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THE BILATERAL PARESES AND PSEUDO-PLEGIAS OF CHILDHOOD, WITH SPECIAL REFERENCE TO A TYPE OF MALARIAL ORIGIN.

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The occurrence of partial paralysis in childhood is not very infrequent, though its interpretation is still a subject of dispute. As the lower extremities are principally and most often affected, only the various incomplete and pseudo-plegias (parapareses) will here be considered. If those known to be dependent on marked organic changes (neuritis, myelitis, bone disease, etc.) be excluded, the remaining types that claim recognition may be grouped into two general classes:

A. Reflex. It is this class of assumed reflex origin that has so many times offered a field for discussion. Some of the best authenticated types of this are briefly recapitulated under the first four sub-heads below. The cases on which they were originally founded were many of them observed in the adult; still it is reasonable to suppose that like causes might produce quite as severe results in children.

B. Resulting from systemic conditions (toxic?). Whether such a distinct class is wholly warranted, it has a sufficient clinical-etiological basis for present convenience.

A. Reflex Parapareses.

1. *From Injury to Peripheral Nerves.*

Such acceptance as this form has received must be attributed to the great weight of Weir Mitchell's authority. But the cases that he relates (*N. Y. Med. Journ.*, February and March, 1866) do not, so far as the present subject is concerned, bear any close scrutiny. He says on p. 402: "Among some two hundred or more of carefully studied instances of wounds of nerves, we have met with only seven cases of reflex paralysis of remote organs, in which the influence was prolonged or severe." The phenomena occurred, not in cases where some large nerve was injured, but from wounds of other soft parts, or from slight and indirect injury to nerve-trunks. There does not appear to have been any authoritative observation of these cases at the most important period, viz.,

directly after the injury, and as (p. 423) "in almost every instance some relic of the paralysis existed even after eighteen months or more from the date of the wound," it is quite as reasonable to suppose that the assumed reflex was the result of some organic lesion. One of his cases was wholly sensory, and in most the reflex was to an upper extremity. In but one were both lower extremities reflexly affected (Case IV., Injury of Testicle), and as this was in an adult its interest here is but theoretical.

2. *From Genital Irritation.*

Sayre's writings on this subject are well known: (*a*) "Partial Paralysis from Reflex Irritation caused by Congenital Phimosis and Adherent Prepuce," *Trans. Am. Med. Assn.*, 1870; (*b*) "Spinal Anæmia with Partial Paralysis and Want of Coördination from Irritation of the Genital Organs," *Ibid.*, 1875; (*c*) "On the Deleterious Results of a Narrow Prepuce and Preputial Adhesions," *Trans. Ninth Internat. Med. Congress*, 1887.

These titles indicate briefly his views. They have been variously corroborated (as recently, 1888, by Reverdin and by Pinto Portello), but also justly criticised (*e. g.*, by Gray in *Annals of Anat. and Surg.*, January and February, 1882). The evidence so far offered is not very convincing as to the reality of such paralyses or their dependence on the cause assigned, and still less of the proposed explanation (spinal anæmia). There is not much uniformity of type in the reflexes described; nor, strange to say, have such observations often been made in nerve clinics. In the profession, however, there is a widespread belief that cases like those given by Sayre do occur, and it is possible that peculiarities in the published descriptions have prejudiced many authorities against the whole matter. Considerable inquiry amongst the most careful observers in Brooklyn has failed to discover any case showing paraplegic phenomena, although a couple are noted in which other troubles seemed to have been favorably influenced by circumcision.

3. *In Certain Cases of Spina Bifida.*

It is well known that a variety of paralytic and spastic troubles, including foot deformities, perforating ulcer (Kirmisson, 1887), etc., frequently accompany this defect in spinal development.

