Embolic Cerebral Infarction and Gastrointestinal Hemorrhage Following Thrombolytic Therapy for Acute Myocardial Infarction

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We report an unusual case of cerebral embolization that occurred after intravenous thrombolytic therapy for myocardial infarction. Direct observation by serial echocardiograms in this patient confirmed that the thrombolytic treatment induced lysis and fragmentation of thrombus, and the subsequent dislodging and embolization of preexisting cardiac thrombi, which caused the cerebral infarction. It is suggested that an echocardiogram, if instantly available, be performed before considering thrombolytic therapy whenever acute anterior wall myocardial infarction is impressed. (ECHOCARDIOGRAPHY, Volume 19, February 2002)

cerebral infarction, thrombolytic therapy, echocardiogram

The efficacy of thrombolytic therapy in reducing mortality from acute myocardial infarction has been demonstrated unequivocally. However, thrombolysis is related to many complications, including intracranial hemorrhage and other major bleeding.

While intracranial hemorrhages are the major neurologic complication, a few case reports described the uncommon occurrence of embolic strokes shortly after thrombolytic therapy,[1–3] which are presumably caused by the rapid fragmentation and subsequent dislodging of a preexisting cardiac thrombus. However, these reports lacked confirmatory evidence, and the assumptions were made in retrospect.

We describe an unusual case of cerebral embolization that occurred during intravenous thrombolytic therapy in a patient who sustained an acute anterior myocardial infarction. Echocardiography before and after the thrombolytic therapy demonstrated that the cerebral infarct was indeed caused by partial lysis and subsequent dislodging of preexisting cardiac thrombi. Moreover, bleeding episodes in the form of ecchymosis over extremities and upper gastrointestinal bleeding also were observed concomitantly. The patient, therefore, suffered from complications of both thromboembolism and internal hemorrhage as a result of thrombolytic therapy.

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Case Report

A 67-year-old man presented to our emergency room with acute substernal chest pain associated with nausea and cold sweating for several hours. His past medical history was unremarkable. He smoked one pack of cigarettes per day and did not use alcohol.

Examination of vital signs showed blood pressure of 160/90 mmHg, heart rate of 86 beats/min, respiratory rate of 22 breaths/min, and temperature of 37°C. The head and neck were normal. Bilateral crackles were heard in the basal region of the lungs. The heart rhythm was regular, and a grade 2/6 systolic murmur was heard over the left sternal border. The abdomen was soft and nontender. The peripheral pulses were intact. The neurologic examination was unrevealing. The remainder of the physical examination was unremarkable.

Complete blood count, blood chemistry profile, prothrombin, and partial thromboplastic time were normal. Chest x-ray films showed cardiomegaly and increased pulmonary vascularity. An electrocardiogram showed sinus rhythm with Q wave and ST segment elevation

