

A CASE OF CEREBRAL TUMOUR; OPERATION; RECOVERY.

By HUGH SMITH, M.D. LOND.,

HONORARY VISITING PHYSICIAN TO THE SOMERSET HOSPITAL, CAPE TOWN.

With a Note on the Operation by C. C. ELLIOTT, M.D., B.S. Lond., Honorary Visiting Surgeon to the Hospital.

THE patient, a married woman, aged 44 years, a European, first consulted me on Sept. 7th, 1905, for pains in the head. The previous history revealed nothing of importance. She had always had good health and there was no suspicion of syphilis or tuberculosis. There was no history of tuberculosis or of insanity or fits in her family. For three weeks she had suffered from almost continuous headache in the left frontal and supraorbital region, with frequent exacerbations of an acute neuralgic character, also from occasional vomiting which occurred irregularly day or night without definite relation to the taking of food and unaccompanied by nausea or retching. For the last four or five days there had been weakness of the right arm and hand and some difficulty in expressing herself clearly in speech. Upon further inquiry her husband stated that her memory had been defective for some months past and that she was becoming increasingly listless and apathetic. There had never been any fits or localised convulsions and there was no history of injury to the head or of discharge from the ears or nose.

On examination the patient's expression and manner were dull and lethargic. She appeared to have difficulty in fully understanding questions and answered slowly and with hesitation. There was no true aphasia—sensory or motor. The right arm and hand were decidedly paretic. The grasp was weaker than on the left side, but she could pick up a pin, button and unbutton her dress, &c., and indeed execute all movements of the limb—although weakly—with the exception that she was quite unable to write. (The patient is right-handed.) The right leg was somewhat weaker than the left and there was slight paresis of the right side of the mouth. The tongue was protruded in the middle line. The ocular movements were normal; the pupils were equal, of moderate size, and reacted to light and during accommodation. Vision did not seem to be impaired. Ophthalmoscopic examination of the fundi revealed double optic neuritis. The knee-jerks were exaggerated, especially the right; there was no ankle clonus and the plantar reflexes were indefinite in type. Pressure over the left frontal and temporal regions caused tenderness and pain. There was no evidence of disease of the ears or nose. The urine was free from albumin and sugar. All the thoracic and abdominal viscera appeared to be normal. The temperature was 97.5° F. and the pulse was 54. The appetite was good but the bowels were very constipated. A diagnosis of intracranial tumour was made and on Sept. 12th I took the patient into the Somerset Hospital.

Progress of the case.—Some temporary partial relief of headache and vomiting occurred under treatment with iodide and bromide of potassium and regulation of the bowels by means of white mixture. The bromide was gradually lessened and discontinued; at the same time the iodide was rapidly increased until 30 grains four times a day were being taken. In spite of treatment the case speedily developed. The optic neuritis increased, with much exudation and swelling, and numerous hæmorrhages—especially in the left eye. This was verified by Dr. D. J. Wood, ophthalmic surgeon to the hospital, who kindly examined the fundi on several occasions. Inequality of the pupils occurred, the right being larger than the left, and their reaction to light became sluggish. Vision gradually became impaired as the optic neuritis developed. On Sept. 27th some weakness of the right external rectus was noticed, and on protrusion the tongue deviated to the right although it could be moved to right or left at will. The facial weakness increased, as also did that of the right upper extremity. The dynamometer, which on admission had registered 13, now only marked 6; while the grasp of the left hand declined from 19 to 13. The paralysis, however, was never complete. With the exception of writing all movements could be carried out, although weakly and with difficulty.

The paresis of the right lower extremity also increased and she became unable to stand unsupported. The knee-jerks became very exaggerated, especially the right, and ankle clonus appeared on that side. Babinski's sign was now present on both sides and Kernig's sign could be elicited.

The mental stupor steadily deepened, with marked somnolence, and it became increasingly difficult to obtain answers to questions or to hold the attention of the patient. Finally, the evacuations were passed in bed without control and apparently without consciousness. The headache and pain in the frontal area persisted and pain was also complained of in the upper cervical and cerebellar region on the left side. Marked tenderness was noticed over a small area in this locality a little behind the mastoid process as well as in that previously noted. Vomiting still occurred occasionally. There was no vertigo. Hearing remained good on both sides; the membrana tympani was normal. Smell and taste were unaffected. There were no ptosis or proptosis, no nystagmus, and no hemianopia. The auditory and visual word centres were not affected and there was no motor aphasia. At no time could any defect of sensation be detected and no epileptiform or other convulsions, tremors, &c., ever occurred. There was no deviation of the head or the eyes to either side. The heart was several times auscultated but no bruit was heard. The temperature varied between 97° and 99°; the pulse usually ranged from 60 to 70 and was regular; and the respirations were about 20. There was no disturbance of phonation or deglutition.

