvement of aphasia and right hemiparesis in 2 weeks	no	25 days
Gassanov et al. [8]	17	left MCA	male	IA	rtPA	approx. 60 min	not reported	complete resolution of deficits in 24 h	no	timing not specified
Bekavac et al. [10]	57	right MCA	female	IA	urokinase	210 min	19	death in 48 h secondary to malignant cerebral edema	no	no
Sugawara et al. [9]	37	left MCA	male	IA	urokinase	310 min	not reported	marked improvement of language and right hemiparesis in 1 week	no	19 days

IA = Intra-arterial; IV = intravenous; SAH = subarachnoid hemorrhage; ICH = intracerebral hemorrhage.

Initially, our patient presented a satisfactory improvement (both clinically and on imaging) with intravenous rtPA. We believe that the unfavorable outcome was most likely due to hemodynamic instability during the surgical procedures which led to massive cerebral ischemia in an already vulnerable brain with recovering areas of penumbra after successful thrombolysis.

It is difficult to draw a firm conclusion from the few existing data which consist of single-case reports employing a variety of methods of administering different thrombolytic drugs. A reasonable hypothesis is that intra-arterial infusion may be safer than intravenous infusion, given the opportunity to evaluate the existence of aneurysms prior to infusing the thrombolytic. On the other hand, just one report of intravenous infusion showed hemorrhagic

events, with a corresponding normal cerebral angiography. It is worth mentioning that the current guidelines on stroke thrombolysis do not recommend against it in patients with atrial myxoma. In conclusion, we believe that patients with a known history of atrial myxoma should not be excluded from receiving chemical thrombolysis, either given intra-arterially or intravenously. Mechanical thrombolysis could also be an exciting alternative.

References

- 1 Joynt RJ, Zimmerman G, Khalifeh R: Cerebral emboli from cardiac tumors. *Arch Neurol* 1965;12:84–91.
- 2 Reynen K: Cardiac myxomas. *N Engl J Med* 1995;333:1610–1617.
- 3 Chong JY, Vraniak P, Etienne M, et al: Intravenous thrombolytic treatment of acute ischemic stroke associated with left atrial myxoma: a case report. *J Stroke Cerebrovasc Dis* 2005;14:39–41.
- 4 Ibrahim M, Iliescu C, Safi HJ, Buja ML, McPherson DD, Fuentes F: Biatial myxoma and cerebral ischemia successfully treated with intravenous thrombolytic therapy and surgical resection. *Tex Heart Inst J* 2008;35: 193–195.
- 5 Nagy CD, Levy M, Mulhearn TJ 4th, Shapland M, Sun H, Yuh DD, Cheung D, Chandra-Strobos N: Safe and effective intravenous thrombolysis for acute ischemic stroke caused by left atrial myxoma. *J Stroke Cerebrovasc Dis* 2009;18:398–402.
- 6 Ong CT, Chang RY: Intravenous thrombolysis of occlusion in the middle cerebral and retinal arteries from presumed ventricular myxoma. *Stroke Res Treat* 2010;2011:735057.
- 7 Yamanome T, Yoshida K, Miura K, et al: Superselective fibrinolysis for a middle cerebral artery embolism caused by a left atrial myxoma: case report (in Japanese). *No Shinkei Geka* 2000;28:653–658.
- 8 Gassanov N, Nia AM, Dahlem KM, Ederer S, Wedemeyer I, Caglayan E, Erdmann E, Er F: Local thrombolysis for successful treatment of acute stroke in an adolescent with cardiac myxoma. *Scientific World Journal* 2011;11:891–893.
- 9 Sugawara T, Takahashi A, So K, Yoshimoto T, Suzuki J, Suzuki Y, Horiuchi T: A case of cerebral embolism caused by atrial myxoma – superselective fibrinolytic therapy (in Japanese). *No Shinkei Geka* 1987;15:1321–1326.
- 10 Bekavac I, Hanna JP, Wallace RC, et al: Intra-arterial thrombolysis of embolic proximal middle cerebral artery occlusion from presumed atrial myxoma. *Neurology* 1997;49: 618–620.
- 11 Josephson SA, Johnston SC: Multiple stable fusiform intracranial aneurysms following atrial myxoma. *Neurology* 2005;64:526.