In a case published by Dollinger in the *Wien. med. Wochenschr.*, 1886, No. 46, there was urinary and fecal incontinence, with contractures in the lower extremities, etc. Puncture and withdrawal of fluid produced each time temporary relief, and osteoplastic closure of the spinal opening was followed by lasting improvement. Apparently quite independent of this, Zenenko, of St. Petersburg (*vide* abstract in *Annals of Surgery*, September, 1889, p. 223, 224), relates a case of sacral meningocele in a boy of fifteen years, with incontinence of urine and feces, "extreme

wasting of the muscles of his lower limbs, and flexory contractures in the knee-joints." Here also an osteo-plastic operation on the vertebral cleft—after extirpation of the tumor, some integument, and loops of the cauda—led to a fairly complete recovery.

Cockburn (American Journal of the Medical Sciences, August, 1890) gives the case of a vigorous boy of nine weeks. "This tumor was but slightly reducible, and pressure on it elicited none of the nervous symptoms which are produced by pressure." It was found on operating to connect by a pedicle through an opening in the first sacral vertebra. "The hips were then raised and the tumor compressed, in order to return as much of the spinal fluid within the membranes of the spinal cord as possible, and a stout catgut ligature was now tied around the pedicle. At the moment the ligature was tightened a sudden and rigid extension of the lower limbs took place, and also a marked change in the respiration." On removing the ligature these symptoms soon abated. "The cauda equina was found included in the ligature. . . . About three-fourths of an inch of the extremity of the cauda with the adherent dura was excised." Recovery without further nervous symptoms.

The fact that various cases of spina bifida have been cured as to the tumor, yet without relief of coexisting paralytic conditions, in no wise detracts from the significance of the cases quoted. In those of Dollinger and of Zenenko it was observed that the sheaf of nerves constituting the cauda was stretched out over the tumor-sac, and it was to the irritation produced by this tension on the nerves that these writers attributed the symptoms from the side of the lower extremities and pelvic organs.

A close relationship might be inferred between these cases and those of genital reflex. The sensory path from the prepuce and adjacent parts passes up through the cauda (third sacral nerve according to Thorburn, 1888). The symptoms noted by Sayre in some of his cases are not unlike those seen at times in spina bifida—only less severe. Hence, the morbid phenomena in the apparently quite separate classes of cases *may* be due to irritation of the selfsame set of nerve-fibres. But such symptoms are not the rule, even in apparently like cases of spina bifida; and where they do occur it is more rational to conclude that not the tension on certain nerves as such, but the dragging at the nerve-roots, and hence direct irritation of centres in the cord, is the real cause.

It might seem that the correct explanation could be decided by anatomical considerations. For, whilst a reflex impulse would at the cord choose functionally rather than physically related parts, direct pulling would probably exert its maximal effects on the nearest centres. But in these few cases the morbid conditions are so complicated that little light is thus obtainable.

4. *From Visceral Irritation.*

Brown-Séquard, in his *Lectures on Paralysis of the Lower Extremities* (Phila., 1861 and 1873), as is well known, divided all cases of paraplegia into those of central and those of reflex origin. Since the time of his writing our knowledge of this subject has greatly increased, especially as to the important part played by neuritis of various kinds. Moreover, the irrelevancy of his cases of reflex—from enteric, intra-pelvic, pleuritic, and other troubles—was long since shown by various writers. To discuss this matter by later published reports would require a special paper.

The following case well illustrates the easy possibility of error. A girl of four years was brought to the dispensary in May, 1889, with the history that for two and a half years she had been subject once or twice a month to attacks of loss of power in the lower extremities, accompanied by fever (101°–102° F.) and a tendency to lie on the side or abdomen with feet drawn back toward head. Treatment was refused without previous observation of the girl at such a time. From the physician, Dr. De Castro, who saw one of these attacks and relieved her by the removal of a large mass of pin-worms, I learn that there was no paralysis at all, but "prolonged epileptoid spasms with considerable opisthotonos" leaving her perhaps a little weak.

