P. K. BULATOV

MODERN METHODS OF TREATING BRONCHIAL ASTHMA

FOREIGN LANGUAGES PUBLISHING HOUSE

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INTRODUCTION

Bronchial asthma is a grave disease occurring quite frequently in internal-disease clinics. There does not exist as yet any radical method of treating this malady; nor is there any definite opinion as to its aetiology or pathogenesis. Hence therapeutists must perseveringly search for new methods of treating bronchial asthma.

According to A. Rodossky, S. P. Botkin, N. F. Golubov and other Russian scientists of the latter part of the 19th and the beginning of the 20th century, it is a reflex mechanism that underlies the origin and course of bronchial asthma. In the last decade, thanks to the achievements of the Pavlov physiological school, clinicians and physiologists (Y. P. Frolov, P. K. Bulatov and M. Y. Aryev) have evolved on the basis of the reflex theory the cortico-visceral conception of aetiology and pathogenesis of this disease. The new outlook, arising out of I. P. Pavlov's and S. P. Botkin's conception of nervism and the cortico-visceral theory, led us to revise our old methods of treating bronchial asthma and to introduce new methods: administration of anti-bacterial preparations—penicillin and sulfanilamide preparations, and Academician V. P. Filatov's method of treatment by means of grafting. It made us take a new stand with regard to treatment with novocaine, etc.

This paper is intended to acquaint the reader with the work performed at the hospital therapeutical clinic of the Pavlov Medical Institute in Leningrad.

CHAPTER I

AETIOLOGY AND PATHOGENESIS OF BRONCHIAL ASTHMA

A great variety of pharmaceutical, physiotherapeutic and other methods of treatment (vaccinotherapy, serotherapy, pyrotherapy, etc.) are at present suggested for the treatment of patients affected with bronchial asthma.

In most cases, however, there is no definite indication when these remedies have to be administered; whether it be in the period of remission, or, on the contrary, in the period of exacerbated attacks; whether the preparation should be administered at all when complications of the basic disease develop, such as chronic vesicular emphysema, cardiac or pulmonary insufficiency, etc. Nor have we found any recommendations as to the interdependence between the relative effectiveness of the preparations and the duration of the disease. It has been observed that very many preparations relieve patients who have suffered from bronchial asthma for only a few months and that these preparations do not produce the desired effect in cases of ten-twenty years duration.

In describing the treatment of bronchial asthma, handbooks and journal articles most frequently recommend therapeutical measures of a symptomatic character.

We regard bronchial asthma from the viewpoint of I. P. Pavlov's and S. P. Botkin's ideas of nervism. It is a reflex mechanism that underlies the development of the disease. All the three links of this mechanism account for the development of the pathological process: 1) stimulant, which

acts on the nerve centres through the centripetal nerves and their endings; 2) the nerve centres which transmit the stimulation on to the centrifugal nerves; 3) peripheral tissues with the centrifugal nerve endings disseminated within them.

Hence, we hold that symptomatic therapy should come second, and that the application of therapy should aim first and foremost at treating the body as a whole by acting on the central nervous system through its reflex mechanisms.

From the viewpoint of modern physiology, the organism of man as well as of animals should be studied in close interrelation with environment: the activities of the individual organs of the body and its reactions to external influences are definitely related to the activity of the cerebral cortex. All the functions of the internal organs are performed with the participation of the cerebral cortex: the latter influences the internal organs, and vice versa.

According to S. P. Botkin's neurogenic, i.e., reflex theory of internal diseases, pathogenetic agents, when reacting on the body and the tissues, produce a stimulation of the corresponding nerve apparatus within them, which transmits it to the nerve centres. It is the latter that determine the development of different symptoms of bronchial asthma including asthmatic attacks.

We consider bronchial asthma to be an allergo-infectious disease.

Infection localized in the respiratory tract—in the bronchi and the lungs—plays a big role in the aetiology and pathogenesis of bronchial asthma. Observations made on 1,200 patients showed that, in 98 per cent of the cases, infection of the respiratory tract preceded the first attack of bronchial asthma.

A considerable percentage of this infection was due to virus influenza and its complications, measles and whooping cough bronchites and pneumonias, chronic tonsillites, inflammations of nasal sinuses and other diseases of the respiratory organs. In the case of 2 per cent of the patients

the causes of the first attack of asthma have not been discovered.

The above observations confirm the data previously published: S. M. Genkin and M. V. Ovchinsky (1928) attributed the first attack of bronchial asthma to infection of the respiratory tract in almost 100 per cent of their patients; S. G. Gotesfried and E. Y. Heinrichsdorf (1941)—in 66 per cent; N. N. Malkova (1936)—in 75 per cent; Moncorgé—in 100 per cent, and Grimm—in 64 per cent of their patients.

