

*Franklin P. Mall*

THE TREATMENT OF CEREBRO-  
SPINAL MENINGITIS.

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## THE TREATMENT OF CEREBROSPINAL MENINGITIS.\*

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YALE.

The part of the discussion on cerebrospinal meningitis to which I was appointed is pathology and treatment, but as so much interest lies in the ætiology and manner of infection, and in the question of contagiousness of the disease, perhaps we cannot have too many expressions of opinion in order to arrive at the general belief.

During the last year one could hardly find a medical journal that did not express views of both the contagiousness and noncontagiousness of cerebrospinal fever.

My personal belief is that it is very mildly communicable, no more communicable than pneumonia or typhoid fever. By this I mean that the nurse or other person caring for a patient sick with cerebrospinal fever might acquire it by carelessness in handling or caring for the nasal or throat secretions of the patient, and the same is absolutely true of pneumonic excretions and of typhoid fever excretions.

I do not wish to be understood as believing that cerebrospinal fever should not be classed as a reportable disease, but I do take the stand that it is no more a reportable disease than is pneumonia, that it is no more communicable than is pneumonia, that a large majority of cases do not die, and that it is not contagious.

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\* Read at a meeting of the New Haven County Medical Association, held in Waterbury, Conn.

In other words, I deplore the fear of the disease that the public has been taught to have. We dare not tell a patient with cerebrospinal fever what the trouble is, and hardly dare confide it to his family, as such knowledge, on account of needless fear, detracts from his ability to recover.

Predisposing causes of acquiring this disease are, like pneumonia, unhygienic surroundings and a debilitated state of the system.

The germs which cause this fever have been found in the nostrils and throats of perfectly healthy individuals, and the same individuals have remained well, showing that under normal conditions the germ is tolerated and that it is not readily infectious. An epidemic of this disease does not start from a focus and widen out, but is widely spread, striking at once a great many persons who in no possible way could have come in contact with each other. This is like the la grippe epidemics, showing that avoidance of those who are ill with the disease will not at all prevent an attack of it.

In a very few instances in this two year epidemic of cerebrospinal meningitis, in Connecticut and elsewhere, have cases of apparently direct communicability been reported, and, as already stated, no more frequently than will occur in typhoid fever and pneumonia. The report of the Children's Hospital, in Boston, of the admission of 110 patients with this disease in eight years, all treated in open wards, without a single case originating in the hospital is to me absolutely positive proof of its noninfectiousness. In all of the above hospital cases the diplococcus intracellularis was found, and the only precaution against contagion was ordinary careful cleanliness of the patient and the nurse's hands.

We have heard discussed the ætiology of the

disease. I will only refer to some recent investigations under the auspices of the German government. Twenty-nine autopsies on patients dead of this disease were carefully made, twenty-two were children under ten years of age, and seven were adults. This report shows that the infection started in the pharyngeal tonsil, entered the cranium through the sphenoid bone, travelling along the vessels which run from the pharynx into the sella turcica through the sphenoid foramina. The part of the brain first affected was the hypophysis, or pituitary body. There was no evidence in these twenty-nine autopsies of the infection passing through the cribriform plate of the ethmoid, and the infection seemed to travel by lymph channels rather than by blood channels. The bacteriological studies in these investigations show that the meningococcus was not necessarily the only germ to produce the disease, and the investigators state that "the real cause seems to be as unknown as that of scarlet fever." In a recent bacteriological report in New York of 150 cases the pneumococcus infection of the brain was found to be of much worse prognosis than the meningococcus infection.

To briefly refer to the pathology of the disease that is of interest to the clinician, it may first be noted that during an acute attack the only organs of the system involved are the brain and spinal cord. All grades of congestion, inflammation, and pus formation can occur on the surface of these organs, and I am convinced that many cases abort with only the primary first congestion. The first symptoms will denote the part of the brain or spinal cord first congested, and the symptoms will of course denote the amount of pressure exerted by the exudation. In my personal experience last winter there were many

more cases of spinal irritation and congestion than of cerebral inflammation.

In typical advanced cases the brain is covered by a thin, yellowish pus which lies over the pia mater, and little petechial hæmorrhages may be found on the surface of the brain. The rapidity with which this exudate may form and cause pressure symptoms is unfortunately known to us all. This fulminating variety of cerebrospinal fever was, fortunately, in the last two years, in Connecticut, not very frequent.

The pus formation and even the simple exudate may not be equally distributed; one portion of the exudate may be clear, and in another part of the brain there may be pus deposits. The ventricles of course are generally filled with exudate.

