others the disappointments I have had which induces me to dwell at some length upon this point, and it may in particular not be amiss in this connection to warn against the now fashionable view of looking upon the nose as the *fons et origo* of all morbid sensations experienced in any part of the body, and of associating the discovery of the smallest abnormality in that part with the hasty conclusion that the neurosis in question must be due to that abnormality. I feel pretty sure that this wave of enthusiasm will pass away as other similar waves have passed, and will leave a very small residuum only of actual facts behind. As, however, in connection with the subject now under discussion, I have, particularly in the course of the last two years, seen several patients in whose cases the nose had been accused of being the cause of their climacteric throat neuroses, and had been more or less vigorously treated, with the result that after either a perfectly negative effect or after a very transitory improvement, the sensations had returned, and the patient, who had been promised a cure, had been reduced to a state of greater despondency than previously—I think it my duty to particularly warn against adopting a form of treatment which in all probability merely acts—to use my friend Dr. M'Bride's telling expression—like a blister applied to a very sensitive spot, the immediate effects of which at best are rapidly evanescent and the lasting results of which usually are so undesirable as those just described.

TREATMENT.

In cases in which there is any reasonable doubt as to whether the neurosis is due to the climacteric period or to some actual local mischief, not the slightest objection can of course be raised against treating the latter in the usual fashion. Thus, marked nasal stenosis, considerable granular or lateral pharyngitis, much developed hypertrophy of the lingual tonsil will have to be treated in the usual way by local measures, and in cases of neuralgia particularly the probe ought to be used in order to ascertain whether there is any tender spot in the region of the pain complained of: again, cases of anaemia and chlorosis should be treated by the cautious use of iron and arsenic, etc. But in all those cases in which there is rational doubt whether the paræsthesia and neuralgia complained of are due to such causes as those mentioned or to the effects of the menopause, the practitioner will do well not to promise too confidently a satisfactory result of the local or constitutional treatment he is going to adopt, and to at once mention the possibility that the sensations complained of may simply be a transitory sequel of the change of life. When, after exclusion of all other possible causes, I have come to the definite conviction that the neurosis is of a climacteric character, I have been gradually led to rely on moral efforts only, and to desist from all other forms of treatment. In the great majority of these cases the patients who (may it once more be said) are by no means of a neurotic or hysterical type, consult the physician only because they are alarmed about the unpleasant sensations of which they themselves cannot give any satisfactory account. When they see that their ailment is not pooh-poohed, and that, after a careful examination, the deliberate opinion is given that the sensations are merely due to the change of life, and when this opinion is coupled with the cheerful assurance that in not too distant a time they may with certainty reckon upon their disappearance, they are as a rule perfectly satisfied. This obtains particularly in those cases in which cancer or consumption or syphilis, or some equally grave disease, has been feared. The usual local remedies, astringents, caustics, etc., I have found perfectly useless or of most transitory effect, and, considering that this whole period of a woman's life is in itself often enough associated with a state of mental depression, I would particularly warn against their indiscriminate use, inasmuch as after their failure patients are liable to be infinitely more depressed and convinced that their ailment is of a really serious character than before. This applies with particular force to all forms of narcotics, which I find are unfortunately much too frequently prescribed in this class of cases. Opium, morphine, cocaine, bromide of potassium, etc., whether locally or constitutionally employed after a very short time lose their effects, and the patients are either driven to become victims of one of the pernicious habits to which the continued

use of these narcotics so frequently gives rise, or their general and local sufferings are considerably increased, if they are compelled to desist from their use. Only in aggravated cases of paræsthesia, and more particularly in cases of neuralgia, do I utilise drugs which cannot do any possible harm, such as a menthol spray or a general tonic. My experience of the use of electricity in such cases is very limited and of an indefinite character. The best effects are certainly obtained in those cases in which the throat neurosis is associated with considerable increase in bulk, digestive disturbances and gouty manifestations. In such cases, if the patients can be persuaded to go through a mild course of the mineral waters of Carlsbad, Marienbad, Kissingen, Aix-les-Bains, Vichy, etc., a disappearance of all the symptoms complained of and establishment of settled conditions in general is often much sooner obtained than in the ordinary forms of climacteric neuroses. But in the great majority of cases, I repeat, no other treatment but moral influence is, in my experience, necessary.

A CASE OF SUBCORTICAL CEREBRAL TUMOUR TREATED BY OPERATION.¹

(WITH COLOURED PLATE.)

BY

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SUMMARY OF SYMPTOMS.

