THESIS on TRACHEOTOMY
in CROUP
by George Meade

March 1863.

A very excellent thesis
in pathology pronounced by John

[Handwritten notes and text below]
When the operation of Tracheotomy for Drip was first proposed by Dr. Home of Edin' towards the close of last century, it was ridiculed and pronounced by the general voice of profession as absurd & impracticable. But the proposal was re-mentioned from time to time & found advocates, e. g. Rush & Michaelis, the latter of whom in particular seeing the great fatality of the malady & how very frequently it set all medicinal treatment at defiance endeavored to stem by some well-reasoned arguments, that Tracheotomy was not unlikely to save life in cases that were otherwise hopeless. But his advocacy of the operation does not seem to have made much impression upon the minds of his profession, if we may judge from the following observation...
When the operation of Tracheotomy for Droup was first proposed by Dr. Home of Edin, towards the close of last Century, it was ridiculed and pronounced by the General Voice of Profession an absurd Impracticable. But the proposal was renovitated from time to time, and found advocate, a Such observer as Dr. Crawford Black & Michaelis, the latter of whom in particular seeing the great futility of the medical & how very frequently it did all medicinal treatment at the offence endeavoured to shun by some well reason'd arguments, that Tracheotomy was not unlikly to save life in cases that were otherwise hopeless.

But this advocacy of the operation does not seem to have made much impression upon the mind of profession, if we may judge from the following Observation.
observation of Dr. Cheyne in his Essay on Syphilitic Tracheitis, published in 1801. "I do not indeed believe raphe that any prudent surgeon will refuse to perform this operation." Contrary to Dr. Cheyne's prognosis however, a surgeon in Philadelphia shortly after was bold enough to give the operation a trial and although this first attempt proved unsuccessful, it led to the repetition of the operation by others with more favourable results. "The operation has now been performed many hundreds of times, and copious hospital statistic have been published of the results."

In the present time, we propose to discuss the question of the frequency of tracheotomy in cases of uncomplicated Carcinoma for although much has now been said and written and many medical pathological facts illustrated, Cases have been put upon record by the advocates of both views of the question, it is time regarded by the profession as an operation of the utmost utility in cases of inflammation of the air passages. Perhaps a good deal of the contention of opinion may be traced to the fact that although the very great advances which have been made in recent times in our knowledge as to the true pathology of the differential diagnosis of Carcinoma good practical rules are still wanting to enable the
the ordinary practitioner to discriminate in what
case surgical interference is advisable and at
what stage in the progress of such cases it should be
prescribed. The observations which seem to
make an extended application exclusively to cases
of uncomplicated Croup, as the circumstance of
the presence of some concurrent disease, such as
biliaris diagnosis, diphterita, equine malaria
smallpox and acute affection of the chest - all
of them grave maladies in themselves - have been
found to diminish so very much the chance
of recovery, that very few surgeons indeed - even
amongst those whose判断 strongly biased in
favour of Tracheotomy as a remedial agency
in the treatment of advanced Croup - would either
recommend or perform Tracheotomy in such cases,
unless as a mere euthanasia, and that only at
the urgent request of the patient’s friends. It has been
asserted that Tracheotomy in Croup is much more injurious
with the surgeon than the physician and with the
junior rather than with the senior members of the profession.
In the one case the partiality of the surgeon for
operations in general has been insinuated as the
dowser of his predilection for operative interference
in the class of cases under consideration.
while on the other hand, the reiterated experience of
the alleged utter futility of ovariotomy, in the vast
majority of cases in which it is resorted to, to save
the life of the patient, is said to explain why senior
members of the profession should be much more
rare in commanding operating to ovariotomy
than their junior and more long-since brethren.

But whether or not there is any truth in these
allegations one thing is undeniable, that ovariotomy
as a cure for cancer is vastly more successful
in the hands of some operators than in others, and as
this success cannot reasonably be ascribed to
any coincidence of having an uninterrupted suc-
cession of unusually favorable cases to operate on
it is a fair inference to deduce that it is due
1st to the exercise of a wise discretion in not
delaying too long to operate after depletion and
other active antiphlogistic treatment than had a fair
trial and have proved unavailing to arrest or break the
persistence of the malady. It is perhaps chiefly to the
superior skill of the operator not only in performing
the operation but in the management of the after-
treatment of the case. Some inclines strongly
towards more importance to this last condition than it may
be thought to merit, for although the operation appears
to be seen in many cases, really is a very simple piece of surgical manipulation, there are a number of details connected with its modern operations which from their apparently trivial nature are very apt to be disregarded, but which attention to which the success of the operation in a great measure depends.

Three classes of objection have been advanced against the employment of thoracotomy as the curative treatment of chronic pulmonary tuberculosis.

The first, based upon the study of the pathology and morbid anatomy of the disease, would disprove the expediency of any such operative interference on the ground that chronic pulmonary tuberculosis is essentially a disease of the chest and therefore not amenable to surgical relief.

The second consists in the alleged fact that thoracotomy is so invariably followed by a fatal issue that its employment is as good as or even more than useless; such can scarcely be regarded as warrantable.

