Lectures.

SUNSTROKE. CHRONIC MENINGITIS.

A CLINICAL LECTURE DELIVERED AT THE HOSPITAL OF THE UNIVERSITY OF PENNSYLVANIA.[1]

BY H. C. WOOD, M. D., LL. D.,
Professor of Nervous Diseases in the University of Pennsylvania.

GENTLEMEN, — The first case that I show you to-day is one of sunstroke. The following is the history: "J. W., age twenty-five, born in Ireland, has been in this country about two years. He has always been healthy, with the exception of bronchitis, which he has every fall. He denies having had venereal disease. He has always been a heavy drinker, and often gets drunk. For two weeks previous to admission he had been drinking very hard. On the 6th of September he was working on the University grounds. With the exception of the effects of his spree he felt as well as usual. About ten A. M. he began to feel weak and dizzy, but continued at work. These symptoms increased, and at half-past eleven he fell unconscious, and was brought to the hospital."

This case presented the symptoms usually seen in sunstroke. This condition is to be differentiated from heat exhaustion. In the latter the symptoms as a rule develop more gradually. The loss of consciousness is usually not so complete, and if the skin is examined it will be found cold and clammy, whereas if, in a case of true sunstroke, the hand be placed on the surface, or the thermometer be introduced into the rectum, it will be found that the patient is burning hot. The sudden onset, the complete loss of consciousness, and the high temperature distinguish this as a case of true sunstroke.

It is, of course, possible to have these symptoms occur in a case of apoplexy. There may be sudden loss of consciousness with high temperature in apoplexy, but very rarely does the temperature go up as rapidly as it does in sunstroke. In apoplexy the temperature may ascend two, three, or four, or more degrees, according to the seat of the clot, but the rise occurs in a few hours instead of a few moments. The completeness of the recovery, so far as the general symptoms are concerned, shows that this was a case of sunstroke and not one of apoplexy. In any case you should at once look for symptoms of a local lesion. You see whether or not the face is drawn to one side, or a leg has lost its power. If in a case of supposed sunstroke it is found that there is a *gradual* rise of temperature, with a distinct and decided loss of power in one part, there is good reason for making a diagnosis not of sunstroke but of apoplexy. This matter is of some importance, for I have seen sunstroke diagnosticated as apoplexy with fatal consequences. The distinctive symptoms of sunstroke are, the suddenness of the onset, the completeness of the loss of consciousness, and the high temperature without local palsy.

The next point in the history of this man to which I shall call attention is that there were some prodromes before the appearance of the unconsciousness. It is commonly thought that sunstroke comes on a man like a lightning flash out of a clear sky, and that under its influence a man drops at once; but I believe that in the majority of cases there is some indication of the coming danger — that there is a little cloud, although it may be no bigger than a man's hand, showing the approach of the coming storm. The prodromes which may precede the sudden onset and fully formed stage of sunstroke may consist, as they did in this case, simply of dizziness and a general feeling of wretchedness, or they may take a more specific type, and there may be headache, flashes of light, especially changes in coloration in the landscape, or there may be a flash of color blindness, or rather a flash of color-seeing. Clouds of yellow, and especially of red, float before the eyes. These are very characteristic of the approach of sunstroke. In the present case the prodromes seem to have been limited to dizziness and weakness, and as he now tells me, to an absence of perspiration. Here is a practical point in regard to prevention, which I shall allude to at this point. When a man, who is working in the hot sun, or in a hot boiler room, or in the evaporating room of a sugar refinery, or in any place where he is exposed to heat, does not sweat and begins to have some symptoms of cerebral difficulty, he is in danger of sunstroke. Under such circumstances it will generally be found that if a thermometer is placed under the tongue the temperature is two or three degrees above the normal, and the man is in the first stage of a disorder which may well be called thermic fever. At this time a cold bath, or simply going into the cool air, may relieve the condition. Every one who is exposed to heat should know that when there is lack of sweating, associated with general distress or disturbance about the head, he is in danger of sunstroke, and should at once give up his work.

