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Foreword

When I was an otolaryngology resident in training at Boston University in the early 1970s, my chief, M. Stuart Strong, MD used a rudimentary instrument called a “stroboscope” which in the Rube Goldberg spirit seemed to be a rather cumbersome and difficult to use device. Employing a mechanical shutter on the light source, a head mirror and laryngeal mirror were used to image the vocal folds in “slow motion.” It was hard enough for me, a first year resident to use the simple head mirror—this new device seemed to be impossible for me to master. What an intriguing idea—observing the vocal cords move in slow motion! The high-speed images of vocal fold vibration done at Bell Laboratories in 1937 were a landmark contribution to laryngeal physiology videostroboscopy and now high-speed digital photography are readily available for clinical use. Laryngology has developed into an exciting, relatively new subspecialty in otolaryngology due in no small part to the development of optic imaging devices as outlined in the Introduction of this book. This small anatomic unit known as the larynx with incredible ability to produce voice can be observed in dynamic action with rigid and flexible optics and captured on digital format for study and reference.

It is customary in a Foreword to tell the readers what is unique about the text and the contribution the book makes to the existing literature on the subject. Prior to undertaking this task, I would like to preface my remarks with some unique insights about the author. I have had the pleasure of knowing Dr. Woo since his residency at Boston University School of Medicine and then working with him both in Boston and in New York. The term “physician scientist” best describes this remarkable doctor. A physician is able to understand the physiology, pathology, and pathophysiology of disease based on study and training but few of us apply the scientific method to medical practice on a regular daily basis as does Dr. Woo. To quote the eminently quotable Sir William Osler, “Observe, record, tabulate, communicate. Use your five senses. Learn to see, learn to hear, learn to feel,

learn to smell and know that by practice alone you become expert.” In my opinion and in the opinion of his peers, Peak Woo meets Dr. Osler’s criteria for being an expert. Dr. Woo is a keen observer who asks the questions we as clinicians need to keep asking, namely, what is causing this pathologic process? It is evident when the reader reads and studies this exceptional contribution to stroboscopy and laryngology that the author has mastered this complex subject—his experience is enormous and his ability to share this experience with the reader in a lucid fashion is remarkable.

Part I, Basic Science and Introduction, serves as a foundation for understanding the following section, Part II, Clinical Section on Laryngeal Disorders. Laryngeal anatomy and physiology need to be mastered by the reader prior to studying the altered, pathologic state. As opposed to sometimes unreadable, at least for a clinician, sections on laryngeal physiology in basic otolaryngology textbooks, this section is lucid and easy to understand. The art and science of stroboscopy is clearly presented and made more understandable by the basic science discussion. The clearly marked diagrams and stroboscopic images are extremely useful and in fact essential for the reader to understand some of the complex laryngeal physiology. As Dr. Woo points out in the text, the technique of stroboscopy is simple—the interpretation is difficult and needs to be mastered with lots of practice and systematic documentation of that observation. However, Dr. Woo does give a unique single author perspective on his detailed technique and tips for successful examination and pitfalls to avoid. Attention to detail in the technique of stroboscopy as well as the standardization for documentation is unique to this text. This careful attention to detail characterizes the way Dr. Woo takes care of his very complex laryngeal patient practice.

In Part II, Clinical Section, a full spectrum of laryngeal disorders is presented and in particular, the use of stroboscopy is stressed. Once again, complex disorders are easier to understand with the superb

line-drawing illustrations and clinical photographs. The topic of the book is stroboscopy, however, this text also serves as a laryngology textbook by giving the reader a complete discussion of common and uncommon laryngeal diseases. In particular, I found the discussion of inflammatory disorders extremely useful through Dr. Woo's insights on the workup and treatment of acute and chronic laryngitis for both the average patient and the professional voice user. The discussion of the workup and management of scarring, in particular sulcus vocalis, is the best I have ever seen in any textbook or journal article on the subject. The in-depth discussion of the various pathologic enti-

ties reflects Dr. Woo's enormous clinical experience, which is presented with keen, insightful comments and recommendations based on the scientific literature and on his many years of experience.