The third objection concerns the operation itself and is based upon certain alleged dangers and difficulties that attend upon and ensue from the performance of it.
An examination of these three groups of objections must now engage our attention with a view to determine whether they are substantiated by the testimony of facts and experience or are merely hypothetical allegations which cannot affect the issue of the question.

In considering the first group of objections it is necessary to premise

1st. That as far as the Respiration is concerned death is occasioned by an inadequate arterialization of the blood due to a deficient supply of air to the lungs, in consequence of which it is rendered unsuited to the purposes of the circulation.

2nd. That the removal or contraversion of all obstructive causes to the free entrance of air to the lungs is plainly indicated as a primary and essential condition of treatment.

3rd. That Frechetomy proposes to effect these results by affording an opportunity for the detachment and removal of the adventitious membrane by relieving the breathing and consequently releasing the system of these exhausting efforts of the respiration muscles to overcome the dyspnea as indicated by the depressed and contracted appearance of the Costal Cartilages and the alternate up and down movements.
movements of the larynx, synchronous with the expiratory and inspiratory effort. 
by unloading the lungs of the accumulated expectoration which could not be got up before, in consequence of the narrowed or spasmically closed rima 
by obviating the danger of that spasm of the glottis, which is produced by the inflammation and which will not cease until either the inflammation is subdued or the spasm relaxed by the approach of death.

As far as the removal of the false membrane is concerned, objections arise that there can be no necessity for tracheotomy because, post-mortem dissections of the larynx show that there is invariably space enough left within the false membrane to allow a sufficiency of air to enter the lungs. An adult can respire for a considerable time without much inconvenience though stouter only quarter inch in diameter and as the albuminous coat in the larynx is never found less than this, it is argued that to lay at least as it remains invicta it cannot be made such a formidable source of obstruction to the respiration as to demand for its early removal the performance of an operation.
operation not unattended with serious risks on its own account. Moreover, assuming that the operation has been performed for this purpose there is frequently found such a mass of coalescence in the membrane that it breaks down in any attempt to remove it, with the result that it may be adherent to the mucous surface of the tongue so that it cannot be detached or the membrane may only exist at one part, while above and below the windpipe or larynx coated with a purulent fluid or there may be only a number of detached crusts of caseous lymph scattered throughout the tracheal mucous membrane; in all of which cases an operation for the removal of the membrane would prove abortive. Again, the removal of the false membrane does not ensure its non-reproduction for although it has been extirpated at a time when the patient was about to recover many cases are on record when it has reformed again after it has been extirpated and the disease soon terminating fatally.

It is further averred that tracheotomy is not likely to afford much relief to the breathing as the cause of the obstruction exists in the larynx which are found to have undergone such extensive morbid changes that not only is their normal capacity so much...
so much diminished that they cannot contain a sufficiency of air, but the lining membranes of the 
ultimate ramifications of the air vessels have become 
transformed and deteriorated that those chem 
ical interchanges between the blood and the oxygen 
of the expired air, cannot take place. It is then 
fore concluded that if Tracheotomy is the only 
service in the treatment of cases as much as to 
relieve the obstruction to respiration arising from 
the formation and presence of false membrane 
on the windpipe, & from an narrowed or stoped mobility of glottis but also that arising from those great 
pathological alterations in the substance of the lungs 
themselves first alluded to.

So these objections, I would urge the following considerations, 
1st. that as they are for the most part derived from post 
mortem examinations which exhibit too the disease 
only when fully developed, they do not derive a 
possibility of arresting the disease by surgical 
interference when it is as yet only in progress. 
2d. From the amount of relief that immediately follow 
and the operation in all the cases I have seen leads 
or hears of—two to three which ultimately terminates 
fatally—seems of an and legitimate conclusion 
that the disease could only have existed at the 
utter last.
upper part of the throat at that time, though it may have
afterward extended downwards in those cases that ended fa-
\_tally; and this supposition is strengthened by the fact
that throughout the entire progress of the disease, from
its commencement to its fatal termination, the most
pronounced and characteristic symptoms are those
of inflammatory Constriction of the Larynx. Thus
at the beginning of the attack the voice is filling
as if the throat were con\_stricted and in some rare
cases the larynx is seen observed to be slightly
swollen externally, the breathing becomes audible
and slower than natural and sounds as if drawn
freely in through a narrow tube. The child complains
of uneasiness about his throat - says he is choking
and coughs and tears at his throat and to awake
the child to respiration, as the disease advances
the laryngeal symptoms become more marked - the
voice becomes deeper and the respirations become
faster, sufficiently indicating how nearly the patient is "guzzoled" by the disease, and as though it were coming more stran-
gulating. The suffocation more imminent, the doctor
looks the patient may die. No signs of Convulsions
or Suffocation or death continue increase of the foregoing
symptoms of Laryngeal Constriction in which case
death will take place with indication of cachexia
of the
of the vital powers and in a state of lethargy.

So that spasm of the vocal glottis and the resulting
interruption to the respiration and pulmonary circulation
is at least quite as liable to occasion fatal issue
especially when it is remembered that the diminished
vital powers of the patient render even slight spasm
dangerous - as exudate accumulation in the
larynx & trachea; and that increases when the respira-
tion is very embarrassed the patient is constantly
liable to suffer (if tracheotomy be not performed)
from a sudden supervention of fatal spasm of the glottis,
induced by the irritation occasioned by some partially
detached fragment of false membrane becoming
entangled in the larynx.

