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Current Therapies in Stroke

A fluid process

Much like the disease process itself, the treatment for stroke is always progressing. The advent of primary stroke centers and comprehensive stroke centers is a significant step forward in the treatment of this disease. Diagnostic tools such as the NIHSS, radiology studies and the ASPECT S scoring method have improved the identification and qualification of cerebral vascular accidents. Intravascular TPA and Intra-arterial therapies have improved outcomes of those affected by a stroke.

Stroke Centers

Hospitals that specialize in stroke diagnosis and treatment are critical in the outcome of these patients. Patients at primary stroke centers have been shown to have better clinical outcomes, shorter door to physician contact time, shorter door to CT time, shorter door to IV TPA time and increased rates of IV TPA use. Comprehensive stroke centers must pass an inspection by an accrediting body and demonstrate that they offer 24/7 intervention. Goals of stroke centers include: door to doctor evaluation <10minutes, door to CT scan <25minutes, door to CT interpretation <45 minutes, and door to drug time of <60 minutes (1).

Diagnostics

The National Institutes of Health Stroke Scale, NIHSS, quantifies the degree of neurologic deficits, facilitates communication, identifies the location of the vessel occlusion, provides early prognosis, selects patients for various interventions and identifies the potential for complications. The scoring of a stroke patient with the NIHSS can be difficult, but it is crucial the evaluator follows the instructions in

the scale. The most problematic scoring area is when an item is not testable. Within each testable item, instructions are given for this situation and if the evaluator is deliberate, the score will be performed correctly.

Laboratory tests are important in guiding management of a suspected stroke. While several tests are essential, the only test which must be performed prior to IV TPA administration is blood glucose. Cardiac enzymes, platelet count, PT/INR, and PTT are also important. However, the caregiver should remember that direct thrombin inhibitors and direct factor Xa inhibitors require a thrombin time to be drawn and that PT/INR will not be affected by these agents.

Non-enhanced CT scans are useful for identifying intracranial hemorrhage but are insensitive in detecting acute and small cortical infarctions, especially in the posterior fossa. Signs of ischemia could include a loss of gray-white differentiation and swelling of gyri that produces sulcal effacement. The hyper-dense MCA sign is indicative of a large vessel occlusion which is associated with a severe stroke and poor neurologic outcome. The MCA "dot" sign represents a clot within a branch of MCA and is therefore a better candidate for TPA. Neurologists use the ASPECTS scoring method (Alberta Stroke Program Early CT Score) to determine the severity of an MCA stroke. This is a 10 point topographic CT scan score where one point is subtracted from 10 for any evidence of early ischemic changes for each of the defined regions (2). Scores of seven or less correlate with both poor functional outcome and symptomatic intracerebral hemorrhage. Scores of 8-10 are associated with greater extent of benefit from IV thrombolysis (2).

For more information and to review case studies of MCA infarcts, visit www.aspectsinstroke.com.

Therapies

Treatment of stroke involves multiple modalities. The patient's blood pressure can be allowed to reach as high as 220 systolic, however, if TPA is being considered the blood pressure must be below 185 systolic and 110 diastolic. Once TPA is administered the blood pressure should be maintained below 180/105. If the patient is hypotensive, multiple studies suggest a small subset of patients with ischemic stroke in the acute period may benefit from a modest (10-20%) pharmacological elevation in systolic blood pressure (1).

Fluid status should be monitored closely. Hypovolemia can cause hypoperfusion, renal impairment, and potentiate thrombosis. Hypervolemia exacerbates brain edema and increases stress on the myocardium. Therefore, euvolemia is desirable (1).

TPA (Alteplase) is the most common therapy for stroke. The dosing for TPA is 0.9mg/kg with a maximum dose of 90mg, a 10% bolus over one minute and the remainder over one hour. Intra-arterial treatment is used at both primary and comprehensive stroke centers and is more effective for recanalization of larger thrombi, severe neurologic deficits (NIHSS >10), proximal arterial occlusion and radiographic evidence of occlusion of a major intracranial vessel. Patients eligible for IV TPA should receive TPA even if IA therapy is being considered (1).

Wake Up Strokes

The single most important part of the stroke patient's history is what time they were last seen normal due to the time sensitivity of TPA and IA administration. Recently, several studies have been conducted to investigate the possibility of treating patients who woke up with their symptoms. Several inclusion and exclusion criteria exist and include:

Inclusion-

- Suspected CVA during sleep and patient was seen normal before sleep the night before
- 18-80 years old
- NIHSS <25
- BP <185 systolic and <110 diastolic
- TPA to be given with 3 hours of waking

Exclusion-

- MCA hypodensity >1/3 territory or ICH
- Prior CVA within 3 months
- History of ICH, aneurysm, or vascular malformation
- BP >185/110
- Coagulopathy
- Surgery or GI bleed within 14 days
- IV Heparin within 24 hours with an abnormal PTT
- Oral anticoagulants with an INR >1.7
- Platelet count <100000
- Glucose <50 or >450 (3)

A European trial showed increased ICH with >1/3 MCA territory versus less involvement benefiting from treatment up to 6 hours for IA and 3-4.5 hours for TPA (1). Four other clinical trials showed that fibrinolytic therapy in the 4.5-6 hour window produced a statistically nonsignificant increase in excellent outcomes (1). These studies show that providers must evaluate the patient carefully and make prudent therapeutic decisions when treating a wake up stroke.

While time of onset is critical in stroke, sometimes this is not able to be known. Wake up stroke trials are operating under the theory that the patient will wake up immediately after the event. The HEMS provider must treat every potential stroke patient as if they were an acute stroke until proven otherwise and have a solid understanding of the associated diagnostic studies and treatment options.

References

1. Jauch, E. et al. "Guidelines for the Early Management of Patients with Acute Ischemic Stroke." Stroke (American Heart Association Guidelines). 2013; 44; 840-947.
2. <http://www.aspectsinstroke.com>
3. <http://www.clinicaltrials.gov/CT2/show/NCT01183533?term=wake+up+stroke+rank=1>.