In summary, this textbook of stroboscopy is a landmark contribution to the laryngology literature written by a master clinician-scientist. It is essential reading for anyone interested in understanding the human voice and its pathologic conditions. Dr. Woo has given us in essence a master class on the subject of the art and science of stroboscopy as well as the pathophysiology and treatment of laryngeal pathology. This text will be a treasured book in my medical library.

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Preface

I remember very well my first exposure to stroboscopic light examination of the vocal folds. It was April 1977; I was a third-year medical student doing a clinical month of otolaryngology under the guidance of Dr. Stuart Strong, who was kind enough to allow the medical students to examine his private patient's and use all the equipment in his clinic. The patient was a young, classically trained male singer with minor voice complaints that nevertheless was major to him. After examination of the vocal folds using a dental mirror that did not show any abnormality, I presented this patient's complaints and physical findings to Dr. Strong. He suggested we do a stroboscopic examination of the vocal fold vibration. At that time, the stroboscope was a rudimentary affair consisting of an industrial box stroboscope with a flash rate that had to be matched by the patient. The stroboscope was affixed by surgical tape to the same lamppost providing the constant light source. The stroboscopic light source flash rate was dialed in by the examiner. The light then bounced off the head mirror of the examiner onto the dental mirror used to examine the larynx and then onto the vocal folds. Through the head mirror, the examiner could inspect vibration of the vocal folds. The diagnosis was phonasthenia and the treatment was voice rest followed by throat gargles. Afterward, the patient willingly let me examine him after the conclusion of Dr. Strong's consultation. His great facility in music training allowed me to dial different frequencies on the strobe machine and he was able to match them. Imagine my surprise and amazement at looking at a subject never covered in medical school! The delicious, voyeuristic pleasure of sampling the source of the human voice by visual inspection was a reality.

I was hooked!

So much has changed so fast in the decades since that early exposure that today laryngologists, speech pathologists, and voice teachers all can enjoy visual images of the vocal folds that correspond to a specific voice output. This applied technology has moved so fast that one can enjoy at one's leisure the recorded video

images of the vocal folds vibrating at high-definition quality. These images can be shared across the globe for consultation by E-mail. The development of fiber-optic and rigid endoscopes, the charge-coupled chip camera, the video recordings, and the computerization of acoustic and visual media in digital form all have made the process of examination and sharing of information about the larynx so much simpler than the days of mirrors and flashing lights. Today, color high-speed cameras can capture pictures of vocal fold vibration at up to 8,000 frames per second. Chip-tip cameras are small enough to go through the nose yet can yield high-definition video quality of greater than 1,028 pixels. There are alternate approaches (narrow-band imaging, autofluorescence imaging, and confocal microscopy) being used to inspect the vocal folds. These are fantastic advances that no doubt will make contributions to medicine that may make this and prior concepts about vocal fold function obsolete.

So, why this book?

What has not changed are the patients and their need to have an understandable solution to their complaints. When the complaint is related to voice, a specific and expanding field of knowledge is now required to perform the medical, surgical, and rehabilitation aspects related to voice care. Despite this growing body of knowledge, the ear-nose-throat physician without added fellowship training often is left to his or her own devices to pick up information from meetings, "experts," and one's own experience. The subject of laryngeal diseases as it affects voice is poorly covered in residency training. In the speech-pathology training programs and in the vocal pedagogy academies, there is a paucity of information related to pathology of the vocal apparatus as it may affect vocal function. To that end, a textbook that covers the basics of vocal fold vibration and uses a pathophysiologic basis for voice disorders may be helpful to all clinicians asked to provide voice care. Despite new equipment and new technology, what will not change is the need for all clinicians to have an understanding of normal and abnormal structure and function of the vocal apparatus.

Understanding the physiology of phonation and relating it to pathophysiology, then, is a critical fundamental basis for future study. Acquiring that understanding as the basis for interpretation of the images related to normal and abnormal vocal function, in my view, is a greater challenge today for the clinician than the ability to acquire beautiful images.

