

A CASE OF CEREBRAL TUMOUR.

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Tumour following injury, and causing paralysis of the left arm and leg, the latter just recovering from paralysis from the same injury; different paths for the conduction of heat and cold.

CASE.—J. C., æt. thirty-eight, a miner, was admitted into the surgical wards of the General Hospital, Nottingham, on account of loss of power in the left leg, supposed to be due to an injury to the hip by a fall of coal eleven weeks previously. As the paralysis was evidently not caused by any local condition of the leg, but was probably due to some affection of the central nervous system, the patient was transferred to my care on February 4th, 1890. So far as he knew he had been quite well, strong, and robust until the time of the accident. Though generally crushed, the patient was not aware of any injury to the head, and did not lose consciousness. There was no scalp wound. With the assistance of two companions he was able to rise after the accident, and walk some distance. For the first fortnight he was able to get up for a few minutes daily, but required assistance in getting in and out of bed. After that he was able to sit in an arm chair for some hours a day. About three weeks after the accident the leg began to "jump," and a week later a feeling of "pins and needles" gradually spread up the leg to the side of the trunk, and to the left arm. Pain commenced in the axilla, and passed down the inner side of the arm to the fingers. After a few days the pain in the upper part of the arm greatly diminished, and was chiefly localised in the fingers. He said the pain was very severe, and "as if the finger nails were being torn off." He gradually lost power in the arm. In about a week it became quite helpless, and has remained so ever since. At the same time he became subject to rhythmical movements of the head, which used to be moved from side to side. The movements continued for about five minutes, and recurred once or twice a day. The liability to these curious movements of the head gradually diminished, but they were noticed a few times after his admission. The left leg is

always everted, abducted, and semiflexed at the hip and knee joints. There appears to be paralysis of the adductors and internal rotators, and some over action of the opposing muscles, as the leg cannot be placed quite in the normal position. There is much loss of power, but not complete paralysis. When he stands on the right leg the left drops nearly into the normal position, but he can bear no weight upon it. There is no pain in it.

Superficial Reflexes.—The plantar and cremasteric reflexes were brisk and equal on the two sides; the abdominal and epigastric reflexes good.

Deep Reflexes.—The knee-jerks were active and equal on both sides. There was an Achilles jerk on the left, but none on the right; no ankle clonus. Triceps jerk on the left, none on the right; thumb jerk equal on both sides; jaw jerk could not be obtained.

Sensation.—Common sensation was diminished in the left leg generally, but he could feel a firm touch. The contrast with the right leg was very marked. In the left arm common sensation was still more diminished: he could not feel the light touch of a feather at all, and firm pressure on the upper arm was undetected when his attention was at all distracted. Sensation on the right side was unimpaired. On the left side of the neck sensation was slightly deficient. The sensation to pain was more diminished than common sensation in the same areas, but was not absent.

Heat and Cold.—The test was carried out with test tubes filled with water at 45° F. and 150° F., and the patient's eyes were covered. In the left leg he was always correct about the cold tube, which seemed to cause discomfort and made him jump. But usually he could not tell whether the hot tube was warm or cold, although it was hotter than he could bear on the right leg. In the arm the same differences were more marked, and in the axilla he persistently called the warm tube cold. In the neck there was also great diminution in the perception of heat. Over the whole of the right side the sensations were normal. When the hot tube was placed in the left axilla the elbow joint was spontaneously flexed, although he was quite unable to make any voluntary movement, except to a very restricted extent at the shoulder joint. Such involuntary movements in paralysed parts are occasionally observed, and resemble the preservation of emotional movements of the face in hemiplegia, and the utterance of emotional words in aphasia.

The left leg seemed shortened, but careful measurements

showed that this was not so. Neither was there any evidence of dislocation or fracture. No localised muscular wasting was detected; no difficulty in swallowing; no definite facial paralysis, but some slight weakness of the left side. The speech was always thick, but was not apparently altered by the illness. He had complete control over the rectum, and nearly complete over the bladder, but passed water into the bed a few times.

