ESKRIDGE (J. T.) & PARKHILL (C.)

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Caused by Septic Emboli resulting from an old Gunshot Wound of the Right Lung inflicted Thirty-two Years before.

Evacuation of One Abscess; Improvement; Death from Exhaustion, caused by Primary Abscess and Old Lung Trouble.

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REPRINTED FROM THE

New York Medical Journal

for August 10, 1895.

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HISTORY AND NEUROLOGICAL REPORT BY DR. ESKRIDGE.

I wish to express my thanks to Dr. Miller and Dr. Levy, the attending physicians, for their invariable courtesy and for their kindness in giving me points in the history of the case about to be reported. Unfortunately, some symptoms that might have aided in diagnosticating the primary abscess were not known to me or either of the attending physicians until after the death of the patient.

Captain E. (retired), fifty-two years of age, born in Ohio, married, white, living in Colorado about thirty years, a mining engineer by occupation, had been a semi-invalid for thirty-two years. The family history is excellent. The patient in childhood was healthy and strong, and continued so until his

twentieth year, when, while in the United States army during the war of the rebellion, he was wounded by a Minié ball. The missile struck and fractured the seventh rib on the right side, just external to a perpendicular line drawn from the nipple downward, and lodged in the lower lobe of the right lung. The bullet was not extracted, and soon after he began to suffer from cough, pain in the lower portion of the right chest, and repeated hæmoptysis. Two years later, or in 1865, he sought the climate of Colorado on account of the pulmonary trouble. After his coming here his physician, Dr. Elsner, informs me that at that time he had as many as eight hæmorrhages from the lung in one day. After a while the bleeding from the lung lessened, but did not entirely cease. He was troubled with a persistent cough, and expectorated considerable muco-purulent material, especially on arising in the morning and after exposure to cold. Consolidation of the lower portion of the right lung and bronchial dilatation, with bronchitis, and at times a rather profuse bronchial excretion of offensive muco-purulent material, frequently stained with blood, were evident up to the time of his fatal illness.

At times months would pass during which he was fairly comfortable, but these periods would be followed by a slight pulmonary hæmorrhage and increased bronchial excretion. During the summer of 1894 he began to complain of headache, usually frontal, physical weakness, inability to maintain mental concentration as well as was his wont, and it was observed that he was losing flesh, although his appetite was still good. His digestive powers, which had not been very vigorous for a number of years, became more impaired. Some time in October or November, 1894, he began to complain of pain in the right frontal region of the head. The pain was nearly constant, rarely severe, but was often spoken of as a gnawing sensation. He said that he could compare it to nothing else that would describe it more accurately than an imaginary feeling caused by the gnawing of a rat in this region of the head. The seat of the greatest intensity of the pain was invariably located about opposite the right posterior angular process of the frontal bone. The discomfort was not superficial, but appeared to be seated

deep within the substance of the brain. An account of this pain I did not succeed in obtaining until after the patient's death. He continued at his duties as president of an important and rather harassing business enterprise until the day when he was seized with acute cerebral symptoms which confined him to his bed.

February 16, 1895.—He felt as well as usual on the morning of this day; he remained at his place of business until 1 P. M., when he ate a hearty luncheon. He felt comfortable until about 5.30 P. M., when, without any appreciable cause to him, the muscles of the left side of the face and pharynx began to be affected with a clonic contraction. Dr. Miller, Dr. Levy, and Dr. Hershy were hastily summoned. I saw him in consultation with these gentlemen about 7.30 P. M. The muscles of the left side of the face were constantly slightly contracted and the face drawn a little to the left, but at periods of every ten or fifteen minutes the affected muscles would clonically contract rather violently for two or three minutes. One of these paroxysms was just beginning as I entered the room, and, as it was said to be similar in every respect to the preceding ones, I will describe it as it appeared to me.

