

muscles and the drawing up of the legs are common symptoms, but general convulsions may also manifest themselves; these are usually inaccurately and inappropriately called "internal convulsions." Pain due to dysperistalsis is often relieved by pressure of the hand, by laying the infant on its stomach, or by hot applications to the belly. Massage along the axis of the colon often promotes the onward passage of a wave which has been fixed, as it were, in a localised spasm, and may then give instant relief.

If the points which I have already enumerated are remembered, no difficulty should be experienced in making a correct diagnosis, although we know well that such serious conditions of enterospasm as volvulus, intussusception, hernia, and constricting bands are occasionally mistaken for enterospasms of functional origin. Persistent and stercoraceous vomiting, a tumour palpable by the hand applied externally, or by the finger passed internally through the rectum, persistent constipation, or a muco-sanguineous discharge from the bowel, are diagnostic indications which can hardly be missed with the exercise of ordinary care.

A few weeks ago I saw an infant who was supposed to be suffering from an intussusception. The infant was, as a matter of fact, passing blood per anum, and was suffering from a severe attack of colitis. But colitis can hardly be mistaken for intussusception if the precaution is taken of making a digital examination of the abdomen per rectum.

Now, as regards the treatment of cases of abdominal pain due to dysperistalsis or enterospasm: excluding all those cases which have an organic basis, they may well be divided into the two classes—acute and chronic.

In acute cases energetic means of a nature we would not willingly repeat may be confidently applied. The chief desideratum is to relieve the spasm and keep the bowel at rest until the exciting cause has been removed. To effect these purposes there is probably no better treatment than the old-fashioned remedies, castor oil and opium. It is needless, I imagine, to remind you that care must be exercised in giving opium. I think that small and repeated doses, during which you can watch the effect, are much safer than one comparatively large dose. *Tinctura camphoræ composita* is a useful form in which to administer opium; one drop given every hour to an infant three months old is not likely to lead to much trouble. Brandy is always a useful antispasmodic, and may be given in 10–15 drop doses to an infant of the same age. All food should be suspended until the symptoms have subsided.

In the more chronic cases we are usually confronted with a vicious cycle of events; the nervous system is made irritable and explosive by the constant sensory impressions which reach it, and the dysperistalsis is encouraged by this very irritability of the nervous centres. It is important, therefore, to dull the excitability of the nerve cells by a nerve sedative such as bromide or opium, while the intestine should, of course, be relieved of all unduly powerful stimuli. The adjustment of the food is naturally one of the factors on which success most depends; cow's milk I regard as a powerful stimulus, especially in the unaltered state; completely peptonised it is less stimulating. Veal broth, whey, or even condensed milk, often help us to tide over temporary difficulties. The most valuable drug I know of in all these cases of irritability of the bowel is petroleum, and this best in the form of an emulsion. Petroleum soothes the bowel; it lubricates its surfaces, and it seems in some way to check decomposition.

Let me now pass on to another group of cases which certainly come under the same category of disturbed motor function. I mean those cases which are characterised by crying and evident pain whenever the infant passes urine. These cases are possibly more common in the case of boys than in that of girls, but in both they are common enough. I do not think, as a rule, the symptoms are dependent on acidity of the urine and irritation of the urethra as the scalding water passes over an irritable mucous membrane. The pain, I believe, is connected with incoördinated muscular contractions associated with the action of the sphincter vesicæ, and possibly with the muscles of the bladder itself; the pain is educational and protective. I only mention these cases because they are so common, and because they often give rise to a suspicion of stone in the bladder.

Renal calculi and concretions of urinary origin give rise to very severe symptoms in infants. The routine examination

of the urine is the only means of avoiding mistakes in diagnosis. A short time ago I had under my charge a newly born infant. I took great care to avoid disturbing the peristaltic functions by unsuitable diet, but in spite of my care the infant evinced the clearest signs of abdominal pain. I could not believe that they were connected with the bowel functions, but for quite 24 hours I could not find any adequate explanation of the constant crying. At the end of that time the child began to pass large quantities of amorphous urates, which evidently gave the infant severe pain on their passage through the ureters. I have known several cases in which concretions have crystallised out of a concentrated urine, and I have found quite hard masses in the urethra which have necessitated removal by surgical interference. The pain of renal colic, due to obstruction of the ureters in the passage by calculi, is generally severe in infants; general convulsions often ensue, and there is nearly always evidence of some hyperæsthesia in the loins and back. The examination of the urine is, of course, the most valuable diagnostic guide under circumstances in which gravel is suspected.