Although primarily the inflammation is limited to the cerebrospinal system, there is no disease that can have as many complications and sequelæ as cerebrospinal meningitis. Besides deafness, blindness, neuritis, and paralysis, we may have pneumonia, pleurisy, endocarditis, pericarditis, nephritis, and arthritis. This disease is not a septicæmic process, and I believe we rarely or never have metastatic abscesses. Neither do the lymph glands nor the spleen ordinarily enlarge.

The symptoms are referable to the pathology of the disease. There is very irregular temperature, depending upon whether the nervous system is in condition of excitement or shock. The same is true of the character of the pulse. The first symptoms are those generally of a congestion of the throat and nose, often, a congestion of the conjunctivæ, and generally a little deafness. Referred pains to the joints of the lower extremities are frequent, there may be intense backache, may be shoulder and arm pains, generally severe headache, may be contraction of any group of muscles, more frequently the muscles of the back

of the neck. The next symptoms depend entirely upon where the greatest inflammation is located in the cerebrospinal axis and then the amount of pressure from exudates and where that pressure is exerted. Reflex vomiting is due to cerebral irritation, and constipation is often due to retarded peristalsis from the same cause. Intermittent pulse and Cheyne-Stokes respiration show pressure on the medulla. After recovery lingering stiffening of the muscles, stiffening of joints, neuritis, deafness, or actual mental deterioration, all depend entirely upon the previous pressure, and therefore lack of nutrition, the different centres may have been subjected to during the acute process.

The treatment, then, consists, there being no specific antidote to the disease or germ, in diminishing the congestion if possible, taking means to prevent or relieve cerebral or spinal pressure, if possible, and combatting all acute symptoms and complications as they occur.

Diphtheria antitoxine in cerebrospinal meningitis is theoretically unsound and practically a failure, if the large number of careful observations are to be considered authentic.

Spinal puncture has been proved not to be a curative procedure. It seems also not to ameliorate acute symptoms sufficiently often to make it a procedure always to be followed. There is also some slight danger connected with it. Also many punctures are made without the withdrawal of fluid. Injections of several antiseptic solutions into the cerebrospinal canal have been made, but none have been proved curative or even to ameliorate the inflammation. Spinal puncture is certainly positively indicated when there is cerebral pressure. As to whether it is indicated for diagnostic purposes only I am very much in doubt except in rare instances. Not being as simple

as an examination of the sputum in suspected pulmonary tuberculosis, or as the serum test in typhoid fever, also, the treatment of cerebrospinal fever not being specific, and the treatment of all cases of meningitis being based on the same principles, also, the diagnosis of a meningitis being generally most easy, I fail to see the necessity for spinal puncture with that object.

The almost constantly beginning sore throat should be treated with antiseptic gargles and sprays, none better than the hydrogen peroxide solution. Conjunctivitis should be treated by simple boric acid drops. A calomel or saline purge should be given as is sensible in the beginning of all acute diseases and more particularly where there is cerebral congestion. Painful joints, a frequent beginning symptom, should be wrapped with cotton and kept warm, and pain, generally the most early symptom, should be stopped with morphine by the mouth or hypodermatically, depending upon its intensity.

If there is vomiting or repugnance to food, it should not be insisted upon for the first two or three days, as the patient is better without it. He should have plenty of water to drink if he cares for it. If the vomiting is frequent and the nausea severe, morphine hypodermatically will, of course, stop it, and let me emphasize my belief that with severe pain anywhere morphine should be given in sufficient doses, whatever that dose may be, to stop it and hold it in check, and with the frequency that is needed. Nerve pains from cerebrospinal meningitis are exceedingly depressant to the heart.

If the pain is not severe and there is no vomiting, and if the pulse is good, the first day or two bromides or chloral may be administered, but certainly they should not be given more than two or three days. Coal tar products I do not believe

give the kind of action that we want, they are too depressant and debilitating and act badly on the blood.

To quiet cerebral excitement and delirium and also pain, and to diminish the necessity for large doses of morphine, in other words, intensifying the action of the morphine that must be given, I believe there is nothing in the materia medica that will compare with ergot. Physiologically it contracts the bloodvessels, and is of course indicated in cardiac weakness or with soft pulse and dilated arteries, but it also has a decided sedative action on the central nervous system, as it seems to contract and relieve congestion in the cerebral and spinal vessels. A patient who cannot sleep even with large doses of morphine will generally be found to sleep well after a dose of ergot has been added. When the best action of ergot is needed it must be given intramuscularly or deep subcutaneously, and a pure, aseptic fluid extract must be used.

