ABSCCESS DUE TO STREPTOTHRIX EPPINGERIS (ACTINOMYCES ASTEROIDES) RESEMBLING A STAPHYLOCOCCAL INFECTION.

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I HAVE been led to publish this case not only on account of its rarity, there being but six already published, but to demonstrate the error into which one may fall, as I did myself in making a hasty diagnosis. Foulerton¹ has drawn attention to the difficulty of making the diagnosis clinically, and the necessity for careful bacteriological examination.

The patient, a maniac aged 48, confined in an asylum, was placed in a cell on November 23rd, 1912, because of his agitated condition. It is an interesting observation that in his cell there was a loose bedding of straw, which he was constantly throwing about. On December 2nd, 1912, the house surgeon noticed oedema and lymphangitis around an abrasion on the right thigh below the great trochanter. Unrelieved by palliative measures, it was incised on December 9th, and half a pint of blood-stained dark yellow, non-smelling pus was evacuated. This showed on microscopical examination debris, degenerated leucocytes, and Gram-positive cocci. The appearance of a few colonies of staphylococci on the agar tubes after eighteen hours led me to presume a staphylococcal infection; the clinical signs and progress supported this view. The patient had had a temperature of 39° C. to 39.5° C. during the previous four days, and was very ill. I gave a vaccine of 30 million living sensitized staphylococci. There was no local reaction and no reduction of the temperature. The patient continued to sink, and died on December 14th, 1912.

Five days after sowing I noticed on the gelatine isolation plates numbers of non-liquefying pale yellow colonies, which microscopically showed non-motile short filaments and cocci; both retained the Gram stain. There were but four colonies of *Staphylococcus aureus*. Repeating the sowing of some pus that had been stored in the ice-house I obtained similar results. Anaerobically, nothing grew on either occasion. The blood of the patient, sown on the day of operation, was also negative. An autopsy was not permitted. I did not think there was a cerebral abscess.

Suspecting a streptothrix from the microscopical examination I chose certain media for cultures.

On glycerine potato there was definite growth in forty-eight hours—nodular, undulated, and irregular, and changing from orange to brick-red day by day.

On carrot, no growth.

On glucose agar, as on potato.

On ordinary agar, similar but slower growth.

On gelatine, colonies slowly growing, yellow, viscous, round-bordered, with ill-defined halo; non-liquefying.

On broth, similar to that on potato, as a veil at the top; liquid clear. At the bottom a cloud-like greyish culture studded with small pale orange-coloured nodes.

Anaerobically there was no growth.

After one month on the solid potato and agars, also on the liquid at the bottom of the potato tube, there were white areas, some defined, some as borders, which by the hand lens appeared as projecting filaments. Microscopically these showed, as the original pus, Gram-positive cocci-like spores. The nodular red and tenacious mass showed Gram-positive rods; a few only lost the violet colour. On staining by the Ziehl-Nielsen method for acid-fast properties, the red colour persisted in the cocci and rods, though the latter retained the stain better at certain points along them.

The injection of a platinum loopful (1 c.cm.) in saline into the peritoneum of a medium-sized guinea-pig killed it in five days. Autopsy showed enlarged and congested kidneys and suprarenal glands. The mesenteric glands and those along the lower border of the stomach and in the omentum were markedly conspicuous and yellow in colour. The sowing of one gave a pure culture. The brain was normal and the blood sterile. Nothing macroscopically was seen in the lungs. An unfortunate accident prevented histological sections.

Injections intravenously and intraperitoneally into mice gave no results. It was only after the cultures were one month on media that I injected two rabbits, first subcutaneously and a week later intravenously. The subcutaneous injections were slow to absorb, but there was no abscess. The intravenous infection was innocuous. The doses were similar to that given to the guinea-pig.

These animal experiments are extremely limited, and the fact

that the results on the rabbits do not correspond with those made during the complete and valuable researches of Eppinger,² Nakayama,³ and McCallum,⁴ probably bear upon the age of the culture and smallness of the dose employed.

