

GUNSHOT INJURY OF THE BRAIN.*

WITH LATE MANIFESTATIONS AFTER IMMEDIATE RECOVERY.

BY JOSEPH RANSOHOFF, M.D., F.R.C.S., (Eng.),
OF CINCINNATI.

Professor of Surgery in the Medical College of Ohio, University of Cincinnati.

It may be fairly asserted that abscesses of the brain present many difficulties of diagnosis, and that autopsies out of number reveal opportunities missed. That they may long remain latent is of common observation. But latency may be seeming and the result of inaccurate observation. The latter probably happens in the majority of instances. A notable exception, a case of true latency, was observed by the writer in the instance of a boy whom he trephined at the request of Dr. E. W. Mitchell for a compound depressed fracture of the frontal bone.

The patient, a lad of seven, had fallen from his bicycle and sustained a fracture in the region of the right frontal eminence. The dura was not injured. The depressed bone was replaced. The union was absolutely by first intention and the recovery unattended by any evidence of infection so far as the most careful clinical and bacteriologic observation could show. The patient left the hospital two weeks after the operation. During more than three years the boy's condition and development were in every way normal. He never missed a day at school by reason of ill health; never complained of headache, and was in every way well. In his school work he frequently led his classes. Three years after his injury he was suddenly seized with violent headache after becoming overheated at skating. He died in coma within twenty-four hours after the onset of symptoms. The autopsy revealed a ruptured abscess which had been encapsulated. It was a little larger than a pigeon's egg and in the right

* Read before the American Surgical Association, June 5, 1909.

frontal lobe directly under the site of the fracture. The bone scar was scarcely visible.

It may be of importance to note that the boy was the only child of very intelligent parents, who would certainly have noticed any deviation of health in him. It is, therefore, fair to assume that the abscess was latent during the time indicated.

The following case is that of an abscess seemingly latent for a number of years and one presenting a missed opportunity.

T. S. T. first presented himself to me June 3, 1907. He was then aged 43. Married. He has two children. The family history is negative. He has been a commercial traveller for five years. He was perfectly well until the 6th of May, 1899, when he was shot with a thirty-two calibre rifle fired at close range. The bullet entered an inch above the middle of the right zygoma. He remained conscious for a short time after he was injured and gave directions about calling a physician. He was not unconscious at any time. There was a short period of stupor which supervened about six hours after the injury was sustained and disappeared entirely after two days. From that time on he continued clear-headed. Immediately after the accident there was a paresis of the left side of the face, the arm, and the leg. This could not have been profound, as the patient got into a buggy, drove home, and alighted, with some assistance. He was in bed about seven weeks, after which time the paralysis began to improve. He was confined to the house altogether for about six months, and at the end of a year he was enabled to dress himself and go about. From that time forth he continued his business, which now was that of a stock broker, with few interruptions.

On the 1st of September, 1903, nearly four and a half years after the injury, the patient was seized with a severe convulsion associated with unconsciousness. The second attack occurred in February, 1904. Both of these occurred in a hotel room after retiring. During both of them he fell out of bed, and after the second he remained on the floor sleeping until morning. On the following days he was about his work as usual. During the following two years he had altogether four similar attacks. In

April, 1904, he consulted Dr. F. W. Langdon, to whom I am indebted for many of the clinical notes.

When the patient presented himself to me in mid-summer of 1907 with a view to operation for the relief of his epileptic seizures, his condition was as follows:

