

REPORT OF A CASE OF TUMOR OF THE LEFT  
FRONTAL LOBE OF THE CEREBRUM ;  
OPERATION ; RECOVERY.

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NEUROLOGICAL REPORT BY DR. BOOTH.

EVERY case presenting the symptoms of a cerebral neoplasm generally throws some light upon the diagnosis of intracranial disease, and is of undoubted value either in support of the findings in similar cases, or standing alone is of great importance to contradict or correct former localizing and pathological factors. The case which I am about to report may be placed in the first group, and is in support of former views concerning the functions of the fore-brain, and therefore only as additional evidence is it of importance.

The patient was referred to me on September 14, 1892, by Dr. David Webster, and the following history obtained :

Edward M., aged twenty-four years. Has had hip-joint trouble since a child ; aside from this has enjoyed fair health until eighteen months ago, when he commenced to have epileptic attacks, which the brother of the patient describes as follows : "He falls down suddenly, becomes unconscious, and then ensue general convulsive movements of both upper and lower extremities." There is no

history of any attack of hemi-spasm, or any limited to a single muscle or group of muscles, though the brother thinks that the jerking was more marked in the right arm. The last attack was in June, and in this one he fell, striking chin and left side of head quite severely. Shortly after this his relatives noticed for the first time the swelling on left temple, the patient himself stating that it was there before this fall. About the same time (June) failure of vision became a marked symptom, and now he can distinguish objects only when held very near. The patient was also troubled by a turning-in of the left eye. No history of hemi-anopsia. During the last month he has had what he designates as fainting spells, in which there are no convulsive movements. One of these seizures occurred during this examination. While sitting in a chair he suddenly remarked, "I feel bad," and put his hand to his head. No convulsive movements of any kind took place, his face became pale, and he seemed in a kind of stupor. Pulse was 86 and of fair strength. He could be partially aroused by shaking, and in reply to questions as to his sensations, etc., feebly replied: "I feel all gone." Duration of this attack was about three minutes. He seemed stupid and uncertain as to his statements during the rest of the examination. For the past year he has had a good deal of headache of a severe character, chiefly in the forehead, through temples, and often radiating back as far as the occiput. Has never vomited. Memory has failed very much during the past year, at present having difficulty in recalling recent events and the names of those with whom he is well acquainted. According to the brother of the patient, there has been a very marked change in his manner; he is more dull and less inclined to talk.

There is no history of injury to the head, other than the one received by falling in the attack of June last.

Confesses to two attacks of gonorrhœa, but denies syphilis.

Parents both living and healthy; there is no history of phthisis in the family.

*Examination.*—Manner quiet; face rather expressionless; speech slow and somewhat uncertain, though there is no marked aphasia; tongue straight and clean; no decided paresis of face, but there is evidently less expression on right side as compared with the left. There is a paresis of the right external rectus. Pupils widely dilated; no reaction to light or accommodation. Vision very much reduced in both eyes, the left being the weaker. There is marked optic

neuritis of both nerves, with numerous small hemorrhages. Stands fairly well with eyes closed; no ataxia; knee jerks absent even with reinforcement. Grasp of hands, as indicated by dynamometer, right, 35-35; left, 35-35. Heart and lungs normal. No anæsthesia or analgesia. Sense of taste normal. Sense of smell is very deficient on left side, there being no reaction to tests made with asafœtida, oil of cloves, chloral and iodoform. On the left temple, just back of external angular process of frontal bone, is quite a prominent swelling, oval in shape, quite tender, pressure on which causes pain to radiate through the head as far back as the occiput. In making deep pressure at base of tumor, the finger passes into a depression indicating absence of bone at this point.

The main points, then, in the case, briefly considered, are: A history of chronic hip-joint trouble; general health fair up to the past year, when there developed the following symptoms, viz.: headache, chiefly frontal, at times very severe; change in character; tendency to lethargy and depression; loss of memory; epileptic attacks; diminution of the sense of smell; failure of vision; an advanced optic neuritis; finally, appearance of swelling in left temple.

These symptoms were certainly sufficient to warrant the diagnosis of an intracranial tumor, and its location in the anterior fossa, or, more definitely, in the left frontal lobe. With this diagnosis the patient was referred to Dr. B. F. Curtis for opinion and propriety of a surgical operation.

Dr. Curtis agreed with me in the diagnosis, and suggested that the localized absorption of bone was an indication of a superficial tumor of the brain, which he thought could be removed by operation.

