

protoplasm. Large rudimentary blood vessels are seen to the left of the field. The examination of many fields showed that the tumour, as a whole, was highly vascular, but that the blood vessels tended to occur in groups, being very plentiful in places, and less so in others. In the figure there are also two irregular bands of fibrous tissue, one in the upper and one in the lower part of the field. A granular or rudimentary fibrous matrix, scanty in quantity, is present in places between the cells. The appearances thus shown are fairly representative of the major parts of the growths, where degeneration or hæmorrhage or necrosis has not set in. These latter stain badly or not at all. There are other parts more purely cellular, and others much more fibrous, probably younger and older respectively. In the latter, which collectively form a small part of the whole, the fibrous tissue is mostly collected in fairly well formed alveoli, in which the cells lie. These latter, however, have not changed their characters much, if any; still the resemblance in general arrangement to the structure of a carcinoma is so great, that it misled several experienced histologists to whom I showed it, until they had examined the other part of the sections. I am clearly of opinion that the growth is a sarcoma of the round-celled type, and not a cancer, and that the variations in structure which it shows are the outcome of an attempt at a reproduction of the arrangement natural to suprarenal tissue. This large, soft, vascular, and hæmorrhagic sarcoma is the form most frequently seen in this situation, and is the commonest of the rarely-occurring class of malignant tumours of the suprarenal capsules. The further discussion of this, and other interesting questions connected therewith, I hope to deal with on another occasion.

#### DESCRIPTION OF PLATE V.

- FIG. 1.—The dome-shaped upper surface of the liver has been removed, and the suprarenals and kidneys vertically divided. The large, perfectly encapsulated primary growth of the right suprarenal and the secondary nodules infiltrating liver and left suprarenal are seen. (From a photograph.)
- FIG. 2.—From a photomicrograph of a margin of a nodule, showing tumour below and suprarenal tissue above. ( $\times 50$ .)
- FIG. 3.—From a photomicrograph of a part of the primary growth. ( $\times 250$ .)

### JACKSONIAN EPILEPSY DUE TO CEREBRAL ABSCESS FOLLOWING UPON TYPHOID FEVER.

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THE case of which I give a detailed account is, I think, of considerable interest for four reasons—(1) With regard to the probable causation of the abscess; (2) with regard to its position; (3) with regard to the difficulty of making a correct diagnosis; (4) with regard to the success of the treatment adopted.

Taking these points in order, I believe I am right in stating that no case of abscess of the brain has yet been recorded which has followed apparently upon an attack of typhoid fever. In all the books that I have referred to, the causes are given under three headings—(1) Trauma; (2) Middle ear disease; (3) Septic processes, such as general pyæmia, bronchiectasis, and gangrene of the lung. Osler mentions, indeed, that abscess of the brain may follow the specific fevers, but records no instance that has come under his notice. As will be seen from a perusal of the case following, the nervous symptoms of which the patient complained occurred towards the end of the time she was being treated in hospital for typhoid fever. Presumably, then, some pyogenic organisms, staphylococci in this particular case, gained access to the system by means of the intestinal ulcerations, and were deposited in the brain, becoming foci for the abscess which resulted. Apparently active for some time towards the end of the fever, they became passive as convalescence progressed, and were only awakened into fresh energy by some lowering of the patient's general health, or by some exciting cause which is unknown to us. Certain it is that the patient had never received an injury, and equally certain that she had neither middle ear disease nor any other septic process that could be detected.

Secondly, with regard to the position of the abscess, it was situated in the Rolandic area of the right side affecting the centres for shoulder, arm, and hand, thigh, leg, and foot, and neck and face; in short, it extended practically all over the ascending parietal and ascending frontal convolutions, involving the upper, middle, and lower thirds of the motor area. The point of origin—the so-called signal symptom—lay in all probability in the middle third. This is undoubtedly an uncommon position for an abscess of the brain, and added considerably to the difficulties of diagnosis. Suppuration most frequently occurs in the temporo-sphenoidal lobes, next most commonly in the cerebellum, and then in the lateral sinuses. In the table drawn up by Ballance, giving the chief guides to reach the various points where abscesses may collect, no mention is made of an abscess occurring in the motor areas of the cortex cerebri.

