New Guidelines for Spontaneous Intracranial Hemorrhage: A Roadmap for Optimizing Outcomes

The American Heart Association has played a leadership role in the periodic assimilation and publication of high-quality multidisciplinary stroke-related guidelines. The spontaneous intracranial hemorrhage (ICH) guidelines were last published in 2010. Recent advances in our understanding of the pathophysiology of this disease and the recent publication of important clinical trials have prompted the need for an update to these guidelines. Spontaneous ICH is associated with significant morbidity and mortality, with an incidence of 16 to 33 cases per 100,000. The newly published guidelines in the July 2015 issue of Stroke have added a number of new recommendations, including 3 new Class I recommendations, compared with the 2010 guidelines. In classifying the level of certainty regarding recommendations, the guidelines follow the American Heart Association/American Stroke Association classification system. The writing team conducted a thorough PubMed search on all pertinent studies conducted between 2009 and August 2013; the outcomes from 2 essential phase 3 ICH trials were also integrated.

The 3 new Class I recommendations concern initial triage, dysphagia assessment, and blood pressure management during follow-up. For diagnosis and assessment, the guidelines emphasize obtaining a baseline severity score (Class I; Level of Evidence B). Many ICH grading scales have been proposed, but the ICH Score has been most rigorously validated (Table). Accurate grading helps document and communicate the patient’s overall condition and facilitates communication between providers. It also optimizes outcomes benchmarking. In addition, the current guidelines emphasize proper dysphagia screening for all ICH patients before they start oral intake to reduce risk of pneumonia (Class I; Level of Evidence B). The most common medical sequelae seen in this patient population is the third new Class I recommendation concerning the prevention of recurrent ICH during follow-up with blood pressure control (Class I; Level of Evidence A). The Perindopril Protection Against Recurrent Stroke Study (PROGRESS) has demonstrated that the risk of ICH recurrence was lowest among patients with lower blood pressure levels on follow-up (median, 112 mm Hg systolic and 72 mm Hg diastolic).

In terms of revisions of prior Class I recommendations, 2 have been revised significantly. First, regarding deep vein thrombosis prophylaxis, the new guidelines were revised to clearly state that deep vein thrombosis preventive measures should start on the first day of admission with intermittent pneumatic compression. As was evident in the 3 Clots in Legs or Stockings After Stroke (CLOTS) trials, intermittent pneumatic compression starting on the first day of hospital stay decreased the incidence of deep vein thrombosis, especially in patients suffering from hemorrhagic stroke (6.7% vs 17.0%, odds ratio, 0.36; 95% confidence interval, 0.17-0.75). Second, the new guidelines emphasize the importance of early inpatient rehabilitation to accelerate the recovery process. Surgical intervention for acute supratentorial ICH remains a hotly debated topic. Three new Class II recommendations are focused on surgical intervention. Regarding evacuation of spontaneous ICH, the new guidelines state that supratentorial hematoma evacuation might be considered life-saving in deteriorating patients (Class IIb; Level of Evidence C). On the basis of recent published small case series, decompressive craniectomy with or without hematoma evacuation may reduce mortality for a subset of patients with supratentorial ICH (Class IIb; Level of Evidence C). Timing of hematoma evacuation remains controversial, whether early or when patients deteriorate (Class IIIb; Level of Evidence A). For increased intracranial pressure, ventricular drainage should be considered to treat hydrocephalus, mainly in patients with decreased level of consciousness (Class IIa; Level of Evidence B). The guidelines acknowledge the growing enthusiasm for minimally invasive clot evacuation, but data remain insufficient to make a minimally invasive approach a guideline recommendation. The Minimally Invasive Surgery Plus Recombinant Tissue-Type Plasminogen Activator for ICH Evacuation II Trial (MISTIE II) has shown promising results in establishing the benefit of minimally invasive surgery plus local recombinant tissue-type plasminogen activator in treating ICH. The MISTIE III trial is currently underway to confirm the aforementioned added value of surgical intervention.

