

Tracheotomy in membranous laryngitis : the indications for its adoption, and some special points as regards its after-treatment / by Robert William Parker.

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TRACHEOTOMY

IN

MEMBRANOUS LARYNGITIS:

43

THE INDICATIONS FOR ITS ADOPTION, AND SOME
SPECIAL POINTS AS REGARDS ITS
AFTER-TREATMENT.

BY

ROBERT WILLIAM PARKER, M.R.C.S.,

ASSISTANT SURGEON TO THE EAST LONDON CHILDREN'S HOSPITAL; SURGICAL
REGISTRAR TO THE LONDON HOSPITAL.

Read November 26th, 1878.

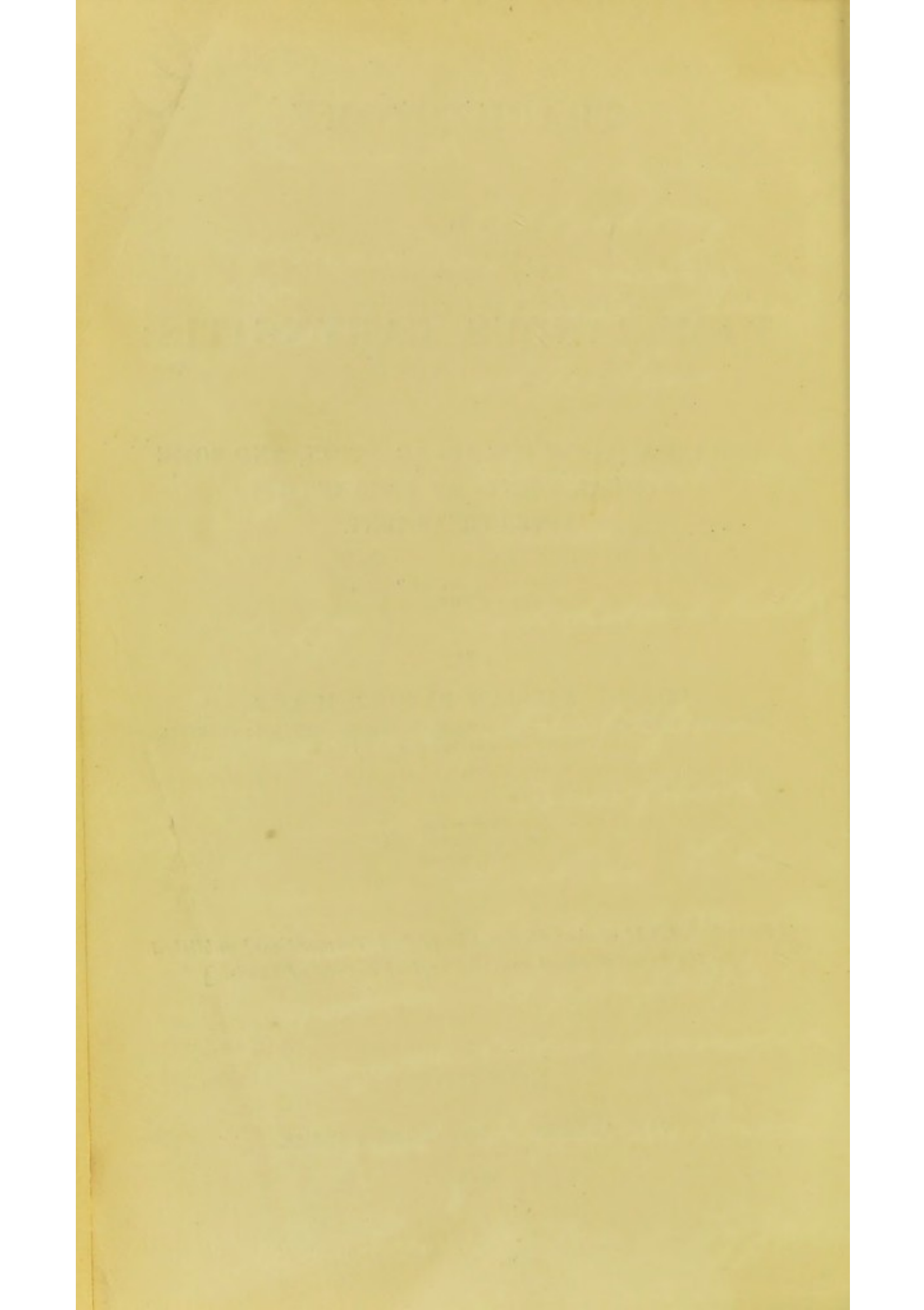
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(Received October 22nd—Read November 26th, 1878.)

“Un remède expérimenté vaut mieux qu'un désespoir assuré.”

TRACHEOTOMY is performed for various diseases involving the larynx, either directly or indirectly. It is, however, with cases of membranous inflammation of the larynx and trachea, either with or without pharyngeal complication, that I am at present concerned. It will not be necessary to discuss the identity or otherwise of these diseases, as the principles of surgical treatment, which I venture to submit for consideration will, I believe, be found applicable to all cases where laryngitis is accompanied by a deposit of membrane, leading to mechanical obstruction, whether they be called croup or diphtheria.

Before entering on the indications for the performance of this operation, I hope I may be pardoned, if I venture to

express regret that the surgeon is only too often called in after all therapeutic measures have failed, and the more so because these measures have generally included the use of depressants, which if not at once beneficial, have by their continued administration tended greatly to increase prostration, so often a predominant feature of the disease.

