ORIGINAL ARTICLES.

INTUBATION OF THE LARYNX, WITH INFERENCES
FROM ONE HUNDRED AND THIRTY-FOUR
OPERATIONS.

Read in the Section on Diseases of Children, at the Thirty-Eighth Annual Meeting of the American Medical Association, June, 1887,

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In presenting this paper, it is not with the object of instructing this assembly or of imparting anything new or startling, but simply to present the result of my experience with this new operation, with which you are all familiar, and to excite a discussion which will be more valuable than any contribution.

On April 19, 1885, I performed intubation, for the first time, according to the method of Dr. O'Dwyer. In August, 1886, I reported 83 cases with 23 recoveries, or a percentage of 27.71. Since the latter report it has been my privilege to perform the operation in 53 cases, with 14 recoveries, making a total of 136 cases with 37 recoveries, or 27.20 per cent.

The ages of these patients were as follows:

5 cases with 1 recovery, or 20 per cent. under one year.			
15	"	3 recoveries, or 20	"
29	"	7	"
23	"	4	"
21	"	7	"
15	"	7	"
3	"	1	"
9	"	2	"
4	"	2	"
2	"	2	"
2	"	0	"
1	"	0	"
7	"	0	"
136		37	
27.20			
Av. age, 3 yrs. 8 mos.			

There were 72 cases three years old or under, with 16 recoveries, or 22 per cent., while there were 64 cases over three years, with 21 recoveries, or 32.8 per cent.

The youngest patient to recover was an infant of nine months; the oldest a child of nine years. In every case without exception false membrane was observed. The longest period that the tube was worn was two weeks, the child being but two years old and making a perfect recovery. The shortest period that the tube was worn was one hour. The patient was a boy three years old, and was under the care of Dr. J. G. Berry. The patient was in a semi-comatose condition and was almost pulseless. All who saw the child were firm in the belief that he could live but a very short time. The tube was introduced and the child was soon resuscitated, considerable membrane being rejected. In an hour we were again called in great haste, as the child had coughed up the tube, together with a small piece of membrane. As the respiration was perfectly easy the tube was not reintroduced. The membrane did not re-form, and the child made a rapid recovery.

Taking the above cases as a standard, the results would seem satisfactory.

In the whole history of tracheotomy where can we

find a record of 72 cases of three years or under, with recoveries amounting to 22 per cent.? Indeed, tracheotomy is so rarely successful at this age that many consider it a contraindication to the operation. After the age of three years we have a record of 64 cases with 21 recoveries, or 32 per cent. A record certainly comparing favorably with tracheotomy.

Many, in criticising intubation, speak slightly of the operation and insinuate that the operation is *always performed early* and often unnecessarily. Such is not the case. In my own experience the operation has often been delayed and accepted only as a last resource. It has not been performed until there has been absolutely no hope without surgical interference.

Many, with limited experience, report a much higher percentage of recoveries than has been given above. Some report as high as 30, 40, and even 50 per cent. of recoveries. In my own experience 17 successive operations were followed by 8 recoveries, or 47 per cent. In another series of cases 13 successive operations were followed by 6 recoveries, or 46 per cent. Taking a large number of cases, however, of all ages, conditions, and grades of severity, and we can hardly hope to save more than about 25 per cent. This, however, is a larger proportion than can be saved by the majority of physicians with tracheotomy.

DISCUSSION.

DR. A. B. STRONG, of Chicago, said: We have listened to a very favorable report on intubation of the larynx for diphtheritic croup. The report is, I am firmly convinced, much more flattering than the facts would warrant, had each and every case so far intubed been appealed to. It is but natural that we should first hear everything favorable to this operation, and but little against it. Surgeons are not accustomed to report their failures or mistakes, yet failures, and many of them to one success, are legion. It is time that the other side should be heard from. For one year prior to last February I gave the subject of intubation for diphtheritic croup much study and most careful practical attention. During that time I intubed 32 cases, and 31 of them are dead. With these personal facts before me, I certainly am no longer justified in recommending the operation. Since then I have refused to intube a large number of cases. I deem it my imperative duty to the profession, and in the interest of humanity, to give you the benefit of my experience. The operation, when skilfully done, is easily and quickly performed, without blood, anæsthesia, or fright of parents. With one or two exceptions I have had no trouble whatever to introduce the tube in a few seconds. The first result, relief of the dyspnoea, is all that could be desired; for a few hours everything as a rule has gone on nicely. But look at the ultimate results! Thirty-one dead, either from the extension of the membrane downwards, traumatic bronchitis, or pneumonia, or both combined, or from actual starvation. The trouble was the children could not eat or drink without in each case and every attempt some of the contents of the mouth passing through the tube into the air-passages, and so exciting them to resentment