The frontal portion of the occipito-frontalis muscle was contracting on both sides, more markedly on the left than on the right. The left eye was constantly opening and shutting, while the right eyelids moved slightly at each violent contraction of the muscles of the left eyelids. The movements of the eyeballs were slightly affected. All the muscles of the left side of the face were contracting rather strongly; occasionally the corner of the mouth on the left side was drawn downward, and the platysma myoides muscle contracted quite vigorously. At the same time there was contraction of the pharyngeal muscles which produced more or less of a gurgling sound and caused attempts at swallowing. The laryngeal muscles seemed to be affected slightly with the twitching. None of the muscles of the right side of the face, with the exception of a slight movement of the muscles around the right eye and on the right side of the forehead, were affected. It was found very difficult for him to swallow during the convulsive seizures. The paroxysm

lasted four or five minutes, during which he was perfectly conscious, as he had been from the first. He was asked at the time if he had any pain. He pointed to the front of the right side of his head and said "Yes." After the paroxysm ceased the muscles of the face on the left side were slightly contracted, and the face was drawn a little to the left. Occasionally there was a slight winking of the left eye, and not infrequent contraction of the platysma myoides on the left side. The remission lasted from ten to fifteen minutes, when the clonic contraction began again. Owing to the excitement and number of people in the room it was impossible to obtain a detailed history of the case, and a hurried examination revealed but little. It was impossible to examine the fundi of the eyes on account of the lids opening and shutting so frequently. All the reflexes seemed about normal, and no muscles were affected except those of the face, especially on the left side, and those of the pharynx, and to a slight extent of the larynx.

The diagnosis seemed to me to rest between embolism and thrombosis, with the probabilities in favor of thrombosis, on account of the age of the patient and the absence of any cardiac murmur. Had I been aware at the time of the character and extent of his lung trouble my diagnosis would have been an infective embolism. The patient was given a quarter of a grain of morphine hypodermically, with the result of relieving the convulsive movements and giving him a quiet and comfortable night. On seeing him next morning, in consultation with Dr. Miller, there had been no return of the muscular spasms on the left side of the face, but these muscles now seemed slightly paretic and the tongue was protruded a little to the left. Deglutition was still a little difficult, and on attempting to swallow water a paroxysm of coughing was produced and some of the water was regurgitated through the nostrils. There was no distinct aphasia, but speech seemed to be a little indistinct on account of the paretic condition of the muscles of the tongue, lips, and pharynx of the left side. Sensation was normal.

During the next three or four days the patient was fairly comfortable, with the exception of headache in the right frontal region, but he was urged to remain in bed. During this period

there was still observed to be some weakness of the muscles of the left side of the face and of deglutition.

On February 21st I was asked to see him again in consultation and found the left side of the face almost completely paralyzed, deviation of the tongue to the left, slight drooping of the left eyelid, and considerable difficulty in swallowing, especially for liquids. The left arm was nearly as strong as the right. I was informed that the temperature since the occurrence of the facial spasms had been normal or subnormal. His mind at that time was perfectly clear, but he looked depressed and seemed to be losing flesh. The deep reflexes were slightly below normal. While his answers to questions were always correct, yet there was observed a mental slowness which was foreign to him in his normal condition, and when asked to press the dynamometer he would always hesitate and look at the instrument in his hand a few seconds before grasping it.

I gave the opinion at this visit that an embolus of an infective nature from one of the pulmonary veins had found lodgment in one of the branches of the middle cerebral artery on the right side, and expressed some apprehension of abscess of the brain.

On the 27th of the month, when I saw him the next time, the paralysis of the left side of the face was absolute, and the patient presented an aspect indicating great prostration. The bowels were obstinately constipated and the mind was obtunded and acted slowly. The face presented a dusky hue and was a little more yellowish than natural. He was still somewhat restless and uneasy about himself, but the anxiety seemed to be less than at my former visits.