There was no paralysis of the ocular muscles, but the right pupil was contracted, oval and fixed. The left was about the size of a No. 4 catheter, and reacted both to light and accommodation. There was no hemianopia and no optic neuritis at this time. The tongue was protruded straight.

Electrical Reactions.—All the muscles of the left arm contracted moderately to faradism. In the left thigh the extensors contracted well, but the flexors, adductors, and all the muscles below the knee reacted very poorly when compared with those of the right side.

In about a week the arm had improved so that he could abduct it nearly to the level of the shoulder. He could not pronate the forearm or move the fingers or wrist.

On February 10th his temperature had begun to rise, and he complained of frontal headache with pain passing horizontally round the head, but worse on the right side. He frequently vomited. There was now some anæsthesia and definite muscular weakness on the left side of the face. Taste was lost on both sides and he could not distinguish salt from sugar.

February 14th.—Temperature normal again; mentally confused; vomiting continues; facial paralysis increased; can move tongue freely to right but not to the left. He answers questions after a long time, but correctly.

February 16th.—Optic neuritis commencing.

February 24th.—Optic neuritis rapidly advanced; vessels covered and margins of discs quite obscured. He has some difficulty in swallowing solid food. Holds fluids in the mouth for a long time before swallowing.

February 26th.—No paralysis of the right arm, but very distinct enfeeblement of the right leg. Cannot turn the head to the left. Left facial paralysis increased. Never speaks except in reply to questions, and then after a long pause. No convulsions, but slight nocturnal delirium.

Died March 4th.

At the inspection fourteen hours after death the skull cup was somewhat sclerosed, the superior longitudinal sinus was empty,

and the other sinuses contained recent black clot. The cerebral veins contained fluid blood. There was no excess of arachnoid fluid, but over the excavation to be presently described, in the left temporo-sphenoidal lobe was a layer of lymph, or decolourised blood clot, about $\frac{1}{8}$ of an inch thick, and in area about 3 inches by 2. It was not adherent to the pia mater. The pia mater was everywhere rather adherent and difficult to remove without tearing the brain substance. In the third quarter from before backwards of the middle left temporo-sphenoidal convolution was a sharply punched-out excavation, irregular in shape, about $1\frac{3}{4}$

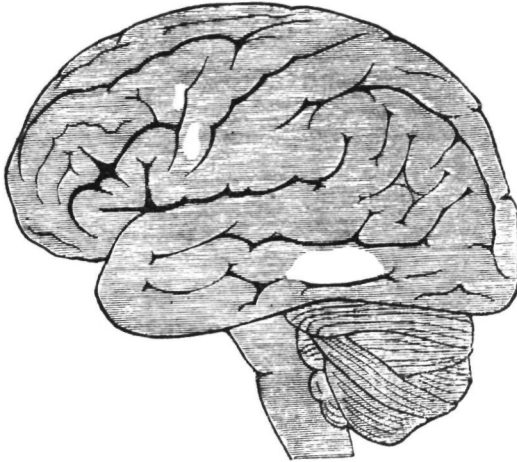


FIG. 1.

The light areas indicate the position of the superficial excavations.

inches by 1 in area, and $\frac{1}{8}$ of an inch deep, with pale base and yellow margins (? stained with blood pigment). Two similar but smaller erosions were discovered, one in the posterior part of the left second frontal convolution, and the other in the lower part of the left ascending frontal (fig. 1). After the membranes had been removed a dark-coloured tumour was discovered at the vertex occupying the upper end of the right ascending frontal convolution, and the posterior extremity of the superior frontal, bulging slightly, firm to the touch, and about $1\frac{1}{2}$ inches by 1 inch in size (fig. 2). The dura mater was not adherent to it. On the median aspect it occupied the greater part of the paracentral lobule. The anterior portion of the gyrus fornicatus was bulging, but not

discoloured (fig 3). No new growth was eventually found in this latter place. The right ascending frontal convolution was in its

