TWO CASES OF LEAD PALSY, WITH REMARKS ON THE DIAGNOSIS.

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ABOUT a year ago a married lady was brought to me by her medical attendant, complaining of great loss of power in the right hand and left foot, which had been gradually increasing for three or four months; and was then so confirmed that she dragged her foot, and could do nothing with her hand. She was 26 years old, healthy looking, and the mother of three children, of whom the youngest was two years of age.

On examination, the right forearm, at a point four inches below the olecranon, was found to measure $7\frac{1}{2}$ inches, as against $8\frac{1}{4}$ inches, the size of the left at the same level. The plump of the thumb, too, of the right hand appeared somewhat thin, and the interossei depressed. The hand could not be brought to a level with the forearm. Its grasp was feeble, and the patient could not perform delicate movements with the fingers. The left foot dropped when lifted off the ground. On the other hand, there was nothing wrong, so far as could be observed, with the left upper and the right lower extremity. This *bizarre* arrangement of the paralysis had suggested to more than one medical observer that the affection was of an hysterical character. The general health was described as fairly good, except that there had been occasional vomiting. The patient was not constipated, nor had she suffered from colic, and careful examination failed to show the slightest trace of any blue line in the gums. Enquiry had not succeeded in eliciting any history of exposure to lead.

When the excitability of the muscles came to be tested by electrical currents, important changes were observed. On the right side none of the muscles on the back of the forearm would respond to the highest strength of induced currents which could be borne, except two. The supinator longus con-

tracted freely to a moderate strength ; and the supinator brevis, which, owing to the wasting, could be picked out by the rheophore between the short radial and common extensors, answered readily enough to the stimulus, producing brisk supination of the hand. The intrinsic muscles of the hand likewise failed to respond to Faradaism. To a voltaic current from eight cells of a Stöhrer's battery, slowly interrupted, all the muscles which had been unaffected by the induced currents contracted freely ; whilst the supinators showed no response to this stimulus, which is not sufficiently strong to affect healthy muscles.

The left leg presented similar inexcitability to Faradaism, coupled with active response to weak voltaic currents in the tibialis anticus group of muscles.

In the left forearm, which presented no obvious lesion, it was found, nevertheless, that the excitability to Faradaism was below the normal in the extensor communis digitorum.

In the right leg, too, there was slight diminution of excitability to Faradaism, but in neither was there exaggeration of irritability to interrupted Voltaism. There was slight loss of electro-cutaneous sensibility in the right forearm and left leg.

The result of examination thus made it evident that the patient was suffering from lead poisoning, and a confident opinion was accordingly expressed to this effect. But the possibility of such a cause was at first strongly denied, both by the patient and her husband. It was only after persistent enquiry that the following fact was elicited. About three weeks previously, the zinc cistern supplying the patient with drinking water had been cleaned out, and three or four feet of lead-piping was found lying loose in the bottom of it, having been dropped there by a careless workman. How long it had lain there could not be ascertained, but it must certainly have been many months.

A few months later a middle-aged lady was sent to me by a medical friend on account of powerlessness of the hands. The weakness, it seemed, had commenced more than five years before, and had gradually increased so much that she had come to have great difficulty in doing anything with her hands. In the course of her long illness she had been seen by several medical men, who had pronounced her, so I was told, to be suffering from Cruveilhier's atrophy affecting the muscles of the hands. She had not had any electrical examination.

There was a helpless look about her hands, which "dropped" somewhat, and could not be kept perfectly extended. The forearms were round—somewhat plump-looking indeed—and

in contrast with them the hands appeared to be wasted more than a closer observation showed them really to be. The fingers could be moved freely enough in various directions. The patient had pains in them occasionally. There was no flattening of either forearm, but the flesh when handled felt pulpy, and wanting in firmness. Whilst the hand could not be extended against even a very slight opposition on the part of the examiner, the movement of supination was performed readily, and with good force.

Electrical examination showed the excitability to Faradism to be very much diminished in the extensor communis digitorum, extensor indicis, and extensores carpi radialis longior and brevior; not so much, but still appreciably lessened in the extensor carpi ulnaris. The supinator brevis could not be reached—the supinator longus reacted to Faradism. The intrinsic muscles of the hands reacted to Faradism equally well on each side, and if there was any diminution of excitability in them, it was but slight. There was an indefinite history of impairment of general health, and the occurrence of occasional spasms of the bowels. An opportunity was not afforded me of examining the gums.

An opinion was given as the result of this examination that the case was one of lead poisoning. On enquiry as to exposure, it appeared that the patient had been in the habit for many years of applying to her head one of the popular "hair restorers," the active ingredient in which is known to be lead. The quantity used at a time was said to be small (which is a relative term), but its application had been constant.

