REMARKS ON THE TREATMENT OF THE PYREXIA OF PHTHISIS.

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PYREXIA is often a most troublesome symptom in both acute and chronic phthisis, though it is not a necessary accompaniment—certainly not of the chronic forms—and it has been known to be absent even in the acute ones. It is, however, in a large proportion of cases, the principal unfavourable symptom. When it is persistent it is impossible for the medical man to give a hopeful prognosis, and when it subsides the case assumes a most hopeful aspect. Its absence has generally been assumed to indicate quiescence of tuberculous disease, and its presence, activity; and while the latter proposition is usually true, the former is not to be always relied on, for in many cases tubercle forms and undergoes excavation without pyrexia.

The pyrexia of phthisis never reaches very high figures—a record of 105° F. is very seldom attained, and the charts rarely run higher than 103°. A chief feature is the uniformity of the afternoon rise. On the other hand, the temperature descends, as in the early morning, very low indeed, and I have registered a reading of even 91.6°. This case was one of acute lung excavation, and the range of temperature in twenty-four hours amounted to 10°.

A rise of temperature above 100° in a case of phthisis ought always to lead to a careful search for the cause of such elevation, and it generally is to be found in extension of tuberculous disease, or in softening and excavation of old tuberculous masses, or, if a cavity be present, in its further extension; or, again, it may be traced to commencing tuberculosis in some other organ, as the lymphatic glands, the joints, the testicles, or the intestines. In a very few cases it is due to pulmonary congestion, generally affecting the bases of the lungs, though pulmonary congestion in phthisis means, as a rule, extension of tuberculation.

Various theories have been put forth of late years to explain the process of fever, and, on the whole, I am inclined to adopt that of Dr. Donald MacAlister,¹ as best meeting the many difficulties which surround the subject, and as being particularly suited to the requirements of phthisical pyrexia.

Dr. MacAlister divided the factors of fever into three: 1, the thermolytic or heat-discharging mechanism; 2, the thermogenic or heat-producing mechanism; 3, the thermotaxic or heat-adjusting mechanism.

Heat is discharged throughout the whole of fever—during its rise, its continuance, and its defervescence, the discharge taking place through the skin by evaporation, conduction, and radiation in the ratio of 80 per cent., and through respiration in the ratio of about 20 per cent.

Heat is produced in the body by the oxidation of tissues, chiefly of muscles, which may be regarded as the furnaces of the body, the heat-producing or thermogenic function of muscle being quite independent of the contractile function, and continuing during rest, though in some degree increased by contraction. This thermogenic metabolism of muscle continues as long as blood and nerve supply are intact. If the nerve be stimulated, muscular contraction and increased production of heat result, but muscular contraction outlasts heat production. When a muscle is poisoned with curare, which abolishes the function of the nerve endings, and thus blocks the way for the transmission of impulses from the nerve trunks to the muscle, both effects are lost, and the thermal behaviour of an animal, whose thermogenic tissues are thus cut off from the influence of the nervous system, is remark-

able. The vasomotor system is intact, but the animal can no longer maintain its temperature. If plunged into a cooler medium the temperature falls, if transferred to a warmer one, it rises. Moreover, the practical cessation of oxidative metabolism is shown by the consumption of oxygen and the exhalation of carbonic acid falling to a fraction, showing how much these processes are due to the thermogenic action of muscles, and how much this latter is due to their innervation.

Heat production in the muscle is, according to Dr. MacAlister, carried on under the influence of a twofold nervous mechanism, the one part exciting to thermogenesis, accompanied by destructive metabolism, and the other part staying thermogenesis and subserving contractive metabolism. The thermogenic tonus is the manifestation of the normal balance between these parts.

Experiments show that by the stimulation of a particular region to the inner side of the corpus striatum the thermogenic function of the muscle is abnormally increased, and this without encroaching on the motor tract, without exciting the motor function, and without any action that can be fairly called vasomotor being brought into play.

The temperature of phthisis is, as I have shown in a paper in the *Medico-Chirurgical Transactions* (vol. lviij), due to a combination of fever and collapse influence. If these are equally balanced, a chart hardly differing from the normal results; if collapse prevails, subnormal temperatures appear, and if the febrile process be in the ascendant, pyrexia shows itself.

