IS TRACHEOTOMY IN TRUE CROUP

A JUSTIFIABLE OPERATION?

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TRACHEOTOMY IN TRUE CROUP.

As a general rule, Is Tracheotomy in true Croup a justifiable operation?

Are there any objections to its being always performed?

These are questions of great importance, and Tracheotomy in Croup being the subject for discussion by the Surgical Section of the Academy of Medicine, I feel constrained to occupy the time of its members by stating my views on the matter.

The great ability, learning, research, ingenuity and plausibility displayed by the advocates of the revival of the (almost exploded) operation of Tracheotomy in Croup, demand sober reflection as well as strict investigation, inasmuch as the character of the Academy might possibly be placed in jeopardy for sound judgment and discrimination, by recommending or endorsing a practice which future experience might demonstrate and prove to be erroneous and uncalled for, as well as derogatory to scientific operative surgery.

For these reasons, as a member of the Surgical Section, I am compelled to protest most earnestly against the operation of tracheotomy in true croup. The consideration of the question, with a view to a satisfactory resolution, calls for an examination of various circumstances connected with the disease known as true croup. Such being the case, I will proceed to illustrate my views as concisely as I can consistently with perspicuity.

The first question that naturally suggests itself to the inquirer is, What is Croup?

In the language of MAUNSELL and EVANSON on the Diseases of Children, "It consists of an inflammation of the mucous membrane of the larynx, trachea, and bronchial tubes, usually ending in the formation of a membranous concretion on the internal surface of these parts." (See page 310.)

BOUCHUT says: "The presence of a false membrane on the surface of the mucous membrane of the larynx is the fundamental anatomical character; without this formation, croup does not exist." (See page 259.)

The definition of croup, as just given, merely describes the pathological condition of the parts implicated, which is only the effect of a previously diseased action of these parts.

The question now suggests itself, What is the primary or exciting cause of the pathological state of the organs alluded to?

It is a philosophical maxim, that there is "no effect without a cause;" it therefore follows, that detailing the pathological phenomena of a disease, without explaining its cause, is not sufficient to promote and insure the grand objects of medicine and surgery, which are not only to prevent, but to remove, diseases after having seized on their victims.

How can this object be scientifically or satisfactorily accomplished without knowing the cause of the disturbance?

What, then, is the cause of true croup?

The answer to this interrogatory leads to the particular circumstances connected with the patient's history and mode of life previous to and on being attacked with the disease.

I will answer the question just proposed in the language of MAUNSELL and EVANSON: "It is also observed to be endemic in certain situations, especially in the neighborhood of seaport towns and about the mouths of large rivers, where the inhabitants are exposed to the effects of a damp alluvial soil and moist atmosphere, and at the same time, usually suffer the privations incidental to a dense state of the population."

Dr. STOKES says: "The disease is sporadic, and in certain situations endemic, but never contagious."

BOUCHUT: "Croup, then, is an epidemic disease. It much

more frequently appears in a sporadic state, and it is thus that it is generally observed."

It is now evident that, in the localities where croup is sporadic or endemic, the atmosphere must be charged with the exciting cause of croup. As the susceptibility of contracting croup is connected with residing in a certain locality, it follows as a consequence, that the locality contains the poisonous agent or exciting cause of croup.

In corroboration of this assertion being true, it is an incontrovertible fact, that a person living in the neighborhood of swamps will be attacked with intermittent fever, the atmosphere being charged with marsh miasmata; there cannot be the slightest doubt that the marsh miasmata is the primary or exciting cause of intermittent fever. The air in one locality contains a poison capable of inducing croup, and in another, a poison capable of ushering in intermittent fever.

Additional proofs that the air contains the poisons just mentioned are afforded by what occurs when a person who has not been vaccinated visits a patient having small-pox, or another who visits a patient having typhus fever, measles, or scarlatina, and who, after respiring the air for some time, returns to his home, where he is, after a certain interval, attacked with small-pox, typhus fever, measles, or scarlatina, as the case may be. It cannot for a moment be doubted that the poison contained in the air of the patient's room is the exciting or primary cause of the disease which has seized on the individual. In all these cases, the air contains a specific poison, which will give rise to certain symptoms or appearances which are known by specific names, such as croup, intermittent fever, small-pox, typhus fever, &c.