On March 5th, when I again saw him, there was a decided change for the worse. Mental hebetude was well pronounced; he was more or less apathetic, and prostration was much more profound. The temperature, as it had been throughout, was about normal or subnormal. The pulse at this time varied from 70 to 80, but I was informed that a few days before it had been down as low as 60. The left arm was decidedly paretic and two days later became completely paralyzed.

On the 8th he was in a semi-conscious condition, and was

apparently unable to maintain any continuity of thought. The temperature in the right axilla was about normal, while it was from a half to one degree above normal in the left axilla. The left arm was absolutely paralyzed, and the left foot and ankle muscles seemed to be weaker than normal. On account of his mental dullness it was impossible to test accurately the special senses or the general sensory phenomena, but, as far as I was able to determine, sensation was as good on one side of the body as on the other. The deep reflexes were nearly normal on the right side, but lessened on the left. By the 10th of the month paralysis in the left leg was nearly complete, and on the 11th it was absolute, when an operation for the evacuation of an abscess in the lower Rolandic region was recommended and urged, but this was not consented to until the 13th. In the mean time all evidences of intracerebral suppuration became more and more pronounced, the pulse showing evidence of weakness rather than of brain pressure, and the temperature remained normal or subnormal on the right side and slightly elevated on the left. He remained in a semi-conscious condition during most of the time for three or four days before the operation, but seemed to recognize his wife and attending physician momentarily when aroused, but all other persons were called by the name of his attending physician. When a different name was suggested to him he would seem to realize it for a moment, but it rapidly faded from him.

The following record of temperature, pulse, and respiration has been kindly furnished by the attending physician, Dr. Miller:

March 11th.—9 A. M.: Temperature, right axilla, 98·4°; left, 99 4°; pulse, 72. Evening: Temperature, right axilla, 98·6°; left, 100°; pulse, 78.

12th.—Morning: Temperature, right axilla, 98°; left, 99·4°; pulse, 84; respiration, 24. Noon: Temperature, right axilla, 98·6°; left, 100°. Six P. M.: Temperature, right axilla, 99°; left, 100°; pulse, 84; respiration, 24.

13th.—Temperature, right axilla, 99°; left, 100°; pulse, 99; respiration, 24. Noon: Temperature, right axilla, 98·8°; left, 100°; pulse, 84; respiration, 20.

The eyes were carefully examined with the ophthalmoscope on several occasions, but no changes in the fundi or discs were discovered.

A surgical operation for the relief of the patient was agreed to about 3 P. M. of March 13th, when he was becoming rapidly comatose, and all the physicians in attendance were of the opinion that life, unless radical measures were adopted, could not be prolonged more than twenty-four hours.

For reasons which I shall explain later, I marked the point about midway between the lower end of the fissure of Rolando and the horizontal branch of the fissure of Sylvius for the centre of the trephine.

OPERATION AND SURGICAL REPORT BY DR. PARKHILL.

The skull having been mapped out by Dr. Eskridge, the Parkhill brain marker was used to transfer these landmarks to the bone. A semilunar flap was made with its base downward. This brought into view the markings over the mouth, lips, tongue, throat, and larynx centres. A three-quarter-inch trephine was employed. The bone proved to be exceedingly hard, with scarcely a trace of diploic structure. When the button was removed, the membranes were found bulged somewhat into the opening, but no pulsation either on palpation or inspection could be detected. The dura was then incised and seemed to be normal, as did also the arachnoid and pia, together with the cortex brought into view. After the suggestions of Macewen, I used a small trocar and cannula with which to make the exploration. This was passed first forward and slightly downward, but discovered no pus. It was then withdrawn to the cortex and passed backward, inward, and slightly downward from the same puncture. At a depth of about half an inch from the surface of the brain considerable resistance was apparent. This was evidently the wall of the abscess, for when it was passed the pus immediately made its appearance. From an ounce to an ounce and a half of pus was obtained. The trocar was attached to the nozzle of a fountain syringe which was filled with normal salt solution. A glass tube, having twice the calibre of the cannula, was inserted into the abscess cavity by