Thirdly, no difficulty was experienced in coming to a diagnosis as to where the lesion existed, but it was not so easy to determine its exact nature. The symptoms left no room for any doubt but that its position was in the left motor area of the cortex of the brain, since they were purely motor in character, no affection of sensation being present at any time. But with regard to the nature of the lesion, the differential diagnosis presented many difficulties. Functional disturbances of the cerebral centres, abscess, tubercle, and syphilis were one by one considered and laid aside in favour of a tumour of some kind. At first it was thought that the fits might be hysterical, but, owing to the absence of any

sensory phenomena, to the gradually increasing paresis, and the discovery of the optic neuritis, this idea was speedily abandoned. With regard to the possibility of an abscess, the position of the lesion, the absence of any cause, and the absence of any rise of temperature, were against its presence. The rapidity with which the symptoms advanced, however, was in favour of it, and its presence, even when acutely active, is undoubtedly sometimes associated with a subnormal temperature. It is unfortunate that no blood film was made, as it is possible that a polynuclear leucocytosis may have been present, which would on the whole have pointed to an abscess being present, seeing that the patient was too young for carcinoma, the only other condition in which such a leucocytosis would likely be present. Abscess, however, was, after careful consideration, excluded. No history of syphilis, congenital or acquired, could be elicited, and no evidence of tubercle could be detected anywhere. The provisional diagnosis of a rapidly growing, probably gliomatous, tumour affecting the right Rolandic area was made, and, as the symptoms were becoming urgent, Mr. Cotterill was asked to operate. Before doing so he expressed his opinion that the lesion might possibly be an abscess, an opinion which subsequently turned out to be correct.

Lastly, the operation was most successfully carried out, and aseptic cranial surgery achieved yet one more triumph. The operation was undertaken just in time, for the girl entirely recovered the use of her leg, and to a great extent she has also regained power in her arm. I saw her on the 30th of July, and found her looking very well, very much pleased with herself, walking well, with only a slight limp, able to raise the arm above her head, to do light work, and with the grasp of her left hand almost equal to that of her right.

CASE.—The patient in question, Nellie C., *æt.* 19, and by occupation a general servant, was admitted to Dr. Gibson's ward in the Edinburgh Royal Infirmary on the 20th October 1899. Questioned as to her family history, she stated that her father was alive and strong. He was a hairdresser by trade and somewhat alcoholic, and she had in consequence frequently suffered considerable mental perturbation owing to the paternal eccentricities. Her mother died at 22, of phthisis, and the patient's only sister was alive and well. No history of hereditary neurotic tendencies could be elicited. The patient had always had plenty to eat and drink, and on the whole had always had a comfortable home. Of the diseases incidental to childhood, she had suffered only from measles. In the early part of 1898 she was in the Royal Infirmary with symptoms of gastric ulcer. She was discharged cured in May, but was readmitted in June with pleurisy and bronchitis. In September she was once again in hospital, complaining of anæmia and general debility. She left in October feeling quite well, and remained in good health from this time until May 1899, during which month she was admitted again to the Infirmary, and was treated in Dr. Gibson's ward for typhoid fever, on this occasion remaining nine weeks in hospital.

At this time, and more especially towards the end of the fever, some nervous phenomena were observed which affected the left side of the body. "The tongue was drawn to the left side, there was a jerking of the sterno-mastoid muscle, and a tremor of the left side of the face, the left arm and leg, which was followed by slight loss of power over these." These symptoms had entirely disappeared before the patient was discharged. After leaving hospital, she was at the Convalescent Home for three weeks, and then returned home, but she never recovered her former health and strength, and so did not go out to service for some time. She suffered from constant headaches, particularly in the morning, and also from frequent attacks of vomiting. These attacks were at first very frequent, and took place nearly every morning. But this condition gradually improved, and about a fortnight before her admission to the Infirmary she felt strong enough to take a place as general servant. On her first day in service she was sick in the morning before breakfast. After breakfast, when on her knees cleaning a hearth, she became conscious of noises in her right ear. Then she experienced a numb feeling in her left hand, and a sensation as if her left hand and arm were being gripped. This sensation passed gradually up her arm to the left side of her face and head. The left hand then began to shake. She arose from her knees, walked a few steps to a chair, and then sat down. The painful gripping sensation in her hand and arm was now passing off, but her left leg began to shake violently, and the shaking in her left hand passed up to the arm. After resting for about five minutes, she tried to rise, but felt her left leg heavy and powerless, and on trying to walk she fell to the left side, striking her head against a table as she fell. She had now what she describes as a frightened feeling, and felt also short of breath. After calling loudly to her mistress, she gradually became unconscious, in which state she remained for about ten minutes. Her mistress says that during this time the patient's face was very red, her hands were clenched, and her eyes were wide open. As she regained consciousness, the patient felt that her head was drawn to one side, and that her eyes were rolling. Her head, face, and hands were bathed in perspiration, and she could hear that her breathing was like snoring. For a few minutes after waking up she was unable to speak, there was a mist before her eyes, and her head ached badly. She remained sitting in a chair for nearly two hours, during which time she felt unable to move, as her left arm and leg were still heavy and powerless. She then got up and went back to her work, and when washing the dishes she felt inclined to fall to the left side, and noticed that the limp which had been present in the left leg ever since she suffered from typhoid fever was distinctly worse. The night following this attack she did not sleep, and until the day of her admission to the Royal Infirmary she was practically kept awake every night by the headache, and vomited on and off every day. Finally, she became unable to retain any food, and as she was gradually losing strength she came up to and was admitted into the hospital on the 20th October 1899.

