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With the writer's regards.

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BY

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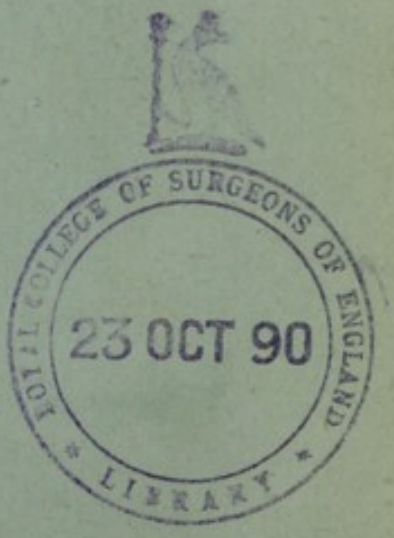

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THREE CASES OF TUMOR OF THE FRONTAL LOBE.[1]

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ALL cases of brain tumor are of special interest at present, since we are to-day in a position to consider not only their nature, progress, and probable site, but even the possibility of their removal by surgical interference. The cerebral hemispheres have been mapped out in the lower animals and in man, in regard to localized function, with a degree of accuracy which, although far from absolute with many functions, is full of encouragement for further study, and which within a few years has caused a complete reconstruction of our theories of the operation of many mental processes. In our maps of the cerebral hemispheres there is still a large undetermined region, the pre-frontal, regarding the functions of which there is great obscurity. In animals irritation of the posterior part of the frontal lobe has been shown to produce movements of the muscles of the head and neck, and sometimes rotation of the eyes, but the experiments are less satisfactory here than when performed in other parts of the brain. Removal of the anterior part of the frontal lobes in dogs seems to

[1] A paper read before the New York Clinical Society, April 25, 1890.

occasion loss of memory and changes in temper, the animals become restless and irritable, or, more often, dull and sleepy, but no abnormalities of motion or sensation are produced. In man very severe injuries of the frontal lobe have been reported, with considerable destruction of tissue, sometimes without any mental, motor, or sensory symptoms whatever. The historic "crow-bar patient"[1] was such a case, where extensive lesion of the frontal lobe produced no permanent impairment of mental faculties beyond slight irritability of temper. Another case, reported by Dr. Noyes,[2] was that of a man in whose orbit the breech-pin of a gun was found imbedded, a sharp end of the metal, one and a half inches long, and half an inch broad, having penetrated the cranium and entered the right frontal lobe, where it lay for five months without producing any symptoms referable to the brain. On the other hand, congenital or acquired defects of the pre-frontal region have often been observed in connection with enfeebled intelligence or idiocy. Many of the lower races of man present a relative deficiency in the development of this region, as well as of the temporo-sphenoidal lobe. Conversely, it is customary to associate a high degree of frontal development with great intelligence. Of the three cases of new-growths isolated in the anterior and middle portions of the frontal lobe, which I now report, one was a sarcoma, secondary to a sarcoma of the neck, and the two others were gummata, but with no accompanying

[1] Barlow, Bigelow: American Journal of the Medical Sciences, 1850, vol. lvi. p. 13.

[2] Ibid., vol. lxxxiv. p. 45, 1882.

syphilitic symptoms or history. All three patients exhibited more or less mental disturbance, either irritability of temper or dulness, or both in alternation. The two cases of gummy tumor were singularly alike in the irritation and convulsions which were present. The other patient had no such symptoms. Periodical general headache was complained of by two of the patients, not by the third. Only the important facts in the histories and autopsies of these cases are herewith presented, irrelevant details being omitted.

The patients all entered my service at the Presbyterian Hospital during the past two years, but one of them I had treated occasionally at my office during the three previous years:

Case I.—V. B., German, male, aged forty-six years, married, cabinet-maker. The patient had led a sober and industrious life, and gave no history of syphilis or alcoholism. He had always enjoyed good general health. About six years before admission he was struck on the head by a falling timber. He was not immediately unconscious, but became delirious afterward. The site of the injury could not be definitely located. He recovered from the shock in about a week, but since that time he had had occasional epileptiform convulsions, these attacks usually following business worriment. At first they occurred about twice or three times a year. Of late they became slightly more frequent, never, however, recurring at shorter intervals than two months. Recently the attacks have grown much more severe. At first they were general, the individual convulsions continuing a few seconds with intervals of half an hour to an hour, the whole seizure lasting eight or ten hours. They were always asso-