There is another practical point to be drawn from the history of this case, and that is that the man whose system is weakened by the habitual use of alcohol, or by the recent excessive use of alcohol, is in a bad condition to resist the action of heat; this condition depresses the nervous system, and is a very strong predisposing cause to the occurrence of sunstroke.

This patient after suffering from the prodromes mentioned suddenly became unconscious. What was the cause of the sudden unconsciousness? The explanation is, I think, not difficult to understand. I cannot to-day give an elaborate discourse on the pathology of fever, but remember that the essential cause of elevation of the temperature of the body is the paralysis of certain cerebral nerve centres, which centres have for their function the inhibition of the production of animal heat. If these centres are paralyzed there is a rapid and enormous development of heat. What happens in cases of the character of the one before us is that the temperature of the body rises continually until finally a point is reached when this nerve centre is paralyzed, and there is nothing to restrain the development of animal heat, and suddenly every part of the body begins to develop heat. If the temperature curve could be registered in such a case, it would be found that a temperature which had been 103° F., 104° F., 105° F., suddenly goes up to from 109° F. to 112°

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may develop at night under the heat of the
may develop in a patient with typhoid
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The notes of this case go on to say
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110° F. The man was complet

[1] Reported by William H. Morrison, M. D.

vomiting incessantly. The evacuations were voided involuntarily. There was slight twitching of the general muscles which later increased to decided, although not severe, convulsions. One of the most striking features of the case was the blueness of the surface of the skin and the almost complete arrest of the capillary circulation. I was not in the city at the time this man was brought to the hospital, but I have no doubt that if I had entered the room where he was I should have diagnosticated sunstroke at once from the odor. The odor of sunstroke is as distinct and as unmistakable as is the odor of typhus fever, small-pox, or any other disease. It is especially marked where there has been involuntary evacutions. Not only does the body give out this peculiar odor, but the stools lose their true fæcal smell in this peculiar, characteristic odor. The cause of this odor I do not know. It is, of course, dependent on the production in the secretions of some peculiar principle, the result of disturbed innervation. You must remember, gentlemen, that there is a close connection between nutrition and innervation. I have had under my care for years a patient in whom at one time, when out of health, a long walk would produce excessive fetor of the body which, while perceptible in all parts, was especially marked in the breath. The odor was evidently due to the production of a sulphur compound, for any article of jewelry that she wore at the time would be blackened by the formation of a sulphide. There was, in a word, the production of a fetid odor containing a peculiar sulphur compound of some kind, whose formation was dependent on lack of nerve power, or nervous exhaustion. In the same way there is developed in sunstroke, as a result of failure of nerve power and altered nutrition, a peculiar, unknown principle, which may be recognized by its odor.

In sunstroke, especially if the case has persisted for any length of time, other symptoms besides those I have mentioned appear. The first manifestations are due to over-heating of the brain, but afterwards symptoms due to disordered state of the blood develop. If the blood of a patient dead from sunstroke is examined it will be found to be liquid, and will not present the natural hue. It does not coagulate on exposure to the air, or perhaps there form in the blood little soft jelly-like masses, which are imperfect attempts at coagulation. The secretions are affected in sunstroke. At first there is dryness of the skin, but later the patient may become bathed with a fetid perspiration. The urinary secretion is lessened and finally arrested, and if the development of the case has not been prevented by proper treatment uræmic symptoms often appear. I mention these facts because they have an important bearing on the treatment. Although the early treatment of sunstroke is a very simple matter, the management of the case after the condition has lasted for
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but also the damage which has been done by the
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gland cell, the nerve cell, the muscular fibre, and all other forms of tissue were meant to run on a certain plane of constant temperature. If the temperature is elevated or depressed there is depression and finally paralysis of the function of the part. The blood stagnates in the capillaries partly on account of the failure of heart power, partly because the muscles of the capillary walls are unable to contract and expel the blood, and partly because the altered crasis of the blood unfits it for moving through the small vessels. The pulse in this condition, although it may be large, is soft and feeble, and often is very rapid.