It is generally impossible to determine by
the aid of the stethoscope whether the lungs are implicated
in the exudation or whether any pneumonic
or bronchitic complication is present, in consequence
of the laryngeal congestion reaching all over the chest
and giving rise to the respiratory sounds which
would otherwise indicate the existence, extent, and
nature of such morbid state of the lungs. And on such
an occasion when we are in doubt as to the presence
of pulmonary complication, we ought to give the
patient the benefit of the doubt.

Dr. Hal
that it is now pretty well established that slight pulmonary complications do not absolutely contraindicate tracheotomy. Slight bronchitis is often thought to be

favourable by Guerstein and other bronch surgeons

for the double reason that it presence seems to indicate a condition of the mucous membrane less predisposed to plastic condensation, while the increased expectoration is thought to facilitate the detachment and expulsion of shreds of false membrane; and many British surgeons, although they do not acquiesce with this opinion in toto go the length at least of admitting that they have found bronchitis present in so many of their successful cases that they do not consider it to contraindicate the operation. Guerstein even says that the inflammation of one lung does not preclude the operation, although pneumonia of both does.

That the statistics of the post-mortem dissection of Crop cases do not favour the opinion that Crop is essentially and primarily a disease of the chest; it only occasionally exceptionally limits to the larynx or larynx and trachea as some nosologists (e.g. Medawar, Young, Good, Cheyne) would wish us to suppose.
Thus of 171 cases collected by Heinevetter the plastic excudation was confined to the trachea in 78 (and in many of these cases we may presume that the excudation was still further limited to the upper portion of the trachea); in 30 it complicated both larynx and trachea; in 26 no false membrane existed at all; in only 42 or scarcely a 1/4 of the whole was the false membrane found to involve the bronchi. And if we bear in mind that there are the statistics of fully developed instances of the disease which have ended fatally we must conclude with Dr West that the larynx is first affected, then the trachea and both more frequently than the bronchi; or with the opinion of Dr Copland which is perhaps more near the truth that in the greater number of uncomplicated cases the plastic excudation exists in the upper part of the larynx.

Finally, from the consideration of these pathological objects to tracheotomy it seems a palpable and logical inference to conclude that not only has nothing decisively contraindicated the operation in the vast majority of cases been established; but if it be true what I have endeavored to demonstrate
By that Oedema is often confined to the larynx or upper part of trachea and that it would appear almost invariably to commence there; that the distension of unrelieved gradually induces asphyxia, toxemia, and exhaustion of the vital energies of the system; that death very often takes place during a fit of convulsive suffocation and that this is liable to be brought on suddenly at any moment from spasmodic closure of the trachea, excited by the irritation of the false or false Membrane becoming entangled in the larynx. I think we are even warranted in adopting an a priori presumption in favor of Tracheotomy in cases of uncomplicated Oedema; and the clearer the more exact and reliable our knowledge of the pathology of the disease becomes, the less unlikeliness that such a presumption will be strengthened and confirmed.

Objection II

That Tracheotomy in Oedema is so invariably fatal that thought never lay to perform.

In the hands of some operators Tracheotomy appears to have been so invariably followed by fatal results that they have not only ceased to perform
to perform it themselves but have denounced the operation as scarcely warrantable in itself — discreditable to the operator & prejudicial to surgery as a cervetant art, preferring rather to leave the little sufferer to his fate and do not certainly many care consider themselves justified in employing it merely as a means of giving some temporary relief to the horrible agonies of the slow and conscious suffocation with which the scene not unfrequently closes.

But lest it may be thought that the opposition of objectors to bronchoctomy is not quite so strong and uncompromising as has been represented I take the liberty of making the following quotation upon the subject from the work of Mr. Porter on "Pathology of the Larynx and Broncli." "But Bronchoctomy says Mr. Potter has in many cases of Croup been successful. True, but where are the thousand instances to the contrary that might be brought against each single one of these? I have performed the operation myself upon the child I have seen it frequently done by others and in no one case has the life of the patient been saved. I have known in advance of it often but never understood that it produces a recovery. Most practitioners are loath of publishing cases of successful operation but are not unwilling to make known those of an opposite..."
opposite description from an idea that these supposed failures might lower them in public estimation; but these detached and solitary exhibitions of fortunate surgery are calculated to produce very serious injury, if they encourage other similar attempts in the hope of similar results. If it was possible to place a list of those cases in which tracheotomy has proved unsuccessful in array against those wherein it has seemed to be useful, it would be certainly necessary to advance any further argument in proof of its uncertainty.

