

Pooley (J. H.)

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IN

DIPHTHERIA.

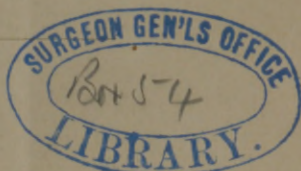
BY



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FROM THE JUNE NO. RICHMOND AND LOUISVILLE MEDICAL JOURNAL.



LOUISVILLE, KY.:

RICHMOND AND LOUISVILLE MEDICAL JOURNAL BOOK AND JOB STEAM PRINT,

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TRACHEOTOMY IN DIPHTHERIA.

I am indebted for the notes of the following case, except the description of the operation, to Dr. G. M. White, of this city, who had charge of the patient:

CASE I.—“Edward F., aged eight years and five months, returned from school at noon, Friday, October 1, 1875, complaining sorely of pain in the left side of his neck, immediately below the ear; chilled for two hours. The chill was followed by an exceedingly high fever. Pulse 160; temperature not taken, but the heat of the skin was far in excess of the most violent case of scarlatina I ever saw; very little swelling on the left side of the neck. Left tonsil slightly enlarged; complained of severe pain in swallowing even fluids. Pharynx, soft palate, and tonsils of a bright scarlet color; very fiery in appearance. Violent pain in the head, and burning sensation in the throat. No perceptible deposit. Ordered opiates, diaphoretics, and a gargle of solution of chlorate of potash in warm elm-water.

Saturday Morning.—Rested well during the night; no complaint of pain; skin moist; pulse 120, soft and weak; tongue coated. There is a thin fibrinous deposit on the tonsils and posterior part of the soft palate. Ordered tinct. ferri chloridi m. v. every three hours; quinia sulph. gr. j. every three hours gargle continued. Passed the day and night comfortably.

Sunday, Monday and Tuesday, he improved each day, asked for and took food, and rested well. The indications all were that he was convalescing. The fibrinous deposit on the tonsils and soft palate had thickened a little, and changed from a fine white to a buff color. Pulse continued at 120, full and moderately strong; breathing regular and easy. Up to Wednesday noon there were no indications that the larynx was involved; during the afternoon, however, the voice became a little hoarse, the cough sharp and ringing—croupy. Pulse increased to 140; lungs free. During the latter part of the night the patient was restless, and suffered a little difficulty in breathing.

Thursday morning breathing became easy, and the pulse fell to 120, but rather feeble. Exhibited stimulants and nourishment freely. Patient comfortable all day, and continued so until midnight. The air of the room was kept moist with the vapor of warm water; hot applications were applied to the throat and chest, and nauseant alkalies and stimulants were given freely.

At midnight Thursday, the breathing became very labored, and continued so until Friday morning, when for a short time it became easy after coughing up some shreds of membrane. About 9 A. M. Friday the breathing again became very labored, and swallowing performed with difficulty; pulse 120; apparently there existed no obstruction below the larynx."

I first saw this child about 1 P. M., on Friday, October 8, one week from the beginning of its illness. He was lying on his back, with the head retracted, in a soporose condition approaching coma, with intervals of extreme restlessness. He was breathing with difficulty, and with a noisy, croupous inspiration; considerable movement of the larynx and top of the sternum in respiration; he was pale and slightly bluish about the finger nails. Pulse 120, full and of good resistance.

Auscultation afforded no clear and reliable evidence as to the condition of the lungs. Upon consultation with Drs. White and Loving, tracheotomy was decided upon, as the child would evidently die very soon as he then was, and the operation offered him the only remaining chance for life, slight indeed, as we all realized it to be. This was fully stated to the parents, and they desired the operation to be performed. I accordingly operated. The child was laid upon a table of convenient height, in a good light, and his head well thrown back by a roll of old cloth placed between the shoulders. Chloroform was administered, and the preliminary part of the operation was almost bloodless. After dividing the skin and superficial fascia there were a few fibres at the top of the wound, which it seemed desirable to divide more completely. Before doing this, I plainly saw a large vein crossing the upper angle of the wound, and filling itself with each inspiration. I ought to have drawn this out of the way, but neglected to do so, feeling sure that

I could avoid touching it with the knife. By some movement of the child, or of the larynx, or otherwise, it got in the way at the critical moment and was cut through. A terrible gush of blood followed, and before this was fully restrained I was obliged to open the trachea; then came another torrent of blood, pouring directly into the trachea. The child ceased to breathe, and for a few moments we all thought he was dead. I immediately applied my mouth to the wound and sucked several large mouthfuls of blood and mucus out of the trachea, while the other gentlemen kept up artificial respiration, and in a minute or two we had the satisfaction of seeing the breathing re-established and feeling the pulse once more at the wrist.