In sunstroke one of the most important elements in the prognosis is the length of time that the symptoms have lasted. This man, fortunately for himself, was working on the University grounds at the time that he was attacked, and was brought to the hospital a few minutes after he had fallen unconscious. If he had dropped at some distance from the hospital, and had not been brought in for an hour or two, I do not believe that his life would have been saved. The symptoms which he presented were excessively severe for the first stage of sunstroke. If you can get hold of a case of sunstroke at once, and have command of the proper appliances, you can almost always save the patient, let the symptoms be as severe as they may. The presence of the capillary stasis mentioned in this case is always an important element in judging of the severity of the case. If such stasis has lasted for some time recovery is not probable.

The peccant thing, the *materies morbi*, in sunstroke is the heat. If this heat can be gotten out of the body the patient will recover, provided the high temperature has not produced organic changes. At first the condition is functional, but after a time the constitution of the blood is altered, the muscular fibre degenerates, and other organic changes are produced. Then, although the heat be withdrawn, the man may not recover consciousness, or if he does may have paralysis of some part or some injury to the glandular organs. Therefore, although you should usually give a favorable prognosis if the case is seen at once, yet if the symptoms be severe, and have lasted many minutes or hours, the prognosis becomes doubtful.

The indication for treatment is plain. It is to withdraw the heat. That method of treatment is the most effective by which the heat is most rapidly withdrawn. This man was very properly rubbed with ice. Although I say that this was perfectly proper, yet I do not consider it the best treatment for sunstroke. If the patient be covered in a bath tub with lumps of ice and a little water I believe the heat will be removed more rapidly than by rubbing with ice. In this case, under the application of ice, the temperature was in an hour and a half reduced to 102° F. With the ice-water bath I should have expected the temperature to be at 102° F. in a few minutes. It is important to bring the temperature down as rapidly as possible. After the temperature was lowered and the application of ice stopped reaction occurred, and the temperature again arose to 104° F. The man was placed in an ice-water bath, and the temperature fell to 101° F. A case to which I have referred on other occasions, but to which I again call attention in order to impress these things upon your minds, was that of a man who suffered from sunstroke at the Centennial Exhibition. I saw him immediately after the occurrence, and packed

him away in an ice-water bath, with large lumps of ice all around. He soon recovered consciousness, and thought that he was stored away as a corpse in an ice-chest. It was rather a novel experience, but it saved him from the ice-chest.

The cold applications should not be continued until the temperature reaches normal. If the temperature at the start has been 110° F., the man should be removed from the bath as soon as the temperature falls to 103° F. The best place to take the temperature is, of course, in the rectum, the next best place being the mouth. The axilla cannot be used because the peripheral temperature falls much more rapidly than does the internal temperature. The reason for stopping the application of cold as soon as the temperature comes within two or three degrees of normal is that very often it continues to fall after the external cold has been taken away, and the danger is that if the temperature be reduced too much it may fall below the normal. There is sometimes in sunstroke a tendency for the temperature to rise after it has been artificially reduced. Under such circumstances the hypodermic injection of quinine is of service, or if the local results be feared, the quinine may be administered by the rectum.

Another very important remedy to be used in these cases, especially where there is convulsive seizures, is morphia by hypodermic injection. One fourth of a grain of the sulphate should be given. In this case the notes state that after the reduction of the temperature digitalis was given on account of the failure of heart power, and with it was associated the deodorized tincture of opium. Bromide of potassium was given to control nervousness, although the man was constantly vomiting. Bromide of potassium should never be put in a stomach which is already irritated. If the stomach is engaged in rejecting everything which is put in it it will simply be encouraged in its evil way by the use of bromide of potassium. It was a proper remedy for the condition of the patient, but it was a very improper remedy for the condition of the stomach, and it was at once rejected by the stomach. It either should have been given by the rectum or substituted by something else. In this case the rectum would probably not have tolerated its introduction.

Soon after the temperature was reduced to normal the man regained consciousness, but the headache remained, and an ice-cap was very judiciously applied to his head. For a day or so there was an evening rise of temperature, but since then the temperature has been normal. There has been occasional slight headache. He is weak, and feels giddy on rising. Remember that this man is suffering not simply from the results of a sunstroke, but from the results of sunstroke superadded to those of a debauch. The symptoms are therefore a little different from those of an ordinary attack of sunstroke. Usually in the affection occurring in a person who does not use alcohol the local symptoms are more marked than the general. The local symptoms which are usually presented are headache, cerebral confusion or distress, and perhaps dizziness. This man had these symptoms only to a slight extent. He has had slight headache and dizziness on getting out of bed, but to these are superadded a condition of general weakness, which is partly the result of the disorder of the nervous system and of the blood wrought by the sunstroke, and partly the result of the exhaustion due to the excessive use of alcohol.

