Thesis for graduation as M.D.
by
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On the Mechanism and Treatment in Bronchial Asthma.

(References on page 32.)
There is no disease which is, apparently, so distressing to the patient, and, at the same time, admits, in itself, of so favourable a prognosis, as asthma.

I have said "apparently" because, except at the very climax of an attack, the feeling of suffocation and general distress is greatly lessened by the knowledge that the paroxysm will come to an end sooner or later; and there is no doubt that one in time becomes accustomed to the temporary dyspnoea.

A great factor in the real distress of the patient is the feeling of utter helplessness which exists for the time being a feeling which is only aggravated by the commiserating looks and speeches of well-meaning friends. In fact, I think from my own experience that, apart from medical treatment, the great desire of an asthmatic patient during a paroxysm is solitude, or, in other words, to be left alone.
Before beginning the treatment, I should like to say a few words concerning the direct etiology or mechanism of asthma.

The immediate cause, of the expiratory dyspnoea, and the extremely distended state of the thoracic walls which occur in bronchial asthma, has long been a subject of controversy.

Many theories have been put forward which it has been found impossible to accept, such as that of Bée, who believed that all the muscular exertion displayed during the paroxysm was simply an extraordinary effort to get rid of certain irritating material in the bronchi; and consequently ceased when that substance was expelled. Walthe, again, believed that the dyspnoea was due to the want of oxygen in the blood, the lungs being at the same time perfectly healthy.

And there have been many others. Three chief theories are still maintained by their supporters with the greatest
tenacity.
The theory which has the greatest number of supporters is, that the prime factor in all cases of bronchial asthma is—Bronchial Spasm, or in other words that there is a contraction of the non-striped muscular fibres surrounding the smaller bronchi, causing thereby a narrowing of the lumen of these bronchi.

The second theory is that the dyspnoea etc. are caused by a tonic contraction of the diaphragm with or without a like condition of the respiratory muscles.

The third theory is advanced by Lebert and in it he adopts a middle course between the first and second, and affirms that there is a tonic contraction both of the bronchial muscles and the diaphragm. That of the bronchial muscles taking place first.

The first theory that of bronchial spasm is of ancient origin and is supported by Trousseau, Bert, Williams, Biermer, Leyden and Professor Fraser. The great opponents of this theory were
Wintrich and Bamberger, who believe that from the low position of the diaphragm it is impossible to have the enlargement of the lungs explained by bronchial spasm, and hold that all the symptoms are fully explained by a tonic contraction of the diaphragm. In this theory they are supported by Lehman.

Lehert in adopting the middle course is of opinion that the tonic muscular spasm is reflex, and although having its main factor in the bronchial muscles, later on affects the inspiratory muscles of the throat, and neck, and chest, exciting a sort of clonic spasm which becomes tonic in the diaphragm and sometimes affects the abdominal muscles in a like manner.

Weber has advanced the theory that the dyspnöea is caused mainly by a tumefaction of the bronchial mucosa, in consequence of a dilatation of its bloodvessels through parasympathetic influence; such tumefaction producing a stenosis of the air-passage.
Stark supports Weber and admits a tonic spasm of the diaphragm. Weber's theory has been clearly refuted by Professor J. R. Fraser in his experiments with the nitrites.

It is my intention to write more particularly in this paper concerning dyspeptic asthma, although endeavouring at the same time to give a full digest of the treatment of all the forms of true bronchial asthma, and here I should like to say a few words as to the theory of causation I myself hold.

By dyspeptic asthma is generally understood that form in which the paroxysm is set up by some disarrangement of the digestive system.

