reported that anaesthesia was not quite so good as it had previously been with the cocaine solution.

In 5 cases, all of whom had been previously anaesthetized with 0.5 solution of cocaine, 1 per cent. solution was used. In the first it was for the passage of a Kollmann's dilator, and in the second of a cystoscope; the remaining three were cases of gonorrhoea in which silver nitrate solution was being instilled into the posterior urethra. All the patients reported that borocaine gave them better anaesthesia than the 0.5 per cent. solution of cocaine.

In 3 cases 2 per cent. solution was used before the passage of a Kollmann's dilator. All these patients had had frequent previous injections of cocaine. It was also used for two cases of cystoscopy where there was no history of previous instrumentation. In the first three of these cases the patients reported perfect anaesthesia and relaxation was improved, as evidenced by the fact that dilatation was higher than usual. In the two cases of cystoscopy anaesthesia and relaxation were perfect, and I consider decidedly better than it would have been with a 0.5 per cent. solution of cocaine. A 5 per cent. solution was tried in the three cases of urethral stricture, with perfect results as far as anaesthesia and relaxation were concerned, but really there was no advantage over the 2 per cent. solution. One of these three patients complained for about two or three minutes of a feeling which he described as rather like a lump in the throat, but this passed off, and there were no further symptoms.

In two cases 2 per cent. solution of norocaine hydrochloride was used as a control. These patients had both had frequent injections of 0.5 per cent. solution of cocaine hydrochloride for the passage of a Kollmann's dilator. They reported that anaesthesia was not so good as before, and relaxation was less, in that dilatation fell short of the point reached on previous occasions.

Conclusions.

A 2 per cent. solution of borocaine borate was a considerable improvement over 0.5 per cent. solution of cocaine in respect both of anaesthesia and relaxation, and there was no sign of toxicity.

The 2 per cent. solution of norocaine hydrochloride fell short of a 0.5 per cent. solution of cocaine. A 1 per cent. solution of borocaine borate gives better anaesthesia than a 0.5 per cent. solution of cocaine.

A 0.5 per cent. solution of borocaine borate has no advantage over a 0.3 per cent. solution of cocaine.

The cocaine solution used at All Saints' Hospital is made up with 0.5 per cent. sodium bicarbonate and 1 in 40 camphor water. A 1 per cent. solution of cocaine has not been tried owing to the risk of toxicity.

BETA-EUCAINE BORATE.

This was used on patients who had previously had frequent injections of 1/2 per cent. cocaine hydrochloride solution. The following results were obtained.

Beta-Eucaine Borate 1/2 per cent.—This was used in two cases for dilatation of urethral stricture with a Kollmann's dilator. Both patients reported that they had never had such perfect anaesthesia, and relaxation was also very good.

Beta-Eucaine Borate 1/4 per cent.—This was used in two cases of urethral stricture before the passage of a Kollmann's dilator. Both patients reported that they saw no difference between this and their previous injection, and relaxation was the same.

Beta-Eucaine Borate 1/8 per cent.—This was used in two cases of urethral stricture, for the passage of a Kollmann's dilator in one case and a gum-elastic bougie in the other. Both patients reported rather more pain than they usually got with 1/2 per cent. cocaine.

Conclusions.

Beta-eucaine borate in 1/2 per cent. solution is a perfect urethral anaesthetic, and relaxation is also perfect. In 1/4 per cent. solution it is equal in its action to 1/2 per cent. cocaine hydrochloride. In 1/8 per cent. solution it is not so good as 1/2 per cent. cocaine.

A 1 per cent. solution of this borate was not used owing to the perfect result of the 1/2 per cent. solution.

THREE CASES OF MIDDLE-EAR DISEASE WITH INTRACRANIAL COMPLICATIONS.

BY

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It often happens that patients who have suffered from chronic suppurative otitis media imagine themselves to be cured because all discharge from the ear has practically ceased. They then return to their normal way of life, giving their condition no further thought; so that one or two striking instances of the risks so run may not be out of place. Instead of keeping their ears under the occasional observation of an aurist, they lull themselves into a state of false security until some disaster occurs and they are found to be in imminent danger of death, when nothing but prompt and drastic surgical intervention can save them. A typical pathological condition under which this occurs is cholesteatoma formation. Under local conservative treatment of the nose and ear all discharge ceases; but the irritation of infective matter still remaining in the attic or antral regions causes proliferation of epithelium, until an amorphous cheesy mass is formed in which cholesterol crystals are thickly deposited. Gradually the bone becomes eaten away until the dura mater is exposed, when the invasion of lateral sinus or brain is only a matter of time.