The patient was admitted on September 24 to St. Luke's Hospital, where he was also examined by Dr. Dana, who concurred in the above opinion.

*Remarks.*—Although this case presented no difficulties in diagnosis, and the lesion being situated in the fore-brain, a locality in which localizing symptoms are not always present, still it may be of some interest to briefly consider the main symptoms upon which the diagnosis was based, viz.: 1, unilateral anosmia; 2, optic neuritis; 3, aphasia; 4, mental change; and 5, external swelling on temple.

I.—The loss of the sense of smell on the left side was quite

marked, as was demonstrated by careful testing. Both nostrils were alternately plugged with absorbent cotton and the following substances used: iodoform, asafoetida, oil of cloves, chloral and ammonia, from the last of which there was a slight reaction on the left side. On the right side there was response to asafoetida and iodoform, but not to oil of cloves. The tumor penetrated to quite a depth, invading the left olfactory tract and causing paralysis of this nerve.

II.—Ophthalmoscopic examination showed the condition of double-choked disc to a marked degree, the margins of both discs were wholly lost, and no line of demarcation could be made out between the nerves and retina. This factor, being a general and not a localizing one, is here quoted only as an important symptom in support of the diagnosis of tumor.

The intense degree of neuritis present was caused by the indirect effects of the tumor through pressure. There was a decided paralysis of the right external rectus, which I am not able to explain as due to the lesion found. I am inclined to believe that there may be another tubercular deposit involving this branch of the third nerve.

III. Aphasia.—Through clinical experience, and the writings of Ferrier, Seguin, Starr and others, it is generally agreed that lesions of the frontal lobe produce no specific symptoms unless they extend as far caudal as the base of the second or third frontal gyri. The tumor involved the first, second and a greater part of the third frontal convolutions, and the patient gave evidence of amnesic aphasia.

From a consideration of the position and size of the growth, as well as its deep penetration, I would have expected a greater disturbance of speech, but beyond an occasional inability to recall a word he wished to use he had no other aphasic symptoms, evidently demonstrating that the growth had not involved to any great extent the caudal extremity of the third convolution.

IV. Mental Change.—Lesions of the pre-frontal region have in a large percentage of reported cases shown distinct manifestations, chiefly psychical, namely, mental slowness and uncertainty,

impairment of memory, change of character, etc. During the past year his memory had failed very much; he had difficulty in recalling recent events, and even the names of those with whom he was well acquainted were forgotten. He became dull and apathetic and was not inclined to converse; would sit quiet without taking any interest in the affairs of the household. This condition was contrary to his former self, and was definitely explained by the lesion found at the operation.

V.—The diagnosis had already been made when the slight oval lump was noticed on left temple. At first I was in doubt whether this was foreign to the intra-cranial trouble or part of the same. Examination by finger and exploratory puncture, revealing absence of bone at this point, left no room for doubt but that we had a tumor of the brain causing absorption of bone either by pressure or disease.

Perforating tumors of the cerebrum are not common, in spite of the mass of literature on the subject of brain tumor and the number of cases reported. As an example of a tumor in the location of the present one, and in which the growth was successfully located and removed, I may briefly refer to a case reported by Dr. F. Durante, of Rome, Italy.

The patient, aged thirty-five years, was first seen in May, 1884. Three months before her left eyeball had begun to be displaced downward and outward. For a year or more the sense of smell had been lost. Memory had become impaired, particularly in regard to remembering names, and she experienced a peculiar sensation of vacuity about the head, which caused her to feel uncertain in her movements. There had been a change in disposition. Dr. Durante diagnosed a tumor of the anterior lobe of the brain. The skull was opened above the orbit, and a tumor weighing two and one-half ounces was enucleated. It occupied the anterior fossa at the base of the left cranium, extending to the right and upon the cribriform lamina, which it destroyed. Posteriorly it extended to the glenoid tubercles before the sella turcica. The patient made a rapid recovery, and was living and well three and a half years later.

## SURGICAL REPORT BY DR. CURTIS.

Edward M<sup>r</sup> was admitted to St. Luke's Hospital September 24, 1892. On examination, a tumor one and one-half inches in diameter, projecting about one-half of an inch above the surrounding level, is to be seen in the left temporal region, just above the zygoma. This tumor is spherical, tense and smooth on its surface, and a bony edge can be felt around the upper half of its base, as if it projected from within the skull. The skin is normal, but pressure is slightly painful over the tumor and in its immediate neighborhood. At two examinations made just after the patient had been walking about, a distinct



FIG. 1.—External projection of cerebral tumor. *A.* tumor.

although slight cerebral pulsation was felt in the tumor, but at all other times this was absent. An aspirating needle inserted into the center of the tumor encounters no bony resistance, and can be passed to a depth of two inches. The needle appears to penetrate through soft tissue, and then at a depth of about an inch through a dense membrane into soft tissue again. Two attempts at aspiration were negative, but one of them was followed by the oozing of a drop of whitish fluid, resembling pus, from the needle puncture.