It cannot be too forcibly impressed or inculcated, although it appears to be extremely simple and very easily understood, that the poison contained in the air must unquestionably pass with the oxygen of the air into the blood, and that it must most assuredly be given off with the oxygen to the glands at the termination of the arteries. The truth of this fact is proved by unmistakable evidence, after some time, on the surface of the body. I cannot help asking, Is the explanation of this mode of poisoning so incomprehensible, so far-fetched, so unfounded,

so utopian, so original, as to baffle the understanding, to create an irresistible incredulity in the mind, to present an insoluble enigma to the intellect or hidden mystery to mankind? Certainly not; nothing can be more easily conceived than the mode in which the specific poisons are communicated, or the mode in which medicines operate to remove disease. Indeed, a true knowledge of the operation of this process of poisoning must be deemed the *summum bonum* of medical science, as it enables the physician to treat disease on true principles.

Having now, I trust, fully and clearly established that true croup is the effect of a specific poison introduced into the animal economy, the question now suggests itself, How does the poison get access into the body? This question must be answered by inquiring, How does the oxygen obtain entrance into the blood?

It is admitted by all, even the most skeptical and incredulous, that the oxygen of the air passes into and becomes incorporated with the venous blood during the process of respiration; as the air is fully impregnated with the poison, there can be no difficulty in accounting for its ingress into the blood, namely, by the same process as that by which the admission of the oxygen into the blood is accomplished.

The next question is, When the poison becomes incorporated with the blood, how is it disposed of, or what becomes of it?

This question must be answered by asking, What becomes of the oxygen, or how is it disposed of? It is unquestionably ascertained that the blood retains its oxygen to the most minute arterial branches which can be discovered. It is an indisputable fact, that at the termination of the capillary arteries, the blood gives off the oxygen. It is equally true, that the smallest capillary veins contain blood totally deprived of oxygen; it therefore follows as an irresistible conclusion, that the blood gives off its oxygen at a point corresponding to the termination of the capillary arteries and commencement of the capillary veins.

The explanation of the mode in which the oxygen is given off is equally applicable to the mode in which the poison is communicated.

Having shown that the poison is given off at the termina-

tion of the arteries, when the blood gives off its oxygen, the question arises, What next becomes of the poison?

This question must be answered by asking, How is the oxygen disposed of, when there is an excess of it in the blood?

Every person knows, if a man runs a distance, his breathing will become quickened, that his surface will become hot, and that he will experience thirst; and that, on taking either a cold or warm drink, and continuing the exertion, he will be immediately imbrued in a copious perspiration; drops of serum or water will fall from the surface of the body.

It is a clear case that this serum transudes through the pores of the skin.

The question now suggests itself, What are the constituents of the serum?

The answer is, that serum is formed by oxygen, hydrogen, and certain salts.

The next question is, Where is the provision made for the secretion of so large a quantity of fluid?

The answer is, by the excess of oxygen introduced into the blood by the increased respiratory process, and the introduction of the cold or warm water through the lacteal, lymphatic, and venous circulation into the arterial blood.

It is a fact, therefore, that the water, introduced by the mouth into the stomach, passes off by the skin.

The next question is, How is the water secreted from the blood?

This question must be answered by asking, How is the urine secreted from the blood in the kidneys?

How is the semen secreted from the blood in the testicles?

How is the bile secreted from the blood in the liver?

How is the gastric juice secreted from the blood in the stomach?

These questions must be answered by stating that a glandular organization has been instituted for these purposes, which is provided with ducts or tubes for carrying off the excretion; as is well exemplified in the cases of the kidneys and liver. A similar provision exists on the internal and external surface of the body for secreting the cutaneous perspiration, charac-

terized by excretory ducts visible to the naked eye—namely, the pores of the skin.

To revert to the question as to the manner in which the excess of oxygen is disposed of when the water is introduced into the blood, it is to be observed, the glands are endowed with the vital faculty of uniting the hydrogen of the water with the excess of oxygen in the blood, thus forming water or serum, which is carried off through the pores of the skin; that the serum is formed in this way, and that the glands are secreting organs, is still further proved by the fact of the serum containing saline ingredients.

It is evident that water taken into the mouth gets into the stomach, and passes with rapidity by the lymphatics and lacteals into the blood. It is equally evident that the water thus taken passes out through the pores of the skin. It is equally true that the water which passes through the pores of the skin contains certain salts, which are not found in the water imbibed. How, then, is the change in the water produced? Or how is the water separated from the blood? The answer must be, by the secreting glands, in which the arteries terminate, the capillary veins commence, and which are furnished with excretory ducts—namely, the pores of the skin.

