THE AETIOLOGY, PREVENTION AND TREATMENT OF CHRONIC BRONCHITIS*

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No one can pretend that the treatment of chronic bronchitis at the present time is anything but profoundly unsatisfactory. No attempts are made at prevention, whilst treatment of the established case depends to a large extent upon the depth of the patient’s purse, and consists of a bottle of cough mixture for the poor patient, and advice to winter in South Africa for his wealthier fellow-sufferer.

It is therefore quite clear that a reconsideration of the whole problem is urgently indicated, especially as this disease is well known to be an extremely common condition in England, and one of great economic importance, extending in most cases over many years of the patient’s working life, and rendering him year by year progressively less capable of following his occupation. The final result is likely to be a state of miserable invalidism, the patient himself crippled by prohibitive shortness of breath, and both he and his family irritated beyond endurance by his constant ineffectual coughing.

Aetiology

Chronic bronchitis is essentially an inflammatory condition, and to bear this constantly in mind is of cardinal importance in the understanding of the problem under discussion. In all acute and chronic inflammatory disorders the nature, severity, and duration of the disease are determined by a balance between the virulence and numbers of the causative agent on the one hand, and the local and general resistance of the patient on the other. Chronic bronchitis is no exception. The organisms are known. They are bacterial, and include micrococcus catarrhalis, pneumococci, various forms of streptococci, both haemolytic and non-haemolytic, especially streptococcus viridans, together with Friedlander’s bacillus, and staphylococci. The organisms are almost always mixed, and it is not possible to say that any of the above predominates in the majority of cases. The resistance of the patient depends upon a number of factors. It is probable that first and foremost amongst these is the natural inherited resistance of the individual. Some persons, indeed some whole families, are unduly prone to respiratory infection both of the upper and lower respiratory tract. Lowering of their general and local resistance to respiratory infection is brought about in these susceptible persons by a combination of causes; these include the obvious ones of chill, damp, fatigue, under-nutrition, and debility from a recent illness of some kind or other. No less important are the local factors: mouth breathing, excessive cigarette smoking, and any real focus of infection in the naso-pharynx. In addition, it is well known that workers in certain occupations are particularly likely to develop chronic bronchitis, and naturally these occupations are those involving the inhalation of dusts and fumes, especially those of silica, iron, steel, asbestos, carbon and kaolin; less commonly, the fumes of chlorine, ether, ammonia, nitric acid and, strange to relate, also in a few apparently innocuous trades, such as hairdressing.

There is an additional group of cases, in which an essential underlying feature is the presence of a permanent, infective focus in the lung, usually bronchiectatic, often with fibrosis, and not uncommonly to be found in stout, thick-chested subjects with a poor respiratory movement. In this minority upper respiratory infection is of less importance in producing chronicity, but is responsible for repeated symptomatic exacerbations.

Clinical Course

It is almost invariable to find that a patient with chronic bronchitis gives a history of recurrent acute or subacute attacks in the past. In many cases the bronchial mucosa is first damaged in childhood during one or other of the acute specific fevers, most often measles or whooping cough, especially if complicated by broncho-pneumonia. At that time the bronchitis clears up quickly, but probably another attack will occur the next winter, after an upper respiratory infection, and on this occasion prove more stubborn, and when the same sort of thing happens the following winter, it lingers on for many weeks, and finally, in succeeding years, tends to drag on in a mild form throughout the whole winter. The ultimate result is a permanently damaged and denuded bronchial epithelium, which reacts violently to the slightest inhaled irritant, so that the sufferer is never really free from symptoms the whole year round. Nor is this all, for owing to the obstructive element, sooner or later in most cases will appear the twin bogies of chronic bronchitis: bronchitic asthma and emphysema.

Preventive Treatment

Any attempts at prevention must be made before the chronic inflammatory changes in the bronchial tree are finally established, i.e. at a fairly early stage, when the patient is still giving a history of recurrent autumnal or winter exacerbations, but is well during the rest of the year. Every effort must then be made to protect these susceptible individuals from upper respiratory infection and its effects. This might be accomplished in various ways, and from every point of view, not least the assessment of results, the measures to be suggested could best be applied to large groups of persons rather than individuals. These measures will consist of:

1. Attempts at diminishing the frequency of upper respiratory infection in those prone to develop bronchitis.
2. Attempts at protecting the individual from the effects upon his bronchial mucosa of an upper respiratory infection, should he contract one.