In conclusion I wish to express my deep gratitude to M. Pinoy for his generous and invaluable counsels during these observations.

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¹ *Lancet*, February 8th, 1913. ² *Ziegler's Beiträge zur path. Anat.*, Band ix, 1890. ³ *Arch. f. Hyg.*, lviii, 3 fasc. ⁴ *Centralbl. f. Bakt., Parasit., und Infect.*, May 14th, 1902.

THE TREATMENT OF CHRONIC PROGRESSIVE DISEASES OF THE SPINAL CORD BY X RAYS.

WITH AN ACCOUNT OF TWO CASES.

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THE "reading up" of spinal cord lesions is a melancholy business for the student of medicine. He finds in textbooks an elaborate classification of symptom-groups into so-called diseases, the names of which he learns with much labour. But if he is called upon to acquire a knowledge of the distinction between progressive muscular atrophy, ataxic paraplegia, disseminated sclerosis, and the like, he is saved the effort of learning any etiology to speak of beyond the time-honoured "cold, wet, exposure, fright, and mental worries." Nor does it take long to peruse the paragraphs devoted to treatment, for they consist of little more than a list of those remedies which have been tried and found useless.

Later on, when he begins to see these cases in practice, he finds as often as not that they will not fit into any particular textbook pigeon-hole. The average physician is content if he can (a) distinguish between functional derangements and organic mischief; (b) exclude active syphilis or tubercle; and (c) differentiate "idiopathic" disease from that due to "parasymphilitic" toxins. If one can make out with certainty that the patient is suffering from chronic progressive disease of the spinal cord which is neither tuberculous, nor syphilitic, nor parasymphilitic, it is of little practical importance whether the malady does or does not fit in with any classical description. In any case, the etiology is unknown, the prognosis bad, and ordinary medical treatment non-existent.

I make the foregoing remarks because the cases which I have to report are somewhat difficult to name. Yet both are undoubted instances of spinal cord degeneration, in which the diagnosis has been confirmed by recognized authorities; and any conclusions which may be drawn from their reaction to treatment may justly be applied to cases presenting a more usual combination of symptoms.

Some years ago certain Continental observers began to use x rays and radium in the treatment of syringomyelia, disseminated sclerosis, etc.; they reported considerable improvement. I myself began to use radio-therapy at the beginning of the year 1911, and as this treatment has not, to my knowledge, been much used in this country, I think it may be worth while to set forth my results up to the present time.

CASE I.

Miss R., aged 18, sent to me by Dr. A. C. Farquharson of Spennymoor. This girl complained of pain and weakness in the right arm and shoulder of some months' duration, and of general loss of energy and spirits. She appeared pale and anæmic. Inspection showed general wasting of the muscles of the forearm, arm, and shoulder girdle on the right side; also slight wasting of the muscles of the left thigh, about which, however, no complaint was made. No plantar reflex could be elicited on either side; the knee-jerks were normal. Tremor was absent, there was nothing peculiar about the speech, and eye signs were lacking. All the affected muscles reacted fairly well to the faradic current. A radiograph, taken to exclude tuberculous disease, showed lateral curvature of the spine in the upper dorsal and cervical regions, with some beveling of the vertebrae.

I was puzzled by the case, but made a provisional diagnosis of late infantile paralysis. (There was a history of an attack of "influenza" some six months before, but the patient was not clear as to whether or not it had preceded the muscular weakness.) Acting on this assumption, I began a course of faradic stimulation of the affected muscles. Rapid improvement took place, and at the end of ten weeks the pain had subsided,

voluntary power was much improved, and but little apparent difference remained between the two shoulders.

Encouraged by these results, I ventured on a favourable prognosis, and stopped treatment; telling the parents to bring the girl back for another course in two months' time.