What, then, accounts for the aetiopathogenesis of bronchial asthma? Our data suggest that infection of the respiratory tract is the principal cause which brings about the change in its mucous membrane. Our concept is confirmed by a postmortem histological examination of the respiratory tract mucosa of 14 patients affected with bronchial asthma. Cylindrical epithelium, for example, after being affected with virus bronchites and bronchopneumonias, dies away, laminates into layers and is replaced by multilayer flat epithelium, which leads to an alteration in the normal protective function of the mucous membrane of the bronchi and respiratory tract.

Thus, conditions are created whereby substances generally harmless for the body become toxic. V. F. Undrits believes that infections remove the protective barrier of the mucous membrane; in addition, during acute or exacerbated chronic infections, the products of bacteria disintegration, toxins and substances resulting from the disintegration of the bronchus tissue, are sucked into the blood through the mucous membrane of the bronchi, and sensitize the organism.

Sensitization means a change in the normal sensitiveness of the organism towards an increase. The penetration of toxins and of disintegration products of the lung and bronchus tissues appears to lead to a stimulation of the bronchus receptor apparatus. The constant stimulation of the receptor apparatus of the bronchi and lungs is also transmitted to the central nervous system.

Given a specific condition of the stimulation and the

nervous system, a sufficiently stable, though weak, excitation of the nerve centres becomes a dominating factor in the activities of the nerve centres—the nuclei of the vagus, the thalamus opticus and the cortex. The doctrine of the dominant is a doctrine on the temporary domination of a focus of excitation or heightened excitability which appears in one or another part of the central nervous system under the influence of stimulations. The latter are characterized by a definite frequency and intensity and act on the nerve centres by way of reflex—through the centripetal fibres or directly through the blood.

"Constantly performed work or the working posture of the body," A. A. Ukhtomsky wrote, "is the outer expression of the dominant."

In its turn, the focus of heightened excitability (the pathological dominant of bronchial asthma), formed in the central nervous system under the influence of impulses which arise in the nerve endings of the respiratory tract, affects the parasympathetic part of the nervous system, causing a spasm of the bronchi and changing the secretory function of their mucous glands.

As a result, we see clinically the development of an attack of bronchial asthma. A study of the properties of the dominant helps in explaining the pathogenesis of bronchial asthma.

Having arisen, the dominant is firmly preserved in the nerve centres and is sustained by various outside stimulations. The attacks of bronchial asthma, once they have appeared, may subsequently be brought about by various causes: odours, meteorological conditions, positive, negative emotions and other causes. The greater the number of nerve elements participating in the formation of the dominant, the longer its effect.

It is this property of the dominant—inertia—which explains the fact that bronchial asthma, once it has appeared, follows its course, though the initial excitation stimulus is no longer there.

The dominant is capable of deflecting from their normal course excitations flowing into the neighbouring nerve centres; it is capable of attracting them and of being maintained at their expense.

This character (the capacity for the summation of excitations) makes it possible to explain the way in which different causes (primarily diseases of the respiratory organs and external factors) may aggravate the course of the disease and bring about more frequent attacks. The dominant does not completely disappear even after subsiding. It may subsequently reappear under the influence of various causes. This property of the dominant (its restoration) accounts for the recurrence of bronchial asthma attacks after a long period of seeming recovery. The dominant ceases to exist (fades away) either because the stimulation that originated it has stopped functioning, or because a new and stronger dominant has come into existence. Thus, the emergence of a rival emotional dominant may result in the termination of the asthmatic state or bronchial asthma attacks.

Hence, from the viewpoint of Russian physiological science, a number of points can be explained which are of great significance in the aetiology and pathogenesis of bronchial asthma. A lasting infection of the respiratory organs of patients suffering from bronchial asthma is the focus from which impulses are transmitted to the central nervous system, thereby creating in the latter dominant foci of heightened excitability—the corresponding pathological dominant of bronchial asthma.

A disease, caused by the presence of a pathological dominant (as conceived by A. A. Ukhtomsky) or of "stagnant excitation" (according to I. P. Pavlov), calls for treatment, primarily directed at the central mechanisms.

It follows from the above that, when treating bronchial asthma, it is necessary first of all to protect the central nervous system from impulses which arise in the toxic infectious foci, located in the bronchi, lungs and other parts

of the respiratory tract. Nor should we overlook pharmacological treatment, aimed at abating inflammatory phenomena along the respiratory tract which helps in reducing the sensitization of the body.

In our view, infection of the respiratory tract accounts for the stimulation of the interoceptors, terminating in the mucous membrane of the trachea and bronchi, which creates the prerequisites for the emergence of centripetal impulses; the latter penetrate into the nuclei of the vagus and the thalamus opticus, and into the cerebral cortex, producing there dominant foci of heightened excitability. The pathological dominant thus created sustains the heightened tone of bronchial muscles and leads to their subsequent hypertrophy; it also intensifies the secretory function of the mucous membrane glands of the bronchi, which in its turn leads to the disturbance of the respiratory function of the lungs, followed by the development of emphysema of the lungs.