On examination, the patient appeared to be a bright, intelligent, and well-nourished girl. Her hair was somewhat thin and short, and she said it had been falling out. There was neither cyanosis, dropsy, jaundice, nor any other morbid appearance. She lay comfortably in

bed, preferably on her back or upon her right side. Her height was 5 ft. 4½ in., and her weight 8 stones 3½ lb. Her temperature on admission was normal and remained so until her removal to the surgical wards. Space forbids me to take up in detail the features presented by the various systems, and I propose, therefore, after touching upon those of less importance, to dwell more especially upon the phenomena peculiar to the nervous system.

With regard to the alimentary system, there was nothing of importance to be noted, except the fact that there had been some degree of anorexia present during the fortnight before admission, and also that the vomiting, which had been fairly constant, seemed to be independent of the taking of food. The bowels as a general rule were regular. Inspection of the abdomen revealed nothing abnormal, and percussion showed a liver normal in every respect.

The hæmopoietic system presented no change of any importance. The spleen was normal in size, and on examination of the blood showed the red blood corpuscles to be normal in quantity with the hæmoglobin at 75 per cent. It is unfortunate, as was mentioned above, that no film of the blood was prepared, as the presence or absence of a leucocytosis might have materially assisted the diagnosis.

The subjective phenomena presented by the circulatory system were some slight dyspnoea and occasional palpitation felt on exertion. Objectively, the heart was in excellent condition, and the pulse, which averaged 72 beats per minute, was regular in time and rhythm, and of moderate tension. The artery walls were normal.

The respiratory, integumentary, and reproductive systems were to all intents and purposes normal.

The urinary system showed no subjective symptoms. The urine was of a pale straw colour, with a specific gravity of 1024. In quantity it was normal, its reaction was acid, and a mucous cloud deposited on standing. It contained no abnormal constituents.

Turning now to the nervous system, with regard to subjective phenomena, she noticed that, while recovering from the typhoid, and also on several occasions subsequently, she suffered from spasmodic jerking movements of the left arm and leg. These attacks, patient said, were always preceded by a creeping sensation in the left side of the head, especially on the face and behind the ear of that side. On the day after her admission, at one o'clock in the morning, patient had a bad convulsive attack. First her left hand and then her left arm began to twitch, and this twitching crept slowly up to the side of her neck and face. Her face was drawn to the left side. Her left leg then began to twitch. She called out to the nurse, and said she could not stop the movements, which she had formerly been able to control. She did not lose consciousness. Forty minutes later, when I was in the ward, she had a repetition of this fit, and the attack was more violent and lasted longer. The same limbs were again affected, and she jerked her head to and fro towards the left side. The breathing became very stertorous, and the cervical reflexes were lost towards the end of the attack. She neither bit her tongue nor passed urine during the seizure. She felt no particular headache when it had passed off, and she could not go to sleep for thinking of it. While her case was being taken, the patient

had recurring attacks of shaking in the left arm and leg. For one or two minutes before the shaking commenced, she was conscious of a heavy and powerless sensation in the parts about to be affected. When she first came to the hospital she was able more or less to control these movements by tightly grasping the arm by her other hand. She remarked that the three convulsive attacks or fits described above differed from the ordinary shaking seizures, in that in the fits she felt as if the affected parts were being tightly gripped, the shaking was more rapid, continued longer, and could not be stopped by grasping the limb.

**EXAMINATION OF THE NERVOUS SYSTEM.**—*Sensory functions.*—The patient occasionally felt a slight numbness in the toes of her left foot. Sensibility to touch, heat, cold, tickling, and pain was absolutely unimpaired.

*Muscular sense.*—She could recognise the position of her limbs in space perfectly, but anything placed in her left hand felt heavier than it had done in her right.