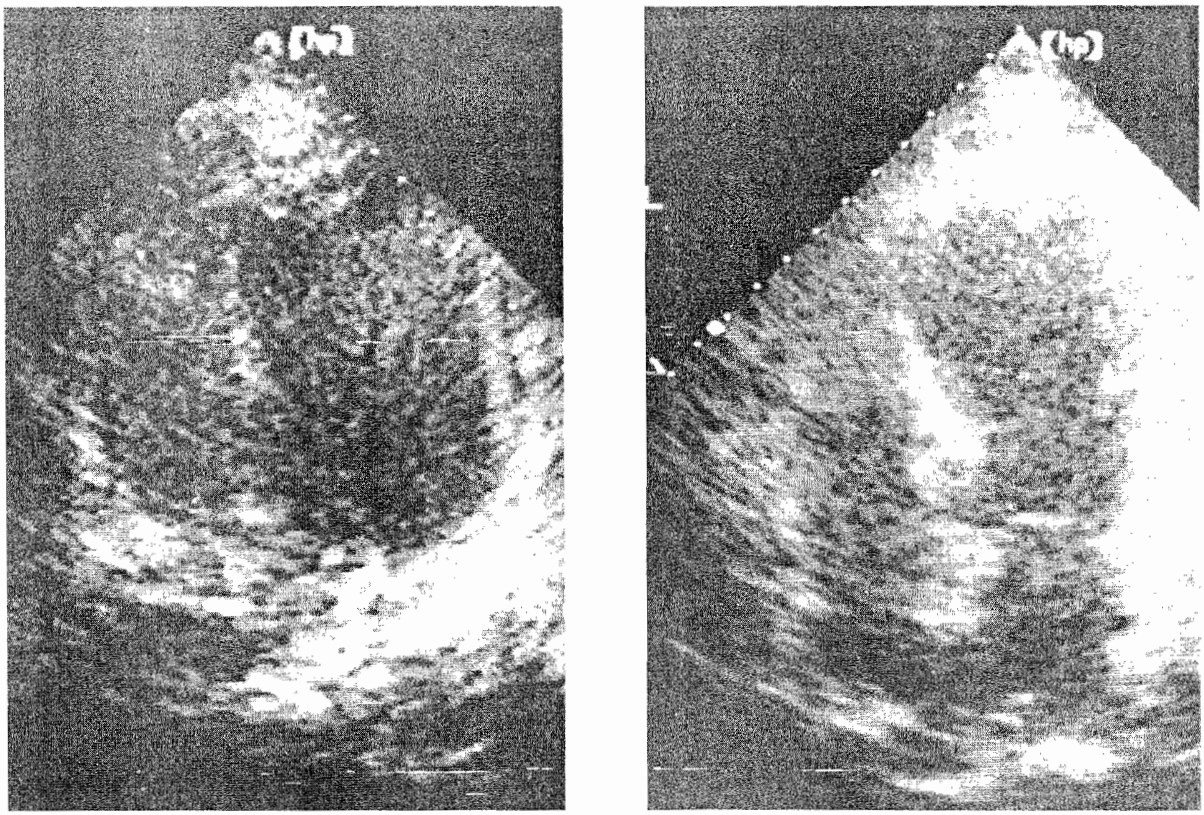

Figure 1. *Echocardiograms performed on admission show an obvious thrombus in the left ventricular apex (left), and after the patient developed cerebral infarction, show a freely moving fragment of the thrombus (right) as a result of fibrinolysis.*

in the anterior leads. A two-dimensional echocardiogram performed shortly after intravenous infusion of recombinant tissue plasminogen activator (tPA) showed severe hypokinesia in the anteroseptum, apex, and anterior wall, with an ejection fraction of 25%. A cardiac mass (Fig.1) was seen in the left ventricular apex consistent with a mural thrombus. Creatine kinase and CK-MB were 846 and 32 IU/L on admission; at 6 hours, 2430 and 287 IU/L; at 12 hours, 2844 and 168 IU/L; and at 18 hours, 2694 and 126 IU/L, respectively. Lactase dehydrogenase was 1812 U/L at 48 hours.

Two hours after tPA infusion, the patient suddenly became lethargic and developed dysphagia, dysarthria, left-gaze deviation, and hemiparesis on the left side of the body. A computed tomographic scan administered 1 hour after the onset of neurologic symptoms showed an early, low density lesion in the right temporoparietal area compatible with an infarction of the right middle cerebral hemisphere and most likely embolic. A repeat two-dimensional echocardiogram administered after the stroke showed a pedunculated, protruding, and mobile thrombus in the left ventricular apex that was much smaller than the former cardiac mass (Fig. 1).

The following day, ecchymosis over the upper and lower extremities was observed. In addition, the patient had hematemesis and melena. H2 antagonist and antacid were given, and the gastrointestinal hemorrhage was controlled.

Discussion

Intracerebral hemorrhage can occur during or after thrombolytic therapy.[4,5] However, thromboembolism following such therapy is extremely rare, with only a few case reports in the literature.[1–3] In the case presented, the patient suffered an ischemic stroke 2 hours after treatment with tPA for acute myocardial infarction. Our patient had no history of previous heart disease, arrhythmias (such as atrial fibrillation), or pulmonary hypertension, nor had he undergone interventions such as cardiac catheterization or surgery. Therefore, although one may consider other processes, such as atherosclerosis, dislodging of other arterial

clots, or just the presence of the mural thrombus, which may have played a role in the stroke, the clinical features and temporal relation of events as well as the serial echocardiogram done before and after the event strongly suggest a causal relation between the administration of thrombolytics and embolization of the preexisting cardiac thrombus, producing the cerebral hemisphere infarct. We believe that the cerebral embolus found in our patient originated from the left ventricular mural thrombus that was formed as a complication of the anterior infarction. The thrombus dislodged to the right middle cerebral artery due to rapid fragmentation and the subsequent emission of disrupted portions of the thrombi as a result of thrombolytic therapy. This dramatic effect of thrombolysis suggests the possibility that even the standard treatment of acute myocardial infarction with tPA implies a risk of embolization in these patients in whom a mural thrombus may be present either from a previous myocardial infarction or from early thrombus development.

Thrombolytic therapy is related to bleeding complications. Common diagnoses of gastrointestinal hemorrhage may include duodenal and gastric ulcers, hemorrhagic gastritis, and esophagitis. In our patient, ecchymosis over the extremities and upper gastrointestinal bleeding were observed. Upper intestinal endoscopy was not performed because the procedure is risky in an unstable patient with acute myocardial infarction. However, the hematemesis and melena were resolved after the administration of H2 antagonist and antacid.

Left ventricular thrombus is an important complication of acute myocardial infarction, especially when it involves the anterior wall. Old age, large size of the infarct, anterior or apical myocardial infarction, atrial arrhythmias, cardiac pump failure or cardiogenic shock, Killip class, creatine kinase level, and severe wall-motion abnormalities are among the important risk factors for thrombus formation.[6–8] The importance of left ventricular mural thrombi lies in their emboli potential, reported to be 21% to 27%.[9] In this patient, tPA was given immediately at our emergency room upon the diagnosis of acute myocardial infarction, and echocardiogram was performed when the patient was transferred to our intensive care unit for further management. As thrombolytic treatment gains wide acceptance, physicians should be aware of this rare but possible complication of cardiogenic embolism. An echocardiogram, if instantly available in the emergency room, may be of value in patients with acute anterior wall myocardial infarction before thrombolytic therapy. The risk-benefit ratio of thrombolysis, should a thrombus be found, is unknown and may depend in part on the characteristics of the thrombus and the extent of the myocardium at risk.[9,10] Therefore, we suggest that an echocardiogram be performed immediately before thrombolytic therapy is considered whenever an acute anterior wall myocardial infarction is impressed. Further studies are needed to delineate more precisely the risk of thrombolytic therapy for patients with various underlying conditions in order to optimize patient selection for therapy.

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