Hence, although much has been written on this subject, there is as yet no convincing proof that paraplegia, partial or complete, is ever of reflex origin. Certain it is that such cases are exceptional, and that recourse to this explanation is less necessary the more carefully cases are studied. The theory of an hysterical neurosis may in this connection be a real advance—or only a shifting of terms.

B. Parapareses Resulting from Systemic Conditions.

The cases of the other class, to which we now come, though not as widely studied, have a more uniform cause and course. The three types described below are known only in children. To these there may be others that can suitably be added.

5. *From Rickets.*

Attention has recently been called to this form of weakness in the lower extremities by Berg ("Rhachitic Pseudo-paraplegia," *N. Y. Med. Record*, November 16, 1889). He says it has received but little notice from writers on rhachitis. A few quotations will show that it has been fully recognized by American, English, and German observers.

Seitz's *Niemeyer* (edition of 1879, p. 600) says: "Stiebel, most true to nature, tells how the children, who otherwise took the greatest pleasure in moving their limbs or perhaps putting their toes in the mouth,

now lie down with their legs stretched out straight and stiff. Apparently, they do not dare to move, they cry out on being turned, and begin to cry when they fear being taken from the bed and carried about." This, of course, refers more to the hyperæsthetic conditions so common in this trouble than to any real paralysis.

Samuel Gee, in *St. Barth. Hosp. Rep.* for 1868 (vol iv. p. 72): "Pseudo paraplegia—'*Veluti inferiorum artuum paralysis*,' as Stoll says—the rickets falling, as it were, upon the muscles; the bones being left, in some cases, comparatively unaffected. An exaggeration, this, of the inability to stand or walk, which is so commonly met with in rickets. That the muscles are at fault more than the bones is shown by those cases in which, notwithstanding great softening of the bones, the children are able to walk at twelve months of age, and become bandylegged in consequence." This is given by Gee as the first evidence of latent, masked, incomplete, or larvated rickets.

Parry (American Journal of the Medical Sciences, January, 1872, p. 30) treats of this trouble very fully: "In these cases it is not uncommon to find children who had been walking cease making any effort of this kind, and even to become the subjects of 'pseudo-paraplegia.' In no other disease excepting paralysis, it has been said, is the muscular power more interfered with than in this. In scrofula, tuberculosis, and the other cachectic disorders, children may continue to walk with considerable energy even until near the close of life, and when the emaciation and atrophy are far greater." "*Pseudo-paraplegia* (p. 51) There is one form of rickets to which we wish to call especial attention. This is the more important since it is repeatedly mistaken for paralysis, and the helpless infant subjected to a course of medication for disease of the brain or spinal cord. . . . Indeed, it seems as if the disease had expended itself upon the muscles. The common form of this variety is loss of power in the lower extremities. . . . The condition is often unassociated with any serious or even with any visible deformity." In a footnote he tells of an autopsy on a girl of four years: "A typical example of pseudo-paraplegia. The brain, spinal cord, and nerves coming from them were found perfectly healthy, while the muscles of the thigh and leg were wasted and very pale." Berg's article, already mentioned, is so excellent and complete, and fortunately so accessible to all, that further quotation or description is unnecessary. That this affection runs a slow course if untreated was shown by a colored girl of six years, referred to me in August, 1889. The lower extremities showed extreme general weakness—inability to stand alone—though not complete paralysis. Musculature of arms as well as legs very scant, without any localized atrophy. The general evidence of rickets was ample, and a prescription therefor was given. But on looking up the case in April, 1890, it was found that this had been lost, and the child had

remained untreated. She was in practically the same condition as eight months previously.

