DIFFICULT DECISION-MAKING IN ACUTE STROKE: TOOLS AND RESOURCES FOR MANAGEMENT OF UNSTABLE PATIENTS

Natalia Rost, MD, MPH
Massachusetts General Hospital
Boston, MA

OUTLINE

- Fluctuating neurological exam: diagnostic tools and management strategies
- Hyperacute stroke complications: bleeding, swelling, and broken heart
- Who are you going to call? Building a functional acute stroke team
- I can see clearly now: using the advanced neuroimaging to guide precision diagnosis and management

Managing patients with fluctuating symptoms presents one of the great challenges in acute stroke. Diagnostic considerations (stroke vs. TIA, "stuttering lacune," hemodynamically significant large-vessel disease, stroke mimics, etc) will be reviewed. Specificity and sensitivity of the diagnostic modalities to be used in assessment of a culprit lesion will be considered. Management options will be discussed.

Frequently, early neurological deterioration results from the systemic dysfunction (systemic hypotension, hypovolemia, fever, infection, electrolyte imbalance etc). Airways should be supported in patients with decreased levels of consciousness or bulbar dysfunction; oxygen should be supplemented for saturations <94%; hyperthermia should be corrected and sources of fever investigated; hypovolemia as are cardiac arrhythmias that might reduce perfusion should be corrected. The goal for blood glucose and electrolytes is to be within normal range.

The most common neurological complications of stroke are hemorrhagic transformation, brain edema, and seizures. Acute stroke patients also frequently suffer from cardiopulmonary complications, infections, systemic thrombosis and thromboembolism.

Comprehensive specialized stroke units (including rehabilitation) have been proven to improve quality of stroke care. As part of early management, prophylaxis of medical complications post-stroke (urinary tract infections, aspiration pneumonia, deep venous thrombosis, gastrointestinal bleeding etc) should be implemented, as should be early recurrent stroke prophylaxis.

Protocols for diagnosis and management of hemorrhagic complications after stroke (including reversal of fibrinolytic agents and access to neurosurgical expertise) should be in place in each medical facility that provides initial and extended care for patients with acute stroke.

In patients at risk for brain edema, early monitoring of neurological function must be instituted, and transfer of these patients to an institution with neurosurgical expertise should be considered early. Surgical decompression has been proven effective in treatment of space-occupying cerebellar infarctions to prevent brain stem compression. In malignant hemispheric strokes, decompressive surgery could be life-saving. Protocols for patient selection for surgical options in large hemispheric strokes will be discussed.

Seizures are reported in <10% of patients with stroke, and possibly greater proportion of those with hemorrhagic transformation. Management of post-stroke seizures should be personalized to the patient-specific characteristics; furthermore, there is no role for prophylactic use of anticonvulsants.

Designation of an acute stroke team that includes physicians, nurses, and laboratory/radiology personnel is an essential key to success. As a prerequisite for developing an effective multidisciplinary acute stroke team, the following specialties should be considered (but not limited to): Emergency Medicine, Neurology, Neurosurgery, Neuroradiology, Neuro-Interventional, Neuro-Critical Care, Cardiology, Vascular Surgery. Clinical scenarios that involve each of the essential team member engagement will be discussed. Early considerations for surgical interventions, novel antithrombotic therapies, minimally invasive procedures, and advanced neuroimaging investigations will be presented.

Emergency imaging of the brain is recommended before any specific treatment for acute stroke is initiated. In addition to non-contrast head CT, which provides the necessary information to make decisions about emergency stroke management, advanced neuroimaging options might be used. If endovascular therapy is contemplated, a non-invasive intracranial vascular study (CT angiogram or MR angiogram) will provide information regarding evidence of large vessel occlusion; however, this should not delay IV tPA if indicated. Non-invasive intracranial vascular imaging can then be obtained as quickly as possible.

Beyond CT/CTA and/or MR/MRA, the role of advanced neuroimaging is currently under investigation. CT and MR perfusion-weighted imaging can be used to obtain information regarding the state of microvascular cerebral tissue perfusion; however, the benefits of using perfusion imaging for patient selection at this time are unclear. Future randomized, controlled trials are needed to determine whether advanced imaging paradigms using advanced neuroimaging modalities, including measures of infarct core, collateral flow status, and penumbra, are beneficial for selecting patients for acute reperfusion therapy.

REFERENCES

- Demaerschalk BM, Kleindorfer DO, Adeoye OM, Demchuk AM, Fugate JE, Grotta JC, Khalessi AA, Levy EI, Palesch YY, Prabhakaran S, Saposnik G, Saver JL, Smith EE; American Heart Association Stroke Council and Council on Epidemiology and Prevention. Scientific Rationale for the Inclusion and Exclusion Criteria for Intravenous Alteplase in Acute Ischemic Stroke: A Statement for Healthcare Professionals From the American Heart Association/American Stroke Association. Stroke. 2016 Feb;47(2):581-641.
- Jauch EC, Saver JL, Adams HP Jr, Bruno A, Connors JJ, Demaerschalk BM, Khatri P, McMullan PW Jr, Qureshi AI, Rosenfield K, Scott PA, Summers DR, Wang DZ, Wintermark M, Yonas H; American Heart Association Stroke Council; Council on Cardiovascular Nursing; Council on Peripheral Vascular Disease; Council on Clinical Cardiology. Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2013 Mar;44(3):870-947.
- Powers WJ, Derdeyn CP, Biller J, Coffey CS, Hoh BL, Jauch EC, Johnston KC, Johnston SC, Khalessi AA, Kidwell CS, Meschia JF, Ovbiagele B, Yavagal DR; American Heart Association Stroke Council. 2015 American Heart Association/American Stroke Association Focused Update of the 2013 Guidelines for the Early Management of Patients With Acute Ischemic Stroke Regarding Endovascular Treatment: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. Stroke. 2015 Oct;46(10):3020-35.