Comprehensive Management of Arteriovenous Malformations of the Brain and Spine
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Edited by

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To all the patients who have taught me so much.

Robert F. Spetzler

To the many residents and fellows who have worked diligently on AVM science, and to Drs. Pierre Lasjaunias and Raymond Kjellberg who first introduced me to the wonders of this complex disorder.

Douglas S. Kondziolka

To my parents, family, wife, and friends, who gave me constant encouragement throughout my life and career. To my teachers, colleagues, fellows, and students who gave me the chance to teach and also to learn from them.

Randall T. Higashida

To my patients who have inspired me; to my grandmothers, Batool and Fatemeh, who taught me the value of perseverance; to my parents, Afrouz and Mohammad, for their unconditional love and for the sacrifices they made to get me here; to my brother, Maziyar, who has always been my best friend; and, to my fiancée, Kristin, whose love and support helps me march on.

M. Yashar S. Kalani
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Foreword

It is truly an honor to have been asked to write a foreword to this truly comprehensive and up-to-date text on arteriovenous malformations (AVMs) of the brain and spine, which has been a favorite topic of mine throughout my career. Clearly, much has been written on this topic and there have been excellent textbooks, frequently on the larger topic of cerebrovascular surgery, which have described in detail one or another aspect of the management of these vascular lesions. However, I know of no other work that “puts it all together” with the most modern available information on this topic.

The first section on development, anatomy, and physiology opens with an excellent chapter by Lawton and his colleagues with beautiful drawings depicting the embryologic development of the vasculature of the nervous system. This section ends with a very good summary of what is known to date about the natural history of AVMs of the brain by Laakso and Hernesniemi. This section also includes an excellent discussion of spinal vascular anatomy by Singh and Gobin. The second section on evaluation and treatment considerations, such as neuromonitoring and neuroanesthesia, concludes with an excellent chapter on the classification of brain and spinal AVMs and fistulae by Du and her colleagues. The next section, on surgical approaches, includes chapters by several of the most experienced cerebrovascular groups, including a beautifully illustrated chapter on the surgery of spinal AVMs and fistulae by the senior editor of this book and his group at the Barrow Neurological Institute. The last section, which includes endovascular and radiosurgical treatments of AVMs, is particularly comprehensive and includes an interesting chapter on the difficult and controversial topic of “palliative” treatment of those lesions that cannot be eliminated with conventional methods. The book concludes with a thoughtful comment by Russin and Spetzler on the ARUBA trial and its impact and possible consequences.

I have truly enjoyed my first cursory look through this excellent textbook. I am looking forward very much to the “banquet” that will be reading leisurely chapter by chapter of the final printed text. Seeing the many beautiful illustrations in almost every chapter in full color will be a special treat. This is a multidisciplinary work that will be equally enjoyed and of great value not only to neurosurgeons but also to neurologists, neuroradiologists, intensivists, and radiation oncologists interested in cerebrovascular disease.

I truly congratulate the editors for gathering a true cast of stars to put together a work of real excellence that will stand as the definite work on the comprehensive management of AVMs of the brain and spine.

Roberto C. Heros, MD
University of Miami
Preface

Arteriovenous malformations and fistulae represent for neurosurgeons rare, but challenging, lesions of the brain and spinal vasculature. Historically, many practitioners have been reluctant to tackle these lesions. It was only with advancements in microsurgical techniques that the routine management of patients with these lesions became possible. More recently, advances in the fields of radiation oncology and interventional neuroradiology have resulted in novel adjuncts for treating patients with arteriovenous malformations. With the rapid growth of knowledge about arteriovenous malformations and fistulae, and the development and application of new modalities for their treatment, we felt it essential to produce a comprehensive guide for practitioners at all levels, summarizing the state of the art in the field. Importantly, we wanted to stress the decision-making process associated with patient selection and the thought process used in applying single or multi-modality treatment to these malformations.

Although older texts have reviewed treatment indications and outcomes for brain and spinal vascular malformations, an updated text on the comprehensive management of these lesions is lacking. Here we have gathered a team of international experts in the management of arteriovenous malformations and fistulae, and the development and application of new modalities for their treatment, we felt it essential to produce a comprehensive guide for practitioners at all levels, summarizing the state of the art in the field. Importantly, we wanted to stress the decision-making process associated with patient selection and the thought process used in applying single or multi-modality treatment to these malformations.

This work is intended for practitioners at all levels who work in the fields of neurology, neurosurgery, interventional radiology, radiation oncology, and critical care medicine and who are involved in the care of patients with vascular malformations of the brain and spine. We encourage readers to familiarize themselves with the literature on the natural history of vascular malformations of the brain and spine. In our opinion, no treatment should be attempted or offered until the practitioner understands the risks of morbidity and mortality associated with the natural history of the lesion and how that risk compares with the risks associated with various treatment modalities or with observation alone. Experts in the fields of neurosurgery, interventional radiology, and radiation oncology have written the chapters in this book. Where appropriate, the written chapters are accompanied by videos highlighting the essential techniques used in the treatment of these lesions.

With advances in the fields of genomics and proteomics, we are likely to see a revolution in the way these lesions are identified and treated. Until that time, surgery, interventional techniques, and radiation remain the mainstay of treatment for these lesions.

We thank the expert authors of the chapters for taking time from their busy clinical practices to produce this volume. This work is the result of numerous hours of hard work and dedication to perfection by the editors, illustrators, and animators at the Neuroscience Publications office at Barrow Neurological Institute. A special thanks to Mr. Mark Schornak, Ms. Jaime-Lynn Canales, Ms. Clare Prendergast, Ms. Dawn Mutchler, Ms. Paula Card Higginson, Ms. Marie Clarkson, Mr. Michael Hickman, and Ms. Kristen Larson, without whose efforts this work would not have been possible. The editors wish to extend a note of gratitude to Mr. Nicholas Dunton and Ms. Joanna Chamberlin at Cambridge University Press for their assistance with the work.