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IN YOUNG CHILDREN, AND
ITS TREATMENT.

Clinical Lecture delivered at the Dartmouth Medical College.

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[REPRINTED FROM INTERNATIONAL CLINICS, OCTOBER, 1891.]





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GENTLEMEN,—We come to-day to the consideration of a disease occasionally met in infancy and early childhood that mechanically obstructs the breathing, and unless recognized and treated in time destroys life by suffocation.

This affection has its seat on the vocal cords and walls of the larynx, and is characterized by soft, whitish, multiple, and often rapidly-growing, warty growths called papillomata. It may sound like an extraordinary statement, but I believe I am correct in making it, that prior to the year 1850 all the children who were the subjects of this complaint died from asphyxiation, without having had any rational treatment and without even the nature of their trouble being suspected. Happily, the number was not large, as the disease is a very rare one.

After what we learned the other day about the laryngoscope and its uses, you will naturally ask yourselves why, if these patients had symptoms referable to the larynx, some one did not look into that organ and find out if anything was wrong there. But it should be remembered that the laryngoscope was not invented until 1858. It was in the ante-laryngoscopic days, therefore, that these children fell victims to an undiscovered and unsuspected disease. And this leads me to say that one of the happiest triumphs of laryngoscopy is that it enables us to discover foreign growths in the air-passages which, if not discovered and treated, may eventually cause death. It is odd, indeed,

nowadays to read of cases like the following: Pelletan, a surgeon who lived in the early part of this century, lost a patient of from thirty to forty years of age by suffocation. The autopsy showed that the larynx was blocked by a solid tumor. Pelletan remarks that "the cause of the accident could neither be known nor attacked; dissection alone could reveal it." In these days the laryngoscopic mirror would make everything clear to us. But in infants and young children who are rebellious, we find obstacles that render a laryngoscopic examination impossible, because the co-operation of the patient is necessary to make such an examination thoroughly satisfactory. How, then, are we to manage with very young or unruly children? I shall speak of this fully when I come to the treatment of the affection. I will merely say here that, after giving you the clinical picture of multiple papilloma of the larynx, the two points I wish to impress upon your minds are: first, the practicability of examining young children with the laryngoscope when they are anæsthetized, and, second, the feasibility of operating upon them under ether in the manner employed in the adult without ether. I shall now call your attention to the histories of four typical cases of this affection that have come under my observation.

CASE I.—G. E. C. D., a boy, aged five years, was first brought by his mother to the Throat Department of the Massachusetts General Hospital, on October 22, 1888. He had been "croupy" since he was two years old. When he was three years of age he began to grow hoarse. The hoarseness steadily increased, until for the space of a year he had been unable to speak above a low whisper. There was no pain, but considerable dyspnoea on exertion, and at night his breathing was heavy and labored. His mother thought he breathed better at the time of consultation than he did four months previously. Nine months before his visit he had bronchitis which lasted two months.

This child being very docile, and having a spacious pharynx for his age, a laryngoscopic examination was effected with ease, and revealed whitish, papillomatous masses lining the walls of the larynx. The larynx was not so completely filled by the growths as to prevent easy breathing during the day, unless the child made some exertion. He was not seen again until November 30. Meantime he had had an attack of jaundice, and after that there had been more difficulty in breathing. The respiration was now noisy by day, and still worse by night. For the past week he had awoke every night oppressed for breath and was unable to breathe for a few seconds.

The laryngoscope showed that the growths had increased during the interval. They were attached to both walls of the larynx and reached to the level of the ary-epiglottic folds. It was, of course, impossible to determine how deep was their attachment downward.

Although the child submitted readily to laryngoscopic examination, he rebelled against every attempt at any operative measure through the mouth.

Tracheotomy was advised, and he was admitted to the hospital in the service of Dr. J. C. Warren.