It is a matter of importance that the late symptoms of sunstroke should be properly treated. The most important sequela of sunstroke is chronic meningitis, which is often associated with chronic cerebritis, that is, chronic inflammation of the brain membranes affecting to some extent the gray matter of the brain. Hence the after-treatment consists in trying to prevent the occurrence of this inflammation. This man had slight symptoms of meningitis, in that for a day or two there were present throbbing headaches, and he was very properly put on the use of a mercurial.

There may be some cases of sunstroke in which it may be right to bleed a patient during the active stage of the attack. I have, however, never seen such a case. There are on record undoubted cases in which a man has fallen from sunstroke, has been freely bled, and at once recovered consciousness. In most of such cases the free bleeding has restored consciousness probably not so much by its direct as by its indirect influence. The running off of the hot blood rapidly lowers the temperature, and the man is relieved not because the unconsciousness was due to cerebral congestion, but because the removal of the blood has rapidly cooled the body. At the same time, if I had a case of sunstroke in a man with powerful, bounding pulse, throbbing temporal arteries, suffused face, and plenty of circulatory force, I might bleed, but I repeat I have never seen such a case.

After the patient recovers consciousness, if there be violent headache, bleeding, either local or general, is the thing to be done. Many years ago a prominent physician of this town had sunstroke. His first remembrance after recovering consciousness is of his father, who was also a physician, standing over him with a medical friend. He awoke with a splitting headache. He said to them, "Bleed me." They refused. He said, "Bleed me, or I shall die." They then bled him, and at once the headache was relieved, and all danger of future trouble was averted. That man was suffering from secondary cerebral congestion. If he had not been bled he would probably have been either immediately or secondarily disabled by cerebral inflammation.

During the past week I saw a young physician of Philadelphia who had sunstroke a week or ten days ago. He was in the city at the time, but on recovering consciousness went to the sea-shore. He then had excessively violent headaches. He went to several physicians and asked them to bleed him locally. They refused, and the headaches continued until he was at tacked with severe bleeding from the nose, which was so profuse as to cause some alarm. The epistaxis occurred a second time, and since then there has been no headache. I believe that the epistaxis saved that man's life, or at least his mental organization. He was in the forming stage of a subacute meningitis. He ought to have been bled, and the physicians failing to do their duty, the mucous membrane of the nose fortunately being tender the man was bled by nature, and thereby his brain was relieved. The man has now perfectly recovered.

In the present case the symptoms of meningitis have not been such as to require active treatment. The man requires simply quiet, rest, and tonic treatment. In these cases tonic treatment should not be resorted to too early. The danger is not from weakness, for this will be recovered from in time, but it is from cerebral inflammation. It is better to let the man

remain weak for two or three months than by trying to rapidly raise him up start a fire in his brain.

After an attack of sunstroke it is imperative that the patient should avoid excessive heat for many months. In the early weeks following the attack he should avoid the glare of the sun, mental exertion, cerebral excitement, and everything that would tend to increase the danger of meningeal inflammation.

CHRONIC CEREBRAL MENINGITIS.

This man states that for the past three months he has suffered from a steady pain in the head, which occupies the vertex and is fixed. Its severity is at times increased. Previous to four months ago he considered himself to be in his ordinary health. Since the appearance of headaches he has had vertigo and some numbness along the inner sides of the legs. There has also been some alteration in his disposition and some loss of memory.