If it is true, as I maintain—and I have demonstrated its truth—that the glands are endowed with the power of removing the excess of oxygen from the blood, which overstimulates the glands, thus overheating the surface of the body, it follows, as a necessary deduction, *that the glands* should endeavor to *throw off* by the *process of secretion* whatever has a tendency to *interfere* with their *functions*, or be *injurious* to the *vitality* of the individual. Thus it is that they *attempt* to *remove intermittent fever* by the process of *secretion;* hence the copious perspiration which follows a paroxysm; hence the *secretion* on the *surface* in case of *small-pox;* hence the secretion on the surface in cases of *measles* and *scarlatina;* hence the *secretion of lymph*, constituting what is called the *false membrane*, in case of *croup*.

But, as objections may be thrown out against the validity of this explanation, I will endeavor to meet them, as well as fully to remove all difficulties surrounding it.

It is a physiological truth, that even when a person is in the best health, certain poisonous or deleterious agents require to be continually removed, in order to keep the body in a healthy condition. For this purpose, certain organs are instituted—as, for instance, the liver and kidneys.

It is true, that unless certain poisonous substances, which are found in the bile and in the urine, were carried off, poisoning would be the result, and life destroyed, as effectually as by the *poisons* of *small-pox*, *typhus fever*, *intermittent fever*, or *croup*. But it is to be remarked, that although ample provision is made for the elimination of poisons incidental to the natural state of the individual, yet no provision is made for the removal of extraneous or foreign poisons; as is exemplified in the cases of fevers and croup.

In this state of things, life adopts the best course that can be taken in the emergency, and selects other organs or parts of the body for the purpose of meeting the unlooked-for contingency of getting rid of the poisons: as, for instance, in the case of *intermittent fever*, the *skin;* in the case of *small-pox*, the *skin* and *mucous membrane;* in measles and scarlatina, the *skin* and *mucous membrane;* in the case of croup, the *air-cells*, *bronchial tube*, *trachea* and *larynx*.

The late Mr. Hunter, whose name will live forever, stated that inflammation was a salutary process. His opinion on the subject cannot be questioned. Inflammation is a vital process to remove something obnoxious from its abode in the body. A healthy abscess, when its mode of operation is understood, confirms the truth of Mr. Hunter's views.

Having said so much about true croup, the next question is, Is there any other form of croup except the one called true or primary croup?

This is a most important question, and one which requires study, as well as thorough conception of; it is one which requires to be fully understood. I will therefore answer the question in the words of one of the highest living authorities—namely, Dr. Stokes, of Dublin. He divides croup into Primary and Secondary.

Primary Croup.

1. The air-passages primarily engaged.
2. The fever symptomatic of the local disease.
3. The fever inflammatory.
4. Necessity for antiphlogistic treatment, and the frequent success of such treatment.
5. The disease is sporadic, and in certain situations endemic, but never contagious.
6. A disease principally of childhood.
7. Exudation of lymph spreading to the glottis from below upwards.
8. The pharynx healthy.
9. Dysphagia either absent or very slight.
10. Catarrhal symptoms often precursory to laryngeal.
11. Complication with acute pulmonary inflammation common.
12. Absence of any characteristic odor of the breath.

Secondary Croup.

1. The laryngeal affection secondary to disease of the pharynx and mouth.
2. The local disease arising in the course of another affection, which is generally accompanied by fever.
3. The fever typhoid.
4. Incapability of bearing antiphlogistic treatment; necessity for the tonic, revulsive, and stimulating modes.
5. The disease constantly epidemic and contagious.
6. Adults commonly affected.
7. The exudation spreading to the glottis from above downwards.
8. The pharynx diseased.
9. Dysphagia common and severe.
10. Laryngeal symptoms supervening without the pre-existence of catarrh.
11. Complications with such changes rare.
12. Breath often characteristically fœtid.

The table just given shows at a glance the distinction between true and false croup. True croup is the result of specific poison always, as in the case of intermittent fever, typhoid fever, small-pox and measles, accompanied by a certain group of symptoms and pathological condition of the parts of greater or less intensity, according to circumstances; whilst secondary croup is the result of a different poison or complication with some other disease.

When the effect of the poison of true croup exhibits itself, its presence is denoted by a chilliness or depression of the vital powers; this state is soon followed by excitation or excessive action of the vital powers; ultimately, collapse, or a weakened state of vitality, supervenes.

When it becomes obvious that a person suffers from the effect of a *specific poison*, as in the case of *true croup*, it becomes highly necessary to administer such medicine, and adopt such treatment, as will neutralize the poison, and, at the same time, assist vital action in discharging it from the system.