THE salient points of the case which we record below were as follows:

1. The gradual onset of the paralysis, involving successively the right ankle, the knee and hip, and then extending, after the lapse of seven months, to the joints of the right hand, and then to the whole of the upper extremity. Finally speech became affected.
2. The classical symptoms of intracranial pressure were present—headache, vomiting, and optic neuritis.
3. The mental condition gradually deteriorated.
4. There was some loss of sensation affecting the right limbs chiefly (see figures on p. 7), while the face entirely escaped.
5. There was no family history of tubercle, and no personal history of tubercle or syphilis.
6. Under antisyphilitic remedies, taken for over six weeks, the patient's condition not only did not improve, but grew worse.

GENERAL DIAGNOSIS.

Hemiplegia may be due to vascular changes such as hæmorrhage, embolism, and thrombosis when the onset is sudden, or takes only a few days to develop; but in the case of hemiplegia, which progressively increases during several months, there is strong presumptive evidence that it is due to a tumour, and when this is associated with optic neuritis, headache, and vomiting, the combination of symptoms makes the diagnosis almost certain.

LOCALISING OR SPECIAL DIAGNOSIS.

Having determined on the presence of a tumour in the left cerebral hemisphere, the next question to settle was its exact position. Such hemiplegia might be caused by a tumour of the cortex, the centrum ovale, or the internal capsule, and we will now give the symptoms of lesions in these different parts:—

(a) The type signs of involvement of the cortex are: 1. Jacksonian epilepsy: the aura or the initial movement being represented in the part of the cortex first involved in the tumour; this is followed later by a permanent paralysis of the same part which progresses in a definite order. 2. Corresponding to the paralysis of the limb segments there is change of sensibility. Light touches may not be felt, but if they are, they are not properly localised. Loss of muscular sense so that the patient is not cognisant of the position or

¹ A paper read at a meeting of the Medical Society of London on November 28th, 1894. The patient was present at the meeting in good health.

the passive movement of his limb.² 3. Occasional tenderness of cranium over site of tumour.

(b) The type signs of involvement of the internal capsule are: 1. Absence of Jacksonian fits. 2. The paralysis is progressive but extends more rapidly than a cortical paralysis owing to the closer gathering of the fibres. 3. Sensation tends to affect the whole of the opposite half of the body including the head, to be more complete than in cortical lesions, and to involve all forms of sensation.

(c) The type signs of involvement of the centrum ovale can only be determined by a process of exclusion, and they probably are modified according as the growth extends towards the cortex or towards the internal capsule. 1. Absence of fits. 2. Absence of tenderness of cranium. 3. Progressive paralysis and progressive loss of sensation either of cortical or capsular type.

In comparing the present case with the symptoms of the above types, the internal capsule appeared not to be involved in the tumour on account of the fact that the anaesthesia corresponded to the paralysed parts, and was not complete; further, localisation was imperfect, and muscular sense was lost, the face escaping completely. The gradual march of the paralysis, too, pointed away from the internal capsule.

The diagnosis, therefore, rested between a cortical and a subcortical lesion.

It is first to be noted that she had never had a fit, and although it is known that a cortical tumour may be present for many months without giving rise to a fit, still the general rule holds good that the absence of fits is against the diagnosis of cortical lesion. Secondly, there was never at any time any tenderness of the cranium, which, if present, makes for the diagnosis of a superficial cortical lesion involving the dura. Thirdly, the sensation was of cortical type, and did not assist in the differentiation of a cortical from a subcortical growth, but it pointed to the lesion being nearer to the cortex than to the internal capsule. Fourthly, the sequence in which the different parts of the brain were involved, as shown by the march of the paralysis, was also instructive. According to the experimental observations of Mr. Horsley and one of us (Bevor) on the monkey, the different segments of the body are represented on the motor cortex and in the internal capsule respectively according to the following tables:

Internal capsule, from behind forwards (Macaque monkey):	Motor cortex, from above downwards (Cortex of Orang):
Ankle	Ankle
Hip	Knee
Hand	Hip
Elbow	Shoulder
Shoulder	Elbow
Mouth and tongue.	Hand
	Mouth and tongue.

It will be seen that, according to the above tables, the order in which the paralysis in this case came on, namely, ankle, hip, hand, elbow, shoulder, speech corresponded rather to the arrangement of the internal capsule than to that of the cortex. This, however, did not materially alter the view that the tumour was probably near the cortex, since it is not known how high the arrangement of the fibres in the internal capsule is maintained in the centrum ovale. We, therefore, came to the conclusion that the tumour was subcortical, and did not involve the internal capsule. The importance of this from the point of view of relieving the patient was very great, since whereas a tumour of the cortex or centrum ovale may be removed, at present, one involving the internal capsule appears beyond the reach of operation. It does matter, too, whether the tumour be cortical or subcortical, since presumably a cortical tumour may be more completely removed than one more deeply placed.