During the night of December 2 the child had two coughing spells, breathed hard, and became cyanosed, but was relieved by hot applications to the neck. The next day, December 3, the dyspnoea became much more urgent, the sternum being sucked in with each inspiration, with recession of the soft parts above the clavicles. Tracheotomy under ether was performed by Dr. Warren, just below the cricoid cartilage. Four days later the stitches were removed. There was very little trouble, with the exception of a slight muco-purulent discharge through the tube. The child was now breathing freely through the tracheotomy-tube. This measure, it must be understood, was merely temporary and palliative, and the question now arose as to the proper means by which the obstructing growths in the larynx could be removed. The usual procedure in similar cases would be to perform thyrotomy and then cut or scrape away the growths from the interior of the larynx, an operation not very dangerous in itself, but apt to lead to serious complications, such as stricture of the larynx and permanent impairment of the voice.

I explained to Dr. Warren a method I wished to try for the first time, as a substitute for thyrotomy, and by his courtesy the child was placed in my care. I waited for a day when the sun should shine brightly, which occurred on December 12, and then, in one sitting that lasted about an hour, the large papillomatous mass that you see here in this vial was removed through the mouth by the following methods: The child was thoroughly etherized, and was then seated upright in the lap of a nurse. The mouth was held open by a gag. The tongue was pulled gently forward and held by an assistant. The sunlight was then reflected into the pharynx, and with a small-sized laryngoscopic mirror I was enabled to obtain a perfect view of the interior of the larynx, all secretion having been previously wiped away. Then by means of the mirror, seeing perfectly what I was about, I proceeded to remove the growths in the manner customarily adopted with adults not under the influence of an anæsthetic. The instruments used

were the laryngeal forceps and curette. Each instrument was introduced many times, and small pieces of the papilloma were successfully brought away until the larynx was free. The growths were found to be attached to the lateral and anterior walls of the larynx, to the ventricles, to the vocal cords, and to the sides of the trachea just below the vocal cords. The hemorrhage was slight, and no reaction followed the operation.

The next day, December 13, a cork was placed in the tracheal opening and the child breathed freely through the natural channels. On December 14 the tracheotomy-tube was removed, and the opening in the neck closed. On December 16 the tracheal opening healed. On the 18th he was discharged from the hospital, breathing naturally, and being able to speak in a loud whisper.

This child has since been seen at intervals, in the out-patient department, but no treatment of any nature has been directed to the larynx.

One of the characteristics of this form of growth is its tendency to recur. In this case a recurrence was detected in July, 1889, when a small nodule was seen on the left ventricular band, and a short time later the ventricular band on the opposite side also became involved. The growth increased for a time, but in January, 1890, it had perceptibly diminished, and the voice had greatly improved. This child was last examined in April, 1891, two years and four months after the operation. His general condition was excellent, and the breathing quite natural. The voice had gained in strength, but was still hoarse. The laryngoscopic examination showed that the interior of the larynx, to a point below the vocal cords, was rough, and here and there were noticed small nodules of the growth, the larger portions being on the lateral walls in the region of the ventricular bands. Unless the growth should again show a tendency to disappear spontaneously (which is not likely) attempts will be made to remove the remaining portions with a curette through the mouth. The child is now so much older that he may prove more tractable to intralaryngeal operations; if, however, he should not submit, he will again be etherized and operated on as before, but without a preliminary tracheotomy being performed.

CASE II.—H. C. W., male, aged five, was referred to me at the Boston City Hospital by Dr. Charles W. Haddock, of Peabody, Mass., on May 13, 1889. The child was well nourished, and with the exception of the condition of his larynx was a perfectly healthy boy. In the past year he had been steadily growing hoarse, which began with an attack of whooping-cough, and when first seen he was practically

aphonic. He had considerable dyspnoea on exertion, and at night had great difficulty in breathing.

The child was very tractable, and his confidence was easily gained, and a laryngoscopic examination was made at his first visit. It revealed a large whitish growth attached to the anterior wall of the larynx, between and above the vocal cords, and filling up about three-quarters of the lumen of the glottis. With forced respiration the growth moved up and down.