I have given my attention more particularly to this form as being that from which I suffer myself. In my opinion the words "disarrangement of the digestive system" used above, may be narrowed
down to 'disarrangement of the stomach.'
I arrive at this conclusion from the
following personal observation, namely
that when I have suffered from an
attack of pure dyspeptic asthma I have
been able by thoroughly cleansing out
the stomach, by emetics or otherwise,
to remove the dyspnoea and restore
the breathing to the normal condition.
The relief becomes apparent almost
immediately and the dyspnoea disappears
in less than an hour.
I believe also that the dyspnoea is
causd mainly by the tonic contraction
of the bronchial muscles, which bronchial
spasm I hold to be set up reflexly by
the irritation of the peripheral
terminations of the vagus in the
walls of the stomach caused by some
product of digestion or rather indigestion.
I have deduced this theory of the
direct irritation of the terminations
of the vagus in the stomach, from
the fact that, when suffering from
an attack of dyspeptic asthma I have
introduced a mixture containing Potash of Fossil and Liquor arsenicales into the stomach I have felt almost immediate relief, the dyspnoea being greatly lessened in a comparatively short time, even in a few minutes; too short a time I believe for the drug to act through the blood.

I believe that the Potash of Fossil acts directly as an antidote to the poison—the product of indigestion—destroying its power to irritate the terminations of the vagus.

I have said that I believe the cause of the dyspnoea to be mainly bronchial spasm, but there is undoubtedly some congestion of the mucous membrane of the bronchi occurring as well, at least towards the end of the attack. This is shown by the flux which invariably accompanies an attack of asthma. There is no proof that this is present at the commencement of the paroxysm as at first there are only dry whistling,
The question arises: what causes this hyperaemia? I cannot think it is the mere constriction of the bronchioles.

Leyden has pointed out that there are present in the sputa of asthmatic patients certain crystals of a form calculated to irritate the mucous membrane of the bronchi. These crystals have been shown to be present in other cases than those of asthma, but that is no proof that they do not cause the hyperaemia in bronchial asthma. I myself think it very probable that they do. It is difficult to account for their presence in the sputa.

Professor Grainger Stuart has remarked upon the influence of the nervous system upon the chemical changes taking place within the body. He states that Schiff has shown that section of a peripheral nerve, such as the sciatic has been followed by
Glycosuria, and I think it is not an unreasonable theory to suppose that these crystals are formed from some chemical change set up in the mucous membrane of the bronchi by the irritated state of the cilia; the irritation being due to whatever cause gives rise to the paroxysm.

It is probable at all events that some congestion of the bronchial walls does take place, and this has been advanced as one great factor in the causation of the paroxysm. That it cannot do so by itself has been clearly shown by Professor T. Fraser in his experiments with Nitrite of Amyl.

This drug acts strongly on non-striated muscular fibres, causing it to relax, and has been used therapeutically, chiefly in relieving the pressure on the heart by dilating the artiesols. Professor Fraser administered Nitrite of Amyl to a patient suffering from bronchial asthma. On auscultation previous to the administration of
Treatment of Bronchial Asthma

Asthma is entirely due to some interference with the case which haemoglobin combines with and delivers up oxygen, and thinks it is probably due to an arrest in the delivery up of oxygen.

Turning to the treatment of bronchial asthma, I wish, in the following remarks while endeavouring to give a more or less complete digest of the various methods adopted therein, to give my own estimate of the value of the drugs and modes of treatment as far as I have tried them in my own case. I have myself been subject to asthma for a period of over twenty years, and during that time have tried a very great variety of methods of treatment, and so feel myself competent to judge of their merits as applied to my own particular case. Although in true bronchial asthma the mechanism of the disease is invariably of the same
quality or in other words although it always consists in a constriction of the bronchioles with or without such minor accessory as congestion of the bronchial mucous membrane, etc., the number of the indirect causes and their unconnected variety renders it impossible to lay down any hard and fast rules in the method of treatment. Also to be taken into account are the various irregularities which occur in cases of this disease. So far does this hold good that it is commonly accepted that every case of asthma must be treated separately and by itself.

Bronchial asthma is essentially a neurotic disease and consists in the main of a bronchial spasm set up reflexly by some irritation of the vagus; hence the first great group of drugs used in its treatment are the narcotics.

The chief and most efficacious of these are undoubtedly the preparations of
Opium and Morphia; and the most direct and most speedy method of administration is by hypodermic injection. But unfortunately the dose has to be increased with the frequency of its employment and as in the majority of cases the paroxysms are more or less frequent there is a great danger of the patient acquiring the opium habit. Opium and morphia may be administered by the rectum in the form of suppositories.

Bichloral Hydrate has been held to be of almost equal value with opium. Bircher and Hilbreich have observed several cases where this drug had an excellent effect, relieving the paroxysm in a few minutes.