A history of exposure to lead, the presence of a blue line on the gums, preceding colic, and the peculiar character of the affection, are features commonly adduced as the diagnostic signs of lead palsy. The history of exposure, however, has often to be sought out by pertinacious enquiry after the diagnosis has been formed through other sources. So again the blue line may be wanting, and there may have been no colic. It is, then, to the peculiar character of the palsy, and especially to the effects of electrical currents on the muscles, that we have usually to look for the most valuable—the only reliable evidence, indeed, of the nature of the disease. The cases described seem to me worth recording as illustrations of the value of these signs.

In both the examination by means of electrical currents gave results in accordance with Duchenne's well-known description of the characteristic signs of lead palsy. The excitability to Faradism was absent or sensibly diminished

in all the muscles of the forearm, except the supinator longus and brevis. The fact that those muscles were not included in the paralysing influence was shown in two ways—1st, when the patient had semipronated the hand, and then flexed the forearm on the arm, the observer tried to extend the forearm against her resistance, when the supinator longus could be felt contracting strongly; 2nd, by testing the muscles with induced currents, when it was found that they retained their normal excitability. The opportunity which I have had of observing a considerable number of cases of lead palsy has shown me that the signs noticed are those which are commonly found. Duchenne went so far, I think, as to say that he had met with no exception to the rule that the supinators were exempted, and writers have repeated his description. But the rule is not quite without exception. I have seen some well-marked instances of the supinators taking their share in the common lesion. These have been, however, comparatively very few indeed, and have always occurred in cases where the exposure has been long continued, and when, if I am not mistaken, some muscles of the arms, as well as the forearms, were involved in the atrophy. So that for all practical purposes, Duchenne's rule appears to me one to be depended upon—at least in cases which are not of very old standing indeed, or of exceptional severity.

In health, the supinator brevis cannot be directly faradised on account of its deep position. But in lead palsy it very often happens that the wasting of the extensor communis digitorum has proceeded far enough to uncover the supinator brevis sufficiently to allow a small rheophore to be applied to it. Under these circumstances the electrical diagnosis is singularly simple, and can be carried out in about the space of a square inch at the upper and back part of the forearm. If it be found (both arms being affected) that the common extensor fails to respond to Faradism whilst the short supinator close by, on a lower plane, is readily excited by it, the case may be positively set down as one of lead palsy.

The exaggerated reaction to Voltaism in the first case is not at all unfrequent in cases of lead palsy of not long standing.

The crossed arrangement of the paralysis in the first patient is curious; and had the apparent exemption of one leg and one arm on opposite sides been as real as it looked, explanation of the anomaly would probably have been impossible. But the electrical examination showed that the difference was in truth one of degree only. The apparently sound limbs betrayed characteristic signs of lesion in the diminished excitability of their muscles, and it was evident that time only was required for them to share the trouble of their fellows. It is much more

common than not in cases of lead palsy for one limb to suffer more than the other. In this instance, however, the contrast was more than usually strong.

It is an interesting fact, that in the apparently sound limbs, there was diminution of electric excitability in muscles which, according to the patient's own feeling, had nothing the matter with them.

In the second case the absence of any flattening of the fore-arms—their marked roundness, indeed—was likely at first sight to cast doubt upon the probability of there being any atrophy of the extensor muscles. But although in many cases of lead palsy, especially in those of rapid and recent occurrence, there is an amount of excavation which is quite remarkable in the situation of the extensor group, yet in those of old standing one often sees that the affected limb wears a false air of nutrition. It is known that this depends upon a large interstitial development of adipose tissue separating and surrounding the wasted and degenerated muscular fibres. No doubt this had happened in the present instance, where the disease, although not very extensive, had existed more or less for some five years.

The entire absence of the blue line in the gums of the first patient is noteworthy, as it tended to obscure the diagnosis. Although the absence of this sign is not by any means unexampled, it is certainly rare in a case of lead-poisoning so marked as this was, to find no characteristic discoloration in the gum. I explain its absence here by the fact of the exceeding care which the patient had evidently taken in brushing her teeth, which were scrupulously white and perfect. As Mr. Tomes has described, it seems likely that it is to the decomposition of portions of food left about the margins and interstices of the teeth, and in the tartar often collected there, that the discoloration is due, sulphuretted hydrogen thereby formed acting upon the lead in the neighbouring tissue. It is worth remembering, as this case well shows, that the blue line is not a necessary feature of lead-poisoning in persons of cleanly habits. Probably the converse is still less to be depended upon. The presence of a very well-marked lead line is quite consistent with health. Some time ago I examined a number of men employed in lead-mining and lead-smelting in Derbyshire. They had all more or less of a blue line in the gum and their complexions were generally pale. but none had any complaint to make of their health. Lead-poisoning, indeed, is as rare amongst the men thus engaged as it is common among those who are employed in the manufacture of white and red lead.