the side of the original instrument. This was in order to give a larger opening for the exit than for the entrance of the fluid. When the water ran out from the abscess cavity perfectly clear this instrument was removed and a small rubber tube passed into the cavity. The external end of this was brought out through a puncture in the middle of the flap. The flap was was then sutured in place, and the usual sterilized dressing applied. There was hardly any shock following the operation, and four hours afterward his temperature was 98·4°, pulse 92. At eight o'clock the following morning his temperature was 98·8°, pulse 98. From that time onward his temperature gradually rose, until at the time of his death, four days after the operation, it had reached 102·2°, and his pulse was 132. I have no doubt that, if the second abscess had been discovered and drained, the patient would have perfectly recovered. The original puncture of the trocar and cannula must have gone within a hair's breadth of this abscess, and yet if that had been discovered the result would have been the same, because I should not have explored for another.

This case brings up the very interesting question whether one would be justified, after discovering one abscess of the brain, in exploring for another. The danger of infection of sound tissue would have to be taken into consideration, and yet this case would seem to indicate that under certain conditions it might be justifiable.

SOME POINTS IN THE HISTORY OF THE CASE SUBSEQUENT TO THE OPERATION, AND AN ACCOUNT OF THE AUTOPSY, WITH REMARKS BY DR. ESKRIDGE.

It is of importance that some of the symptoms subsequent to the operation should be given in detail in order to compare them with those of other recorded cases of the same nature in which all the pus has been evacuated and recovery followed. By this method it may be that we shall, after a more extended experience, be able to determine by the symptoms whether, when the contents of one abscess

have been got rid of, we have yet another that has not been reached.

On the morning of the day of the operation the temperature in the right axilla was 99°; in the left, 100·2°; pulse, 99; respiration, 23. At noon the temperature in the right axilla was 98·8°; in the left, 100°; pulse, 84; respiration, 20. About one degree higher had the temperature been found in the left axilla than in the right for several days immediately preceding the operation.

A few minutes after the patient was removed from the operating table the temperature was equal in each axilla, and registered 98·4°. The pulse and respiration for that hour are not recorded on the chart.

March 13th.—8 P. M.: Temperature, right, 98·8°; left, 99°; pulse, 92; respiration, 23. 10 P. M.: Temperature, right, 99·2°; left, 99·4°; pulse, 91; respiration, 23.

14th.—2 A. M.: Temperature, right, 100·2°; left, 100°; pulse, 91; respiration, 26. 4 A. M.: Temperature, right, 99·4°; left, 100·2°; pulse, 91; respiration, 24.

A careful record of temperature, pulse, and respiration was made every hour by a trained and careful nurse. The temperature during the remainder of the forenoon registered about 99° in each axilla; pulse varied from 85 to 97, and respiration from 24 to 30. Physical prostration was intense, but apparently less than before the operation. Mentally he was decidedly brighter, but attempts to answer questions soon exhausted his mental power. From 2 P. M. of the 14th to 4 A. M. of the 15th the temperature ranged from 100° to 100·8°, being nearly the same in each axilla, occasionally a little higher on the right side than on the left, but more commonly its difference was in favor of the latter. The difference during this time did not amount at any time to more than four tenths of a degree, and usually to only two tenths of a degree.

The pulse varied from 97 to 100, and respiration from 24 to 32. It was still difficult for him to swallow liquids, as it had been before the operation. Although he seemed to be getting an abundance of nourishment and stimulants, yet it was evident