Mrs. S., aged 39, a patient of Dr. Morgan, of Seaford, was admitted to the National Hospital for the Paralysed and Epileptic on May 21st, 1894, for symptoms which had been recognised by Dr. Morgan and one of us (Ballance) as probably due to the presence of a subcortical cerebral tumour.

History of Present Illness.—Twelve months before admission the right ankle gradually became weak, and the foot was dragged in walking; this continued for some time; the paralysis then gradually extended up the limb, and it was not till seven months later that the right hand became affected. Soon after the whole of the right upper extremity was paralysed. Four or five weeks before admission the speech became for three

or four days stuttering and thick, and three weeks ago it was noticed that tactile sensations were not properly localised on the affected side, and that light touches were not felt at all. At the time that speech became affected she first had an attack of vomiting, and at the same time very severe headache referred to the frontal region. The vomiting and pain intermitted; the last attack having occurred about a week before admission. No history of a definite fit could be obtained, or of giddiness. Double optic neuritis was observed three weeks ago. During the last week she had had attacks of sudden pain in the left side of the head of a hammering character.

Previous History.—The patient has always had good health, and has had (previous to this one) no illness of importance. Married eight years; has had three children; one miscarriage two years ago after the birth of the last child. Husband is a coachman, a strong healthy man with no history of specific disease.

Family History.—There is no history in the family of tumours or nervous diseases.

Condition on Admission.—Fairly well nourished; face somewhat expressionless; mental state dull; no delusions; memory bad. Temperature rather subnormal, equal on either side; pulse 100. Motor System: Movements of eyes good; movements of right side of face less brisk and rather weaker than on left side. The upper face muscles act equally, as do the muscles of mastication, and the tongue is protruded straight. Movements of right fingers and elbow are very feeble, extension of the latter being absent. No movement of shoulder, and this part cannot be shrugged. The grasp of the right hand is absent. Abdominal muscles—that is, the recti—act equally. Right Leg: No movement of toes or ankle; flexion and extension of knee very weak; movements at hip with difficulty obtained. Patient can walk fairly well with assistance, swinging the right leg forwards. The wrist tap on right side is increased, as is also the right knee-jerk. Jaw-jerk brisk. Plantar reflexes equal and brisk; ankle clonus is present on the right side. There is no rigidity of the right limbs.

Sensation.—Frequent attacks of headache, but no tenderness of scalp. No anaesthesia of face. Light tactile sensations not so well felt on the right arm and leg as on the sound side. *Localisation* imperfect; sometimes too high and sometimes too low; this is more marked over the upper arm, shoulder, and hand than on the forearm. The anaesthesia extends over the chest to the mid-line and up to the lower jaw, but is less marked than on the shoulder. Over the abdomen and back on the right side there is slight blunting of sensation and defective localisation. Over the right lower limb sensation is blunted to an extent equal to that over the shoulder. *Muscular sense* lost in the joints of the right upper limb and in the right toes and ankle. It was present in the right knee and hip. No complete analgesia, but pricks are felt less on the right side below the face than on the left side. *Heat and cold* impressions blunted over the right limbs and right side of trunk.

Ophthalmoscopic Examination by Mr. Gunn.—In the right and left eye there is blurring of the edges of the discs all round with considerable venous turgescence. Each optic disc is high coloured and the retina for a long distance outside is wanting in transparency; the details of the fundus are somewhat interfered with by a vitreous haze which Mr. Gunn considered indicated specific disease. Vision: right eye $\frac{1}{4}$ ths badly, J. 1, 10 inches; left eye, $\frac{1}{4}$ ths well, J. 1, 10 inches. No hemianopsia; no limitation of visual fields. Pupils unequal; R. 7 mm., L. 6 mm.; they react normally.

Smell and taste good on both sides; no affection of hearing. Lungs, heart, and abdomen healthy; urine normal.

