Case Report

Reperfusion strategy for simultaneous ST-segment elevation myocardial infarction and acute ischemic stroke within a time window

Abstract

Stroke is a recognized complication after acute myocardial infarction and is associated with high mortality. The use of intravenous tissue plasminogen activator for patients with acute ischemic stroke 3 to 4.5 hours after onset showed a significant treatment benefit; however, there is little information on the type of optimal reperfusion therapy and the antithrombotic adjuvant therapy to be applied to patients with ST-segment elevation myocardial infarction (STEMI) associated with an acute ischemic stroke from early onset within a time window for both events. We report the case of a 66-year-old woman who presented with STEMI with atrial fibrillation complicated from the beginning with acute ischemic cardioembolic stroke. At the time of admission to the emergency department, we had a time window of 50 minutes, and brain computed tomography showed no hemorrhage. Despite the possibility of primary percutaneous coronary intervention (PCI), she was successfully treated with systemic fibrinolytic therapy. The door-to-needle time was 65 minutes, and the total ischemia time was 115 minutes. The brain computed tomography, at 12 and at 72 hours, showed acute ischemic stroke without hemorrhagic component. On the fourth day, PCI was done at the saphenous vein graft to the posterior descending artery, and antiplatelet therapy with clopidogrel plus aspirin was established. The patient did well and was discharged. This case highlights the importance of considering the systemic fibrinolytic therapy at the emergency department for a specific scenario STEMI complicated with early acute ischemic stroke within a time window, 2 life-threatening clinical conditions.

Acute ischemic stroke in patients with acute coronary syndrome is uncommon but devastating; it occurs in 1% to 2% of patients, and it is the single strongest risk factor for in-hospital mortality [1,2]. On the other hand, it has been proven that patients with acute ischemic stroke treated with recombinant tissue activator plasminogen (rt-PA) had a significant benefit in the 3- to 4.5-hour window [3]. However, there is little information on the type of optimal reperfusion therapy and the antithrombotic adjuvant therapy to be applied to patients with ST-segment elevation myocardial infarction (STEMI) associated with an acute ischemic stroke from early onset within a time window.

A 66-year-old woman presented to the emergency department with a 50-minute history of sudden left-sided hemiparesis, dysarthria, and chest pain. She had a history of smoking, hypertension, myocardial infarction, coronary artery bypass surgery, and percutaneous coronary interventions (PCIs). Prior to admission, the treatment was aspirin, angiotensin-converting enzyme inhibitors, β-blocker, and statin.

At admission, the clinical examination revealed a heart rate of 40 beats/min, blood pressure of 90/60 mm Hg, respiration rate of 20 times per minute, and a 36.5°C temperature. Neurologic examination showed dysarthria and left hemiplegia, with a score of 16 points according to the National Institutes of Health Stroke Scale (NIHSS).

The electrocardiogram demonstrated ST-segment elevation in the inferior leads, atrial fibrillation with third-degree AV block (Fig. 1). Brain computed tomography (CT) had normal result and did not exhibit hemorrhagic stroke (Fig. 2A). At first, the patient was considered for primary PCI of the STEMI; nevertheless, because of the simultaneous presence of STEMI and acute ischemic stroke, within a suitable time window, we decided to apply systemic fibrinolytic therapy without antithrombotic adjuvant therapy. Therefore, we started intravenous rt-PA treatment with the recommended dose for acute ischemic stroke [3]. The door-to-needle time was 65 minutes, and the total ischemia time was 115 minutes. The patient presented with clinical improvement after the infusion of rt-PA, thoracic pain disappeared, and ST-segment resolution was more than 80%, with a decrease of an NIHSS score of 9 points. The strength of left arm and leg improved, and the dysarthria disappeared. Transthoracic echocardiogram showed a left ventricular ejection fraction of 45% and undocumented intracardiac thrombi. The brain CT, at 12 and at 72 hours, showed acute ischemic stroke without hemorrhagic component (Fig. 2B, C). At 48 hours, we began the antiplatelet treatment with aspirin. On the fourth day, coronary angiography was performed and showed significant obstruction in-stent of the saphenous vein graft to the posterior descending artery, so PCI with drug-eluting balloon was performed. Dual antiplatelet therapy (clopidogrel plus aspirin) was established during the PCI (Fig. 3). During her hospitalization, she had a recovering sinus rhythm and an improved neurologic condition with an NIHSS score of 5 points.

