

Editorial

History of Laryngology

The Specialty Otorhinolaryngology was born in the second half of the 19th Century. Until then, diseases of the ears, nose and throat had been treated separately, as if the three organs were independent one from the other. It was in the 19th Century that, for a series of reasons the idea spread that, from a physio-pathological point of view, close correlations existed between the nose, ears and throat and that many disorders of these three districts influenced one another, therefore, the physician's studies and professional practice should focus on all three organs together¹.

Laryngology began in the 19th century when mirror laryngoscopy enabled visualization of the larynx. Since that time, progress in laryngology has been marked by advances in the ability to examine the larynx and manipulate laryngeal tissues. The key watershed initiatives in the history of laryngology were the development of direct and indirect laryngoscopy. Improved laryngeal visualization led to enhanced understanding of laryngeal pathophysiology and new techniques of laryngeal surgery, both transoral and transcervical. Each new discovery in laryngoscopy and laryngeal surgery was followed by an expansion phase in which physicians of the era steadily advanced and applied the techniques first developed by their colleagues. More recent advances have ushered in a modern period of laryngology².

Credit for the discovery of mirror laryngoscopy is often given to **Manuel Garcia** (Figure 1), an opera teacher who was able to visualize his own vocal folds with the aid of two mirrors and reflected sunlight in September 1854. He

described his technique to the Royal Society of London in a paper titled "Observations on the Human Voice" in 1855. Although he was not the first to visualize the larynx, he was the first to utilize that imaging to provide valid concepts of human voice production. These descriptions were the first to ignite widespread interest in study of the larynx and earned Garcia recognition as "The Father of Laryngoscopy". Garcia lived to the age of 101 and remained much celebrated throughout his career. To celebrate his centennial birthday, and in honor of the fiftieth anniversary of his description of laryngoscopy, laryngologists worldwide commissioned a Jhon Singer Sargent portrait of Garcia³⁻⁵.



Fig.-1: Manuel Garcia (1805-1906)

LARYNGOLOGY

Early years

Larynx and pharynx surgeries and treatment reports date back from Egyptian, Hindu and Greek physicians. The oldest reference in laryngology is a drawing found in medical tombs in the planes of Saqqara, Egypt, from

approximately 3,600 years B.C. The image seems to portray a tracheostomy. In India, medical documents called Sushtrata, from 300 B.C. and Charaka, from the year 100 B.C. had chapters describing drugs and treatments for voice disorders, suggesting some anatomical knowledge of the throat and larynx as the origin of our voice^{1, 6-9}.

Aristotle was the first to mention the larynx in his book: *Historia Animalium*, Book I, chapter XII of the year 350 B.C. in which he described: the neck is the part between the face and the chest. Anteriorly is the larynx. Speech and breathing happens through it, which is protected by a structure known as the windmill. Erasistratos, in the year 290 B.C. described the function of laryngeal muscles and Galeno, in Rome, in the II century A.D. in his treaty *De usu partium corporis humini* already discussed laryngeal functions⁷.

One of the first written reports on larynx treatment and surgeries date back from Macedonia. Historians report a tracheostomy made by Alexander the Great himself, who saved the life of an agonizing soldier by sticking the tip of his spear in the region described by Aristotle as the windmill, probably the cricoid cartilage⁷.

XVI, XVII and XVIII centuries

Artists such as Leonardo da Vinci and Michelangelo performed some dissections in human cadavers and reported detailed descriptions of laryngeal function. The first laryngectomy, a precursor of modern tracheostomy, seems to have been performed by Musa Brasavola in Italy, in 1545. Giovanni Morgani in the paper *Adversaria Anatomica Prima* brought about detailed illustrations of the larynx. Ferrein, in 1741 was the first to publish the term vocal cords. He compared the structures to the cords of a violin, activated by the contact with an air column.

Bertin, in 1745, brought this new concept that the structures described by Ferrein were, in fact, folds, and not cords⁷.

XIX century

The barrier preventing laryngology to develop was the incapacity to directly examine the larynx. Clinical laryngology made it possible, by means of a number of favorable developments. Lighting methods and observation through mirrors, local anesthesia, aseptic surgery practices and an increase in our knowledge regarding cellular pathology made possible this new medical practice⁵⁻⁷.

In 1806, Bozzini developed an angled speculum with a mirror, used to examine the most varied human cavities¹⁰.

In 1837, physiologist Johannes Muller, in Berlin, expanded Ferrein's results, as he analyzed the movement of vocal cords in cadavers^{7,8}.

The English physician Benjamin Ebbington carried out a laryngoscopy with a device called glottiscope in 1829, however, the first successful use of the mirror to inspect the larynx was not made by a physician, but rather by a Spanish Music Professor - Manuel Garcia in 1854. With a small mirror, used by dentists and proper lighting, he could see the functioning of his own vocal cords with breathing and vocalization. He published numerous books about voice and developed his own laryngoscopic technique⁷.