Localisation of the tumour.—The diagnosis of intracranial tumour being clear it remained to determine, if possible, its nature and exact position. Tuberculous and syphilitic growths seemed to be excluded by the negative history, the absence of evidence of these diseases in other organs, the absence of indications of multiple lesions of the brain, and, in the case of syphilis, by the non-improvement under the treatment. The rapid development of the case, on the other hand, pointed to malignant growth—glioma or sarcoma—or possibly to cyst. The paresis of the right side, affecting ultimately the arm, the leg, the face, the tongue, and the eye, indicated a lesion on the left side of the brain involving, directly or indirectly, some part of the motor tract. The wide distribution of the paresis and its comparatively mild degree, together with the absence throughout of epileptiform seizures, seemed to exclude the Rolandic cortex, a tumour of which, even if unattended by convulsions, would produce a monoplegia rather than a hemiplegia, or if ultimately involving the whole of one side would probably cause very pronounced paralysis of the part first affected before spreading to others.

The onset of the case with mental symptoms (dulness, apathy, loss of memory) and their predominance throughout, compared with the localising signs (right-sided paresis), seemed to point to tumour of the left frontal lobe with indirect pressure on the motor tract, and the absence of convulsions made it probable that the growth itself was sub-cortical. The paralysis having affected chiefly the arm and the leg indicated a lesion of the upper convolutions, while the actual onset of the paresis in the arm and hand and the complete inability to perform any of the movements of writing (motor agraphia) led me to localise the tumour at the posterior end of the second or middle frontal convolution just in front of the precentral sulcus—that is, in the position assigned by Exner and others to the cheiro-kinæsthetic centre.

Other possible sites of a tumour from which direct or indirect pressure might be exerted on some part of the motor tract, causing hemiparesis, were eliminated, or at least rendered improbable, from various considerations. Thus, the inferior frontal convolution—from absence of motor aphasia and from the slight degree of paresis of the face and tongue, the complex fine movements of which would readily be destroyed by comparatively little pressure; the orbital surface of the frontal lobe—from the integrity of the sense of smell, the absence of proptosis, unilateral blindness, &c.; the parietal lobe—from the absence of word blindness and hemianopia, and of sensory defect; the temporo-sphenoidal lobe—from the absence of word deafness and of defect of smell or taste; the occipital lobe—from the non-interference with vision; the internal capsule—from the relatively mild degree of motor paralysis compared with the rapidly deepening stupor and increasing optic neuritis and from the absence of sensory defect; the crus cerebri and pons—for the same reasons and from the absence of alternating or crossed paralysis; the medulla oblongata—from the absence

of disturbance of respiration and circulation, or impairment of articulation, phonation, or deglutition; and the cerebellum—from the absence of vertigo, tremors, and the cerebellar type of ataxia.

As the patient's condition was rapidly growing worse in spite of three weeks' treatment with iodide of potassium, it was considered advisable to trephine at the supposed site of the lesion without further delay. Even if the tumour were not found or could not be removed some temporary relief would be afforded from the excessive and rapidly increasing intracranial pressure. On Oct. 1st the positions of the Rolandic and precentral sulci, the superior and inferior frontal sulci, and the bifurcation of the fissure of Sylvius were marked on the shaven scalp. It was then noticed that one of the tender pressure spots of the scalp exactly coincided with the site chosen for trephining, although this region was less tender than the area behind the mastoid process on the same side. On the following day my surgical colleague, Dr. Elliott, operated and removed the tumour and I am indebted to him for the appended surgical note. The tumour was situated over the posterior two-fifths of the middle frontal convolution and the adjacent part of the superior convolution. It was of fairly firm consistence and roughly hemispherical in shape. The more rounded under surface was separated by a thin but definite capsule from the subjacent compressed cortex on which it lay. The upper and outer surface in contact with the dura mater—from which structure it seemed to be growing—was circular in outline and measured two inches in diameter. The depth of the tumour was one and a half inches and its circumference just over six inches. There had been hæmorrhage into it near its surface and the dura mater over it was very hyperæmic and adherent. On section it was found to be a mixed, spindle- and round-celled, sarcoma.

