Since the publication of the National Institute of Neurological Disorders and Stroke tissue-type plasminogen activator (NINDS tPA) trial, the appropriate focus of patients with acute ischemic stroke has been to maximize the number of patients who can undergo safe and effective administration of intravenous tissue-type plasminogen activator. The exact timing and mode of various revascularization strategies, including endovascular treatment, is the subject of ongoing inquiries. Despite this area of clinical uncertainty, many patients with ischemic stroke are at high risk for serious complications in the initial hours after stroke, independent of exposure to reperfusion therapies. For the patient such as the one presented in this clinical vignette, with a high National Institutes of Health Stroke Scale (NIHSS) score, early, immediate transfer is essential. Triage of such patients to a center that has the expertise, experience, and resources to anticipate complications, as well as optimize the likelihood of a positive outcome is of unequivocal benefit.

Patients with an NIHSS stroke >10 are more likely to have a large vessel occlusion, and an NIHSS of 20 at 5 hours has >95% specificity for an internal carotid or middle cerebral artery occlusion. For such patients, whether they receive intravenous tissue-type plasminogen activator, the risk of hemispheric swelling and hemorrhagic transformation is high. An urgent MRI study with immediate interpretation of infarct volume is critical to identify those patients at highest risk of further deterioration. Systematic, prospective data in patients with a middle cerebral artery occlusion demonstrate that an diffusion-weighted imaging–based infarct volume of >82 mL (odds ratio, 0.98; 95% confidence interval, 0.94–1.00) is highly specific for a malignant course. When combined with an early NIHSS, the MRI diffusion-weighted imaging can increase the sensitivity of identifying patients who are likely to deteriorate. Parenthetically, observations from several independent cohorts suggest that endovascular therapy in patients with diffusion-weighted imaging lesion volumes >70 to 80 mL may be futile, further buttressing the argument for an acute MRI in patients with NIHSS scores >10.

It is the occasional practice to observe patients with high NIHSS and to consider transfer after the patient experiences a decrement in level of arousal. However, at this point, the drop in level of consciousness is often a sign that significant tissue swelling has already occurred. The prompt identification of patients at high risk for neurological deterioration is necessary so that the management of swelling can be planned and coordinated rather than reactive, after the decline has already commenced. Patients with ischemic stroke who undergo endotracheal intubation are at substantially increased risk of poor outcome. Fever, hypercarbia, and nonconvulsive seizures can not only exacerbate neurological injury but each entity is a potential confounder when considering the primary clinical determinant of swelling, level of arousal.

The Case
A 55-year-old right-handed man presents with a left middle cerebral artery syndrome and National Institutes of Health Stroke Scale score of 20 five hours after symptom onset. He is known to have a recent transient ischemic attack and left carotid stenosis of 75%.

The Questions
(1) Should the patient be transferred to a comprehensive stroke center or stay in a community hospital Stroke Unit? Why?
(2) If yes, should he be transferred immediately or subacutely (first 48 hours)?

The Controversy
EARLY TRANSFER OF PATIENTS WITH STROKE TO COMPREHENSIVE CENTERS IS NECESSARY.

Early Transfer of Patients With Stroke to Comprehensive Centers Is Necessary
Kevin N. Sheth, MD
At a comprehensive stroke center, mandated by accreditation organizations and accepted quality measures, the necessary tools are in place. Dedicated personnel in critical care medicine and stroke neurology are on call 24/7, advanced neuroimaging and interpretation is readily available, and specialized neuroscience nursing is equipped to provide individualized care. In addition, a pooled analysis of 3 prospective trials of decompressive craniectomy for large hemispheric infarction demonstrated a clear benefit, and in appropriate cases, surgery may be appropriate. The optimization and monitoring of patients before surgery requires the ready availability of intensivists and neurosurgeons around the clock. In the pooled trials, which enrolled patients <60 years of age, the decision to proceed with decompressive craniectomy was made within 48 hours of stroke onset. In this context, perhaps what is most important is to provide family members the opportunity to discuss the nuances surrounding this difficult clinical practice decision with a team that has considerable experience.

For the proportion of patients who do not have persistent symptoms or imaging findings consistent with a large stroke, transfer to a comprehensive stroke center may facilitate timely implementation of secondary stroke prevention strategies. Patients with a symptomatic carotid artery require an early carotid endarterectomy. To achieve the optimal window of 2 weeks from stroke, early surgical referral and evaluation are necessary. In patients with larger infarcts, a more comprehensive evaluation of anatomy, surgical risk, blood pressure control, and other factors by an experienced team is prudent. Finally, comprehensive stroke centers may provide patients access to clinical trials beyond the immediate tissue-type plasminogen activator window.

Ultimately, the most pressing concern for patients with stroke is not whether they are treated at a comprehensive stroke center but whether they have access to both effective and timely management. The initial NIHSS is a good measure of stroke severity, and MRI-based neuroimaging can be a useful complement to identify high-risk patients. The attention to timely triage cannot end with the go versus no-go decision for tissue-type plasminogen activator. When patients are transferred, efforts should be made to return patients to hospitals and facilities closer to their home, where they may be more likely to receive the support needed for what is often a long road ahead.

**Disclosures**

Dr Sheth is the national co-PI for the Glyburide Advantage in Malignant Edema and Stroke-Remedy Pharmaceuticals (GAMES-RP) study and also serves as a member of the American Heart Association Get With The Guidelines Stroke Executive Committee.

**References**


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