This accident shows the necessity of the utmost care in drawing out of the way any veins that may make their appearance in this operation. The tube was now introduced, not without difficulty, showing that the trachea itself was to some extent occupied by the false membrane. The conclusion of the case I give in the words of Dr. White.

"Respiration was comparatively easy for an hour or two after the operation, when it again became difficult, from extension probably of the diphtheritic exudation. Patient took stimulants freely but rapidly grew worse, and died at 7:45 P. M."

A post-mortem examination could not be obtained.

CASE II—On Friday, September 29, 1876, I was called to see Herman B., of this city, aged five years. He had been sick for two weeks with what was regarded as a very severe sore throat, but had had for most of that time only domestic treatment. Two days before I saw him their ordinary medical attendant, a homœopathic physician, was called in; he had been in attendance up to a short time before my first visit, when he said that he could do no more for him, and advised that I should be sent for.

I found the child in his father's arms, breathing with considerable difficulty, respirations being rapid, shallow, and noisy; he had a loud, harsh, distinctly croupy cough; his skin was hot and his pulse rapid, but not particularly feeble; there was slight duskiess of the countenance, a thin, flaky, excoriating discharge from nostrils, swelling of the tonsils, and of the lym-

phatics at the angle of the jaw. He had no appetite, and refused to swallow anything but cold water. On looking into his throat it was seen to be red and swollen, with patches of diphtheritic exudation on each tonsil. I advised the immediate administration of an emetic of sulphate of mercury (turpeth. mineral), and prescribed in addition a mixture containing chlorate of potash, muriate of ammonia, and tincture of iron, to be taken every hour after the operation of the emetic.

I saw him again in about three hours, the emetic had acted well, brought away large quantities of mucus, and a good-sized semi-cylindrical piece of false membrane. He seemed relieved, and was breathing much better; I directed the continued use of the mixture mentioned above, and a repetition of the emetic if his breathing should get worse again.

Saturday, September 30.—He had been worse again in the night, and the emetic as recommended had been given, with the effect of bringing up a still larger piece of membrane than before, and numerous shreds. After this he was very much relieved, and his parents were quite jubilant over the result. Even when I saw him, which was about 9 A. M., he was very much better, and was breathing with comparative ease; mixture, as before to be given regularly every hour, and the room to be kept full of steam.

Later in the day he was not so well, dyspnoea returning, but not with its former severity; treatment continued, and as he looked rather feeble, and his pulse was weaker and more rapid, whisky punch to be given frequently.

October 1.—He has passed a wretched night, sleeping but little; his father obliged to walk the floor with him all night. Rather better at my morning visit, but still breathing very badly, and unable to lie down.

I saw him again in the afternoon, he was much worse, difficulty of breathing extreme, each inspiration accompanied with a strange and painful grin, and aided by strongly grasping his father's shoulder; face suffused and becoming cyanotic. I stated to the parents that the child could not live many hours as he then was, and that I had nothing further to propose except the operation of tracheotomy, to which they immediately acceded.

Accordingly at 4 P. M. I operated, assisted by Drs. Starling Loving, and T. C. Hoover. The child was placed on a table suitably arranged, and an anæsthetic mixture of alcohol, chloroform, and ether, as recently advocated by Dr. J. C. Reeve, of Dayton, Ohio, administered. The child struggled very much against being laid upon the table, and against the anæsthetic, which was very carefully administered by Dr. Hoover, whose trustworthiness in such an office I have frequently tested. He could not have breathed more than a few drops of the mixture before he suddenly ceased breathing and seemed to be dead, his mouth fell open, his eyes glazed, and his pulse ceased beating; his heart did not cease to beat I think at any moment, but pulsated feebly. I rapidly opened his trachea, and inserted a large-sized tube. The windows were thrown wide open; artificial respiration was set up, his tongue drawn forward, and the lips and interior of the mouth bathed with strong brandy. Some feeble respirations soon followed, but his pulse could not yet be felt, and the surface of his limbs and body was cold. A number of hot irons were placed about him, and he was warmly covered. The means already in use, especially the artificial respiration, were kept up, his breathing gradually improved, and as soon as he could swallow brandy and water were given to him by the teaspoonful. At length, after many anxious minutes, he made two or three long, deep inspirations, followed by a convulsive cough, in which he threw out through the tube a mass of false membrane, which presented a nearly perfect cast of the epiglottis and vocal cords. After this his breathing became natural and easy, but he was very much exhausted for several hours, so much so that he was left lying on the operating table.