or inflammation. To inject a little food into the rectum of a child is easy enough, but as a means of nutrition it is practically a failure. To put a rubber catheter through the mouth or nose into the stomach, can be done, though not easily or without great resistance from the frightened child. To nourish the little one in this way, many times in the twenty-four hours, is, to say the least, of doubtful utility. In bedside practice it is thoroughly impracticable.

Again, in introducing the tube there is danger of making a false passage. I know of three or four such cases, one of them in my own practice. The point of the tube was seen and felt under the skin just above the hyoid bone. On introducing the tube no force whatever should be used, unless you are absolutely certain that the point of the tube is in the glottis, and then only a minimum amount. To avoid such danger knowledge, skill, and gentle manipulation are as essential here, or rather more so, than to introduce a sound into a narrow and tortuous urethral track without doing violence to the parts. Don't make a false passage. Don't use force.

Again, when the membrane has existed in the larynx for three or four days, when it generally begins to loosen, there is great danger of crowding it down, with imminent risk of suffocating the patient. This has happened to me four or five times. Though there was no death from this cause alone, I came very near killing one little patient. In short, my experience, personal and otherwise, on introducing the tube compels me to say it is not the simplest operation in all surgery. To remove the tube is more difficult than to introduce it. In about one-fourth of my cases I have had more or less trouble to get the tube out. That is, I failed on the first or second trial. To get into the small hole at the upper end of the tube with the point of the extractor, while the larynx moves up and down and the child struggles, is easy to talk about; but to do it without puncturing the soft parts adjacent to the collar, or grasping them in the bite of the instrument, is entirely another matter. In one of my cases the tube appropriate for the age slipped through the larynx. It was not pushed through. I had great difficulty in extracting it through the glottis. It is scarcely necessary to say the child died a few hours afterwards from a then existing pneumonia and shock consequent upon the operation. In only one of my cases was the tube coughed up. I always found the tube perfectly clear; no incrustations. This was so whether the tube had been in position a few hours or several days.

I have heard enthusiastic supporters of intubation say that the after-treatment of a case wearing the laryngeal tube, was easy in comparison with a similar case wearing the tracheotomy tube. This certainly has not been my experience. I believe it to be a most erroneous claim. Facts that I have observed will not sustain it. The child is tormented with thirst; only when this great craving becomes intolerable will the little one eagerly attempt to swallow fluids. He makes a bold attempt, gulps or sips down a little, but pays most dearly for his experiment in the distressing cough the act has excit-

ed. You can't coax him to try that again until his burning thirst is so intolerable that he must have fluids. Ice in the mouth serves him the same way. He takes nothing willingly. This is no fancy picture. It is simply a statement of facts as observed in each one of my thirty-two cases. Some have not so much difficulty as others, but all have more or less; enough to do them a positive injury. It makes no difference when the child is taking fluids, whether it is lying down or sitting up, head bent to one side or the other, chin depressed on the chest or occiput thrown back. In any and all positions of the head, he can't drink without a dangerous amount of the fluid passing into the air-passages.

Since quitting intubation I have made tracheotomy in some cases; two of these recovered, making for me a total of five recoveries in eighteen tracheotomies. Never before my experience with intubation did I fully realize what a great blessing it is for a child, after tracheotomy, to be able to drink as fully and as often as it desired without endangering its life by coughing or having its lungs irritated by the fluid. I believe my personal experience warrants the assertion that tracheotomy will save every case that intubation will, and do it with much more comfort to the little patient and far less anxiety to the surgeon and parents.