Her sight was excellent. Her pupils acted well, both to light and accommodation. The left pupil was slightly larger than the right. The field of vision for all colours was practically normal. She occasionally experienced the sensation of "seeing stars." Hearing was good, but not quite so good in the left ear as in the right. Taste and smell were normal.

*Motor functions.*—The organic reflexes were normal. The skin reflexes were slightly duller on the left side.

*Tendon responses.*—The right knee-jerk was slightly exaggerated, the left markedly so. The plantar reflexes were very slightly present on both sides. Ankle and knee clonus could not be elicited on either side. Elbow and supinator jerks were exaggerated on the left side. There was considerable loss of motor power on the left side, patient being unable to resist any firm pressure made against either limb. The tongue was slightly deviated to the left when protruded. The cranial nerves were examined and found normal. The dynamometer registered a grip of 45 with the right, and only 15 with the left hand. Co-ordination was good. Romberg's symptom was absent. Electrical reactions were normal. Vasomotor and nutritive functions showed nothing abnormal, except that, before and after the shaking attacks, a cold sweat broke out over her left foot and over the palm of her left hand.

*Cerebral and mental functions.*—Patient was a bright and intelligent girl, with an excellent memory. She slept very fairly well. The cranium showed nothing abnormal. There was an absence of any "bogginess" anywhere in the scalp. The spine betrayed no peculiarities. There was no affection of bones or joints. In walking she dragged the left leg slightly.

She was sent to bed, and treated by faradic and galvanic currents to the affected side, and an occasional dose of bromide of potassium was administered at night. She was carefully watched, and seemed to improve somewhat. For some days she had no symptoms to cause anxiety. No headaches and vomiting, and no increase in the shaking movements. It was, however, noticed that the power of the left arm and leg was gradually diminishing. On 27th October, however, she had a severe

frontal headache, and an hour and a half after tea a very bad attack of vomiting. On 28th October the severe headache persisted, as also did the vomiting. The twitching affected the left shoulder. On 30th October the headache became very bad, the vomiting continued, and in addition her face and head began to twitch towards the left side. She was given 30 grs. of bromide of potassium at night, and slept well. On 31st October her eyes were examined by Dr. George Mackay, who found — (1) visual acuity not impaired; (2) field of vision slightly reduced; (3) double optic neuritis present in a very early stage; (4) no nystagmus; (5) left pupil did not react so well to light as the right, unless the patient was at the same time accommodating.

Her head ached badly, especially towards the back and left side. She did not vomit, but she was quite unable to stop the twitchings of her head, face, arm, and leg. The loss of power in the left arm and leg continued steadily to increase, the dynamometer grip being 38 in the right hand and almost nil in the left. The left knee-jerk, elbow-jerk, and supinator-jerk were now much exaggerated, and ankle-clonus could occasionally be obtained. Sensibility was in no way impaired. All over the affected side she was able to recognise the points of the æsthesiometer at less than half an inch distance.

On 3rd November the patient was unable to do more than just raise the left arm from the side, and the twitchings went on constantly. The headache also continued to be very bad.

As I have already mentioned, the differential diagnosis with regard to the nature of the lesion presented many difficulties. Hysteria, tubercle, and syphilis were all, after careful consideration, excluded. Hysteria was considered impossible, in view of the rapidly increasing loss of motor power, and the presence of optic neuritis. No evidence of tubercle could be anywhere detected, and no history of syphilis, congenital or acquired, could be obtained. The position of the lesion, the absence of any cause for suppuration, and the absence of any rise of temperature, were in favour of a tumour being present, while the rapidity with which the symptoms advanced pointed to the possibility of an abscess. On the whole, after carefully weighing the pros and cons of the case, the balance of evidence was in favour of the lesion not being an abscess, and accordingly the provisional diagnosis of a rapidly growing, probably gliomatous, tumour was made, and seeing that things were getting so much worse, Mr. Cotterill was asked to operate, which he accordingly did on the 5th November. I am indebted to Dr. Forsyth for kindly allowing me to give the following notes of the operation and the subsequent progress of the case:—

The patient having been placed under chloroform, and a flap having been turned down, four trephine holes were made at the corners of a square, 2 in. on each side, so arranged as to cover the fissure of Rolando. The periosteum was lifted up from the bone, between the lower two holes, Dr. Cotterill's saw introduced under it, and the bone half sawn through. Then with a Hey's saw the bone was completely sawn

through the other three sides. Crowbars were then introduced into the upper trephine holes, and the flap of bone pressed back, the periosteum being continuous. The dura mater immediately bulged out very tensely. One spot looked suspicious, and, on its being investigated, about 3 oz. of pus came out. (This was afterwards examined bacteriologically, and found to give a pure culture of the *Staphylococcus pyogenes aureus*.) There was no tumour. The brain sank a little, but not much. The dura was drawn over it, but did not nearly cover it. A drainage tube was inserted, the bone flap replaced, and loose horsehair sutures put in the scalp. The wound was dressed, and the patient put back to bed.

