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The Tobacco Heart

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WHEN we approach the subject of tobacco pathology we are immediately impressed by two facts. One is, that our knowledge of this subject is not so great as would naturally be expected, considering the long time during which the effects of tobacco on the human organism have been under observation and the large amount of the available clinical material. The other is, that when we investigate this subject we encounter peculiar difficulties. There are not only the intrinsic difficulties, but also those which arise out of the extraordinary esteem in which tobacco is very generally held. Tobacco appears to be not as other drugs; it seems to possess a special privilege and to have powerful friends at court. We find poets singing its praises, clergymen speaking of it in terms of commendation, and scientists and even physicians showing a disposition to look only at its good qualities. In a recent number of the *Lancet* we find such a statement as this: "Medical opinion is inclined to favor indulgence in smoking." The writer in dealing with this subject is perhaps the more keenly sensible of these peculiar difficulties because he himself has smoked for over forty years. And the intrinsic difficulties, moreover, are aggravated by the wide variation in susceptibility to the effects of tobacco which obtains in different individuals. Some can use tobacco in large amounts for many years and live to an advanced age without suffering bad consequences, or bad consequences which are recognized; while others experience toxic effects from very moderate indulgence. And tobacco has the negative advantage, that its use is not associated with definite antisocial features, as is the case with opium addiction and alcoholism.

When we investigate the seamy side of tobacco we are apt to have our attention drawn early to its effects on the circulatory apparatus. It is usually symptoms of circulatory disorder that bring the tobacco patient to the physician. The bad effects of tobacco on the alimentary tract, on the nervous system and on mental and physical efficiency seem not to disturb him so much, or they excite his apprehensions less.

The tobacco heart has been named and is well known by its name, but its nature is not well known. We are very much in the dark as to its pathology. Lewis sums up our knowledge of the most serious pathological heart condition which has been attributed to tobacco as follows: "It is suspected, but not proved, that heavy tobacco smoking can lead to degeneration of the arteries, including the coronary vessels." Experiments on animals have been made which go to show that tobacco lessens the electrical excitability of the cardiac muscle; but this is not sufficient to prove that tobacco is regularly a causative agent in the production of myocardial degeneration. That its excessive use can produce changes

in the rate and rhythm of the heart's action is pretty well established. It has been widely stated that tobacco raises the blood pressure; but on the other hand, low blood pressure is often observed in chronic tobacco poisoning. In tobacco cases with demonstrable cardiac or vascular lesions it is difficult to determine the share in the pathology which properly belongs to tobacco. In the present state of our knowledge the tobacco heart appears to be mostly a matter of symptoms and functional disturbances. But the fact has to be borne in mind that pathological physiology and pathological anatomy differ essentially only in degree; and that long continued abnormal physiology may result in permanent structural changes. The proposition can hardly be denied that tobacco is intrinsically a toxic agent, and that it is entitled to qualify at least as a contributing factor in cardiovascular pathology.

Definite knowledge of the pathological changes produced by tobacco in the cardiovascular apparatus being largely lacking and difficult to obtain directly, the most convenient way to study the tobacco heart would seem to be by clinical observation. The following cases are cited in illustration of its clinical aspects (Reports of four of these cases have previously been published by the writer¹).

Case I. A man of thirty-five, an intellectual worker, but fond of out-of-doors sports; with good general health and no previous morbid history of significance; whose parents never used tobacco; began to smoke at the age of eighteen, acquiring his tolerance with unusual difficulty, and soon became an excessive smoker. He gave the following history. At different times during the previous year or two, after unusually heavy smoking (twelve to fifteen cigars a day), he experienced a sensation of unease or a dull pain in the precordium just below the left nipple. Sometimes after a cold plunge or a very cold shower bath he felt short of breath. On one occasion after carrying a heavy load up one flight of stairs he suffered for several hours from a sense of cardiac oppression, a dull pain in the precordium and shortness of breath. Lately the cardiac unease and the dull pain in the precordium have occurred more frequently than formerly and were more easily provoked, which induced him to lessen considerably the amount of his smoking.

Physical examination showed him to be well nourished and of a healthy appearance. His skin was warm and ruddy, which is habitual with him, as well as facile perspiration. A slight enlargement of the area of deep cardiac dullness was made out (perhaps due to athletics). His heart sounds were soft but clear, his heart action was slow, and there were occasional extrasystoles. His blood pressure was, systolic, 115; diastolic, 60.

Immediately after the examination of his blood pressure above recorded, he smoked a pipeful of tobacco, and fifteen minutes later his blood pressure was found to be systolic, 115, and diastolic, 70,

¹Read before the American Therapeutic Society, Cleveland, Ohio, June 9, 1934.

showing a slight rise in the diastolic pressure without a rise in the systolic pressure. During the following two months the systolic pressure, as observed, ranged between 85 and 110, being most of the time around 100; the diastolic pressure ranged between 60 and 65; and the pulse pressure ranged between 30 and 40, except on one occasion when it was found to be only 20. After two months the blood pressure began to rise, so that the systolic pressure was often found between 115 and 125, the diastolic pressure remaining between 65 and 75. The pulse rate was found mostly between 60 and 70. Six months after the first observation above recorded the blood pressure was found to be, systolic, 125, and diastolic, 65; and the pulse rate was found to be 60. An exercise test made at this time caused a fall of ten points in both systolic and diastolic pressures, and a slight rise in the pulse rate.