An ear which is dry but foul-smelling should always be suspect, and if a few fibres of cotton-wool twisted closely on a carrier are introduced through the perforation (often in the attic region) and come away coated with thick nauseous matter the diagnosis of cholesteatoma formation may be made with confidence and a radical mastoid operation advised. Unfortunately, as discharge ceases, patients often take matters into their own hands and disappear; but they should previously be warned that the ear requires occasional supervision, unless it is so obviously healthy that the patient can be dismissed with a clear conscience on the part of the aurist. Every aurist knows of cases where patients have neglected or have failed to understand such advice and paid the penalty of death. In the cases I have selected the patients were somewhat more fortunate; each case presents certain individual features which are interesting of themselves apart from any moral to be drawn therefrom.

CASE I.—Cerebellar Abscess with some Unusual Features.

A young agricultural labourer had for some weeks been suffering from bad headaches, and after a short time became increasingly drowsy. He was accordingly admitted to the Romford Infirmary under Dr. O'Loughlin.

After an initial rise of temperature lasting three days the fever subsided and the body heat became if anything subnormal and remained so. The pulse also after a short period of increased rate became normal and of good quality. Meanwhile the mental condition progressively deteriorated and the patient was almost continuously in a state of coma, from which he could with difficulty be aroused to take a little food at intervals. He gradually lost weight and became very emaciated. His limbs were flaccid and no definite reflex responses could be obtained. There was a vague history of his having, some years previously, suffered from middle-ear disease, but there was now no discharge from either ear and he had for a long time been considered cured of that trouble. The condition seemed to warrant a diagnosis of encephalitis lethargica, and after a second concurring opinion the patient was treated from this point of view.

He gradually became worse, could no longer be roused from coma, and on Saturday night, August 30th, 1924, profuse discharge started from the left ear and a little from the right ear; the next day I was called to see him.

Examination showed the patient to be in the last stages of emaciation—resembling a case of cholera. All the bony prominences of his face were clearly defined, with deep hollows between them. He was quite unconscious and his mouth lay open, with sordes on both lips and tongue. He had lost his left eye in infancy, but the right was half closed, with the pupil turned upwards. All his limbs were flaccid and his knee-jerks absent, while Babinski's and König's signs were negative. The pulse (76) was of good volume and pressure; the temperature was subnormal; the respirations were only four to the minute, and the patient appeared to be moribund.

A diagnosis of left-sided intracranial abscess was made owing to the profuse discharge from the left ear, and an immediate

operation decided upon as the only chance of saving his life. Within half an hour he was on the table, and was given an anaesthetic of open ether in the hope of stimulating his respirations; this was successful.

Operation.—A rather wide post-auricular incision was made and the mastoid process opened. Pus was soon found, and, a little deeper, a cholesteatoma; there was an "overhanging" middle fossa and a "forward" lateral sinus. A considerable area of dura mater was rapidly exposed over both middle and posterior cranial fossae; everywhere the temporal lobe and cerebellum bulged into the field of operation under high pressure; the whole area was in a state of intense engorgement and of soft consistency, it being impossible to distinguish brain from dura mater. On gently probing the soft red mass in the direction of the cerebellum, pus was seen to come from a posterior direction, and a director was passed into a large abscess cavity backwards and inwards. The pus, which was liquid and foul-smelling, was allowed to escape slowly while the radical mastoid operation was completed with some difficulty owing to the bulging of the brain into the cavity. Pus escaped slowly for about half an hour, and I estimated it at 1 to 1½ ounces. The director passed into the cavity for 2 inches, but the width of this cavity was impossible to estimate owing to the surrounding encephalitis and high pressure, which was so great that a small-bore rubber drainage tube passed into the bottom of the cavity was squeezed out again in two or three seconds, and had to be transfixed by a safety pin and held in position by the dressings. The pinna was then packed forward, dressings applied, and the patient returned to bed.

The respirations had by this time become fifteen to the minute, due to the relief of intracranial pressure on the respiratory centre in the medulla oblongata following on the evacuation of the abscess.