I do not think that this patient's dangerous and nearly fatal condition was brought about solely, if at all, by the anæsthetic, but mainly or altogether by the constraint exercised in placing him in the horizontal position in his nearly asphyxiated state, and against which he struggled violently. I saw him again late in the evening, still lying on the operating table, quite revived, and fretting for his father, who had been banished from the room. I took him on my lap and rocked him, and in

a few moments he fell asleep. I then laid him in a bed prepared for him, and without waking up he turned on his side, curled up his knees and slept as quietly and sweetly as any child in the world. I left him in charge of my student, Mr. John B. Fleming, with directions to keep the tube free, the air moist with steam, and let him sleep as much as he could, giving him a little whisky punch whenever he awoke.

October 2.—He slept well all night, and this morning seems very comfortable; respiration easy and noiseless; very little accumulation in the tube; prescribed a mixture containing chlorate of potash and cubebs; ordered the room to be kept warm, about 80°, and the air moistened with steam; allowed any nourishment he would take. Pulse 100. Membrane has disappeared from the tonsils; less discharge from the nose.

October 3.—Patient doing finely; seems stronger than yesterday, but has not taken any nourishment; sleeps a good deal, but quietly and naturally, as though recruiting his thoroughly worn-out nervous system; ordered continuance of treatment with sweetened whisky and water. I removed both outer and inner tubes. The wound looks perfectly well, and he breathes without difficulty, even when the wound is covered. After a few minutes the tube was returned.

October 4.—Everything progressing favorably. There has been more accumulation in the tube; some discharge around it. He begins to ask for something to eat. The tube was taken out and cleaned; it was left out a little longer than yesterday. Taking it out caused a slight oozing of blood and some suffocative cough; the wound looks slightly inflamed. Continued treatment.

October 5.—The patient is getting along finely. I took out the tube and left it out for three-quarters of an hour. A suture was removed from the lower angle of the wound, which still looks a little inflamed. He eats well; sits up looking out of the window, and busies himself with his toys. His pulse is stronger; his nasal discharge has ceased. He looks pale, and though bright and cheerful is quite weak; prescribed iron, tinct. ferri chloridi ℥j, syrup lemon ℥iii; a teaspoonful three times a day.

October 6.—To-day at 11 o'clock A. M., I removed the tube

permanently. When I visited him at 7 o'clock in the evening, I found that he had had one or two rather alarming attacks of dyspnoea, which, however, were relieved by cough and expectoration through the wound. His breathing is accompanied by slight whistling, not increased by closing the opening. He can breathe through his nose with lips as well as the opening in the trachea closed, but is evidently most comfortable with the wound open. It is astonishing to see how rapidly the opening has diminished in size, nearly one-half in a few hours. After some hesitation, I decided not to re-insert the tube, believing that the slight disability of the vocal cords, whether from swelling or paralysis, would pass away, and perhaps all the sooner if they were subjected to the stimulus of the contact of air. His voice is stronger than at any time since the operation.

October 8.—To-day the patient's parents had quite a severe fright. The wound has closed up very rapidly during the last two days, and at night, when the child went to sleep, his breathing became very noisy and a good deal embarrassed, and the father sent for me to see about re-introducing the tube. I found that though the breathing was noisy and difficult, it did not interrupt the child's sleep, and became quiet and easy as soon as he was thoroughly waked up. I decided that it arose from paresis or weakness of the vocal cords, and the rapid closure of the wound, and did not re-introduce the tube, but prescribed quinine and strychnia.

October 11.—Child going on perfectly well; breathing regular and easy; wound nearly closed; voice becoming audible.

October 13.—Patient virtually well; voice completely restored; wound nearly healed; looks a little pale and thin.

October 16.—Visited the patient to-day, and found him sitting at a table with his brothers eating peanuts and carrying on like a young rowdy. He greeted me with quite a shout. The wound is healed, and he is perfectly well in every respect, except that he remains rather pale and weak; is to continue his iron for some weeks.

