Emergency Treatment of Stroke

The past year was highlighted by the implementation of the Paul Coverdell Stroke Registry. This is the first American national effort to assess and facilitate use of recombinant tissue plasminogen activator (rtPA) in the treatment of stroke by promoting quality improvement.¹ The registry goal is to reduce the disability associated with stroke. This effort is substantially later than similar efforts in many other developing countries.² For example, in Europe, the SITS-MOST registry, required by the European authorities in connection with the conditional approval of rtPA, is actively recruiting patients treated within 3 hours after stroke onset will test the effectiveness of regionalized stroke care across >200 sites in 26 countries.³ Recognition that benefits of early, coordinated interventions for the stroke survivor are achievable has been slow in the United States, but overall the evidence from this year’s scientific publications is that barriers to widespread community implementation of effective stroke treatment can be overcome.⁴

Public and medical system education can change the use of emergency treatment pathways for stroke with >50% of patients reporting in <3 hours in some systems.⁵⁶ Thus, the major barrier to widespread achievement of emergency stroke treatment is acceptance by the medical community. Implementing successful stroke center programs in the United States has now been reported in Cuyahoga County, the Kansas City region, and in a community setting in Maryland.⁷⁸ Organized emergency medicine publicly demonstrated reluctance to endorse regional stroke center utilization or the standard use of rtPA for the indicated.⁹ The major basis for this disagreement appears to be safety and training. Education has previously been demonstrated to produce effective medical care delivery that overcomes both of these barriers. Thus, it can only be hoped that these same associations will commit to employing the evidence to improve care.⁴¹¹ Reports this year demonstrated that multiple communities worldwide are capable of delivering the efficacy promised by the results of the NINDS trial. These authors hope that reason triumphs and the American community can also benefit from more complete access to emergency stroke treatment.

High rates of intravenous rtPA treatment (10% to 18%) previously thought to be obtainable only in clinical studies have been demonstrated. Data demonstrating the ability of emergency medical services personnel to identify stroke reproducibly compared with physicians. Evaluation of the emergency transport time to initiate neuroprotection demonstrates the potential to shorten time to first treatment by over an hour.¹² The possibility of initiating brain protection in the field is now achievable, only the useful neuroprotective agent is still missing. This finding mirrors parallel work in acute myocardial infarction, which demonstrates the safety of in the field implementation of established emergency department treatment routines.¹³¹⁴ Both the path to improved care and the potential for further as yet unrealized public benefits are now very clear.

Intracerebral Hemorrhage

Intracerebral hemorrhage (ICH) remains the most frequent stroke emergency with the highest mortality.¹⁵ The first-ever industry-sponsored intervention in ICH, the Nexo-7 trial, in which recombinant factor 7 is given to reduce the risk of early hemorrhage growth, is under way as a safety trial, bringing this disease entity more into the center of stroke research.¹⁶ This year a MRI study of human perihematomatatal tissue demonstrated the absence of a major role for ischemia in the early pathogenesis of this disease.¹⁷ This study again focuses the efforts of human investigators on clot reduction to minimize local effects of blood and blood products on brain tissue. The study also opens the opportunity for early aggressive blood pressure reduction as a therapeutic intervention. Despite such pathophysiologic indications, equipoise exists with respect to evidence for surgical intervention. This can be seen in recent scientific debate¹⁸⁻²⁰ and from the direct measurements of surgical decision making,²¹ where a wide range of surgical practices suggests substantial uncertainty about treatment exists. A large trial of early craniotomy, STICH, has been completed. This trial was based on the “uncertainty principle” in which patients for whom the surgeon was uncertain what course to pursue were randomized to early surgical or medical treatment. The trial proposes a novel set of dichotomized outcomes based on change from severity of illness at time of presentation.²² The results will be available in early 2004. A smaller trial in the Netherlands demonstrated the safety of minimally invasive surgery plus urokinase assisted clot lysis. This particular protocol produced a 17% reduction in clot size over medical treatment at 1 week, but did not achieve large, early reductions in hematoma volume.²³ Highly selected convenience samples of ICH patients have produced much more impressive reductions in clot size, ie, approximately 90% reduction.²⁴ Thus,
the idea that amelioration of the major severity of illness factor (clot volume) can lead to improved mortality or function remains unproven, but also not fully tested. This year’s studies should provide solid basis on which to plan and execute more vigorous collection of evidence regarding the value of clot size reduction: either pro or con. What remains clear is that translation of surgical animal models to the human situation has potential for injury reduction.

Intensive Care of Stroke

The malignant MCA infarct syndrome produces rapid onset of dependency. A prospective study of cranial decompression for this injury recently started in Europe. A recent PET study demonstrated deterioration was associated with infarct size but that tissue monitoring of glutamate, ICP, and tissue oxygen tension identified abnormalities too late in the course of deterioration. Findings from a 5-center study of timing of deterioration confirmed the rapid onset of this syndrome during the initial 48 hours after stroke in North American hospitals. Pneumonia can also complicate large and small strokes. A prospective study demonstrated worse outcomes for the patient whose stroke is complicated by pneumonia. Leaving this complication as a possible target for improving stroke outcome. A similar ICU-based evaluation of outcome for ventilated ICH patients suggests that independent functional outcome at 2 years after a bleeding event can be achieved in about half of the survivors. This suggests that late assessment of outcomes in ICH may be of particular importance.

Management of blood pressure during stroke is becoming a target for intervention in both ICH and ischemic stroke. Subpopulations of patients that benefit from a particular strategy are now being identified. These include patients with bilateral high-grade stenosis in ischemic stroke as well as patients with intraventricular extension of hemorrhage in ICH.

References


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