Intra-Arterial Thrombolysis for Left Middle Cerebral Artery Embolic Stroke During Coronary Angiography

Patrizia Presbitero, MD; Gabriele L. Gasparini, MD; Paolo Pagnotta, MD

Cerebral thromboembolism is an uncommon but serious complication of cardiac catheterization. Early diagnosis and rapid treatment by reperfusion techniques have been shown to prevent long-term neurological morbidity. We report 2 consecutive cases of successful local intra-arterial thrombolysis (LIT) for embolic stroke of the middle cerebral artery (MCA) during diagnostic coronary angiography that resulted in complete neurological recovery.

A 77-year-old woman with severe valvular aortic stenosis was admitted to our catheterization laboratory for a preoperative coronary angiography. Performed from the femoral approach, it showed a normal angiographic pattern. Immediately after the procedure, the patient became stuporous with right hemiplegia and global aphasia. She was hemodynamically stable.

The left carotid digital subtraction angiography that was performed immediately revealed total occlusion of the M2 part of the left MCA. There was no extravasation of contrast (Figure 1). We decided to administer selective intra-arterial urokinase infusion. After systemic heparinization (bolus of 5000 UI), a 6F Amplatz Right Guide catheter was placed in the left internal carotid artery. Using an infusion catheter (Ultrafuse 3.6 F) that was advanced to the upper end of the cervical part of the internal carotid artery, we performed LIT with urokinase (total dose, 700 000 U) near the proximal end of the occluding thrombus. Twenty minutes after LIT (2 hours after the clinical onset of occlusion), a control angiogram showed complete recanalization of the vessel (Figure 2). The patient’s neurological status improved immediately. The next day, neurological evaluation revealed no deficits. Computed tomography performed 4 days later did not show any signs of infarction. Ten days later, the patient underwent successful aortic valve replacement.

A 72-year-old man with a congestive heart failure was admitted for cardiac catheterization. Coronary angiography, performed from the femoral approach with 6F catheters, excluded coronary artery disease. Two hours after the procedure, the patient was found stuporous with global aphasia. Ischemic stroke resulting from a left MCA occlusion was confirmed by a left carotid digital subtraction angiography. There was no extravasation of contrast (Figure 3).

We again administered intra-arterial urokinase as previously described. Five minutes after LIT (total urokinase dose, 500 000 U), a control angiogram showed complete recanalization of the left MCA (3 hours after the clinical onset of occlusion) (Figure 4). The patient’s neurological status improved immediately. Computed tomography performed the next day was normal, and neurological evaluation did not reveal any deficit. The patient was discharged 3 days later.

Catheterization-related strokes are rare (0.07% to 0.38%).1,2 and almost always are of embolic origin. Emboli can originate from dislodgement of material from plaque rupture, calcium from aortic cusps, or thrombus formation in the catheters or on the guides.3–5 Furthermore, the apposition of thrombus to the embolic material may be an important component of cerebral artery occlusion. Computed tomography scan and magnetic resonance imaging seem to be unnecessary because they do not add anything to the diagnosis and treatment. An immediate carotid angiogram to assess cerebral artery occlusion appears to be the best and least time-consuming approach. Hemorrhagic stroke can be recognized by extravasation or late persistence of contrast. Recent studies comparing intra-arterial and intravenous thrombolytic therapy in thromboembolic stroke have shown a higher rate of revascularization with intra-arterial thrombolysis.6,7 Previous trials have shown the safety and efficacy of intra-arterial thrombolysis with urokinase.8,9 The reperfusion rate is ≈70% in atherosclerotic strokes within the first 6 hours and ≥75% within the first 3 hours.10 Cerebral bleeding was noted in 10% of patients who had successful thrombolysis.9 The major constraints for a wide application of intra-arterial thrombolysis in embolic stroke are the narrow period of efficacy (first 3 hours)10,11 and the availability of facilities for catheterization and experienced personnel. Therefore, in an interventional setting, intra-arterial thrombolysis seems to be the most effective and least time-consuming approach. To the best of our knowledge, intra-arterial thrombolysis was never reported in the treatment of stroke as a complication of coronary angiography. The excellent angiographic and clinical results obtained in these 2 cases lead us to advise this treatment as the first choice for treating embolic stroke during cardiac catheterization.

Disclosures

None.

From the Department of Invasive Cardiology, Istituto Clinico Humanitas, Rozzano, Italy.
Correspondence to Dr Patrizia Presbitero, Department of Invasive Cardiology, Istituto Clinico Humanitas, Via Manzoni 56, 20089 Rozzano (Milan), Italy. E-mail patrizia.presbitero@humanitas.it

(Circulation. 2006;113:e64-e66.)
© 2006 American Heart Association, Inc.

Circulation is available at http://www.circulationaha.org

DOI: 10.1161/CIRCULATIONAHA.105.552802
Figure 1. First patient with severe calcified aortic valve stenosis. The carotid angiogram, performed immediately after coronary angiography at the beginning of cerebral symptoms, reveals total embolic occlusion of the M2 part of the left MCA with TIMI 0 flow (arrow).

Figure 2. First patient. Recanalized left MCA after 700,000 U intra-arterial urokinase infusion, with total disappearance of the occlusion with normal anterograde flow (arrow).

Figure 3. Second patient with dilated cardiomyopathy. The carotid angiogram, performed 2 hours after coronary angiography at the beginning of cerebral symptoms, reveals total embolic occlusion of the M2 part of the left MCA with TIMI 0 flow (see arrow).

Figure 4. Second patient. Recanalized left MCA after 500,000 U intra-arterial urokinase, with total disappearance of the occlusion with normal anterograde flow (arrow).
References

Intra-Arterial Thrombolysis for Left Middle Cerebral Artery Embolic Stroke During Coronary Angiography
Patrizia Presbitero, Gabriele L. Gasparini and Paolo Pagnotta

Circulation. 2006;113:e64-e66
doi: 10.1161/CIRCULATIONAHA.105.552802
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2006 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/113/5/e64

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org//subscriptions/