Such a case as this is a sufficient reward for many unsuccessful efforts. This child was obviously snatched from impending

death. Without tracheotomy a few more hours would have closed his career. A large share in this most gratifying result must in justice be attributed to his father, who, after his first nervousness and fright, proved a most invaluable nurse. He watched his child night and day with an intelligent assiduity which, alas, we can rarely command. If we could, I feel persuaded that the statistics of tracheotomy would present a much more encouraging aspect. In scarcely any operation is judicious and skillful care and nursing afterwards more important than in this. It seems to me considerable risk was run by the very early removal of the tube on the fifth day in this case, and I should hardly be encouraged to do it again. With a less watchful and reliable nurse, I should certainly have re-introduced it on the night of the 8th, when his breathing became so seriously embarrassed. Fortunately this proved only temporary.

CASE III.—On Thursday, October 5, 1876, I was called at 4 o'clock P. M. to the child of Mr. M., aged three years, in consultation with their family physician, Dr. A. Neil, of Columbus. He had been sick several days with sore throat and cough, but only during the last two days had there been any difficulty with his breathing. When I saw him dyspnoea was extreme and constant, the breathing being shallow, rapid, and noisy. He had a hoarse, croupy cough; his pulse was rapid and weak. There were several patches of diphtheritic false membrane on his tonsils, and I was informed by Dr. Neil that this deposit had been much more extensive. He was a pale, weakly-looking child. He had been taking large quantities of ipecac to procure vomiting, but without effect. I prescribed an emetic of turpeth mineral, proposing to return as soon as I could make the necessary preparations, and if he had not been notably relieved to perform tracheotomy; to this the parents readily consented, being convinced that unless something could be done to relieve him their child had not long to live.

It was after 6 o'clock by the time I returned; the emetic had produced no effect, and I at once prepared to operate. The evening was dark and cloudy, and as daylight was rapidly failing, I was obliged to operate by the light of kerosene lamps,

and having never done so before, I soon found that I had never realized the serious disadvantage of this necessity. The child's neck was short and fat, which made the wound correspondingly deep, and nothing could be plainly and satisfactorily distinguished. However the operation was safely accomplished, though it took more than twice as long as I had ever known it to do before.

The hæmorrhage was slight, and mostly confined to the last incision, by which the middle lobe of the thyroid, which could not be got out of the way, was divided. I was ably assisted by Drs. A. Neil, N. C. Reed, and Professor Wheaton of Starling Medical College.

The child did not seem to be at all prostrated by the operation, and when it recovered from the effects of the ether breathed easily and well. There was marked relief of the distressing dyspnœa.

It continued to do well until the afternoon of the next day, Friday, the 6th, when the breathing again became rapid and difficult, and the lungs seemed to be filling up; scarcely any respiratory murmur could be heard, though on percussion the resonance was good. It was freely stimulated, and an attempt made to throw warm spray of lime water in through the tube, which gave some relief, but it died a little after midnight, at 12.15. Post-mortem was held Saturday, October 7, at 4 P. M. Rigor mortis strongly marked. Only larynx, trachea, and lungs were examined. Wound of operation in median line, dividing first three rings of the trachea and middle lobe of the thyroid. Rima glottidis completely occluded by false membrane and inflammatory swelling of the mucous membrane. Membrane extended below the point of operation, but not in a continuous tube, only in shreds and patches. The lungs did not collapse on opening the chest; the right showed marks of pressure against the ribs. They were crepitant throughout except part of the lower lobe on the left side, which was congested. Bronchial tubes, to their minutest ramifications, were filled with bloody, frothy mucus. Child died of capillary bronchitis. Ten days after the death of this child a younger brother, fifteen months old, died of diphtheria, which did not

involve the respiratory passages, at least not to any serious extent.

CASE IV.—I was called at midnight, on Sunday, October 8, 1876, to go to Commercial Point, twenty-two miles from my residence, to see a child with diphtheritic laryngitis, for the purpose of performing tracheotomy, if judged necessary. I arrived at the house about 3 o'clock next morning. Found that the patient, a fine, stout-looking girl of five years old, had been sick for about two weeks with sore throat, and occasional attacks of dyspnoea, which for the past two days had been constant, and increasing in severity. There had been patches of false membrane visible in her throat, but at the time of my visit there were none to be seen.

When I first saw her she was lying in bed with her head thrown back, breathing very noisily and with great difficulty; she had not slept for two days and nights, was very restless, tossing about in bed at intervals and frequently asking to be taken up.

I operated at 7 o'clock in the morning, assisted by Drs. Samuel and Joseph Helmick, and Dr. Tipton. Ether was given, and as the operation was somewhat protracted, at its conclusion she was nearly asphyxiated, and when the trachea was opened seemed for a moment to be quite so. This was probably from the sudden effect of the free ingress of air so long cut off.