6. *Of Malarial Origin.*

Case I.—In June, 1886, a boy, Frankie B., was brought to the dispensary for loss of power in the lower extremities and peculiar associated symptoms. He was six years old, and came from the malarious Red Hook. The father, a chronic alcoholic, showed old bilateral wrist-drop, the result of some metallic poisoning. Frankie's trouble was already of three months' duration, though worse "by spells." He likes to lie around, especially on his stomach. Complains of pain in feet and finger-tips. Has a way of pulling off shoes and stockings and holding his feet in his hands; this he would do, if undisturbed, even when brought for examination. Is not inclined to say much even when questioned. Sleeps well. Has lost flesh greatly, though no special atrophy is discoverable. Cervical glands large. Eyelids red. Later he lay down all the time, cried more at night, and then had his worst attacks about 3 A. M., crying and doubling up as his mother said. At the time no cause was discovered (no genital trouble nor helminthiasis), and it was simply called a neuritis. Various lines of treatment proved futile. Many features of the case were so striking and peculiar, however, that the matter was kept in mind with a view to its eventual solution.

In January, 1887, the mother applied for treatment of what was evidently a brow-ague—and this in part suggested the treatment in the subsequent cases.

In March, 1890, it was learned that for a couple of years Frankie had ceased complaining, is well, and uses all his extremities perfectly. He took no medicine; hence recovery was spontaneous, unless influenced by moving to another neighborhood.

Seen again in December, 1890, when he was suffering from a keratitis. Some two years previously he had had a similar trouble of the same right eye. Dr. Lennox, in whose care he has recently been, kindly informs me that it was the ordinary form of keratitis and not in itself characteristic of malaria. Still, as it did not improve, he was then put on quinine and soon relieved. Dr. Lennox considers that the keratitis was without doubt of malarial origin.

Case II.—German-Irish boy of five years, brought to the dispensary September 17, 1889. Sick all summer. Was at the Seaside Home for a while with asserted malaria. For three weeks now he has been losing the use of his legs; this has become much worse the last two days. He can still walk a little, but soon gets so tired that he has to be carried. He has a slow swinging gait, not simply an excessive waddling but also a laborious dragging. This resembled that sometimes seen during recovery from spinal injuries, where there is simply weakness in the lower extremities with a slight tendency to toe-drop. He likes to sit or drop on his knees. The hands are not stretched out fully, the left one being worse than the right, and appearing like an ulnar paresis (of the type so well shown by Bowlby, *Injuries and Diseases of Nerves*, 1890, Figs. 15 and 16). There was also some undetermined difficulty in speech. He is cross, peevish, and losing flesh. Of late has a bowel movement after each meal, though the evacuation is described as quite natural. Nuchal glands rather large, splenic dulness ditto. Reflexes all normal.

A trial was first made with anti-rhachitic treatment, but as this did not affect his condition, and it was found that he lived on the first floor in a very malarial neighborhood—Sackett St., adjacent to Gowanns Canal—quinine with a little arsenic and iron was substituted. In five days he was reported a little better, and in nine more as decidedly improved.

Seen again two months later, when he was almost and perhaps quite free from any motor disturbance, and wholly recovered as to other symptoms. The mother was very enthusiastic over his rapid and full cure, and as later reports are all that he is well, it is certain that he has had no relapse. The anti-malarial treatment had probably lasted about three weeks altogether.

It seems that this boy had been seen also in May, 1888, when the following note was made: "Healthy fellow up to just a week ago, though nervous and old in manner. On that day he came in complaining of pains in his legs, and wanted to be put to bed. Varying since, sometimes he wanted to go about on his knees, again he walks fairly. Comes to the dispensary, walking with knees half bent; can be straightened out without much pain, and in fact the condition seems to be functional (spasmodic) contracture. No knee-jerk. Moans in sleep. Does not eat very well this week. No preputial adhesions. Urinates well. Bladder not full." As both he and his sister had passed intestinal worms, medicine therefore was given. His history up to the next attack given above is not known to me.