Before using the small mirror, laryngoscopy attempts were made with a device called A verys laryngoscope, but unsuccessfully. Mackenzie, in 1865, wrote about these frustrated attempts on the use of Avery's laryngoscopy in the paper *The use of the laryngoscope in diseases of the throat*⁵.

After descriptions by Garcia, Carl **Ludwig Türck** developed laryngeal mirrors and used them not only to examine his own larynx, but

also to observe laryngeal pathologies in his patients using sunlight, only during spring and summer in Europe. Türck developed his studies with Ernst Brucke, who worked with **Johann Nepomuk Czermak**, from Budapest. Czermak was very interested in this technique and adapted artificial lighting for laryngeal studies during fall and winter, what made him publish numerous uses for the mirror with lighting in the exam of patients with laryngeal pathologies, but without mentioning in his work the collaboration from Türck^{11,12}.

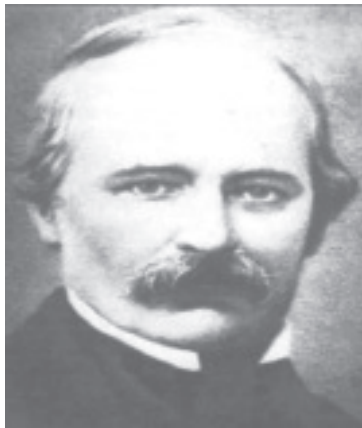


Fig.-2: *Ludwig Türck*



Fig.-3: *Johann Nepomuk*

In England, Sir Morrell Mackenzie was fascinated with the descriptions made by

Czermak. He redesigned the laryngeal mirror and baptized it laryngoscope. He also designed instruments for laryngeal biopsy, by using indirect laryngoscopy. Gustav Killian, in Berlin, also developed a device for laryngoscopy and a device for laryngoscope holding. Lynch modified this device and made it popular in the United States. Near the end of the century, Chevalier Jackson, in

Kirstein refined direct laryngoscopy and tracheoscopy by designing a variety of spatula and tubular laryngoscope speculae. **Gustav Killian** advanced these investigations by subsequently perfecting direct rigid bronchoscopy. Killian reported that he had initially questioned Kirstein's accounts of direct laryngoscopy, but after witnessing Kirstein perform the technique Killian declared, "From that time, my entire thought became bound up in the subject. Killian then developed several refinements of the laryngoscope, including an inverted-V spatula blade designed to improve exposure of the anterior commissure. Killian also developed suspension laryngoscopy^{13,14}.



Fig.-4: *Alfred Kirstein(1863-1922)*

Philadelphia, developed a distal lighting method for the endoscopy equipment. Jackson, with great enthusiasm, dexterity and communicative skills was one of the persons responsible for the expansion of endoscopic applications in the diagnosis and treatment of laryngeal lesions^{7,8}.

However, laryngologists, performed small surgical procedures, such as the removal of minimum lesions in the larynx and pharynx using curved mirrors and forceps^{7,8}.

Local anesthesia with cocaine in laryngeal surgeries started to be used by ophthalmologist Karl Koller and laryngologist Edmund Jelinek, in Vienna, who removed a laryngeal polyp from a patient and improved the pain of another patient with tuberculosis in his larynx^{7,8}.

In 1862, the German Von Bruns reported the successful removal of laryngeal polyps; however, one of the major problems for performing small laryngeal surgeries was access and the surgical drape, a problem that was solved by different methods along time. In 1879, Reichert described an epiglottis retractor⁷.

Other larger lesions in these regions needed to be treated by surgeons, and Sir. Felix Semon was the first laryngologist-surgeon of London. At this time, he already did laryngeal-fissure surgeries with his student Sir St. Clair Thomson, for laryngeal cancer in initial stages. Thomson was the first to correlate these lesions with smoking and followed patients, recording two intraoperative deaths and a survival rate of 76% in 3 years, in a series of 74 patients in 19065.

The first total laryngectomy was carried out in 1873, in Vienna, by surgeon Theodor Billroth. The 35-year-old patient survived the procedure and lived for seven more months. The major complication described by Billroth in this patient was aspiration and difficulties swallowing. Gluck, Billroth's student, solved this problem by doing a surgical technique in

which he separated the larynx from the trachea, opening the neck's skin and suturing the trachea's orifice directly on this opening. Gluck also had knowledge on the removal of lymph node cells with metastatic involvement during the surgery to remove the primary tumor. By doing so, he obtained the best results^{7,8}.

Carl Gussenbauer developed a vocal prosthesis in 1874 to be used by patients submitted to Billroth's laryngectomy. In 1900, Nicholas Taptas, a Turkish doctor, rehabilitated a laryngectomized patient using a connection between the trachea and a pharyngeal fistula created, making the patient speak as she occluded the tracheal hole in her neck⁷.

One of the most curious facts in the history of laryngectomies was the sickness of Prince Frederich, from Germany. In January of 1887, the Prince started to have dysphonia, initially attributed to a cold. Inhalations and gargling were not efficient, and his physician, Wegner, called Gerhardt, the famous laryngologist from Berlin^{9,15,16}.