Dr. Charles S. Bull kindly examined the eyes and reported as follows: Convergence of the right eye. Exophthalmos downward

and outward of the left eye, with distinct elasticity backward. Double optic neuritis with numerous venous hemorrhages to the third degree, most marked in the right eye. Total blindness is imminent.

The right hip joint is partially ankylosed in moderate flexion and adduction, with a practical shortening of five and one-half inches, and a real shortening of three and one-half inches, of which one and one-half inches lies between the great trochanter and the knee joint—arrest of development. The scars of several old sinuses are to be seen near the crest of the ilium and the trochanter, and on the anterior and internal surfaces of the thigh, two of which have only recently closed. Examination of the heart, lungs and abdomen was negative.

*Operation.*—September 29, 1892. The head and left eyebrow had been shaven and prepared for operation in the usual manner. Ether anæsthesia was employed, preceded by a hypodermic injection of morphiæ sulph., gr. 1-4; atropiæ sulph., gr. 1-100. Dr. Curtis operated, assisted by Dr. Francis H. Markoe.

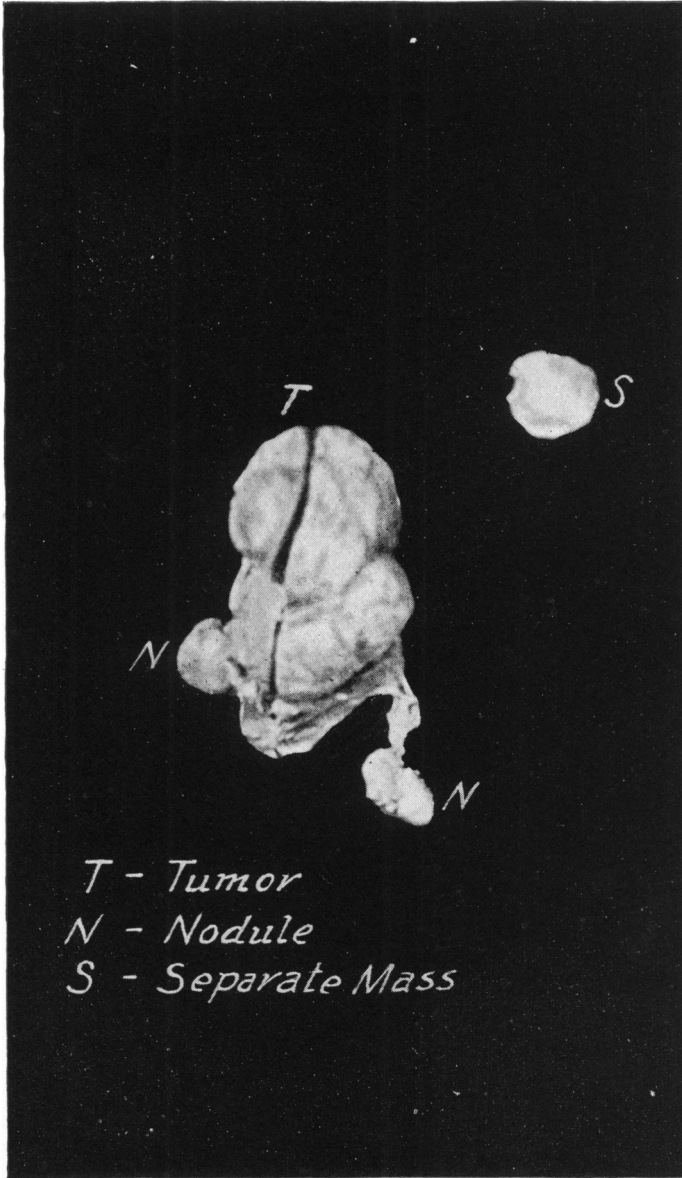
A horse-shoe shaped incision was made, its apex directed upward and reaching to within about one inch of the median line, its anterior limb ending in the middle of the left eyebrow, and its posterior limb ending in front of the ear, just above the zygoma. The knife was carried directly down to the bone and the pericranium dissected up with the flap by an elevator. While somewhat adherent to the surface of the tumor, the pericranium could be separated from it by blunt dissection, and the flap was turned down until the entire external tumor was exposed. The tumor was elastic and fluctuating, and was covered with a soft, thick, red membrane, which was accidentally punctured in a couple of places, giving issue to a cheesy fluid resembling the contents of a tubercular abscess, or broken-down gumma. This membrane was cut away and a circular opening in the bone, about one inch in diameter, was disclosed, the bone being thickened on its outer surface around the rim. The opening in the bone was occupied by a more solid broken-down material, yellowish in color, and of the consistency of cream cheese, and this was removed by the curette down to a firm elastic surface about on the level with the dura mater, which it proved to be. Below this the hard tumor tissue could be felt. With rongeur, chisel and gouge the opening in the bone was enlarged nearly equally in all directions until the upper margin of the tumor could be felt. The bone was very thick and sclerosed above, requiring very forcible blows upon the chisel for its removal, but the pulse was not perceptibly affected by the shock of these blows. The lower limits

