tracheotomy. The reason why the operation has so little favor with us in Germany, and also in England, is, that we really have few diphtheritic, but mostly genuine fibrinous croup patients.

The operation itself is not attended by any danger to life, and, according to *Trousseau*, is performed in the following manner:

The child is laid upon the table, and under its shoulders a pillow is placed, supporting only the neck, so that the head may hang down a little backward, and the trachea be properly stretched. A longitudinal incision one and a half inches long is now made, commencing at the cricoid cartilage, and carried straight downward. The lips of the wound are retracted with blunt hooks, due attention being paid to the veins, which are also drawn aside by the blunt hooks. After the trachea has been sufficiently exposed, to an extent of three to four cartilages, which are recognized by their white appearance and greater resistance, a blunt-pointed bistoury, the dilator, and the double canula, especially made for tracheotomy, are then got ready. An incision is now made into the trachea, the opening is dilated, and the canula is then introduced by slipping it in between the separated branches of the dilator. After the operator has convinced himself that the air passes through the tube, the dilator may be removed, and the canula is secured by the aid of a tape, and the child, which has suddenly commenced to breathe freely, is allowed to rise.

Of the serious accidents liable to occur during the operation, *Trousseau* mentions, first of all, *hæmorrhage*. Venous hæmorrhage is controlled by simple compression with the finger, and ceases as soon as the canula is introduced; arterial bleeding, of course, must be arrested by the ligature. The anxiety about the blood finding its way into the trachea, on the whole, seems to be somewhat exaggerated, since in patients with hæmoptysis a certain quantity of blood necessarily must remain in the trachea and bronchi, but it generally does not induce any particular suffocative attacks.

Syncope very frequently occurs after the operation, and is produced by the sudden disturbance of the cerebral circulation, in consequence of the respiration having suddenly become free. *Trousseau* once saw it last one hour, but never terminate fatally.

If the respiration does not improve after the operation, the canula will be found to be blocked up with blood coagulæ or pseudo-membranes, which must be removed by means of a forceps made for that purpose.

In the after-treatment, the greatest attention is to be bestowed upon the canula. The wound should be covered with a piece of oiled silk, with a hole in the centre to admit the tube; a second canula is introduced into the first, so that, for the purpose of cleansing, the whole apparatus need not be removed; and a thin cloth is tied around the neck, in order that the air may not come directly in contact with the tracheal mucous membrane, but first be purified from dust by passing through the cloth. The canula should be taken out every three or four hours and cleansed. Once only *Trousseau* was able to remove the canula permanently on the fourth day, several times on the sixth and eighth, generally between the tenth and thirteenth, once not till the forty-second, and once after the fifty-third day. No tracheal fistula ever resulted from the operation.

Children eat and drink immediately after the operation, and without any difficulty. Four or five days later, however, a spasmodic cough comes on every time drink is taken, and part of the liquid is expelled through the canula, a proof that the epiglottis is not able to perform its functions as thoroughly as in the normal state. This condition lasts one or two weeks and then subsides. In serious suffocative attacks, *Trousseau* forbids all liquid nutriments.

So much about the execution of this most unfavorable of all operations, which I, for my part, never insist upon, nor directly oppose when proposed by other physicians, and still less by the parents themselves.

Let us assume that all the children operated on had genuine croup, the ratio of recoveries of twenty-two per cent. is nevertheless an extremely unfavorable one, and especially since the greater portion of the children operated on suffered from the milder diphtheritic form. And if we take into consideration the additional fact that the majority of physicians experienced in children's diseases have abandoned the operation in croup, on the ground that it is a general disease, with localization upon the larynx, we must, it appears to me, discourage its practice generally, and close with the following words from old *Goelis*: "Ad tracheotomiam, omnium remediorum incertissimum confugere res ardua est; parentes abhorrent, aversantur agnati et periclitatur medici fama, quem, infausta si fuerit operatio ac votis illudens, lacrymis multis velut homicidam prolis amatae detestantur parentes."*

(2.) Pseudo-croup (*Laryngitis Catarrhalis*).—When an adult contracts a catarrh of the larynx, he becomes hoarse, has a tickling and itching sensation in the larynx, and along with that coughs, but dyspnœa and fits of choking do not occur, as a rule. If a child, on the contrary, falls sick with a simple catarrhal swelling of the laryngeal mucous membrane, violent disturbances of the respiration immediately set in, having their foundation in the narrowness of the chink of the infantile glottis. There seems to be a different relation in the larynx of

* See Appendix, Treatment of Croup and Diphtheria.

the child, between the swelling of the mucous membrane and width of the chink of the glottis, from that which exists in the adult. While the glottis of the latter still tolerates a certain degree of catarrhal infiltration, without inducing any very severe dyspnœa, it very often happens that children, who are scarcely noticeably hoarse, are suddenly attacked by fits of suffocation, and for the time present a deceptive similarity to genuine fibrinous croup.