As he saw a hyperemic node in the left vocal fold, during laryngoscopy, Gerhardt tried to remove it with a metal loop, but he was unsuccessful. Another frustrated attempt happened with the scalpel. He finally managed to cauterize it with the electrical cautery; however, the wound increased in size, even after weekly cauterizations. The vocal cords were mobile, which at the time ruled out the possibility of malignancy. The prince was advised to spend 15 days resting in the mountains, however his dysphonia worsen. In May, Gerhardt decided to call a surgeon, Von Bergmann, to cut it out. When Queen Victoria from England, received a letter from her daughter, princess Viki, Frederich's wife, about his disease, she consulted with her private physician, James Reid, who immediately indicated the most renowned otorhinolaryngologist of England, Morrell Mackenzie, for the procedure. Mackenzie

went to Germany right away. He was the most famous otolaryngologist from London, however, his throat hospital, still in Goldn Square today, was not well regarded by the Royal College of Surgeons of England^{15,16}.

Amidst all this commotion, dozens of physicians present, Mackenzie operated the prince, under anesthesia by chlorophorm, on May 21 of 1887, removing part of the tumor through laryngoscopy. The surgical specimen was sent to Virchow, who examined it and declared it was not a tumor^{7-9,15,16}.

Then, they called a round table to discuss the case, with Mackenzie, Von Schrötter from Vienna, Krause from Berlin and Moritz Schmidt from Frankfurt. They came up with two solutions: total laryngectomy, which at the time was almost murder, or a palliative tracheostomy, to improve his breathing. The Prince chose the second alternative^{7-9,15,16}.

Bramann, specialist in tracheotomies in children with diphtheria, performed tracheostomy in January of 1888. On March 09, 1888, Frederick's father, Emperor William I, died and, the aphonic new Emperor Frederick III took the train to Berlin to take over the imperial throne^{15,16}.

His clinical condition worsened; and Mackenzie exchanged the tracheostomy cannula frequently and with increasing difficulty, until one day, during a cough spell,

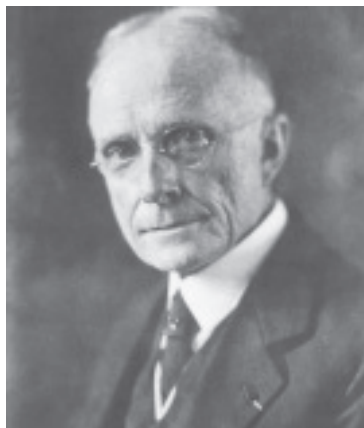


Fig.-5: Chevalier Jackson (1865-1958)

the Emperor coughed his own trachea by the orifice, and died 93 days after having taken the throne^{16,17}.

XX Century

Greenfield Sluder, in the United States, popularized the use of the guillotine to perform tonsillectomies; Brunings, in Germany and Jackson, in the United States, started to use the monocular microscopes to perform larynx surgeries during the 1950's. With the invention and widespread use of binocular microscopes, new surgical techniques for laryngeal procedures were introduced with the use of Yankauer's laryngoscopes, which used binocular magnifications and which were redesigned by Jako in 19705.

Nuclear technology also brought about progress in the medical field, especially with radiotherapy for the treatment of malignant lesions in the larynx. Problems such as mucositis, skin burns, dosage and scope of action were being solved by piecemeal⁷.

Optic fibers endoscopes were developed in 1954, by Hopkins, and brought about a new era in endoscopy with flexible fibroscopes, used to examine the larynx, nasopharynx, nose and pharynx^{7,8}.

Currently, larynx examination has been greatly developed thanks to the pioneer work of physicians such as Karl Storz and Hopkins, together with new techniques being developed for treatment and surgery^{7,8}.

In the last 30 years, laryngology has gradually evolved with the collaboration of head and neck surgeons, radiotherapists, oncologists and other specialists⁸.

Thyroplasties, oral cavity reconstructions, flaps and microvascular anastomosis are carried out with the support of new technology.

The concept of phonosurgery, as a procedure to improve or reestablish voice, introduced by Von Leden was restricted to laryngeal

microsurgery to remove lesions on the top of the vocal folds, which projected to the glottal space. Minimum structural alterations were not part of the diagnostic routine. Currently, with more sophisticated microsurgery material and with better physiopathological material, endolaryngeal microsurgery has become more efficient. Surgeries of the laryngeal framework, thyroplasties, published by Isshiki since 1976, were popularized at the end of the 80's, thanks to courses given at the North American Academy⁸.

The growing sophistication and evolution of endoscopes, with modern optic fibers, combined with more sensitive stroboscopes, have led to a greater understanding of how the vocal cords work and a new era in laryngology: voice quality analysis. Working closely with singers and people who use their voices professionally, these tools help diagnose early on small lesions and perform microsurgeries of the larynx, phonosurgeries, which allow the removal of these lesions in just a few minutes.

In 1998, the first larynx transplant was carried out in Cleveland; however, there were numerous problems, especially related with organ rejection by the patients immune system⁸.

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