The treatment at first adopted was inunction of ung. hydrarg. daily, with the internal administration of pot. iod., gr. 5 ter die. The dose of pot. iod. was gradually increased. On June 6th she was taking gr. 20 ter die., on June 13th gr. 25 ter die., and on June 20th gr. 30 ter die. On June 8th the mental state was more lethargic and the optic neuritis was worse. The discs were examined by Mr. Gunn, who reported that the right disc could be seen with + 3 and the left with + 4, and that there were hæmorrhages in both discs. As the paralysis did not improve, and as the mental condition was deteriorating, it was determined to operate with a view to the removal, if possible, of the tumour.

Operation.—On July 11th, the scalp having been prepared in the usual way, the patient was placed under chloroform, and a large Horsley's Ω -shaped flap was thrown down on the left side. This flap included the periosteum, and allowed of the exposure of the coronal and sagittal sutures, about 1 inch of the posterior part of the left frontal bone, and practically the whole of the parietal bone with the exception of the anterior inferior angle, and the part immediately adjacent to the lambdoid suture. The portion of bone to be removed was then marked out by means of a large saw. It was in shape a parallelogram, whose anterior and posterior borders running parallel with each other were planned also to run parallel with the sulcus of Rolando. The anterior border encroached a little on the frontal bone at its lower end. The upper border of the parallelogram corresponded with the sagittal suture, and extended along it from the bregma for fully $3\frac{1}{2}$ inches. The lower border was parallel with the upper and $2\frac{1}{2}$ inches below it. The portion of bone removed would thus include the parietal eminence, and would allow of the free exposure of the upper part of the motor cortex, especially of the toe and ankle centres at the upper extremity of the ascending parietal convolution, which it was desired to thoroughly examine.

The removal of the bone thus marked out was accomplished by the aid of the same large saw, by means of which it was divided up into small quadrangular pieces by vertical and horizontal cuts. These pieces were then easily raised from the dura by an elevator. As soon as one piece had been removed the use of strong bone cutting forceps facilitated the final separation and removal of the pieces into which the bone had been mapped out by the saw. Along the upper boundary of the opening in the skull the final removal of bone was accomplished in part by disarticulation at the sagittal suture. In this way the dura was exposed without injury, and the middle meningeal artery lay upon it without having been wounded. The dura bulged considerably into the opening in the skull. As it was clearly desirable to perform the operation in two stages, the edges of the scalp wound were now brought together by horsehair sutures, the antiseptic dressing applied, and the patient put back to bed.

² Horsley, BRITISH MEDICAL JOURNAL, October 9th, 1886, p. 670.

On July 17th (that is, six days after the first operation), the patient having completely recovered from the previous operation, she was again chloroformed by Dr. Dudley Buxton. On removing the dressing the wound was found united by first intention, but its edges were easily separated by the handle of a knife after the stitches had been cut. The scalp flap was again thrown down, no bleeding occurring, and wrapped up in an antiseptic dressing. A little clot was lying on the dura. This was taken away, and as large a square dural flap as possible was cut and folded down over the scalp flap. The part of the cortex thus exposed was bulging, and, especially over the upper part of the ascending parietal convolution, presented a mottled unnatural appearance. This mottling may have been due to minute ecchymoses produced during the removal of the bone a week before, or to malignant invasion of the cortex. The former alternative seemed the more probable. On palpation no area of special resistance indicating the site of the tumour could be discovered, but on exploring the mottled ascending parietal convolution with the finger, the cortex being here greatly thinned, was broken through, and the tumour of a whitish-grey colour, was seen. As the ruptured cortex receded the tumour appeared to be discontinuous with the brain substance, and an attempt with the finger and the handle of a sterilised silver spoon was made to shell it out. This, however, was impossible, as it was discovered to be continuous with and infiltrating the surrounding cortex, and also the substance of the hemisphere about an inch below the surface and towards the front and middle line. The consistence of the tumour was semigelatinous, softer than the normal brain substance, and it was found easier to remove it with a silver spoon than in any other way. A considerable hæmorrhage occurred at the time, and, as it was not well controlled by filling the cavity in the brain by cotton wool, a series of fine silk threads were passed through the cortex for a depth of about $\frac{1}{2}$ inch all round the affected area except for about an inch at the median line, and tied so that all the vessels within the operation area were controlled. The area was about $2\frac{1}{2}$ inches in diameter. A free incision was then made through the cortex all round, just within the line of ligature, and all the included part, brain, and tumour was taken away by means of the spoon. The tumour extended to the medial surface of the hemisphere, and so a part of the marginal convolution and quadrate lobule was removed, the falx being clearly exposed. In this way as much of the tumour as was visible was removed, but as the line of junction of healthy and diseased tissue was so indeterminate, it is not possible to say that the whole tumour was excised; it is, indeed, probable that it was not.