Therefore we find a surgeon who has a large experience in the treatment of Cases stating that he has never seen a successful case of tracheotomy in that department either in his own practice although he had repeatedly performed it in the practice of professional friends and further it would seem to be his belief that a successful case of tracheotomy in Cases is scarcely within the pale of possibility. The experience of other surgeons however differs very widely from this so widely in fact that the incoherence of the contrated results of their practice seems almost inexplicable. For while one class of practitioners"
as useless and cruel practised middle-class surgery the other class of practitioners show results as very favourable as to have no doubt whatsoever as to the expediency of tracheotomy in all cases of uncomplicated croup. If we look into hundreds of French surgery on this point we find all surgeons stating that their average of successful cases is as 1 to 3, and all current surgeons to the Hospital des Enfants in Paris publish their results as even more favourable as 2 to 5. But it may be objected to these French statistics, that they are unreliable because they include in all probability cases where tracheotomy was performed for simple laryngitis, laryngeal abscess, chronic suppurative croup and congenital diphtheria. The bulk of the complications is no doubt from the lack of these e.g. Compère diphtheria or any it may be called French croup in contrast distinct from true or British croup. But after all, these cases of congenital diphtheria cannot very determinate the value of these statistics very much as it is well known that congenital diphtheria is as compromising a case to perform tracheotomy upon as any case of British croup can be. The two affections are no doubt essentially different, the one being inflammatory requiring
requiring antiphlogistic treatment; the skin being 
generally hyperemic and requiring local and general 
stimulants; but the danger of British Croup from 
the violence of its inflammatory action and its 
tendency to implicate the lungs is not much 
greater—indeed greater at all—than a Case of 
Diphtheria when in addition to the membranous 
erythema involving the tonsils, fauces, Pharynx 
& larynx, the patient at the same time labours under 
that peculiar form of vital depression which 
characterizes the mature stage of this disease. 
Therefore we may say that practically so far as 
the operation of Tracheotomy is concerned, it makes 
no difference whether the Case is one of Common, 
Diphtheria or True Croup.

But these French Statisticians are said to be open 
to this further objection, that in consequence of 
Tracheotomy being resorted to by French Surgeons 
at a comparatively early stage of the disease 
and before medicinal treatment has had as 
complete a trial as it deserves, some of the Cases 
recorded as successful would have recovered 
completely without the operation and any in 
spite of it.

Making allowance therefore for such possible 
discouragement,
discrepancies of the writers of the general average of success, but on it in a result of favorable experience to justify the expediency of resorting to Ducho
stomy in suitable cases of croup.

But in the practice of Mr. Spence of this city a still more favorable result is obtained. I quote his cases in preference to those of any other British surgeon as they as an opportunity of seeing him operate in several of them and of watching their progress toward convalescence. Out of 15 cases of Ducho
stomy in croup (of which he has published a detailed account) no less than 9 proved successful—a proportion of success which in all other remarkable or he makes a point of never recommending the operation until all other means have been tried
a terribly failed—excepting of course those cases when the dyspnea becomes so urgent at an early period of the disease that Ducho
stomy has to be performed without delay of the patent cutaneous
from the danger of rapidly proceeding from asphyxia.

Of his eight fatal cases four were complicated with
other grave affections, thus one laboured under the sequelae
of scrofula of a severe character and though completely
relieved as regards the breathing, sank from pernicious
omitting, and emaciation; another was an
acute case of whooping cough supervening on congestive scarletina with quenched maligna; in that the disease appeared in the progress of measles also of a congestive character; and a fourth was a child only recently recovered from a severe attack of scarlet fever, of those four cases should be deducted from the fatal cases there shown if it is more favorable result for tracheotomy in pure, uncomplicated, Case.

Reasoning therefore from these quotations of French and British practice it is conclusively manifest I think that the objection to tracheotomy on the ground of its alleged fatality has no real foundation; in fact, and when it is remembered that nearly or many, if those attacked with whooping cough by tracheotomy as by all other means whatever, that tracheotomy is not resorted to until all other means have been tried in vain so that without it they must have terminated fatally mean constrained to acquiesce in this panegyric which ill Valleria pronounced upon the results of this operation when he calls it "true merited victory."

III. Objection

By the alleged difficulties and risks which attend...
upon and ensuing from the performance of Tracheotomy
These are of three kinds, organic, anatomical, manipulatory

