

IRRIGATION OF THE POSTERIOR CEREBRAL FOSSA FOR THE RELIEF OF BASILAR MENINGITIS.¹

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I AM not aware that trephining into the posterior cerebral fossa and cleaning it by irrigation have ever been practiced or suggested for the relief of basilar meningitis, except in Macewen's cases, in which the meningitis was local and occurred as a result of infection from disease of the middle ear.² Several have endeavored to relieve cerebral pressure by tapping the spinal canal at the upper cervical region and drawing off the accumulated fluid. Not long since a case of basilar meningitis limited to the posterior fossa, following an attack of pneumonia, came under my care, and the diseased process was so limited, that it occurred to me, that the pressure probably might have been relieved, and most of the results of the inflammation gotten rid of, by draining the cerebral fossa and washing it thoroughly through an opening made into the fossa through the occipital bone on each side of the median line. This case in detail is as follows:

Leonard M., male, aged 20, single, white, American by birth, employed as a dry-goods clerk, with a negative family history, had enjoyed good health in childhood, and his habits were said to have been excellent. He had never had a discharge from either ear, but on get-

¹ Read by title.

² Dr. J. B. Roberts, of Philadelphia, trephined the skull for the relief of pressure in a case of tubercular meningitis, placing the trephine three-quarters of an inch above and three-quarters of an inch in front of the auricle. Proceedings of the Philadelphia County Medical Society, p. 465, for 1894.

In the *Times and Register* for 1894, Dr. B. Merrill Pickets published an article which I have not seen, entitled, "The Removal by Trephining of Fluid as the Result of Acute Cerebral Meningitis, with Report of a Case."

ting water into his ears, especially the right, on several occasions while in bathing, he had complained of pain in the latter ear. About March 18, 1895, he had an attack of pneumonia involving the base of the right lung. It was ushered in by a chill and followed by fever. The physician in attendance says, there was but slight consolidation of the lung, and the patient did not seem very ill, but made a rather tedious convalescence. He was able to return to his work about two weeks from the time of the beginning of his illness and continued on duty in the dry-goods store, until April 8, feeling rather weak, but complaining of no special ailment. On this date he worked all day, but in the evening began to complain of headache. By 10 P.M. the pain was excruciating, and localized in the front and back of the head, one side of the head not seeming to be involved more than the other. The next day, April 9, he had one or two chills, but the physician says he found no rise in temperature, but on the contrary, the axillary temperature was invariably sub-normal. He slept a great deal that day and seemed rather stupid; the following night he was restless. On Wednesday morning, the 10th, he was in much the same condition that he had been in the day before, although he did not complain of as much headache. During the afternoon he laughed and talked with his physician, and said he did not feel a particle of pain in his head. Early Thursday morning a slight difficulty in speech was observed, which seemed to be rather a difficulty in articulation, but with an effort he could make himself understood. He was irritable and restless, and it seemed to be difficult for him to concentrate his attention and keep it on any object long at a time. The temperature was normal. He was complaining then of pain in the back of the head. During the latter part of the forenoon he was delirious and restless, so that he became more or less unmanageable. At noon the temperature was slightly sub-normal; pulse 60; respiration 24. At 5.30 P.M., I saw him in consultation with Dr. Richmond, his attending physician. When I went into the room he was lying in bed, apparently asleep, but occasionally would open his eyes, stare, rub his forehead and then bury his head in the pillows. He was restless, throwing himself from one side of the bed to the other. He was considerably emaciated and depressed, corrugation of the forehead was observed, and the facial expression was that of suffering. His

