Foreword

The twentieth century has been known as the era of human communications; at the center of this development has been the human voice. The principal organ of voice production, the larynx, requires supervision in health and disease, which in turn calls for imaging of the vocal organ.

On my return from the U.S. Naval Service after World War II, I settled in Chicago. In my work at Northwestern University, I faced a challenge of inadequate visualization of the vibrating larynx. My wife and I assisted in the restoration of the famous Lyric Opera, and I had an opportunity to assist a number of singers with vocal problems. During these examinations, I became concerned that my laryngeal mirror was not sufficient to present a clear and accurate view of the vocal margins during the vibratory cycle. On reflection, I realized that the blurred movements of the vocal folds were actually the result of the high vocal frequency of the singers’ voices. In other words, my eyes were limited to the perception of eight or ten images per second, while the vocal cords of my patients vibrated perhaps a thousand times a second. Consultations with distinguished colleagues in Philadelphia, Boston, and New York failed to offer a solution to my quandary.

At this stage of my research on the vibrating vocal cords, I remembered an experience during my Naval service in which we examined a rapidly moving engine with ultra-high speed photography at about 5000 frames per second. It occurred to me that perhaps we could use similar equipment for the study of vocal fold movements in slow or ultra-slow motion. Why not apply the same principle to the vibrations of the pathologic larynx? After considerable searching, I discovered that Northwestern University did have such a camera tucked away in the corner of an old coal cellar in the basement of a campus building. We also had a skilled voice pathologist, Professor Paul Moore, who was able to adapt this equipment to examinations of the human larynx. Our medical school was ready to support our work with the essential space, and some of my patients were willing to provide the necessary financial assistance.

We started our imaging with motion pictures of a normal larynx at ultra-high speeds of 2000 frames per second, which, on normal playback, translated into slow motion pictures. As it happened, our first major film, “The Function of the Normal Larynx,” won a first prize for the United States at the famous film festival in Venice, Italy, in 1957. Subsequent ultra-high speed motion pictures of “The Function of the Larynx under Daily Stress” and on “The Function of the Pathologic Larynx” won similar awards at international film exhibitions in Milan, Vancouver, Padua, San Francisco, and other international meetings. Even our more doubtful colleagues were impressed with these results and were willing to admit the scientific and clinical value of this new type of laryngeal examination. Over the next 25 years, our educational motion pictures on the larynx and voice were used for
teaching and research at some 120 universities and colleges in the United States and abroad. (I have just learned that in some locations, they still are used for that purpose.)

Unfortunately, our equipment and several hundred thousand feet of research film were stolen during a move from our research institute in Los Angeles to a new medical facility. It was, of course, clear to us that this expensive and time-consuming examination was ill-suited for clinical practice in the office of the laryngologist or voice pathologist. That is one of the main reasons why I am so pleased to support Dr. Kendall’s work with ultra-high-speed laryngeal imaging as is demonstrated in this book. Interested readers will note the necessary preparations and requirements for a successful study of the larynx in ultra-slow motion.

In an effort to prepare better clinical diagnostic equipment we worked with a German scientist, Dr. Rolf Timcke, who joined our Institute at Northwestern University. During his time with us, Dr. Timcke designed and fabricated the first practical electronic synchron-stroboscope for laryngeal imaging. On his return to Germany, Dr. Timcke established a factory that was designed for the production of stroboscopic imaging equipment, and which supplied stroboscopes for laryngeal examinations to most major European universities. We had an awful time with U.S. Customs officials, who were not familiar with this high-tech equipment and could not find any description of it in their manuals.

The American Academy of Oto-Rhino-Laryngology was equally suspicious, but for different reasons. During an annual meeting of our Academy in Chicago about 1960, we attempted to demonstrate our new electronic synchron-stroboscope to our colleagues. The Academy sent two distinguished professors (F.L. and P.H.) to our booth to evaluate this newfangled device. The two official examiners listened to our brief explanation, performed a short examination, and came to the conclusion that they did see some strange vibratory motions. They also reported back to their colleagues that this type of equipment would never be of help to the practicing laryngologist.

Some 40 years later, Part III of this book on laryngeal imaging confirms that video stroboscopy has “arrived.” Numerous chapters of this textbook elaborate the value of a stroboscopic examination for the clinician in practice. Dr. Kendall and her associates have described the manifold diagnostic and clinical applications of laryngeal stroboscopy that are recommended for current day practice. Pertinent chapters discuss the indications and techniques of this procedure. Specific disorders are reviewed and paired with the appropriate stroboscopic evaluations.

These observations are equally true for the development of flexible endoscopy, which has become a routine procedure for the imaging of the larynx by both the practicing laryngologist and the skilled voice pathologist. The chapters on flexible endoscopy cover the range of this valuable examination for normal and pathologic evaluations of the laryngeal interior, and discuss the special applications of flexible endoscopy for in-office procedures. Needless to say, this technique has proved of great importance for the intralaryngeal evaluations of patients with a disruptive gag reflex.

While Dr. Kendall and her fellow authors have presented an excellent review of past and present techniques for laryngeal imaging, what is to be said about the future of this critical diagnostic tool? Some years ago, my colleague Dr. Yasuo Koike and I envisioned the use of computer techniques to assist in the early detection of laryngeal disease. Frankly, I am surprised that, in our computer age, this potential has not been fully explored. I am hopeful that Dr. Kendall and her team will continue their scientific explorations into further imaging of the human larynx and provide new opportunities for physicians, voice pathologists, and patients in the care of the human voice.

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