Hundred Years of Laryngology

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Indirect laryngoscopy was done successfully for the first time in 1885. But even at the end of the twentieth century many of us do not know how the foundations of Laryngology were laid during the years after the introduction of mirror laryngoscopy. Initially the patterns of laryngeal diseases and prevalence were different. Infectious diseases were frequent and life threatening. For any research work leading to alleviation of diphtheria, the then commonest cause of croup, Napoleon offered a large prize. Amongst the chronic infection, Tuberculosis and Typhus were the commonest affections of larynx. Because the life span was then shorter in comparison to modern days, malignant diseases were of less importance.

It is now difficult to perceive how impossible it was then for a clinician to see the interior of the larynx. During the earlier part of the Nineteenth Century, no internal organs could be examined. There was then no ancillary aids to diagnosis, no X'ray, no microscope, no blood test, no knowledge about infecting organisms, no knowledge of anatomy or physiology.

And yet from this poor beginning, we achieved all the bests of our today's achievements.

The modern study of the larynx began with the Renaissance anatomist. The anatomy of voice and hearing by Julie Casserious published in 1600 is remarkably accurate in its descriptions and drawings. Andersch in 1791 and Swan in 1830 described the epithelial lining of the larynx.

In 1890, the motor innervation of the larynx was

described and the mechanism of action of the vocal cords in phonation was understood.

In the early Nineteenth Century, the functions of the laryngeal muscles were established and the action of the crico arytenoid joint was illustrated. The theories about the passive vibration of vocal cord was introduced in 1806 by Dutrochet.

At the same time i.e., early 19th Century, attempts were made to discover endoscope for examination of the interior of bladder, vagina and throat and the attempts of Bozzini was successful.

Fig.1

Bozzini's Laryngeal Speculum (after Hufeland)

He used a candle as a light source, shielded in a massive tower and developed specula of different shapes and sizes for different orifices.

The first text book on the diagnosis and treatment of larynx by Ryland was published in 1837. In it, the clinical descriptions of the diseases were superb but the therapeutic modalities recommended were primitive.

Leeches applied to the throat for chronic laryngitis, and nitric acid painting by means of a laryngeal brush of the fauces coupled with mercury ingestion

for diphtheria. Bronchial foreign bodies were either coughed out or removed by a tracheotomy blindly by a forcep with anaesthesia.

Attempts to examine the larynx had been in practice long before Garcia described his mirror examination of the vocal cords. It is said that quacks working in the fair grounds of Europe, attempted to examine the interior orifices including larynx during the 18th Century. Bozzini's attempts have been noted and already in 1825 Dela Tour attempted to see his own larynx in an identical way to that used by Garcia 30 years later.

Bennati of Paris, physician to Halian Theatre, wished to view the larynx and published his findings in 1832, in a book 'Recherches sur le Mecanismes de la Voix Humaine'.

The effort of Avery in 1840, inventors of Perforated Head Mirror, a source of light (candle) and a Laryngeal Mirror, all mounted on a head holder, for examination of cavum larynx, also deserves a mention. It was cumbersome, heavy and awkward to use.

The first separate unit on laryngology was established in Vienna by Schrotter in 1854. He states 'A Spanish vocal music teacher, Manuel Garcia had inspected his own larynx for vocal physiological purposes'. The story of his discovery is well known. He hit on the idea when he saw sun light reflected from a window glass. He purchased a dental mirror, and using it and a hand mirror to shine light on it and to view the dental mirror saw his own larynx.

In 1855, Garcia published his 'Observation on Human Voice' in the proceedings of the Royal Society of London.

Unaware of Garcia's invention, Turck, a Neurologist, began to use a laryngoscope with a little mirror, which was of his own construction, in Vienna General Hospital during the summer of 1887 using the sun light as source of light. In the following spring, Czermak, Prague born

Physiologist, published in the 'Vienna Weekly' his observations on his own larynx which he made with the aid of artificial light and the mirror he borrowed from Turck. He asserted his claim to priority in the meeting of the Society of Physician on April 9, 1858. On April 14, Czermak definitely acknowledged Turck's claim but he withdrew the said acknowledgement in his subsequent publication. Thus began the priority dispute between Dr. Turck and Czermak nicknamed 'The Turckish War'. Publication and counter publication followed. In early 1859, Turck and Czermak both published several case reports about laryngeal diseases.