At the close of the operation the brain presented a large cup-shaped cavity nearly 2 inches deep, and the size of half an orange. It is probable that the area removed comprised the upper part of the ascending frontal and parietal convolutions, the anterior part of the parietal lobule, and the adjacent portion of the marginal convolution. When all bleeding had ceased the dural flap was very carefully stitched in position with fine silk. No bone, of course, was returned. The scalp flap was brought into place by many horsehair stitches.

The antiseptic employed during the operation was solution of mercuric perchloride (1 in 2,000). The brain wound was constantly irrigated with the solution so as to keep it clear of blood, by squeezing a wet cotton wool mop over it. No marine sponges were used, and the operation area was kept free of blood, not by mopping or touching the brain, but by the stream of fluid.

During the operation the patient was kept warm by several hot bottles, but she was much collapsed when she was put back to bed, the pulse was very small and thready, and her temperature was as low as 95° F. A brandy enema was administered, the bed placed in front of a large fire, and, the patient being surrounded by hot bottles, her condition improved, and the danger of death from shock soon passed away.

Dr. Colman, Pathologist to the hospital, made a microscopical examination of the tumour, and reported the growth to be a sarcoma with round and spindle cells.

On the next day, July 18th, the pulse had improved, but was still of poor force and tension; the patient had marked aphasia, largely motor, as she could say her name, but could not repeat words spoken to her. She understood a good deal of what was said to her, and said "Yes" and "No" appropriately, but she did not understand simple commands, as when told to put her hand on the top of her head she failed to do so. She was completely paralysed in the right arm and leg.

On July 19th the patient had a series of clonic spasms involving the right angle of the mouth, which was drawn upwards and outwards, but the orbicularis palpebrarum was not affected. Each attack lasted a few minutes.

On July 20th she had a similar attack lasting three hours. From this date her convalescence was uninterrupted. The dressings were changed twice, on the 19th and 29th, and on the latter date the stitches were removed. The temperature varied from 97.5° to 99° , and was not materially different on the two sides.

July 26th. It was noted on this date that the position of the right hand was as follows: The hand lay on the bed with the thumb adducted and with the phalangeal joint flexed; the first and second fingers were in the interosseal position, while the third and fourth fingers were semiflexed at all the joints. There was constant clonic spasm of the thumb and index finger towards each other with extension of the first and second fingers, but without affecting the other fingers and the wrist. This spasm was first noticed on the 22nd, but was not continuous till the 26th. The aphasia had passed away, but there was still some hesitation in speaking, although appropriate words were used, it had been noticed that the nouns were the last to return.

There was absolute loss of power in the right upper extremity, and on July 25th the patient began to have voluntary movement in the right lower limb, and was able to flex the hip and extend the knee, raising the heel off the bed, but she had no power to move the right ankle or toes; abduction and adduction of the hip-joint, and flexion of the knee was also possible. On testing sensation it was found that she could recognise the slightest touch on the right side, but localisation was defective.

July 30th. The clonic spasm had ceased, motor power had still further improved in the leg, but the upper limb remained powerless.

Mr. Donald Gunn, on July 31st, made an ophthalmoscopic examination, and found the right disc was swollen to $3\frac{1}{2}$ D. The swelling was steep at the edges, and extended on to the retina beyond the margins of the disc: there were also some hæmorrhages with full veins.

On August 28th her vision was R = $\frac{1}{2}$, with difficulty, and J. 6 at 10 inches for both eyes, slowly.

August 29th. The condition of the patient was as follows: Her mental condition was very much improved, and from being morose and dull, she became lively, and amused the other patients. She had no paralysis of the face, and could now carry the right hand to the chin, but could not move the fingers or thumb; she could walk with a little assistance, she had good movement at the hip and knee and some movement at the ankle, but no movement of the toes.

With regard to sensation, she could appreciate light touches everywhere, but over the right upper limb, the localisation was still faulty. Speech was perfectly restored.

We wish to thank the resident medical officers of the hospital, Drs. Whiting and Warrington for the great care which they took in the management of the case.

CONDITION AT PRESENT TIME, NOVEMBER 20th, 1894.

The hair has grown again, hiding the area of operation. The scalp covering the opening in the skull, which when she left the hospital was a little concave, is now at the normal level. The edges of the bony opening are not quite so sharp as they were. The scar has to be looked for, being very narrow and showing the perfection of union by first intention. It might be thought that the filling up of the opening and the rising of the scalp over it to the normal level was due to recurrence of the growth, but in the absence of symptoms such a view cannot be definitely asserted, since a like phenomenon is not unknown after recovery from compound fracture, involving loss of brain substance.