of the tumor could not be reached because the zygoma prevented any further retraction of the flap, so the two ends of the process were divided by the chisel, being exposed by carrying the posterior limb of the incision a little further down, and by making a small incision anteriorly. The flap could now be forced much farther down, after it had been detached from the supra-orbital ridge, and the inferior margin of the opening in the bone was cut away until the floor of the anterior fossa of the skull (the roof of the orbit) was reached. The anterior branch of the middle meningeal artery was divided and after a little trouble was secured. The opening in the skull was quadrangular in shape, and measured two and one-quarter inches from before backward, and two and one-half inches from above downward. Its limits were: anteriorly, the external angular process; inferiorly, the floor of the anterior fossa; superiorly, a line parallel with, and one and one-half inches distant from the median line; and posteriorly, the root of the zygoma.

The finger was carried inward along the roof of the orbit, detaching the dura, and it was found that the tumor had also caused absorption of the bone at this point, but the dura was readily separated from the edges of this bony opening, which was circular and about three-quarters of an inch in diameter, and there seemed to be no involvement of the contents of the orbit. The finger could also detect the posterior limits of the tumor below, nearly corresponding with the fissure of Sylvius, and the exploration was carried toward the median line until the rounded border of the lesser wing of the sphenoid bone was felt and followed nearly or quite to the anterior clinoid process. Up to this time the dura had not been opened, and the operation had thus been practically limited to an exploration, but as it appeared that the limits of the tumor were now within reach on all sides, removal of the mass was decided upon.

After the ligation of two or three large veins in the dura by ligatures passed under them with a curved needle, that membrane was opened by a curved incision carried around the upper limits of the tumor, about one-quarter of an inch away from the point of adhesion between tumor and dura. The brain was exposed and appeared healthy, but the tumor could be felt just below its surface, and after ligation of one vessel (also with the curved needle) the incision was carried down through the brain in the same line with the scalpel. The surface of the tumor was reached at a depth of about a quarter of an inch, and was found to be limited on its cerebral aspect by a very firm,





TUMOR OF THE CEREBRUM.

smooth capsule. The end of the index finger was then inserted and the tumor readily separated from the cerebral substance without any hemorrhage of moment, some small, almost detached, nodules being recognized by the finger and shelled out with the main mass. When the finger had penetrated to the floor of the anterior fossa, a blunt instrument passed in below the tumor, outside of the dura, was distinctly felt, and it was proven in this way that all connection between the brain and the tumor had been separated—the latter being only held in place by the dura. The latter was then cut away by carrying the former incision downward, partly by the scissors, partly by tearing with the end of the finger, and the tumor was removed, a couple of vessels being clamped and ligated afterward. Digital exploration of the cavity revealed a small nodule in the substance of the brain, just beyond its posterior limits, and this nodule was easily shelled out.

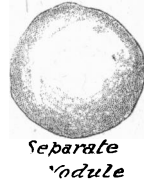


FIG. 2.

The cavity in the skull had almost entirely filled up with the expanding brain tissue, but a considerable quantity of iodoform gauze was packed in such a way as to allow of its easy removal by traction through the posterior part of the wound. The flap was then returned to its place and secured by fine silk sutures on the forehead, and coarser catgut on the scalp, the upper portion of the posterior limb of the incision being left open, and its edges separated by a few layers of gauze. The extension of the posterior incision in front of the ear, and the small wound of the cheek which had been made for division of the zygoma, were sutured. A thick sterilized dressing was then applied, with considerable pressure.