Briefly put, one may say, that tracheotomy is indicated in cases of increasing or persistent dyspnoea, due to mechanical obstruction in the larynx or trachea; the best test of the degree of this mechanical obstruction not being the apparent distress of the patient, but rather the amount of the recession of the chest wall, and supraclavicular spaces, especially in conjunction with suppression of voice, more or less complete.

The loud clanging cough, which is such a source of terror to the anxious parent, is really far less ominous than the hoarse whisper and the almost inaudible cough, which mean direct implication—one might almost say, with Niemeyer, inflammatory infiltration and paralysis—of the narrow chink of the glottis.

The indications for tracheotomy are the more urgent, when expiration, as well as inspiration, are alike laboured; for neither spasm nor paralysis will explain impeded expiration.

To wait for distension of the jugular veins, and until general cyanosis have supervened, is postponing the operation beyond the limits of mere mechanical obstruction; it is waiting for the advent of pronounced carbonic acid poisoning.

After deciding upon the operation, the first point, which has to be settled is, shall the patient be chloroformed? I have never seen any harm result from this proceeding; a very little chloroform usually suffices, and therefore advantage ought to be taken of the facilities, which it undoubtedly offers for a careful and deliberate operation. Care and judgment must of course be exercised in each individual case.

Coming to the operation itself, I agree with those authors who advise the high operation. In young children, the high

is more easily performed than the low operation. It would often be more correctly named crico-tracheotomy, involving, as it probably nearly always does, the cricoid cartilage and one or more tracheal rings. I have never seen any inconvenience result from cutting the cricoid. The position of the isthmus of the thyroid gland varies considerably in children. I have more than once seen it lying across the cricoid cartilage; it is, however, more frequently situated over the upper two or three tracheal rings. Whenever the isthmus is high, it is better to incise the cricoid, more space is obtained for the easy introduction of the tube; the old fear of its non-uniting or necrosing is, in my experience groundless. Should the isthmus ever be found really in the way it may be divided without hesitation, though it is perhaps better to depress it with the handle of the scalpel or with a blunt hook, whenever this is possible.

In common with Mr. Holmes and Mr. Marsh, I would insist on the advantage of thoroughly exposing the trachea before it is incised, for this allows us to make our opening with precision, and moreover facilitates the introduction of the canula. I believe also the danger of infiltration of pus into the muscles and intra-muscular planes during the subsequent course of the disease is diminished.

One of the greatest and most frequent impediments to a rapid operation is hæmorrhage. The veins of the neck are very numerous, and being over-distended they bleed freely when incised. It is difficult sometimes to know what to do, under these circumstances. I believe, however, that I may venture to advise what not to do; do not tie them, for this may give rise to thrombosis, which may prove dangerous from extension into the large veins. The hæmorrhage does not continue as a rule; if it be severe a pair of Dieffenbach forceps may be temporarily hung on; they can be removed as soon as the trachea has been opened and respiration re-established. I have never known hæmorrhage continue, or recur after the operation was once completed.

I would suggest the methodical use of a dilator after the trachea has been incised, rather than the immediate intro-

duction of the canula, because shreds of membrane and thick muco-pus can be expelled through a slit in the trachea more easily than through a silver tube.¹

I advise that a large feather be passed into the wound, downwards into the trachea, and upwards towards the glottis, so as to detach all the membrane as completely as possible. The presence of membrane or inspissated mucus in the larynx, above the tube, after tracheotomy, is often an unsuspected source and cause of reflex cough and irritation; there is a not unnatural tendency to the accumulation of exudation products in the larynx; some of them may have been deposited before the operation, a portion may possibly collect afterwards. In either case, the surgeon ought, every now and then, to clear out the larynx, so long as the patient is unable to do this for himself by natural means; and while he has to wear the canula in his trachea, he is unable to use the natural means, viz. coughing, owing to the fact that all air is diverted, from the larynx, through the tube.

This clearing away of the local manifestations of the disease is of the first importance, and it should be done in all cases before the child is removed from the operating table, seeing that it can be done more easily before than after the insertion of a tube, provided a suitable dilator be used. I venture to surmise that, after many a well-performed operation, in which, notwithstanding a careful incision of the trachea, the insertion of the tube has not been followed by relief, the secret is to be found in the fact that the trachea has not been cleared out. The tube may actually pass between the tracheal wall and a complete membranous cast,

¹ Mr. Holmes ('Surgical Treatment of Children's Diseases,' page 322) says, "If the air-tube has been well exposed and freely opened, a great gush of air instantly comes out, accompanied by violent spasmodic cough, and the free expectoration of blood, mucus, and false membrane, if present;" and in a footnote he adds, "False membranes may *sometimes* be seen in the wound. In such cases it is well to draw them out, and to wait for some little time before putting in the tube." It will be seen that I go further than this author, and would urge the importance of thoroughly clearing the trachea and glottis of all foreign matter in *every* case as a matter of routine, whether shreds of membrane protrude or not, before the introduction of a tube.

which it has but partially thrust aside. Indeed, I have a specimen illustrating this. The too-anxious surgeon often feels that his patient is not safe until the tube is inserted and he hurries to accomplish this. But let it be remembered that, with a dilator in use, immediate danger need not be apprehended; while, on the other hand, a tube inserted too soon may prove but a false security.