The best position for the injection is in the deltoid muscle, and if swelling or irritation occurs, a wet dressing should be placed upon the arm. Other injections should be given into the same muscle, dodging, of course, the points already punctured. This causes but one side of the body to be disabled, or sore, or painful. Of course if the injections must be used long enough to make this arm too sore, the other arm must be used, or the calf of the leg. I have never seen an abscess from ergot in my own or in consulting practice. The frequency of a hypodermic injection depends, of course, upon the symptoms. I have given them every three hours, but I think the average frequency should be about once in six hours, unless there is great cerebral excitement or the pulse is very bad. An indication that too much

ergot is being used is a very high pulse tension and a too greatly slowed heart.

The ice cap to the head and the spinal ice bag are, I believe, very necessary, and especially an ice bag to the back of the neck is of positive value. I keep up these ice applications more or less constantly, depending upon the positive local discomfort they give the patient, unless the temperature is subnormal. If the temperature is subnormal or the surface of the body is cold, dry hot applications are certainly of advantage. Personally I have had no experience with hot water baths, but theoretically, provided they could be given with a minimum of disturbance to the patient, they should at times do good. In other words, anything harmless that will bring the blood to the surface of the body and relieve the internal congestion in low temperatures in cerebrospinal meningitis is good treatment.

Ice, ergot, and morphine I believe is the treatment that will save and has saved many patients from death from this disease.

The general care of the patient should be the same as in typhoid fever; a large, airy room, kept rather warm, if the weather is cool. The room should be light and sunny, the eyes properly shaded if the light is objectionable. I do not believe in a darkened room for the treatment of these cases, except while they are sleeping. The patient should be kept very quiet, the nurse in attendance should be absolutely calm, there should be no bustling, and no talking should be done except what is directed toward the comfort of the patient. The care of the mouth and the body should be the same as in typhoid fever. The urine should be frequently examined to note albuminuria, if it should appear. The feet should be kept warm with a hot water bag most of the time. The bowels should be moved daily, either

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with glycerin injections or with mild salines, unless the patient is too weak.

After the first few days the nutrition is very important, and expressed beef juice, raw eggs and milk should be given sufficiently for positive nutrition, not, however, in excess, lest indigestion be caused.

Alcohol I avoid if possible, but use it in small doses in emergencies. Theoretically, it should not be used in meningitis on account of its exciting the brain. Practically a little of it may work well if the heart and circulation require that sort of vasodilatation on the surface of the body.

Strychnine should most certainly be avoided unless there is severe cardiac depression and ergot has failed.

Quinine should never be given on account of the cerebral stimulation that it causes.

As soon as the patient begins to get well, the activity of the disease having ceased and ergot being no longer needed, I believe that potassium iodide or sodium iodide in small doses, from one to five grains, depending upon the age, is efficient in aiding the absorption of the exudates.

I believe a patient should remain in bed a week after the cessation of fever, the diet being gradually increased. After that time the convalescence should be slow and a resumption of duties put off as long as possible. During this period the patient should receive some form of iron.

Paralyses, stiffening of the muscles, and contractions should be treated with massage and electricity. If there are adhesions in joints they should be forcibly broken up under chloroform.

Complications occurring during the fever may be treated by such local applications as they seem to require, but little other medicine, if any, than the above outlined should be given.

If you will allow it, I will briefly refer to my

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last winter's cases as illustrating different types of the disease, some showing complications.

I think we have come to believe too implicitly that the disease cannot be mild and that the prognosis is bad, viz., as I have been told by a number of physicians, that over one half of the patients die. I am convinced this is wrong and that a large majority of cases recover.

CASE I.—A student, while in his room with an injured knee, began with a sore throat, tonsilitis without exudate, slight fever, and some headache. In two days there was severe pain in the arms and shoulders, then a macular eruption, reddish in color, all over his body. There was sharp pain in the bowels, requiring morphine for several days to stop it. There was no diarrhœa, he was very constipated, almost obstipated, had a good appetite, the pulse was slow, there was subnormal temperature, pain in the legs and ankle joints, but no swelling or heat. There was a systolic blow, best heard at the apex of the heart, but there were no cardiac symptoms. He was sick ten days and out in two weeks. His heart was all right, but his legs were a little stiff. His treatment was small doses of salicylic acid.