Progress.—The course of events was then as follows: Two days later the patient regained consciousness. The tube was replaced

CASE II.—Lateral Sinus Suppuration with Metastases in Lung and Shoulder.

A young man, aged 20, was admitted to University College Hospital complaining of headache. His temperature was raised and his pulse rapid, and it was thought that he had influenza. A year previously he had attended the hospital for a running ear, but believed himself to have been cured of that complaint as all discharge had ceased, and he discontinued coming.

Two days after admission he had a rigor, and his right ear became tender on pressure over the mastoid process; I then saw the case and made a diagnosis of lateral sinus thrombosis. The membrana tympani had a small perforation behind the handle of the malleus, was not inflamed, and only a little moist. An operation was performed without delay.

Operation.—The usual curved post-aural incision was made, and the mastoid opened. The cortex was thick and very dense, but pus was soon found in a large cavity, involving the antrum and the cells adjacent to its lower border, the greater part of which was occupied by a cholesteatoma. A radical mastoid operation was completed, during which the facial nerve, laid bare by the cholesteatoma, was unfortunately cut. A channel of soft bone was then found running through the dense cortex and was exposed until the lateral sinus was laid bare. As soon as a small piece of bone was removed from over it pus welled out and the sinus wall was seen to be collapsed. Accordingly the ear wound was temporarily covered with dressings, and the jugular vein was exposed in the neck. The common facial vein was divided between ligatures, and 1½ inches below its junction the jugular vein was divided between ligatures and the upper end brought out on to the neck through the upper part of the incision, which was otherwise closed. Dressings were applied and the mastoid wound was again investigated. More bone was removed from the sinus, and the outer wall of its dura mater, which usually lies in contact with the bone, was found partly destroyed and its remains rolled up

Temperature chart of Case II, showing the various stages of the patient's illness.

every day for a week, when it could no longer be introduced. The skin flap was allowed to fall back into place. The mental condition remained poor.

Three weeks later, when I again examined the patient, it was found that the wound had nearly healed and that there was no longer any discharge from the meatus. The right eye showed coarse nystagmus to the opposite side. There was some weakness of grip of the left hand compared with the right, and he had difficulty in pronating and supinating rapidly the clenched fists of both hands at the same time in a symmetrical manner; the difficulty taking place in the hand on the same side as the cerebellar lesion—a condition called dysdiadochokinesis; he also had some difficulty in carrying food to his mouth with the left hand. The knee-jerks were absent; Babinski's sign indefinite. His general condition was much improved; he had put on flesh and could take food well. His mental condition was poor, but he could ask for what he wanted.

During the next three months he put on 3 st. in weight, and then went back to his work as an agricultural labourer. His only inconvenience during convalescence was some inco-ordination of the left leg. His mental condition remained poor, but, on the other hand, he had never at any time shown any intelligence above a low bucolic level. He finds no difficulty in doing his work.

My thanks are due to Dr. O'Loughlin for the opportunity of operating on this case, and for himself successfully carrying out the after-treatment, on which so much depends; and to Dr. Boyce for giving the anaesthetic in difficult circumstances.

This case is interesting because of the large size of the cerebellar abscess, the long duration of coma, the extreme emaciation and moribund condition of the patient, and his remarkably complete recovery. In such cases death is frequently the result of failure of breathing brought about by pressure on the respiratory centre in the medulla oblongata. Here the respirations had been reduced to four to the minute. The result recorded well exemplifies the favourable outcome which may be hoped for if such pressure be relieved in time.

in one corner of the abscess cavity. Pus was pursued in the proximal and distal portions of the sinus until a little clot was found, and free haemorrhage obtained at both ends. These were then plugged with small strips of ribbon gauze. The wound was left widely open, dressings applied, and the patient returned to bed.

Progress.—The patient appeared a little cyanosed, but made good progress until another rigor announced the formation of an abscess in the left subacromial bursa, which was opened. The lower end of the upper segment of the jugular vein also started to discharge through the opening which was left in the upper part of the incision in the neck. He again appeared to mend, until another sudden rise of temperature was caused by a patch of pneumonia in, and partial collapse of, his left lung. But in spite of that he continued to make good progress until the advent of the fog of December 10th, 1924, when he took a decided turn for the worse, possibly owing to the effect of the foul air upon his lungs. An abscess gradually developed in the lower lobe of the left lung, accompanied by a rise of temperature for fourteen days; but its contents were gradually coughed up, and the condition settled down. The temperature chart shows the various stages of the patient's illness. The post-aural wound cleared up well, and there was no further discharge. But a small plastic operation will be necessary at a later date to secure a good cosmetic result. A facial-hypoglossal anastomosis is also a matter for future consideration, but its desirability in this particular case is doubtful. The lung and shoulder lesions already referred to have both made favourable progress, and the patient is now well.

