

OBSERVATIONS ON THE TREATMENT OF CHRONIC INFANTILE PARALYSIS

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The triumphant event in the study of chronic infantile paralysis is the change in the minds of the profession toward a more favorable prognosis. Whereas only a decade ago the accepted verdict was that "muscles which do not recover in the first weeks or months usually remain paralyzed for a whole life time" (Strümpell), now the belief is that "treatment faithfully and persistently continued is frequently rewarded by the return of power and usefulness in the atrophied and helpless limb" (Young).

Coupled with this change is the growing confidence in the simpler forms of treatment for this disease. For instance, it has but recently dawned on orthopedists that in tendon transplantation the benefits derived were due to the persistency of the after-treatment rather than to the substitution of a healthy tendon for a degenerated one. In the Hospital for Deformities and Joint Diseases of the City of New York, where approximately 1,100 cases of chronic infantile paralysis were treated within the last four years, the methods used were as follows:

Scarcely any tendon transference, arthrodesis, tenodesis, or nerve-grafting were done, while operations were limited only to the correction of paralytic deformities. Braces were avoided as much as possible, because of their tendency to lull the parents into the false belief that the child was wearing something which would cure him, and thus tend to make them neglect the treatment. Hand massage, the interrupted galvanic, the faradic and the sinusoidal currents were used. Practically all cases, not only those in the recessional stage, in which improvement is physiologic, but those also in which the paralytic attack was of over a year's duration, improved under this treatment. This is especially so in those cases in which previous treatment was neglected or imperfectly carried out.

EFFECT OF MASSAGE IN INFANTILE PARALYSIS

Sometimes a child suffering from this disease cannot contract a muscle or a group of muscles, not because they are paralyzed, but because they are inflamed. When this is the case the child winces or cries with pain when the muscles are massaged, while palpation of these muscles elicits tenderness. This tenderness is caused by the hyperstretching of the paralytic muscles, which injures the contractile element and produces

a myitis or an actual neuritis. Massage helps to overcome the inflammation and voluntary motion is possible.

Straining the ligaments of the joints is common in infantile paralysis, because in urging the child to walk, his weakness produces abrupt movements which cause strain. Paretic muscles are also incapable of much exertion. In exercising these patients we are apt to overwork them, which causes stiffness of the muscles the next day, so that often patients cannot do their exercises as well as they did at the previous treatment. Massage helps to relieve the sensitiveness of the muscles and ligaments, which is caused by the above strain and fatigue.

The hardest part of the exercises occurs at the beginning when the child has to overcome the locking of the muscles. This locking of the muscles is produced by the hyperstretching of the paralytic group and the contracting of their opponents. Massage stimulates the contractile element of the stretched muscles and tends to relax the spastic opponents. It also raises the temperature of the muscles. This raised temperature, usually from 1 to 5 degrees Fahrenheit, renders the muscles electrically susceptible, i. e., it takes a smaller amperage to cause contraction of paretic muscles after massage than before. The importance of this phenomenon from a therapeutic standpoint is self-evident.

The belief that massage builds up atrophied muscles I find to be incorrect. In the Lucus-Championière method for the treatment of fractures, in which the limb is thoroughly massaged daily, massage diminishes but does not prevent the atrophy of muscles. Nor does massage and electricity prevent atrophy of inactive muscles. I have tried this a number of times on limbs that were held by posterior splints for inflamed joints. Despite the daily use of massage and the interrupted current, flabbiness of the muscles appeared in a short time. If, therefore, massage or the use of massage and electricity do not prevent the atrophy of healthy but inactive muscles, these agents certainly cannot "build up" atrophied and partly degenerated muscles, such as exist in chronic infantile paralysis.

Atrophy seems to be the result of the law of supply and demand of the organism, which is, that increased function of tissue is followed by the increased size and strength of the tissue; diminished function by atrophy, and useless tissue by degeneration. The lesion in chronic infantile paralysis is a destruction of motor cells in the spinal cord, while the part of the cord affected is shrunken and sclerotic. Improvement in the chronic stage is not due to the regeneration of motor cells in the spinal cord. The pathologic law that dead organic cells never regenerate is fixed. Improvement is due to the physiologic law that cells increase in size and strength with function, and that sometimes a cell takes over to itself the function of the destroyed neighboring cell. This must be true. How else can we explain the improvement that takes place in the chronic

stage of this disease and the fact that many children gradually outgrow their trouble?

In order to understand the *modus operandi* of the treatment in the chronic stage of this disease, we must first glance at the structures that are involved in a voluntary muscular contraction. They are, the motor cells in the spinal cord, the spinal nerves, the muscles, the conducting tracts, the motor centers in the brain, and the will power. In chronic infantile paralysis there is a break in this psycho-neuro-muscular cycle at the motor cells in the anterior cornu of the gray matter of the spinal cord. Atrophy and degeneration in chronic infantile paralysis is not only limited to the muscles, but also affects the nerves, the conducting tracts and the motor cells in the brain centers dominating the affected muscles, and the will power to concentrate on these brain centers becomes weakened from disuse caused by the break in the cycle.