It is accepted that upper respiratory infections occur either by direct droplet spread from individual to individual, or by inhalation of airborne pathogens spread in the atmosphere from a more distant source. Although

* A paper read before the London group of the Association of Industrial Medical Officers in September 1945.
the former is probably the more common way of con-
tracting an upper respiratory infection, the latter also accounts for a considerable number of cases, and its importance may well have been somewhat under-
estimated in the past.

Measures aimed at diminishing direct droplet in-
festation have quite properly attracted a great deal of
attention for a number of years past. The damage is
done, however, when the gross droplets, the size of which can be avoided only with difficulty by most
persons, for example the public transport vehicles.
However, widespread propaganda against indiscriminate
coughing and sneezing is obviously of great value, and it
is evident that warning notices should be posted in all
crowded places in public and industrial premises, and
elsewhere. Bronchitic subjects might be well advised to
walk or cycle to work if they can, or if travel is un-
avoidable, a bus is probably a better choice than the
underground. In workrooms, proper spacing of
workers is naturally essential and the erection of glass
screens between opposite benches has much to recom-
mand it. It is a wise course to send home anybody
who arrives at work in the morning with a streaming
head cold.

Measures aimed at controlling distant airborne
droplet spread are important. Droplets are dissemi-
nated over a range of about 15 feet, and they remain airborne for a considerable
length of time. It has been found possible to recover influenza
virus from various parts of a large room one hour after
its occupants have left, and the atmosphere remains an
important source of the spread of respiratory infection from these airborne
droplets, the concentration of pathogens in the
atmosphere must obviously be kept as low as possible. This
might be achieved in various ways:

(i) Improved ventilation in indoor premises. Al-
though most large buildings are equipped with some
form of mechanical ventilation, natural ventilation can
usually be made satisfactory by attention to various
elementary points. Natural ventilation depends upon
wind pressure and gravity, air being driven in through
windows on the windward side and out on the leeward.
Gravity effects are due to temperature differences, warm
air being drawn upwards through the chimney, especially
with a fire burning. If there is no chimney, roof cowls are
valuable, their action being supplemented by the
force of the wind itself. Windows should be adequate, the
usual allocation is said to be 5 square feet of window
space for every 100 square feet of floor area. Mechanical
ventilation is usually of propulsion type in large premises,
but in small buildings, natural ventilation is quite satisfactory providing
there is a high window in the wall of the house, with
air drawn in through cracks and under doors, producing
draughts. It is also important to remember that windows
should be closed in the near vicinity of the
extractor, to prevent short circuiting of fresh air. Actual
air conditioning does not seem to confer any additional
benefit from the point of view of ventilation. The
whole subject of ventilation is admirably dealt with in a detailed
article by Bedford (1944).

(ii) Bacterial mists. Much laboratory work has
been published on the use of bacterial mists, and has
shown quite definitely that the dissemination of certain
mists in the atmosphere of the laboratory in small con-
centration is sufficient to inhibit the growth of airway
pathogens. It remains to put this method to the test
of a full-scale field trial from the clinical point of view.

The essential requisite of a bacterial mist is that it
should be bacterial. It should start without any
harmless, not unpleasant in the atmosphere, non-
injurious to clothing or industrial products, non-irritant
to the nares, non-corrosive to metals, cheap and easy to
clean. Various are the agents hit upon, none seem to
meet all requirements, but perhaps the most promising, at least there is much to be said for resorcin. It is genuinely
bacterial in quite small quantities in the atmosphere,
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test of time, and the clinical impression of many very
erieRED physicians is that cod liver oil has some
value in building up resistance to winter chills.

Some observe that vaccines past have, and still are, in
use as prophylactics. A stock anti-catarrh vaccine is
commonly advised, but large-scale experiments carefully
controlled have not shown any appreciable protection in
the treated groups. It does seem, however, that the
autoegemination is of some value, as although it cannot
be said to prevent upper respiratory infection in
bronchitis, its use appears to ameliorate the severity of
the symptoms of any resultant bronchitic attack, and
very frequently the attacks themselves are fewer in
number.