Dr. T. V. Williams has also had good results from its use and advises that it be given in twenty to thirty grain doses at the commencement of the attack. He mentions one case that of a gentleman who had taken it thus for ten years without any bad effect.
Chloroform is also largely used, both internally and by inhalations. C. T. Williams considers it best given in severe paroxysms in capsules containing ten minims along with three to five minims of the outside of ethyl. In my own case I have not received much benefit from the inhalation of chloroform.

Belladonna and Cannabis India have been extensively employed in this disease. I myself have used them with but indifferent success. Belladonna may be given hypodermically or per rectum, and great benefit has sometimes been derived from the hypodermic administration of atropia.

Dr. Hyde Salter was of opinion that cannabis India was best given in small excitant doses, and that it would probably act best in those cases which derived most benefit from small draughts of strong coffee.

Dr. C. C. Williams uses excitant-
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form of a cigarette or by burning a small quantity on a plate. The variety of Satura used in making the cigarettes is the Satura Tatula, this being the most powerful of the three varieties; and when the smoke of the dried leaves is ineffectual, Dr. Alexander St Helens states that the seeds may be crushed and then smoked in a pipe with much greater effect. Of the other relative antipneumatics - horsegram, tonium, and tobacco, each one has had claimed for it great good effect in the treatment of this disease. I have myself tried them all, and with the exception of tonium with very little effect. Of the effect of tonium in my own case I shall have to speak later on. Trousseau, a great authority on asthma relieved the mild attacks from which he suffered by a few puffs from a cigar. I have also occasionally received benefit from the inhalation of tobaccos smoke during a paroxysm. The greater number of the patent
Asthma cures are composed of the leaves of these plants. Thus "Himrod," and the "Green Mountain" cures are made up of Lobelia, Stramonium, tea, and rice, in different proportions.

Senecio Powder, Savory, and Moore's tablets, and Epps's cigarettes have their active agents derived mainly from this group. Epps's cigarettes have for a long time been great favourites. Trouseau gives the following as their composition:

- Belladonna Leaves 5½ grains
- Hyoscyanus Leaves 2 3/4 "
- Stramonium Leaves 2 2/4 "
- Leaves of Hydrocorium Aquaticum 1 "
- Extract of Opium ½
- Sherry Laurel Water 9. S.

Dr. J. T. Williams has also tried the use of stimulating liniments such as Linimentum Terebinthi Aeticeum and the Linimentum Ammoniacae applying them to the chest, with some success. I may also add here the treatment by counter-irritation of the skin over the course of the vagues.
I applied nicotine in my own case,
over the vagus for some time, but
without any appreciable effect.
Mr. Mitchell Clarke has experimented
in five cases of asthma with
sulphate of spartein. The treatment
in these cases extended over periods
varying from one to five months.
Of these cases four were entirely
relieved and one was not benefited.
Sulphate of caffeine has been found to do
good in some cases, but its effect
has I think been over-estimated.
I have not received much benefit
from it. Its administration is
not without danger and I have
read of a case where the patient,
a young man, was thrown into a
state of syncope from which he
was with difficulty recovered, by the
administration of one graining the drug.
Dr. Althaus has had good results from
the action of the constant electric
current, applied mildly, and for
two minutes at a time over the
course of the cure.

Mr. Benjamin Walker has used hydrocyanic acid in asthma with good results. He gives it in doses of one-hundredth part of a grain every half hour and keeps up the treatment after the disappearance of the paroxysm, gradually lessening the frequency of the dose.

The treatment by compressed air seems to be efficacious in some cases and is supported by Dr. Hyde Salter, who also advocates the use of oxygen gas.

Trouseau recommends the following complex method of treatment:

For ten successive days of the month, the patient is to take at bed-time, at first one and after three days two and the last day four pills each containing one-sixth of a grain of the extract of belladonna, and the same quantity of powdered belladonna root, or else one, two and finally four...
granules of atropine each containing one sixty-fourth of a grain.

2nd The ten following days the belladonna preparation is to be superseded by syrup of turpentine (a tablespoonful three times daily), or better by three capsules of oil of turpentine.

