3D ANGIOGRAPHIC ATLAS OF NEUROVASCULAR ANATOMY AND PATHOLOGY

The *3D Angiographic Atlas of Neurovascular Anatomy and Pathology* is the first atlas to present neurovascular information and images based on catheter three-dimensional (3D) rotational angiographic studies. The images in this book are the culmination of work done by Neil M. Borden over several years using one of the first 3D neurovascular angiographic suites in the United States. With the aid of this revolutionary technology, Dr. Borden has performed numerous diagnostic neurovascular angiographic studies as well as endovascular neurosurgical procedures. The spectacular 3D images he obtained are extensively labeled and juxtaposed with conventional 2D angiograms for orientation and comparison. Anatomical color drawings and concise descriptions of the major intracranial vascular territories further enhance understanding of the complex cerebral vasculature.

Neil M. Borden, MD, is a board-certified neuroradiologist who has been practicing for 20 years. He completed a neuroradiology fellowship at the Neurological Institute of New York at Columbia Presbyterian Medical Center and a two-year fellowship in endovascular neurosurgery at the Barrow Neurological Institute in Phoenix, Arizona. Dr. Borden is a senior member of the American Society of Neuroradiology and is currently practicing at the Cleveland Clinic Foundation in Cleveland, Ohio.

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This book is dedicated to my wife Nina, my daughter Rachel, and my son Jonathan, whose support and encouragement made this effort possible. They are my inspiration and guiding light.

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FOREWORD

We have all – patients and physicians alike – come to take the capabilities of diagnostic imaging technology for granted; indeed, our expectations of that technology continue to increase – higher resolution, faster acquisition times, less artifact – the list of demands goes on and on. However, it is scarcely within the span of a generation that lesions considered occult in one imaging modality can now be diagnosed based on features that are pathognomonic in another modality. Young clinicians embarking on their careers at this time may be unaware, for example, that cerebral cavernous malformations with their distinctive appearance on magnetic resonance images were not that long ago considered to be angiographically occult arteriovenous malformations.

I offer this brief historical detail because readers of this volume are about to embark on an amazing three-dimensional visual journey of the circulation of the brain and neck that very few years ago would have been impossible. From the perspective of a neurosurgeon, the appreciation of the vascular system afforded by these images is priceless. Not only does three-dimensional rotational angiography improve the accuracy of diagnosis, it considerably enhances our ability to optimize treatment for patients with challenging neurovascular disorders. Preoperative planning is immeasurably improved by the ability to rotate these images in space to view the posterior regions of vessels that can even be difficult to view intraoperatively. The neck of an aneurysm, for example, can be assessed to determine its suitability for clipping or the presence of other vessels whose inclusion in a clip could be catastrophic. The experience is the neurosurgical equivalent of viewing the dark side of the moon – and always somewhat miraculous to those of us who trained when little more than conventional radiography and angiography were available. To note merely that patient outcomes are concomitantly improved is an understatement that fails to do justice to the lives that can be saved and the devastating complications that can be avoided.

The technology and images showcased in this volume also offer a huge educational benefit. Students, neurosurgical trainees in particular, have always had to struggle with translating the two-dimensional images of neurovascular anatomy in textbooks into the pulsating three-dimensional wonder of the human brain. The hundreds of beautiful images in this text will offer great solace to those striving to master this complex task. The color anatomical illustrations in Chapter 2 and the three-dimensional reconstructions in the orientation insets on each page help readers to place the three-dimensional angiographic images of the vasculature in their anatomical context. The liberal use of conventional angiographic images also helps readers to appreciate the normal anatomy and its perturbation by pathology.

That this superb angiographic atlas was assembled by Dr. Neil Borden is no surprise. Even as a resident Neil gained the reputation of being a "walking radiology encyclopedia" and a "sponge" for knowledge. Between 1994 and 1996, Neil completed a fellowship in interventional neuroradiology with us at the Barrow Neurological Institute in Phoenix. He joined us as a seasoned neuroradiologist who left an established practice to pursue additional training, and I believe that his choice to do so reflects his undiminished love of learning and teaching.

Remarkably, Neil had little experience in research or publishing when he joined us. His commitment and dedication to medical education are now manifest in the volume before you. Having assembled a few neurosurgical atlases during my career, I can assure readers that the finished product is the culmination of hundreds and hundreds of hours spent acquiring and weeding through countless images to optimize the learning process. The technology provides the images, it is true. However, only Neil's keen intellectual competency could have created this thoughtfully formatted and beautiful atlas. It is my pleasure and honor to recommend *3D Angiographic Atlas of Neurovascular Anatomy and Pathology* to both students and masters of the neurosciences.

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