In conclusion, I would say there is one condition in which I have found intubation of decided practical value. That is as aid to the after-treatment of tracheotomy. You are aware that tracheotomy tubes sometimes have to be worn weeks and months after the patient has recovered from the laryngeal stenosis. The text-books of current literature are full of such cases. The explanation has been that granulations grow in the upper angle of the tracheal wound and so obstruct its lumen when the tube is removed that air cannot pass through the larynx.

Surgeons have cut and burned off these growths once, twice, or it may be a dozen times; and still often they dare not leave out the tube for fear of suffocating the patient. The trouble I have found is not so much in the granulations as in the obstruction caused by the infolding of the cut edge of a ring or two of the trachea, at the upper angle of the incision into it. When the tracheal tube has been worn for days this infolding is well-marked, together with depressed condition of a whole ring or two of the trachea just above this highest incised one. This condition was most beautifully shown in one of my cases. I tried many times for three weeks, by snipping and burning, to get rid of the tube. Not till I placed the child in a good light and made careful examination of the part did I discover what was the matter. I found abundance of granulations, but they were resting on the incurvated parts, as I have mentioned. I introduced the laryngeal tube through the mouth and had the great satisfaction of seeing the infolding parts brought up to their natural position, and so the obstruction was removed. I immediately removed the laryngeal tube and did not replace the tracheal one, and the wound healed quickly without any further trouble.

The same experience I had with another case. I

shall keep my intubation set for just such cases. I shall not intube the larynx again till some modification of the O'Dwyer tube enables the child to swallow nourishment. Some one else, however, will have to do the experimentation first. No more of it for me.

DR. M. P. HATFIELD, of Chicago, said:

My experience with intubation, although much less, closely resembles that of Dr. Strong. The cases were ten in number; the insertion of the tubes in the first two being performed by Dr. Waxham, and the results were ten deaths. In four of the cases death apparently resulted from exhaustion, or diphtheritic poisoning, in the remainder from "Schluck-pneumonia," or that produced by food entering the trachea. Consequently, I believe with Dr. Tascher that the most valid objection against intubation is the dropping of food into the bronchial tubes and the resulting broncho-pneumonia. This ordinarily appears in the course of forty-eight hours, and is, and will continue to be, I fear, the most frequent cause of death after intubation. The insertion of the tube, even in the hands of experts, is not as easy as they would seem to imply, but this difficulty can be overcome more easily than the danger just alluded to. The tube often gives great, if not permanent, relief, but the more promising cases are the very ones in which the subsequent pneumonia appears. At least, such is my experience. It will be, I fear, that of the general practitioner who hopes to realize Dr. Waxham's gratifying percentage of recoveries.

Furthermore, it ought to be remembered that, while great credit is due to Dr. O'Dwyer for his patient and conscientious experimentation with intubation, it is not a new device. It was fully and fairly tried more than thirty years ago in France, and abandoned because the results were less favorable than those from tracheotomy. In fact, Bouchut, who proposed the instrument, finally abandoned it entirely because, in his own words: "The application of the cannula produces the results which might have been expected from an instrument of that nature. It delays asphyxia and avoids a grave operation, tracheotomy, which the progress of events might have rendered useless." Does intubation do more to day?

DR. MARY THOMPSON, of Chicago: I would like to ask Dr. Waxham whether he introduces the tube in the original way—anteriorly or posteriorly?

DR. C. W. EARLE, of Chicago: I wish to compliment Dr. Waxham for the introduction or revival of this operation in our city, and the skill with which he performs it. I think we, as a profession, and those more particularly engaged in the practice of diseases of children, are under great obligations to him for pushing this matter forward. The tabulated statement of cases which the doctor has presented to us this afternoon is very favorable indeed; although I think he is mistaken in believing that tracheotomy, in the hands of skilful operators, has not presented as good results. I am in favor of the operation when I can get Dr. Waxham to perform it for me. The trouble is that everybody thinks he can do it. It is like abdominal surgery—everybody believes he should be permitted to dabble in it, and many who have had no special study, practice or fitness, rush in to tube

the larynx. A large number of people will permit the operation of intubation who would not permit tracheotomy, and in my judgment many lives will be saved for this one reason. There are a certain number of throats to be opened, for we shall always have cases of laryngeal stenosis, and tracheotomy or tubage must be done. What we should insist upon is that only those specially fitted should be allowed to do this operation.