Abdominal pain due to spinal disease, caries or osteomyelitis, often escapes diagnosis. The spine, however, should be examined as a matter of routine, and undue rigidity should always arouse suspicion. It is well to remember that lateral movements of the spine apparently cause more pain in spinal caries and osteomyelitis than forcible extension and flexion in the antero-posterior directions.

Pain due to appendicitis and peritonitis is not usually very severe in infants. Examination by way of the rectum is best calculated to reveal the existence of the conditions. Tuberculous peritonitis often runs a very chronic and unobtrusive course, and in my experience gives rise to very little pain.

The only way, after all, to appreciate the illusive symptoms of the impressionist baby is to live with it, or even to sleep with it. But pain must not be regarded as an unmixed evil; it is often a most valuable educational medium.

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EXTRADURAL ABSCESS AT THE APEX OF THE PETROUS BONE.

A COMPLICATION OF ACUTE INFLAMMATION OF THE MASTOID PROCESS; OPERATION; RECOVERY.

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AN extradural abscess is the most frequent complication of acute inflammation of the mastoid process, being due to direct extension of the infective process through the bone to the outer surface of the dura mater, and is almost invariably found in the region of the tegmen tympani or of the lateral sinus, the latter being most frequent. In this particular instance the situation of the abscess at the inner part of the anterior surface of the petrous bone is so rare that I venture to publish the case in detail. Failure to discover such an abscess invariably leads to death from meningitis, usually from rupture of the abscess through the dura mater into the subdural and subarachnoid spaces of the posterior intracranial fossa; and necropsies proving this can no doubt be recalled by the majority of those who have had an extensive experience in aural surgery.

The history and subsequent treatment of the case are as follows. During the first week of April, 1912, the patient, a girl, aged 18, while at school abroad, had an acute attack of earache on the left side, accompanied by some tenderness over the tip of the mastoid. Within a day or two the drum perforated with considerable relief of the pain, and as there were no serious symptoms the medical man in attendance sent her home to England. The patient first came to me on April 23rd, three weeks after the onset of the trouble. There was a history of intermittent attacks of neuralgia of the left side of the face and for the last two weeks pain in the head, but there was no sickness or giddiness. The patient looked ill, and was dull and languid. Examination of the ear showed marked bulging of the tympanic membrane in the upper posterior quadrant, with a small nipple-shaped perforation from which exuded considerable discharge. There was also some slight tenderness over

the tip of the mastoid. The patient was at once put into a nursing home. During the night the temperature was 100° F. and the pulse-rate 104.

Although the general condition pointed to the probability of the mastoid operation being indicated, paracentesis was first performed on April 25th. This seemed justifiable, as there was no pain over the body of the mastoid, and the drainage from the middle ear appeared to be insufficient. After paracentesis the temperature and pulse-rate at once became almost normal and the headaches and neuralgia disappeared. Within two days, however, there was further bulging of the membrane, with renewal of the symptoms. On April 29th the simple mastoid operation (Schwartz's) was performed. The extent of the disease was found to be much greater than had been anticipated. The cortex was dense; the antrum together with a large cell at the tip of the mastoid process were full of pus; and the bone was soft and hæmorrhagic, with dots of pus spreading through it, especially in the posterior group of cells surrounding the lateral sinus.

The operation was extensive, involving exposure of the outer wall of the lateral sinus for a considerable distance posteriorly, with complete removal of the mastoid cells. The opening into the aditus was enlarged, and at the end of the operation fluid could be syringed through it into the middle ear and out of the auditory canal. The wound cavity was lightly packed with gauze. Cultures taken from the secretion showed a pure growth of the pneumococcus.

The immediate result of the operation seemed satisfactory, the tympanic membrane healing within a week, and by the fourth week whispering could be heard at least 15 feet off. On the other hand, there were still occasional attacks of neuralgia on the same side, and on changing the dressings a drop or two of pus always oozed out from the depths of the wound just behind the aditus. Examination of the optic discs and of the general nervous system showed them to be normal.