that the patient was getting weaker. At 6 A. M. of the 15th it was reported that he had passed a comfortable night; the temperature in the right axilla was 99·8°; left, 99·4°; pulse, 97; respiration, 27. From 8 A. M. to 8 P. M. of the 15th the patient seemed to be doing well, and once during the day he smiled at his wife and made a pleasant remark. While Dr. Parkhill was dressing his head, he took a cigar from the doctor's vest pocket and put it in Dr. Miller's pocket, and seemed to enjoy the pleasantry, as he knew Dr. Miller did not smoke or use tobacco in any form. About 11 P. M. he had a slight pulmonary hæmorrhage, and at midnight the temperature was: right, 100·4°; left, 100·2°; pulse, 124; respiration, 44. Four hours later the temperature remained about the same, but respiration was 49. During the forenoon of the 16th the temperature was about 101°, or a fraction of a degree below; pulse, 114 to 120; respiration from 34 to 49. Physical prostration was increasing, and it was with difficulty that he could swallow any food. During the afternoon the temperature registered 103·4°; pulse, 142; respiration, 53. It was impossible for him to swallow, and he was nourished both by the rectum and by the nasal tube. Rectal enemata had been resorted to throughout his stay in the hospital. From 11 P. M. of the 16th to 3 P. M. of the 17th, when death occurred, the temperature ranged from 101° to 102·4°, being lower than it had been the day previously.

Autopsy, March 17, 1895, at 8 P. M., five hours after death, by Dr. E. R. Axtell, pathologist to the hospital. The skullcap was very thick, with very little diploic structure. The adhesions of the dura to the bone were very firm over the vertex. The trephine opening in the skull was found to correspond to the junction of the upper with the middle third of an imaginary line drawn from the lower end of the fissure of Rolando to the point where the fissure of Sylvius bifurcates into the vertical and horizontal branches. No adhesions existed between the pia and the dura. Over the left hemisphere some recent exudate was found on the pia over a space about two inches square in the region of the vertex. Membranes, vessels, and brain presented a normal appearance over the base. The left hemisphere showed no evidence of disease in the cortex, white sub-

stance, or ganglia. The left lateral ventricle contained about the normal quantity of fluid.

Right Hemisphere.—In the frontal lobe there was an abscess. It had a firm capsule and occupied the place of and had destroyed nearly all the white substance of the lower and anterior two thirds of this lobe. It extended backward to about an eighth of an inch of the anterior tip of the lateral ventricle, from the cavity of which it was separated both by its own cyst wall and by an adhesive obliteration of the anterior third of the cavity of the ventricle. The abscess did not directly interfere with the motor region. The pus, of a dirty, greenish-brown color, was viscid and extremely fœtid. There were about three ounces of it. The capsule seemed very firm. A second abscess, smaller than the first, but also encapsulated, was found in the white substance immediately beneath the lower portion of the ascending frontal and parietal convolutions, and the parts around the lower end of the fissure of Rolando (third frontal). Its sac, which had been pierced by the trocar of the surgeon at the time of the operation, was less firm than that of the large abscess. Its cavity was capable of containing about a fluid-ounce and a half and was about half full of fœtid pus. No connection existed between the first and second abscesses. The brain substance around the abscess was softer than normal.

Chest.—The left pleura was free from adhesions, except for a slight area over the diaphragm. The right pleura was universally adherent by firm fibrous tissue which could be broken down only with great force. Beneath the sixth and seventh ribs, at a point where they had been resected thirty years before in the axillary line, the fibrous bands were so strong that they had to be cut with a knife. These strong adhesions also existed over the diaphragm for a space of two or three inches from the ribs. The left lung presented evidence of extensive catarrhal pneumonia throughout the lower lobe. Section of the bronchi in this lung showed the mucous membrane in a state of subacute inflammation. The right lung was normal in the upper third. The lower third was a solid mass of fibrous tissue, and the bronchi here, as well as in the middle lobe, presented a well-marked condition of bronchiectasis and the cavities were filled

with pus and mucus. In the lower lobe of the right lung there was found a large Minié bullet which was greatly flattened at the conical end. The bullet rested in a dense white capsule of connective tissue which in places was fully four tenths of an inch thick. The heart and pericardium were normal. The spleen was small, but showed no evidence of disease. Both