mother reported that he had been yawning a great deal during the afternoon. On arousing him and asking him if he had headache, he replied emphatically, "No." On repeating the question he became irritable, and with great effort answered "No" quite loudly. I found it difficult to get him to concentrate his mind, and it was impossible for him to hold his attention on any one subject for more than a few seconds. The muscular tone and strength for one in his depressed condition appeared normal in legs and arms, but slight paresis of the left side of the face was apparent. The left pupil was a little dilated, and responded more slowly and feebly to light than the right. It was impossible on account of his mental condition, to examine the special senses or general sensory phenomena. The ophthalmoscope revealed a hyperæmia of the optic discs. The physician informed me that he had taken his temperature but a few minutes before I saw the patient and found it 98.3°; pulse, 60; respiration, 16. The deep reflexes were slightly lessened and the superficial absent. On account of the sub-normal temperature, which I cannot verify as I did not take it at that time, the dilatation and slow response of the left pupil, and the slight paresis of the left side of the face, an abscess of the brain was suspected, and the patient was removed to St. Luke's Hospital at my request. Two hours later on taking the temperature, it was found to be 102° in each axilla; the pulse was still slow, about 60, and respiration 28. The elevated temperature was suggestive of meningitis rather than abscess. One hour after my examination, at 5.30 p. m., he became totally unconscious and ceased to speak. He was quite restless and rubbed his forehead with his right hand considerably. On the next day Cheyne-Stokes respiration became apparent, lasted for an hour, and then was replaced by normal breathing. The posterior cervical muscles were observed to be slightly rigid, the knee-jerks were a little increased, and the apparent paresis of the left side of the face had almost entirely passed away. The pupils were equal and responded readily to light. From 8 a. m. of April 12, to 7 p. m., the temperature in each axilla ranged from 102.4° to 103°, and was found the same on each side of the body; the pulse varied from 70 to 76 and at times was intermittent; respiration was 36. During the early evening of April 12, the temperature descended about two degrees, pulse increased to 78°, and unconscious.

ness became profound. On the morning of the 13th the temperature was 102° in each axilla; pulse 92; respiration 34. He raised the left arm a number of times, but did not move the fingers of this hand. The left hand had been partially closed all night. During the next day, April 13, he remained in an unconscious condition, bowels were obstinately constipated, temperature varied from 102.4° to 103.1° , and was the same in each axilla; pulse was 92, respiration varied from 36 to 44. Retraction of the head became quite marked on the 14th; stupor gradually deepened, temperature remained about the same; pulse reached 118° ; respiration 38. At 5 A.M., of the 15th, the temperature was 104° in each axilla; pulse 180; respiration 56. At 8.10 A.M. the temperature was 107.2° in the rectum. He died ten minutes later. On the 11th and 12th the surface temperature on each side of the head was registered and found to be from 2° to 2.5° less than the axillary.

Autopsy, three hours after death, by E. R. Axtell, pathologist to the hospital. The brain only was allowed to be examined. The bones of the skull were thin. The dura and bones everywhere presented a normal appearance. The pacchionian bodies were prominent and the portion of the brain covered by them seemed to be slightly inflamed, but no pus was found here. The pia on the convex surface of the brain and over the base of the anterior and middle fossae presented a normal appearance. The parts lying in the posterior fossa were found covered with a thick layer of yellowish pus and inflammatory exudate and abundant watery fluid. The inflammatory material extended around the medulla. Both lateral ventricles were distended with an opaque watery fluid containing a small quantity of flocculent material. Considerable of this material was found in the fourth ventricle. The interior of the brain presented a normal appearance. A specimen of the lymph and pus was given Dr. Crouch, who reported as follows:—

“Cover glass preparation from the purulent lymph in the sub-arachnoid spaces showed the presence of *diplococcus lanceolatus* (pneumococcus) in great numbers and in pure cultures. Stroke cultures on glycerine agar resulted in almost pure cultures of the pneumococcus.

“H. C. CROUCH.”

This patient was removed from his home to the hospital because at the time of my first visit an abscess of

the brain was suspected, and if this had proven correct, an operation would have been necessary, but upon having the temperature carefully observed, and finding it elevated from four to five degrees, and especially when rigidity of the posterior cervical muscles developed, it was evident that I had a meningitis and not an abscess of the brain to deal with. While witnessing the post-mortem examination of the case, and seeing that the inflammatory products lay entirely in the posterior fossa, it occurred to me that in a similar case this condition might possibly be relieved by trephining into the fossa on each side of the median line and washing out the inflammatory products.

Three days later, or on April 18, I was asked by Dr. Richmond to see another case with him, at about 5 p. m. The history is as follows:—

J. N., aged 30, white, a boilermaker by occupation, whose family and personal history were not obtainable, suffered from La Grippe about four weeks before. He was greatly reduced by the attack, but no localized lesion was found. He had gradually recovered, so that he anticipated returning to work in a day or two, but he was still weak and languid. On the morning of the seventeenth, about thirty-six hours before I saw him, he awoke and was talking with his wife, when suddenly he put his right hand to his head and cried, "Oh my head!" Soon after this he lost consciousness, but rallied in the course of a few hours and talked some during the day, but seemed dull and stupid, and complained of a pain in his head. The next morning he was nearly unconscious, but in the afternoon he was able to talk with his wife and seemed rather bright. The temperature, Dr. Richmond reported, had appeared normal, although he had not registered it. When I entered the room at 5 p. m., he observed and spoke to me, and said that his head was paining him. He looked depressed and appeared to be suffering. Pupils were small, but responded to light. The posterior cervical muscles were rigid and the head slightly retracted. After I had been in the room examining him for two or three minutes, he became unconscious, and I found it impossible to arouse him. Temperature was 98.3° in each axilla; pulse 72; respiration 16. The knee-jerks were slightly increased. The ophthalmoscope showed no ocular change and there was no evidence of paresis or paralysis of any of the muscles. The history of La Grippe, the prolonged con-