Dr. Waxham has undoubtedly saved more cases by intubation than any surgeon in the city has by tracheotomy; but if we knew all the unsuccessful cases which have taken place, the percentage would be small enough, and might not compare favorably with tracheotomy.

Some operators in this city have tubed the larynx many times and have lost every case, and they are now crying a halt for the operation. It is time for them to stop, or do as I do, send for Dr. Waxham. I have tried to do the operation with the doctor by my side: it was impossible for me to enter the larynx; but as soon as I relinquished the instruments to my colleague the child was relieved at once. I made this open confession before the Chicago Medical Society some weeks ago, and a quiet smile passed around the hall. If others had made this same confession and stopped operating (and among them some who perhaps smiled), it would have been better for the babies. I regard the operation as a justifiable one, and one which will save many, but I shall insist, as far as I am personally concerned, that none except those who are expert, those who have had a great deal of experience, and who thoroughly understand the technique of the operation, shall perform it. I desire to raise my voice against every person getting a set of these instruments which the doctor has exhibited, and every time he sees a child suffering with slight stenosis of the larynx, attempting to do this operation. I know a great many children are killed through lack of skill on the part of the operators. The only criticism that I desire to make, and I have made it before, is that Dr. Waxham represents that the operation can be done *with perfect ease by anybody*. I think that in this he is in error. He performs it easily, but everybody cannot.

DR. J. A. LARRABEE, of Somerville, Ky.: I regret coming in too late to hear the whole of the paper. The statistical showing is exceedingly rare, and Dr. Earle has more than covered the ground when he says that the great success is due to the skill of the operator. I have never performed intubation. I think there is but one physician in the city of Louisville who has performed it, and in every case the patients died. In three instances the tube was buried with the patient.

We have had this past winter an epidemic of diphtheria in our city, and in the moribund cases in which I was called upon to do the operation of tracheotomy, under the most unfavorable circumstances, as a *dernier ressort*, I operated fifteen times, with three recoveries; the three patients that recovered were all under 3 years of age, and the others 4.

DR. WAXHAM, in closing the discussion, said: I am very glad to have heard from Dr. Strong and from Dr. Hatfield, for it is only fair and right that we

should hear from both sides of every question. Because some have met with unvarying failure with tracheotomy, shall we denounce the operation? Because two or three have been unfortunate in their experience with intubation, shall we all vote the operation a failure? What do these gentlemen say when the statement is made that one operator has performed tracheotomy 100 times with but 1 success, and another 50 times with but 2 recoveries, another 20 times without a single recovery, and another 16 times with but 1 success, and still another 14 times without a recovery, making 200 cases by five operators with but 4 recoveries, or only one out of every 50? The failure of these gentlemen with intubation has more than its parallel in the history of tracheotomy, and I cannot understand why they should denounce one operation, and still uphold the other. Indeed, I cannot understand the reason of their failure, unless it be from the use of too large a tube, or from lack of careful attention in the management of their cases. I am not alone in my success. Dr. O'Dwyer reports to me 25 per cent. of recoveries, while Dr. Ingals, at the meeting of the American Laryngological Association, reported 514 cases collected from various sources with 134 recoveries, or 26 per cent., a percentage almost identical with my own.

If you have intended purchasing these instruments, by all means do so; learn to use them *skilfully* and *well*, and I assure you that you will never regret it. Do not be discouraged by the report of a few unsuccessful cases. I feel that if any operation was ever a Godsend to suffering humanity, this one certainly is.

In answer to Dr. Thompson's question, I would say that I still introduce the tube with the beveled surface forwards, and the projecting shoulder backwards. The epiglottis can more perfectly close the larynx with the tube in this position; and there is much less danger of ulceration.

In answer to another question I would say that, while the artificial epiglottis does not work quite as perfectly in the larynx as it does under my finger, yet it is of great assistance in swallowing.