6th November.—Patient felt well, with no headache and no shakings. A large discharge continued to come away.

11th November.—Temperature fluctuated greatly. Cerebro-spinal fluid still continued to come away. No power in the arm. Massage ordered.

15th November.—Patient lost power in her left leg. No disturbance of sensibility. Hernia cerebri very large.

12th December.—Patient regained the use of left leg.

14th December.—Was able to move foot. A slight left facial paralysis appeared. Temperature began to settle down.

16th December.—Was able to move left hand slightly.

20th December.—Had a slight tremor in her right leg. Was able to move left shoulder.

25th December.—Another slight tremor in right leg. Could move left leg easily.

26th December.—A slight tremor in left leg. Hernia cerebri smaller.

15th January 1900.—Got up for first time, with no headache and no twitching. Sleeping well, and taking food well. Facial paralysis practically all away.

22nd January.—Walked the length of four beds with assistance. Was able to move arm much better. Could flex and extend elbow. No movement of fingers.

31st January.—Could move fingers. No sign of optic neuritis.

3rd February.—Had bad twitching of left leg and arm, left side of trunk and head, which lasted for two minutes. Grasp of left hand showed wonderful increase.

5th February.—Moved left thumb for the first time.

8th to 17th March.—Had a bad influenzal attack.

31st March.—Grasp of both hands was nearly equal. Walked with a slight halt of left leg. Could stand all right.

14th April.—Sent to Convalescent Home. Walked downstairs from the ward to the cab without any help. Hernia cerebri much better.

18th May.—Readmitted to Mr. Cotterill's ward for observation. Sent out in a few days, to come up regularly as an out-patient for dressing, massage, and electricity.

I saw the patient on the 30th July, and, as mentioned above, found her quite well in every respect; her left arm being almost as good as her right. Such is the account of the case, which I venture to hope will prove to be of interest to medical men.

While regretting the fact that a wrong pathological diagnosis was made, it is a consolation to know that the treatment undertaken was so eminently successful. It was indeed almost with a feeling of relief that I saw, at the time of the operation, that the diagnosis had been faulty; for by the presence of an abscess instead of a tumour the patient had a much better chance of complete recovery—which, after all, is the main consideration.

## A CONTRIBUTION TO THE MECHANISM OF ARTICULATE SPEECH.

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HUMAN speech may be looked at from many different points of view, *e.g.* in its relation to mental culture, as a department of anthropology, from the pure grammarian's standpoint, and so on. Fundamentally, after all, it is a function of the human body, and thus comes within the scope of physiology. But even in its physiological aspect it may be approached from various directions, and studied from different standpoints; thus it may be considered as a brain function, localised in certain centres and carried out by the aid of certain co-ordinating fibres; or it may be looked at in relation to the muscular movements producing it. Similarly, the muscular act of walking might either be considered in connection with Ferrier's areas, or else treated apart from any reference to the brain, the various paces—the walk, the trot, the run—being analysed into their individual movements, and the sequence of these and their modifying influences on each other being duly considered. From the latter point of view, I propose to approach the subject of speech, discussing simply its articulatory mechanism.

*History and bibliography.*—The subject is said to have occupied the attention of Caius Cæsar, Octavius Augustus, Varro, Appian, and others of the ancients; but one need not now consider their work. Indeed, even the earlier literature of the modern period, though it is remarkably accurate for pioneer work, is full of curious blunders, and often exhibits quaint and fantastical notions. A good example of this is a little duodecimo by F. M. B. van Helmont,<sup>1</sup> published at Salzburg in 1667. The workers at the subject have belonged principally to four classes—physiologists, teachers of the deaf and dumb, spelling reformers, and elocution masters; and this is an early instance of the second class, to whom much of our progress is due. It is very doubtful whether van Helmont's method could ever have given the slightest help to a deaf-mute; his belief was that the position of the tongue was the original of each Hebrew character, and his book contains a large series of plates to display this relation. If

<sup>1</sup> "Alphabeti veri naturalis Hebraici brevissima delineatio."