By May 25th the symptoms were so slight and vague, and the amount of purulent discharge so minute, that I thought it permissible to allow the patient to return to the care of her medical attendant in the country, in the hope that change of air and tonics might do her more good than remaining in a nursing home, but he was warned that the case was not progressing normally, as by this time the purulent discharge ought to have ceased. On June 9th (six weeks after the operation) a letter was received from the medical attendant saying there was still some purulent discharge from the depths of the wound cavity which otherwise was quite healthy, and that the hearing seemed normal, but he added the following note: "Within a few days since she arrived she has been sick every morning when she gets up. It passes off, and she goes on all right for the rest of the day. She also has a good deal of neuralgia of the left side of the face. Her pulse is about 60 and her temperature sub-normal. She is looking rather better, but is still listless and disinclined to do much."

On receipt of this I telegraphed for the patient to come to London. On June 10th, when I went to the nursing home to examine her, I found her lying curled up in bed on the opposite side, still complaining of slight pain over the affected side of the head, often referred to the eye, with attacks of nausea when she moved about. Examination showed the wound to be much smaller and to be healing well, but a drop of pus oozed from the depths of the wound on the removal of the gauze dressing. There was no nystagmus, and the reflexes and optic discs were normal. Next day the patient was anæsthetised and the wound carefully examined. Pus was found to exude drop by drop from a minute aperture in the tegmen tympani at its innermost margin, through which, however, a probe could not be inserted.

Further operation was then decided on in the expectation of finding an extradural abscess in the region of the tegmen tympani, but as the hearing was normal I promised the parents not to interfere with the tympanic cavity. For this reason the operation was limited to chiselling away the posterior wall of the auditory canal, with the exception of its innermost margin, together with the posterior part of the tegmen tympani. Unfortunately, the suspected extradural abscess could not be discovered even on raising up the dura mater from the underlying bone. The dura mater itself was slightly congested, but its surface was intact and

pulsation was definite. The result of the operation was negative.

On June 13th (two days later) the patient complained of feeling sick and of pain in the left eye, but next day she was very much brighter, having no pain or vomiting, and retching less when moved. On dressing the ear no pus was seen to come from the wound cavity. On June 15th she seemed rather worse, being more drowsy, with a constant feeling of nausea, and she lay curled up in bed on the opposite side, having occasional periods of restlessness. It was obvious that there was still some undiscovered cause for these symptoms, and as there was nothing pointing to an intradural lesion it seemed certain that there was a collection of pus situated somewhere between the bone and the dura mater.

Mr. Charles Ballance and Dr. Henry Head were now called into consultation. Dr. Head confirmed that there was no optic neuritis, and that there were no symptoms pointing to an intradural lesion. Mr. Ballance also agreed with this opinion, and as pus was again oozing from the depths of the wound he supported my diagnosis of a deeply seated extradural abscess. Next day, June 16th (Mr. Ballance being present), I operated again, the remains of the posterior wall being freely removed, together with the outer wall of the attic, the malleus, and incus. The anterior portion of the tegmen tympani was then removed as far forward as possible, also the bone between the lateral sinus and semicircular canals, so as to expose the dura mater in the region of the posterior surface of the petrous bone. No extradural abscess could be discovered in this region. It was then decided to work forwards and to explore the inner part of the anterior surface of the petrous bone, even though it involved injury to the superior semicircular canal. The eminence formed by the superior semicircular canal was then cut away, which permitted the lifting up of the dura mater from the anterior surface of the petrous bone. As no pus could be seen, a blunt director was passed forwards downwards and inwards towards the apex of the petrous bone. After it had been inserted for nearly an inch over a drachm of thick yellow pus gushed out. Two fine rubber tubes were then inserted along the track of the director, and the abscess cavity flushed out with dilute hydrogen peroxide solution. The dura mater forming the roof of the abscess was somewhat thickened, and pulsation could not be felt. It was therefore incised for a space of half an inch, when some slightly turbid fluid escaped. A small rubber tube was then fixed into this opening by means of a suture, and the wound cavity lightly packed with gauze.

After the operation the patient was very restless and noisy, the pulse being 118 and the temperature 98°. Vomiting was incessant and was not relieved by a hypodermic injection of 1/6th grain of heroin. The patient lay curled up on the opposite side. As soon as she was conscious it was noticed that there was marked lateral nystagmus to the opposite side. The slightest movement caused the most intense giddiness and gave rise to the sensation that objects were going round in the opposite direction even when the eyes were closed. Next day the temperature was 99-99.4° and the pulse-rate 116-120. The patient lay motionless in bed, curled up in the same position, and objected to the slightest movement. Nystagmus was still intense and the vomiting so incessant as to prevent food being taken by the mouth, subcutaneous injections of ¼ grain of morphia in no way relieving it. Thirty-six hours after the operation collapse was extreme from general exhaustion. Improvement was obtained by means of saline injections and nutrient enemata. This treatment had to be continued for three days owing to the continued retching and vomiting. The patient still retained the same position of lying curled up in bed on the opposite side. The wound was dressed each day, when pus exuded freely from the deeply placed tubes.

