Vestibular Schwannoma Surgery

Mustafa K. Baskaya • G. Mark Pyle Joseph P. Roche

# Vestibular Schwannoma Surgery

A Video Guide



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#### Foreword

Among the most challenging lesions and surgeries that neurosurgeons face throughout their training and early years of practice, some stand out as particularly formidable and daunting. Petroclival meningiomas, giant aneurysms, large arteriovenous malformations, and high-flow interposition bypasses are examples that come to mind. After all, these are the quintessential cases where drama is assured, whether in triumph or disaster. There is nothing more reinforcing to the learning process than the vivid memories of the surgical battlefield during residency. Perhaps most zealous residents look forward to scrubbing on these surgeries. They certainly may be eager to participate, particularly if cerebrovascular or skull base surgery is in their future, but I doubt very much that even the most overconfident among them would have the courage (or misguided desire!) to want to be a primary surgeon on any such cases.

I believe vestibular schwannomas have earned the right to join this elite group of intimidating lesions. I concede that, unless they are giant in size, they do not inspire quite the same emotions of fear and trepidation in the young surgeon that a large aneurysm might. After all, the dreaded complication of transecting the facial nerve during tumor dissection, while devastating to the patient, still happens in an instant, with a slip of a blade or an excess of traction. Yet it happens without much drama. It happens in silence, often with no gradual change in intraoperative monitoring, without a flood of blood or cardiorespiratory instability. It does not generate a sustained flurry of adrenaline-charged activity by everyone in the room. It easily goes unnoticed by all present, even the surgeon initially. Equally disappointing but less consequential is the sudden loss of auditory waves, and there evaporates the hope of hearing preservation. But it is precisely the anticlimactic nature of these complications, their instantaneous occurrence and their irreversible impact on patient satisfaction and quality of life, that should earn the vestibular schwannoma a deserved place in the pantheon of treacherous neurosurgical lesions. It simply should not be tackled by the young surgeon who has not spent enough apprenticeship time with "deep observation" of his/her mentor, followed by sequential and cumulative time acquiring the judgment and surgical skills required to tame this lesion without creating collateral injury. When I reflect on my own training and early years in practice, and I am asked which surgical procedure was associated with a substantial learning curve well beyond my fellowship time, I do not hesitate to respond: resecting a vestibular schwannoma.

Unless the young surgeon performs the surgery for him/herself, over and over again, it is simply quite difficult for even the most skilled of surgical educators to convey in words or through demonstration to that young surgeon all the surgical subtleties required for surgical success. Indeed, the surgical pearls are not obvious; and there are many. Even discounting the entire complex topic of surgical indications, the balance of wait-and-scan versus radiosurgery versus surgical resection, the timing of treatment, and other popular debate-generating controversies, the steps involved in the surgical procedure itself are difficult to completely master quickly. A simple deviation from proper patient positioning, ignoring the importance of venous return, can result in cerebellar edema even before opening the dura. Placing the craniotomy a touch too high to access the lateral recess of the cisterna magna forces the surgeon to manipulate and retract the cerebellum to access CSF spaces, initiating a vicious cascade of cerebellar contusion and further worsening of tumor exposure. Tearing an out-of-field superior petrosal vein because one did not look for it early almost guarantees another cascade of bleeding, swelling, and venous contusions. The pitfalls abound at every step. But of all the skills needed for a great surgical outcome, the hardest one to teach is the mastery of the arachnoidal plane of dissection (a double plane in fact), which then leads to an intimate adhesion plane with the facial and/or cochlear nerve. It is the lack of confidence in recognizing, developing, manipulating, and maintaining the momentum in this plane that distinguishes the novice from the master surgeon. It is these acquired skills-the intimate familiarity with this plane, the sixth sense of where the thinned out facial nerve fibers are heading, the prediction of how much traction is too much-that allow the experienced surgeon to resect in 30 min a tumor that easily takes a fully trained but relative novice surgeon 4 h to do. When I think of which tumor in neurosurgery exemplifies the greatest variability in surgical operative time among different operators, vestibular schwannoma is the uncontested grand champion. A simple visit to different operating rooms around the globe will easily demonstrate these extremes. There are centers where masters run 3-4 simultaneous rooms all filled with sizeable vestibular schwannomas, and are done by 3 p.m. And there are centers where welltrained but younger surgeons will spend the whole day, evening, and sometimes the entire night removing one tumor. The learning curve is indeed long and steep.