It is my belief that there is a need today for the clinician to go beyond image acquisition. The meaning of the videostroboscopy findings and their interpretation forms one of the most valuable tools available to the clinician from their diagnostic toolbox. Multidisciplinary evaluation with the laryngologist, the speech pathologists, and the voice teacher has become common as recognition of each specialty's expertise in voice care is acknowledged. Yet we know that underlying all the technology and consultations, it is ultimately the master clinician's synthesis of the voice disorder that will determine the effectiveness of the initial diagnosis and then treatment. As subjective interpretation of stroboscopy will be with us for a while, a nuanced and skilled knowledge set by the clinician with experience in stroboscopy can make a great deal of difference in subtle cases of voice disorders. I hope to help speed that process with this book.

This is a text for the clinician interested in incorporating flexible and rigid videolaryngoscopy with stroboscopy into their clinical practice.

The book is presented into two parts that are complementary. The first section is the basics of stroboscopy (Chapters 1-12). Upon completion of this section, the reader should have an understanding of the scientific principles of stroboscopy, normal and abnormal vocal fold vibration, and the basics of how to set up and implement stroboscopy into their clinical practice. This section covers the principles of stroboscopy (Chapter 2), the basics of anatomy and physiology of the vocal fold (Chapter 3), the basics of phonatory physiology (Chapter 4), and normal and abnormal vocal function (Chapters 6-7). Chapters 8 through 12 deals with the basics of equipment selection, laboratory set-up, and documentation and interpretation of the video images so that it can be used efficiently for communication and data archiving.

The second section focuses on clinical science. It is divided into clinical sections that include: inflammatory, benign vocal fold lesions, vocal fold paralysis, and malignant diseases. Because stroboscopy is mostly used

in the medical diagnosis and management of voice disorders, and because I am a physician, it is necessarily biased and incomplete. A comprehensive book that covers all voice disorders as they affect medicine, speech pathology, and singing, is impossible. It is biased toward medical conditions and thus does not have a complete review of all the rehabilitative treatment options for voice disorders. Because of my western tradition of medicine training, there is little mention of nontraditional medical approaches to voice disorders. I suspect the clinical section may be of limited value to voice teachers. The section on voice disorders due to functional voice disturbance is short and incomplete. For the physician interested in a complete catalogue of all medical illness affecting the voice, the section on neurologic and oncologic diseases affecting the larynx will be wanting. Rather, this section is skewed to medical and rehabilitation diagnosis where stroboscopy or high-speed imaging of vocal fold vibratory function will contribute to diagnosis and treatment. Therefore, considerable detail of the section on benign diseases is devoted to differentiating nodules from polyps from cysts from sulcus, as an accurate diagnosis forms the basis for surgical treatment. At the risk of too many illustrations, the clinical compendium may be used as an atlas of some common clinical and operative endoscopy finding in common laryngeal pathologies.

For the novice new to stroboscopy, the contents of this book should not and cannot be digested without practical practice. The text is meant to complement and not supplant the actual recording and interpretation of the stroboscopic image by the clinician. Therefore, to learn stroboscopy, one has to perform the recordings and do it often. In stroboscopy workshops, I encourage clinicians to perform the exams themselves rather than relegate this to a technician. The nuances of how to elicit the proper voice token and its implication on the patient's pathology is complemented by the images. Do not look at it as a chore. It is by repetitive performance of the examination that one becomes an expert, both in the performance and in the interpretation of the video images. Do not be discouraged by the initial inundation of superfluous information and the lack of coherence from the first six months of doing stroboscopy. In time, pattern recognition and dedicated pursuit of excellence will reach that "ah-ha" moment when the visual informa-

tion, experience, and knowledge will gel into one coherent synthesis of the voice problem, such that you are the master of the voice clinic. My own experience from years of teaching stroboscopy workshops is that there is continued learning over many years as one masters not only the craft of voice care, but that one can appreciate over time the delightful art and

the mystery that continues to provide years of intellectual stimulus in one's profession.

Finally, the fascination of voice and the need to understand it better and offer patient solutions continues. The quest to understand this unique human instrument has yielded years of pleasures in its discovery. I wish the same for you.

Peak Woo