Symptoms.—There is a very simple catarrh of the nose or bronchi, or of both at the same time; the patients are comfortable the whole day through, and eat with the customary appetite, and, aside from a few sneezes and coughs, are in perfect physiological condition. They fall asleep at the proper time, cough perhaps a little during the sleep, or snore in an unusual manner, but suddenly wake up with a well-marked attack of croup. Croupy cough, hoarseness, croupous respiration, and very violent choking-fits, immediately come on, and now no person is able to distinguish this affection from genuine croup. The same anxiety and oppression also supervene; the child rises to a sitting posture, the face becomes red, and the pulse considerably accelerated. These symptoms last for one, or at the longest two hours, and then begin to subside; the breathing and the voice become almost normal, the child lies down again, may call for drink, and then fall asleep, during which a general perspiration breaks out. The physician, who usually arrives at the house about this time, finds a perfectly healthy, sleeping child, who wakes up very indignant at again being disturbed in its night's rest. Two or more attacks seldom take place in one night, but they generally recur in the following nights, and sometimes even after they have been absent for many days or even weeks. Slight hoarseness, a barking cough, and loud snoring during sleep, generally remain after the attack; the temperature of the skin on the hands and forehead may, it is true, be slightly elevated, but actual fever, with general *malaise* and great depression, does not occur. Children thus attacked desire to leave the bed and partake of their meal, although not with a full appetite. Strange to say, no violent attacks ever occur in the daytime; a fact due perhaps to the greater sensibility of the larynx to the masses of mucus accumulating within it during sleep. In the daytime, as soon as this accumulated mucus is of any amount, it excites cough-paroxysms, and is finally coughed out from the larynx into the pharynx, while at night it remains there for a longer time, and then induces violent reflex phenomena.

The entire duration of the affliction is from three to eight days. The usual, indeed almost invariable, termination is in recovery; but cases also occur in which children for many days display distinct catarrhal laryngitis, but finally, under aggravation of the general disease, fall into genuine croup, which generally terminates in death. At the autopsy, membranes are not commonly found in these cases, nothing more than a marked swelling and reddening of the laryngeal mucous membrane, and upon it, as well as upon the tracheal and upon the pharyngeal mucous membrane, a thick coating of tenacious mucus.

Pseudo-croup is very much disposed to relapses, as is often learned from the statements of adults, who claim to have had the disease six and eight times in their youth. It most frequently attacks children in whom the eruption of the last molares is in progress, but does not, however, spare older ones; while in small children, who still labor under the effects of cutting the incisor teeth, the spasmodic form of laryngeal affection, without any catarrh, is the most frequent variety. Moreover, there are also transitory forms in which it is very difficult to decide whether we have to deal with a simple spasm of the glottis or pseudo-croup. Only the hoarseness of the voice and the croup-tone of the cough in the intervals allow the diagnosis for this or that form to be established with certainty, for these symptoms never occur in pure spasms of the glottis. Pseudo-croup is also distinguished from genuine croup by its intermittent character. Although in the former the voice in the daytime is hoarse, and the cough affected with a croupy clang, still the fever and the general affection will never awaken any special anxiety; the children get up, are lively, amuse themselves with their playthings, and even partake of some nutriments. But from all this the case is totally the reverse in genuine croup, and the laryngeal symptoms are always much more pronounced.

Treatment.—Pseudo-croup should never be regarded slightingly even in its mildest form; for very gradual transitions into the genuine croup happen, and, after the fatal termination of which, we may, when too late, regret having carelessly treated the first hoarseness. Children thus affected are to be kept in a perfectly uniform temperature; the neck should be wrapped up, and they should be confined to a milk diet and plain soups. Moist compresses to the neck, when properly applied, act very favorably. The compress should be no wider than a narrow cravat, covered by a piece of gutta-percha, and these confined around the neck by a second dry cloth in such a manner that the water will not run down upon the body, and cause a too rapid evaporation and partial cooling of the neck, by which the hoarseness generally becomes aggravated. This danger on the one hand, and the conviction that the wet cravat is not always absolutely necessary,

have induced me to discard it altogether where a special and experienced nurse does not undertake the care of the child. Internally, I generally give kali carb. (℈ss—℈j to water ℥iv), and allow the patients to drink as much as possible, because experience has proven that, by promoting diuresis and diaphoresis, a mitigation of the catarrhal secretion of the respiratory mucous membrane is produced. It will seldom be necessary to resort to emetics.