After-progress.—The operation was performed at 11 A.M. on Oct. 2nd and the patient was in a very collapsed state at its conclusion. At 5 P.M. she suddenly called out, the eyes became fixed and staring, and the teeth clenched. The head was turned to the right; the limbs were not affected. This fit lasted about one minute and had ceased before the arrival of the resident medical officer. There was no subsequent recurrence of convulsions. For a day or two the patient wandered mentally and the pulse was very frequent (120); but the mental condition rapidly improved, she became brighter and less somnolent, and answered questions readily and intelligently. No vomiting occurred after recovery from the anæsthetic. On Oct. 3rd the power of the right hand noticeably improved and the facial paresis was less marked. On the 5th the dynamometer registered 8 with the right hand and 21 with the left. The knee-jerks were less exaggerated and the ankle-clonus had disappeared. The right external rectus could move the cornea outwards to the external canthus: the tongue was protruded in the middle line. She was able to write her name, although not without mistakes, thus "Mary" was written "Marry." On the 6th the dynamometer registered 16 with the right and 18 with the left hand. There was no appreciable change in the condition of the fundi. On the 10th the facial paresis had practically disappeared and the movements of the eye and tongue were normal. The mental condition had much improved and was indeed quite satisfactory. The inequality of the pupils persisted. On the 12th Mr. Donald Gunn, acting for Dr. Wood, kindly examined the fundi and made the following note: "There is double optic neuritis much more marked in the right than in the left eye, probably subsiding in both. By the direct method I estimate the apex of the papilla as + 6 D. in the right and + 5 D. in the left; the swelling, however, is much less than this, as there is general hypermetropia of from 3 D. to 4 D. (according to the meridian chosen) in each eye. Right eye: The margin of the disc is obscured by the swelling, the base of which fades away into the retina in a corona of streaks of retinal infiltration and radially-placed linear hæmorrhages. Left eye: The edge of the disc is visible. There are a few hæmorrhages above and below it with some fine retino-choroidal changes but no areas of exudation. The vessels in this eye are about normal in size."

On Oct. 13th the dynamometer registered—right, 20; left, 23. The pupils were equal. The knee-jerks were very little exaggerated and were equal on the two sides. On the 17th there was still slight tenderness in the left cerebellar region. On the 20th the patient was allowed out of bed. On the 24th she could walk quite well and she was able to write her name correctly. The dynamometer registered 23 with

either hand. The tenderness in the cerebellar region had disappeared. On Nov. 2nd Mr. Gunn noted that "the neuritis was definitely lessening, that the hæmorrhages had disappeared from the right fundus, and that the margin of that disc was beginning to show at the outer side. In the left eye, though the disc was clearly defined and there was no swelling of the nerve, hæmorrhages were noted below the disc." On the 11th, the wound having practically healed and an aluminium plate having been fitted over the trephined area, the patient left the hospital feeling perfectly well. The paresis had quite disappeared and the mental condition was entirely satisfactory.

The patient came at intervals to report progress. When last seen on Dec. 12th the wound was soundly healed and there was no bulging. No trace of paresis remained. She wrote her name, &c., with facility. The tendon reflexes were normal or possibly a little increased. Her mental condition appeared to be perfectly normal. She answered questions readily and intelligently and seemed keenly interested in her affairs. When questioned she stated that she remembered little or nothing of her stay in hospital prior to being allowed out of bed. Her memory, however, was now quite good again. She had remained free from headache, tenderness of the scalp, and vomiting. She said that she felt "perfectly well."

Mr. Gunn kindly examined the fundi again on this date (Dec. 12th) and I am greatly indebted to him for the following, as well as for the previous, notes. "Under hom-atropine—

Right: with $\begin{array}{l} + 4 \text{ D. sph.} \\ + 1 \text{ D. cyl.} \end{array} / 70^\circ. \text{ V.} = \frac{2}{3} \text{ partly.}$
 Left: with $\begin{array}{l} + 3 \text{ D. sph.} \\ + 1 \text{ D. cyl.} \end{array} \backslash 80^\circ. \text{ V.} = \frac{2}{3}.$

Right eye: The optic disc is almost clear, being only slightly blurred by the grey striation of the overlying nerve fibres. There is no swelling. The vessels are almost normal in size and, except for some short kinks in the veins, have almost normal curves. There are some fine pigmentary changes both about the yellow spot and in the periphery, and one or two flat pale patches that probably represent former hæmorrhages. Left eye: there is incomplete optic atrophy but not much evidence in the disc itself of a past neuritis. The thicker layers of nerve fibres form a gauzy veil in front of an optic disc which has too hard an edge and too sharp a colour contrast with the surrounding retina. There are fine changes about the yellow spot and in the periphery as in the right eye. Below the disc there are still innumerable fine red brown spots, probably the remains of the hæmorrhages. The vessels are, if anything, below the normal size."