CASE II.—A married woman, 30 years of age, began with a sort throat, very red tonsils and pharynx, but no exudate. She had a violent headache, complained of the light hurting her eyes, was very irritable and easily fretted. She had high fever and was obstinately constipated. Soon there was lumbar backache and excruciating sciatic pains, especially in the left leg. The leg became stiff and could not be moved, and there was a very painful ecchymotic patch over the left ankle. There was herpes on the left forearm, also some urticarial wheels which itched badly. Both ankles showed some swelling. The fever was irregular, tended to be high, and lasted two and one half weeks. The violent headache lasted one week. Soon the right leg became affected exactly like the left, then both shoulders, all so painful that she screamed when moved. There was no vomiting. The tongue was coated as heavily as in typhoid fever.

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Later an ecchymotic patch appeared on the right foot and another on the right arm. She was up in four weeks and out in six weeks, but her legs were stiff for two months. Her treatment was ergot, ice, and sodium salicylate.

CASE III.—A girl 21 years of age, seen several times in consultation, was taken in the middle of the night with pain in the back and legs and lower abdomen, so severe that she screamed with it. There were tetanic spasms, opisthotonos rapidly recurrent, with attacks of pain. Her head was clear, and there was no headache whatever. The leg muscles cramped violently. One and one half grains of morphine hypodermatically, in three hours, with added chloral and bromides, did not stop the convulsions. Injections of hyoscine 0.02 grain with repeated chloroform inhalations quieted her to sleep, but 0.01 grain of hyoscine had to be repeated every two or three hours for five or six times, then less frequently. Her subsequent treatment was ergot hypodermatically and a spinal ice bag. There were no eruptions and no brain symptoms at all. She was down stairs in two weeks and out in three weeks. Her legs were very weak, there was persistent lumbar back-ache, and she was very sleepless for weeks.

CASE IV.—A boy, about 18, seen in consultation, had been ailing a day or two, then suddenly became stupid, comatose, when aroused was deaf, had a few red maculæ on his feet near the ankles and urticarial spots on his arm. He had repeated attacks of heart failure, so severe that it seemed as though he could not live an hour. He was revived by ergot and his head became clear. An ice cap was kept on his head, but for several weeks, if the ergot was stopped, his heart would again fail and he would again become stupid. He was dangerously ill for five weeks, and finally died suddenly when he was supposed well and convalescent.

CASE V.—A young child three years of age was taken suddenly with high fever which soon dropped. He vomited frequently and had an eruption like German measles with an almost scarlatinal efflorescence. He cried constantly, was sleepless with pain, which was not well explained but apparently was mostly in

the head. He was given ergot, and entirely recovered in a week.

CASE VI.—A boy 15 years of age began with pain in both ankles, lower legs were stiff, there was no swelling, and but little fever. In two days he had a sudden attack of coma which lasted half an hour, followed by high fever, severe headache, pain in his shoulders and legs, and he yelled when his legs, arms or shoulders were moved. His neck was a little stiff, there were no joint swellings. The next day he had diaphragmatic pain, so severe that he could hardly breathe, a dark cyanotic color to his face, his nostrils dilated. The urine had to be drawn, as he could not exert abdominal pressure enough to pass it. Cardiac pain next developed, which was severe, his heart became dilated until the apex beat was one inch outside the nipple line and in the sixth interspace. There was a loud systolic blow at the apex. He often had attacks of Cheyne-Stokes respiration, and respirations were always short and jerky. There were frequent attacks of angina pectoris. The pulse at one time would be of very high tension and full, and in an hour might be very weak. His head was always clear, and he had no more attacks of coma, was very sleepless on account of pain. He received morphine hypodermatically for days, and the same was true of ergot. He had no food for four days, as he could not take it, having had several projectile vomiting attacks. His tongue was not badly coated, but he sometimes complained of a sore throat. There was no exudate in the throat. He had several ecchymotic patches on his arms and legs, and he often had abdominal pains and backache, at times he was a little deaf.

He had ice to his head and back and a hot water bag to his feet almost constantly. At times he had hot water bags all around him. His temperature was typhoid in type, and ended by lysis. He was sick for six weeks, very slowly recovered and very slowly convalesced. His heart became perfect, but his legs were stiff for weeks after he was out of doors.

CASE VII.—The patient is a man, 30 years of age, and was seen in consultation. He had had several days of irregular fever simulating malarial fever, with a

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temperature often as high as 105° F. He had petechiæ all over his body, absolutely no part of him that a finger could touch without covering a spot. His heart was very rapid and weak, he was deaf, very much excited, and very talkative. His fever, at the time I saw him, was not high, but he was breathing very rapidly, and examination of his urine showed acute nephritis. Two months before his urine had been examined and found normal. Ergot revived his flagging heart, and according to the report of his physician kept him alive for several days. He finally died of nephritis.