The trachea and larynx having been cleared out by means of a feather the tube may be inserted. Contrary to the advice of some English authorities,¹ I would advise the use of the largest tube which can be got into the trachea, without actual violence.

These surgeons argue that there is no need "for a larger opening than nature gives us." But I do not think that the narrow chink of the glottis ought to be compared with a silver tracheotomy tube. The depth of the former at the most is one quarter of an inch, the length of the latter at least one inch. Even supposing other things were equal, the mechanical power required to draw in air, or expel air and exudations, would vary in proportion to mere length or depth of the tube—the resistance or friction increasing, of course, with the length. This can easily be appreciated by any one who will endeavour to breathe, for some little time, through tracheotomy tubes of different lengths and sizes. Then again we have to remember that the strength of the patient is below normal, while the call for air—that is, the required number of respirations per minute—is increased in consequence of the disease, and possibly because a portion of the lung being *hors de combat*, the rest has to do duty for the whole.

Another very important advantage in using a large canula is the comparative facility with which the tracheal secretions are got rid of.

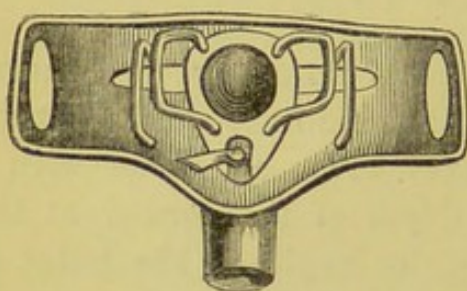
For these reasons, I venture to recommend the largest-sized tubes that can be got into the windpipe without actual violence; further, I would advise that they be as short as is consistent with safety. Seeing that scarcely any part of the

¹ Marsh, 'St. Barth. Hosp. Rep.,' vol. iii, p. 341; Holmes, op. cit., p. 324.

body is liable to vary in size and shape more than the neck, I refrain from giving any precise measurements for the tubes, but would say that the particular curve, calibre, and length of tube, will vary with each individual case, and can only be decided at the time of the operation.

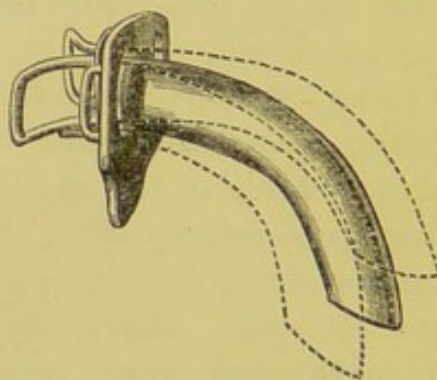
The most useful canula that I am acquainted with, is the one which M. Roger, I think, originally devised (Fig. 1). Its essential feature is the moveable collar.

FIG. 1.



Drawing of tube, showing mechanism of the moveable collar.

FIG. 2.



Profile drawing. The dotted outline shows the degree of movement

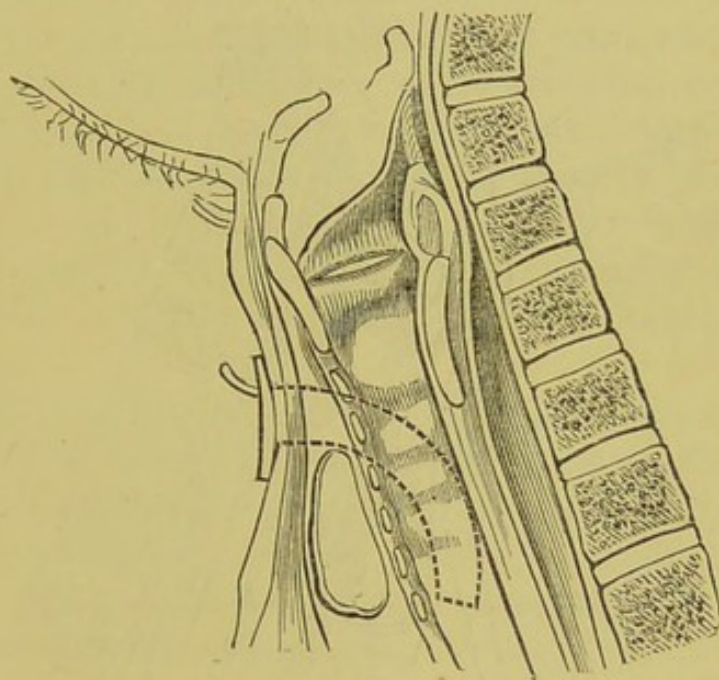
Fig. 2 shows how the tracheal part of this instrument can alter its position, and hence its curve, and how therefore it can adapt itself to a variety of necks, and to the ever-varying movements, which the trachea undergoes in talking, breathing, coughing, swallowing, &c.

The curve of the canula is a matter of great importance. For the most part, tubes are made in quarter circles. I do not consider the quarter-circle to be a good curve to adopt; in my opinion, it is from this circumstance *chiefly*, that ulceration of the anterior wall of the trachea is now and then met with. This is not remarkable when we consider the direction which the trachea takes.

The outline figure is copied from Braune's 'Atlas of Topographical Anatomy,' and its correctness was tested by a preparation which I made this summer at University College, with the aid of my friends, Mr. Godlee and Mr. Ottley. The

tube, in dotted outline, represents an ordinary canula of the usual quarter-circle curve. I think the drawing fairly demonstrates that such a tube must almost necessarily impinge and press upon the anterior wall of the trachea.