Under treatment, which consisted of reduction of his tobacco to a small amount, his symptoms abated and finally practically disappeared; but they could be recalled by increasing his smoking.

The above observations were made twenty years ago. Since then the patient has been more or less under the writer's continued observation. He has been free from the symptoms above described and in good general health, but he has used tobacco with great moderation, for he has learned by experience that more than moderate indulgence will bring back his heart symptoms: he can bring back the angina by smoking three cigars in one evening.

CASE II. A man of forty-four, a physician, whose previous health was generally good, except for several attacks of renal colic; who was a very hard worker in his profession; and who was a heavy smoker of cigars; had a sudden attack of faintness, in which, however, he did not entirely lose consciousness. His blood pressure, taken near the time of this attack, was systolic, 92, and diastolic, 80, and his pulse was so feeble that its rate could not be well made out, but it seemed slow. These symptoms continued for about a week, slowly improving. During this period, and at rare intervals during the previous two years, he had slight but definite attacks of precordial pain coming on in the night time. His treatment consisted of rest in bed for two weeks, and, after that, gradual return to ordinary activities, and complete abstention from tobacco. Two months after the above mentioned attack of faintness he still complained of general weakness, but was free from particular symptoms. His blood pressure ranged between 100 and 125, systolic, the diastolic pressure being around 70. Six months after the initial attack, he was very nearly back to his normal condition, and had resumed the use of tobacco, but in great moderation.

CASE III. A man of twenty-five, a physician, who was an excessive smoker of cigarettes, awoke one morning feeling very weak. His pulse rate was between 50 and 60, and his blood pressure was very low, as estimated by the finger on the radial artery. After rest in bed for two days and abstention from tobacco, his heart action returned to the normal.

CASE IV. A man of thirty-seven, a physician, who had an unusual susceptibility to the effects of tobacco, and for that reason had never smoked much, suffered precordial pain after smoking one-half of a cigar. Observation on one such occasion showed that his diastolic blood pressure rose ten points, while his systolic pressure remained unchanged; his blood pressure was generally low.

CASE V. A man of thirty-two, a physician, who was a hard worker at his profession, and also a heavy smoker of cigarettes, suffered during the preceding two years from occasional attacks characterized by a feeling of oppression or crowding in his anterior left chest, pain and air hunger. The pain was increased by taking a deep breath, but did not radiate and had no relation to exertion. In the first attack, which came on in the night time, the pain was so severe that the patient says that he was unable to turn in bed or reach for the telephone; the pain lasted about two hours, after which he went to sleep; when he awoke in the morning the pain was gone. With this pain there was tenderness in a small area of the precordium. Between the attacks of pain, and especially recently, this precordial hyperesthesia was present. His electrocardiogram was negative; physical examination of his heart was negative; and x-ray examination of his chest was negative. His pulse rate on first examination was 72, and his blood pressure was, systolic, 112, and diastolic, 65. He abstained from tobacco for several days, and was relieved of his symptoms. Then he smoked one cigar, and the pain came back and lasted ten minutes, and the tender spot in the precordium came back and lasted for a half hour. He gave up tobacco entirely and his symptoms have not returned.

These few case reports may serve to illustrate the syndrome, if we can call it by so definite a name, of the tobacco heart. We will now discuss very briefly some of the particular symptoms.

The rate of the heart action is often found to be increased in smokers, but it is also often found to be abnormally slow. There seems to exist in chronic tobacco poisoning an increased susceptibility to certain nervous influences by which changes in the heart rate are brought about. The writer has been impressed by the tendency to bradycardia in this condition.

Of the disturbances of rhythm observed in this condition, extrasystoles seem to be the most common. Lewis says that "extrasystoles can not be caused by nervous impulses playing on a healthy heart." So if we accept this statement, it becomes necessary, when we find extrasystoles associated with tobacco poisoning, to predicate either preexisting myocardial pathology or tobacco toxic disturbance of the myocardium. Krehl says that tobacco is not without influence on the heart's substance. White says that tobacco in large amounts may even excite in susceptible individuals paroxysmal tachycardia or paroxysmal auricular fibrillation.

Palpitation is a common symptom in chronic tobacco poisoning; and the writer has observed hiccup to be apparently produced by smoking.

Syncope occurs not infrequently in tobacco poi-

soning, especially in cases in which tobacco has been used excessively and for a long time.

It is generally stated that the effect of tobacco on the blood pressure is to raise it. The writer has received the impression from clinical observation that in chronic tobacco poisoning the blood pressure is likely to be low, unless other reasons exist for hypertension.