Remarks.—According to a recent estimate only 3.3 per cent. of all cerebral tumours are operable. The successful removal of one of these growths is therefore of sufficient rarity and interest to merit publication. Sarcoma, which occurs in about 20 per cent. of all cases, is "the form of tumour most easily extracted from the skull and the majority of the successful cases of removal of brain tumour have been sarcoma; . . . of 72 cases of sarcoma removed 52 recovered and 20 died" (Starr). In the present instance the tumour was on the surface, was encapsuled, and was readily removed by the finger. There seems, therefore, a very fair chance of the recovery being permanent. The rapid progress of this case is very striking, being, indeed, suggestive of abscess rather than of tumour; but against the former diagnosis were the unusual site of the lesion and the absence of discoverable cause of suppuration—such as injury, disease of the nose or ear or of bone.

The association of apparently complete agraphia with the presence of a tumour at the site assigned by many writers to the cheiro-kinæsthetic centre is a point of very great interest. In some cases of growth in this region reported by Starr and McBurney deviation of the head and eyes was noticed. In the present instance no such deviation was present except during the fit which occurred a few hours after the operation. The absence of convulsions, local or general, throughout the case (with this solitary exception) is worthy of notice in connexion with a tumour of the cortex so nearly adjacent to the motor area. Tenderness of the scalp to pressure and percussion was of very little localising value in this case. It is true that one such tender spot coincided with the actual site of the lesion, but equally or more tender areas were found in the prefrontal and cerebellar regions of the same side.

In conclusion I would draw attention to a point on which there appear to be some inexactness and uncertainty. As a preliminary to many operations upon the brain for tumour, abscess, Jacksonian epilepsy, &c., it is necessary to mark on the scalp the position of the chief fissures of the motor area of the cortex and especially of the fissure of Rolando. In text-books of operative surgery the upper end of this important fissure is said to be in the median antero-posterior line five centimetres—i.e., two inches—behind the "bregma." Unfortunately, however, this latter term is used differently by different authors, for while in Jacobson's "Operations on Surgery" and in most anatomical text-books the name "bregma" is given to the point of junction of the coronal and sagittal sutures, in Cheyne and Burghard's "Surgical Treatment," Part 5, the term is applied to a point midway between the glabella and the external occipital protuberance. Now in most skulls this midway point will be found to lie about one and a half inches behind the coronal suture and therefore there will be a corresponding difference in the position assigned to the Rolandic fissure according as we follow Jacobson's or Cheyne and Burghard's directions. As a matter of fact, the upper end of the fissure of Rolando lies two inches behind the coronal suture and therefore only half an inch behind the point midway between the glabella and the external occipital protuberance. That this is its exact position may be verified by another method of localisation—namely, by Reid's method of drawing a base line from the lower edge of the orbit backwards through the centre of the external auditory meatus and a second line at the posterior border of the mastoid process at right angles to the first. Where this second line intersects the median line of the vertex lies the upper end of the fissure of Rolando and

FIG. 1.

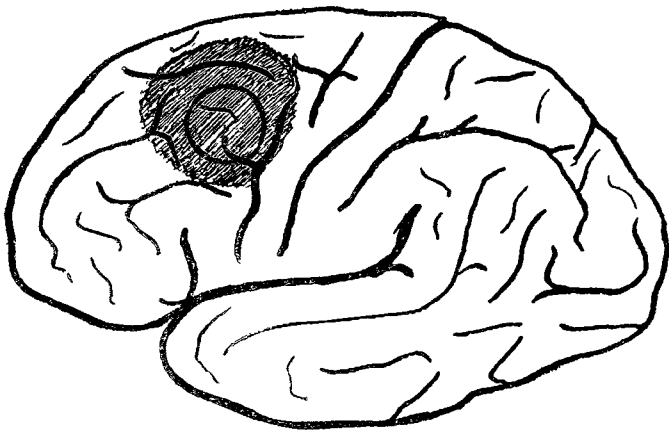
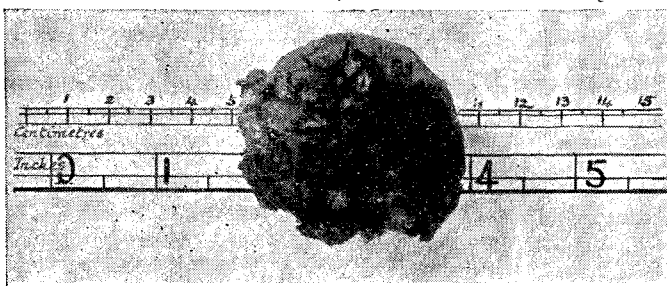