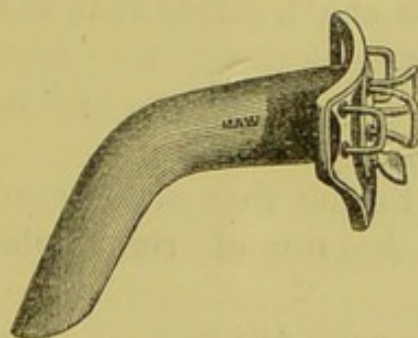
FIG. 3.



Sketch of trachea, with a dotted outline of the ordinary tube *in situ*.

With a view to diminish this risk, I now propose a differently shaped canula (Fig. 4). The direction of this tube,

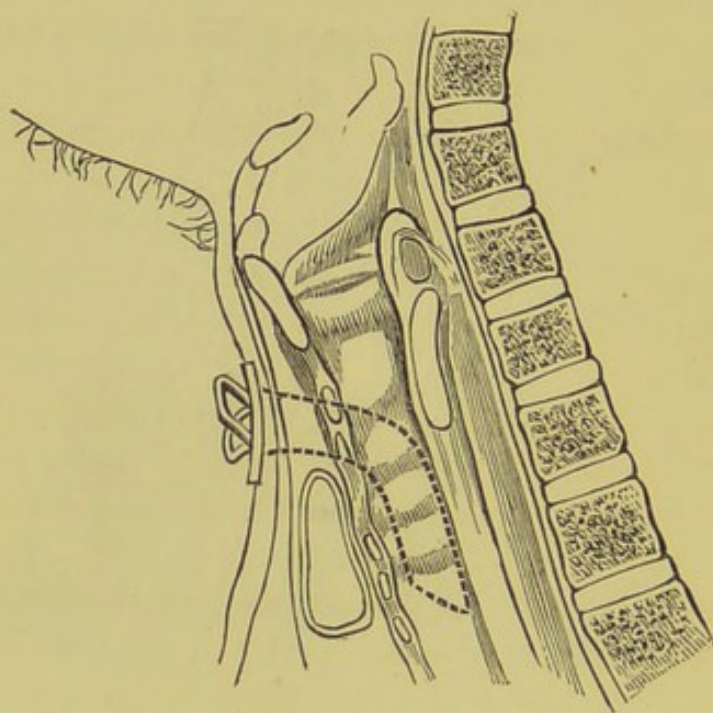
FIG. 4.



downwards and backwards, corresponds with that of the trachea. Such a tube can hardly press upon the anterior

wall of the trachea, and its moveable collar will also prevent pressure at the posterior part. I venture to think that it will be found useful. Fig. 5 shows the tube *in situ*, the outline figure being the same as that used in Fig. 3.

FIG. 5.



Sketch of trachea, with a dotted outline of the new tube *in situ*.

In describing the curve of such a tube, one may say, that its outline should approximate to the *Gothic*, rather than to the *Roman* arch. The tubes should, in all cases, be as short as is consistent with safety, and the lower orifice should be made at an acute angle, rather than at a right angle to the long axis, for this again lessens the danger of friction against the anterior wall of the trachea, and it also increases the area of the opening.

Mr. Baker,¹ believing that many disadvantages and some dangers attend the use of rigid tubes, has invented a flexible tube.

While I very much admire the ingenuity of the idea, and the excellence *per se* of flexible tubes, I cannot quite

¹ *Vide* the Society's 'Transactions,' vol. lx, p. 71.

subscribe to the imputations cast on the silver (rigid) tubes. Mr Baker would seem to imply that the dangers are due to the mere fact of the tubes being rigid, and no allowance seems to be made, either for a possible want of special knowledge and experience in the treatment of these cases, or for the use of ill-fitting tubes. When we consider the circumstances under which tracheotomy is so often performed, and that the operation is done chiefly by those who have had little or no experience, either in its performance, or in its after treatment, and further, when we come to think of the very small number of tubes which the surgeon, for the most part, has at his disposal, it will be conceded I believe, that there are other and potent reasons in explanation of some of the troubles which develop during the after-treatment of tracheotomy.

Ulceration is, in many cases, no doubt, produced by the pressure of an ill-fitting tube, but, under similar conditions, I believe, that the flexible tube would also produce a like result. I cannot think that pressure, sufficient to alter the curve of a flexible tube, could be exerted by the trachea, without giving rise to ulceration.

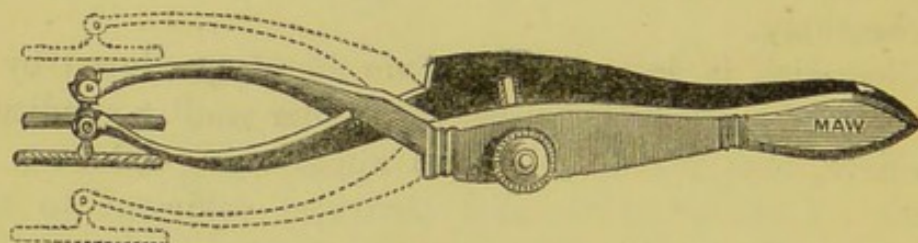
In other cases the granulations and ulceration are simply the result of the presence of a foreign body—to all intents and purposes, a canula is such—in the trachea, and in such cases the rubber would be just as likely to set it up as the silver; much on the same principle that a foreign body on the eye gives rise to inflammation, whether that foreign body be a fly, a grain of sand, or an inverted eyelash.