It must be always borne in mind that a poison has to be eliminated, and that under the most favorable circumstances such cannot be accomplished until the lapse of a certain interval; it is further to be remembered that the shock at the commencement, induced by the poison, weakens vitality; secondly, that the excitation in the second stage is an increase of vital action for the purpose of getting rid of the poison; and thirdly, that the stage of collapse clearly shows the exhaustion of vital action consequent on its efforts to expel the poison.

The various modes of treatment recommended by authors in the treatment of croup, at once furnish proof that the true method of treating the disease is not understood. It will be remembered, in a case of true croup, when the false membranous secretion of lymph takes place, it is generally recommended to give a warm bath, afterwards to apply leeches, or have recourse to venesection, as well as the free administration of tartar emetic in large doses; the treatment being often persevered in until death closes the scene and cuts short the operations of the medical attendant. It is true that some cases recover, but they are the exceptions.

It will be asked, What are the objections to the treatment of croup by the mode just specified?

The most evident one is, that the heroic treatment would so lower the vital powers that they would not be able to resist the double shock: namely, that one caused by the treatment, and the other by the specific poison. With respect to blood-letting, the only good it could accomplish would be by keeping the circulation at such a very low point, almost in a fainting state, that no lymph could be secreted, but under such circumstances the patient would be as likely to die for want of oxygen as the effects of the poison; thus it is that children often die from a small loss of blood. The full administration of the tartar emetic might be expected to be productive of good by depressing the vital powers to such a degree as to prevent the secretion of lymph, but in this case the remedy might prove as fatal as the disease.

The danger of administering tartar emetic to infants is fully pointed out by the late eminent Doctor JOHN B. BECK, in his Essays on Infant Therapeutics.

With respect to the good to be calculated on from placing the patient in a warm bath, it appears in some instances to afford relief, but the relief is only temporary; its mode of action, in the first place, consists in the relaxation of the muscles concerned in the process of respiration; but the salutary results accomplished in this way are more than counterbalanced by the greater quantity of lymph that is effused; the capillary arteries become dilated; a greater quantity of blood is consequently supplied to the secreting glands, and consequently a greater amount of lymph must be shed or secreted by the glands.

Thus it is that children sink rapidly after warm baths; it can be easily conceived, therefore, how a warm bath aggravates rather than ameliorates the symptoms. In a case where the warm bath is often repeated, the accumulation of lymph must be still further increased in the trachea, bronchial tubes, air-cells, and larynx, and the patient must therefore soon die for want of oxygen, probably in a state of collapse, or suddenly.

What should be the rational mode of treatment in a case of true croup?

In the first place, with a view of relieving the stomach of its contents, ipecacuanha should be repeatedly given until full emesis is produced.

Ipecacuanha does not depress the vital powers; it causes contraction of the capillary arteries, and thus has a tendency to prevent the effusion of lymph by diminishing the supply of blood in the capillary arteries to the secreting glands; a full dose of calomel should next be administered, to cause a secretion of bile from the liver, as well as to clear out the intestinal canal; the calomel thus assists in the ejection of the poison. It is well known, and indeed can be observed, as in a case of syphilitic iritis, that calomel not only prevents, but causes, the absorption of lymph, and in this way has a good effect in preventing the effusion of lymph into the trachea.

The next great end to be aimed at, is to neutralize the poison and invigorate the powers of life by strengthening the organic nervous system, as well as to prevent the effusion of lymph. The exciting or primary cause being understood, it is evident that sulphate of quinine should be administered, with a view to neutralize the poison and strengthen the vitality through its action on the organic nervous system, and that Dover's powder, with moderate doses of calomel, should be also given, with a view of allaying spasm, arresting the secretion of lymph, as well as rendering the secretion soluble, so as to be readily expectorated after its secretion. The opium contained in Dover's powder allays spasms of the capillaries, as well as causes contraction of the capillaries, and thus cuts off the supply of blood to the glands, and consequently, the effusion of lymph by the glands.

The ipecacuanha contained in the Dover's powder acts precisely in the same manner as the opium, as regards the contraction of the capillaries.

The sulphate of potash in the Dover's powder renders the albumen soluble, and thus converts the membranous secretion into mucus, which can be readily expectorated.

It must be admitted that the philosophy of this treatment

seems to be very satisfactory. To *recapitulate*, the ipecacuanha unloads the stomach and removes irritation.