Charts showing the areas of anesthesia which entirely disappeared after the operation. Vertical lines show marked blunting to tactile impressions; dotted areas show slight blunting to tactile impressions.

The patient is restored to her normal mental condition; Speech is perfect. There is no headache. Movements of face normal.

Upper limb (right): Fingers as a rule are kept straight, phalangeal joints being extended and metacarpo-phalangeal joints being flexed. There is some very slight rigidity about the joints of the hand and wrist, and at the elbow the humerus can be passively abducted to a right angle but beyond that pain is caused. She can extend the fingers but not thumb. Grasp, left, 60; right, 11 (weakest dynamometer). Can flex well thumb and fingers, can pick up a pin with the right hand from a soft ground, not from a hard flat one. Cannot button with

finger and thumb. Consensual movement of the right hand obtained with grasp of left, but grasp of left does not increase power of right grasp. Frequent slight clonic spasm of first finger and thumb (no tonic spasm) observed and increased by emotion. Can extend wrist to line with forearm but not beyond. Can pronate and supinate forearm. Can flex and extend elbow. The humerus she can elevate to a right angle but not beyond that. She has some difficulty in advancing the humerus, but can adduct it strongly. In abduction the whole scapula moves. She has very little power to shrug the right shoulder, but the anterior part of the trapezius acts well in forced inspiration. Walks without assistance, or stick, swinging the right leg, catching it on the ground sometimes.

Right lower limb. There is no rigidity in the joints, but the calf muscles have shortened so that the ankle cannot be dorso-flexed to less than a right angle. She has not the least power in the toes, either flexion or extension, and she can only faintly plantar-extend the ankle, but cannot dorso-flex it. The right knee she can extend powerfully, but flexion is weak; extension and flexion of the hip are good, but weaker than on the left; rotation out of hip good, rotation in weak. Knee-jerk excessive on the right, well marked on the left; right ankle clonus. Radius and ulna tap readily obtained on right; no jaw-jerk. Right plantar reflex deficient.

Sensation.—Pain in the right shoulder, especially when it is moved. No anaesthesia anywhere, and localises correctly. No loss of muscular sense.

A remarkable feature about this case is that, though so large an area of cortex has been removed, the patient has recovered sensation completely, and, with the exception of the toes, ankle, and shoulder, she has recovered almost completely as regards direction, but with diminished strength as compared with the other side. We should explain this, according to the theory of Dr. Hughlings Jackson, as follows: that all movements of the upper limb, for instance, are represented in all parts of the upper limb area of the cortex, but in different degrees; and that it is not possible to completely paralyse the upper limb unless the whole of this area is removed. In our case some of the upper limb area was left. This is no way invalidates the minute analysis of cortical representation, which demonstrates the place where any definite movement is most highly represented.

The question is not seldom asked, "What do patients suffering from tumours of the brain gain from surgery?" It appears to us that in the several following ways enormous benefit may be given by operation:

1. The complete removal of a tumour, as in Mr. Horsley's case, of a small tuberculous mass occupying the cortex in the region of the representation of the movements of the thumb.³ This patient, a man aged 20, suffered from frequent local fits, beginning in the thumb and forefinger, and from headache and from these symptoms he was completely relieved by the removal of the tumour and part of the cortex.

2. Partial removal of a tumour, as was probably done in the case on which this paper is founded. The operation on this patient relieved her of headache, vomiting, double optic neuritis, anæsthesia, and from the greater part of her paralysis; the mental condition, which was very much deteriorated, was restored, the patient regaining her former bright and cheerful condition.

3. The draining of a cavity in a cerebral glioma or sarcoma which cannot be removed. This is well illustrated by a case which was under the care of one of us (Ballance) and Dr. Gowers. This patient, aged 11 years, suffered from headache, vomiting, double optic neuritis, fits beginning in the thumb and followed by hemiplegia, and was practically relieved of all his symptoms, including moral deterioration (stealing) by this procedure. He lived for three years.

4. *The Removal of Bone and Incision of the Dura Mater.*—The benefit resulting from this operation is well shown by a case which was under the care of Dr. Buzzard and one of us (Ballance). A woman, aged 41, was admitted with symptoms pointing to tumour of the internal capsule, namely, hemianæsthesia, nearly complete hemiplegia, double optic neuritis with failing sight, and severe headache with agonising paroxysms. In one of these paroxysms she became comatose and was

evidently dying, it was thought from hæmorrhage into the tumour. The above operation was at once performed and the relief of the urgent symptoms was immediate, and in a month's time the report states that there was no headache, vomiting, or optic neuritis, and some return of power and sensation had already occurred, with improvement of sight and restored mental condition.