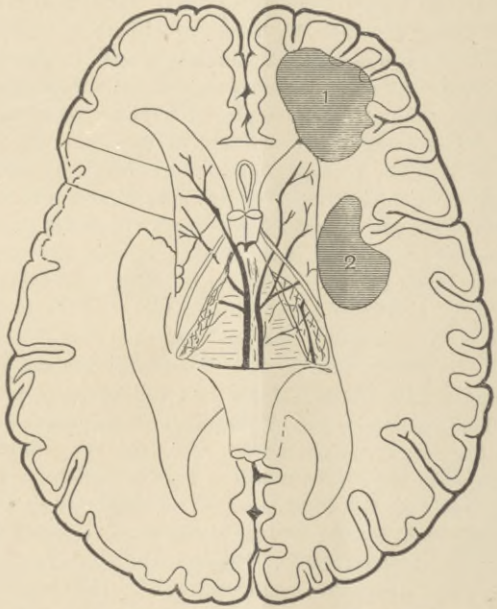

FIG. 1.—Horizontal section, showing both abscesses.

kidneys were healthy. The liver was normal. The gall bladder was distended with gallstones of two varieties, the black and the pink. The cystic duct was obstructed by a soft, crumbling stone. The spinal cord was not examined. The bone of the right arm was exposed just above the elbow joint. At this point the bullet of thirty years before had plowed its way through the bone. A resection had been made and good union obtained, with but slight bulging of the callus anteriorly.

Examination by Dr. H. C. Crouch of the contents of brain abscess No. 2, removed at operation on March 13th: "Microscopically the direct examination showed the material to consist of pus cells (the majority of which were more or less in a condition of fatty degeneration), and the *débris* of such, with some fat crystals and many fat globules; a few broken down nerve cells, red blood-corpuscles, and a small amount of pigment, apparently hæmogenic in origin. A search for pigment of pulmonary origin (anthracosis) failed to give any positive results.

"Cover-glass preparations stained for bacteria showed the presence in considerable numbers of what were apparently streptococci. These stained according to Gram, which meth-

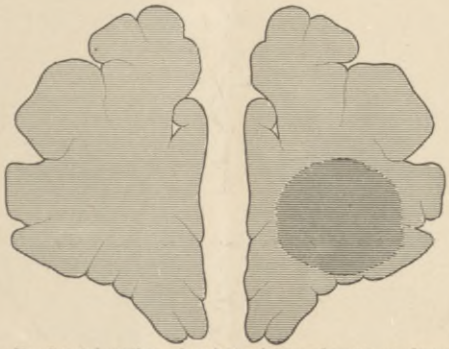

FIG. 2.—Pre-frontal section, showing primary abscess, or abscess No. 1.

ods gave the best results. Seen thus, the micro-organisms were mostly in chains, some of them being of considerable length, and would correspond in general appearance to the *Streptococcus pyogenes*. The individual cocci varied in size. Their general appearance seemed to indicate degeneration and involution forms. The cultures seemed to confirm this. Gelatin tubes were inoculated and plates prepared therefrom. Stroke cultures were made on glycerin-agar in tubes and dishes. The cultures remained sterile, however, in spite of the apparent abundance of the cocci in the cover-glass preparation."

Microscopical report of the cyst wall and of the contents of the primary abscess by Dr. Axtell:

"The microscopical examination of the pus taken from the abscess shows pus cells and granular matter. The pus cells were much less distinct than they are usually seen. They all presented granular disintegration. No crystals and no calcareous matter could be found.

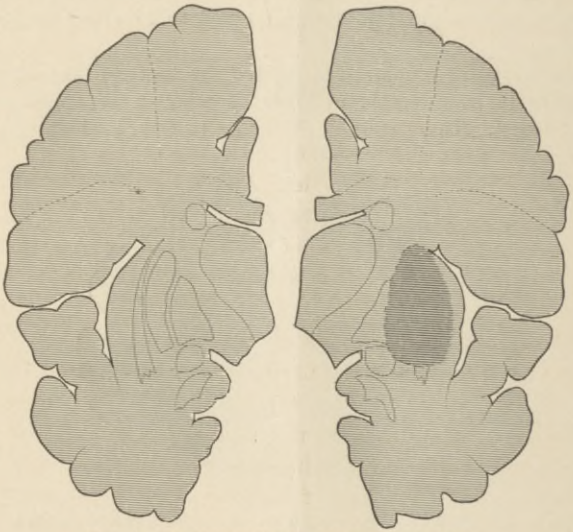

FIG. 3.—Frontal section, showing abscess No. 2.