All attempts to remove it in the customary manner through the mouth having failed, on June 27 the child was etherized, and, with the assistance of Dr. J. Payson Clark, I operated by means of the laryngoscope, the patient being seated upright in the lap of a nurse, as described in Case I. In this instance, however, the patient was not tracheotomized, which greatly added to the difficulty and danger of the operation, a point to which I shall again refer. The child took ether perfectly, there was no sign of spasm of the glottis, very little secretion, and no hemorrhage at all alarming. Two days after the operation the child was again examined, and a small portion of the growth was seen remaining between the angle of the vocal cords. The breathing had become normal at night, and he was able to speak in a hoarse voice. He was not seen again until December, 1889. The growth between the vocal cords had increased in size. This was removed by the curette in the ordinary way, the patient having become much more tolerant of the intralaryngeal procedure.

In response to my call the child came to see me on April 22, 1891. There had been no return of the growth. His health is perfect. His voice has steadily improved and is now very good, indeed, although slightly muffled, owing to the anterior portions of the vocal cords being still a little thickened.

CASE III.—E. D., a negro child, aged five, was first seen at the Massachusetts General Hospital, November 14, 1889. His history closely resembled that of Case II. His symptoms were difficult breathing and aphonia. He began to grow hoarse one year previously, and this had steadily increased until, when seen, his voice was a very low whisper, and it was with difficulty that he could be induced to utter any sound at all. His breathing, when awake, unless he made some exertion, was good, but at night it was distressingly labored, and some one was obliged to sit up with him for fear of suffocation. He was strong, well nourished, obstinate, and exceedingly difficult to examine with the laryngoscope. A perfect view, however, was finally obtained, and a large papillomatous mass was seen filling up the

laryngeal cavity. It appeared to be one distinct tumor, attached to the right side of the larynx.

On November 26, preparations having been made for tracheotomy, in case it should be necessary, the child was etherized, seated upright in the nurse's lap in the sunlight, and with the aid of the laryngoscope I proceeded to remove the growth.

The instruments used were the laryngeal snare, Schrötter's tube, forceps, and the curette. The operation lasted one hour and a quarter. The larger portion of the growth was taken away with the snare; the bleeding was insignificant, and during the process of etherization and the operation there was not the slightest indication for the performance of tracheotomy.

Examination ten days after the operation showed that a little of the growth still remained on the anterior portion of the right side of the larynx, apparently springing from the ventricle. The breathing, by day and by night, had become perfectly normal. The voice was very good, but hoarse.

The child was not seen again for more than a year, when it was found that the right side of the larynx and the right vocal cord were perfectly healthy. The left ventricular band, however, is now occupied by the growth, which prevents the left cord from being seen. There is also a good-sized nodule attached to the anterior wall of the larynx, just under the right vocal cord, which moves freely with respiration. The voice is very good indeed, but husky. The breathing is unobstructed, and the child is perfectly healthy. Since he was last examined he has become most tractable, and the laryngoscopic examination was effected as easily as on the adult. Another operation will be necessary in this case.

CASE IV.—I am indebted to the surgical records of the Massachusetts General Hospital for the early history of this child, and to the kindness of Dr. C. B. Porter for placing him under my care the second time he was admitted to the hospital.

E. K., male, aged two years, first came to the out-patient department of the Massachusetts General Hospital, May 14, 1889. He was strong and healthy. He began to talk at the usual age, and could say a few words plainly. About three or four months ago a slight huskiness was noticed in the voice, which grew rapidly worse, and for the past two months the voice has been lost entirely. Since then the respiration has been very difficult and labored. He was seen by Drs. F. I. Knight and S. W. Langmaid, and recommended to the hospital for tracheotomy. He entered with labored breathing and loud whizzing

sound with each respiration; depression of epigastrium and supraclavicular spaces very marked. He could make no sound, either of talking or crying.

The patient was tracheotomized by Dr. J. W. Elliot. The operation was performed without any especial difficulty, and was followed by great relief to the breathing. The child did well until six days after the operation, when he came down with an attack of measles. This proved to be mild, and soon subsided. He was discharged in excellent condition on June 6, as there was a case of diphtheria in the ward. The tube was still in, and he was told to return. He was not seen again until December 3, 1890, one year and seven months after being tracheotomized. He was brought back on account of difficult breathing. The tube was found to be in good position; it could be easily removed and easily put back. With the tube out, the child inhaled perfectly through the mouth, but exhaled through the tube-hole.