By June 20th the general condition was improved, nystagmus being less intense when lying quietly, but there were still marked giddiness and nausea when trying to lift the head from the pillow; also the discharge from the tubes was becoming less. It was now possible to feed the patient by the mouth. She began to sleep better and to make spontaneous movements. On June 24th the tube was removed from the dura mater and the other drainage tubes were also removed, cleansed, and reinserted. The discharge had almost ceased. Next day there was a relapse, the patient being very depressed and inclined to be drowsy. There was

also a recurrence of neuralgia in the head and of pain in the eye on the same side. The nystagmus and giddiness were less, but there was still marked vomiting on movement. The optic discs were examined and found normal. Next day there was no discharge from the tubes but the above symptoms had increased in intensity.

On June 27th there was increasing pain in the left eye. The drainage tubes were removed and the dura mater then raised from the surface of the bone by means of a spatula and a blunt probe inserted along the track of the tubes. About half a drachm of thick yellow pus escaped. Next day the patient was much better, although her general condition varied in an extraordinary degree, at one time there being considerable sickness with increase of nystagmus and at another complete freedom from pain or giddiness. By July 3rd the head symptoms, including vomiting and giddiness, had disappeared, and except for general weakness the patient was quite comfortable and could take light food. The wound looked healthy and on removing the tubes some clear fluid escaped in a slight amount. The dura mater was now seen to pulsate, which had not hitherto been noticed. Next day the tubes were removed. On the 7th the patient was allowed up for one hour, in spite of which there was no giddiness. From this time onwards an uneventful recovery took place, although until about the end of July there was still a tendency to giddiness if the patient made rapid movements or over-exerted herself. When seen in January, 1913, the following note was made, "The wound has now completely healed. The ear is in good position, the only external deformity being some depression behind the mastoid region which is concealed by the hair." Ever since December, 1912, the patient has been leading a normal life and enjoying society, including many dances. The hearing on the affected side is extremely bad, the voice only being heard when close to the ear. The high tuning-forks are not heard, showing that the internal ear is involved, the unavoidable result of the last operation during which the superior semicircular canal was injured.

Remarks.—The chief difficulty in the treatment of the case was the vagueness of the symptoms. Although the parents from the first pointed out that their daughter was usually of a bright and merry disposition, yet her dull and listless manner at the time of the first consultation was no more than might have been expected in the circumstances. At the same time, her intermittent attacks of drowsiness were sufficiently noticeable to be remarked upon by the nurses, although this was not brought to my notice until a later date.

After the first operation the unilateral headaches and attacks of neuralgia in the eye were so slight and so intermittent as to be almost neglected. Nevertheless, although no definite lesion could be discovered, one felt rather uneasy with regard to the progress of the case, because of the knowledge that after the simple mastoid operation the patient should be practically well with regard to her general condition within 48 hours; whereas the continuance of headache, neuralgia, drowsiness, or other such symptoms is always suggestive of some further extra- or intradural complication. With this feeling, but at the same time with the hope that the general condition might be due to the patient's temperament, and a suppurating cell the cause of the slight discharge and reflex symptoms, the patient was permitted to leave the home without further operation.

At the third operation it was necessary to remove the eminence of the superior semicircular canal in order to give more room to explore the innermost part of the anterior surface of the petrous bone. Before this was done it was found impossible to separate the dura mater sufficiently from the petrous bone. It was no doubt due to this anatomical fact that the abscess remained so localised and did not discharge itself more freely. The constant occurrence of headaches and neuralgia of the eye on the same side was probably due to irritation of the first division of the fifth nerve within the skull from the proximity of the abscess. Stoddart Barr has noted similar symptoms together with paralysis of the sixth nerve in connexion with suppuration of the cells at the apex of the petrous bone,¹ but in this case the cells were normal.