I passed a gum catheter through the tube into the trachea to seek for possible obstructions, and finding none, used it as a means of inflating the lungs by blowing into its free end. This answered the purpose admirably, and is, it seems to me, an expedient to be strongly recommended in such an emergency. In a minute or two the child revived, and coughed a large piece of false membrane into the tube, from whence it was withdrawn by forceps. After this her breathing was very much relieved, indeed perfectly easy, and she soon fell asleep, for the first time in many hours. When I left she was perfectly comfortable; her pulse was good; expression of face in sleep and aeration of the blood all that could be desired, and everything from which an opinion could be formed, as far as the condition of the patient was concerned, seemed to promise a favorable result.

But I was not sanguine of success, for the surroundings were not such as to admit of the kind of care necessary in such cases, and of the importance of which I have the highest possible opinion. She continued to do well until Wednesday, the 11th, when she became worse. She had a severe and protracted attack of crying and screaming, her breathing became again difficult, her temperature high, and she sank and died, as Dr. Samuel Helmick, the attending physician, thought, from extension of disease to the lungs. No post-mortem could be obtained.

I have not reported these four cases so much on account of any interest they may have in themselves as for the sake of drawing attention to the operation of tracheotomy as a life-saving measure, for the purpose of averting threatened death from dyspnoea in pseudo-membranous inflammations of the larynx and trachea, whether they be called croup or diphtheria. This operation would seem to be established on so firm a basis as no longer to need any recommendation or advocacy, and yet in some parts of the country it is regarded with general disfavor, and even in some quarters bitterly opposed. If we attempt to make an appeal to authority, we are met by a difficulty in the very outset, for many authors make a distinction between what they call true membranous croup and diphtheritic croup, and their distinctions are so arbitrary, uncertain, and ambiguous that it is by no means easy always to tell which or what they are talking about. I myself believe that the two diseases, so-called, are one and the same thing, differing only in minor and unessential particulars, if at all. We read of epidemic croup. What is that but diphtheria? And then again we have sporadic cases of laryngeal diphtheria, which, according to some, we must call croup and not diphtheria. This, I confess, seems to me a kind of scientific thimble-rigging, "now you see it, and now you don't."

Epidemics of diphtheria differ markedly in the number of cases in which the air passages are involved, and also in the severity of what may be called the toxic phenomena of the disease; the constitutional symptoms.

Hillier says (*Diseases of Children*, p. 141), "I can detect no difference between membranous croup, and laryngeal diph-

theria." Dr. Jacobi, of New York, whom I regard as the best authority on the subject, says that there is no conceivable ground for the distinction; and in an article in the "American Journal of Obstetrics," for February, 1875, uses the following language:

"Thus if anatomy and physiology mean anything, I hope the vexed question of croup or diphtheria in the larynx will be considered as settled." Other authors, who still hold to this old distinction without a difference, are evidently struggling hard with doubts, and we can not help thinking that the time will soon come when the essential unity of the two diseases will be generally acknowledged.

But be this as it may, it has only a subsidiary importance for our present object, for as Holmes aptly says (Surgical Diseases of Children), "it seems to me that for surgical purposes, it will be better to consider the diseases that are spoken of as croup, diphtheritic croup, and diphtheria, under a single aspect."

And those voluminous authors, Meigs and Pepper, though they have a long article under each title, evidently recognize the fact that whatever force the distinction may otherwise have, it has none as bearing on the question of operation, for they refer their readers for indication for its performance in diphtheria to the article "Croup." Indeed, why there should be any distinction made here is hard to say, for whenever tracheotomy is undertaken in either disease, admitting for argument's sake that they are two and not one, as we firmly believe, it has the same simple sole object—to avert impending death from suffocation. It may be contra-indicated by intense poisoning of the system, which renders death almost certain, even if the asphyxia be relieved, though all authorities, as we shall presently see, are not of this opinion.

I have heard it said that it should not be performed in laryngeal diphtheria, for the false membrane is sure to spread to the trachea or even the bronchi, but this is evidently assuming for an individual case what no one can possibly know beforehand, for it is not true as a rule, abundant experience having proved that no such invariable, or even perhaps general rule, can be established. The second case narrated in this paper is

one in which the false membrane was almost certainly limited to the larynx. And even if such a rule were proven, it would not contra-indicate the operation, for many patients have recovered after tracheotomy where such was undoubtedly the case.

Dr. Jacobi was the first in this country to draw attention particularly to this subject, which he did in an able and elaborate paper published in the first number of the "American Journal of Obstetrics," May, 1868. In this paper he gives the statistics of New York operations—213 in number with 50 cures, or 23½ per cent. What I have seen of the operation, though very little, comparatively, is fully as favorable as this.

