unwillingly; not that it has not great claims as a much debated question, but that its debatable aspect is not exactly subject-matter for the present discussion. I have introduced it, because I wished to say something explanatory of the cases, so much relied upon by opponents, in which operation is not performed or is refused, and which yield to treatment. The difficulty of diagnosis between the two classes of cases I have specified, is probably the chief reason why there are so few existing trustworthy statistics to show the average mortality of croup and diphtheria when treated by medicine alone. The only table that I have been able to find is that of Dr. Ware of New York, quoted in Dr. Flint's *Practice of Medicine*. This gives nineteen fatal cases out of a total of twenty-two. If this represent the average mortality, the advocates of the operation have every reason to be satisfied. One recovery in ten without operation contrasts very unfavourably with the one in three or four after operation. A real comparison would be still more creditable to the operation. We may assume that only the milder cases of the former recovered, whilst, as it is only the severe cases that are tracheotomised, any recoveries must tell in proportion so much more favourably.

The last point to which I shall address myself is the operation itself. My own deliberate judgment in its favour must be looked on as the more emphatic when I state that, from my experience as well as from that of others which I have observed, it is one of the most serious in surgery. Observe, I do not say the most dangerous. It is, perhaps, the only operation the very performance of which, however skilfully done, is calculated to aggravate for a time the particular dangerous symptom for the relief of which it is undertaken. The manipulation necessary in order to open the trachea tends, until the entrance is freely made, to reduce to a minimum the already deficient breathing power.

On the cadaver the operation is so delightfully easy, that the young surgeon almost runs the risk of losing his presence of mind when called on to perform it in the case of a fat infant with a short thick neck, the veins of which, turgid with black blood, stand out obtrusively in the line of his incision.

As regards the prognosis after operation, we are fortunately enabled, from our own and other experience, to tell approximately what cases are most likely to terminate favourably. But, even in those considered most unpromising, namely, those of extremely tender age, there are recoveries enough to warrant us undertaking a grave operation, and counting on a chance of success. As I do not mean to dwell on the accidents of the operation, I shall conclude by alluding to what have been termed its unavoidable dangers. Assuming that it is skilfully performed, are there any dangers inseparable from it? Shock must necessarily attend it, as it does every serious operation; a danger directly proportional to the extreme youth of the patient. To that I shall return when I dispose of the second and only additional one, namely, congestion of the lungs or bronchitis as the result of the immediate contact of the cold and with the pulmonary mucous membrane. I confess my utter unbelief in this; but, even allowing its existence, it is quite a preventable danger—a pure accident—and therefore can be guarded against. The shock is unquestionably a necessary concomitant. I do not wish to underestimate its seriousness, and I believe it is the principal cause of danger in very young infants; but if we place in the opposite scale the immediate and complete oxygenation of the blood which follows a free opening in the trachea, the consequent resumption of all the vital functions, and the cessation of the exhausting and ineffectual struggles for air, I think we shall see a counterbalance sufficient to outweigh any risks we may incur.

As to the proper time for operating, I have said nothing; that must depend on individual judgment. In my own hospital, whose surgeons all hold my opinions on the subject, we lay much stress on the occurrence of substernal sinking in respiration, a symptom which shows that, whilst the diaphragm is contracting, the lungs are not descending.

In conclusion, I and many who believe with me hope to hear at this meeting an echo of the sentiments which actuate those in other lands whose practice we have endeavoured to imitate here; which will give us the satisfaction of thinking, whatever the results may be, that we are acting in accordance with the views of the most advanced and most enlightened of our profession.

THE cost of the milk supplied to the patients in the Mercy Hospital, Cork, during the past year, amounted to £120, or nearly a tenth part of the entire cost of the hospital. In reference to this matter, the medical officers of the institution remark that, in addition to the prescribed dietary, they have always given directions that milk should be allowed to the patients without limit, it being a cure as well as part of the diet, containing, as it does, every element essential for the formation of healthy blood, and renewing and restoring the tissue of the body worn out by a combination of severe labour and disease.

TRACHEOTOMY IN CROUP.*

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

Assistant-Surgeon to the East London Hospital for Children.

FEELING how impossible it is to treat this subject at all fully in the short space of time which the rules of this Section accord me for my paper, I have considered it well to be somewhat dogmatic in the expression of my views, which, with a view to elicit discussion, shall take the form of propositions. If I have appeared to ignore the work of others in this same subject, it is simply because I have not the time to do them justice, though I am nevertheless well conscious of the obligation I owe them.

It seems to me quite impossible to rightly estimate the rôle of the operation of tracheotomy in "croup", without first of all defining the term croup; for something like definite notions on the pathology as well as on the etiology of the disease are clearly necessary before we can hope successfully to cope with it. For the purposes of this debate, I shall consider "croup" to signify "membranous laryngitis". Thus it will include both membranous croup and laryngeal diphtheria, respectively so called. I may further be allowed to state that I consider all forms of membranous laryngitis to have a common etiological significance. The diseased process is at first a purely local one; the constitutional symptoms depend on the absorption of the products of the local disease. The treatment should, therefore, at first be local; its success will depend on its power of destroying all local manifestations.