Case III.—Samuel W., six years old. Dispensary December 26, 1889. Brothers and sisters said to be weakly; mother dead. Sammy's legs first became weak about a fortnight since. He walks clumsily, with an uncertain waddling gait, much after the manner of the preceding boy, though not quite as badly. Stands with legs apart. He is uneasy; does not sleep well, though he is sleepy mornings and looks sleepy. Eats well, though he cannot swallow solids as well as liquids. A slight disturbance in speech has already improved. Tongue a trifle coated. Face pale and said to show that he is not well. Spleen large. Knee-jerks normal; faradic reactions good. He had lived for three years in one of the most malarious parts of the city. Last October moved to a much healthier neighborhood.

To test treatment he was first put on iron and arsenic. For a week he seemed to improve a little, but then no further. Finally, he was put on quinine with Donovan's solution. He then mended rapidly, and in three weeks was able to walk on the street alone. His gait had become natural. He was no longer inclined to lie down all the time; is lively, active, and does not look sleepy.

March 11, 1890, reported to have kept perfectly well. He has his strong voice again. Goes to school, runs, and plays.

Case IV.—Vigorous boy of three and two-thirds years (mother epileptic). Seen August 7, 1890. Thought not to have been as active in running and playing this summer. For a week especially some loss of appetite, grinding of teeth at night, etc. Since yesterday high fever (over 104°). Constipation. This fever was soon relieved. Next day he went on an excursion, and in the following night awoke complaining of pain in the legs. This continued on the 9th, with a disinclination to walk. Brought to the office August 10, P.M., in his father's arms. This morning the pain was in the left ankle but now it has shifted to the right, the outer anterior surface in each case. No certain swelling at this spot, but pain on press-

ing, twisting, or standing; some tenderness of left ankle also. Gentle squeezing of either calf is well borne, but of lower thighs makes him cry. Arms not tender. Will only walk by leaning on something, and even then has to be compelled and at first cries. Now toes-in when walking, though when well walks toes-out. No speech-impediment observed. Very peevish. Sighs now and then deeply. No longer feverish. Spleen a trifle large. Put on quinine and Warburg. For two days more he continued to complain of his legs. On the third morning he came down himself, shouting, "Papa, I can walk!" Since then in good health.

A younger brother (of two years) had a febrile attack believed to be intermittent, and yielding only to anti-malarials some three months later. The mother thought that he also had some difficulty in walking, until the fever was broken, but it might not have been noticed had she not recalled the brother's trouble.

Amongst the asserted nervous complications and sequelæ of malaria are: Neuralgias, including sciatica and cruralgia; limited contractures (Holt, *N. Y. Med. Journ.*, 1883); intra-cranial inflammations of a meningitic type; pigmentary deposits in the brain; epilepsy (Hammond, *Trans. Am. Neurol. Soc.*, 1875, 1 case; Hamilton, *Pepper's System*, vol. v., p. 472, 3 cases);[1] hysteria (Regnault, *Gaz. des Hôp.*, 1890, No. 3, 1 case); mental disorders (Lemoine et Chaumier, *Annales Médico-psychologiques*, 1887, i., pp. 177–209; their fourth conclusion is that "There very probably exists a form of paludal general pseudo-paralysis"); multiple neuritis; and, according to Morton Prince (*Journ. Nerv. and Ment. Dis.*, October, 1889), even tabes and desseminated sclerosis. Vought, in Starr's "Familiar Forms of Nervous Disease," attributes 3 out of 124 cases of chorea to malaria.

Neuritic malarial paraplegia is specially considered by Strachan, of Jamaica (article in *Sajous' Annual*, 1888, vol. i., p. 139); by Singer (one case reported in *Wien. med. Wochenschr.*, 1887, No. 22, pp. 730–1), and by Cardoso Fonte ("Impaludismo larvado; paraplegia complete," *Brazil Med.*, 1888–9). An intermittent form of malarial paraplegia has also been variously observed (*v.* Birdsall, in *Sajous' Annual*, 1889, ii., 110).