Without going further into the history you can see at once that there are present symptoms of meningitis. There is a persistent severe pain in the head, a certain amount of alteration of disposition, loss of memory, and giddiness; there is also a diffused irregular numbness in certain parts of the body. In this instance we have the symptoms of cerebral meningitis. These symptoms also occur in brain tumors, but tumors are very often associated with cerebral meningitis, and it is sometimes impossible to diagnosticate tumor from meningitis if there be no symptoms of localized trouble. If with the symptoms of meningitis we found some local paralysis, a facial monoplegia for instance, or certain localized convulsions in one part of the body, or if there were persistent clearly localized numbness, we should have more reason for believing that the man was suffering from tumor. There may be a tumor associated with this meningitis, but the symptoms are clearly explainable on the supposition that the man has meningitis. The peripheral gray matter is supplied with blood from the brain membrane, and therefore when there is disturbance of the circulation of the membranes there is disturbance of the gray matter. I believe that you never have pain in the head as the result of pure disease of the gray matter unless the disease be of such nature as to alter the pressure in the brain. This man has evidently meningitis or a tumor, but the probabilities are in favor of the former condition.

Having arrived at this conclusion so far as the disease is concerned, the next thing is to search for the existence of a cause. The three most common causes of chronic meningitis in the non-tubercular adult are injury, sunstroke, and specific disease. A case of non-tubercular subacute or chronic meningitis not the result of one of these three causes is excessively rare.

The notes of this case state that the man met with an accident some months ago in which he had three ribs broken, but he is not certain that he was struck on the head. He was unconscious for a few minutes after the injury. He was in the hospital under treatment for some time. On leaving the institution he noticed severe headache accompanied with great vertigo. He also gives a history of two sunstrokes, one occurring in 1856 and the other in 1862. Since the last attack he has had headache off and on, but not so constantly as since the accident. He also acknowledges having had venereal disease thirty-five years ago. We have, then, all three causes of meningitis present in this case.

Is there any way by which we can determine the rôle which sunstroke plays in the production of these symptoms? I think there is. We must investigate as to the rapidity with which the headache followed the sunstroke. The headaches which he has had since shortly after the last sunstroke have not been very decided nor very steady, and I think that it is perfectly plain that the sunstroke could not have set up a genuine meningitis. This man has not been incapacitated from following his trade as a carpenter. Has been able to work out-doors during the hottest summer weather. This would not have been possible had he had a meningitis lasting for twenty-two years. The sunstroke may have produced a condition of impaired nutrition of the brain and a weakening of the vessels, which would render them less resistant to any cause which would produce inflammation.

When we come to the question of the rôle played by the venereal sore and the accident, we come to a question which cannot be positively settled. I think that it may be considered well established that when a man has a venereal taint the local manifestation of that taint may be decided by an accident. Such a person receives a blow on his shin, and he has a periostitis excited by the blow, but the inflammation is of the specific type. If the same person had received the blow on his skull he would have had an inflammation of a specific type set up in that locality. There are one or two reported cases in which cerebral syphilis has in the same way followed sunstroke. The sunstroke has been the exciting cause, — the match which has fired the gunpowder which was there all ready to be exploded.

Again, the injury was of itself possibly sufficient to account for the meningitis without the existence of a venereal taint. The man evidently received a severe blow on the head. Ordinarily, however, a blow which produces only a few minutes' loss of consciousness, as happened in this case, does not result in inflammation. While we cannot say positively, then, that the syphilis has had anything to do with the occurrence of the disease, it is very probable that it has, and that there is a specific meningitis started by the local injury, although it is possible that the injury may have been the sole cause of the attack.

The treatment in this case will consist in the administration of iodide of potassium in amounts sufficient to produce iodism. Even in cases where there is no reason to suspect specific taint the use of iodide of potassium, associated with counter-irritation, is the best plan of treatment of chronic meningitis.

— The people of British Columbia are becoming alarmed at the negligence shown by the government in not providing suitable isolated quarters for the Chinese lepers at present confined in the jail at Victoria. At the last meeting of the city council it was moved and carried that the provincial government be requested to communicate with the dominion government with a view to have the necessary steps taken for the erection of a leper hospital. The mover knew of several cases, two of which were in the city jail. The Chinese doctors of the city believe the disease to be so contagious that the people are liable to catch it by inhaling the breath of a leper, and the mover believed that many young men had caught the disease by smoking cigars made by Chinese lepers.