valescence following it, and the sudden development of head pains with normal temperature, made me apprehensive of cerebral abscess, although no discharge was observed from either ear, and his wife stated that he had had no ear trouble. On removing him to the county hospital two hours later, his temperature was found to be 100.4° in the right axilla, 100.2° in the left, and 100.4° in the rectum. The rise in temperature was thought to be due to the disturbance caused by removing him to the hospital. He did not seem to be totally unconscious, his eyes would follow me or the lamp around the room, and when asked his name he endeavored to give it, and succeeded in doing so in an indistinct manner. I asked Dr. Rogers, the attending surgeon at the hospital, to see him with me at 9 P.M. The temperature then registered 99.0° in the right axilla, and 99.2° in the left; pulse 60; respiration 16. Retraction of the head was well marked, and on my attempting to bring the head forward, it seemed to give him some pain. The diagnosis at this time seemed to rest between meningitis and cerebral abscess. The retracted condition of the head indicated irritation of the meninges in the posterior cerebral fossa, but the normal temperature at the time of my first visit, and its again descending after he had been resting a few hours in the hospital, seemed to militate against the presence of meningitis. That night his temperature was registered in each axilla every two hours, and the average temperature for the night was 98.4° , being about the same in each axilla. At 9 A.M. the next morning the temperature in each axilla was 99.0° ; pulse 64; respiration 18. He was becoming more stupid, pulse was occasionally irregular and respiration at times intermittent. About noon, when Dr. Rogers again saw him with me, his condition remained about the same as it had been during the morning, but we could find no indications for operative procedure. During the afternoon his temperature varied from 98.6° to 99.4° ; pulse 63; respiration 18. It was quite evident that there was pressure in the posterior fossa, especially around the pons and medulla. The low temperature contra-indicated meningitis, although normal or sub-normal temperature is sometimes observed in this disease. Abscess of the brain did not seem likely as the temperature had been found constantly a little above normal for the twenty-four hours he had remained in the hospital. During the afternoon he seemed to be sink-

into a deep comatose condition, and it was evident that life could not be prolonged many hours unless relief of pressure of the pons and medulla were effected by surgical means. I could be positive of but one thing, and that was pressure at the base of the brain in the posterior fossa, and I asked Dr. Rogers if he would trephine and endeavor to remove, by washing, any inflammatory material that we might find in the posterior fossa. To this he agreed, and the operation was set for 8.30 P.M. Just before the operation he was totally unconscious; temperature was 99° in the right axilla, and 99.2° in the left; pulse 64; respiration 18. Retraction of the head was well marked, and he presented the appearance of one dying from intra-cranial pressure. Although he appeared totally unconscious, yet it was found by pricking him with a pin, movements of the limbs would take place, so that we were compelled to use an anæsthetic. Just at the time of beginning with the chloroform the pulse was found to register 78; as soon as he became anæsthetized it fell to 54.

Description of the operation by Dr. Rogers.

The operation was begun about 9 P.M. A curved incision was made and the tissue stripped downward so as to expose the skull to as low a point as possible. A three-fourth inch trephine was then used, and the opening was slightly enlarged latterly with a rongeur forceps. It was subsequently shown that the opening was about on the level of the posterior margin of the foramen magnum, and about three-fourths of an inch to the left of the median line of the occipital bone. All tissues appeared normal, the veins being slightly engorged. The dura was then laid open transversely for about three fourths of an inch. A large amount of cerebrospinal fluid escaped. This could not be measured, but it seemed to be a greater quantity than would normally be present. The cerebellum could be easily raised from the dura, and when the flow had abated, a soft catheter was passed in through the opening in the dura, and the sub-dural spaces freely irrigated in all directions with normal salt solution. To the right of the median line the catheter easily passed without obstruction, a distance of over two inches. It was subsequently shown without much doubt that this passed across into the right fossa. The salt solution returned freely. The pulse at the beginning of the operation raised to 140, but fell during the irrigation to 112, and the respiration became deeper and more regular.