ciated with extreme constipation and with a well-marked aura. Recently, the convulsions, which were at first general and moderate, became much more intense upon the left side, and were followed by deepening coma. I had the patient under observation for three years before his admission to the hospital, and I saw him in several of these attacks. About a year before admission he had one which was followed by complete left hemiplegia, with absence of reflexes on the affected side, and slight muscular rigidity; sensation and speech remaining normal. The hemiplegia lasted for three days, with gradual but complete recovery. Between the seizures the patient worked hard, but his family and friends complained that he was abnormally irritable, excitable, and morose. His memory was very slightly impaired. The urine was always normal. Heart and lungs normal. No evidence of atheroma, or of any disease of abdominal viscera. During the attacks the temperature sometimes rose to 100°, but never above. The patient at these periods always complained of severe general headache. Three days previous to admission to the hospital the patient was seized with convulsions more severe than usual, accompanied by cyanosis and involuntary evacuations. For twenty-four hours the seizures recurred about once an hour, and in the interims he was conscious. After this they recurred every ten or fifteen minutes, and he passed into deep coma. The left hemiplegia recurred after the first twenty-four hours of this final attack, and after twelve hours more it was followed by complete hemianæsthesia of the left side of body and face. The reflexes, particularly the plantar, were increased, especially upon the left side. There was also decided convulsive twitching of the left side of the face. Pupils normal. On admission to the hospital the temperature was 102°.

The convulsions did not return. The patient regained consciousness, but did not speak. The following day the heart-action suddenly became very feeble, and in a few hours the respirations were rapid and stertorous, œdema of the lungs ensued, the temperature rose to 105°, and two days after admission the patient died.

The autopsy revealed about a dozen gummy tumors, some larger, some smaller than a pea, which occupied the anterior and central parts of the right frontal lobe. Some of the tumors were quite superficial, others were deeply seated. Immediately around these growths the convolutions were pale and necrotic, with obliterating endarteritis and degeneration of the nerve cells. Nothing else of importance was detected.

I confess that I failed to diagnose this case. The possibility of traumatic epilepsy due to the pressure of a depressed fracture received from the injury six years before, occurred to me, but it could not be located, as the convulsions were at first general and there was no external evidence of violence. As the autopsy showed, no such condition had existed. Repeated hæmorrhages or irritation from emboli, for various reasons appeared equally out of consideration. It was late in life for idiopathic epilepsy to develop. The possibility of syphilitic tumor occurred to me, but I could get no history of venereal disease. The man had long been married, had a large family of perfectly healthy children and he appeared to be in remarkably sound physical condition. He was put upon various forms of treatment during the three years in which I had charge of the case, and was more relieved by large doses

of the bromides than by anything else. He was also given potassium iodide, but he felt so well in the intervals between his attacks, that it was difficult to enforce any plan of treatment, and he only reported to me when alarmed by some unusually vigorous seizure. If I had been certain of the existence of a gummy or other tumor, I should have located it much further back, in the motor area.

Case II.—C. T., negress, aged thirty years; married; housewife. The patient was well up to six years before admission. She denies alcoholic or syphilitic history, and a most careful examination fails to reveal any of the ordinary lesions or symptoms of the latter, excepting very slight enlargement of the cervical glands. Her several children died young. About six years ago the patient had for the first time an epileptiform convulsion which came suddenly, without apparent exciting cause. Similar attacks have since recurred at irregular intervals, gradually becoming more and more frequent, at first twice a week, and of late more often. The day before admission she had eight attacks. The seizures afterward recurred every fifteen or twenty minutes. At first the convulsions were general and involved all the limbs and body equally. Recently the right leg and arm have been more affected, and these have shown a certain amount of paralysis between the convulsions. Otherwise the patient's physical condition between the seizures was normal and she was going about until the time of admission, but she was rather dull and foolish mentally for a long time previously. On admission the attacks commenced on the right side of the body, and the head turned toward the right. Respiration was suspended during the seizures from spasm of the diaphragm. The convulsions, though very violent, did not last over

half a minute, and there was little cyanosis. Urine and fæces were retained. The patient's mind was dull between the attacks, but she responded to questions. No headache complained of. A diagnosis of probably gummy tumor was made, and the patient was given potassium iodide 75 grains *per diem*, and all the usual remedies for the control of the convulsions were tried without effect, such as potas sium bromide in 60-grain doses, chloral, amyl nitrite, etc. The urine contained a trace of albumin, but was otherwise normal. No aphasia or rigidity, and the reflexes were normal. During the seizures there was a low cry on inspiration, the facial muscles were involved, and the eyes were rolled upward and to the right; this was soon followed by tonic spasm of the muscles of all the limbs, and then by general clonic spasm with moderate opisthotonos. Thumbs strongly inverted. Pupils equal and normal. Temperature 100¾° to 101¾°.

The woman lived for thirty-six hours after admission. During the last night of her life she had nineteen convulsions despite every effort to relieve them. It was not justifiable to disturb her much, but in an interval between the seizures it was found that the patellar and plantar reflexes were diminished upon the right side. Pulmonary œdema developed and the patient died from heart-failure without spasm of the diaphragm. The convulsions continued until a few moments before death.