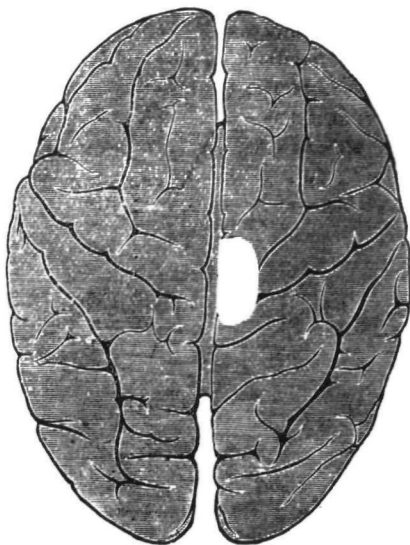


FIG. 2.

whole length nearly twice as broad as usual, viz., $1\frac{1}{4}$ inches to $1\frac{1}{2}$ inches. The brain was hardened in Müller's Fluid for subsequent

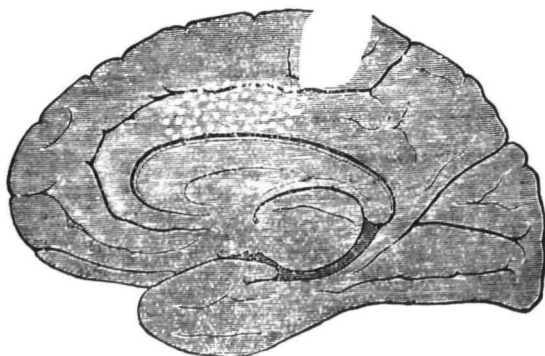


FIG. 3.

The light area indicates the position of the tumour; the dotted area the bulging of the gyrus fornicatus.

examination. The other viscera were normal. The spinal cord was removed, hardened in Müller's Fluid, and careful examination

revealed no abnormality. There was no dislocation, and there had been no fracture of the left femur.

Eight vertical tranverse sections of the hardened brain were made, as recommended by Professor Hamilton. In the lower part of the right ascending frontal convolution a small area of sub-cortical gelatinous softening was found. In the fifth, sixth, seventh and eighth sections the tumour was found irregular in outline and occupying the positions marked in the diagrams (figs. 4, 5, 6). There was no trace of a capsule, and no defined limit. The section of the tumour was pale in the centre, and was surrounded by a

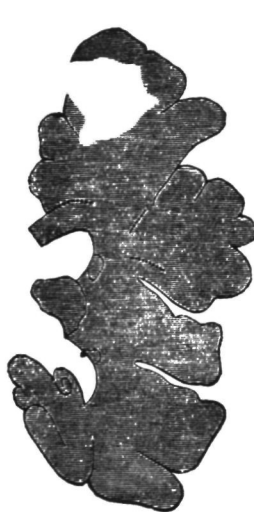


FIG. 4.



FIG. 5.

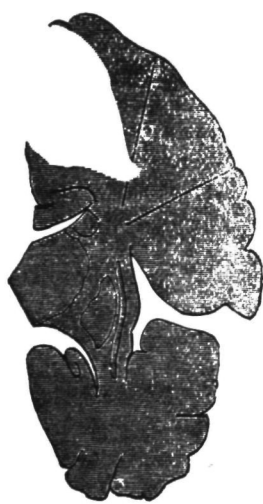


FIG. 6.

dark zone which was partly hæmorrhagic. It hardly extended so far as the internal capsule. On microscopical examination of the hardened tumour, it was found to be an angio-sarcoma. There was an abundance of small round cells, some small spindle cells, and a few large round oval nucleated cells. The intercellular substance was scanty and granular and in some places fibrillated. The blood vessels were very numerous, of large size, and with greatly thickened hyaline walls. There were numerous small hæmorrhages, and several areas of degeneration. Many portions seemed infiltrated with threads of fibrine. There were no cells with processes.