Of the Anatomical the following may be specified: (1) The
narrowness of the Trachea, from 8 to 12 years, which is said
not to be more than 3/8 of an inch in diameter, and the
diminished size of the part, generally are very likely to embarrass
the operator. (2) Risk of Hemorrhage taking place from the
division of the insertion of the two superior thyroïd
Arteries along the upper border of the larynx of the thyroïd
body. (3) Injury of the larynx of the thyroïd body itself is
likely to occasion disagreeable bleeding because anatomically
the Commissure of the Arteries and Veins. (4) The
probability of injuring the middle thyrroid when it happens
to be present, as it ascends from the artery in the median on
the arch of the aorta directly in front of the Trachea to the isthmus.
(5) Instances have been repeatedly observed when the
right Carotid artery was situated directly in front of the
Trachea, unless great care was taken, would inevitably
have been wounded in performing the low operation
of Tracheotomy. (6) The veins that unite communicate in
front of the Trachea between the inferior thyroïd Vein and
which are sometimes of good size. Some instances are said
to be recorded where death from suffocation from this cause
took place during the performance of the operation.
The columns of the pharyngeal body which is normally situated over the second, third and fourth rami of the cricoid, has sometimes a vertical measurement of very considerable length, so that it has been seen lying in front of the trachea almost down to the sternum. 10. The risk of injuring the external jugular veins which are elevated near the middle line or their communicating branch which cross in front of the trachea. These veins are sometimes very large, being generally inversely that of the external jugulars, so that when the external jugulars are eliminated these supplemental cutaneous veins have not uncommonly been found up to an inch in diameter and in some instances, nearly half an inch. 11. The thymus gland is often found lying flattened out in front of the trachea and deeper and passing from this gland to the thymus there exist numerous vessels which bleed profusely. It may be necessary to these anomalies (of which at the same time involute the manipulation) obstacles to the safe performance of tracheotomy that they are easily obviated by care and perfect self possession on the part of the surgeon, by his being deliberate and methodical rather than brilliant and rapid in his procedure, by his possessing thorough knowledge of the normal and irregular anatomy of the part, a manipulator devoid of haste, while and a perfect familiarity with all the detail.
the details of the operation, and lastly, and by no means least, by the plan of operating that is adopted, which should not be by the blind and rash plunge into the texture of any instrument specially devised for the operation, but by a progressive and cautious division of the texture from the skin downwards, by which means the operator will quite see every contingency and may happen to arise, and can adopt suitable prophylactic measures to anticipate and prevent the occurrence of any troublesome or dangerous complication.

Of the consequences to the operation the following include all that are noteworthy:

1. That the opening of the Windpipe in cases where dyspnoea has been great by suddenly relieving the State of cerebral congestion, is likely to bring the patient's life into immediate jeopardy from the great and persistent syncope that is apt to occur. Indeed, cases stimulants such as coffee, tea, or brandy, injected a little forte wine or the like especially that recommended by the means of kelling the broken through the artificial opening with a feather, such means never fail to resuscitate the patient.

2. That much blood may be lost during the operation to prove fatally exhausting to the patient unless strength is forced out of the patient. Of course, will always be prevented by the presence on the part of the surgeon to legate any arteries.
Arteries and apply temporary pressure to bleeding veins; or if they are large and directly under way, they should either be carefully held aside with a blunt hook by an assistant or divided after a double ligature has been previously applied. But venous hemorrhage should never deter the surgeon from proceeding with the operation as it will be readily effectively checked by opening the trachea; the venous return will be stopped, which is necessarily much retarded during the operation, being thereby favoured.

3. That the patient may die during the operation from the mere effect of shock upon a system already in an extreme state of exhaustion. This casualty however will be avoided by reserving to the operation before the patient has reached such a state of extreme weakness.

4. That the necessary consequence of the introduction of the camila is to deprive the patient of the power of coughing and thereby rendering him incapable of making a forcible inspiration to effect the detachment and expulsion of the false membrane. This difficulty may be partially overcome by placing the finger for a few seconds over the orifice of the camila so that the air may be forcibly expelled and if the patient should grow too weak to expectorate, an attempt may be made to extract the mucus by suction, either by an adapter of a syringe or by the mouth of the nurse or assistant.
And it is worthy of remembrance, that previous to the operation he frequently found that the patient is unable to expectorate while consequence of his inability to inspire a sufficient quantity of air so as to act with the necessary extensile force behind the accumulated mucous, which he is enabled to accomplish whenever the tracheal aperture is made.

4. That the opening in the trachea is made into the very centre of the disease. This is not necessarily the case as the seat of the disease may still be limited to the upper part of the larynx.

5. That the irritation produced by the presence of the cannula is certain to induce the further spread of the pleural inflammation downwards into the lungs or at least of exciting secondary bronchitis or pneumonia. This objection is less answerable than the other, as there is great likelihood that the irritation from the presence of a foreign body will aggravate the local disease and may possibly determine its extension downwards into the bronchi, but as this objection is purely hypothetical, seeing there are no means of verifying its reality, it cannot be admitted as valid.

7. That when the false membrane is only partially detached, the anterior wall of this pleuritic cavity is liable to lie
to be pushed aside by the tube when it is introduced and occasion complete and incurable occlusion of the windpipe I almost instant death from asphyxia.

A careful examination of the trachea by the surgeon before introducing the Canula and his removal of any portion of detached false membrane that may be lying within reach of his Canulntile forces bile under this accident (and really is) a very rare one.

8. That the entrance of blood into the trachea at the moment it is opened may produce a violent suffocative fit of coughing in which the patient may expire. By adopting the precautions mentioned above to prevent or arrest venous bleeding, and by making the patient sit up or by turning him on his side or face immediately after the operation is completed, the aspiration of the little blood which almost inevitably enters the trachea at the moment it is opened, will be favoured and the spluttering choking cough which at first occurs will soon subside.

9. That in consequence of the long continued dyspnea the blood has become laded with Carbonic Acid to an extent very unfavourable to the patient's chances of rallying. This objection is no doubt a very serious one as the tendency of this state of the blood is to produce congestion and stagnation in the heart, brain and lungs.
and lungs, but as tracheotomy should be resorted to if it is believed to be at all with any chance of success before the blood has reached such an extreme stage of desiccation, the objection does not go for much. 30 That the opening in the trachea may never heal up so that a permanent tracheal fistula may be established and prove (and must) a source of great discomfort to the patient for the remainder of his life. The necessity for the operation must certainly override this objection. The more so when we remember that tracheotomy is often performed in cases of structural disease of the larynx with the premeditated intention of establishing a permanent or the very result which the objection deprecates.