The calomel removes some of the poisonous agency, by causing secretion of bile from the liver, and clearing out the intestines, and further arrests the secretion of lymph.

The quinine strengthens the organic nervous system, neutralizes and overpowers the poison.

The opium and ipecacuanha arrest the secretion of lymph by their action on the capillaries, whilst the sulphate of potash converts the albumen into mucus. But it may be fairly asked, How the medicines in question are brought in contact with the diseased parts?

I am satisfied (it may be presumptuous to say so) that no person up to the present period, with the exception of myself, has attempted to give a rational idea of the *modus operandi* of medicines in the treatment of disease. The views hitherto put forward are empirical, and cannot be said to be philosophical or scientific; merely stating the effects of medicine when administered, without stating the cause or the manner in which the effect is produced, must be deemed so.

To give a forcible and clear demonstration of the *modus operandi* of medicine, not only in croup, but other diseases, let me give a familiar illustration.

What is the state of things in a case of intermittent fever, when a person is attacked with chills at various intervals, giving origin to the terms quotidian, tertian, and quartan ague? In these cases, all the organic glands in the body have been subjected to the influence of a specific poison. By the inhalation of malarious poison contained in the air of a swamp in an aguish district, the poisonous vapor passes into the blood with the oxygen of the air, and is given off with the oxygen at the termination of the arteries to the organic glands.

It becomes necessary to destroy the influence of the poison, and with the object of arresting and curing the disease, quinine is ordered to be taken at certain periods as a specific, and most truly, it may be stated, the symptoms which characterize the disease no longer harass the patient. But the question arises, How can quinine be brought in contact with the diseased organic glands? The question is easily solved, and that,

too, in a manner the most obtuse intellect cannot fail to comprehend. It is true the quinine is introduced into the stomach by the mouth; it is equally true that it passes by the lacteals, lymphatics and veins to the right side of the heart, and from the latter to the lungs, and that on the blood being oxygenized it passes with the blood to the left side of the heart, from whence it passes with the blood through the arteries, and is given off with the oxygen at the termination of the arteries to the organic glands. Thus it is that the quinine takes precisely the same course as the specific poison; it is fully brought in contact with all the poison, neutralizes its morbific influence, and imparts tone and vigor to the organic glands.

So in like manner, when the calomel, the ipecacuanha, the opium, the sulphate of potash, are introduced by the mouth into the stomach and intestinal canal, they are absorbed by the lacteals and lymphatics, pass by the thoracic duct into the venous circulation, arrive at the right side of the heart, and are carried from thence to the lungs; next they are brought to the left side of the heart, and from the latter are conveyed by the arteries all over the body, and on the blood giving off the oxygen at the termination of the arteries, their further progress is arrested; their course is, in truth, intercepted, and they are fully brought in contact with the organic glands, where they operate, by changing and arresting the diseased functions of the glands in the larynx, trachea, bronchial tubes, and air-cells. The question has been often asked, How is medicine brought to operate on a diseased organ? I presume this puzzling interrogatory is now physiologically, anatomically, and scientifically answered.

But to revert to the treatment of croup. In case the patient falls into a state of collapse, what treatment should be adopted? Beef-tea, made salty, should be freely administered, sweet milk whey should be allowed. Efflorescence of the body should be induced, by washing the surface with warm water mixed with turpentine. Milk punch should be also imbibed. It is to be remembered a patient should not be given up as hopeless, even under the most discouraging circumstances, as many have recovered who were doomed to death by the medical attendants.

I will quote Dr. STOKES' words on this matter: "The coldness of the surface, the feebleness of the respiratory efforts, the failure of the pulse, the sinking of the eyes and the pallor of the countenance, all point out that the period for depletion has passed by, and that if there be any hope, it must be from the exhibition of stimulants—wine, brandy, opium and ammonia must be employed; hot turpentine stupes may be applied to the chest and extremities, and now and then the reward of the *nil desperandum* practice may be *obtained*."

The mode of action of the remedies enumerated may require explanation. I will endeavor to demonstrate their curative agency: The beaf-tea increases the quantity and richness of the blood; the sweet milk whey also assists in the process of sanguification; the salt imparts vigor to the organic nervous system; the brandy imparts strength and vigor to the organic nervous system.

It is thus manifest that these agents assist in the process of sanguification, as well as the recuperation of the organic nervous system, and in this way support and stimulate vital action, and enable it to throw off the poison which threatens its very existence. With respect to the external application of the turpentine, it is proper to state that the late Dr. DEWEES placed great confidence in its efficacy.