Motor disturbance of malarial origin and of the type illustrated by the preceding cases (paraplegic, non-intermittent, though sometimes varying in extent and severity, not severe and protracted but yielding readily to treatment, occurring only in the young) has been fairly recognized by at least one observer (Holt, "The Symptoms and Diagnosis of

[1] Ferreira (*Archivio Italiano di Pediat.*, 1889; *v. Arch. f. Kinderheilk.*, Bd. xii.) "distinguishes four different varieties of the cerebral form (of malaria), which are especially seen in children during the heated seasons, and which are very frequent and very dangerous. These varieties are: 1. The eclamptic form. 2. The comatose form. 3. The delirious form. 4. The meningitic form. The last two are observed more in older children." Earlier cases of malarial epilepsy are quoted in Hanfield Jones's work, 1868.

Malaria in Children," *Am. Journ. Obstet.*, 1883). His remarks on this subject are worth quoting in full:

"Neuralgic pains in the back, the extremities, the neck, and general soreness have all been noted occasionally. The general cutaneous hyperæsthesia is often acute, and, when accompanied by fever, may lead to the diagnosis of some affection of the central nervous system. In the subjoined case the febrile symptoms were slight. It, however, illustrates well the point under consideration."—p. 213.

"Case I.—Robert M., aged eleven years, was brought to the dispensary May 19, 1882. His mother stated that he had been complaining for several weeks of headache, and of late seemed to be growing stupid. She thought that he was losing his memory. For two days he had been having severe pains in the calves of both legs, of a neuralgic character, and had also complained of the parts being sore to the touch. His limbs were so weak he could scarcely walk a block and a half. A slight fever had been noticed to come on toward evening, but there had been no chill, no sweating, and no vomiting. His axillary temperature was found 101°; he was pale and anæmic; pulse regular; pupils normal. He walked unsteadily, not clearing the floor well with his feet, and seemed inclined to drag the left limb slightly.

"On testing the different muscular groups separately no real paralysis could be discovered, but all the muscles seemed weaker than normal. Over the whole of both lower extremities there was great hyperæsthesia, so that even moderate handling caused him to cry out with pain. This was much more acute in the thighs than in the legs. None was present in the upper extremities. Cinchonidia was ordered, and two days later he reported. There was no hyperæsthesia to be found, and he said the pains were much less severe. He could walk much better than before. Slight fever continued for a few days, and the pains steadily improved, the medicine being kept up. He was not seen after a week from his first visit until November 8th, when he was found walking perfectly well, and said he had no return of the symptoms since I last saw him."

"Motor disturbances are less frequent than the sensory. I have met with three cases in which paresis of the lower extremities was present. In two cases it was associated with severe pain, and improved rapidly under anti-periodics until a perfect cure took place. The third case was not traced; when last seen there was some improvement; some lameness existed."—p. 433.

Two similar cases in children were described by Gibney (*Am. Journ. Neurol. and Psychol.*, 1882, No. 1). They were not intermittent in the same sense as malarial fever, but rather recurred after further exposure to the paludal poison.

It is remarkable that all these patients have been boys, and generally of vigorous rather than puny appearance.

In each of my cases genital irritation, helminthiasis, and vertebral disease were excluded. The possibility of latent rhachitis was considered but no further evidence of it discovered, and though the symptoms resemble somewhat those at times seen in that trouble, it is fair to conclude that malaria was the prime and predominant if not exclusive cause.

Microscopical evidence from examination of the blood is wanting—though in one case, kindly sought for by Dr. Van Cott, of the Hoagland Laboratory—and in such atypical forms of malaria may well prove negative. As to the malarious districts of Brooklyn the Thayer-Baker committee report (*N. Y. Med. Journ.*, May 8, 1886) is not very explicit; but E. D. Page (*Ibid.*, 1887, ii., p. 566) briefly says that, "Usually, these cases (of malaria in children) can be traced to those districts skirting the bay or in the vicinity of Gowanns Canal, regions known to abound in malaria." The first three of the above cases came from the worst parts of this neighborhood.