There was no evidence to prove the exact origin of the abscess, whether it was due to direct infection through the mastoid process, or through the tympanic cavity itself during

the period of acute suppuration; but the fact that the head symptoms dated from the beginning of the illness and disappeared when the abscess was evacuated, only to recur again when it re-formed owing to imperfect drainage, points to its development even before the first operation had been performed. The complete absence of labyrinthine deafness up to the time of the last operation excluded internal ear suppuration. A blood count, if taken, no doubt would have shown marked leucocytosis, and further confirmed the diagnosis of an abscess. The difficulty, however, was not the diagnosis, but the situation of the abscess. The unilateral headaches and neuralgic pains in the eye rightly suggested the abscess to be located at the inner part of the anterior surface of the petrous bone.

The failure to discover the abscess at the second operation was due to the fact that the operation was limited in extent because a promise had been given not to injure the tympanic cavity, and consequently sufficient bone could not be removed. The knowledge that a suppurative lesion was present made me hesitate to separate the dura mater too forcibly from the underlying bone owing to the risk of injuring the meninges; this only could be done after the more complete operation, which involved removal of the eminence of the superior semicircular canal.

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PNEUMOCOCCAL ABSCESS OF THE LUNG IN CHILDREN.

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THREE varieties of acute abscess of the lung are met with in children. There is the abscess which arises from the presence of a foreign body in the bronchus; the multiple abscesses often following broncho-pneumonia and debilitating illnesses which are found scattered throughout the lung, which are due to a variety of organisms and which are not amenable to surgical interference; and the single abscess due to the pneumococcus with or without a preceding lobar pneumonia. It is as an instance of the last, the least common variety, that I narrate the following case.

A boy, aged 6 years, was admitted into the Hospital for Sick Children, Great Ormond-street, on Nov. 14th, 1911, under the care of Dr. A. E. Garrod. From the parents it was ascertained that he had been in excellent health until five weeks before admission. His illness began with what was described as a bilious attack. He became feverish, suffered from pain in the side, and developed a severe cough. He wasted rapidly and became pale and ill. The vomiting attacks became more frequent, the vomit being described as resembling phlegm. He had developed a well-marked lateral curve of the spine since the onset of the illness. His previous health had been good and the family history was unimportant.

On examination the most striking features were the pallor of his appearance and the curvature of the spine in the dorsal region with the convexity to the left. There was no dyspnoea, no cyanosis, no clubbing of the fingers, and no glandular enlargement. The tongue was furred and the breath was rather offensive. Perspiration was excessive. The temperature was 100.2° F., the pulse was 152, and the respirations were 32. The movement of the right side of the chest was deficient. The right base was dull on percussion. There was no Grocco's triangle on the left side. Over the dull area the breath sounds were tubular in the upper part, faint but audible in the lower. The vocal resonance was rather ægophonic. There was no cardiac displacement, the apex beat being in the fourth space in the left nipple line, and there was a systolic murmur to be heard in the pulmonary area. The abdomen was somewhat tumid. The liver and spleen were not palpable, and no mass could be felt. The blood count was as follows: hæmoglobin, 80 per cent.; red corpuscles, 4,408,000; and leucocytes, 21,500. Differential count: polymorphs, 84 per cent.; large mononuclears, 0.5 per cent.; large lymphocytes, 6 per cent.; small lymphocytes, 9 per cent.; and eosinophiles, 0.5 per cent. The diagnosis of empyema was made, but exploration in two interspaces over the dull area was negative. On Nov. 16th a radiogram of the chest was taken by Dr. W. Ironside Bruce. He reported: "The right of the heart opacity is an area of evenly distributed increased opacity to be seen, obscuring the inner portion of the right diaphragm and possessing a sharply defined margin above and a diffuse one externally. It suggests a localised collection of fluid in the right pleural cavity towards the midline and base. Not much real displacement of heart, probably some rotation and apparent displacement on account of spinal curvature."

Despite the negative results of exploration, the blood count, the radiogram, and the appearance of the boy so strongly suggested the presence of pus that it was decided to open the pleural cavity to see the condition of affairs. On Nov. 18th chloroform was administered, and at Dr. Garrod's request I explored the right lung in numerous directions with the needle, but no pus could be detected. I therefore excised part of the eighth rib behind. The opening was just above the dome of the diaphragm. The collapsed lung was lying upwards and inwards away from the parietes. No adhesions of any kind were present, and

¹ Brit. Med. Jour., Sept. 26th, 1908.