How does the turpentine act? The medicinal agency of the turpentine is the same, whether given internally or applied externally. The turpentine excites a new action in the organic glands, not only stimulating them, but arresting the process of secretion, as is well exemplified by the suppression of urine which follows when it is administered in doses not large enough to act on the patient's bowels, but rather stimulates the kidneys. Its mode of action as well as its power to remove lymph can be seen in cases of syphilitic iritis, where, as shown by Dr. HUGH CARMICHAEL, of Dublin, it arrests the deposition of lymph, and further promotes the absorption of the effused lymph. In puerperal fever, the late Dr. BRENNAN, of Dublin, has shown the utility of turpentine as a therapeutic agent in puerperal fever, in arresting the disease. In croup, it is evident, therefore, from these observations, that the turpentine possesses higher qualities than that of a stimulant: it

promotes the *absorption* of the *false* membrane, and thus assists in the *restoration* of the normal process of respiration, by the *removal* of the obstructions.

In a case such as the one alluded to by Dr. STOKES, some will say, certainly the patient should get the benefit of the operation of tracheotomy. What mischief, it will be asked, would follow from performing the operation? The answer is simple: The vital power is so depressed that the shock consequent on the operation would render it impotent to extricate itself from the fangs of the poison, and which would thus, as a consequence, succumb under its grasp.

From what has been just stated, it is evident the vital powers will occasionally succeed in throwing off the poison, even under the utmost emergency; precisely on the same principle that small-pox, measles, scarlatina, erysipelas, and typhus fever will accomplish the elimination of the poison which produces these diseases; very often only requiring the slightest assistance from the medical attendants.

For some time past, the operation of tracheotomy in croup has found very able advocates amongst the French and German surgeons, and the operation has been performed several times by the latter in the United States. Let me here observe, the statistics of the results of the operation do not afford any favorable data to encourage others to follow their example. BOUCHUT says: "Although the success of the operation is not very brilliant, the results are, however, such, that they ought to encourage the medical attendants of a child half asphyxiated in croup. M. BRETONNEAU, out of twenty operations, has saved six children. Out of one hundred and sixty, I have saved *forty-five*. M. LECLERC, (of Tours,) one successful in two operations he has performed. M. PÉTIT, *(de Cateau Cambrésis,)* who has followed the same step, has performed three successful operations out of six he has attempted. Thus, in one hundred and ninety-eight operations of tracheotomy, fifty-seven successful cases may be reckoned; that is, a little more than one-fourth."—(BOUCHUT, p. 270.)

It is to be recollected that what is called secondary or false croup frequently occurs; and it is to be remembered that many of the cases called croup should be placed under the

denomination of *secondary* croup; and even of cases fit for the operation of tracheotomy, or cases which would have recovered without any operation, or even in despite of the latter.

The advocates of the operation of tracheotomy in croup do not seem to recognize that there is any degree of importance to be attached to the circumstance as to whether the case that comes under notice or requires the operation, in their minds, is one of *true* or *false* croup.

The statistics afford no information on this point, and the operators certainly do not appear to be impressed with the necessity of making the distinction. It will, indeed, be admitted that there are several cases of secondary croup where a surgeon may be called on to perform the operation, and hence his reputation will be at stake unless he is able to make a correct diagnosis between *true* and *false* croup.

The great and fundamental distinction between primary and secondary croup consists in the mode of secretion of the false membrane. In secondary croup, the trachea can be opened below the false membrane, as demonstrated by RILLET and BARTHEZ; whilst in true croup, the operation must be performed above the false membrane. In the former case, there is a fair prospect of success, whilst in the latter there is none.

I will now proceed to demonstrate that the operation of tracheotomy should not be performed in true croup.

Drs. MAUNSELL and EVANSON, in their work already quoted, state: "Dr. CHEYNE has shown that in fatal cases a space of more than two-eighths of an inch usually exists in the larynx for the transmission of air; the patient, therefore, except in cases of sudden spasms, dies, not because air cannot have access to his lungs, but because these organs are unfitted, by their inflamed condition, from performing their own functions: consequently, bronchotomy is unnecessary for the effecting of the first object, and can do no good towards removing the false membrane, if it could be accomplished, which those who are familiar with the morbid appearance in croup will doubt. The same ultimate objection applies, namely, that we still have the diseased condition of the lungs remaining, and

by the removal of that, we contribute nothing by opening the windpipe."