The formation of tubercle may not cause great variation in the temperature chart from the normal, but any variations which occur take a particular form, which is visible in apyrexial cases, but is accentuated in pyrexial ones. Thus, the temperature of tuberculation is characterised by a considerable range of temperature, varying from 94° F. to 103° F., by afternoon pyrexia and subnormal early morning temperatures. For tuberculation without fever the curve is similar, but not so marked, the collapse influence prevailing.

Now we may look at the subnormal temperatures as instances of the thermolytic agency, where heat is being discharged in the form of night sweats. Then in the afternoon pyrexia we see the thermogenic influence giving rise to that wasting of tissues, especially of muscle, which is so characteristic of phthisis. When we examine the hectic temperatures of acute excavation we see there all the features of suppurative fever in the afternoon and evening pyrexia, followed by the rapid fall during night and early morning, and the recovery in the later morning hours. Here we appear to have more thermogenic influence in the afternoon and evening, and more thermolytic in the night and early morning, while the whole chart seems sadly to lack the thermotaxic control shown in the thermogenic tonus, and this is still more marked in the records of advanced phthisis.

The treatment of the pyrexia of tuberculation, if the latter be limited in extent and do not amount to acute tuberculosis of the lung, may often be dealt with, and dealt with successfully, by general measures. In some cases the addition of arsenic or quinine to the tonic will suffice to reduce temperature; in other cases derivative measures in the form of free application of counter-irritation to the chest wall succeed, if combined with the promotion of large secretion from the whole bronchial tract by saline expectorants, to which the addition of aconite or digitalis is often desirable. With regard to counter-irritation, vesication, and specially with the preparations of cantharides, if applied so as to produce a large blister over the affected lung, is far more efficacious in reducing temperature than any amount of poulticing or iodine painting. The best form of expectorant in these cases is the effervescent carbonate of ammonia draught, to be given two or three times a day, to which may be added 4 to 5 minims of antimonial wine, and the same dose of tincture of aconite. This, with the ordinary precautions of rest in bed during the fever rise, reduces the heat in a great proportion of cases of tuberculation. Where these measures fail, quinine, given in an effervescent form in 3 to 5-grain doses, just before and during the rise of the temperature, is advisable. Salicylate of soda, or salicin, may also be tried. Professor Jacoud's plan of giving hydrobromate of quinine in doses of 15 to 30 grains every night for three consecutive nights, which, he states, lowers the temperature in this stage of phthisis for

¹ Goulstonian Lectures, 1887.

four days, failed entirely in my hands in two cases in which a fair trial was given to it, though cinchonism and great mental excitement were thereby induced.

The treatment of the pyrexia of softening and excavation of tubercle is encompassed by far greater difficulties, as here we have to deal with suppurating surfaces out of surgical reach, from which reabsorption of pus and septic products with our old enemies, the tubercle bacilli, is continually taking place, and consequent infection of fresh tracts of the lung, so that we have to treat suppurative fever and the pyrexia of tuberculation in the same individual.

Small wonder is it that our efforts to reduce such fever result, for the most part, in temporary, and rarely in permanent, success. The temperature falls under treatment, but rises directly that treatment is suspended, and generally the pyrexia only subsides when excavation is for a time complete, or a cavity has still further extended and the patient's vital powers have become more and more collapsed.

The number of medicines which have been tried to reduce the temperature of this stage is an almost endless list, which I shall not attempt to exhaust, but will enumerate those of which I have most experience. Quinine in doses of from 5 to 20 grains dissolved in acid, undoubtedly will temporarily reduce temperature, but as cinchonism is soon produced, it is impossible to persevere for any length of time. The effervescing quinine draught before mentioned, combined with digitalis tincture (10 minims) is far more effectual because it can be continued longer, and I have had the best results from this antipyretic. Heim's pills, often called Niemeyer's, containing a grain of sulphate of quinine and digitalis, combined with half a grain of opium given three or four times a day, also exercises a good temporary effect. Salicylate of soda and salicylic acid reduce temperature, but cannot be continued long on account of the lowering influence of the drugs. Of the two, salicylate of soda is preferable, and, when given in 20 grain doses every four hours, soon has the desired effect, and may be afterwards taken twice in the afternoon to control the pyrexia.