5. Removal of a considerable area of bone without opening the dura mater is, we believe, considered by some to be adequate to relieve the classical symptoms of tumour. It is true that the dura bulging through the opening in the skull indicates that there is a relief of pressure, but what we have to deal with is tension within a practically inelastic membrane, and the intradural space can hardly be materially increased while the dura is intact and the opening in the skull is comparatively small. The sac of the dura cannot be distended to its full extent while the cranium is intact, and so when bone is removed its foldings are flattened out. A considerable fall in pressure can only be obtained by taking away a large area of bone, and in tumour cases, when this is done, the dura still bulges under much *plus* pressure. As we have known of no case in which the removal of bone alone has relieved the pressure symptoms, we should advise that the dura should always be opened; another reason of great import being that the cortex might be involved without any of the type signs being present.

The following experiment is of interest in showing how little extra room is gained in the dural cavity by the removal of a very large area of skull.

A dog was killed with chloroform, and a cannula was passed into the cranial cavity through the spinal theca in the cervical region. This cannula was then connected with a manometer which was filled with oil. The column of oil was made to rise 1,000 mm. high in the capillary tube connected with the manometer, and a trephine opening 1 cm. in diameter was then made in the skull. The fall in consequence was very slight, the dura bulging through the trephine hole. Then more and more bone was removed, until nearly half the vault of the skull was taken away. It was then noted that the oil in the capillary tube had fallen 300 mm., the volume of which, as estimated, showed that only 0.54 c.cm. of oil had entered the dural cavity in consequence of the removal of bone.

We are much indebted to Dr. Sherrington for his aid in this experiment.

We would conclude this paper with the question, How soon should one of the preceding operations be performed? When the type symptoms are present, it is quite certain that no delay is desirable after a fair trial has been given to anti-syphilitic remedies, and we should limit this time to six weeks or two months.⁴ The main difficulty arises when the symptoms are not typical, and it is to be borne in mind that large, slowly-growing tumours may be present without any symptoms which are unequivocal. As an instance of this, a case may be referred to which was under the care of Mr. Horsley and one of us (Beevor). The patient had occasional fits with unconsciousness, beginning in the corner of the mouth, six years before other symptoms arose which justified operation, and then the tumour was found to be so situated that it could not be removed without producing aphasia. It would be easy to mention other cases illustrating the same point.

In any case in which the typical signs of tumour are absent, and where the fits always begin with the same localised warning, and are attended with loss of consciousness, the question is, Are these fits due to idiopathic epilepsy, or are they due to a tumour? And we would say that no operation is advisable, other signs of tumour being absent, unless the paralysis which follows the fits is permanent—that is, not recovered from in the course of a few days, or unless the fits occur very frequently. While it is impossible to lay down absolute rules for the treatment of these cases, it would appear that occasional fits, beginning locally, followed by loss of consciousness and attended only by headache, would not justify an operation. But that any other combination of the type symptoms—headache, purposeless vomiting, optic neuritis especially with failing sight, localised fits, and permanent paralysis—would render surgical operation advisable.

³ BRITISH MEDICAL JOURNAL, 1887.

⁴ Horsley, BRITISH MEDICAL JOURNAL, 1893.

TO ILLUSTRATE PAPER BY CHAS. E. BEEVOR, M.D., AND CHAS. A. BALLANCE, M.S.

DESCRIPTION OF COLOURED PLATE.

The drawing was made from memory (C.A.B.). It illustrates the plan of and the parts involved in the operation. The opening in the bone corresponds to the deficiency at present existing in the patient's skull. It is to be remembered that the curve of the head prevents the actual linear dimensions of the deficiency in the skull being reproduced on a flat surface. The drawing is a view at right angles to the mid point of the exposed cortex and was made in part from the normal brain and in part by the help of one of Professor Cunningham's casts. At the upper border of the opening in the skull is seen the sagittal suture, at the lower border the scalp flap and the flap of the dura mater. R = the sulcus of Rolando. + = the place where the cortex ruptured during palpation. With regard to the area of so-called "motor cortex" involved in the operation the reader is reminded that the ascending frontal and parietal convolutions are separated from each other for a distance of $3\frac{3}{4}$ inches by the sulcus of Rolando. The fine silk cortical ligatures which controlled the bleeding within the region of the operation are represented. The continuous line within the silk threads is the line of incision of the cortex. The darker blue tint of the dura below the sagittal suture marks the course of the superior longitudinal sinus.