A typical case of so-called "croup" no doubt presents symptoms which differ widely from those produced by well-marked diphtheria. The former depend on threatened asphyxia; the latter are those of blood-poisoning. The differences are due to the function of the part chiefly or primarily affected. Many a well-marked case of "croup", in which tracheotomy has averted death, has subsequently developed into equally typical diphtheria, time having allowed the disease gradually to unfold itself.

As regards the operation of tracheotomy; the first point to remember is, that it is not a curative measure in the true sense of the word; it is done for the purpose of re-establishing respiration, which false membrane in the larynx has interfered with. The disease, of which the membranous exudation in the larynx is but the outward manifestation, cannot be influenced by the mere act of opening the trachea; and yet it has hitherto been the rule to suspend all other treatment from the moment that tracheotomy has been performed.

The dangers of the operation have all along been greatly exaggerated, probably because a great number of patients die *after it*. A careful examination of the published statistics, however, shows that *few die in consequence of the operation*. On the contrary, it is perfectly obvious that the majority die of the disease which originally called for an operation.

I venture to believe that the causes which contribute to the large mortality *after tracheotomy* may be summarised under three heads:

1. A routine and too long continued use of antimony in the preliminary treatment;

2. Delaying the operation until secondary complications render success all but impossible;

3. The withholding of suitable treatment after the operation.

1. As regards *antimony*; I have several times seen a state of depression brought on by its use, from which it was almost impossible to rouse patients. For my part, I believe that any favourable action which emetics exercise is due to their mechanical action. They cause retching and vomiting, and so detach the membrane, which is then coughed up. In this way the glottis is cleared. If emetics be used, it is highly important to select those which do not depress. Sulphate of copper, I think, will be found the best (ten to twenty grains in two to three ounces of water; giving half an ounce every five or ten minutes until free vomiting is produced). As a general rule, I should say, *if the laryngeal obstruction be not quickly relieved after free vomiting, it is useless and undesirable to continue the use of emetics*.

2. An *early operation* is of great importance; for, if it be unduly put off, secondary complications are apt to occur, which materially decrease all chance of success. This continued laryngeal obstruction leads to collapse of portions of lung, which condition cannot be recovered from. Further, the disease is all the while spreading nearer and nearer to the lungs, where it is impossible to get at it. And, lastly, a condition of carbonic acid poisoning is being allowed to supervene, for which neither tracheotomy nor anything else can avail.

3. *The Continuation of Treatment*.—I do not hesitate to ascribe a vital importance to the continuation of treatment; for I regard the

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operation simply in the light of a temporary expedient, and believe that, when the danger of suffocation has been set aside, the surgeon's real opportunity then commences. At present, however, this seems to be the exception rather than the rule; and many physicians and surgeons regard the operation in the light of a last effort, and, having done it, await the result with folded hands. Even the great Trousseau, who did so much to popularise the operation, wrote: "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 measures previously to the operation. They get well of themselves."

The views I have briefly expressed in this paper may be summed up as follows.

1. The presence of membrane in the larynx is the chief cause of the symptoms which call for the operation.
2. Membrane is infective as well as obstructive. The re-formation after removal is the visible evidence of an infective process still active in the body.
3. The chief object of the operation is to remove this membrane.
4. The chief object of after-treatment is the prevention of any re-accumulation.

The limits of this paper prevent my entering into the subject of the after-treatment, which is a very large subject. Neither is it necessary before an assembly of surgeons such as this. Each one will be able to devise for himself a line of treatment suitable to the requirements of the individual case. As regards the treatment which I personally have been led to adopt, I will only say this: it consists in a careful treatment of the larynx and trachea, with a view to destroy the local manifestations of the disease; in the use of a limited amount of steam; and in the employment of silver tubes, the curve of which corresponds to the anatomical direction of the trachea.

As regards the future of the subject, I venture to think that we need the formulation of certain broad facts. Is "croup" a purely local disease at any time? Is it likewise an infective one? Then, if a local disease, can general remedies alone influence it? And is not the omission of local treatment therefore reprehensible? Are there not palpable analogies between diphtheria and hospital gangrene? What surgeon would be content with purely internal remedies for these diseases?

TRACHEOTOMY IN CROUP.*

By WILLIAM THOMSON, A.B., F.R.C.S.I.,
Surgeon to the Richmond Hospital, Dublin.

I DO NOT think that any more urgently important subject has been set for discussion at this meeting of the British Medical Association than that of tracheotomy in croup. It is of special interest in Ireland, because the professional feeling regarding the operation is not favourable, if it be not hostile. In Dublin, at all events, which is the centre of Irish medical opinion, the operation is not generally practised; and to those who see good in the proceeding it will be a great pleasure if discussion here should give it increased prominence.