(11) That as the greatest number of cases occur in children of the age of two years, tracheotomy is contra-indicated because at that tender age the powers of endurance are so small—the strength is soon exhausted—aphonia occurs easily induced—the danger from subsequent inflammation so great and the irritation from the presence of the tube so little liable to be endured. This cannot however be admitted as an objection to the operation but only as a circumstance making
flying the chances of success and indeed it may be laid down as a general rule that the younger the patient is the smaller the probability of success. But very few cases of Oroup occur in the first year of childhood; on the other hand they gradually diminish in frequency from the second year of life to puberty when the peculiar exciting and predisposing causes of Oroup cease to act altogether for some reason which as yet has received no satisfactory explanation.

The different objections to Tracheotomy in cases of an uncomplicated Oroup have now been successively passed under review and after an important consideration of them I do not think that the utility and expediency of Tracheotomy in the advanced stage of this malady has been in the least degree impaired.

Before proceeding to describe how the operation ought to be performed there falls to be considered the very important question as to when it should be resorted to. This is a point of the very gravest moment, for there can be little doubt that the greater success of some surgeons to others in this operation is as much due to a proper selection of the time when it should be had recourse to as to manipulatory skill.
Chill in performing the judicious management of the after treatment. As in certain cases of spasmodic and inflammatory congestion, the incautious physician may overlook the ephemeral or non-inflammatory character of the Case and put in practice the rigorous and phlogistic treatment suitable to genuine Croup. On the other hand and a Case of true Acute Croup he is very apt to persever too long in the exhibition of those powerful therapeutic agents which however suitable—and almost specific—in the treatment of the first stage of the attack are at all but universally admitted to have no curative efficacy in the second and therefore their continued use can only have the effect of lowering the vital powers of the system, to such a degree as to render any benefit from surgical interference extremely problematical.

In reference to the ineffectiveness of the medicine treatment of Croup in its second stage. Lanu-Foobs observes that few well-characterized instances of Croup in the second stage will yield to the influence of measures even the most rational and conformable to the results of experience. I quote from Dr. Cheyne (in his articles on Croup in the Cyclopaedia of practical medicine) who is very
Sanguine upon the medicinal treatment of Guomp & very strongly opposed to Tracheotomy, saying that in cases when it is doubtful whether the patient is in the first or the second stage of the disease you may employ bleeding as an ancillary measure; for if in the first stage it will probably do good and if in the second it does not matter much as to few cases recover. Now that in the medical treatment recommended in the second stage it is this: After the patient has been treated for the first stage with repeated bleedings & repeated antimonial emetics with calomel & saline powder every two or three hours the warm bath purges & blister & yet the case not understanding has passed into the second stage the following is recommended by Dr. Hayne & quoted approvingly by Dr. Watson: “Half a grain of Salicylic Antimony dissolved in a tablespoonful of water is to begin to a child two or three years of age the sickness & vomiting are produced, and two hours after the last act of vomiting the same process is to be recommenced & do repeated while the strength will admit.” Now to antimonialize a child of so tender an age to such an extent as this – in therecover alone or what may be called...
called the asthenic or at least the Commencing asthenic stage of the affection. I must say it is firmly admitted that all antiphlogistic treatment is found to be unavailing; that bleeding positively accelerates the fatal crisis, appears to me most irrational; and if such a case tracheotomy were performed it would be almost unreasonable to expect success. I am inclined therefore to maintain that the physician and surgeon ought to act in concert in the treatment of acute Comp. so that so soon as the therapeutical appliances of the one have been fairly tried and have failed to arrest the progress of the Malady, the services of the other should be at once put in requisition, and acting by such an arrangement as this it is perhaps be found that M. Fronseca’s Doctrine on the subject is the most satisfactory; by of operating as early as possible in the second stage—that is, to operate as soon as the following group of symptoms begin to manifest themselves:—The cough from being loud and sonorous becomes husky and suffocative—like that of tracheal Otitis—and the presence of false membrane or exudation is indicated by the recurrence of dyspnea with intervals of perfect res.-the respiration is hoarse, cyanosed, pale, lips livid.
Skin motley. Cheeks heavy, pupils dilated, tongue loaded, with purplish edges, that considerable skin much less the worst, dark and fatigued. Should the dyspnea remain at any time become so urgent into theater immediate suffocation would be proper and justifiable to resort to once the operation with out delaying until medicinal treatment had had so full actual. As in other cases it is entitled to. Manifestly no reliance can ever be placed in the mere duration of the affection as requisite to determine when tracheotomy ought to be resorted to; for although a large proportion of the cases culminate either one way or another on or about the fourth day from the commencement of the attack, very many become critical as early as the second day, while that event in other cases is protracted until the eighth or tenth day. I think if the attack be sudden and the progress rapid there will be an earlier necessity for tracheotomy, than when the onset of the attack has been gradual and its progress slow. The faculty however of determining the precise time when tracheotomy ought to be performed must be the reward of clinical experience, and can not be acquired in the study; and as a practical deduction from this observation, I may be suggested
that in almost no other department of surgery would the specialist be more serviceable than in that at present under consideration, so much does the success of tracheotomy in Group seem to depend upon the trained judgment, special knowledge, experience of the operator. Not only is the operation simple enough, but it is generally admitted to be, but in advising when it ought no longer to be delayed.