When changes in the mucous membrane take place, the products of disintegration of the tissues and bacteria pass into the blood stream and sensitize the organism.

In examining the problem of treating bronchial asthma, we analyze below each method of treatment individually: anti-bacterial and protective therapy of the central nervous system, psychotherapy, and other kinds of therapy. The last chapter deals with first-aid methods in cases of bronchial asthma attacks.

CHAPTER II

TREATMENT OF BRONCHIAL ASTHMA

1. ANTI-BACTERIAL THERAPY

The high therapeutic activity of sulfanilamides and penicillin was the reason for using them to cure patients suffering from bronchial asthma and receiving treatment in our clinic at the First Medical Institute in Leningrad. This was justified by the presence of acute or chronic infection of the respiratory organs, which preceded the bronchial asthma disease in 98 per cent of cases, as well as by the fact that in the course of the disease in 96 per cent of patients the infectious-toxic factor was the chief cause bringing about recurrent attacks of bronchial asthma.

The number of patients affected with bronchial asthma and treated with sulfanilamides and penicillin totalled 350; of these 205 were in-patients and 145 out-patients. The observations covered a period of from six months to ten years.

First group (172 patients). The patients received only sulfanilamides according to the following schedule: first day—6 gm., second day—5 gm., and the days following—4 gm. a day. In the course of treatment from 30 to 60 gm. were administered. White streptocide was administered to 22 patients, sulfidin—to 26, sulfazole—to 49, sulfathiazole—to 22, disulfan—to 30, and other sulfanilamides—to 23 people.

Second group (52 patients). The patients received intramuscular penicillin injections every four hours. From 40,000 to 100,000 I.U. of penicillin were injected into the

outer upper quadrant of the gluteal region. The patient received from 200,000 to 600,000 I.U. of penicillin a day. In the course of treatment, from 2,500,000 to 21,500,000 I.U. of penicillin were administered.

Third group (22 patients). The patients received intravenous injections of penicillin. From 100,000 to 300,000 I.U. of penicillin were administered into the cubital vein twice a day. Every patient received from 200,000 to 600,000 I.U. of penicillin a day.

Fourth group (16 patients). Every patient was given simultaneously an intravenous injection of from 100,000 to 400,000 I.U. and an intramuscular injection of from 300,000 to 400,000 I.U. of penicillin daily.

Fifth group (88 patients). Of these 66 patients were treated alternately with sulfanilamides and penicillin, while 22 received simultaneously sulfanilamides and penicillin according to the above dosage.

I. At first the patients of the first group were treated with white streptocide. Eleven patients had an acute infection and eleven suffered from complications. Streptocide exercises a bacteriostatic influence on the gram-positive group of microbes. The application of white streptocide in cases of exacerbated infection of the respiratory tract was always effective, although, when using other sulfanilamides, the therapeutical results were more pronounced. The asthmatic condition of patients affected with infectious foci in the lungs improved at the end of the first or the beginning of the second day after the administration of 5-8 gm. of sulfanilamide preparations, sulfazole or sulfathiazole. The patients were able to sleep without being compelled to remain in a sitting posture, and to exhale more freely. With the treatment continued, we observed a lowering of temperature, an abatement of local inflammatory phenomena in the bronchi and lungs (less crepitation and sputum). Roentgenoscopy showed a diminution of stagnant phenomena in the lungs. Leucocytosis was reduced and the differential blood count and the E.S.R. returned to normal.

After the termination of the course of treatment, the asthmatic state or attacks did not recur in 48 cases, while in 35 instances a relapse was observed. In the case of patients suffering from complications (vesicular emphysema of the lungs, chronic non-specific pneumonias, etc.) the results of treatment were less pronounced: in 33 cases the attacks ceased during our observations, and in 48 cases they continued, though in a less marked way.

In two cases, where no infection foci were present, the attacks were stopped for a protracted period (up to a year). In six other cases the attacks continued, though in a less pronounced form.

In the case of 32 patients affected with chronic non-specific pneumonia, when prophylactic treatment with 1 gm. of sulfanilamide two or three times a day was recommended, attacks of bronchial asthma, which generally set in after the inhalation of various odours (smoke and dust, moist or cold air, etc.) were prevented for a period of two-three months.

The effect was most pronounced when our patients were treated with sulfazole and sulfathiazole, and less marked when treated with white streptocide.

The table below summarizes the therapeutical effect of sulfanilamide preparations on our patients.

Table 1

	Infection foci	No infection foci present	Complications	Total number
Number of patients	83	8	81	172
Results of treatment { improvements .	48	6	33	87
Results of treatment { no change . . .	35	2	48	85

We believe that the positive effect obtained in patients suffering from complicated bronchial asthma and affected with infection foci was due to the bacteriostatic and, pos-