The most striking symptom of the tobacco heart is precordial pain. This pain is usually limited to the region of the heart, although it may have a more extensive distribution. It may consist of short stabs, or it may be a steady pain or soreness, or it may be so severe as to simulate the pain of typical angina pectoris. It is not usually attended with the feeling of intense mental depression and fear which characterizes typical angina pectoris. The pain is apt to come on in the night, when the patient is in bed. Regarding this pain Lewis says: "An oppression in the chest or a sense of sore constriction is not uncommon among smokers when they take active exercise." It has been noted that the chest pains due to tobacco may persist for several weeks after the use of tobacco has been discontinued; and also, that the strictly precordial pain is apt to disappear more quickly than the substernal pain. The sensory disturbances in the cardiac region due to tobacco occur without evidences of mechanical heart failure. It has been suggested in explanation of these sensations that they are due to myocardial ischemia produced by spasm of the coronary arteries; and it has also been suggested that they are due to tobacco toxemic disease of the periaortic nerves. While it is true that pain in the heart region occurring in heavy smokers often disappears after the patient stops smoking, it must be borne in mind that pathological conditions predisposing to angina may exist which tobacco brings to the surface.

The effect of tobacco on the blood vessels is of particular interest. For a long time it has been suspected that tobacco has a constricting effect on the coronary vessels, and lately its effects on the peripheral vessels have been studied with results which suggest a causal relationship between chronic tobacco poisoning and thromboangiitis obliterans. A relationship between excessive smoking and the "soldier's heart" has also been suggested. The writer is not aware that anyone has been so bold as to suggest a relationship between the recent great increase in deaths from heart disease in this country and the contemporaneous increase in the use of tobacco, which appears to be much greater than can be accounted for by its recent large use by women.

In considering the effect of tobacco on the coronary vessels one is inclined to speculate as to tobacco toxemia producing coronary spasticity, with lessened peristaltic action of the blood vessels in the heart and consequent myocardial ischemia. Such a speculation is based on the doctrine of vascular peristalsis as a motive factor of the circulation.

In connection with tobacco toxemia the question of special sensitization comes up. Not only are some individuals more susceptible to the effects of

tobacco than others, but some who do not show susceptibility to a given amount of tobacco at one time, later may show susceptibility to a much smaller amount.

In concluding these few remarks on a difficult subject, the writer will repeat some statements which he has already made. We know comparatively little about the tobacco heart, but we know enough to make it impossible for us to ignore it. We know that certain symptoms referable to the circulatory apparatus and certain functional disorders of that apparatus are often observed in tobacco subjects, which generally disappear after the use of tobacco has been discontinued. We know that tobacco acts like a toxic agent, and that considerable but various degrees of tolerance to it can be acquired. We have reason to believe that it can produce special sensitization. We suspect that it can produce coronary vascular spasticity. It would seem to be a conservative statement, that chronic tobacco poisoning can be at least a contributing factor in the production of organic disease of the circulatory apparatus. At any rate, we know enough about the tobacco heart to form a basis for a rational therapy.

1218 Pacific Street.

1. E. E. Cornwall, Chronic tobacco poisoning and the circulation, *American Medicine*, Feb., 1914.

Idem. Remarks on cardiac vascular disease and angina pectoris, *Medical Times and Long Island Medical Journal*, March, 1934.

Physical Therapy Session to be Held in Philadelphia

The thirteenth annual scientific and clinical session of the American Congress of Physical Therapy will be held in Philadelphia at the Bellevue Stratford, September 10, 11, 12, 13, 1934.

This year's session will be especially noteworthy because of the excellent program which has been arranged. Outstanding clinicians and teachers will present the results of the newer researches in the field emphasizing short wave therapy, hyperpyrexia, light therapy, remedial exercise, massage and other interesting subjects.

On Wednesday evening, September 12th, a joint session will be held with the Philadelphia County Medical Society.

Special features will be the scientific and technical exhibits and the small group conferences. The latter have been arranged for Tuesday morning. Every specialty of medicine and surgery will be represented. The technical application of physical measures will be demonstrated and the fundamentals emphasized. The general sessions will be taken up with symposia on cancer, arthritis, poliomyelitis, industrial surgery, etc.

Friday, September 14, has been set aside for hospital teaching clinics which will be held in the leading institutions of Philadelphia.

You should plan now to attend this very important medical gathering. Physicians and their technicians, properly vouched for, are eligible to attend.

Send for preliminary program. Address American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago, Illinois.

The Henry Street Visiting Nurse Service

The re-election for a period of two years of Mrs. Charles S. Brown, Jr., as chairman of the Nursing Committee of the Henry Street Visiting Nurse Service is announced by Miss Marguerite Wales, General Director. Mrs. Morris Hadley and Mrs. Gerard Swope have been re-elected vice-chairman and corresponding secretary respectively.

Dr. George W. Kosmak, editor of the *American Journal of Obstetrics and Gynecology*, has been elected chairman of the Medical Advisory Committee of the Visiting Nurse Service, succeeding the late Dr. Linsly R. Williams. Two new members on this committee are Dr. John Wyckoff, Dean of the New York University School, and Dr. Marjorie Strauss Knauth, who has been elected secretary.