Dr. CHEYNE objects to the operation, "secondly, because, when the membrane of croup, fully formed, is expectorated, the disease is generally fatal, even when all the benefits of the operation are obtained. If the disease was confined to the larynx, then, and then only, would bronchotomy be advisable."—(See *Cyclopædia of Practical Medicine*, Article *Croup.*)

The late highly distinguished Mr. PORTER, Professor of Surgery in the Royal College of Surgeons, Ireland, remarks, in his "Surgical Pathology of the Larynx and Trachea:"

"To the casual success of such an operation I would attach no professional reputation, whilst I think much character may be lost to the individual, and general obloquy cast on the profession, by the too frequent performance of operations thus undertaken at hazard, almost always at a period of the disease when its efficacy (if it ever possessed any) must be executed too late."

The testimony given by the distinguished surgeons in this city, as well as in France and Germany, fully sustains the opinion of Dr. CHEYNE and Professor PORTER. They candidly admit that patients upon whom they have operated, and whose windpipes they have fairly and scientifically opened, excising large pieces, and thus making large openings or windows in the organ, capable of admitting any quantity of air into the lungs, have died after the operation in periods varying from a minute to twelve, twenty-four, or thirty-six hours.

It may be here asked, "*Cui bono*" the operation? Or what can be more discouraging than to find that only one-fourth of those children operated on survive the operation? Again, when the average number of deaths occurring in all kinds of croup is compared with the same number and description of patients where no operation is performed, it will become manifest it is not only unsuccessful, but actually causes the death of many who would recover.

Thus it is the operation inflicts a double injury: one, on the patient; the other, on the character of operative surgery.

It will be observed, the greater the extension of the disease in the trachea, bronchi and air-cells, the greater the intensity

of the specific poison that has induced the disease; and consequently, the greater depression and exhaustion of vitality of the organic nervous system; so it is that there are mild cases as well as severe ones of true croup, in the manner that there are mild and severe cases of small-pox and typhus fever. Dr. CHEYNE, who is an excellent authority, and whose testimony is fully endorsed by Professor STOKES, states that death occasionally follows even when all the false membrane is detached, and when the air has free admission into the lungs. Here is a case which not only overthrows the arguments of the surgeons who so strenuously recommend bronchotomy, but which further overthrows the theory of the modern physiologists who insist and teach that the blood is aerified by the process of *endosmose* and *exosmose*, or the soaking in of oxygen and the soaking out of carbon.

When the barrier made by the specific or false membrane is removed, the process should go on as usual, but such is not found to be the case, and consequently the difficulty presents itself to physiologists, namely, to explain the cause of death in a case such as described by Dr. CHEYNE; the term *asphyxia* is not applicable, as the patient cannot be said to die for want of air. What, then, is the true or physiological cause of death in a case where the false membrane is thrown off? This question must be answered after some reflection on the state the patient has been reduced to, as well as the knowledge that vitality contained in the organic nervous system is sunk to the lowest degree, and consequently, that the pulmonary glands are rendered impotent to discharge the functions of giving off vital fluid or electricity to unite the oxygen of the air with the venous blood, precisely in the same manner that a *torpedo* which has been worried is unable after some time to give an electric shock, and actually dies of exhaustion of the nervous system; thus, on the same principle, the child in *croup dies of exhaustion* of the *organic nervous system, caused* by the *want of oxygen*. I beg to refer to my work for a further explanation of the matters touched on here.*

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* "The Placenta, the Organic Nervous System, the Blood, the Oxygen, and Animal Nervous System, Physiologically Examined."

I have further to protest against the operation of tracheotomy in true croup, on the following grounds:

Firstly. That the operation cannot be productive of advantage, inasmuch as the air cannot be brought in contact with the sound part of the lungs in consequence of the diseased action of the organic glands, which have thrown out a false membrane in the trachea and bronchi, and a similar substance to the false membrane in the air-cells, which thus *throws* up a *blockade against the contact of the air with the pulmonary glands.*

Secondly. That there is *prima facie* evidence that the operation is useless, inasmuch as the patient dies *after the operation* at certain intervals, as before stated.

Thirdly. That it is well established, that in cases suitable for the operation of tracheotomy, such as foreign bodies in the trachea, idiopathic or specific laryngitis, secondary croup, there is very little danger to be apprehended from the operation; it therefore follows that the great mortality attendant on the operation for true croup must be the consequence of some other difficulty in addition to the impediment presented by the false membrane to the entrance of air into the lungs: the truth is, the patient dies from exhaustion of the organic nervous system and want of oxygen, when death takes place after the operation.