A considerable amount of investigation has now
been made in the use of penicillin by spray and inhala-
tion. The actual and modified moustache washes to
reassuring results, however, in a number of cases. The
inhaler apparatus, designed for experimental purposes,
has been made in the use of penicillin in bronchitis. It
is estimated that as a dose of 1 million units is
administered by spray, it is possible to obtain one
mixture of any value at all, and have sought to
prove that after administration of expectorants there is
no increase in the amount of sputum produced. What-
ever may be the laboratory evidence, however, all
bronchitic sufferers will testify that the expectoration
is facilitated by certain mixtures, and the distress of
coughing much relieved. Not all expectorants are of
equal value in this respect, and it is the strong conviction
of the writer that the two of greatest worth, ammonium
iodide and ammonium carbonate. The former especially
has a notable effect on the sputum, liquefying it and
relieving bronchospasm to some extent. It should be
given indefinitely in small doses throughout the winter
months to these patients. To be of any use, ammonium
carbonate, although unpleasant, must be given in large
doses. In addition to the above drugs, the Bromthalea
hot water mixture is often a great help in the mornings,
and consists of sodium chloride, sodium bicarbonate,
spirit of chloroform and aniseed water, and is given in
an ounce of hot water. One other small point is the
immediacy of the common routine addition of
iestraminum or belladonna to these mixtures, because of
their action in drying up secretions.

For the treatment of emphysema it is permissible to
emphasize the surprising success of physiotherapy in
some of the most unfavourable cases. Relaxation,
deflation of the lungs and added mobility to the thorax,
together with improved inspiratory breathing power,
and an increase in the vital capacity itself, can all be
achieved by patient tuition in a well organized clinic,
providing the subject is allowed the necessary time to
attend, for it is usually many months before the maximum
benefit is attained. The use of a belt to hold in the
abdomen and elevate the diaphragm, to diminish the
amount of residual air in the lungs, has been advised
and is theoretically sound, but patients themselves dis-
like the sense of constriction round the waist and are
unwilling to adopt the rig. Ephemrines are of great value, even in the absence of
any obvious bronchospasm which, however, always
exists to a certain extent in these cases. It should be
given in full doses at regular intervals for an indefinite
period. Some patients will complain of its side effects,
such as palpitation, and it may then be found that
administration as a mixture instead of as the usual tablet
overcomes this drawback. It is also worth while bearing in mind that elderly bronchitics may complain of
the difficulty in passing water after taking ephemrines.

Conclusion

The writer has been much impressed by the con-
stancy of the infective factor in the great majority
of cases of recurrent bronchitis. As it appears im-
possible at the present time to do more than ameliorate
the symptoms of the chronic case, it is felt that attention
should be directed towards the prevention of the pre-
curring recurrent infective episodes. There seems to be
sufficient laboratory evidence to justify the experimental
use of bactericidal mists and inhalations on patients
themselves.

It is suggested that it would be profitable to undertake
a field trial of these methods in industry, or wherever
there are large numbers of persons under continued
supervision, especially where they have properly docu-
mented past medical histories.

REFERENCES
63, 11.

Treatment of the established case of Chronic
Bronchitis

Apart from advice on general health, and the avoidance
of the occupational precipitants noted earlier in this
article, the duty of the physician towards the patient
with real chronic bronchitis lies chiefly in the treatment
of the obstinate cough, the accompanying broncho-
spasms, and the progressive pulmonary emphysema.

Different kinds of vaccines have been, and are
being, prepared. Of these the antitoxin variety is the
most generally esteemed. The antitoxin for use in
anaesthesia was prepared by a number of laboratories,
including the writer's, and has been used with
satisfactory results. However, the antitoxin is not to be
expected to give any permanent improvement, and the
use of hourly or more frequent administrations is
frequently necessary. In some cases, however, the
improvement is so marked as to encourage the persis-
tence of the treatment. In the writer's experience, the
treatment has been continued for from a week to a
number of months.

The antitoxin should be given by syringe, and the
solution worked up and down the bronchi by coughing
and expectoration. The antitoxin is not to be
absorbed into the blood, but is to be rapidly excreted
from the body. The antitoxin is to be given in doses of
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