Cases of tracheal ulceration have occurred in my own practice, and that too, although I was fully alive to the possibility of its occurrence, and though I endeavoured to avoid it. I do not attribute this to mere rigidity of tube, but rather to my own want of skill, and to the use of tubes not suitable to my case. While, therefore, I most willingly admit the utility of flexible tubes, I nevertheless, for the present, reserve my judgment as to their comparative value. We must wait until their more extended use enable us to look back on the results obtained in other hands than those

of the inventor, before we can offer any reliable opinion on this point.

While on the subject of instruments, I would just allude to a little "automatic retractor" which I have had made. I devised it after having been once or twice suddenly called on to perform tracheotomy when there was no one to assist me, and I need scarcely say that it is a very awkward operation to do alone. Under such circumstances the "automatic retractor" will be found useful. The incisions into the soft parts having been made, the blades of the retractor are introduced closed (like an eye speculum), they are then opened to the required extent, and the screw is adjusted.

FIG. 6.



Automatic retractor.

It does not take the place of a good assistant, but it may occasionally be found valuable, when an assistant is not at hand, not only in tracheotomy, but even also in hernia, in the removal of small tumours, and in other and like operations.

Passing on to the after-treatment, properly so called, I ought first to mention, as perhaps, the most important, the advantage, indeed, the absolute need of well-trained nurses to take charge of the cases after the operation.

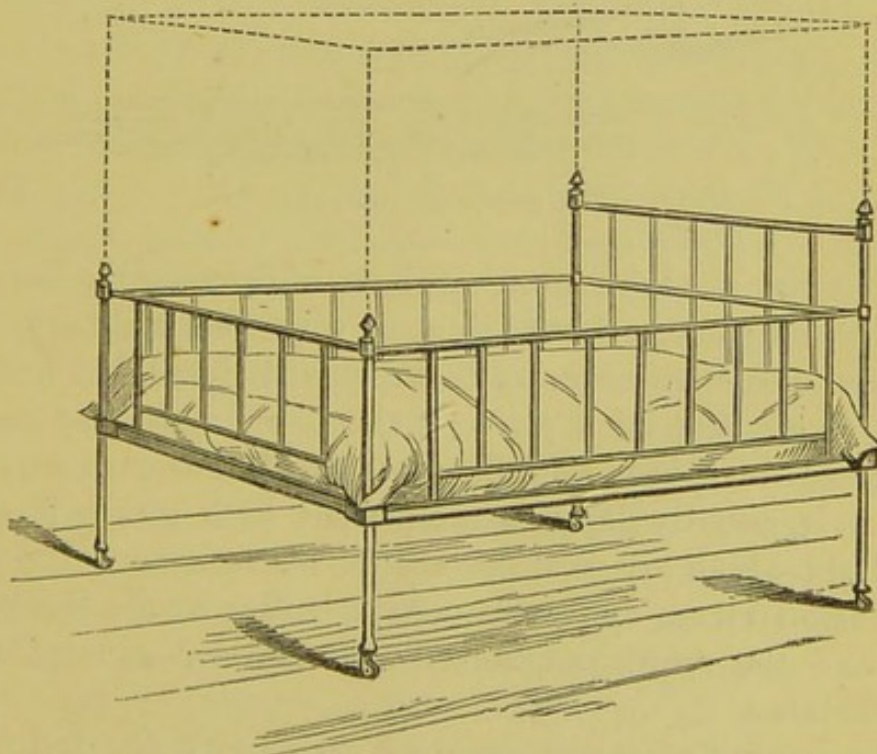
If we constantly keep in mind the chief object of the operation, viz. the easier admission of air into the lungs, we get one of the most important and useful indications for treatment. This indication I would formulate as follows:—*The air-tube is to be frequently and carefully cleared, in some way or other, of any retained membrane or other secretion, as soon as its presence is suspected.* Its presence may be suspected among other symptoms, 1st, by progressive dyspnœa,

general malaise, and restlessness; 2nd, by a whistling sound heard with each breath; 3rd, by suppression of the tracheal secretion which the presence of a canula ought itself to set up.

The presence of membrane in the trachea is dangerous from a two-fold point of view. 1st, it is dangerous because it mechanically prevents the entrance of air into the lungs; and 2nd, because it is infective. I would therefore advocate its early and complete removal and destruction, just as I should endeavour to get rid of it if I saw it attack an external wound.

Various means may be used to facilitate its removal. By far the most important of these is the inhalation of steam. For this purpose, the patient's bed should be surrounded with curtains. The plan I found in use at the Hospital for Sick Children, seems to me the most practical and best adapted to its purpose. A rod (wood or iron) is strapped to each one of the four legs or supports of an ordinary child's