Salicin if added in 10-grain doses to the effervescing carbonate of ammonia draught already mentioned, considerably strengthens its antipyretic effect.

Iodoform in doses of 3 to 5 grains, three or four times a day, I tried in a number of cases, but with no good result whatever.

Kairin and chinoline were both so nauseous, that I cannot say I succeeded in persuading the patients to make a fair trial of them.

Antipyrin I have used very largely, and for a long time it was my principal febrifuge. It generally reduces the temperature if given for a few days in 15 to 30-grain doses every four hours, by inducing perspiration, but if persisted in, is followed generally on the eighth day by a measly rash, which disappears on the drug being omitted. Anorexia and vomiting, and sometimes collapse, have been noted in cases where antipyrin has been continued for a lengthened period, as is necessarily the case in phthisical pyrexia. Its action is very rapid, the temperature often falling within an hour of the first dose, and the fall is often very great. I have known the thermometer fall from 103° F. to 96° F. in a few hours, where 20 grains were administered every two hours for a day, but it rose again when the doses were only repeated every six hours. This is the great difficulty—we have often to choose between pyrexia and saturating the patient with antipyrin, and in the end generally prefer even the former.

Resorcin, a derivative of benzol, in 10 to 25 grains has a similar effect to antipyrin, and was very successful in reducing the temperature of one case of acute consumption under my care.

Thallin is a very powerful antiseptic derivative of coal tar, of which I have used the sulphate and tartrate in two cases for reduction of temperature according to the recommendation of Ehrlich and Laquer.

In a case of cavity with high pyrexia, which hydrobromate of quinine had failed to reduce, but which had temporarily subsided under antipyrin when carried to the extent of producing the measly rash, after its omission thallin was tried in 1-grain doses every hour, with speedy reduction of temperature from 101.5° F. to 97° F., but, unfortunately, with symptoms of collapse, rigors, and a feeble pulse, and the thallin had to be discontinued.

In another cavity case 1 grain was administered every two hours, and the temperature was lowered in eight or ten minutes. The medicine was continued in 1½-grain doses three times a day, but here again collapse followed, and the drug had to be omitted. For rapidity of cooling action thallin, even in small doses, surpasses all other drugs, but its effects are nearly as alarming as those produced by pyroline, which I strongly recommend all members to have nothing to do with.

Antifebrin or phenylacetamide has given me, on the whole, good results in phthisical pyrexia. Its action is rapid, and the lowering of the temperature appears due to diaphoresis, which is sometimes long continued and may be exhausting. The great advantage of antifebrin over antipyrin and other antipyretic coal tar derivatives are (1) the small dose (5 to 7 grains dissolved in warm water, it being insoluble in cold), and (2) the few doses required in the twenty-four hours—as a rule, two doses a day, given at noon and 4 p.m. will suffice to keep the temperature within moderate bounds; (3) that it can be easily suited by the patient to his or her own requirements. A record of the temperature is kept, and if the chart rises above 100° F. or 101° F. a powder is at once taken, but if the record remains below this it is omitted. Much has been said about the danger of antifebrin in causing collapse of the circulation; all I can say is that I have administered it in the above doses to hundreds of consumptives without the slightest evil result; and I regard it, on the whole, as one of the best antipyretics available for the pyrexia of phthisis. It speedily lowers the temperature 2 or 3° F., which effect remains as long as the antifebrin is taken.

Phenacetin has been found useful in some few cases where antifebrin failed. The dose is smaller and the sweating not so profuse. I once tried hypodermic injections of carbolic acid of strength varying from 1 in 30 to 1 in 50, in accordance with the advice of M. Léon Petit, of Paris, who informed me that the reduction of phthisical pyrexia by these means was complete. Two female patients, with well-marked third stage pyrexia, were selected, and 15 minims of a 5 per cent. solution of carbolic acid were injected before the fever rose every day for a fortnight, the dose being gradually increased to 30 minims. The result was purely negative, but the patients did not complain of the proceeding.