Stat. Pras.: Vigorous-looking man; height six feet; weight 220 pounds; pulse 76; heart and lungs normal; no evidence of increased intracranial pressure; no headaches at any time; ocular fundus normal; urine normal. His mental condition is normal in every regard. He is clear in his ideas and logical. There is no defect in speech, nor is there any trace of asteriognosis. The pupils act normally and the ocular muscles are unimpaired. Dr. Langdon found in 1903 a very slight weakness of the lower face on the left side and the mouth drawn slightly to the right. At the time of my examination this weakness had disappeared. Dr. Langdon also noted some dulness of taste and smell, but not localized on either side. This was not noticed in my examination. Movements of trunk and extremities normal. There is no inco-ordination. A dynamometer test of the grasp of both hands is better than the average. The left sole is less sensitive than the right. The knee-jerks are weak but equal on the two sides. A most careful inquiry as to the history of the convulsions, of which the patient has about four a year, fails to show them to be of the Jacksonian type. X-ray plates were now taken by Dr. Thompson in anteroposterior and transverse diameters. They show the course of the bullet to have been slightly backwards, upwards, and inwards. The bullet was broken into three parts. The outer fragment was evidently in the temporal fossa and extracranial. The middle fragment was either just within or in the bony wall of the middle fossa. And the largest fragment was behind the sphenoidal sinus on a level with the cribriform plate, and it was impossible to state whether it was within the skull or not.

The writer believed the convulsions due to an irritation from either the second or third fragment or from a brain scar. But in the absence of any focal starting point of the convulsions, he was unable to determine which of the fragments caused them. It was natural to assume that the larger fragment was the one which, if an operation were determined upon, should have been the object of the search. Considering the excellent condition of the patient and the infrequency of the attacks, and the absence of the ordinary

FIG. 1.



Lateral skiagram of cranium.

FIG. 2.



Anteroposterior skiagram of cranium.

FIG. 3.



signs of increased intracranial pressure, and that the attacks became less frequent under rest and bromide, an operation was not advised. The writer did not again see the patient alive.

He learns that about a year after his last visit to him there developed a paresis of the left side of the face and of the left arm. There also was noticeable a slight dragging of the left foot. While in this condition, the patient came to the city for consultation on the 20th of February, 1909. Because I was out of the city, he concluded to return to his home, seventy miles away. An engagement was made for consultation two days later. While on the train that morning, he complained of a severe headache which came suddenly after a severe jolt. When he arrived in the city the headache became intense. Shortly after reaching his hotel profound coma supervened and the patient died ten hours after the onset of the acute cerebral symptoms.

The autopsy had to be hurried and was incomplete; only the head was examined. No effort was made to find the extracranial fragment. On removing the brain the right sphenotemporal lobe was found adherent to the middle fossa and removed with great difficulty. In the floor of this fossa was a small opening the size of the end of a lead pencil. The largest fragment was firmly imbedded in the cavernous sinus between two layers of the dura mater, and without question had been innocuous from the time of its lodgment there. The brain was removed as a whole and hardened and carefully examined by Dr. Wolfstein, neuropathologist of the Cincinnati Hospital, who has given me the report which follows.

Report of Dr. Wolfstein.—Brain given me for examination by Dr. Joseph Ransohoff showed an incision in the right hemisphere on the outer lateral surface evidently made during removal. No abnormalities on the convexity of either hemisphere. At the base of the right hemisphere situated directly underneath (and ventral) to the right cerebral peduncle is an egg-shaped cavity 4 cm. in diameter. On opening this cavity thick pus poured out and then the cavity was seen to have a depth of about an inch and a quarter and to be evidently walled off from the surrounding convolutions.

The cavity occupies a position at the base of the temporosphenoidal lobe extending forwards to the uncus, in fact to the anterior extremity of the sphenoidal lobe reaching to the Sylvian fissure, separated from it, however, by a portion of the compressed thin convolution before mentioned. It also occupies the anterior third, at least, of the gyrus occipitotemporalis and impinges upon the inferior temporal convolution. The

optic tract in its passage around the crus was in direct relationship with the roof of this cavity and may have been pressed upon, but does not appear in any way to be obliterated, although it does not appear to be as healthy as the tract on the opposite side. The optic chiasm, the mammillary bodies, and the third nerves appear perfectly healthy. On opening the cavity at the bottom, it extends inward into the substance of the uncus and the sphenoidal lobe as above mentioned and the wall of the cavity looks very much as if it had a pyogenic membranous lining. Lateral to the abscess cavity a firm substance can be felt, around which there is a marked fibrous thickening which is cut through with some difficulty, and encysted in the substance of this thickening a foreign body can be plainly felt. As said, it is completely surrounded by fibrous tissue.