(3.) Neurosis of the Larynx. — Motor disturbances of the laryngeal muscles frequently and almost exclusively occur in childhood. Both forms, the spasm and paralysis, are observed, but the former is much more frequent than the latter. It must be premised that, as a rule, all those laryngeal affections must be excluded in which any symptom of material lesions of the mucous membrane can be detected; for, since the muscles of the larynx must by such lesion become altered, a change of the voice follows, as well as a change in the manner of breathing, and in the cough. These exclusions having been disposed of, the neuroses remain. In slighter deviations from the normal construction, which, in the cadaver, presents a pathologically altered mucous membrane, it is often difficult to decide whether death resulted from a pure neurosis, or from a swelling of the mucous membrane, or an œdema of the glottis.

(a.) *Spasmus Glottidis.*—That the glottis may become spasmodically contracted is no longer any subject of doubt. This may be demonstrated experimentally by vivisections, and is anatomically confirmed by the insertions of the muscles of the larynx. These muscles are supplied by the recurrent laryngeal nerve, and are (1), the thyro-arytænoidei; (2), the cricoarytænoidei laterales; and (3), the arytænoideus transversus.

An acute and a chronic form may be distinguished. There are spasms of the glottis in which death ensues, after the first few paroxysms, by choking or suffocation, and others again which last for months, and may relapse after very long pauses. The writers of the preceding and of the present century record no precise reports concerning this condition, but differ remarkably from each other in their views upon it, and consequently have invented a number of names, most of which are based upon etiological views, causing the greatest confusion in the minds of those physicians who do not rely upon their own investigations. Thus there was an asthma acutum et chronicum Millari, the symptoms of which, however, are more applicable to our own pseudo-croup than to a pure spasmus glottidis—an asthma thymico-cyanoticum—a suffocatio stridula—an angina stridula—apnœa infantum—catalepsis pulmonum (Hufeland)—a laryngismus stridulus—phreno-glottismus—laryngo-spasmus infantilis—tetanus apnoicus infantum—and finally even a cerebral croup, by which the English, especially *Clark*, understood a species of croup, at the autopsy of which the larynx was found unaffected, and which, of course, was always ascribed to a cerebral disease that was not demonstrable.

Symptoms.—The following morbid picture may be delineated in general outlines. Usually very healthy, robust children are seized during the process of dentition with a suffocative attack. All at once the face becomes strongly injected, the head is thrown backward, the mouth is slightly open, or makes snapping movements; the extremities are stiff, or hang down powerless; the child also plucks at its neck, as if it would tear away the cause of its strangulation. Finally, after a most tormenting struggle of a half to one minute, a few short, abrupt whistling inspirations follow, with which no expirations alternate, and then the whole fit is either at an end, and the normal respiration inducted again by a prolonged whistling expiration, or another suffocative attack, with totally arrested respiration, begins. This entire phenomenon may recur several times in succession, so that the child does not return to normal or much improved respiration for several minutes. The paroxysms occur as often in the daytime as in the night, and may return forty times in the twenty-four hours; they are especially induced by deep inspirations. If the disease has existed for a certain time, general convulsions will become superadded to the spasm of the glottis—a condition which has been described by some authors as the second stadium.

If we are to analyze the individual symptoms more accurately, it will be necessary to classify them first into two groups: (1), as to the symptoms during the attack, and (2), the symptoms in the intervals.

(ad 1.) The tone which accompanies the first inspiration after the suffocating fit, and at the beginning of the cataleptiform state, popularly called "Ausbleiben" in German, is always very characteristic. It is a crowing, whistling cry (the crowing inspiration of the English), and is tolerably accurately imitated by executing a sipping inspiration through the almost-closed chink of the glottis, while at the same time attempting to utter the vowel *i*. Sometimes this cataleptic state is also ushered in by a few of these inspirations, but, in most instances, the children have not the time for that, and, as if strangled, gasp voicelessly for air, along with which they become livid, and throw the head backward, in order to dilate the chink of the glottis as much as possible. Immediately after the attack, the expirations are superficial and apprehensive, but soon become perfectly normal, and free from the whistling noise heard in croupy breathing.

The superaddition of general convulsions to *spasmus glottidis*