Diagram showing the situation and extent of the tumour and the relative position of the trephine hole.

it will be found to correspond with the position assigned to it by the former method. As in practice we have to deal not with the bare skull but with the living scalp-covered cranium on which it is not always easy to make out the position of sutures and fontanelles, it would seem advisable to leave the term "bregma" to the anatomists and to determine the position of the fissure of Rolando by actual measurement with reference to the point midway between the glabella and the external occipital protuberance, verifying the result by Reid's method.

FIG. 2.



View of upper and outer surface of the tumour, photographed upon a scale to show size.

For the photographs of the tumour from which the accompanying figures have been reproduced and also for a report

on its histological characters I am indebted to the kindness of Mr. G. W. Robertson, Government bacteriologist.

Surgical note by Dr. ELLIOTT.—The operation was performed on Oct. 2nd. A semi-circular flap was turned up and a large trephine hole was made over the posterior third of the mid-frontal convolution in front of the precentral sulcus on the left side. There was considerable pressure beneath the dura mater. Beneath it was found a tumour, smooth and fairly firm, pressing upon subjacent cerebral tissue. A considerable portion of bone was removed in order to get at the tumour thoroughly, which was then shelled out easily. It was of about the size of a goose's egg and its removal left a large depression which, however, partially filled up by advancing cerebral substance even before the operation was concluded. There was a considerable amount of hæmorrhage. The wound was lightly plugged with gauze and most of the skin was brought together with sutures.

The patient was put back to bed with a very small, feeble pulse, but by next morning had recovered largely from the shock. On the 3rd the outer dressing was changed. On the 5th the plug was removed and a small one was re-inserted. The brain was expanding well and pulsation was quite evident under the operation flap. There was at first some appearance of hernia cerebri occurring but this danger was averted and the wound healed well after removal of the plug, with no rise of temperature or other bad symptom surgically. An aluminium cap was fitted over the area of the wound as a considerable portion of the skull had been removed.

Cape Town.

ON THE SPECIFIC NATURE OF THE SPIROCHÆTA OF THE AFRICAN TICK FEVER.

BY ANTON BREINL, M.D.,

ASSISTANT LECTURER IN TROPICAL MEDICINE.

(From the Runcorn Research Laboratories of the Liverpool School of Tropical Medicine.)

FURTHER studies of the spirochætæ of the African tick fever, brought home by Dr. J. L. Todd from the Congo Free State, have now been conducted. Through the kindness of Dr. Norris¹ and Dr. Terry, to whom I express my great indebtedness, we were able to compare the African strain with one derived from a case of relapsing fever in New York. This was identified by Novy² as spirochæta *Obermeieri* and in this note will be called "O" strain.

A short preliminary report³ on the animal reactions of the spirochæta of the African tick fever was published from these research laboratories. Further inoculations were made in monkeys. Some species—e.g., *Macacus rhesus*, *Cercopithecus*—survived the infection and have apparently recovered, since tame mice and rats, in our experience the animals the most susceptible to the African spirochæta, inoculated with large amounts of the monkeys' blood, did not become infected.

A large *Cercopithecus* (Experiment 1015) was inoculated on Jan. 15th. It passed through the ordinary course of the infection, had two relapses, and after Feb. 15th no spirochætæ were seen in spite of twice-daily examinations by the thick-film method. It was re-inoculated on April 2nd and on the 5th a rise of temperature was noted from 102° to 105° F., but in spite of most careful examination no spirochætæ could be seen. A white rat sub-inoculated on the 5th did not become infected. The second re-inoculation of the monkey on May 5th was not followed by even a rise of temperature. A second "Sooty" monkey of the same species followed a similar course.

A *Macacus rhesus* was infected through tick bites. It had

¹ Norris: A case of Spirochætal Infection in Man, Proceedings of the New York Pathological Society, No. 4-8, p. 93. Preliminary Communication upon a Spirochætal Infection of White Rats, &c., *Loc. cit.*, p. 162 ff.

² Novy and Knapp: Spirochæta *Obermeieri*, Journal of the American Medical Association, Jan. 13th, 1906.

³ Breinl and Kinghorn: Observations on the Animal Reactions of the Spirochæta of the African Tick Fever, THE LANCET, March 10th, 1906, p. 668.