The advantages are believed to be gained by operating early in the second stage. 1. By early relief of the dyspnea, preventing the bad effects of the gradually increasing imperfect aeration of the blood—local pulmonary congestion or emphysema. 2. By preventing the retention of the mucus or plastic exudation downwards. The first of these advantages may be readily conceded, but with regard to the second which is by far the most important and formidable of the two, the case is not so clear. On the contrary it is not probable as shown already admitted in a previous part of this paper that the irritation caused by the presence of the tube may in some instances at least promote the spreading of the exudation downwards into the bronchi. This is a point however upon which for the present judgment must be suspended, as it is not amenable to any form of demonstration.
But equestria has very naturally attracted itself upon
our consideration as a sort of corollary to the one
we have just been discussing. Why should tracheotomy
be performed in any case where the very advanced
stage of the disease has progressed or where the
case is complicated with some concurrent affection
almost necessarily fatal in itself. I feel convinced
that the operation added in the least degree
to the little patience dying suffering the very slender
chance of recovery which it holds out, would cases
might be humanly ignored. But tracheotomy
is invariably found to give at least temporary relief
from the horrible agonies of suffocation. And what these
agonies are we can form some idea from the symp-
toms that immediately precede death. The patient
loses all control of the great distress—pecus, one object,
around him and grapples them convulsively for a
moment, clutches at his throat as if to remove
some obstacle to respiration, makes feeble
efforts to expand his lungs and after a longer or
shorter period of such extreme distress expires, often
with signs of convulsion, suffocation. And when
then circumstances added other temporary relief from
sufferings the fact that some cases, although
perceived hopeless, have recovered in virtue of the
operation.
Operation I am inclined to think that we are bound to do in such extreme cases — especially if the patient is insane — to give the patient the benefit of the doubt and every small chance of saving his or her life. But his only chance of recovery.

How is the operation of tracheotomy to be performed?

Several special instruments have been devised to facilitate the performance of it; but they are all open to the same objection that is raised in the bronchoscope, namely what is called "the risk of hemorrhage." Each plunges in the dark, and speaks into the windpipe, by means of which the risk of hemorrhage is greatly increased while in an inconceivable degree the opportunity and power of controlling it decreases.

The only one of these instruments, to which I think, if all necessary to attend is that invented and used by M. Chassaignac. It consists of a grooved director, with a sharp, pointed hook at its extremity, curved in the direction opposite to the groove. This is inserted into the trachea, so as to lay hold of the cricoid cartilage with the hook, which it fixes and raises; and tracheotomy is then performed along the groove into the trachea, dividing it and all the tissue superficial to it at once, to the extent desired.

The ordinary
Operation. I am inclined to think that we are bound even in such extreme cases—especially of the patient finds himself to give the patient the benefit of the chances even a small chance however the chance—but his only chance of recovery.

How is the operation of tracheotomy to be performed? Several special instruments have been devised to facilitate the performance of it, but they are all open to the same serious objection, that in using them, the surgeon does not know what he is about, but makes a rash plunge in the dark, so to speak, into the windpipe, by reason of which the risk to human life is greatly increased, while on the reverse side, the opportunity and power of controlling it diminishes. The only one of these instruments to which I think it at all necessary to allude is that invented and used by M. Chassaignac. It consists of a grooved director with a sharp pointed hook at its extremity, curved in the direction opposite the groove, This is inserted into the trachea, so as to lay hold of the Cricoid Cartilage with the hook, which it fixes and raises, and by means of it, then run along the groove into the trachea, dividing it and all the texture superficial to it at once, to the least danger.
The ordinary mode however of performing trephiny is much preferable to this one as it enables the operator to see precisely where he is about. A sharp-bladed scalp is perhaps the instrument best suited for this purpose. The child should be laid on its back with its arms extended by an assistant, only being put with its head down and the back then pinned tightly round it. The shoulders should be slightly elevated by a pillow placed below the neck and the head bent a little back wards but supported by the one hand of an assistant while with the other hand the skin is kept fixed with moistened lime as gently to the surgeon. A longitudinal incision is made through the skin commencing at the Occipital Cartilage and extending downwards in the median line for an inch or an inch and a half towards the sternum. After dividing the fat and superficial fascia, the Sterno-hyoid and Thyroid muscles are to be separated by the finger or handle of the scalpel and both two blunt hooks are held apart by another assistant. Should any vein or veins be found crossing the line of wound, they are to be pushed aside or cut across after a double ligature has been applied. Should they happen to be large, the settons of the thyroid body should now be pushed upwards out of harms way and a similar caution is to be adopted both respect to the Thymus gland which