Points of Interest.

(a) *Factors against the Patient.*—(1) At the time of the operation the clot in the lateral sinus was about 2½ in. long, of which about 1½ in. had already suppurred. (2) Although the jugular vein was tied before any surgical interference with the sinus had taken place, metastases had already occurred.

(b) *Factors in Favour of the Patient.*—(1) When suppuration occurred in the lower end of the upper and isolated portion of the jugular vein, there was drainage awaiting it in the neck owing to part of that incision having been left open. (2) As soon as practicable the abscess in his subacromial bursa was opened and drained. (3) A metastasis occurred in only one lung and

respirations were not at any time very rapid. (4) The patient's own courage and apparent indifference to matters concerning his health.

My thanks are due to Mr. Herbert Tilley for the opportunity of operating upon and permission to publish this case; and to Dr. Batty Shaw and Mr. J. B. Hunter for kindly looking after the medical and general surgical aspects of the case.

In both of these cases the ear was not at first suspected on account of apparent cure of the aural condition. The result was that neither was operated on until the disease was so advanced that recovery seemed doubtful.

The conditions governing and the symptoms associated with cholesteatoma formation are such as to warrant some such general rule as follows: "That when anything goes seriously wrong with a patient who is suffering from, or has at any time suffered from, aural discharge, the ear should be suspected unless a diagnosis of some unconnected disease can be made with certainty, and the ear excluded." In such a case, unless the ear can be absolved, operation is indicated; because the risks run by an early operation are as nothing compared with the danger of delay. The safest course of all is to keep chronic suppurative middle-ear disease under observation, and perform a radical mastoid operation as soon as it is clear that no simpler measures will cure it, and before any intracranial complications have had time to develop.

CASE III.—Staphylococcal Meningitis of Otic Origin: Operation: Recovery after Trans-thecal Irrigation.

The patient, a small girl aged 2 years, was admitted to University College Hospital under Dr. Poynton on April 19th, 1925, suffering from signs of early meningitis, which was at once recognized as being of aural origin.

History.—On September 1st, 1924, the patient had been admitted to University College Hospital with an acute mastoid abscess of the right ear. This was successfully operated upon. Three weeks later the tonsils and adenoids were removed, and in another fortnight she was discharged apparently cured. On December 4th, 1924, she was again admitted with a profuse discharge from the nose and throat, as well as from the right ear. There was also an abscess beneath the scar of the previous operation. A conservative operation was again performed, in the hope of saving the hearing of the right ear. Unfortunately the next day the child was found to have measles and was removed to a fever hospital. When she returned to the ward the posterior operation wound was soundly healed, but the discharge from the external auditory meatus still continued and became foul-smelling in spite of thorough treatment by irrigation, which was carried out as an in-patient. The parents were therefore advised that it was necessary to convert the conservative into a radical operation in order to make the ear safe; but further operation was refused and the child was discharged from hospital. She attended later as an out-patient, but made no progress. Operation was again advised, and was refused, and the parents no longer brought her to the aural out-patient department. On April 2nd, 1925, she became giddy and frequently vomited her food; but the parents paid little attention until she became drowsy, when they brought her to hospital on April 19th.

On examination the child was drowsy, with intervals of unconsciousness. When aroused she screamed, and resented any movement or interference. Temperature 102.5°, pulse 120. The eyes were upturned under half-closed lids. No nystagmus in any direction could be elicited. Hot and cold water tests were not attempted owing to the condition of the patient. There was foul-smelling discharge from the right external auditory meatus. The left ear also was now discharging, and pressure over the left mastoid process was evidently very painful. The head was retracted, and any movement of it was resented. König's sign was indefinite. The knee-jerks were brisk.

A diagnosis of meningitis of aural origin was made and an immediate operation decided upon.