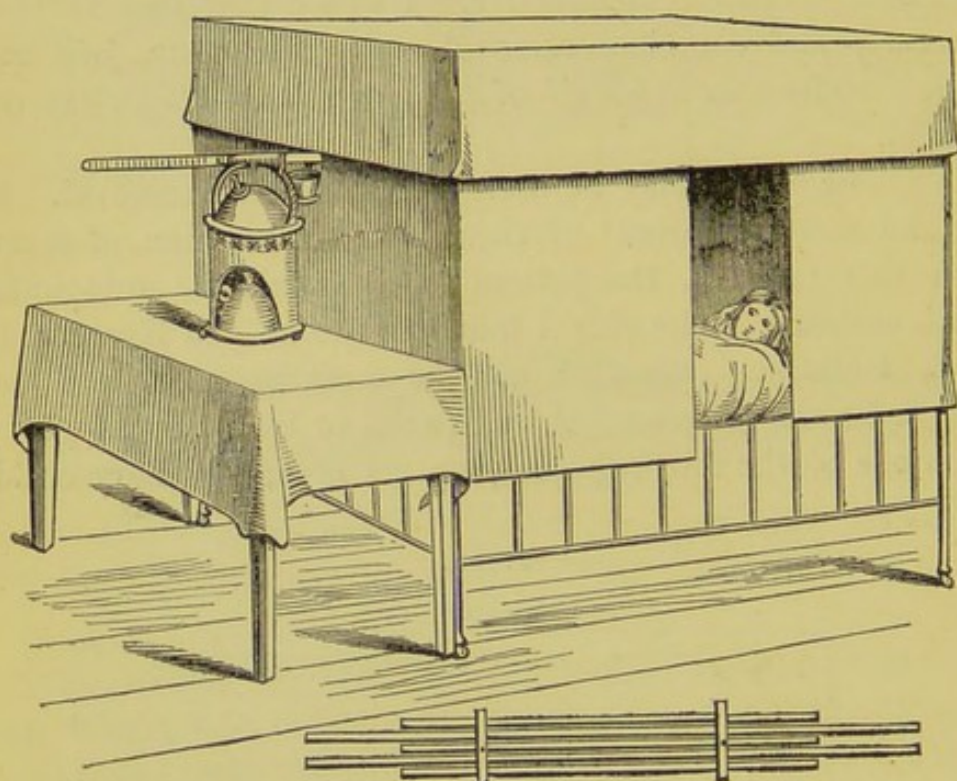
FIG. 7.



An ordinary cot. The dotted lines show the iron framework.

cot; these four uprights are then connected together by four other cross rods; in this way an open cot is converted into an old-fashioned four-post bed. Sheets are then thrown over this extemporised framework so as to cover the top, the two ends, and one side. The diagram explains the plan better than any words can.

FIG. 8.



The croup-bed complete.

The plan, at use in some hospitals, of drawing the bed close to the fire-place, surrounding it with the ordinary ward screens, and then covering them in with blankets, does not seem to me so good a plan as the one I have just recommended; for it is more difficult to regulate the temperature, and it frequently deprives the patient both of the fresh air and light which are so necessary for his recovery.

A *small* steam apparatus is kept boiling at the foot of the bed, and the requisite amount of steam is conducted inside the curtains.

The amount of steam required varies with the individual case. *An excess, however, is in all cases to be avoided, as it*

tends to depress the patient. The indication for steam, may, I think, be formulated thus:—The less there is of tracheal secretion, the more is steam needed; and the converse. Steam acts on the bronchial mucous membrane much as it acts on the skin; it encourages secretion; the secretion tends to loosen the membranous exudation, and so bring it within the current of the expired air. It thus facilitates its removal.

Steam, too, may be made the vehicle for important medication; thus, disinfectants, stimulants, sedatives or expectorants, may be added according to circumstances. The importance of systematically using disinfectants—especially in children's hospital practice—cannot be over-estimated. For this purpose either carbolic acid or kreasote may be used. The latter is especially valuable, since it possesses a decidedly stimulating as well as disinfecting influence. I have found it useful in cases where, owing to scanty tracheal secretion, the removal of membrane has been attended with difficulty. Amongst sedatives, the compound tincture of benzoin, with or without a few drops of chloroform, has given good results.

I shall now speak of *solvents*. By solvents I mean drugs, the action of which is to liquefy the membranous exudations. Among the most important are the alkalies, lime, soda, and potash. If portions of well-formed membrane be placed in different test tubes, severally containing a solution of saccharated lime, of carbonate of soda, of carbonate of potash, and of distilled water, very marked differences in result will be observed; the lime solution will dissolve the membrane in an hour or two; the soda and potash in a somewhat longer time; while the distilled water will not produce any effect for several days, and then only by decomposition. In any given case, where it is desired to liquefy the membranous exudations, one or other of these solutions may be tried. I myself prefer the soda solution. The lime is so quickly altered and rendered inert by the carbonic acid of the expired air, as to become practically useless. A solution of carbonate of soda (10—20 grains to an ounce of distilled

water) is very effectual. It may be sprayed in front of the canula and the spray inhaled; it is thus brought into immediate contact with the surface of the tracheal mucous membrane. This is to be continued for five or ten minutes, at longer or shorter intervals, according to circumstances. I do not wish to imply that this momentary contact of the soda with the membrane, acts in the trachea as it does after a lengthened interval in the test tube; fortunately, the membrane need not exist as such after the trachea has once been opened; for membrane is a gradual formation, and results, no doubt, from an aggregation of smaller particles. It is exactly on these smaller particles that the soda solution can, and I believe, does act, in the sense of liquefying them, of helping to detach them, and of rendering them less organisable.