which will often be felt at this stage of the dissection lying beneath the finger flattened out upon the lower part of the trachea. Sometimes a number of vessels can be seen (but they require looking for) passing up from the Pharynx along to the thyroid body, which require to be attended to otherwise they may prove the source of fatal hemorrhaging. The surface of the trachea being now laid bare, it should be carefully cleaned of the loose cellular tissue lying in front of it so that there may be no obstacle to the entrance of the cannula when the opening is made. The knife should, for obvious reasons, be introduced with the back to the sternum, about the fifth or sixth ring and by allowing movement upward the opening is made to the necessary extent involving generally the division of three or four of the Cartilaginous rings of the trachea. The wound thus formed is made to gape by means either of galligator—specially constructed for the purpose, or by the opened blade of a pair of common dissecting forceps—to facilitate the introduction of the cannula. Care being taken however that it has actually entered the windpipe and has not passed merely in front of it to the side of it. As soon as the tube is inserted the patient should be raised to the sitting posture or lowered upon his face outside to permit the further...
the further escape of blood into the trachea, and to favour the
expectoration of that little which almost inevitably enters along
with the tube, at the moment of its introduction, the presence
of the presence of the Camula acts as very effectual
demonstrate in arresting and oozing from the margins
of the wound into the trachea. The Camula
should be of such size as will easily fit into
the windpipe so as not to impinge upon its internal
surface but at the same time to afford as much
space as possible for expectoration and inspiration.
It should be of sufficient length to enter both into the
windpipe and should be surrounded at its outer extremity
with a flat shield of at least a quarter of an inch in extent
perforated by a vertical slit on each side, through which pieces
of tape are threaded, brought round to the back of the
neck and there tied so as to retain the tube in its place.

As regards the use of the tube, it should neither be
too great nor too slight, for in the one case it will
impinge against the anterior, in the other against the
posterior wall of the trachea. In all cases the Camula
ought to be double, the internal tube suited and fitting
easily, perfectly into the outer, should never be forced in
site by spring or other means so that in the event of it
becoming at any time clogged with mucus, it may be
easily removed by the nurse or coughed out by the patient.
Expiratory efforts of the patient to overcome the obstruction, a male aperture should exist at a corresponding level at the upper wall of both tubes to admit of the gradual restoration of the respiration by the normal passages. It is important to see that the aperture is within the trachea, since if it is too far forward (which is very apt to occur if the soft texture around the wound should happen to be subsequently to the introduction of the tube) not only will the object for which it is intended be frustrated, but hemorrhagic fluid from the upper part of the tracheal wound will drain on through it back to the trachea; and occasioning great deal of unnecessary irritation.

With respect to the after treatment of tracheotomy several important points need to be attended to. The care and assistance of an intelligent nurse should be secured. One who has previously attended a case of tracheotomy. Before leaving the surgeon should instruct her, though she how to do, especially with respect to the management of the tube, which must be kept clean and protected by sponging it with a piece of linen or sponge, or change it according to the end of a piece. Should the breathing not be) understanding this procedure become labored and difficult, the inner tube must be slowly removed, its inner surface touched, and the outer tube should be slowly introduced.
clean out and then duly replaced. The orifice of the tube should be lightly covered over with a piece of gauze or other loosely woven fabric to prevent the entrance of impure matter from without and to raise the temperature of the inspired air before it is taken into the lungs. The temperature of the room should never be allowed to fall below 65° and the air may be rendered somewhat humid by conducting into it the steam from a kettle kept constantly boiling. Then is one thing which I think ought never to be omitted in the after treatment of a case of tracheotomy in Croup, and that is the inhalation of vapour through the tube either from an ordinary inhaler or by means of a folded towel saturated with steam at the top of a boiling kettle and then held at a proper distance over the mouth of the canula, so that the patient may in the manner breathe a very moist and warm atmosphere, which, besides being soothing to the inflamed and congested membrane of the lungs, tends to prevent the desiccating of the bronchial mucous. I am quite sure that I have seen good results from this treatment in one case at least that appeared very hopeless before it was resorted to. And if it be true what some writers on the pathology of Croup assert, that it is due to the effect of temperature and the passage of the air over the characteristic albuminous discharge.
Discharge which the vessels of the mucous membrane lining the air passages cause, that a false membrane is formed; then we have a very satisfactory explanation why the inhalation of steam should prove useful in the after-treatment of Tracheotomy for Croup.

When it is deemed necessary to excite consciousness at this stage of the Case the fauces may be tickled with a feather or the act of sneezing should be used, which tends at the same time to moderate the febrile Condition and induce gentle diaphoresis. Antimony powders should on no account be employed in consequence of its depressing action upon the vital powers of the system but its tendency to excite dysenteric purging. As to the diet it should during the first day or two be non-stimulating such as milk and farinaceous food. Afterwards bovine and beef tea may be given, but modified by the diet must be regulated entirely by the Condition of the patient. The tube should be removed as soon as possible and every precaution employed to prevent or subdue consecutive inflammation of the chest.

In the foregoing thesis I have endeavoured to prove by reference both to the Pathology of the disease and to the statistics of the operation that the utility and expediency of Tracheotomy in cases of complicated Croup is indisputable.