# Management of Cerebrovascular Disorders

## A Comprehensive, Multidisciplinary Approach

Alejandro M. Spiotta
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*To my mentors, past and present, for inspiring me to become an academic neurosurgeon. Thank you, Vicki, for your endless support and understanding. To Lucia, Daniela, Victor, and Robert – dream big and go for it!*

*Alejandro M. Spiotta*

*To the people of the great state of South Carolina.*

*Raymond D. Turner*

# Foreword

*Dans les champs de l'observation le hazard ne favorise que les espirits prepares*
Translation: Chance favors the prepared mind.
Attribution: Louis Pasteur, Lecture at University of Lille, December 7, 1985

Chance favors the prepared mind. I was reminded of this aphorism during my endovascular fellowship at UCSF. Strategy can make the difference between success and failure in neurointerventional procedures. The concept holds true at many levels of the human experience, certainly in medicine and its procedural disciplines. Major advances in computer-aided imaging and microcatheter engineering now permit endovascular procedures to treat a wide variety of cerebral vascular diseases. The point of impact is often 150 centimeters away from the site of access in the femoral artery. As endovascular specialists, we manipulate devices with limited degrees of freedom: we can push, pull, and rotate clockwise or counterclockwise. We rely on representations of physiology and anatomy, mostly using catheter angiography and fluoroscopic "roadmap" imaging. The devices are small in size; cerebral stents, for example, are measured in 250 micrometer increments. Precision and accuracy in size and placement are fundamental to procedural success. Technical skill requires acquisition of knowledge and intuition about device behavior under specific anatomical circumstances. For mechanical thrombectomy in acute ischemic stroke, technical success is also measured by speed of revascularization. Clinical outcome is the ultimate performance measure, and there is a growing body of scientific evidence to support the importance of endovascular techniques in the treatment of many neurological diseases with vascular etiologies. Moreover, the list of conditions we treat continues to grow through iterative and paradigm-shifting advancements.

In *Management of Cerebrovascular Disorders*, Drs. Spiotta, Turk, Turner, and Chaudry have brought together a panel of thought leaders in our specialty, known for their insights into the development and application of minimally invasive surgical and endovascular techniques to treat cerebral vascular diseases. Each chapter provides a succinct and comprehensive review of a specific category of disease seen through the lens of a recognized expert. Relying on the authors' combined experience and a detailed review of the medical evidence, this text is an excellent

compendium of our most current knowledge, using state-of-the-art procedures; and it is written in a manner that is accessible to students and experienced practitioners alike. Because open surgical and endovascular techniques are complementary, the editors have supplemented when appropriate with chapters on the nexus of endovascular and conventional "open" cerebrovascular surgery, including patient assessment, and practice in a hybrid operating environment utilizing the best methods to achieve optimal outcomes. Strategy is predicated on the concept of causality, the principle that events have causes and consequences. Success should not be left to chance. The knowledge and perspective about neurovascular diseases in this text will help the reader battle chance head-on.

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# Preface

This volume attempts the daunting task of bringing the reader (student, resident, fellow, or specialized attending) "up to speed" in both foundational and cutting-edge concepts in the medical and surgical/endovascular management of patients with cerebrovascular diseases. Every author was handpicked for their particular expertise in the topic to be covered in a concise fashion. For the efforts and participation of our contributing authors, the editors are forever indebted.

The management of patients suffering from cerebrovascular disorders can be exhilarating, challenging, rewarding, and humbling. The care of the cerebrovascular patient brings together a melting pot of physicians including neurosurgeons, neurologists, neuroradiologists, and neurointensivists, among many others. Those of us who have the opportunity to take care of these patients should consider ourselves very fortunate, as our generation has been part of some major advances that have greatly helped us impact the lives of those afflicted with cerebrovascular disorders. The introduction of the detachable coil and the rapid advances that followed in the field of neuroendovascular surgery have revolutionized our approaches to the treatment of aneurysms, now proven to be a tried-and-true approach with data from randomized trials. Trials involving carotid and intracranial atherosclerosis, and most recently, the landmark positive thrombectomy trials, have drastically and forever altered the landscape in ischemic stroke treatment. The development and maturation of neurocritical care, a field driven forward by a group of intensivists from diverse backgrounds with a singular focus to provide specialized, intensive care to the neurologically injured patient, has immensely improved the outcomes of our patients. Currently, three randomized controlled trials are underway employing novel minimally invasive methods of evacuating deep spontaneous intracerebral hematomas, with the promise that these techniques may confer benefit over medical management.

Each of these advances has proven to be remarkable. To have all these advances arise in such a short period of time is truly monumental and reflects the incredible passion and dedication of those taking care of the patients. "Take care of the patient, the rest will follow" (Edward C. Benzel). It also reflects the contributions of our

predecessors, to which we are eternally grateful – *we stand on the shoulders of you, giants*. Thank you.

As we all strive to take care of our patients as best we can, our quest for novel therapeutic approaches, cost effectiveness, and outcomes research catapults the field forward in leaps and bounds. I eagerly await what lies ahead for our patients.

Charleston, SC, USA

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