The mass removed was about the size of a small hen's egg, ovate in shape, but markedly lobulated, measuring about two and one-half inches in its long diameter, and about one and one-half inches in its short diameter. It was covered externally and below with the adherent dura excised with it, and on all other sides by a firm fibrous capsule. The main mass consisted of two almost globular lobes fused together, the lower having caused absorption of the roof of the orbit, and the upper having been the base of the external tumor at the opening in the vault of the skull, both presenting at these points circular roughened spots on their surface. Three or four small lobes were attached more or less firmly to the main mass, and one was entirely distinct, having been separated by normally soft brain substance. After hardening in alcohol and the removal of a thin slice from the centre for examination, the tumor weighed 20.25 grammes.

Dr. John S. Thacher, pathologist to the hospital, reported: "The tissue is quite firm, and on section is yellowish, except the superficial layer, which is gray and forms a capsule to the mass. On microscopical examination all but the superficial layer is found to resemble cheesy degeneration. At the surface is inflamed connective tissue containing a few giant cells and some small areas resembling tubercle tissue. By appropriate staining tubercle bacilli are found."

There was no shock after the operation, and no stimulation was required. Consciousness was rapidly recovered, and the patient spoke intelligently on awaking. The following morning the patient could help himself to a drink from a cup standing near the bed, and

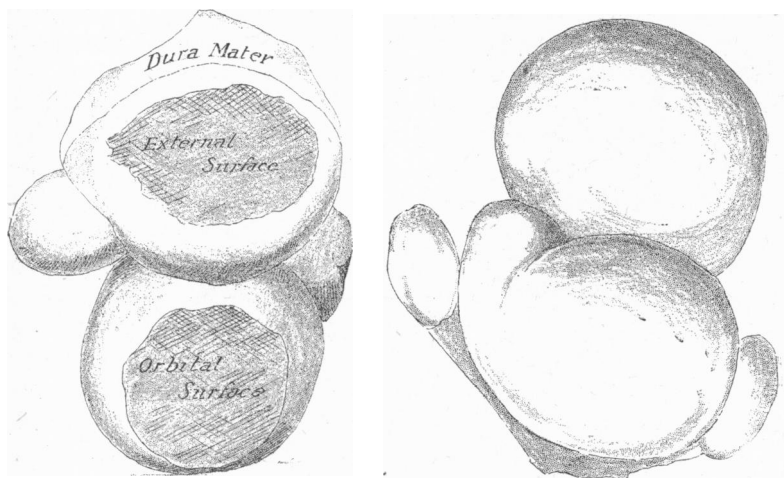


FIG. 3.—The tumor, natural size.

complained of nothing except a sensation of something being in the left eye, probably due to œdema and eversion of the conjunctiva. He slept most of the day. He talks as well as before the operation. On the fourth day, the bowels moved. On the fifth there was a marked œdema of the right eyelid, and when the lid was raised the patient said that he could see nothing. On the sixth day the dressing was changed, but the packing under the flap was left untouched. The sutures were removed from that part of the incision which crossed the forehead, and union here was complete.

On the seventh day the eyes were examined by Dr. Bull, who reported very large hæmorrhages occupying the entire right retina and two-thirds of the left, with no perception of light. The case pro-

gressed without event until the seventeenth day, when he was suddenly found to have recovered sight in the left eye, recognizing some visitors at the foot of his bed.

October 18, nineteen days after the first operation, ether was administered, the iodoform packing removed, and after breaking down a little of the fresh union in the wound, a thin plate of aluminium, curved to fit the shape of the skull, was slipped under the flap, so that it rested upon the bone on all sides of the opening in the cranium, and then the posterior part of the wound was closed with sutures. The brain just rose to the level of the skull after the packing was removed, presenting a red, granulating surface, bleeding but very slightly on withdrawal of the gauze. The following day the patient was perfectly well, able to see with the left eye (as tested by counting fingers) and able to talk as well as before. Beyond a very abundant flow of serous, probably cerebro-spinal, fluid, which soaked the dressing through repeatedly, there was nothing of note until the twenty-third day, when the temperature rose to  $101\frac{1}{2}^{\circ}$  F. and he had an epileptic fit—a general convulsion with loss of consciousness, followed by repeated vomiting. He was then found to have lost the sight of the left eye again. The dressing was cut down and the stitches were partly removed, with superficial primary union, and no perceptible rise of temperature. The following day the temperature remained elevated, but on the next day it fell to  $100^{\circ}$ , although the serous discharge continued and the dressing was changed. As there was evidence of retained secretion, a thin milky pus having collected, the sutures were entirely removed, the wound partly reopened and the plate removed. A light packing was inserted under the flap. With the exception of these two days the temperature was never above  $100^{\circ}$  throughout the case. The patient was given ten grains of bromide of soda three times a day, and this was increased later to fifteen grains.