There are many advantages that intubation possesses over tracheotomy, the chief one being our ability to gain the consent of the parents. We shall have a great many patients where tracheotomy would not be allowed. One of the most touching incidents of my life occurred not long since. I was called to perform the operation upon an interesting child of 4 years. The people would never consent to tracheotomy, and the mother left the room weeping and in the deepest distress at the thought of having even this operation performed upon her child. The nurse took the suffocating child upon her lap, and in about five seconds the tube was in position and the child perfectly relieved. The mother was recalled, and approaching the child, crying and wringing her hands in the greatest grief, the little one looked up to her with a smile, and said, "Mamma, I never said boo!" This certainly is a great contrast to the scene at a tracheotomy. But we must have other than æsthetic reasons for preferring intubation to tracheotomy. The crucial test is this: Can we save as many or

more lives by this method than by tracheotomy? The statistics bear me out in the statement that we can.

I have now under my care a little patient 9 years old who has been wearing a tube for two days.¹ The case was one of pharyngeal diphtheria, with extension of membrane in the larynx. There are two other cases of diphtheria in the family. The operation was performed to prevent impending suffocation, which had been increasing for two days. I would suggest that a committee of two be appointed to visit and examine this patient and report their conclusions through *THE JOURNAL* of the Association.

REPORT OF THE COMMITTEE ON INTUBATION.

TO THE CHAIRMAN AND MEMBERS OF THE SECTION ON DISEASES OF CHILDREN, AMERICAN MEDICAL ASSOCIATION, 1887:

Gentlemen:—In accord with the provisions of the motion passed by your Section on the afternoon of June 9, 1887—a motion which directed the selection of two members of the Section to visit with Prof. F. E. Waxham a patient upon whom he had performed the operation of intubation three days before, we the undersigned, your committee, visited the patient about 8:30 P.M. June 9. We found a girl, Minnie Smalley, aged 9 years, a light brunette, in the ninth day of an attack of diphtheria. Both parents, nurse and attending physicians, reported the child on the sixth day of her illness as apparently dying from dyspnoea. She was cyanotic, with thready pulse, and there were little hopes of her recovery when Dr. Waxham was called, and in a few moments succeeded in introducing a tube into the larynx with complete relief to all the threatening symptoms. A spray of diluted alcohol was ordered, or rather was permitted, and semi-solid foods directed. Dr. Waxham had not seen the patient again until the hour he called with your committee. We found the respiration perfectly easy, 28 to the minute, not noisy, an easy cough with muco-pus expectoration, voice a little hoarse and bronchial, lips red, skin dry, circulation good, pulse 125, soft, compressible, volume medium, temperature 101 $\frac{1}{4}$ °, tongue coated with a white fur-membrane still visible over arches and columnæ, but very thin and soft; adjacent parts red and inflamed. While we were present the child ate tapioca pudding freely without any cough or spasm whatever. She had not known there was anything in her throat until the day previous when her mother incidentally mentioned the fact. The improvement had been steady from the moment the tube had been introduced.

There were two other children sick with the disease in an adjoining room, but both cases mild. Dr. Waxham suggested a little more nourishing grade of food, and announced that he would remove the tube the following day, as it was a rule with him not to leave it longer than the fourth day, even if he was required to reintroduce within a few hours, giving as a reason the liability to the development of ulcerative action, and the danger in such case of the sloughing of the unhealthy tissues with the added complications resulting from such possibilities.

¹ June 16—Patient fully recovered.

It was the privilege of one member of your committee to be present next day, June 10th about 11:30 A.M., and witness the removal of the tube, which was done in the exact manner advised by Dr. Waxham in his monogram upon intubation. The removal was accomplished with an ease, a dexterity and a skill which was a revelation to those present, a revelation which exhibited the hand and the mind of the master in his chosen art.

Still clinging to the removed tube were pieces of false membrane from an eighth to a fourth of an inch in diameter, and as thick and firm as good strong blotting paper. The child said she felt no pain, nor special annoyance during the removal of the tube, and a few moments afterward ate freely of some semi solid food. Her condition was about the same as on the previous evening with perhaps a slight increase of debility and a tendency to heart failure, but still with many favorable symptoms giving strong hopes of recovery.