The symptoms are few. Apparently there is a general motor weakness of both lower extremities, without special atrophy or change in reactions, reflexes, or local circulation. The main complaint for which they are brought is that their legs have become very weak or paralyzed. The children have been too young and uncommunicative to say whether it was tenderness and pain that interfered with their walking. They object to making any attempts, and when stood up remain where placed with feet somewhat apart, or make clumsy attempts at progress and drop down helpless. In one of these and in one of Holt's cases the thighs were found to be more tender than the calves, though some general oversensitiveness to touch and pressure may exist.

The children are ill-humored and fretful. They are not, however, as timid and inclined to cry as choreics, though a slight early speech trouble—more a disinclination to speak than any distinct defect—might lead one to think of chorea. This, as also Morini's recent case, corroborates Singer's observation that aphasic affections are common in disorders of the nervous system due to malaria. This, with the arm trouble in one case and slight impediment to swallowing in another, indicates a more than local implication of the nervous system. The variable pains in the extremities are also frequent in children suffering from other forms of malaria.

Little value attaches to any enlargement of the spleen, since this occurs also in rickets. There is a marked difference between the favorite attitude of these patients—as also of those from rickets—and that attributed to paraplegia from genital reflex or spina bifida. In the latter there is frequent mention of a tendency to adduction of the thighs, whilst in the former quite the opposite prevails.

The distinction of malarial from rhachitic paraplegia may not be as easy, and, in the absence on the one hand of febrile attacks, past or present, on the other of distinctive rhachitic marks, one has to depend partly on determining which etiological factor is more probably present, or on therapeutic experiment.

7. *In Chorea (Rheumatic?).*

In this disorder there are two distinct forms of paralysis that do not appear, however, to have been very carefully distinguished. Only one of these, the first below, belongs to the clinical forms under discussion.

(*a*) True choreic paralysis usually incomplete. This commonly appears either very early in chorea or else at the beginning of convalescence, A paralysis varying from partial to very pronounced may usher in the more characteristic phases of chorea. The child is brought by the anxious parent with this complaint alone. Inquiry shows that though it may have developed rapidly its onset was not strictly sudden. Such cases are far more misleading than where the trouble follows a typical chorea. Though this form is usually unilateral (monoplegic or hemiplegic), in rare cases a paraplegic or paraparetic type, or a condition like general motor exhaustion occurs. However, the mono- and hemipareses in the prejactatory stage of chorea, not infrequent in any large nerve clinic, sufficiently attest the fact that motor impairment may be due to the choreic process alone; and they further indicate that the general paralytic condition, seen in or following many cases of chorea, is not wholly due to the tiring of the nerve motor apparatus.

Souza-Leite and E. Cherbuliez (*Progrès Med.*, 1889, No. 19) have published two observations on girls—or really young women—with neuropathic family history, in whom for a time there was paresis of both lower extremities (arsenic as a factor excluded). They also quote a corresponding case from Ollive's thesis. The choreic paralyses, including paraplegia without marked jactation, are also fully considered by Cadet de Gassicourt (*Rev. mens. d. Mal. de l'Enf.*, 1889; seen only in abstract).

Paralysis during or after the characteristic period of chorea will rarely be misconstrued. In early and doubtful cases something in the mental condition of the child, a greater impairment of one side, an occasional choreic twitch, or a history of past chorea, usually gives a clue to their real nature.

(*b*) Neuritis (arsenical or rheumatic) following chorea. This is a far more frequent cause of paraplegia than chorea alone.