"The examination of the capsule surrounding the abscess showed it to be about a sixteenth of an inch thick, of some firmness, with a smooth inner surface. Under the microscope it was found to be composed of loose connective-tissue elements and granulation tissue with a limited blood supply. The brain substance adherent to it was infiltrated with lymphoid cells, and the cerebral elements presented fatty degeneration."

After learning the full extent of the patient's lung trouble and its character, the diagnosis of cerebral abscess

following a septic embolism from the lungs was the only rational conclusion that could be reached. Had I known the full extent of his head symptoms during the months preceding the beginning of his fatal illness, I am inclined to think that I should at least have suspected an abscess of older date than the one which was diagnosticated. From the time of the first manifestations of the facial spasm to the death of the patient, only twenty-nine days elapsed, yet at the autopsy the second abscess was found surrounded by a capsule whose walls were fibrous. From the study of traumatic abscesses of the brain it is believed that such a capsule will not form before the end of the second month. If such a length of time is required for the formation of a fibrous capsule, we must conclude that the more recent abscess was of older date than one month, and that the symptoms that were thought to be due to embolic occlusion of an artery were caused by the destructive irritation of the abscess in its extension backward and involving the motor region. There seems to be nothing inconsistent with such an explanation for the terminal symptoms. It would seem improbable that a person should be able to attend to his business with two large abscesses in the frontal lobe of his brain, but equally as great a destruction of brain tissue has been observed in this region of the brain unattended by obtrusive symptoms.

A study of the meagre temperature record that was kept of the case prior to the operation did not throw much light on the nature of the intracranial mischief, for the reason that the brain symptoms were complicated by those of the lung trouble. The three days immediately preceding the operation, the only time during which frequent temperature observations were made and careful records kept, the temperature was normal or subnormal on the right or non-paralyzed side, except on one occasion, when

it reached 99° F., while the same thermometer registered one degree higher in the left axilla than in the right. These observations were made with great care, the thermometer being held in the axilla whose temperature was first taken ten minutes, and in the second axilla five, the instrument still being warm from the first axilla when it was placed in the second. To prevent any possibility of error, the temperature was taken in the right axilla first at one time, and in the left axilla first on registering the temperature the next time, and thus alternately obtaining the temperature of right or left axilla first. Subsequent to the operation the temperature was found nearly the same in each axilla, the difference in the axillæ never being more than four tenths and usually only two tenths, and the difference was not always found in favor of the left side. The temperature being about the same in each axilla after the removal of the pus from the right motor region of the brain would seem to corroborate the observation made by me in a case observed in Philadelphia in 1882, and communicated to the College of Physicians in that city in 1883, in a paper entitled Report of Three Cases of Abscess of the Brain (*Transactions of the College of Physicians*, 1883, p. 77). In one of the cases there reported in full, the temperature was found from five tenths to three degrees and four tenths, Fahrenheit, higher on the paralyzed than on the unaffected side, extending over a period of more than two months, and only on one occasion was it observed to be equal or greater on the unaffected side of the body. I have made similar observations in numerous other cases of abscess or tumor of the brain involving the motor region. If this result should be substantiated by future observations, it may serve a useful purpose in differentiating ordinary vascular from irritative focal lesions of the brain.