In another case the hypodermic injection of guaiacol was performed on a hospital patient of mine by a German physician, who reported most satisfactory results from this treatment in his own country. The dose was 18 minims of an alcoholic solution, and it was injected under the skin of the thigh, the temperature being then 101.8°. The patient complained of a slight burning pain over the puncture spot, which soon passed off. Half an hour later she felt very hot and perspired profusely, the temperature falling to 97.4°. Two hours later symptoms of collapse came on, and for two hours the temperature was so low that the thermometer failed to register it. By 10.30 p.m., under stimulating measures, the patient had recovered, and the temperature rose first to 96.4°, and by 12.30 to 101.4°. I need hardly say the experiment was not of a character to encourage or justify repetition.

Cold Applications.—Some eighteen years ago I published² three cases of pyrexia of phthisis treated by cold baths, where consumptives with high fever were immersed in water at 90° F., which was rapidly cooled to 60° F. The reduction in all cases was very decided, and in one case amounted to 6°. In all three cases the temperature rose again, but in two of them the bath seemed to be the starting points of improvement in appetite and strength, breathing, and physical signs, and moreover, in these two, the records were never so high after the bath, and the pyrexia gradually subsided. The third case was an advanced one, with double cavities, and the temperature was lowered, but not permanently. In neither of the patients was any congestion of the lungs or bronchial catarrh induced by the baths.

However, cold baths are at best a clumsy arrangement, and quite inadmissible in many instances, and so I next tried tepid sponging of the body in several cases, with great refreshment to the patient. The ice pack was also tested in some instances of severe pyrexia, and found effective for reduction of temperature, though difficult of frequent application. Finally,

² *Clinical Transactions*, vol. vi.

at the suggestion of the late Dr. Wilson Fox, I tried Chapman's spinal ice bags, arranging that the patient should wear one of these for a few hours each day whenever the temperature rose above 100° F. This reduced the temperature decidedly for the time, and added greatly to the patient's comfort.

A natural question arises here: Is it advisable to reduce the pyrexia of phthisis at all? We do not thereby stop the tuberculous process; and as regards the wasting, I have shown elsewhere³ that pyrexia in phthisis is compatible with gain of weight, provided the diet be of a sufficiently abundant and nutritive character. In most cases the reduction of temperature is attended with a certain degree of comfort to the patient. But even to this statement there are exceptions, for occasionally patients, when the pyrexia is reduced by antifebrin or antipyrin, experience such uncomfortable sensations—chiefly of oppression—that they prefer the high fever to the effect of the antipyretic.

Two agencies which sometimes prove powerful antipyretics must be mentioned. One is confinement to bed. This I have seen by itself reduce temperature to the extent of 2° or 3° F. The other is sleep, which will reduce temperature 2° and more at a time without any medicines.

My conclusions as to the treatment of pyrexia in phthisis are:

1. The pyrexia due to tuberculation is best dealt with by derivative measures, such as counter-irritation, salines promoting secretion from other organs, and assisting expectoration.

2. That in the treatment of the pyrexia accompanying softening and excavation, measures which hasten these processes are found to be most successful, especially if combined with antiperiodics, such as quinine, salicin, salicylate of sodium, to moderate the fever.

3. That the use of medicines solely directed to lowering the temperature of the body without promoting increase in the natural secretions is generally inadvisable.

4. That our object in the treatment of phthisical pyrexia should be, not the reduction at all hazards of the temperature, but its lowering to the limits compatible with the comfort and well-being of the patients, and for this end that much may be done, in addition to the discriminating use of medicines, by the simple means of frequent food combined with stimulants and rest in bed.

THE LUMLEIAN LECTURES

ON

STRUCTURAL DISEASES OF THE HEART CONSIDERED FROM THE POINT OF VIEW OF PROGNOSIS.

Delivered before the Royal College of Physicians of London.

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LECTURE II.—DILATATION: SYMPTOMS: TREATMENT.