Autopsy.—General nutrition good. All the organs were normal, excepting the kidneys and brain. The kidneys showed the early stages of chronic diffuse nephritis. Brain normal, excepting left frontal lobe. Over the superior and middle frontal convolutions the pia was adherent and thickened, and contained about a dozen nodular gummy tumors, varying in size from a pea to a hazelnut, and with caseous cen-

tres. The convolutions beneath were somewhat softened, and contained a few similar nodules. The dura over the same region was thickened and adherent. The optic thalami and lenticular nuclei upon both sides seemed slightly more mottled than usual. The dura and pia were also thickened and adherent at the tip of the right frontal lobe, though there were no other lesions on this side.

I was able to make the diagnosis in this case merely from its extraordinary resemblance in nearly every important detail to the preceding one, which died a few months before. But the patient was seen too late for any relief from the large doses of potassium iodide which were administered.

Distinctive features common to Cases I. and II.

1. General irradiation of irritation from a local lesion.

2. Local lesion far in front of the common motor areas.

3. Entire absence of history or definite symptoms of syphilis.

4. Complete recovery between the attacks.

Case III.—The patient, a female, aged forty-seven years, had been operated upon in the Presbyterian Hospital one year previously for sarcoma of the right side of the neck. She made a good recovery, and was well until six weeks prior to her re-admission to the hospital on August 15, 1889. During this interval of six weeks she had suffered from severe headaches (not localized), followed by periods of stupor lasting a day or two at a time, the attacks becoming constantly more frequent and more severe. No lesions were discovered in the thoracic or abdo-

minal viscera. The patient could walk, but appeared weak and disinclined to stand. She seemed very listless and dull, and sensation in both legs was diminished and retarded. She had impaired articulation, which seemed likewise to be due to her mental dulness. At times she could think of certain words and pronounce them without difficulty; at other times she had apparently both amnesic and ataxic aphasia. She was of a race (Swedish) in which I have often noticed great apathy in any illness; she spoke English imperfectly, and therefore it was difficult to test her speech and sensation thoroughly. There were no unilateral nerve symptoms, and the pupils were normal in size and reaction. The patellar and plantar reflexes seemed equally diminished on both sides. The movements of the arms and hands were normal. No disturbance of the sphincters. The most pronounced symptom was the mental dulness. This condition lasted for sixteen days, with periods of lucidity in which the patient seemed fairly intelligent and answered questions without aphasia. The dulness then increased until complete coma resulted, with stertorous respiration, cyanosis, incontinence of urine, and total loss of sensation. A loud, harsh mitral systolic bruit developed, the pulse became rapid and feeble, the temperature rose from normal to 104°, and, on the nineteenth day after admission, she died from heart-failure. There was no emaciation, and no marked cachexia.

Autopsy.—There was nothing of importance in any of the organs excepting the brain. The calvarium was normal. Both the dura and pia were congested. There was atrophy of the convolutions over the vertex of both hemispheres. In the anterior portion of the right frontal lobe was a mass 4 by 3.5 centimetres in its diameters, black in color, and

quite firm. There was an excess of fluid in the left lateral ventricle. Weight of brain, 50 ounces. Vessels at the base were normal.

Microscopical examination.—Sections of the tumor of the right hemisphere show its structure to consist mainly of a fibrous connective-tissue stroma with small and large round cells in close association with the stroma. In places there are numerous alveoli. In some of these are found the above-described cells. The growth is a fibro-sarcoma. Tissue resembling non-striated muscle is seen in some portions of the tumor. The tumor also contains much pigment and numerous bloodvessels. No giant cells are observed. There are areas of a granular appearance which stain imperfectly.

The interesting features of this case are: first, the absence of unilateral or distinctly localized symptoms, with the presence of a cerebral tumor as large as a small egg; secondly, the varying mental condition of the patient. The diagnosis of a cerebral tumor was suggested by the mental condition and the patient's history of previous operation for malignant growth. If the situation of the tumor could have been exactly determined, it might have been removed by operation, as it was near enough to the surface. The tumors in the other cases could not have been excised, for they were too numerous, and some of them were too far from the surface. All three cases are interesting in regard to the periodicity which was noticed in the appearance of the symptoms.

The cases seem to add but little to our knowledge of the functions of the frontal lobe, but they confirm previous observations in regard to alterations in

temper and disposition, mental irritability associated with alternating stupor, which accompany lesions of this obscure region. The convulsions may have been due to indirect pressure upon the motor areas posterior to the tumors, which was periodically augmented, perhaps by temporary alterations in the local blood-supply, perhaps by the commencement of a new focus of growth, to which the cortical cells would later become accustomed.

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