In rather less than this time, however, she returned, complaining again of pain in the arm. The clinical picture had in the meanwhile greatly changed, and was now unfortunately only too clearly one of progressive spinal cord disease. The shoulder had maintained its improvement, but there was marked tremor in both hands. The interossei of the right hand were markedly wasted, and both the little and ring fingers were partially flexed, owing to paresis of their extensors. The adductors of the thumb and the muscles of the hypothenar eminence were also much atrophied. The patient stated that both hands felt "clumsy," and that the right had no power.

I was now compelled to tell the parents that a progressive, and probably incurable, spinal cord lesion was present, and advised that x rays should be tried as the only treatment likely to be of any real benefit.

A fortnight after the commencement of irradiation the tremor began to subside, and by the end of two months had altogether ceased. Meanwhile the contracted fingers were massaged, and their wasted muscles faradized, with the result that they became almost straight. The pain in the arm proved somewhat obstinate, but finally disappeared, seemingly as the result of treatment to the arm and shoulder by means of an electrically driven vibrator.

At the end of six months, when the patient had received in all forty sittings, I decided to stop the irradiation. The girl had been obliged to give up cycling, piano-playing, and sewing, but she was now able to resume all these occupations and amusements, with the exception of difficult music and fine needlework. Her general health also had much improved; she looked robust; and it would have required more than a casual examination to detect any trouble.

After another two months she again presented herself. There had been a somewhat sudden return of extensor paralysis and pain in the arm. These symptoms disappeared in a few weeks under treatment directed to the cervical spine; but, while actually undergoing this course, she developed pain and stiffness in the small of the back. Relief followed the irradiation of this region. Since then I have never allowed more than a week to elapse without seeing her.

In the summer of 1912 the patient consulted Purves Stewart. He confirmed the diagnosis of progressive cord degeneration, and said that so far as he could name the trouble, it was disseminated sclerosis, localized chiefly in the cervical region. As to treatment, he advised that x rays should be continued, in conjunction with medicinal tonics.

More than two years have now elapsed since the disease first definitely manifested itself, and the patient is now about as she was after the first six months' treatment. That is to say, by means of, or at any rate coincidentally with, constant x-ray treatment the improvement has been maintained for a period of over eighteen months.

CASE II.

Mr. H., aged 33. Sent by Dr. Martin, of Darlington. Between six and seven years ago this patient noticed a weakness in the left ankle when playing tennis; the "springiness" of his toes seemed impaired. He thought little about the matter at first, but the weakness grew steadily, though very slowly, worse. Next came tingling sensations in the right arm and at the tip of the tongue; also some loss of control over the bladder and over the rectum so far as flatus was concerned. Finally, a commencing weakness in the hitherto sound leg greatly alarmed him, and he consulted Risien Russell. Russell told him that he had a chronic progressive disease of the spinal cord, for which little could be done, but advised him to undergo a course of electrical stimulation of the leg muscles, in the hope that at least some temporary benefit might ensue.

In view of this advice, his own medical attendant, Dr. Martin, sent the patient to me. I agreed to carry out the treatment recommended, but suggested that, in addition, x rays should be applied to the spine.

At this time there was extreme wasting of the calf muscles of the right leg, and some atrophy of those covering the back of the thigh and buttock. Power to extend the foot had been completely lost, and the calf muscles responded to the galvanic current only. On the opposite side the calf appeared small in proportion to the remainder of the limb. The right buttock responded to faradism, provided that an intense current was used, and then only after it had passed for some seconds. In the other limb faradic reactions were all brisk. Plantar reflexes were absent on both sides; both knee-jerks appeared somewhat exaggerated. Neither eye-signs, nor tremor, nor abnormality of speech could be detected, and sensory perception appeared to be unaltered.