On two occasions, I have brought this subject before the Surgical Society of Ireland, and have pleaded for at least a trial. My first cases were all fatal, but I was upheld by my own belief that the operation was a justifiable one, and by the personal encouragement of Mr. Spence of Edinburgh. On the second occasion, I was able to report success. As time has gone on, and the results have appeared more hopeful, it has been not a little encouraging to notice the gradual toning down of opposition in some, and the declared conversion of others. My own experience of the operation extends to six cases, besides a large number in which I have assisted my colleagues and others; for, in the Richmond Hospital, the staff adopts the principle of surgical relief when necessary. My success has been two, the fourth and sixth respectively; both occurring in hospital practice. Let me give a very short *résumé* of the cases.

CASE I.—A boy, aged 5, had been ill three days before admission. There was no sign of membrane on the tonsils or pharynx. Tracheotomy was performed on the fourth day from the commencement of illness. He lived thirty-seven hours. *Post mortem* examination showed membrane throughout the bronchi.

CASE II.—A boy, aged eighteen months, had been ill for several days. No membrane was visible. Tracheotomy was performed. He lived fourteen hours.

CASE III.—A boy, aged 5, had been very ill one day before admission, but had been complaining for some days. No membrane was

visible. Mercury and tartar emetic were administered. Great relief was derived from the operation. Death occurred on the third day, after a violent paroxysm caused by blocking of the tube.

CASE IV.—A boy, aged 5 had been ill for three days. No membrane was visible. Mercury and tartar emetic were given; leeches were applied to the upper end of the sternum. The symptoms becoming more urgent, I operated next day. A large piece of false membrane was removed from the trachea with a forceps. The relief was immediate. On the fourth day, the temperature was 99°; respirations 44. The tube was removed and a considerable portion of membrane was ejected. The tube was altogether removed on the eighth day, and the boy was discharged quite well in four weeks.

CASE V.—This was the case of a little girl aged 3, whom I saw in the King's County, in consultation with my friends Dr. Saunderson, senior, and Dr. Saunderson, junior. The child had been several days ill. Mercury and antimony had been freely administered without improvement. Operation was performed, with great temporary relief, but the child died in nineteen hours.

CASE VI.—A boy, aged 4½, had been ill for several days. There was a membrane on the left tonsil. Mercury had been administered. When I saw the case with my colleagues, the symptoms were judged urgent, and I operated. The child made an uninterruptedly good recovery, the tube being permanently removed on the seventh day.

I take it that the form which our inquiries ought to assume is: 1. Under what circumstances ought the operation to be performed? 2. What conditions will tend to ensure its success?

Now, it may be necessary for some that we should assure them that the surgeons who adopt this method do not look upon it as the remedy for croup or diphtheria. On the contrary, all are ready to admit the advantage of medication up to a certain point; but, when failure to relieve is the result, the surgeon asks that some regard should be had to the good offices which surgery can render; and that the struggling dying child shall not be abandoned to death without one effort to save it at least from pain. Our opponents point to our results as justifying their opposition. Unhappily, they do not show a high percentage of recovery; but, at least, they show better than the results of the same class of patients left to medicine only. In a large number of cases, I have seen one only recover without operation, in which operation was proposed. Steiner, who has seen one hundred thousand cases of children's disease, says: "Out of quite a large number of cases occurring in my practice, before I had adopted the operation of tracheotomy, I saw but three recoveries." (Ziemssen.) But it is further to be said in our defence—for that is necessary—that the surgeon rarely sees the case until all the damage is done; when, indeed, its state almost accords with one of Liston's reasons against operation: that when done too early, it is dangerous; and when done too late, it is useless. The history of a case of croup, as we usually see it, is that the child has been ill for some days; that then it has been brought to the physician, who uses his remedies. These too often fail, so that the surgeon sees the child when it has been dosed with mercury or tartar emetic, or both; when the lungs are becoming engorged with carbonised blood; when the nerve-centres are being poisoned; when, in a word, the child is in a condition which almost precludes success from any opening in the trachea. Yet even here, the results are very encouraging, as any one who has watched the effect of such an operation must admit; for, where life is not saved, the patient is relieved from the pain that otherwise accompanies his death.

I have said that I believe in medication up to a certain point. In some of my own cases, calomel and tartar emetic were given, in the hope that the patient was yet in the pre-exudation stage, and that the tumidity of the membranes might be reduced by this means and by leeching. But when a membrane is present in the larynx and trachea, I do not believe that calomel does anything but harm; it will not remove it, and the giving of it only leads to hopes that are disappointed and to the loss of precious time. If any good is to be done, it is by emetics of ipecacuanha or sulphate of zinc; and this plan ought to be tried. These are preferable to tartar emetic, which is too depressing, particularly as it may not cause vomiting, owing to paralysis of the pneumogastric nerve, and may then help to kill the patient.

As the obstruction in the air-passages increases, there are indications which point urgently to the necessity of some relief. These are the sinking in of the chest-wall, especially of the lower end of the sternum; of the soft parts about the root of the neck in front; and of the epigastric region. They can all be easily recognised in a bad case; and, although the lips may not be blue, nor the symptoms of collapse yet be present, I would recommend operation; for, if the membrane cannot be expelled, these other symptoms will only too surely come, which indicate lower vitality and less fitness for surgical interference.

Those who hold the identity of croup and diphtheria maintain that tracheotomy cannot do good in a case of constitutional disease, because

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