In 1874, the first clinic of laryngoscope was established in the Vienna General Hospital with Schrotter as the Head. It had only two wards, each with eight beds and a small sized O.P.D. Schrotter was the first person in the world to remove a polyp from the vocal cord even before the discovery of local anaesthesia. The worst difficulty was the want of any such source of light which might illuminate the larynx. To overcome this, the discovery of Schrotter light concentrator

Fig.2

Indirect Laryngoscopy in progress

was unique. It was glass bowl filled with water, as was then used by the shoe makers.

Later kerosene lamps and gas lights were introduced. Incandescent lighting did not arrive for more than 20 years. Direct laryngoscope was not invented for another 40 years. There was no local anaesthetic agents available as such. Turck for the first time tried to anaesthetize the larynx by using a mixture of morphin, chloroform and alcohol. But Alas! his patients became intoxicated. In the initial period of introduction of any surgery upon larynx, patients had to be trained for a few weeks to control gagging that might be produced following application of any instrument.

In 1884, Koller discovered the use of cocain to anaesthetize the eye in Vienna. Afterward in the same year, Jelinek recommended its use in pharynx and larynx. The first book about pathology of the larynx was published in 1829 by Albers.

A book entitled 'Mechanism of Human Speech together with a Description of a Speaking Mechanism' was published by Rempelen in 1791.

The problems of the professional voice users, as found amongst the itinerant preachers who rode from village to village and were obliged to sermonize at great length, was then known as 'Dysphonia Clericorum'. It was described in a book by Mackness in 1848.

Amongsts the early laryngologists, Morell Mackenzie was the most famous person. His 'The Hygiene of the Vocal Cord' was one of the most successful publications. He learnt his preliminaries on laryngology from Czermak who also taught him about the use of the laryngeal mirror. He returned to London to establish his practice as a laryngologist. He, instead of teaching local practitioners, trained many foreign specialists from America. He published many books on laryngology like 'Growth of the Larynx', 'Use of Laryngoscope', 'Diseases of Throat and Nose' in two volumes.

He was the Founder Editor of the 'Journal of Laryngology and Otology' which is still in existence, he invented many instruments and techniques of operations through indirect route.

The patients held their own tongue, Mackenzie held a mirror in one hand and the forceps in the other.

In U.S.A., the first person to practise laryngology was Dr. Horace Green of New York.

Dr. Horace believed, for the cure of laryngeal diseases, the medicines should be applied directly into the larynx and for this he invented many brushes (Fig.2) and sponges attached to probangs

Fig.3
Laryngeal Brushes

(Flexible piece of whale bone). As it appears in the history of medicine, the indirect laryngoscopy (Fig.3) was practised in U.S.A. well before 1860 and in surgery Gurdon Buck of New York was the pioneer who was the first person to undertake laryngo fissure for cancer larynx in 1851.

It is now difficult to imagine what enthusiasm and excitement was then generated by the introduction of laryngeal mirror. By this, for the first time, an internal organ of the human body was visualized. It showed the rays of hope for the diagnosis of other diseases in other hidden organs. Following the introduction of laryngeal mirror, within 10 years, many books were written. Many specialized clinic sprang up in many parts of the world.

Fig.4

The guarded laryngeal lancet and various knives

The American Laryngology Society was founded in 1878. Likewise National Societies dealing with laryngology were established in U.S.A., Germany, Spain, Italy, U.K., Australia, Hungary, Belgium, and Japan—all before 1900. The first International Congress of Laryngology took place in Milan in 1880.

Scientific advances on the study of larynx followed quickly. The functional innervation of the larynx was studied and the effect of dividing various nerves to the organ was quantified leading Semmon to his law. The germ theory of the diseases like tuberculosis, diphtheria, typhus, etc. made a great impact on clinical practice. The cellular theory was also established in the same time to make clinician understand the difference between inflammatory, infective, degenerative and neoplastic diseases. These helped to evolve rational methods of therapy. The distinction between the larynx and pharynx as separate organs by Isambert was a land mark in the rational evolution of surgical treatment of larynx. *Pari passu* new instruments were evolved. Oertel's mechanical stroboscope (1876) for observation of the vibration of vocal cord was one of its kind. Electronic stroboscopes were introduced in 1960 but the light it produced was insufficient to allow photography. The development of spot stroboscope, sources, first introduced for the Apollo Moon Mission and the

introduction of video cameras, helped laryngeal stroboscopy to come into its own as an invaluable tool.

