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José Biller

## Current Updates in Perioperative Management of Intracerebral Hemorrhage

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Patrick C. Hsieh, Issam A. Awad, Christopher C. Getch, Bernard R. Bendok,  
Szymon S. Rosenblatt, and H. Hunt Batjer

Spontaneous intracerebral hemorrhages (ICH) account for 10% to 30% of all strokes and are a result of acute bleeding into the brain by rupturing of small penetrating arteries. Despite major advancements during the past several decades in the management of ischemic strokes and other causes of hemorrhagic strokes, such as ruptured aneurysm, arteriovenous malformations (AVMs), or cavernous angioma, there has been limited progress made in the treatment of ICH. The prognosis for patients who suffer intracerebral hemorrhage remains poor. The societal impact of these hemorrhagic strokes is magnified by the fact that affected patients typically are a decade younger than those afflicted with ischemic strokes.

## Management of Spontaneous Intracerebral Hemorrhage

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Spontaneous intracerebral hemorrhage (ICH) has the highest mortality of all cerebrovascular events. Thirty-day mortality approaches 50%, and only 20% of survivors achieve meaningful functional recovery at 6 months. Many clinicians believe that effective therapies are lacking; however, this is changing because of new data on the pathophysiology and treatment of ICH, particularly research establishing the role of medical therapies to promote hematoma stabilization. This article provides updates to a recent publication discussing basic principles of ICH management, including initial stabilization, the prevention of hematoma growth, treatment of complications, and identification of the underlying etiology. Minimally invasive surgery (MIS) to reduce clot size is also discussed, with the goal of preserving neurologic function through reduction in parenchymal damage from edema formation.

## The Timing of Carotid Endarterectomy Post Stroke

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Eli M. Baron, Darric E. Baty, and Christopher M. Loftus

The timing of carotid endarterectomy (CEA) post stroke remains a controversial area. Most authorities have advocated waiting at least 2 to 6 weeks after stroke before performing a CEA. More recently, these recommendations have been challenged. This article reviews the background leading to advocacy of delayed CEA after stroke, current literature recommendations regarding CEA after subacute stroke, current literature regarding neuroradiologic imaging findings and their implications in decision making regarding CEA after stroke, and the role of CEA for stroke in evolution.

**Angioplasty and Stenting for Cerebrovascular Disease****433**

Lotfi Hacein-Bey and Panayiotis N. Varelas

Only 10 years ago, a review of the use of stents to treat cerebrovascular disease would have resulted in a limited report. Currently, however, stents increasingly are used in clinical practice, and this trend is expected to grow exponentially as a result of constant technologic improvements and refinements and cross-fertilization from several fields of medicine, science, technology, business, and industry. Cerebrovascular conditions, which so far have been demonstrated to, and may benefit from the use of stents, include atheromatous disease, broad-based cerebral aneurysms, arterial dissections, and venous occlusive disease causing increased intracranial pressure.

**Carotid Artery Stenting Versus Carotid Endarterectomy: Current Status****447**

Kevin M. Barrett and Thomas G. Brott

Carotid occlusive disease remains an important cause of ischemic stroke. The results of large, randomized, clinical trials have established the benefit of surgical revascularization in patients with symptomatic or asymptomatic carotid stenosis. The introduction of balloon angioplasty and stenting of the extracranial carotid artery as a potential alternative to surgery has been received with enthusiasm by patients and physicians. Whether or not this enthusiasm is justified fully has yet to be determined. This article reviews established and emerging data from clinical trials evaluating the safety and efficacy of carotid endarterectomy, carotid angioplasty, and stenting.

**Hemicraniectomy and Durotomy for Malignant Middle Cerebral Artery Infarction****459**

Michael J. Schneck and Thomas C. O'rigitano

Decompressive hemicraniectomy with durotomy is a life-saving procedure for patients who have large middle cerebral artery or carotid terminus strokes at high risk for malignant cerebral edema. Although randomized clinical trial data are not yet available, there are several case series that attempt to address issues of patient selection and timing of the procedure in the context of survival and functional outcomes. Patients who have an increased number of medical comorbidities, especially older age, are less likely to benefit from the procedure, but patients who have even large dominant hemispheric infarctions may do relatively well in certain circumstances.

**Current Options in Clipping Versus Coiling of Intracranial Aneurysms: to Clip, to Coil, to Wait and Watch****469**

Thomas C. O'rigitano

Treatment of intracranial aneurysms involves many factors: patient preference and demographics; aneurysm size, site, geometry, access, and intrinsics; practitioner experience and availability; facility; technology; and ancillaries. Volume counts, teamwork enhancement, and management should be individualized.

**Is Extracranial-Intracranial Bypass Surgery Effective in Certain Patients?****477**

Sepideh Amin-Hanjani and Fady T. Charbel

Cerebral revascularization can be performed through a variety of extracranial-intracranial (EC-IC) bypass operations, using several different donor and recipient

vessels, interposition grafts, and anastomotic techniques. The choice of bypass option is dependent on many factors, including the goals of the operation and the availability and accessibility of particular donor and recipient vessels. Potential indications for EC-IC bypass fall into two major categories: (1) flow replacement, in the treatment of complex aneurysms or tumors that require vessel sacrifice and (2) flow augmentation, for treatment of cerebral ischemia. The effectiveness of EC-IC bypass for these indications is reviewed in this article.

## **Perioperative Uses of Transcranial Perfusion Monitoring**

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Martin Smith

Transcranial perfusion monitoring provides early warning of impending brain ischemia and may be used to guide management of cerebral perfusion and oxygenation. The monitoring options include measurement of intracranial and cerebral perfusion pressures, assessment of cerebral blood flow, and assessment of the adequacy of perfusion by measurement of cerebral oxygenation and brain tissue biochemistry. Some monitoring techniques are well established, whereas others are relatively new to the clinical arena and their indications are still being evaluated. Currently available monitoring techniques are reviewed and their appropriateness and application to the perioperative period is discussed.

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