On the 14th inst., *i. e.*, on the fourteenth day also of the disease, we received from Dr. Waxham the following note dated the 12th inst.: "It gives me great pleasure to report that our little patient is now out of danger. The doctor informs me that the pulse to-day is 80, temperature down, strength improving, and that he considers that there is no further danger."

This adds one more success to the operation, and we assure you it adds two earnest converts to the importance and high value of the operation as a means of tiding over the most dangerous period in a certain proportion of cases of laryngeal obstruction in pseudo-membraneous disorders. Of course it requires thorough anatomical knowledge, manual dexterity, sound judgment, and well planned collateral management, but so does every other great success in hours of extreme danger.

We believe that every gentleman who provides himself with the necessary instruments should also further prepare himself by repeated operations upon the cadaver until he has acquired the necessary skill to do the operation with rapidity and ease, thus adding largely to the possibilities of its success. The celerity with which the operation may be performed, its freedom from local injury to the diseased tissues and its promptness in relieving a threatening fatal symptom, all commend its favorable consideration, and generally its preferable selection as compared with the older and possibly (?) more brilliant operation of tracheotomy.

We believe that Dr. Waxham deserves the thanks of the profession for his untiring and persistent efforts in giving this operation, with which his name will be always associated, the consideration it deserves, and in placing it in the high position to which it belongs in the list of remedial measures in desperate emergencies.

(Signed,) GEO. WHEELER JONES, M.D.
JOHN A. LARRABEE, M.D.
Committee.

Danville, Ill., June 22, 1887.

SUPPURATIVE INFLAMMATION OF THE ANTRUM.

Read in the Section on Ophthalmology, Otology and Laryngology, at the Thirty-Eighth Annual Meeting of the American Medical Association,

BY E. FLETCHER INGALS, A.M., M.D.,

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The mucous membrane lining the antrum of Highmore is liable to suppurative inflammation and a collection of pus which may partially or completely fill the cavity, if its opening into the middle meatus of the nasal cavity remains patent; but when the latter becomes closed by inflammation and swelling of the Schneiderian membrane, the pressure caused by the continued formation of pus may cause great expansion of the bony walls, and corresponding increase in the size of the cavity. This condition has been termed abscess of the antrum, but as, excepting the presence of pus, it is usually devoid of all the characteristics of an abscess of the soft tissues the term suppurative inflammation is more appropriate.

From the location of the antrum, immediately above the bicuspid and molar teeth, the fangs of which often perforate its floor; and from its more or less free communication with the nasal cavity, it would be expected that disease of its lining membrane would be frequent, resulting either from affections of the teeth, or extending from the nasal mucous membrane, which is so often inflamed. As a matter of fact, however, this disease cannot be considered common, for many physicians practice a lifetime without meeting examples of the kind. However, it is doubtless more frequent than generally supposed, for it not infrequently happens that the affection is simply called catarrh, and its real nature is overlooked for want of a careful examination. Inflammations in this locality are occasionally caused by external injury, and they are sometimes due to extension of the same process from the nasal cavity, but by far the most frequent cause is disease of the teeth. The normal opening from this cavity into the middle meatus varies from the size of a crow-quill to an opening nearly large enough to admit the tip of the little finger; in the latter condition the products of inflammation may be readily discharged, and a spontaneous cure may result without suppuration, but when the orifice is small it may readily become closed and then the pent up secretions become purulent and offensive. In the earlier part of the affection the patient is liable to experience a sense of weight in the part, or to suffer from more or less tenderness and pain in the teeth, cheek, orbit or frontal sinuses, but in some instances none of these symptoms are present, and in chronic cases they are often absent, doubtless on account of the secretions having found free exit into the nasal cavity, as the swelling of the acute inflammation subsided.

The formation of pus is usually indicated by an increase of the pain, which becomes of a throbbing character, and these symptoms are often attended by rigors alternating with flashes of heat. Together with these symptoms an unusual discharge is usually