THE symptoms which attend the earlier stages of dilatation are extremely varied and very vague. An imperfect and fluctuating supply of blood to the brain will give rise to impairment of bodily and mental energy, and to irresolution and vacillation of purpose: the memory is liable to fail, especially in regard of recent events, and the power of sustained attention and consecutive thought is diminished. The frame of mind will often be despondent, and the temper may be irritable. There may be attacks of giddiness or faintness; in one case the patient, a vigorous old gentleman, aged 78, fell down from time to time as if he had been shot, with momentary loss of consciousness, getting up again at once apparently none the worse; sleep is usually disturbed, and sometimes almost absent, and, whether the nights are good or bad, there may be sleep at any period of the day, the patient dropping off to sleep even over his morning newspaper. For the same rea-

son, the irregular and imperfect blood supply and the back pressure in the veins, digestion, and the action of the liver will be deranged. The appetite is usually bad, and food is followed by discomfort and by flatulent distension, which latter again reacts on the heart, and gives rise to oppression, or palpitation, or irregular action. The bowels are usually torpid. The urine is usually deficient in amount and high coloured, and there is often an habitual deposit of urates. Turbidity of the urine day after day, whatever the food and drink, or weather, or mode of life, should direct attention to the state of the circulation.

There is no one, and scarcely any combination, of the symptoms enumerated, however, which may not occur independently of weakness and dilatation of the heart, especially in states of system attended with high tension; and it would be waste of time to attempt to disentangle those directly due to the state of the heart from those which are merely accidentally associated with it.

The special symptom which calls attention to the heart as the probable starting point of a number of ailments is breathlessness on slight exertion, but even this may be produced by other causes—by anæmia, for example; after middle age, pernicious anæmia may often give rise to extreme breathlessness, which may excite a suspicion of heart disease. High arterial tension alone, which has not yet given rise to dilatation, simple debility, very sedentary habits, may also cause great shortness of breath. These facts are mentioned in order to warn against a too ready inference that heart disease exists simply because the breath is short in speaking. An interesting fact in connection with breathlessness due to dilatation of the heart is that it is often relieved by exercise of the voice. I have met with numerous instances in which a clergyman has climbed into the pulpit with the utmost difficulty, and has not only preached a sermon comfortably, but has been all the better for it. A sense of breathlessness coming on during repose, and inciting the patient to make frequent deep inspirations, is usually a symptom of nervous depression, and has no necessary relation to heart disease. For the most part, as the disease advances, symptoms arise which are indicative of back pressure in the systemic veins, a gradually advancing œdema, and the like.

Prognosis.—But the problems which come before us in the prognosis of dilatation of the heart will best be elucidated by discussing them as they present themselves at different stages of the disease, and we may first take the fully developed effects. The patient is dropsical, œdema invading the thighs, loins, and abdominal parietes, as well as the legs, and there may be fluid in the abdomen and perhaps in one or both pleural cavities. The feet and legs will be cold and pale, or purple and livid, especially if hanging down; the hands also will be cold, and are often crimson or purplish, and the nails of a deep or dusky, instead of a bright pink. A white patch on the hand, produced by pressure, is very slowly invaded by returning colour. The sufferer is probably unable to lie down in bed, and is propped up by pillows, or he must have his legs down, and therefore spends days and night seated in his chair. Remarkable exceptions, however, are met with in this respect, some sufferers, while extremely ill, being able to lie down without distress. The face is pale, and perhaps puffy, especially under the eyes, with injected capillaries over the cheeks, and wears an expression of distress, and the eyes are watery. The lips are pale or bluish; the breathing is more or less laboured, even in repose, and the sufferer constantly supplements his reflex respiration by voluntary deep breaths. When he speaks it is in fragmentary sentences, and with evident effort and aggravation of the respiratory distress. The least movement brings on shortness of breath, which is often painful, even to witness. The pulse is frequent, irregular, and probably greatly deficient in tension, but not always. The urine will be scanty, of a deep colour, and probably high specific gravity; it most commonly throws down a copious deposit of brickdust lithates, and it may contain albumen. The appetite will be very bad, and there may be nausea; the tongue probably furred, the bowels constipated or irregular. One of the most distressing symptoms is sleeplessness, and when, after hours of weary shifting of position, the sufferer is overcome by fatigue and drops off, he has painful dreams, and wakes suddenly in afright and suffocation for lack of voluntary help to his respiration.

³ BRITISH MEDICAL JOURNAL, vol. ii. p. 262, 1872.