November 3, Dr. Bull examined the eyes and reported choked disc in the third or atrophic stage, outlines of disc concealed, considerable exudation still present, but disc white and arteries small; iris dilated and irresponsive; no fresh hæmorrhages.

The wound contracted steadily, and on the 21st of November the patient was allowed his clothes and made to walk about the ward, as he had given indications of diminished mental vigor, and it was hoped to counteract this tendency. The bromide was reduced to five grains, three times daily. The patient, however, grew excitable and had both delusions and hallucinations, smelt bad odors, thought people were trying to poison or injure him, refused food, medicine,

etc., and this condition lasted until the end of the month, when the bromide was stopped entirely and he gradually returned to quietude, although he still remains in much feebler mental condition than immediately after the operation, and his aphasia is more marked.

The local condition at present (December 6) is that the wound has healed, except for a narrow and superficial sinus across the base of the flap, with a pocket anteriorly which holds about a drachm of fluid. There is also a smaller pocket just under the skin at the centre of the flap, corresponding to the site of the external tumor—evidently due to farther tuberculous infiltration. Both cavities secrete very little pus, and are steadily healing under iodoform-vaseline injections.

The patient is dressed and sitting up daily.

This case is of interest surgically, especially because of the external tumor and one or two points in connection with the operation. The external tumor led us to believe, erroneously, that we had to deal with a tumor of the membranes, perforating tumors of the brain proper being so rare. The hip-joint disease led us to a correct guess at the character of the mass. I have been unable to find any successful case of operation just at the critical moment when the eyesight was about to fail entirely, and consequently have no data upon which to estimate the danger to the eyes in operating in the presence of such conditions of the retina; but the question has little practical value, as the eyesight must be lost in any event before long, and in our case the only possible regret is the usual one, that the operation came too late to save the eyes.

Very noteworthy was the complete absence of shock during and after the operation, and this was probably due to the almost absolute bloodlessness of the separation of the tumor from the brain, which in its turn depended upon the fact that we were dealing with a tuberculous, and not a sarcomatous, mass. Finally, I would call attention to the circumstance that the operation was so conducted as not to open the dura until it was tolerably certain that the tumor could be removed, the first part being in fact only exploratory, in spite of the large opening in the skull, so that it would have been possible to close the wound at any time without having entered the true cerebral envelopes. This was the more necessary, as it was evident that we were attacking a very large mass, and

fortunately its superficial situation, lying as it did directly under the dura, lent itself to the plan. For the same reason, the size of the tumor, I felt unwilling to use the osteo-plastic methods which are so excellent in some cases, anticipating a very prolonged operation without them, and fearing to add to its duration and thus increase the shock which was dreaded, although happily without cause.

On December 21st, the sinuses having entirely closed, the patient was allowed to go home. The excitement of his return brought on a severe epileptic fit, followed by four others within three hours, without recovery of consciousness in the intervals. Two hours later, one of us saw him, finding him unconscious, breathing stertorously, with pale, bluish skin, but full and rapid pulse, the brain bulging forcibly from the opening in the skull under the flap. There appeared to be no paralysis. The following day he recovered somewhat and tried to talk, but never fully regained consciousness, and died on December 23d. A post-mortem examination was made by us ten hours after death, the head only being opened. The wound was found to have healed entirely. At the site of the opening in the skull the skin was adherent to the dura, and was drawn in so as to make a very deep depression fully one and one-quarter inches in depth—a strange contrast to the protruding brain of a few hours before. The walls of this cavity in the brain were completely altered by tuberculous degeneration. The brain was very soft, and has not yet hardened completely. Practically all that remained of the left frontal lobe was converted into a hard tuberculous mass, with a large cavity below it full of soft cheesy material. The rest of that hemisphere and the right hemisphere showed no other foci of disease, but a softened area of considerable size was found in the left lobe of the cerebellum. Nothing has as yet been found to account for the paralysis of the external rectus of the right eye.

The disappointment in this case gives an additional reason, besides the usual multiplicity of the foci of disease, for not operating upon tuberculous cerebral tumors, for there can be little hope of radical cure when a tumor apparently so well encapsulated as this continues its growth on all sides in spite of what seemed a thorough extirpation of the disease.