3rd During the last ten days of the month the patient is to smoke arsenical cigarette.

Finally in addition every tenth day the patient is to take, in the morning on an empty stomach sixty grains of powdered calisaya bark in a small cup of black coffee.

Trousseau claims to have observed great benefit from this treatment.

The secret remedy of Aubrié is also among the most noted medicines. According to Trousseau the formula is as follows:

\[
\text{Seneca root} \quad 30 \text{ grains} \\
\text{Make a decoction with four ounces of water then add} \\
\text{Oxide of potassium} \quad 231 \text{ grains}
\]
Syrup of opium 4 fluid ounces
Brandy 2

Tincture of cochineal enough to colour
Filter. The patient to take three
table-spoonfuls daily.

Jodide of Potassium is considered to be of especial use in asthma.

Mr. Germain See says it is the true
cure for asthma, and pushes it to
codium. When this condition takes
place Mr. See replaces the Jodide
with pyridine which he praises
very highly as a palliative and
claims that in pure bronchial
asthma it completely cures the
paroxysm. He considers it more
reliable than morphia and less taxing.
Pyridine should be administered as
follow: sixty to seventy-five
grains are put in a saucer which
is placed in the middle of the
room, while the patient, in one
corner, is made to inhale the
fumes mixed with air for twenty
or thirty minutes. This is to be
repeated three times a day.

Strychnine gives iodide of potassium in doses of forty-five grains three times a day during the attack and continues the drug in doses of twenty to twenty-five grains for some time. He is of opinion that the iodide is not of much consequence. He also considers the iodide a good prophylactic. In accordance with his theory of the causation of asthma, given above, Dr. Dobell recommends anhydrous oxide of barium which has the power of absorbing oxygen from the air, and of delivering it up under diminished pressure.

Professor J. R. Fraser has experimented with the nitrates as regards the treatment of asthma. He has tried nitrite of amyl, nitrite of ethyl, nitrite of soda, and nitroglycerine, and has not found one better than another, but from their stability and convenience of administration he prefers the two latter.
I was present at the clinical lecture when Professor Fraser demonstrated the effect of the nitrites on the disease of two patients suffering from bronchitis and can testify to the temporary relief experienced by both.

I have since that time taken nitrite of amyl both by inhalation and by the stomach during an asthmatic paroxysm and have experienced a like striking relief, this relief lasting however for a very brief period and I have been unable to obtain a more lengthened cessation of the dyspnoea from the nitrite of soda and nitro-glycerine.

Where the nitrites seem to me to be of the greatest service is in the extreme climax of the paroxysm, in the relief of the orthopnoea which obtains during that climax.

The burning of nitre-paper, that is of paper soaked in a
Strong solution of nitrate of potash very often gives great relief, a relief which I have often experienced myself.

In some of those cases where the paroxysm comes on during sleep, and causes the patient to awake, the asthma may be subdued and the patient be allowed to continue his slumbers, by igniting a piece of nitre-paper and causing the sleeper to inhale the smoke thus created.

In the treatment of asthma the patient's constitution must be taken into consideration as in the case of asthma occurring in a chlorotic girl. In such a case a part of the treatment must be constitutional namely by the administration of iron in some form or other.

Locality has a great deal to do with some cases of asthma, and where possible the patient should try to find some locality suited to
his particular case. In many cases the
smoky atmosphere of a town will give
a patient immunity from attacks when
the pure air of the country has an opposite
effect. I myself have often experienced
great relief during an attack by going
to the gallery of a theatre where the
atmosphere is certainly not of the purest.
I shall conclude this paper with
some remarks on the treatment of
dyspeptic asthma.

About five years ago a fellow student
placed in my hands a small work
written by Mr. Bridham of Bideford
concerning a special method of
treatment pursued by him in
dyspeptic asthma. He gives in that
work the results of nearly a hundred
cases of this form of the disease, and
the success of the treatment in these
cases inspired me with such confidence
that I determined to try the method
in my own case.

Mr. Bridham recognised that the initial
cause of the attack was some
Disarrangement of the stomach, caused either by overloading it and overtaxing its digestive powers, or by the introduction of some improper food.