In endeavoring to select a point for the removal of the button of bone from which the abscess might be most easily reached, it was necessary to take several things into consideration. The entire left side, including face, arm, and leg, was completely paralyzed. If the trephine opening had been made over the arm centre, as is often done in operating for the relief of complete hemiplegia due to the presence of a tumor, it would have been very difficult to reach the abscess from this point and impossible to have kept it well drained. Even if the centre of the trephine opening had been over the middle of the face centres, thorough drainage of the abscess cavity would not have been easy to maintain. It is a well-recognized fact that abscesses of the brain are most commonly situated in the white substance, and that much of the loss of function resulting from their presence is due to pressure and œdema of adjacent structures. In the case under consideration, as the early symptoms were attended by involvement of the muscles of the larynx and pharynx, the platysma myoides, as well as the muscles of the face, and in the subsequent progress of the disease the muscles innervated by the cortical centres below the lower end of the fissure of Rolando were seriously affected, it was thought that the lower portion of the abscess was situated nearly on a level with the horizontal branch of the fissure of Sylvius. The autopsy showed that the button of bone had been removed from a point where the abscess was most easy of access and thorough drainage the least difficult to accomplish. In the case reported in this paper there were two abscesses; the contents of one were evacuated, while the other abscess remained undetected. If we compare the symptoms subsequent to the operation in this case with those of brain abscess in which all the pus has been got rid of at one operation, are there appreciable differences that will enable

us in a similar case to the one here reported to determine, when one abscess has been evacuated, whether another yet remains in the brain ?

We must remember that the symptoms of most cases of abscess of the brain are complicated by those of the morbid condition that has given origin to the infective material that has found a lodgment in the brain and given rise to the abscess. In the case under consideration it was impossible to determine how much the prostration and general depressed condition were due to the serious lung trouble and how much to suppuration in the brain. In uncomplicated abscesses of the brain the temperature is usually normal and often subnormal, the pulse slow, and respiration infrequent; but very soon after the pus has been evacuated the temperature ascends to about 100° to 101°, the pulse to 100 or more, and respiration to 16 or 20. In the case now under consideration, the temperature on the paralyzed side fell about one degree to normal, and was the same as that of the right side both before and after the operation; and for the next six hours it was about half a degree above normal in each axilla, and did not reach 100° until eight hours after the operation. After this it ranged from 99° to 100° for six hours more. The pulse remained about the same in quality and frequency for twenty-four hours subsequent to the operation as it had been before it. Respiration also showed no perceptible effect from the operation. These symptoms were considered at the time, but the purulent condition of the lungs prevented their attracting attention to lead me to suspect another brain abscess. The patient's mental condition was so much better forty-eight hours after the operation than it was before it that, although he was failing physically, I was inclined to attribute this to the condition of the lungs rather than to that of the brain, especially as respiration became so rapid.

Death finally took place by the lungs rather than by the brain, as the patient did not become entirely comatose until about twelve hours before death, although the respiration was 50, the pulse from 130 to 135, and he was deeply cyanotic for thirty-six hours before death. Undoubtedly the presence of the large unevacuated abscess in the brain contributed to his death. It hastened it, and would have caused death irrespective of the lung trouble; but it is more than probable that had the lung difficulty not been so serious he would have made a temporary and imperfect recovery after evacuating one abscess, as the brain was not found markedly œdematous around the old or primary abscess, whose capsule was firm and unyielding.

It may not always be possible to determine by the symptoms the presence of another abscess in the brain, after one has been evacuated, if the brain symptoms are complicated by those of the primary morbid process; but in the uncomplicated cases a careful study of the pulse and temperature will greatly aid in the diagnosis, and even in such a case as the one reported in this paper an analysis of the symptoms will put the physician upon his guard, and with accumulated experience may lead to an accurate diagnosis of the most complicated cases. We have much to learn in regard to abscess of the brain, and every case should be exhaustively studied and the symptoms recorded until we have a fund of information sufficient to guide us in the analysis of the symptoms of the most obscure diseases of the brain.

The New York Medical Journal.

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PUBLISHED BY

D. APPLETON & CO., 72 Fifth Avenue, New York.