CASE VIII.—A boy, aged 10, was seen in consultation. He had been sick for two days, but the fever was not high. He was deaf and stupid, did not have a great deal of pain, and had no eruption. He could be slightly aroused, had some retraction of his head, and vomited frequently. The treatment was ergot and ice, and he recovered in ten days.

CASE IX.—A woman, 28 years of age, was seen in consultation. She had been sick for two weeks with irregular fever, pain in the joints, headache, and severe abdominal pains. She had severe dyspnoea, and examination of her heart showed pericarditis. The treatment was ergot, and ice over the heart. She recovered in three weeks.

CASE X.—A babe, ten months old, seen in consultation. The child was comatose, the eyes were crossed, the head retracted, the skin was dry and harsh. There was constant vomiting on the least movement of the child. The abdomen was shrunken and retracted. As there was some history of previous night terrors the surroundings of the patient were bad, and the child looked miserable and poorly nourished, I diagnosed a probable tuberculous meningitis. Ergot, potassium iodide, and ice to the head was the treatment. I thought the case was hopeless, but the child recovered and is well to-day.

CASE XI.—A man about 55 years of age. The disease started in with a severe headache, severe pain in both shoulders and arms without any swelling or joint symptoms. He also had pain in the back of his neck, slight fever, and was constipated. He was well in 48 hours. This was undoubtedly an abortive attack.

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CASE XII.—A child, 5 years of age, taken suddenly with severe headache, pains in the abdomen, vomiting, slight stiffening of the muscles of the back of the neck, intolerance to light and noise, and a very slight rise in temperature. The treatment was withholding of food and administration of ergot. The child was well in a week.

CASE XIII.—A boy, aged 17, seen several times in consultation. He had been sick ten days with what apparently looked like an irregular, intermittent malarial fever, having had several chills and rises of temperature. He suddenly became comatose, was almost absolutely deaf at the time I saw him, but could be aroused to extend his tongue. His heart was at that time normal and pulse tension augmented. Ergot rallied him and aroused him so that for a week he seemed to improve. This patient did not have much pain. The pupils at times were asymmetrical in size, and one of them would not well react to light. His comatose periods became less frequent, and his head seemed to be better, but his heart became weak, and he finally died in coma after a sickness of between three and four weeks. There were no kidney lesions.

CASE XIV.—A man, first seen by me after he had been ill for two months, his illness having begun with pains in his thighs and with contractions of the leg muscles. Twice he had apparently convalesced and gotten out of bed, to again grow worse and return to bed. At the time I saw him he had severe pains in the back of his neck, stiffening of the neck muscles, stiffness and adhesions of both shoulder joints, and was unable to move his hands across his body on account of the pain it gave his arms and shoulders. He had a very bad heart, with inconstant murmurs, was lying on four or five pillows, and had to sleep almost upright. He had a little cough without expectoration. Examination of his lungs showed consolidation at the back of both, with crepitant râles. He also had pains shooting down his legs, and some in his joints, but there was no joint swelling. His eyes were all right, but the reflexes were slightly exaggerated. His tongue was heavily coated, and there was almost a paralysis of the intestines. Examination of the abdomen was

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negative. He had the most profuse sweatings I have ever seen. To get any sleep at all required large doses of morphine. Every treatment had been instituted with no avail.

The previously attending physician, my associate, Dr. Bean, and two gentlemen whom I called in consultation all agreed with me that it was a case of general tuberculosis.

The treatment was ergot and yeast; the yeast cleaning his tongue, increasing his appetite, and moving his bowels perfectly, the ergot allowing rapid diminution and finally stoppage of the morphine. His only other treatment was iron. He was sick for two more months, then was up and about, stiff legged and stiff armed, and putting on weight rapidly. He has now been at work for several months, apparently perfectly well, and having perfect full movement of both arms and legs. The lungs are clean. It was a case of cerebrospinal meningitis.

CASE XV.—The patient, a young boy about eight years of age, was seen in consultation. He showed persistent vomiting, some deafness, some mental stupor, had high temperature, some stiffening of the back of the neck. The history of two days' illness began with an apparent cold. The treatment was ergot and ice. In three days he was comatose, the pulse exceedingly rapid and weak. This was made better by pushing the ergot hypodermatically. Spinal puncture was made and one c.c. of clear straw colored liquid withdrawn. The boy brightened, the pulse became immediately better. Ergot and ice were continued, and the child recovered without sequelæ.