THREE CASES OF INTRACRANIAL ABSCESS :
RECOVERY IN EACH CASE.

By ROBERT W. MURRAY, F.R.C.S.,
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ONE of the following cases was operated upon three years and a-half ago, and an account of this case has been published in the BRITISH MEDICAL JOURNAL of February 13th, 1892. I again refer to it as the subsequent history of patients operated upon for cerebral abscess is always of interest, especially when the lesion occurs in childhood.

AFTER-HISTORY OF A CASE OF CEREBRAL ABSCESS.

The following is a brief history of this case. A. L., admitted into the Children's Infirmary on May 5th, 1891, on account of loss of power of the left hand, and epileptic seizures affecting the left upper extremity and the left side of the face. A fortnight previous to her admission her father threw a poker at his wife, missed her, the poker striking the child end on, on the right side of the head. There was free bleeding from the wound, which was cleansed and a plaster applied. The child appeared to be in her usual good health until two weeks after the accident, when she ran into the house crying, because her left arm and the left side of her face were twitching. This twitching continued without any loss of consciousness for half an hour. She had no further attacks until the day before admission. When I saw her there was paralysis of the left upper limb, chiefly involving the hand, which assumed a claw-like position. There was a small sloughing scalp wound in the right parietal region, corresponding to the junction of the upper with the middle third of the Rolandic area. The bone here was bare, and a probe could be passed through a small aperture in it into the cranial cavity. I trephined at this spot, and at a depth of two inches opened a cerebral abscess, a drachm of thick non-offensive pus escaping.

She had no more fits, and made an uninterrupted recovery, very soon regaining the power of the paralysed arm and hand. She was at the time of operation 5 years old, and is now $8\frac{1}{2}$ years of age. During these three years and a-half she has enjoyed good health, and shows no sign of mental impairment.

TEMPORO-SPHENOIDAL ABSCESS.

In the next case the abscess was the result of middle-ear disease. L. J. was admitted into the Children's Infirmary on November 17th, 1893, being then $9\frac{1}{2}$ years of age. She was quite well until four weeks previous to her admission, when she had great pain in her left ear. This was followed by an offensive discharge from the ear, which discharge continued for four or five days; it then ceased, and there had been no discharge from the ear since then. This ear trouble necessitated her being away from school for a week. She went back to school on October 23rd, but remained at home the next

day, as she felt tired, and her head ached. She, however, attended school the following day, and managed the morning lessons, but only had light work to do, as she looked poorly. She returned home at midday, and almost as soon as she arrived had a fit. In this fit she struggled slightly, then became semiconscious, and relapsed into another fit; this was followed by a third, the three fits lasting in all about one hour and a-half. The character of these fits could not be ascertained, as the friends were too much upset to observe details. These attacks occurred on October 28th. After that date she had no more fits, but was decidedly ill, remaining in bed with the exception of two days, until her admission, complaining of constant frontal headache. She vomited occasionally. She had no shivering and was not feverish. She was brought to the hospital on November 17th, it then being four weeks since the onset of the otorrhœa, and three weeks since her last fit. She was a well-grown child, conscious though drowsy, knew where she was, and answered questions. Constantly put her hand to her forehead, and said her head ached. There was a slight divergent squint of the left eye, and the left pupil was dilated. The right side of the face was slightly paralysed, but there was no apparent weakness of the right arm or leg and no aphasia. There was no discharge from either ear. Her temperature was 97° F. Mr. Stevenson, Surgeon to the Eye and Ear Infirmary, kindly examined the eyes for me, and said there was double optic neuritis, more marked in the left than in the right eye. As it was late in the evening when the child was admitted I decided to postpone operating until next day. But shortly after I arrived home I was telephoned for, as the child's condition had undergone a marked change for the worse, and she appeared to be dying. Her pulse and respiration, which on admission were both below normal, had fallen to 48 and 8 respectively.

Fig. 1.—Case II: temporo-sphenoidal abscess showing line of incision adopted.

I at once operated, making a curved incision practically corresponding to the line of the squamous suture on the left side, and removed a disc of bone with a half-inch trephine, about three-quarters of an inch directly above the external auditory meatus. The dura mater bulged into the opening and did not pulsate. When the dura was divided the brain protruded through the incision. I then passed a tenotomy