Update in the Management of Acute Ischemic Stroke

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KEYWORDS

• Acute ischemic stroke • Thrombolysis • Hemicraniectomy • Critical care
• Neurocritical care • Outcomes • Neuroprotection • Cerebral edema

KEY POINTS

- All patients with acute ischemic stroke presenting within 4.5 hours of symptom onset must be considered for thrombolytic therapy. The sooner intravenous thrombolysis is administered, the better the outcome.
- Careful attention to blood pressure control is necessary. For patients receiving thrombolytic therapy, blood pressure should be kept lower than 180/105 mm Hg at all times within the first 24 hours.
- Patients with acute ischemic stroke requiring mechanical ventilation should be intubated using rapid sequence intubation while avoiding hypotension.
- Young patients presenting with severe strokes involving the middle cerebral artery territory should be considered for early decompressive hemicraniectomy to decrease mortality and improve functional outcome.
- All patients with acute ischemic stroke should be evaluated emergently and transported to specialized stroke centers to receive the best available care.

INTRODUCTION

Stroke is a common neurologic emergency and an important cause of death and disability in the United States. According to American Heart Association (AHA) statistics, approximately 795,000 Americans each year suffer a new or recurrent stroke, and approximately 137,000 of them will die.[1] Fortunately, overall evaluation, management, and outcome of patients with ischemic stroke have improved significantly. For example, stroke is currently the fourth cause of death in the United States, down from number 3 a few years ago. Much of this is due to the advent of thrombolytic therapy and the development of stroke systems of care, which have changed the way

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practitioners view and treat this devastating disease.[2,3] Tools developed to improve early detection and increase potential for treatment include (1) the Newcastle face, arm, speech test (FAST) stroke warning sign and symptoms directed to educate the general population; (2) the Cincinnati prehospital stroke scale directed to emergency medical services (EMS) personnel; and (3) the stroke Chain of Survival directed to the EMS, emergency department (ED), and hospital stroke teams. The overall goal of these tools is to improve response time and care of patients with stroke and thus increase the number of patients receiving comprehensive treatments, including thrombolytic therapy, critical care, and rehabilitation.

In this review, we present an update on the management of acute ischemic stroke divided into the first 24 hours and then beyond with pertinent measures for the intensive care unit (ICU) setting. While discussing management within the initial 24 hours, we further differentiate between patients who receive recombinant tissue plasminogen activator (rt-PA) and patients who do not, as management differs between these 2 groups. Beyond the first 24 hours, the management of the patient with ischemic stroke is usually the same regardless of initial thrombolytic therapy.

INITIAL 24 HOURS FOR PATIENTS ELIGIBLE FOR THROMBOLYTIC THERAPY

The ultimate goal in the early management of acute ischemic stroke is to be able to administer thrombolytic therapy to all eligible patients in a timely manner. The benefit of this therapy is time dependent, TIME is BRAIN.

The initial evaluation of a patients with potential stroke starts with immediate stabilization of the airway, breathing, and circulation, which is usually performed by first responders (**Table 1**). Subsequently, patients should be transferred to hospitals or patient care areas appropriately staffed and equipped with dedicated stroke teams, stroke units, and neurocritical care expertise, as this has been shown to improve outcomes in terms of reduced death and disability rates compared with conventional care.[2,3]

Once in the ED, an initial clinical assessment remains the main tool for an accurate diagnosis of stroke. A brief patient history, including the determination of the time of symptom onset (last time the patient was seen normal), comorbidities, and medications will determine eligibility for thrombolytic therapy. The physical examination should be divided into a general and neurologic examination. Such examinations will help rule out other etiologies that can mimic stroke, such as trauma, infection, psychiatric disorders, and other systemic abnormalities.

The use of a stroke rating scale, such as the NIHSS (National Institutes of Health Stroke Scale), which is considered an abbreviated neurologic examination, has been developed as a tool to assess initial stroke symptoms, stroke severity, and guide management decisions before and after thrombolytic therapy.[4,5] Very importantly, the NIHSS should serve as a communication tool among ED physicians, neurologists, intensivists, and other health care personnel. The NIHSS can be used as a monitoring tool of progression or worsening throughout the patient in-hospital stay (**Table 2**). In addition, the Glasgow Coma Scale (GCS) can help monitor the level of consciousness and can guide in decisions regarding institution of mechanical ventilation, as will be discussed later (see **Table 2**).

After the initial physical examination is performed, the only tests that should always precede the decision to administer rt-PA in eligible patients are a noncontrast enhanced computed tomography (CT) scan of the brain, to rule out intracranial hemorrhage (absolute contraindication) (**Fig. 1**), and serum glucose (point-of-care testing) to evaluate for severe hyperglycemia or hypoglycemia. Other testing, such as