Sherwell (*Brooklyn Med. Journ.*, April, 1890, p. 273) has added a recent case to others by Brouardel and Pouchet. Railton's case of paralysis following chorea is attributed by others (*v. Sajous' Annual*, 1888) to arsenic; and the same possibility is suggested in Fry's case ("Chorea with Multiple Neuritis," *Journ. Nerv. and Ment. Dis.*, June, 1890). Several other cases have been published. In fact there has been some question whether the cases attributed to chorea were not in reality all due to arsenic. But such is certainly not the case. In Ashby's case (*Manchester Med. Chron.*, 1890), occuring in the course of a choreic

attack, both arms and legs were affected; the sensitive contractures, atrophy, etc., indicate that it was a neuritis, evidently rheumatic.

Do these cases of the second class (B) represent the initial or slightly developed stage of severer trouble, or, are they always self-limited? As to the malarial group, one of the above cases, as well as one of different character given by Holt, indicates that spontaneous recovery may be expected; and the same holds for the rhachitic and choreic forms. There is evidently no gross pathological basis, as these cases do not in themselves present any proof thereof, and under suitable management recover so rapidly. The paresis may be the immediate effect of toxic matters in the circulation; or it may be a pseudo form, the consequence of muscular and fascial tenderness; according to prevailing views, however, some mild form of neuritis seems most probable, though, as is the case in common pressure paralysis, the change may be too slight to be demonstrable.

However, it is quite possible that the seat and nature of the trouble may be very different in the different forms. That the condition in each seems to favor the development of poly-neuritis is indicated by various cases, some of which are mentioned in this paper.

8. *Other Forms of Paralysis to be Distinguished from the Preceding.*

(*a*) The possibility of confounding any of these cases with infantile spinal paralysis or that following meningitis, especially cerebro-spinal, is slight; but certain other motor disturbances in childhood are at times confusing.

(*b*) The nearest analogy is furnished by certain forms of neuritis. That malaria in children, usually after a more typical course, may induce undoubted neuritis with resulting atrophies in both upper and lower extremities was made probable by two cases observed late in their course. Both were in boys, one of five, the other of seven and two-third years. The trouble followed intermittent febrile attacks without the intervention of any such condition as that in the previous cases.

(*c*) Another form of neuritis occurring in children is that, now so well recognized, from arsenic. Various recent writers note that at least in adults diabetic neuritis preferably attacks the lower extremities, and is more often bilateral. Alcohol, lead, and the rest of the category of neurotoxics might doubtless be included as possible analogous causes of paraplegic phenomena in the young.

(*d*) The post-infectious paralyses (after diphtheria, scarlatina, measles, etc.) are sufficiently common. At present they are largely classed as cases of neuritis. That following diphtheria is familiar to all, and probably that after scarlet fever is essentially similar. A form of extensive and for a time severe (complete) paralysis after measles has been described (principally by French writers within the last decade), and "a certain tendency to simple paraplegia" noted. According to the

two cases seen by the writer—one, a girl of six years, at the dispensary in the spring of 1885; the other, a boy of two years, in the practice of Dr. McNaughton—this form is somewhat distinctive in character. At first all the voluntary muscles below the head, except the respiratory, were involved. Improvement began in a few weeks, and went on to entire recovery in from one to two years.

(*e*) Hysterical cases of this type must be very rare in American children at least. S. P. Denhope (*Cincinnati Med. Journ*, Nov., 1890, p. 366–9) gives a case of hysterical paraplegia in a German girl of twelve years.

(*f*) Incipient paraplegia from Pott's disease should be carefully excluded.

(*g*) Syphilitic or osteo-chondritic pseudo-paralysis, often called Parrot's disease, is apt to attack but one extremity, whether a lower or an upper, at a time. It has been described in this country by Van Harlingen and others.

(*h*) Infantile spastic paraplegia (of Osler, Fergusson, and others) cerebral in origin.

It is certainly of the greatest moment, for practitioner and patient, to recognize the difference between the essentially functional and the tedious organic paralyses of childhood. Though relatively rare, these lighter forms are nevertheless worthy of further study and fuller recognition. Treatment follows from the diagnosis; and the prognosis also, usually excellent, depends on the primary trouble.