This method was as follows:—When first called to a case he administered an alterative and purge, so that he might start fairly on a clean alimentary canal. He then put the patient upon a diet, the rules of which were to be most strictly observed. I may here give an example of the diet prescribed by Mr. Pridham. In this diet writing was to be weighed.

Breakfast at eight o'clock, — half a pint of green tea or coffee with a little cream, two ounces of dry stale bread; dinner at one o'clock —two ounces of fresh beef or mutton without skin or fat; two ounces of dry stale bread or well-boiled rice; three hours after dinner, half a pint of weak brandy and water or fruit-water; supper at seven o'clock —two ounces of meat with two ounces of dry stale bread. The patient was
not to be allowed to drink within one hour of his dinner or supper, or till three hours after; at other times he was not limited.

Along with this diet Mr. Bridham used a sedative treatment employing such drugs as tonium, hysteryrams, belladona, etc.

I subjected myself to this course of treatment, strictly adhering to its rules, for a period of nearly three months with the most perfect success in that respect claimed by Mr. Bridham, namely, the absence of asthmatic paroxysms, and that although I had been suffering frequently from these attacks before commencing the treatment, I limited myself entirely to a diet similar to that given above, and took three grains of tonium twice daily. Unfortunately I was working for an examination at the time, and the low diet combined with the sedative power of the tonium, had such an effect upon my whole
nervous system that I was rendered utterly incapable for any mental work and so had to stop the treatment.
I believe that the method of treatment adopted by Mr. Bridham as limited to the overpowering of the asthmatic tendency is most effectual, but I consider the diet to be unnecessarily severe, and also that the use of sedatives is not advisable in every case. I, myself, have succeeded in getting the asthma in my own case completely under control. As I have before stated, I believe the direct excitant cause to be some product, or products, of indigestion. I endeavour to keep the stomach in as perfect order as possible so that and I have employed an ordinary hypoactive mixture with the following formula.

\text{Rx}

\begin{align*}
\text{Acid. Pictorium. Dl.} & : 3\frac{3}{4} \\
\text{Zig. Strychn.} & : 3 \\
\text{Syrp. Aurant.} & : 3 \\
\text{Ug.} & : 0 \\
\text{M. Sig.} & : 3\frac{3}{4} \text{ ts in die.}
\end{align*}
I use this mixture whenever I feel my stomach has the least tendency to dyspepsia. The mixture I use to arrest the paroxysm when brought on by indigestion has the following formula:

\[
\text{Pt. Iod.: } 3\frac{1}{4} \\
\text{Lig. Arsenical: } 3\frac{1}{4} \\
\text{Syr. Aurant.: } \frac{3}{7} \\
\text{Lig.: } 0 \quad 3\frac{8}{11}
\]

Mr. Lig. one tablespoonful as required.

As I have said before, if, on account of a heavy meal or the injudicious choice of food, I feel the symptoms of a paroxysm coming on I have only to take a dose of this mixture to arrest it at once. Even if, through not having this mixture with me, the attack comes on, and I am able to obtain the medicine, directly I have taken a dose I feel relief, and in a very short time the dyspepsia disappears; although the irritating cough and flux
remain for some time, which I believe to be due to the presence of those crystals of Leyden.

Before I commenced this treatment I could never take a meal after nine o'clock in the evening, without being asthmatic in the morning. Now, I often indulge in a hearty supper, merely taking a dose of the iodide mixture before bed-time, and I am as certain to waken in the morning with my breathing in perfect order, as I would be certain to awaken with dyspnoea, were I to be without it.

In this mode of treatment I would add one word, and that is, that when I have a severe attack, and am without the iodide of potash mixture, I have used with never failing benefit those asthma cigarettes called "cigars de Joy." If possible I am never without them although now, I have very seldom occasion to use them. When the smoke of
These cigarettes is inhaled, during a paroxysm, the relief experienced is wonderful, and lasts for a considerable time; several are, however, needed to keep off the dyspnea during a lengthened attack.

With these two mixtures, and a box of "Sigars de Joy," I need no longer fear my old enemy.

W. Stewart Campbell.
References,

2. Virchows Archiv. 5+ Bd.
15. Ibid. p. 583.