It has been stated that some of the patients on whom the operation has been performed have been put under the influence of chloroform, and that there was very little difficulty experienced in producing insensibility. Having protested against the operation of tracheotomy in true croup, I cannot find language sufficiently strong to protest against the administration of chloroform to a child suffering from true croup.

What happens when chloroform is administered? The vapor of the chloroform is brought in contact with the pulmonary glands; it next accompanies the oxygen of the air into the blood, on being carried from the lungs by the pulmonary veins to the left side of the heart; it is next conveyed by the aorta and its branches to the head, trunk, and extremities.

Having already shown (what, indeed, cannot be considered a recondite or far-fetched idea, but one open to observation,) that the blood loses its oxygen at the capillary extremities of

the arteries, it is almost unnecessary to observe, that as the oxygen is taken into the blood, united with the vapor of chloroform, so, in like manner, the oxygen is given off at the extremities of the capillaries to the organic glands, united with the vapor of the chloroform. Thus it is the organic glands are brought under the deadly influence of the chloroform.

The cerebral glands have their functions arrested; the nerve-tubules, of which the brain is composed, as well as the nerve-tubules of the nerves, cease to be supplied with the stimulus secreted by the cerebral glands; sleep is the result, and consequently total abstinence from pain follows as a matter of course. But when the chloroform *paralyzes* the pulmonary glands, so as to interfere with their functions, then death at once follows, for the want of oxygen; and hence it is that, even with the assistance of *artificial* respiration, life cannot be re-established.

From what has been just stated, it will be observed that an additional poison is added to the specific poison the patient is sinking under. Is it any wonder, therefore, the patient should die?

This kind of case may well be put forward as a strong objection against the theory of *endosmose* and *exosmose* in the arterialization of the blood.

But I must stop, as I might be charged with dogmatizing. Let me, therefore, state, I am fortified by the result of a recent *post-mortem* examination made by the able and talented President of the Surgical Section of the Academy, which must settle the question as to the mode of poisoning by chloroform. The blood, in the case alluded to, was of the color of *Port wine*, and *fluid*, evidently and clearly *deprived of its oxygen*.

I may be permitted here to say, by way of parenthesis, that I declared, in a discussion at the Academy of Medicine some time ago, which took place in reference to the cause of death by chloroform, that the *color of the blood should be venous*, and that death must result from the *want* of oxygen, induced by the *depressing influence* of the *chloroform* on the *pulmonary organic glands*. So it is in the case alluded to: the patient died for want of oxygen, caused by the paralysis of the pulmonary glands. In case of croup, the patient is brought easily under the influence of the chloroform, inasmuch as *vitality* is *greatly impaired*.

In making the foregoing observation, I am actuated by a desire to prevent junior members of the profession from being stigmatized as unsuccessful operators. The feelings of a young surgeon, who has performed four operations, three of which have terminated fatally, may be conceived, but cannot be expressed; he must be possessed of a very extraordinary mind if he does not feel humiliated and downcast; he cannot help thinking that operations are useless, and that the public must look on him as being possessed of very little knowledge of his profession. The success of the operating surgeon is measured by his skill and judgment in the selection of the proper cases for operations, as well as his attention to the medical and general treatment of the patient before and after an operation.

In conclusion, it is almost unnecessary to state, that many cases of what is known as secondary croup will be cured by proper and judicious medical treatment. The operation of bronchotomy in secondary croup may be performed in cases requiring it, with a great amount of confidence; whereas, the operation in true croup should never be performed.

The diagnosis between true croup and secondary croup should be the great object of the physician and surgeon in the first instance, with a view to giving a true prognosis, and equally with a view to the proper medical and surgical treatment to be pursued.

As an apology for the crude manner in which this paper is written, want of time prevents me from doing the subject proper justice. I need scarcely say, I disclaim being influenced by any motive, in endeavoring to overthrow the opinions of the learned gentlemen who preceded me, except the anxious desire to promote the good of the community, and the honor, dignity, and usefulness of the profession, and to demonstrate that the revival of bronchotomy by BRETONNEAU should not be upheld, practiced or sanctioned by the Fellows of the Academy of Medicine of New York.

230 WASHINGTON SQUARE. SOUTH.
New York. May 23d, 1862.

Doctor Blakeman,
113 Tenth St.

Is Tracheotomy in True Croup

A JUSTIFIABLE OPERATION?

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