The chief point of physiological interest is the support this case gives to the opinion, which now receives a very general acceptance, that there exist different paths for the conduction of the sensations of heat and of cold. In this case the sensibility to heat was greatly impaired, whereas that to cold was, if anything, rendered more acute. Although the tumour did not involve the falciform lobe (gyrus fornicatus) the distinct bulging represented in fig. 3 indicates that pressure effects extended so far. On the mesial aspect the tumour was limited to the paracentral lobule, and did not extend sufficiently far forward to involve, unless indirectly, the area in which the trunk muscles are said to be represented. During life no paralysis of the trunk muscles was noticed, but such a condition is easily overlooked. It is to be noted that the patient usually lay on the right (unparalysed) side, and that at one stage he complained much of pain and numbness in the lower part of the left axilla. The widening of the left ascending frontal convolution was probably of the same nature as the bulging of the gyrus fornicatus, and due to expansion from the pressure of the adjacent tumour. The enfeeblement of the right leg, noticed on February 26th, is not easily explained except on the hypothesis of Broadbent, that parts which are accustomed to act bilaterally are largely represented on both sides of the cerebrum. We must suppose that the right leg was paralysed only so far as it was innervated from the right hemisphere. The superficial cortical lesions in the left ascending frontal and left middle frontal convolutions may have increased the thickness of speech. No effects could be traced to the extensive lesion in the left middle temporo-sphenoidal convolution.

It is difficult to say whether or not this was an instance of a cerebral tumour following and arising in consequence of an injury. If not, the coincidence was very remarkable. The sarcomata are *par excellence* the class of tumours that are apt to arise from injury. Unquestionably the man was quite well so far as he knew, and able to do laborious work up to the date of the accident. He *at once* lost most of the power of the left leg and four to five weeks later further paralysis of undoubted cerebral origin came on. At the end of eighteen weeks death ensued, and a tumour was found. It is not unlikely that the primary loss of power in the left leg was due to a hæmorrhage caused by the accident, and the subsequent paralysis to the growth of the tumour in the injured tissues.

When the patient arrived in the hospital, eleven weeks after the injury, it was for a moment thought possible that the paralysis might be due to neuritis from the injury; but in addi-

tion to the presence of the knee-jerk, and the slight alterations in the electrical reactions, the difficulty of explaining the spread of the neuritis upwards through the cord to the upper extremity seemed insuperable. The affection of the arm and face made some form of cerebral disease almost certain, and the development of optic neuritis removed any possible doubt. But I have seen so many cases of severe optic neuritis in cerebral cases, which ended in recovery, that I am unable to accept even an intense neuritis as conclusive of tumour.

In the above case, even with the light thrown upon it after the fatal event, it still remains difficult to correctly apportion the different symptoms to their causes. It was at one time thought that there might be thrombosis of the venous sinuses or cerebral veins, which would have been favoured by the extensive bruising and blood extravasation at the time of the injury. This was found not to be the case, but the erosions on the left side of the brain were evidently of vascular origin, and due either to superficial hæmorrhages, or more probably to sharply localised thrombosis in the superficial vessels. The temporary pyrexia was probably due to the slight meningitis, which was not restricted to the immediate proximity of the tumour. The numerous small hæmorrhages in the tumour did not apparently produce any recognisable symptoms, as the patient presented no sudden variations such as are not uncommon when vascular tumours repeatedly bleed. Although it was felt that the whole of the symptoms were not explicable by the presence of a single tumour, and that the existence of meningitis was almost certain, none the less the great probability that the paralysis was due to tumour was fully accepted. But the total absence of local convulsion rendered it so improbable that the tumour was cortical that no operation was suggested. The extent to which the mesial aspect of the brain was involved showed that removal would have been difficult. The coarse movements at the shoulder and hip joints were very much less affected than the finer movements at the more distant joints. The strange inability to adduct or invert the left thigh was never satisfactorily explained, but there was certainly no physical condition of the joint to prevent it.

The gradual creeping of altered sensations from the axilla down the arm, and the subsequent severe pain in the fingers, both preceding the paralysis, suggest that sensation is represented in the motor area of the cerebral cortex. The absence of hemianopia excluded the likelihood of the lesion being seated in the internal capsule near the "sensory crossway."