

HISTORY CORNER

Bouchut, O'Dwyer and laryngeal intubation in patients with croup

Bouchut, O'Dwyer e l'intubazione laringea nel croup

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The recent flare-up of a few epidemic outbreaks of diphtheria, which occurred in countries of the ex Soviet Union and in Poland, confirmed the persistence of a disease which we believed had been wiped out forever thanks to vaccination with anatoxin, first prepared by Ramòn in 1923. Europe, in past centuries, had, as is well known, been periodically afflicted by epidemics of this kind, decimating, in particular, infants, often affected by the most severe localisation of the disease, that of the larynx, the most dreaded "croup".

If nothing could be done to combat the neurotoxic and myocardiotoxic damage induced by the bacterial exotoxin (discovered in 1888 by Emil Roux and Alexander Yersin), the only alternative, in order to save the patient from death, due to suffocation, was tracheotomy. However, this operation, in the 1800's, still presented a very high risk of death, both intra- and post-operative (more than 70% in patients with diphtheria), particularly in children, on account of the dimensions and mobility of a child's trachea.

This situation still continued in the mid 1800's despite the improvements made in tracheotomy by Armand Trousseau (1801-1867), and it, therefore, became mandatory to find other means which, in a less invasive fashion, would offer the possibility to maintain sufficient ventilation in the patient. This was achieved with the introduction of laryngeal intubation. Prior to the actual realization of this technique, various attempts were made to introduce catheterization of the larynx, not only by Dieffenbach in Berlin in 1839, but also by Reybard in Lyon in 1855 and by Weinlechner in Vienna, in 1866. Despite the fact that results were very disappointing they, nonetheless, led to the onset of a completely new field of research. A solution to the problem was found thanks to two brilliant paediatricians: Bouchut in France and O'Dwyer in America. Bouchut was actually the inventor of the new method but, for the reasons outlined below, he did not complete his work. O'Dwyer, on the other hand, succeeded in designing the instruments and a technique, both efficacious and practical, which, within a very short time, used worldwide, received praise from the scientific community.

It is for this reason that, still today, O'Dwyer is remembered by most as the true "father of laryngeal intubation in croup", whilst very few know of Bouchut's merits in this particular area. Perhaps, it would be more correct to remember the two together, as for Turck in the past, who was the first to use the small laryngeal mirror, in clinical practice, and Czermak who made it popular and led to its use becoming widespread. However, it is now usual and generally accepted, in the History of Science, to respect more he who

perfected a discovery and succeeded in leading to its being used, rather than he who actually had the first idea. Antisepsis with phenic acid, for example, will always be related to the name of Lord Lister, who promoted it and was responsible for its widespread use, while very few will remember that Lemaire in France and our own Bottini in Italy were the first carry out the experimental studies.

The history of laryngeal intubation in croup began in 1858, when Eugène Bouchut (1818-1891), the Parisien Paediatrician, experimented with an original method able to bypass a laryngeal obstruction resulting from a diphtheria-related pseudomembrane, without having to use tracheotomy. The method, as already pointed out, was based upon the attempts to perform laryngeal catheterisation carried out by Dieffenbach, Reybard and Weinlechner and consisted in introducing, by means of a suitably curved catheter, and leaving a small straight metal tube, indwelling, within the glottic space for a few days, securing it on the outside by means of a silk thread.

Unfortunately, the shape of Bouchut's small tubes did not adapt to the anatomy of the larynx and their sharp edges were a very traumatic cause of lesions to the mucosa and of intense pain.

On 18th September 1858, at the Academy of Science in Paris, Bouchut presented his personal method together with the results obtained in the first 7 cases.

The Members of the Academy were clearly and firmly against the proposal, not only on account of the negative technical aspects (traumatic method and difficult to perform), but, above all, because they had been induced to this reasoning by the highly critical and negative remarks of Armand Trousseau (1801-1867), convinced supporter of tracheotomy, for which he had been responsible, in those very years, for having perfected the technique (Fig. 1). The authority and charisma of Trousseau were at their highest, at that time and such, that it was not difficult to condition the opinion of his colleagues. Only one voice was raised to defend Bouchut's proposal, that of Jean François Malgaigne (1806-1865), the famous surgeon also well known for his studies on the History of Medicine. He showed great interest in this new technique for which he had foreseen the practical possibility of its future use and clearly stated that if perfected and made, not only easier to perform, but also better tolerated, would certainly have enjoyed the success previously observed with the endoscopic manoeuvres in urology. These were his prophetic closing words: "Who knows, one day intubation for croup could become what



Fig. 1. Armand Trousseau was considered the “father of tracheotomy” as he drew up the final description of the technique. He was highly critical as far as concerns intubation, proposed by Bouchut, since he considered it to be not only a useless, but also a harmful, practice.

lithotripsy has become for bladder stones”.