Meigs and Pepper give the Philadelphia operations—28, with 6 cures, 21.4 per cent. The whole number of operations in all parts of the world up to date of his paper was, according to Jacobi, 1,024 with 220 recoveries, or 21.48 per cent.

Now when we consider that of these recoveries very few would probably have taken place without it, and that the operation itself involves very little danger to life, and furthermore, that when it fails to save life it makes death less terrible, both to the patient and to the friends, it seems to me that we have said enough, and the question might well be considered as settled without further words.

Indeed, I do not hesitate to endorse the statement of Hillier, who says: "When it is remembered that nearly every case in which tracheotomy is resorted to would certainly die if left to itself, if a much smaller proportion than one in four, even one in fifty, could be saved, the operation would be justifiable."

This same author says elsewhere: "To avert death by asphyxia, when other measures fail, or if death is imminent, recourse is to be had to tracheotomy. I would recommend this operation whenever there is a decided and persistent distress from want of air, with laryngeal respiration, and increasing recession of the chest walls, and not of the neck in inspiration, if it is not relieved by an emetic. It is not well to wait until lividity sets in; at the same time, however near death the patient may seem to be, if laryngeal obstruction is the probable cause, the operation is to be recommended, with the understanding that the case is a desperate one, which can not be made

worse by an operation, and that there is the remotest chance of success from an operation."

Meigs and Pepper recommend the operation, except in case of profound general diphtheritic infection, where the danger of the child depends upon the constitutional disease, even more than upon the laryngeal obstruction.

But even under this most unfavorable of all conditions many experienced operators still defend tracheotomy. Jacobi asserts that whenever the indication of suffocative dyspnoea, steadily increasing and not relieved by emetics, exists, he would operate despite any complications, general diphtheria or anything else, and uses this positive language: "Seeing a person suspended by the neck and being strangled, we should hardly investigate the propriety of cutting the rope from the point of view that the sufferer might be or is affected at the same time with tuberculosis, cancer, or diabetes."

In his latest publication on the subject, *Contributions to the Pathology and Therapeutics of Diphtheria* ("Amer. Jour. Obstetrics," February, 1875), Dr. Jacobi says that although his success with the operation has not continued to the same extent as when he wrote his first article, he still advocates it. These are his words: "Since 1868 I have saved but a small percentage of suffocating children, and still I can not but stand by my former indications for the operation. It must not be omitted when obstruction in the larynx threatens to be the cause of death by suffocation. No complication of disease or epidemic influence ought to be a contra-indication."

Just here we need to remember, as I have already stated, that epidemics of diphtheria, as of all other epidemic diseases, vary so widely that we need constantly to take heed, lest we allow the want of success of any plan of treatment in a given epidemic to dictate our general judgment as to its advisability.

Steiner, ("Compendium of Children's Diseases"), advocates the operation, and says: "The prognosis is dismal, a fatal result being almost the rule, for in tracheotomy alone there seems to be any chance of recovery. In the Children's Hospital at Prague 34.6 per cent. of the affected children have been saved by the operation." (About the worst statistics that can be

found anywhere). He gives the following indications for its performance. "The emetics must be repeated on the occurrence of any suffocative attack as long as they seem to afford any relief. As the emetics lose their effect the indications of threatening asphyxia become more and more apparent, and the necessity for tracheotomy is exhibited." Lawson Tait, Steiner's translator, endorses the measure. As is well known, Trousseau, Bretonneau, and the French writers generally advocate the operation, and their early experiences with it were of the most discouraging character.

Not to multiply needlessly references and quotations, we may say that the drift of modern authority is almost universally in favor of the operation, and I can only add my own opinion, formed independently of authority, and held long before I had put it in practice, that no child ought to be allowed to die of laryngeal obstruction, from diphtheria or any other cause, without tracheotomy, while even if it does not save life, it lessens the terrors and distress of death by progressive strangulation. I have had parents, who had lost a child after the operation, to say to me, "if I had another child similarly affected and knew that it also would die after the operation, I should still insist on its being performed." In this connection, and in concluding this part of my subject, I can not refrain from quoting the strong language of Professor Flint, in the last edition of his *Practice of Medicine*. "With reference to the propriety or importance of the operation, however, the simple question is, are lives ever saved by it? This question is undoubtedly to be answered in the affirmative. The question, how many lives are saved, is of less importance in its practical bearing. If lives are ever saved by tracheotomy or laryngotomy in diphtheria, a practitioner is reprehensible if he allows a patient to die from laryngeal obstruction without opening the larynx or trachea. The patient is entitled to the chance of being saved by an operation, however small that chance may be."