On cutting through this tough fibrous thickening, a fragment of a bullet falls out, but it is remarkable how firmly encysted this piece of bullet was. I expected at first to find a large flattened mass of bullet, instead of which I found the tough fibrous material was five or six times the size of the bullet and in places a third of an inch thick.

On cutting away this mass, it was found that in its interior the mass was of the same consistency as cartilage. The abscess can be dissected loose without much difficulty from the structures which form its roof, and its roof lies directly under the medial convolutions of the island of Reil.

When the abscess cavity is removed completely a tongue of tissue forms its roof lying immediately ventral to the right crus cerebri. Immediately back of it can be seen the posterior edge of the right columna fornicis. There seems to be also a marked purulent infection of the overlying lateral ventricle. On turning the brain over and examining it from the top, a purulent infection of both lateral ventricles as well as the middle ventricle is very well marked.

The infection involves both the columnæ fornicis and even the fibres of the upperlying corpus callosum. The tissues posterior to the roof of the middle ventricle, namely, the corpus callosum and the junction of the two columnæ fornicis, are also the seat of purulent infection. On dividing these the choroid plexus appears and seems to be of a lusterless dirty hue, evidently also the seat of an inflammatory disturbance.

A secondary infection can be traced forward into the front end of the middle ventricle and along the anterior descending column of the fornix. On cutting through the cerebellum and the superior medullary velum exposing the corpora quadrigemina and the floor of the fourth ventricle, it also presents the same dirty greenish appearance as above described.

In turning now to the corpus striatum on the right side, the infection seems to have extended pretty well out toward the lenticular nucleus and certainly has involved the fibres of the corona radiata in its outer aspect.

On cutting open the right optic thalamus and part of the right lenticular nucleus, the capsular fibres seem to be involved in their outer

half and certainly in the passage of the fibres from the capsule into the crus they have been markedly pressed upon by the abscess above mentioned and also no doubt involved in the inflammatory process. The two crura cerebri and the upper portion of the brain stem were saved for hardening in Miller's fluid to determine secondary degeneration.

The hemiplegia (think it was left) was due either to involvement of the pyramidal tract as it passed through the capsule interna or more probably to pressure of the abscess on the right crus. As said, the optic tract was not destroyed, but there may or may not have been symptoms on the part of the visual fields due to pressure.

REMARKS.

The case reported is another illustration of the fact that the right temporosphenoidal lobe may be the silent site of an abscess. Nearly ten years elapsed between the infliction of the injury and death. Immediately after the accident there were positive evidences of impairment of the internal capsule or of the pyramidal tract. It is likely that a hemorrhage slowly coming on by pressure caused the initial stupor and left-sided hemiparesis. With the gradual encapsulation of the clot, the focal pressure-symptoms disappeared. When the infection within the exudation occurred, it is impossible even to surmise. Although it is not without parallel elsewhere, it does seem very improbable that the infection which caused death had remained quiescent during nearly ten years.

Although the term "latent" might be used in the case reported, it would, in the light of subsequent events, be misused. I reluctantly quote from Mr. Ballance, "Is it not possible that in at least some of the latent cerebral cases, the latency has been in the faculties of the observer; not in the clinical reactions of the patient."

Had the patient been carefully observed at any time during the six months preceding death, it is practically certain that a lesion of the temporosphenoidal lobe would have been recognized and relieved by an operation. Before the paralysis supervened there were no symptoms except the general convulsions which were supposed to be the result of a brain scar, or due to the presence of the fragments of the bullet. My natural belief was that the convulsions were due to irritation

from the larger fragment which, on account of its position, had lodged near or within the cavernous sinus and could only be reached with the very greatest difficulty and danger to the patient. In the light of subsequent events I am certain that, had an operation been performed when the patient came under my observation in June, 1907, the abscess would have been at once encountered on opening the temporal fossa and the smaller fragment or real cause of the convulsions easily found. I am justified, I believe, in reporting this case as exemplifying an opportunity missed.