Unfortunately, poor Bouchut, humiliated and disillusioned by the refusal of the Academics and the criticism of his colleagues, completely abandoned his research in this field, dedicating his time to other areas (in the 1860's, he was the first to make a precise description of neurasthenia, in 1879, he published an important treatise, in two volumes, on the History of Medicine and, in 1886, illustrated, for the first time and in an exhaustive manner, the miliaric granulations of TB). That was a great pity since just a few modifications would have been sufficient to make the “tubage de la glotte” not only an effective and innocuous method but also easy to perform. Instead, some 30 years were to elapse before, thanks to O'Dwyer, a solution was found to the problem.

Joseph P. O'Dwyer (1841-1898) was born in Cleveland, Ohio, his family was of Irish origin, and he later moved to New York. He dedicated his entire life to his profession, as a Surgeon and Paediatrician, partly at the Foundling Hospital and partly in private practice (Fig. 2).

On June 2nd, 1885, he presented a laryngeal intubation method, which he had experimented with success in small children with diphtheria, to the New York Paediatricians, not aware, as he said, of the previous experience of Bouchut.

Contrary to what had happened years earlier in Paris, the American Paediatricians and Surgeons immediately showed O'Dwyer their enthusiastic approval as far as concerned a method which appeared to easily guarantee the possibility, in a negligibly invasive manner, to restore ventilation in patients with croup. The modifications made by O'Dwyer were, in fact, determinant: the set was made up of a series of small tubes, made of hard rubber or metal, with rounded edges and, therefore, very well tolerated. In the extreme upper part, small holes had been introduced in order to anchor it and it was introduced into the glottic space with the aid of an angulated instrument, on the handle of which there was



Fig. 2. The American, Joseph O'Dwyer, holds the merit of having designed the instrumentation which resulted in intubation becoming not only easy to perform but also well tolerated.

a lever, which, under slight pressure, immediately released the insertion in place. The patient was maintained in a sitting position in front of the Surgeon who, after having selected the right sized tube, hooked his index finger of the left hand around the epiglottis and slid, along this finger which acted as a guide, the instrument holding the tube, then placed in position, without seeing, the small prosthesis (Figs. 3, 4, 5).



Fig. 3. The position of physician and patient when performing intubation according to Marfan (from Laurens).

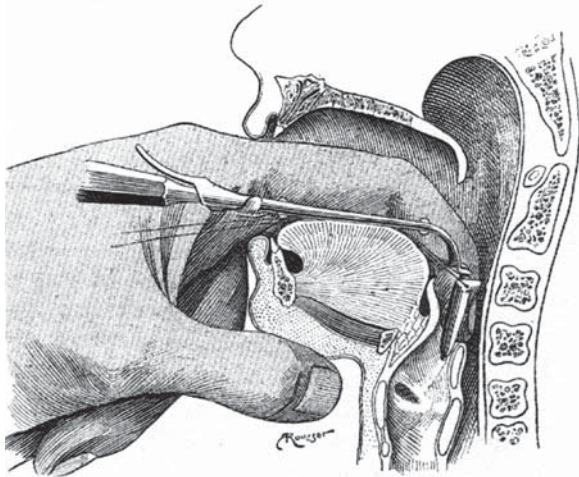


Fig. 4. The index finger of the left hand, not only holds the epiglottis, but also guides the instrument holding the tubes which slides along it (from Laurens).

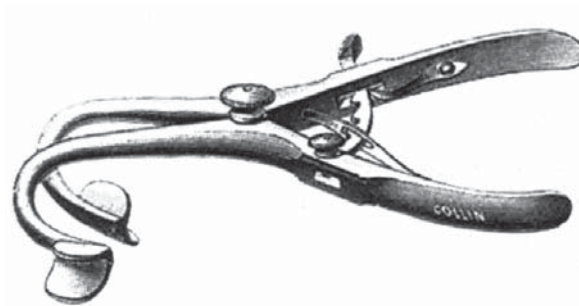


Fig. 5. The instrument designed by O'Dwyer, introduced between the molars of the patient, was indispensable for performing the intubation manoeuvres.