It was impossible for him to breathe with the tracheal opening closed. Owing to the child's bad temper, all attempts to examine him with the laryngoscope were useless. Accordingly, on January 7, 1891, he was etherized solely for diagnostic purposes, and with the sunlight a perfectly satisfactory laryngoscopic examination was made. He was held upright in the nurse's lap, the mucus in the pharynx wiped away, the mouth held open by a gag, and, the pharynx being spacious for such a young child, a perfect view of the interior of the larynx was obtained, a small-sized rhinoscopic mirror being used. The cause of the difficulty was at once apparent. The larynx was seen to be completely blocked by a whitish papillomatous mass attached to the anterior and lateral walls. On January 15 he was again placed under ether, and, with the laryngoscope, in the manner described in the previous cases, I removed the growths. The operation, in which I was assisted by Dr. J. P. Clark and Dr. F. C. Cobb, lasted one hour. The instruments used were the laryngeal forceps and the curette. The papilloma was exceedingly soft, and the bleeding was not at all troublesome. On January 16 the temperature was normal and the general condition excellent. On January 17 a cork was placed in the tracheotomy tube and retained there for some time, the child breathing perfectly through the natural channels. The tube was removed and the tracheal opening closed with plaster. On January 20 the opening in the neck had healed, he breathed naturally, his voice could be heard across the ward, and he was improving daily. The child remained in the hospital until February 23, when he was discharged in excellent condition.

The salient symptoms common to all the cases related above, as will have been noticed, pertain to the alteration in the tone of the voice and to the difficulty in breathing. In all similar cases the history will be the same. It is rare for these growths to be congenital, yet there are a few instances recorded. It is usually at about the first, second, or third year that the symptoms begin to manifest themselves, and the first thing noticed is that the child is hoarse. This, however, instead of passing off in a few days, as is usually the case, persists and constantly grows worse, until the voice is reduced to a low whisper or even, as in Case IV., no sound whatever can be made.

The next symptom to make its appearance is a difficulty in breathing. This comes on at varying intervals, according to the case, sometimes in a few months, and sometimes not for years after the first alteration in the voice. It is at night, while the child is asleep, that the labored breathing first manifests itself. During the day the child may be running about and playing, the picture of health, and breathing freely, but as soon as he falls asleep, the will-power being gone, the parts become relaxed and the respiration labored and noisy. As time goes on and the growths increase in size, the breathing by day becomes difficult, especially when any exertion is made. If the child is at rest, the breathing may not attract attention as being abnormal, and yet the larynx may be nearly filled by the growths. Do not allow yourselves to be deceived and caught napping by this peculiarity of the breathing. It is remarkable how easy the breathing may be when there is almost complete occlusion of the larynx, provided the individual be awake and not making any effort. Be on your guard, therefore, in respect to this insidious symptom. Suspect papillomata of the larynx when you meet with these sturdy, healthy-looking children who have a history of long-continued, labored breathing, and hoarseness or loss of voice.

Other symptoms which may be present are cough, rarely trouble in swallowing, and pain. You will have remarked that all the cases I have reported were boys. This affection is much more frequent in males than in females. Causit,¹ who has written a most complete monograph on the subject, estimates the predominance of males over females, attacked by this disease, to be in the proportion of twenty-eight to fourteen. It is difficult—in fact, at present it is impossible—to say what causes this affection in children. Diphtheria, croup, measles, and whooping-cough are said to be predisposing factors. The children who came under my observation were robust, vigorous, and

¹ Étude sur les Polypes du Larynx, Paris, 1867.

healthy-looking boys, sound in every organ with the exception of this local growth in the larynx.

Authors, such as Ehrmann, Horace Green, and Sir Morell Mackenzie, who have written well-known works on the subject of growths in the larynx, are of the opinion that any prolonged irritation may lead to the formation of these pathological products. Our New England climate occasions much irritation and chronic congestion in various portions of the air-tract in the larger proportion of the inhabitants, yet papilloma of the larynx is, fortunately, seldom met with, and the fact that it may be congenital leads me to think that its most important etiological factor is unknown.