Concerning posterior fossa hemorrhage, the guidelines advise an aggressive surgical approach for select patients.

Patients with cerebellar hemorrhage who are deteriorating neurologically or who have brainstem compression and/or hydrocephalus from ventricular obstruction should undergo surgical removal of the hemorrhage as soon as possible (Class I; Level of Evidence B). Initial treatment of these patients with ventricular drainage rather than surgical evacuation is not recommended (Class III; Level of Evidence C).
The new ICH guidelines serve as an important resource for neurosurgeons and all stroke care team members. Although much ambiguity remains regarding the management of this challenging disease, there is now growing evidence that a thoughtful and proactive healthcare approach can make a difference in outcomes. Much innovation is yet to come, and neurosurgeons can be a great force for progress in this important area of health care. Future advances will likely focus on earlier diagnosis and intervention (likely in an ambulance or at the site of ictus), prevention of clot expansion, reduction in the negative sequelae to surrounding brain tissue, and minimally invasive clot evacuation.

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Randomized Clinical Trial of Balloon-Expandable Intracranial Stenting Versus Aggressive Medical Therapy for Symptomatic Intracranial Arterial Stenosis

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stroke is a leading worldwide cause of morbidity and mortality. Ischemia from intracranial athero-occlusive disease is a leading cause of stroke, and these patients are at a considerable risk of recurrent stroke. Despite the significant number of patients who suffer from intracranial atherosclerosis, a limited number of trials have been aimed at patient management.

In the Warfarin Aspirin Symptomatic Intracranial Trial (WASID), patients with symptomatic intracranial stenosis had decreased rates of ischemic and hemorrhagic stroke when treated with aspirin vs warfarin. Recurrent stroke rates were still considerable, particularly in symptomatic patients and those with significant intracranial stenosis (70%-99%).

Since WASID, more recent trials, including the Stenting and Aggressive Medical Management for Preventing Recurrent Stroke in Intracranial Stenosis (SAMMPRIS) trial and the Carotid Occlusion Surgery Study, demonstrated that recurrent stroke rates have decreased over time when patients are treated with maximal medical therapy. Although these trials have found that outcomes in stroke patients with intracranial atherosclerotic stenosis are improving over time with aggressive medical therapy, the individual long-term patient outcomes are disheartening. Additionally, these trials failed to demonstrate a benefit from endovascular or neurosurgical intervention.

In the SAMMPRIS trial, patients with a recent transient ischemic attack or stroke attributed to stenosis of 70% to 99% of the diameter of a major intracranial artery were randomized to aggressive medical management alone or aggressive medical management plus percutaneous transluminal angioplasty and stenting (PTAS) with the Wingspan stent system (Stryker Neurovascular, Fremont, California; formerly Boston Scientific Neurovascular). Aggressive medical management included antiplatelet therapy, intensive management of vascular risk factors, and a lifestyle modification program. This trial was stopped early because of the higher stroke rates in patients receiving stenting. During a median follow-up of 32.4 months, the rate of stroke or death was significantly higher in those receiving PTAS (23%) vs aggressive medical therapy alone (15%). Additionally, major hemorrhage was higher in those receiving PTAS (13%) vs those receiving maximal medical therapy (4%).

Critics of the SAMMPRIS trial noted that the high rates of recurrent stroke in the PTAS cohort may have been due to in-stent stenosis or thrombosis inherent to the Wingspan stent. Prior studies have found rates of in-stent stenosis and thrombosis to be >30%, which may be higher than rates found with both other stents and intracranial pathologies. Further limitations of the Wingspan stent include the necessity of angioplasty with a separate balloon before stent deployment, which necessitates a microwire exchange for stent placement. This may increase the incidence of thromboembolic phenomena and hemorrhage resulting from perforator microwire perforation. Balloon-mounted stents commonly used in coronary angioplasty may have lower rates of in-stent stenosis and thrombosis and can be deployed quickly with