After three months' treatment reaction to interrupted currents began to return in the extensors of the left foot, and a limited amount of voluntary movement became possible. Also, the buttock muscles now responded to moderate stimulation, and had increased considerably in size. These results in themselves might perhaps be put down to the effect of faradic electricity, but the same could not be said of the improvement in the arm and tongue symptoms. The tingling sensations also disappeared, and have not so far returned (eight months). The patient himself summed up the matter subjectively by saying that he felt as if his disease had retraced its steps by more than a year. At Christmas the patient went to Switzer-

land for a holiday and received no treatment for about three weeks. He came back complaining that there had been some retrogression of voluntary power in the calf muscles, which he first noticed by reason of not being able to push himself up by his toes whilst having a bath. On the resumption of treatment, the power returned.

Up to the present there has been no improvement in the condition of the bladder and rectum.

That spinal-cord disease of the type under discussion is liable to natural remissions, and even passing improvement, is, of course, well known; and it is open to the sceptic to say that these patients would have improved equally in the absence of any therapeutic measures. In both cases, however, cessation of treatment was followed by relapse within a short period, and in Case II there was a history of slow but steady degeneration over a period of years without any sign of even temporary betterment.

Looking at the matter from the standpoint of pathological theory, it is of interest to recall the views of Hastings Gilford, as expressed in a recent work.¹ He believes that spinal cord lesion of the "idiopathic" type, together with cancerous tissue change and many other degenerations, are in reality instances of premature senile change. Carrying the matter further, he holds that cells which are senile, whether normally or prematurely, show a tendency to reproduce some of the characteristics of their embryonic stage. They become simple in structure, lose their specialized functions, and commence anew to proliferate. But whereas true embryonic cell division proceeds in an orderly manner to a definite end, pseudo-embryonic or senile proliferation is purposeless and anarchic.

Assuming that there is some truth in this view, we may suppose that, amongst other reacquired embryonic peculiarities, is an extreme susceptibility to the effects of x rays and radium. The effect of rays in small doses on normal adult cells is to stimulate their growth; but such doses need not be too small to produce an opposite effect upon embryonic cells. Hence may be explained such anomalies as that x-ray treatment may at one and the same time depress the cells of a rodent ulcer while stimulating the normal epithelium to spread across the raw surface which has occurred as the result of cancerous activity. In the case of sclerosis of the cord we have, on the theory under discussion, proliferating prematurely senile or pseudo-embryonic cells, together with more or less normal cells weakened by their proximity. From judicious irradiation we may therefore expect a two-fold effect—namely, depression of the unhealthy neuroglia cells, together with stimulation of such neurones as are not too deeply injured to respond.

Whether or not the above explanation of their *modus operandi* be correct, the use of x rays in certain types of spinal cord disease appears to be clinically justified. Radiotherapy combined with the persistent local application of electricity is at present the only treatment which holds out any hope of amelioration; and any patient, once a diagnosis of progressive idiopathic degeneration is established, should be told of its possibilities.

X-ray treatment, for whatever purpose applied, usually seems to have a general good effect upon the body functions, comparable with that of electricity or medicinal tonics. Apart from this, its action on cord diseases, as in cancer, is a purely local one. It will be recalled that, in Case I, symptoms referable to the lumbar cord came on actually during a course of treatment limited to the cervical spine. As to permanence of effect, while it is easy to inhibit the growth of embryonic cells, it is difficult to kill them outright. For example, the permanent sterilization of a healthy young woman by means of x rays is almost impossible. Where we have to deal with intravertebral disease, it is probably not feasible to do more than hold the degeneration in check. In other words, the patient must lead an "x-ray life" comparable with a "thyroid life" in cases of myxoedema. Although, even apart from question of expense, this may seem a poor prospect, it must be remembered that the victims are often men in early middle life, the fathers of young families wholly dependent upon their exertions. To such the prolongation by even a few years of business or professional activity may be a matter of the utmost importance.

REFERENCE.

¹Hastings Gilford, *The Disorders of Post-Natal Growth and Development*.