It is precisely because of these and other considerations that I enthusiastically welcome the addition of this fantastic book to the list of rare, practical, truly educational, and surgically minded publications, which demonstrate and celebrate surgical skill and subtlety. Mustafa K. Baskaya is a master neurosurgeon who has accumulated extensive experience in cerebrovascular and skull base surgery. He has ridden the learning curve and has been coasting for some time. He has surrounded himself by a great team of collaborators in neurosurgery and neuro-otology at the University of Wisconsin in Madison and has distilled their years of tackling vestibular schwannomas into this remarkable publication. As the consummate student (and teacher) of neuroanatomy, and all-around accomplished surgeon and scholar, which he has always been, since his resident days in our program at the University of Miami, Dr. Baskaya includes video cadaveric demonstrations of all three basic surgical approaches: retrosigmoid, translabyrinthine, and middle fossa.

These accompany very well-written chapters and several surgical well-edited video examples of cases. A special chapter is included on clinical features and the physiology of intraoperative monitoring. Another chapter covers some complex lesions that required specific considerations.

Throughout the book (text and videos), mastery is on display. Subtleties in technique are constantly highlighted. Surgical moves are measured and carried out in confidence. Mastery in anatomy blends with and reinforces mastery in surgery. The technical steps demonstrate, over and over again, why knowledge well rooted in neuroanatomy is a prerequisite for proper surgical technique. This book will be of immense benefit to all neurosurgical learners interested in accelerating their curve in vestibular schwannoma surgery. I encourage the reader to watch the videos with "deep observation," and re-watch with an analytical mind. Question yourself. Make sure you understand each move. You will indeed become a better surgeon, less prone to inadvertent moves, more cognizant of pitfalls that characterize this deceiving pathology.

For all this, I congratulate Drs. Baskaya, Pyle, and Roche and their team for a superb publication.

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Jacques J. Morcos

### Preface

The treatment of vestibular schwannomas has undergone numerous changes and advancements in the past century. Innovations in surgical and now microsurgical techniques allow for the removal of these lesions with the preservation of nearby cranial nerves in the majority of cases. In addition, the development of stereotactic radiation can provide disease control in a minimally invasive fashion. Further, improved understanding of the natural history of these tumors and the proliferation of cross-sectional imaging techniques allow the safe observation of selected lesions. Lastly, molecular and targeted therapies hold the promise to both treat these tumors and restore lost functions as a result of tumor growth and/or treatment. However, despite the increasing use of nonsurgical management strategies, surgery nonetheless remains an important tool in the treatment armamentarium for physicians and surgeons.

Advances in and the widespread use of audiovisual technology have made a significant impact in teaching surgical techniques in general and more specifically in teaching skull base surgery. Among all the surgeries that skull base surgeons perform on a daily basis, the surgery of vestibular schwannomas or so-called acoustic neuromas is among the most challenging for trainees, fellows, and young surgeons to learn and obtain experience with. This is because the hands-on training for these surgeries may be limited due to concerns for cosmetic outcome factors including hearing and facial function. Therefore, there is a need for improved materials to teach these surgeries. With audiovisual observation, trainees, fellows, and young surgeons can observe basic and complex surgeries. This operative audiovisual atlas, which we believe is the first of its kind, is intended to accomplish this pedagogical goal by enabling its viewers and readers to observe the step-by-step techniques of vestibular schwannoma surgery.

This book and video series was conceived and designed to provide both in-training and practicing neurosurgeons and neurotologists a complete educational reference on the surgical treatment of vestibular schwannomas. The cadaveric and human illustrations, in conjunction with video dissections, demonstrate the exposure and extirpative techniques utilized in contemporary skull base microsurgery. While other textbooks, articles, and videos are available as individual resources, this Video Guide to Vestibular Schwannoma Surgery provides a comprehensive collection of reference materials and video demonstrations involving all aspects of operative vestibular schwannoma management. It is the hope of the authors that readers will gain a detailed understanding of both the science and the techniques involved in the contemporary surgical management of vestibular schwannoma patients.

We thank our families for their continuous support and are grateful to our acoustic neuroma patients and their families for their trust in us.

Madison, WI Madison, WI Madison, WI Mustafa K. Baskaya G. Mark Pyle Joseph P. Roche

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