We come now to the practical questions of diagnosis and treatment.

Ehrmann, who lived before the invention of the laryngoscope, said that there was but one certain sign of the existence of this disease,—viz., the discharge by expectoration of some portions of the tumor. We can now affirm that the one certain method of determining the presence of the growth is by employing the laryngoscopic mirror.

Provided we can gain the confidence of young children, laryngoscopic examinations can be easily made on them; otherwise they are impossible. In Case IV., detailed above, the child fought, kicked, and vomited at every attempt made to examine him, and nothing was ever effected with the laryngoscope until he was placed under ether. I would suggest that laryngoscopic examinations under ether should always be attempted for diagnostic purposes in unruly children. Such examinations are facilitated by using sunlight for illuminating purposes. Then, after wiping away all accumulations of mucus in the pharynx, a perfect view of the larynx can be obtained, especially if the child has ample space between the base of the tongue and the posterior pharyngeal wall.

Children vary greatly in this respect. They also vary greatly in the amount of secretion in the pharynx, which is the chief obstacle to these examinations under anaesthesia. But, so far as my experience goes, after the child is thoroughly etherized and the mucus once carefully wiped away, it is not again secreted rapidly enough or in sufficient quantity to hinder the examination.

The presence of the growths having been determined, their removal should be effected in one sitting under ether, according to the method described in Case I. That child, it will be remembered, had been previously tracheotomized, but in Cases II. and III. the growths were removed in the same manner without a preliminary tracheotomy. The

operation by this method, difficult under any circumstances, is greatly facilitated if tracheotomy has been previously performed. But it is well to avoid this operation if possible. Whether tracheotomy should be done or not must be decided by the urgency of the case in reference to the dyspnoea. If the growths occlude the larynx to such an extent as to cause labored and stridulous breathing by day when the child is not making any exertion, a preliminary tracheotomy should be done. If the breathing, however, is tolerably free, tracheotomy can be dispensed with. The admission of blood into the lungs is to be guarded against. In Cases II. and III., operated upon without tracheotomy, as soon as a portion of the growth was removed the child was reversed, and held with its head down to allow what blood there was to escape by the mouth. The bleeding in the cases reported was not profuse and not at all troublesome.

The instruments at our command to remove the growths are the forceps, the cold snare, and the curette. The selection of any particular instrument will depend upon each individual case. These papillomata are friable, and cover a large surface in a very narrow organ. The instrument that has given me the most satisfaction is the curette. This instrument was made for me by Codman & Shurtleff, of Boston, and consists of a solid back so shaped that when the growth is scraped off it is caught in the depression at the lower end of the curette and thereby prevented from dropping down the trachea. The instrument is attached to a shank having the Schrötter curve, and can be readily watched while it is being manipulated in the larynx. This is an especial advantage in young children, where the larynx is very small. When the growths have been cleared away no further treatment should be directed to the interior of the larynx. By this I mean to advise against cauterizing the seat of attachment of the growths in the hope of preventing their recurrence. You will find that the galvano-cautery, chromic acid, nitrate of silver, and other caustics, are recommended by many for this purpose, but experience has shown that such applications do little in preventing a regrowth, and there is danger of the cauterization being followed by adhesion between the vocal cords, which would be a serious complication. In my judgment, therefore, since cauterizations do not prevent a recurrence, in cases where the growths extend over a large surface the wisest course to pursue is to remove the obstruction as completely as possible so that free respiration may be established, and wait for the time when the growths shall cease to recur, removing them, meantime, if they should reach a size sufficient to impede the breathing.

In closing, let me remind you that the disease we have been discussing is an extremely rare one. Do not hastily conclude that the first children coming under your care who happen to be hoarse are the subjects of papilloma of the larynx. Many of you will pass the whole of your professional lives without meeting with a single case. But in view of the fatal nature of the affection if not recognized, your attention should be called to it; and I trust that what has been said will enable you to detect it.