In adults and slightly older children, in whom the larynx is in a lower position, this manoeuvre was made under visual control, using the small laryngeal mirror. A simple manoeuvre, efficacious and, above all, well tolerated, according to the results reported by O'Dwyer, results which rapidly convinced the American doctors. Determining this general consent was also the positive enthusiasm expressed in the judgement of Abraham Jacobi (1830-1919), the acclaimed *Maestro* of Paediatrics in the United States, he who succeeded in creating, in New York, the first Clinic to be reserved exclusively for the hospitalisation and treatment of children.

By a strange coincidence, the success and widespread use of laryngeal intubation were significantly influenced by the opinion of two figures of great authority: Trousseau, who in France, in 1858, had disapproved without appeal and Jacobi, who, in America in 1885, was the most convinced supporter.

Within a very short time, O'Dwyer's method was accepted worldwide (Egidi introduced it in Italy and Bonain in France) and gradually took the place of tracheotomy in most cases of croup, thus leading to a significant reduction in the death rate.

Many European Surgeons and Laryngologists used O'Dwyer's original set of instruments, whilst others, such as Avignaret, Collin, Citelli, Egidi, Ferroud, Marfan, Perez, Valagussa and Weil, introduced personal modifications, moreover of little importance (Figs. 6, 7).



Fig. 6. Various small changes were made to the original instruments of O'Dwyer, by others, in order to improve their efficiency. This figure shows (from left to right and from top to bottom): Collin's extractor, Ferroud's, Aviragnet's and Collin's intubators.

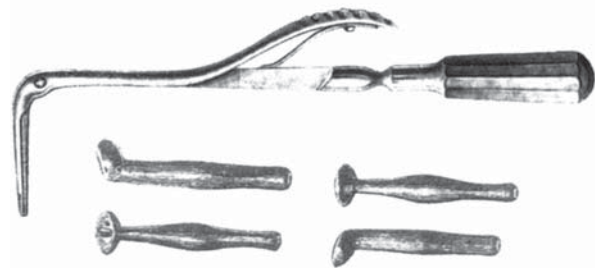


Fig. 7. The pincers and tubes designed by Egidi were those most used in Italy, between the end of the 19th Century and the beginning of the 20th.

At the X International Congress of Medicine held in Berlin, in 1890, the Combined Sessions on Laryngology and Paediatrics were entirely dedicated to problems concerning laryngeal intubation: this was the official consecration of this technique.

During the Congress, Bouchut and O'Dwyer actually met, a meeting characterised by "fair play". The American, who had become, only shortly earlier, aware of the Frenchman's experience, showed no difficulty in affirming that he should be recognized for the invention and for the outstanding value of his research into this new approach. Bouchut, on the other hand, declared that he was convinced that it was only thanks to the technical improvements made by O'Dwyer that had led to the practical use of the method and its worldwide use. Albeit, in Bouchut's soul, there still remained the deep bitterness when he recalled the criticism received many years earlier, as clearly emerges when he declares "One would be tempted to surmise that envy and jealousy do not exist in America".

This criticism had no doubt been the cause of his having decided not to continue with studies on intubation, that, when so close to success, was to have a devastating effect.

Bouchut died the following year and his research studies on "tubage" were, thereafter, taken little into consideration and, indeed, his name all too soon forgotten. All the fame and prestige went to O'Dwyer, and his tragic death, in 1898, due to diphtheria-associated myocardopathy further added to his notoriety; he had, in fact, on account of cruel destiny, been infected by one of his small patients whom he was treating with intubation.

It was thus that two great personalities, responsible for having left such a very important chapter in the history of Laryngology, that of a method which they had invented, outlived them by little more than 30 years.

The advent of serotherapy commenced, in 1890, by von Behring and Kitasato, progressively led to a clear decrease in the death rate and morbidity from diphtheria and gradually to less need for surgical intervention (Fig. 8). The disease was almost completely eliminated, in the 1930's and 40's, thanks to the systematic use of vaccination. At that point, laryngeal intubation remained only a memory.

Fig. 8. Emil von Behring (1854-1917), after having, for a long time, carried out experiments together with S. Kitasato on animals, tried the anti-diphtheria serum, for the first time, on Christmas Eve 1890, on a child hospitalised in the Surgery Unit of von Langenbeck in Berlin. The child lived and from then on serotherapy became an irreplaceable aid that, in the following years, resulted in a progressive decrease in the use of intubation and tracheotomy in cases of croup, also known as laryngo-tracheobronchitis.



Selected Reading

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