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Foreword

The field of cerebrovascular surgery has undergone a monumental metamorphosis in the last 25 years. It is a source of personal amazement—and a stern reminder of my own ephemeral longevity!—to recollect that the GDC coil became FDA approved the year I started my neurosurgical practice, back in 1995. Creativity, innovation and technical excellence in the endovascular world have not been in short supply since. We will be hard pressed to name a neurosurgical subspecialty that has witnessed more transformation in such little time. Hardly a year goes by where a conceptual breakthrough, clever redesign or technical improvement in neuro-endovascular science does not occur. The field had been heralded with promises of superior outcomes through minimal access means. In most instances, the promises have been and continue to be realized, to the benefit of thousands and millions of patients.

Who is the modern endovascular surgeon? He or she is generally a highly motivated, intelligent, innovative, academically-productive individual who was attracted to the mesmerizing complexity of cerebrovascular anatomy, physiology and pathologies early on in his or her journey. This thriving discipline is now the domain of neurosurgeons, neuroradiologists and neurologists alike. Their paths were different, but they met at a nexus of sorts—the common ground of stroke, aneurysms, and vascular malformations. They share a common language of catheter names and sizes, flat panel technology, radiation dosimetry, subtle finger ergonomics of wire twisting/pulling/pushing, recanalization scores, and such. They keep up with the ever-changing world of industrial innovations. They lead or participate in numerous clinical trials and bring the full might of Level 1 scientific evidence to bear on clinical endovascular practice. They travel the world teaching others their craft through lectures, cadaveric courses and advanced simulators. There are also some high profile live international courses that have become legendary and a must for any endovascular trainee.

Drs. Rangel-Castilla, Siddiqui and Levy represent some of the best and brightest endovascular experts that the field has produced. Through their contributions to the science and craft of endovascular surgery at Buffalo and Mayo they have created, advanced and refined numerous concepts and techniques in this discipline. The remarkable house that Nick Hopkins built in Buffalo in the 1970s has produced many stars indeed that have permeated and reshaped the discipline across this nation. The Hopkins legacy is alive and well under the Levy tenure. This new publication, the *Video Atlas of Neuroendovascular Procedures*, is a unique undertaking. It capitalizes on the enormous breadth and depth of experience that the authors have garnered over the years, but then distills it into individual vignettes of cases presented in a very practical way. Not only does the reader have access to chapter-type comprehensive reading material about the entire endovascular field, but also to actual case-specific videos and superb artistic renditions of the angiographic summary for each vignette. The authors talk the talk, but also walk the walk. They include all relevant technical details. They tell us *why* to do it, why not to do it a different way, how to do it, and lead us by the hand as they show us how they did it. And they do this for every type of case in eight separate thematic sections.

What a wonderful idea it was to put this project together. It is a carefully and intelligently designed mix of didactic and practical knowledge. It synthesizes, analyzes, demonstrates, and illustrates all at once; it has something for everyone. As technology constantly transforms itself, with the creation of new devices, it is inevitable that some of the technical aspects presented here will become in time obsolete. That should hardly detract students from wanting to own this atlas, study its every detail and reference the cases—which can be pulled up on their cellphones with a quick scan—as a practical guide to their own practice, providing discussion points with their teachers and peers in their own institutions. And one day, far into the future, when all cerebrovascular pathologies will be curable with a pill or genetic probe, when the clipper will put down the clip, when the coilee will put down the coil, at least our then-retiring readers will own a piece of history! They will be able to show their grandchildren how early in the 21st century some of the most gifted endovascular practitioners battled the vascular beasts with superb ingenuity, relentless courage and uncommon dexterity.

I congratulate the authors for this labor of love. The sweat behind it has not gone unnoticed. It is there in every aspect of each case, sometimes obvious and sometimes subtle. But what readers will need to realize as they watch and learn from the masterful execution of each featured case, is that behind it is a mountain of experience, that the path to mastery is paved with discoveries, sometimes welcome and sometimes not, and it takes supremely committed and astute surgeons, like the authors, to grow and blossom after each realized triumph and each encountered disaster. This publication will undoubtedly help students of neuroendovascular surgery shorten their journey towards mastery.

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Preface

In the 1990s, early neuroendovascular techniques underwent an evolutionary leap forward. From a developing modality, they rapidly matured and dramatically expanded in capability to the point that they substantially changed the approach to most neurovascular diseases.

The goal of the *Video Atlas of Neuroendovascular Procedures* is to present basic and complex neuroendovascular procedures differently from traditional textbooks that tend to emphasize natural history, physiology, and morphology. Rather, our book will present in a concise manner a clinical case, relevant noninvasive neuroimaging findings, neuroendovascular procedure planning, and the rationale for endovascular intervention. Each case includes a list of devices and materials used to accomplish the task and an explanation for using those specific tools based on the patients' vascular anatomy and pathology. Most importantly, each case is accompanied by an edited and narrated high-definition video demonstrating step-wise sequences of the procedure. The book is also interactive; each video is presented with a QR code that can be scanned with a smart phone or tablet playing the video immediately in the palm of the reader's hand. Readers thus can read the text and explanation while simultaneously watching the video on an electronic device. Each case features a professional illustration summarizing the procedure in a single exquisite image.

This book represents a compendium of current knowledge to serve as reference for those already practicing and as a text for study for those entering the field. It is designed to be both a comprehensive reference and a focused tool. It can serve as a text that one would read cover-to-cover or as a go-to resource for the management of a specific case. In both roles, the text is also designed to benefit medical students, residents, and fellows in need of a quick reference to pertinent must-know information. The text is organized in 8 sections according to diagnosis, topics, and procedure types. It covers all known neuroendovascular interventions. Section I includes vascular access, from traditional femoral artery access to increasingly used radial artery and direct carotid access. Section II covers diagnostic procedures: cerebral, spinal, arteriograms, venograms, balloon test occlusions, and petrosal sinus sampling. Section III contains extracranial vessel angioplasty and stenting such as carotid artery stenting with distal or proximal protection and flow arrest techniques, and the less commonly performed vertebral artery and venous sinus stenting. Section IV covers acute stroke procedures such as mechanical thrombectomy with or without a stent retriever, in anterior or posterior circulation, intracranial or extracranial stenting in emergent situations, and angioplasty for intracranial atherosclerosis. Section V covers all endovascular techniques for the treatment of intracranial aneurysms: coiling, balloon- or stent-assisted coiling, flow diversion, liquid embolic agents, and novel devices such as aneurysm neck reconstruction and intrasaccular flow-disruption devices. Section VI covers endovascular embolization of intracranial and spinal arteriovenous malformations and fistulas, which are relatively uncommon but challenging lesions to manage. Section VII includes head and neck embolization of hypervascular tumors, epistaxis, and carotid blow out. The last section, and perhaps the most interesting, Section VIII, covers common complications in neuroendovascular surgery and their management.

We hope you find this volume interesting and that you will enjoy reading this book as much as we enjoyed putting it together for you.

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