Steam, often without any mechanical aid, materially helps in the expulsion of membranes; it is not well to trust to this alone. I make free use of large feathers,¹ and twirl them about in the trachea, so as not only to detach the membrane, but also to entangle it and draw it out through the tracheal wound. If a feather does not suffice, then recourse may be had to aspiration. For this purpose, a soft or elastic catheter answers very well. Care must be had to close the tracheal wound before suction is made, or otherwise, the aspiration is unavailing. The catheter may be inserted as far as it will

¹ The late Professor Trousseau at one time advocated mopping out the trachea. He says ('Clinique Médicale,' vol. i, Paris, 1861):—"When I first practised tracheotomy, following Brettonneau's example, I used to order the trachea to be mopped out, as low down as possible, with a sponge fixed on to a bit of whalebone. I have long discontinued this proceeding, as also cauterisation of the trachea which I used to practise. . . ." It is difficult to gather from this statement whether Trousseau's proceeding is comparable with my suggestion as to the methodical treatment of the trachea, either at the time of the operation or subsequently. It is, however, very probable that this treatment by Trousseau first gave me the idea of trying it. Trousseau, however (op. cit., p. 424), says, "It is a remarkable fact that, when once tracheotomy has been performed, we need not further occupy ourselves with the pharyngeal or the laryngeal manifestations of the diphtheria, which claimed such energetic treatment previous to the operation. They get well of themselves."

reach, without any fear, in cases where the disease has spread from the trachea into the bronchi. By this means membrane may be followed down deep into the chest, and success obtained, where without such means death would be inevitable.¹

The next question is, how often must the tube be cleaned, and how often must it be taken out. This will vary with each individual case. The interior tube may require changing every hour, or even oftener; when the temperature is high, the tubes also become heated, and the discharges the more quickly inspissate and adhere to the tube. The soda solution will be found useful in cleansing them.

Speaking generally, I would say that a free secretion from the trachea is not an unfavorable sign; on the other hand, a "dry tracheotomy" ought to be regarded with anxiety. These "dry" cases are especially tolerant of interference. I have seen a large feather introduced for several inches into the trachea, without giving rise to any reflex action. Of such cases I am always very suspicious, and should always give a most guarded prognosis.

The exterior tube, after the lapse of from twenty-four to thirty-six hours, ought also to be taken out and cleaned. This is an useful proceeding for many reasons; for it allows us to detect the earliest signs of unhealthiness in the exter-

¹ I may, perhaps, be allowed to say that much of this treatment will be found adapted to, and efficacious in, the early stages of membranous laryngitis. Indeed, I would recommend the use of steam with or without medicaments, and the spraying of the mouth and fauces with soda solution as soon as ever symptoms of laryngeal affection come on. If the disease commence primarily or at all severely in the pharynx, then the application of hydrochloric acid, as recommended by Bretonneau and Trousseau, is of great service. Strong hydrochloric acid, diluted with two or three times its bulk of glycerine, is the solution I would recommend. The secretion from a diphtheritic surface is peculiarly acrid and irritating; it tends by excoriating the mucous surfaces to spread the disease; it is, therefore, a source of danger, and it ought to be thoroughly destroyed. Whatever be the *modus operandi*—whether it merely substitute a simple for a specific inflammation as Trousseau taught, or whether it destroy the microphytes, which Oertel, among others, regarded as the source of the infection—matters little; it is beyond all question a most efficacious application.

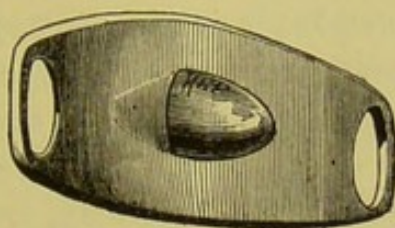
nal wound, and to apply appropriate remedies. Occasionally too, the tube is found to be discoloured; this suggests decomposition, and warns us to look out for possible complications. I think it is a good plan to have two tubes, identical in everything except length, and to use them alternately; this is one means of anticipating and preventing erosions. There is not much difficulty, as a rule, in reintroducing the tube after the first forty-eight hours have elapsed; but it is safe to have a dilator at hand in case of need.

Another advantage of taking out the exterior tube is, the opportunity, thus afforded, of testing the breathing power through the larynx. It is well to commence these trials early—say about the third day—before disuse has crippled the muscles which open the glottis; the attempts may be renewed once or twice daily, according to the encouragement which any individual trial affords.

The final removal of the tube is always an anxious part of the after-treatment. In many cases it is accomplished without any difficulty, in a few cases, it is a source of great trouble and not a little danger. It would be outside the limits of the present paper to enter at length on this subject. I must content myself with the briefest allusion. It seems to me, the most troublesome cases are those in which the difficulties arise from inflammatory thickening of the vocal chords, and of the muscles which open them. This leads to what is practically paralysis. In such cases the patients can breathe for an hour or two, and then difficulty comes on; in others, the patients get on well enough as long as they are awake; but the moment they fall asleep—and when, therefore, the accessory muscles of inspiration are also asleep—their difficulties at once come on. It is important to persevere with such cases. The tubes must be removed for as long as possible every day, in order to reimpose on the larynx its normal functions. Then, as soon as difficulty arises, the tubes must be replaced, in order to give the inspiratory muscles rest. The reintroduction of the tubes after a few hours' absence is not always easy, on account of contraction taking place in the wound. Under these circumstances, I have

found it useful to insert a little silver plug just long enough to reach the trachea, without, however, doing more than keeping patent the wound. A piece of moulded gutta

FIG. 9.