We report an uncommon condition of a patient who presented with simultaneous thrombosis of 2 distant vascular territories, STEMI and acute ischemic stroke. In patients with STEMI, the earlier the patient presents and the earlier the artery can be recanalized, the better situation ("muscle time" paradigm). Update guidelines for the treatment of STEMI clearly favor primary PCI over fibrinolytic therapy when it is done within 90 minutes of the first medical contact [4,5].

On the other hand, acute stroke management has undergone a radical change with the approval of intravenous rt-PA as a treatment option. Increasing evidence shows that intravenous fibrinolytic therapy within the first 4.5 hours is the criterion standard treatment [3,6]. There is a similarity between the heart and the brain; time to restoration of blood flow remains a critical moment. Several studies have shown that the effectiveness of any stroke therapy is time dependent ("time is brain" paradigm) [7].

Widimsky et al [8] mention that the reperfusion therapy for both diseases has a similarity: intravenous fibrinolytic therapy is superior
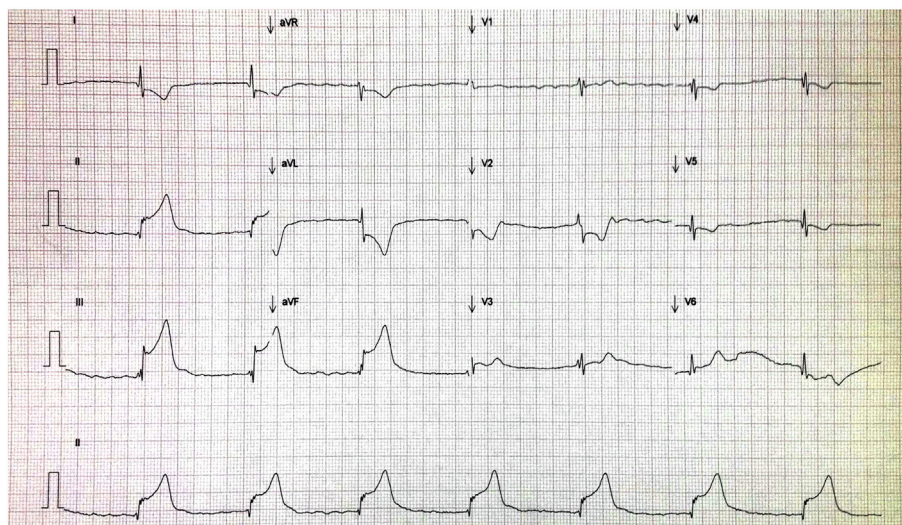
Fig. 1. Electrocardiogram tracing revealed atrial fibrillation with third-degree AV block, a slow junctional escape rhythm, and signs of inferoposterior acute myocardial infarction. ST-segment elevation in the inferior leads (II, III, and aVF).

to placebo, provided that it is used timely. However, there are also differences: direct catheter-based thrombectomy in acute ischemic stroke is more difficult than primary PCI, and there is no evidence available about periprocedural antithrombotic adjuvant therapy. Therefore, after reperfusion therapy for STEMI, antithrombotic therapy should be given as early as possible to inhibit the thrombotic processes and to optimize clinical outcomes [4,5,9].

Our patient presented with STEMI and acute ischemic stroke at the same time, getting to the emergency department within the first hour after symptoms started. With the availability of a catheterization laboratory, our first choice was primary PCI, but we reconsidered and decided that the patient could get a major benefit with systemic fibrinolytic therapy without providing adjunctive antithrombotic therapy. It is currently considered that patients with acute ischemic stroke who are candidates for systemic fibrinolytic therapy should not be given antiplatelet drugs in the first 24 hours after intravenous thrombolysis. Previous studies have shown a significantly increased risk of intracranial hemorrhage in patients receiving antiplatelet drugs at the time of treatment with rt-PA [10].

There are no strong data to support an optimal reperfusion therapy strategy for the specific scenario of STEMI complicated early with acute ischemic stroke within a time window, so that the systemic fibrinolytic therapy may be the optimal reperfusion therapy for these patients. European and US guidelines for the treatment of STEMI do not mention this situation.

This case highlights the importance of considering the systemic fibrinolytic therapy at the emergency department for a specific scenario of STEMI complicated with early acute ischemic stroke within a time window. However, additional research is needed to understand the antithrombotic adjuvant therapy in order to lower the risk of cerebral bleeding.

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