The first photograph of the larynx was taken by Czermak and exhibited in Academy of Sciences of Vienna in 1861. High quality colour photography came up with the introduction of Brubecker-Holinger camera after the second world war. With the advent of telescopes and halogen light, photography of the larynx is now easy and elaborate. With the formation of voice foundation in Philadelphia and devotion of medical and non-medical scientists, voice impaired patient have found their importance and remedy. Development of neurolaryngology, a new medical discipline devoted to vocal problems and evolution of many new instruments and operations called Phono Surgery ultimately benefitted those patients in a way which was at one time unimaginable. It took 40 years after the introduction of indirect laryngoscope for Kirstein to develop a direct laryngoscope in 1895. The reason for this delay is simple. Lack of light source. And in a span of short interval bronchoscopes, gastroscopes, cystoscopes were introduced.

First micro laryngoscopy was done after the invention of mono-ocular microscope by Burnings of Germany. Killian, a tireless innovator of endoscopy, in 1911, invented suspension laryngoscope which is still in use.

In North America, direct laryngoscope was introduced by Chevalier Jackson. Philadelphia became the prime city for learning endoscopy of the respiratory tract. He is now considered as the pioneer in the treatment of laryngeal carcinoma.

Carcinoma of the larynx was first described by Boerhave in 1769. Morgagni described its pathology in 1732. The first credit of removal of carcinomatous mass goes to Gurdon Buck of New York in 1851: The patient a 50 years old lady, hoarse for a year, was 'seated before a window in a low arm chair, – no anaesthetic was

used – her fortitude allowed a 4" incision in her short fat neck. An epithelial growth was partly removed and tracheostomy was done. Next day the wound was reopened, further growth was removed and the larynx was cauterised with the nitrate of mercury. The procedure was repeated a month later, but the patient died of local disease in the 15th month.

In 1865, Sands, under ether anaesthesia, removed a sessile growth through an incision dividing the thyroid cartilage and upper three tracheal rings.

In 1867, Solis Cohen did thyrotomy for removal of carcinoma larynx.

Lengenbeck, the father of German Surgery, and his student Billroth, devised the procedure of laryngectomy after observing the failure of thyrotomy.

Gussenbcener in 1873 devised an artificial larynx with which the first patient of laryngectomy done by Billroth was able to be heard from one end of the ward to the other.

To Solis Cohen also goes the credit of having the first patient in whom oesophageal speech was documented in 1894.

Surgical therapy was disastrous until the pharynx and trachea were totally separated. The technique of this separation was first described by Gluck.

In 1876, Isambert first suggested the classification of carcinoma larynx into extrinsic and intrinsic. Surgery thereafter became more effective and meaningful. Earlier, operation was done for wrong diseases like ca-base of the tongue, oesophagus or pharynx and brought disreputation for the surgery.

In 1878, Billroth introduced the vertical hemilaryngectomy. The object of partial laryngectomy was to cure cancer and preserve voice. The evolution of the partial laryngectomy for carcinoma showed the road to the successful treatment of the disease.

External irradiation for the treatment of carcinoma larynx was introduced about 50 years back. But

it was disastrous initially due to severe skin reaction. It became safe and effective after the invention of cobalt.

Laryngology has benefitted further after the development of flexible light in 1950 which is now an invaluable tool for examination and operation.

During the past 20 years laser also has come into use for laryngology. Laser was invented in 1958. CO₂ laser came into surgical practice in 1970 and rev Jako and Strong has revolutionized the endoscopic surgery of the larynx using the CO₂ laser.

Operative laryngology was further developed following publication of Kleinsarser's book in 1968. The use of stereoscopic microscope and invention of various microsurgical instrument made phono surgery find its place into reality. However, rehabilitation of severely hoarse and voiceless persons is still posing a problem, specially after laryngectomy. But with current research it appears to be resolvable. Much work is being already done to make the papilloma virus understandable and manageable. Basic research on oncology is likely to bring relief to those with malignancies. Neuro science is now on the increase to reinnervate the paralysis larynx. Social awareness about environmental pollution and vocal abuse is also on the increase to stop suffering from chronic laryngitis.

It is interesting to note the otology, rhinology and laryngology all had their separate beginning.

Otologists have kept their promise by finding the means of conquering deafness. Cochlear implant has now made major progress.

In Rhinology, Anosmia still remains a challenge. But development of Rhino plastic procedure has worked well to improve the appearance of an ugly nose.

Laryngology has already made a fascinating progress. Hoarseness from various reasons has

been largely conquered by phono surgery. Laryngeal reinnervation surgery is taking its first step to this field and if established, we may hope an aphonic to phonate understandably well.

References

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Fig.5
Laryngoscopic chair, especially adapted for hospital purposes—As used the 18th Century