Let us now consider the operation itself, and the after-treatment of those cases in which it has been performed for diphtheria of the larynx. And first, I would say that I can not regard it as so simple, almost as trifling a procedure as some

appear to do. On the contrary, it seems to me a serious and often a very difficult operation, and though I have now operated a good many times, I find this feeling growing upon me. Bryant, in his "Practice of Surgery," expresses my views upon this subject so exactly and so well that I can not do better than to quote his words; he says, p. 145: "Tracheotomy is by no means a simple operation. In very young children it is always troublesome; under all circumstances it is a delicate one, requiring coolness and caution. When performed hurriedly, it is too often made difficult, and even dangerous." "The surgeon may at times be called upon to be rapid in his movements, but he ought never to be hurried; as the result of hurry many are the mistakes that might be enumerated, such as wounding of the innominate or carotid artery; the opening of the œsophagus through the trachea; the puncturing of the spine through both these tubes, etc."

Some authors, and among them Mr. Pugin Thornton, in a recently-published monograph on tracheotomy, forbid the use of anæsthetics; but though it is not to be denied that some inconveniences attend their use in these cases, where the patient's breathing is already seriously interfered with, still I think that with due care they are both admissible and advisable. I have never operated without, except in one case where the child was so nearly asphyxiated as to be insensible to the knife, and where even the delay of administration might have been fatal. To be useful, pretty thorough anæsthesia must be induced, but the condition of the surface should be carefully watched as well as the state of the breathing, and if it becomes cyanosed the ether or chloroform must be suspended. I have used ether, chloroform, and an anæsthetic mixture of the two with alcohol in three cases, and prefer ether, as I feel safest with it, nor can I see any compensating convenience in the others to make up for what I regard as an increased risk. The head should not be thrown too far back, lest this interfere with respiration, but only just enough to render the trachea conveniently prominent, and care should be taken to maintain the same amount of retraction throughout.

The greatest attention should be given to keeping the wound

of operation, both in its superficial and deeper parts, strictly in the median line; any deviation from this is fraught with danger, and leads to perplexity in the mind of the operator, which once experienced is hardly ever recovered from, and makes his task a most anxious and difficult one.

I am in favor of a free external incision, generally two inches in length, its conveniences are many, and I fail to see any good argument against it. If it is found to be too large after the introduction of the tube, a stitch or two above and below is all that is needed.

It is a matter of more importance to avoid as far as possible the extensive separation of the parts below the skin, and this is more easily guarded against when the external incision has been free. Any veins that get in the way should be gently drawn aside by blunt hooks, a pair of strabismus hooks answer this purpose admirably, but there should be no unnecessary pulling aside of other tissues, for thus the median direction of the operation is easily lost, more easily than inexperienced operators would believe.

Two or three rings of the trachea should be divided, as high up as possible, and to accomplish this we may go either above or below the middle portion or isthmus of the thyroid. I do not think this a matter of much importance. I have done both, and in some cases have not known which, for the thyroid body has not been recognized in the operation at all. If it interferes, and can not be got out of the way, unless some conspicuous vessel is plainly seen in it, the middle portion of the thyroid may be unhesitatingly divided; bleeding from it is not much to be feared.

It is certainly desirable that all bleeding should cease before the trachea is opened; and too much stress should not be placed on the entrance of air following the opening in arresting the hæmorrhage. Blood may pour into the trachea before respiration is established, and if this is large in quantity it is one of the worst accidents that can complicate a tracheotomy. But on the other hand, if the patient is becoming asphyxiated, as will often be the case, the trachea must be opened at once, regardless of every other consideration, and artificial respira-

tion established. Just here, I doubt not, patients are sometimes lost by dawdling and pottering.

While hurry and confusion are to be avoided, prompt and fearless action is imperative.