A piece of gauze was left as a temporary drainage for what fluid might be left, so as to slightly separate the edges of the dura. With this exception the wound was completely closed.

This drainage was removed the next day, and the wound allowed to close completely. No great difficulty or serious symptoms occurred during any part of the operation.

Further remarks by Dr. Eskridge.

Immediately after the operation the temperature in the right axilla was 99.6° , and in the left 100.5° ; pulse 114; respiration 24. At 2.30 o'clock the next morning the temperature registered in the right axilla 100.6° , left 100.8° . The pulse was then 120, respiration 24. Two hours later the temperature had risen to 102° in each axilla, pulse and temperature remaining the same as before. At 8.30 A.M. the temperature had fallen to 101° , where it remained the greater portion of the forenoon. A few hours after the operation the patient opened his eyes and looked around the room. During the forenoon succeeding the operation the patient presented an improved appearance. He would open his eyes and try to protrude his tongue when requested to do so, but was unable to get it beyond the teeth. In the afternoon, when visited by his wife, he seemed to recognize her and succeeded in protruding the tongue at the request of the nurse. He was able at this time to empty the bladder, which he had not done the previous forty-eight hours. He kept his eyes open for about three-quarters of an hour and took notice of what was going on around him. On the morning of the second day the temperature ascended to 103° ; pulse 154; respiration 14. He was then comatose, rapidly failed and died just before midnight.

Autopsy eleven hours after death by Dr. Leonard Freeman, pathologist to the hospital. The wound had healed without the formation of any pus, no abnormal adhesions between the dura and the bone were detected. The external surface of the dura presented a healthy and glistening appearance. The pia over the convex surface exhibited no marked changes except engorgement of the veins. No clots were found in the venous sinuses. The arteries of the base of the brain presented evidences of disease in their walls, and in the main branch of the left middle cerebral artery, just before the cortical vessels are given off, a clot was found which

blocked up the entire calibre of the vessel. In the centrum ovale of the left frontal lobe a considerable quantity of semi-fluid blood was found, which after plowing up and destroying a considerable portion of this part of the brain, ruptured into the lateral ventricle, and filled the lateral, third and fourth ventricles. The corpora striata were softened. A slight hæmorrhagic extravasation was found in the right frontal lobe. The remainder of the brain presented a normal appearance. There was no evidence of any meningitis nor of abscess. The pathological condition was one of hæmorrhage into both frontal lobes, the greater in the right, the blood finding its way into the lateral ventricles, and filling these together with the third and fourth ventricles.

In the clinical history and pathology of this case there are many points that invite discussion, but the main subject to which I wish to call attention in this communication is the probable effect of draining and irrigating the posterior cerebral fossæ in basilar meningitis. Unfortunately the absence of meningitis in this case prevented us from being able to determine practically the results likely to follow the surgical measures resorted to for the relief of this trouble. The brilliant results obtained by Macewen from irrigating one-half of the posterior cerebral fossa in localized meningitis encouraged me to hope that a more desperate condition might be relieved by more elaborate, but somewhat similar surgical procedure. I had first planned to have Dr. Rogers enter the posterior cerebral fossa by two trephine openings, one on each side of the median line, but on his exposing the left side, finding no pus and being able to pass a soft catheter over to the other side and irrigate it, it seemed that the removal of another button of bone was unnecessary. In a case of meningitis practical experience will teach whether the removal of one button of bone will suffice to enable the surgeon to accomplish all that he can hope to do from draining and irrigating the basilar surface of the posterior portion of the brain. It is probable that in general basilar meningitis the measures resorted to in this case would do nothing more than slightly prolong life by relieving pressure on the parts in the posterior fossa, but that in numerous cases of cerebro-spinal meningitis in which the cerebral mischief is almost entirely limited to the posterior fossa, they may result in the cure of the disease. The result of the operation in the case here

reported seems to demonstrate that the posterior cerebral fossa may be drained and irrigated during life by means of a trephine opening into the fossa, on one side, and in properly selected cases, may give relief to the patient. It was evident after the operation that the patient's respiratory and cardiac centres acted much better than before it. The man's improved general condition and his partial restoration to consciousness for a period of twenty-four hours after the operation indicated that general intra-cranial pressure had been partially relieved by the surgical measures resorted to.

I wish to thank my colleague, Dr. Rogers, for his co-operation in this case, for the skillful manner in which he performed the operation, and for his courtesy in giving me a description of it for this paper.³

³ Microscopic examination of the diseased cerebral vessels show them to be affected with syphilis.