Plug.

percha will answer the purpose equally well, if a silver plug cannot be had. On removing the plug, the tube can be easily inserted; if there is still any difficulty, then the dilator may be used. Each case must be treated on its own peculiar merits. Mr. Thomas Smith contributed an exhaustive paper on the subject to the Royal Medical and Chirurgical Society in June, 1865,¹ to which the reader is referred for further details on this important matter

Most surgical authorities agree as to the non-dangerous nature of the operation *per se*, and a careful study of many published fatal cases, inclines me to think that exceedingly few die from the effects of the operation itself. The most frequent cause of death is the supervention of pneumonia, This complication has been attributed to the opening of the trachea; but it is worth noting that pneumonia seldom ensues on operations done for other morbid conditions (e. g. warty growths, foreign bodies, &c.); whereas, pneumonia is *constantly* found post mortem in cases of diphtheria, which have *not* been tracheotomised.

* * * *

Bearing in mind then, that the operation is undertaken, not as a curative measure but simply with a view to relieve a mechanical impediment to respiration; seeing, nevertheless, the great frequency with which, after tracheotomy, the

¹ *Vide* Society's 'Transactions,' vol. xlviii, 1865, p. 227.

trachea and larynx, on the post-mortem table, are found covered, not to say choked up, with membranous exudation (specimens of which may be found in almost every anatomical museum), I think, as a practical outcome of the foregoing paper that I may venture to enunciate the following dictum.

The presence of membrane in the trachea in a fatal case of membranous laryngitis after tracheotomy, must be regarded as evidence of the want of due care on the part of the surgeon in charge, just as much as would the presence of a piece of gut in the inguinal canal after herniotomy, or a calculus in the bladder after the operation of lithotomy.

APPENDIX OF CASES, in which the after-treatment, as advocated in the foregoing paper, was carried out by the author, or under his supervision.

Total Cases, 21: recoveries, 12; deaths, 9.

Where operated on.	Physician.	Date.	Sex.	Age.	Recoveries.	Fatal.	Remarks.
<i>Hospital for Sick Children.</i>							
Dr. West	.	Feb. 20, 1873	M.	3 years	1	...	Pharyngeal as well as laryngeal; severe case; tracheotomy; inflammatory œdema of neck; no sequelæ.
Dr. Dickinson	.	June 2, 1873	F.	1 year 8 months	...	1	Had been ill one week; pharyngeal as well as laryngeal; antimonial treatment at first; was almost moribund when operated on; died on the third day.
Dr. Dickinson	.	Feb. 25, 1874	F.	3 years	...	1	Antimony at first, with temporary amelioration; died forty-eight hours after operation.
Dr. West	.	May 23, 1874	M.	2½ "	1	...	The boy developed scarlet fever the day after the operation; he nevertheless made a good recovery.
Dr. Gee	.	Aug. 22, 1874	M.	2½ "	1	...	Operation four hours after admission to the hospital.
Dr. Dickinson	.	Oct. 11, 1874	F.	6 "	1	...	Other cases had occurred in the same house; she had been ill eleven days; operated on a few hours after admission.
Dr. Dickinson	.	Nov. 2, 1874	F.	8 "	1	...	Had been ill one week.
Dr. Dickinson	.	Nov. 19, 1874	M.	2¼ "	...	1	Antimonial treatment, then sulphate of zinc and ipecacuanha; child was comatose when operated on; never revived again; was made to breathe oxygen; died ten hours after operation.
Dr. Gee	.	Jan. 23, 1875	F.	2 "	...	1	The child died seventeen days after an operation under symptoms of general sepsis.
Dr. Dickinson	.	Jan. 30, 1875	F.	6½ "	1	...	Was convalescent from typhoid fever.
Mr. Thomas Smith	.	March 4, 1875	F.	3¼ "	...	1	Scald of glottis; diphtheria supervened on the sixth day.

Where operated on. Physician.	Date.	Sex.	Age.	Recoveries.	Fatal.	Remarks.
<i>Hospital for Sick Children</i> (continued)—						
Dr. Dickinson . . .	April 1, 1875	M.	4 years.	1	...	Had been ill four days.
Dr. Cheadle . . .	May 10, 1875	F.	3½ "	...	1	Vin. ipecac.; operation one hour after admission; died of erysipelas of neck and blood poisoning on third day.
Dr. West . . .	April 8, 1873	M.	5 "	1	...	Operation by Mr. Howard Marsh; after treatment by author.
Dr. Dickinson . . .	May 13, 1875	M.	3½ "	1	...	Operation by Mr. Howard Marsh; after treatment by author; boy still wears his tube.
<i>Private Operations.</i>						
Meredith Townsend, Esq.	April 13, 1875	M.	2½ "	1	...	Among other complications, had scarlet fever and nephritis; severe diphtheria.
Mr. Brend . . .	April 10, 1877	F.	11 "	...	1	Died of intense blood poisoning.
<i>East London Hospital for Children.</i>						
Author . . .	Sept. 17, 1878	F.	2½ "	...	1	Severe case; at the autopsy tubular casts were found in the small bronchi of both lungs.
Dr. Horatio Donkin . . .	Sept. 25, 1878	F.	4 "	1	...	Operation by Mr. Hayward, House Surgeon; the case was complicated by some inflammatory oedema of neck.
Dr. Eustace Smith . . .	Sept. 25, 1878	F.	2½ "	1	...	Operation by Mr. Hayward, House Surgeon; a cast of the trachea was got up at the operation.
Dr. Donkin . . .	Sept. 30, 1878	F.	9 months	...	1	Operation by Mr. Hayward, House Surgeon; child died suddenly; exact cause not known.