If the trachea be opened in the midst of considerable bleeding, as must sometimes be done, the patient should be turned over on the side that the blood may run out of, rather than into the trachea, the tube inserted, which acts as a tampon to the wound, and breathing and cough encouraged by every possible means. In opening the trachea it is an excellent plan, sometimes absolutely necessary, to fix it and draw it toward the surface by a sharp hook or tenaculum thrust into it between the rings. Sometimes when it is not deep, nor drawn rapidly up and down in respiration, this may be unnecessary, in which case the forefinger of the left hand should be passed into the lower angle of the wound and down upon the trachea as a guide to the knife, and pressed partially into the opening as it is made. Various forms of dilators have been invented to be inserted into the windpipe and facilitate the introduction of the tube; they sometimes answer a good purpose, but a reliable assistant holding the edges of the tracheal wound apart with strabismus hooks is better, and even without this by following the direction to keep the left index-finger on, or as nearly in the wound as possible, the introduction of the tube is rarely a matter of difficulty. When real difficulty occurs in introducing the tube it generally arises from the presence of false membrane in the trachea, which may either fill it up, or, not having been pierced by the knife, be crowded before the tube. I have known a case where the tube was lodged between a cast of false membrane and the trachea, and thus the child instead of being relieved was only the more rapidly choked to death by the operation.

The moment of opening the trachea is always a critical one; a moment of supreme anxiety to the operator. And when at last it is accomplished the patient may seem to be gone, or with the first in-rushing of air he may cease to breathe. But this must never be accepted as final. His asphyxia, this cessation of respiration, though perhaps the most terrifying of accidents to a novice, is one of the least dangerous after all. It is very

seldom fatal; with promptness and perseverance almost never. We must make sure of the patency of the tube and of the trachea, for which purpose a gum elastic catheter, which should always be included among the tracheotomy instruments, is best adapted, and is also very useful in inflating the lungs. If much blood has entered, it may be sucked out through the catheter, or by the mouth applied directly to the wound, as in Case I of this paper. Mucus will generally be coughed up; pieces of membrane must be looked for, and if seen removed with curved forceps.

In these cases of suspended respiration we must not be too ready to give up in despair and accept defeat; success generally rewards persevering efforts, more especially in keeping up artificial respiration. Success has finally rewarded these efforts even after the lapse of a very long period of time; in one recorded case after three quarters of an hour.

A most essential requirement in tracheotomy is to have a good supply of light, and yet we are sometimes obliged to operate by artificial light, and it may be of a very poor quality too. No one who has not tried it can realize how this enhances the difficulties of the operation. On such occasions a coal-oil lamp with a good reflector would be of the greatest service; where this can not be obtained its place may be supplied by a small looking-glass, obtainable almost anywhere, and held in a suitable position by an assistant so as to concentrate the light upon the wound.

Take it altogether, tracheotomy in diphtheria is as difficult an operation, and presents as many dangers, complications and emergencies as any in surgery; it needs above everything else a cool head and a stout heart.

The treatment of these cases after operation is of the greatest possible importance. Want of a due recognition of this fact at one time led to the most discouraging want of success, and wherever it prevails will still vitiate the result of the best performed and most promising operations. It does not include many points, but those it does include are of imperative moment. Care of the tube comes first, and this should be entrusted to the most reliable person that can be secured. When

it is possible a competent medical man (one who has seen such cases, is to be preferred), should be within easy reach, for the first few days at any rate. Patency of the tube must of course be maintained, and it must be cleaned out often enough for this purpose with a feather, brush, piece of soft rag held in a pair of curved forceps, or other suitable means, care being taken that whatever is used is not dropped into the tube. There is considerable variety in the kinds of tube in use; only two things seem to be of real importance, that the tube should be a double one, and that its parts be very firmly joined together. Tubes of hard rubber are objectionable, as the junction of the tube with the shield which passes over the neck weakened by constant contact with discharges may give way, and the tube slip down into the air passages. I know of at least one accident of this kind. The child after tracheotomy is to be kept as quiet as possible, all sources of irritation, or even of pleasurable excitement should be kept away. An even and somewhat high temperature should be maintained, as high as 75° or 80° , and the air of the room should be kept moderately charged with steam or watery vapor. The room should not be swept or dusted while the patient is in it. A supporting treatment, with plenty of food, fluid for the first few days, afterwards as varied as the patient can take, with free alcoholic stimulation when required, is to be recommended. This is the simple routine, but as important as it is simple; attention to these few rules rather than the use of a multitude of remedies will secure success, if success be attainable.

Of special drugs I have none to recommend, except perhaps cubebs, which latterly has seemed to me to accomplish to some extent the desirable end of retarding or preventing the reformation of the false membrane.

Though my own success has been no ways remarkable, I am, as will be seen, a strenuous advocate for tracheotomy in diphtheria. I believe when faith in it is more general, and it is done more frequently and in due time, and the immense importance of the after-treatment is properly appreciated, it will save multitudes of lives that would otherwise be lost.