Operation.—(1) Under a general anaesthetic a lumbar puncture was performed and a test-tubeful of turbid cerebro-spinal fluid was evacuated under considerable pressure. (2) The left ear being the most acute, a radical mastoid operation was performed on this ear first. The middle ear and mastoid process were found to be full of pus, and a search was made for a channel of infection of the meninges, but none was found. The wound was then plugged with gauze, soaked in bipp, and dressings applied. (3) A radical mastoid operation was then performed on the right ear; and a large fistula was found in the lateral semicircular canal. The labyrinth was thereupon opened above the canal of the facial nerve. The promontory between the fenestra ovalis and the fenestra rotunda was then removed and the vestibular cavity found to contain serum. It was evident that the infection had passed through the labyrinth and lamina cribrosa (through which the eighth nerve enters the labyrinth) into the internal auditory meatus and so to the basal meninges. The lamina cribrosa was therefore removed so as to allow the basal cisterns as free drainage as possible along the route of infection. (This method of establishing intracranial drainage is known as the Scott-West method.) No cerebro-spinal fluid escaped when this was done, which is unusual. A short rubber drainage tube was

then inserted into the deep part of the cavity, and gauze strips soaked in flavine were packed around it. Dressings were applied, and the patient was returned to bed after being under an anaesthetic for an hour and a half.

Progress.—The following day Dr. Goodhart's report on the cerebro-spinal fluid was: "Pus cells in large numbers. No organisms seen. No growth after twelve hours." The patient was slightly less restless, but otherwise the condition was unchanged. Temperature 102.5°, pulse 120.

Irrigation of the Internal Ear through the Spinal Canal.—The same evening another anaesthetic was given, and turbid fluid sufficient to fill a test tube and a half was removed from the spinal theca. The needle was accordingly left in position, and the operating table tilted until the patient's head was considerably lower than the pelvis. The dressing was removed from the right ear, which was downmost, and some Locke's solution at body temperature was perfused through the spinal canal by way of the lumbar puncture needle, in the hope that some infectious fluid might be washed out through the internal auditory meatus of the affected ear.² This was successful in so far that some 3 c.cm. of fluid escaped from the deep part of the mastoid wound on that side, whereas none had previously drained away. The dressings of both ears were changed, and the patient returned to bed. At this time the pulse rate had risen to 160, there was some collapse, and the condition gave rise to anxiety. But during the night there was continuous improvement, the temperature fell to 99.5°, and in the morning the child was conscious and sensible; at lunch-time she sat up and asked for pudding. The recovery was remarkably rapid.

Dr. Goodhart's report on the cerebro-spinal fluid evacuated the night before was as follows: "Pus cells ++; staphylococci in large numbers." But there was no growth in culture, and it was evident that drainage of the basal cisterns of the meninges and the internal meatus and ear was effected sufficiently early to prevent their reinfection through the ear, thus allowing the cerebro-spinal fluid to overcome the initial contamination.

The patient subsequently made good headway, and ten days later the incisions for each operation were closed by sutures after cutting the meatal flaps usually made in a radical mastoid operation. This could not be done at the time of the first operation owing to the necessity of establishing as free drainage as possible for both ears, and of getting the patient back to bed in the shortest possible time.

The child is now well.

I have to thank Mr. Herbert Tilley for the opportunity of performing the various operations on this case and for permission to publish it.

Sir William Milligan has differentiated three types of meningitis of otitic origin: (1) Meningitis benigna (or serous); (2) meningitis semi-maligna (in which pus cells are present in the cerebro-spinal fluid); and (3) meningitis maligna (in which both pus and organisms are present). Of cases in Type 3 only 2 to 3 per cent. have been known to recover, whatever treatment they received.³ From what I have seen of such cases the majority of the few cases of meningitis maligna which do recover appear to be staphylococcal.

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THE NON-OPERATIVE TREATMENT OF PYLORIC STENOSIS.

BY

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DURING a term in attendance at the Kaiser and Kaiserin Friedrich Kinderkrankenhaus, Berlin, in February and March, 1925, I was enabled, through the kindness of Professor H. Finkelstein, the director, to investigate the results of the non-operative treatment of pyloric stenosis. The following is an analysis of these results, and an attempt to estimate the value of the various kinds of feeding and medicinal measures.

The results of non-operative treatment are of interest because of the decided bias toward the operative procedure in England. German medicine has adopted a conservative attitude. Its resources are directed to postponing operation as long as possible. Statistics of successful treatment naturally are the criterion of the justice of this view. The results, so far as figures are available, appear to support it.