Since the contractile element of the muscles is often injured or destroyed by the hyperstretching of the paralyzed muscles or by atrophy and degeneration, it is obvious that the care of the muscles themselves is imperative in this disease. Massage and electricity exercise the muscles, but the exercise produced by these agents is of a passive variety (an exercise of muscles without the exercise of the other structures of the cycle), and clinically we know that the benefit of passive exercise is slight. Permanent benefit is only derived from the simultaneous and coordinated exercises of all the elements of the cycle. This is only possible during voluntary muscular contraction, because in this wise the will power and the atrophic brain cells are exercised and by reciprocal action the motor cells in the spinal cord are developed and the muscles strengthened. And so, at bottom, it is the exercise of the will power that causes improvement in chronic infantile paralysis, by developing the gray matter in the brain and cord.

The dominant effect of massage is suggestion. The suggestion of massage in chronic infantile paralysis differs, however, from the psychic effect that massage has on the adult patient in other diseases. In the adult patient massage makes him feel that he is being "benefited," an element in massage long recognized, which explains its popularity in the treatment of nervous diseases. In chronic infantile paralysis in children, however, massage suggests focusing their will-power on the motor brain centers of the affected muscles and stimulating them into action. Suggestion itself, however, may not produce the desired effect or may even produce an opposite effect, which is true oftentimes of suggestion in general as, for instance, when a physician suggests or tells a neurasthenic that he is free from organic diseases and that he will get well, the patient becomes convinced that the opposite is true. Resistance to suggestion or command is often observed in the beginning of treatment of children with

chronic infantile paralysis. The strange surroundings of the dispensary or office, the manipulations, etc., frighten the child and arouse its antagonism, so that the child persists in contracting the muscles under massage and suggestion, or command to contract the paretic muscles is followed either by no response at all or only by desultory and superficial contraction.

The masseuse, however, towers over the child, grasps the limb with one hand and with the other executes movements on the body of the child which are centripetal or circular and which induce a tingling and a thrilling sensation. These movements are monotonous and are made in front of the child and resemble the passes of a hypnotist. I have seen children who when first massaged were unhappy and cried, but later become used to it and lie during the treatment completely relaxed with flushed faces and dreamy looks, a condition resembling the prehypnotic state in which the mind becomes susceptible to impressions. These various manipulations (rubbing, kneading, striking, etc.), performed during that period are suggestions to the child to contract the involved muscles. These suggestions repeated so frequently accumulate into a hypnosis which arouses and concentrates the child's will power on muscular contraction.

We see this often, in fact, when children who at the beginning of the treatment respond feebly to the command to contract their muscles, later begin to focus their energy to such an extent that their faces are flushed from the exertion. These extreme efforts can hardly be explained by the theory of the child's own initiative, but are rather prompted by a hypnosis which resulted from the movements of the masseuse.

PASSIVE MOTION

In passive motion the masseuse relaxes the stretched muscles and stretches the contracted ones. This is temporary, however, as the muscles slip back to their former position as soon as the hand of the operator is removed. During passive motion no muscular contraction takes place, and the effect, therefore, of these movements on the muscles themselves are practically nil. Its value is chiefly due to the fact that during the relaxation of the stretched muscles and the stretching of the contracted muscles such movements are suggested to the child.

ELECTRICITY

"Except as a matter of exercise, electricity is practically useless" (Sachs). The interrupted currents exercise the muscles and hinder the atrophy and degeneration which progress in the muscles. The exercise, however, induced by the currents is of a passive variety, since it affects the muscles alone, and the benefit of such exercise is slight. We see

cases in which a group of muscles have regained their power (as shown by their response to the faradic current), and still the child is unable to contract them. This can be accounted for by the child either forgetting how to contract the muscles during the period of their inactivity, or by his will-power to concentrate on these brain centers becoming weak from disuse. I believe that the chief value of the interrupted currents is not due to their local effect on the muscles, but is due to the impulses of the muscular contractions that are conveyed and registered on the child's brain. These impulses are object lessons to the child which imperatively suggest imitation of the movements.

CONCLUSIONS

The benefits of massage, electricity and passive motion are not due to the local effect of these agents on the muscles. In chronic infantile paralysis the affected muscles are unbalanced, atrophied and partly degenerated, are subnormal in temperature and have subjective symptoms of weakness, stiffness in exercise, and often of pain. The above agents, especially massage, relieve the pain by their counter-irritating effect, and the stiffness by their antispasmodic action, and temporarily raise the temperature and relieve the weakness by exciting the circulation and stimulating the contractile element in the paretic muscles. These effects help the patient to bring the muscles under the control of the will-power and facilitate their exercise. The chief value of these agents, however, is due to their reflex mental action, consisting of suggestions, of impulses of muscular movements which are conveyed to the brain, and which the child instinctively imitates, and the building up of an hypnosis which arouses the mental energy of the patient into a concentrated effort during the muscular contractions.

That this is true is proved by observations in the gymnasium. A bright child, for instance, a type generally susceptible to impression, makes greater progress during the treatment than the stupid child, a type not susceptible to suggestion. No matter how much local treatment the latter receives, he remains unresponsive and makes little progress. It is also proved by cases in which physicians have given a great deal of local treatment, together with a bad prognosis, and the patient has made but little progress during that time. Finally, perhaps, an intelligent parent or nurse may have applied herself with energy to the treatment of the child and produced remarkable results in a short time. Instances of that kind are not at all rare, and reports of such occurrence have of late found their way into the lay press.

The prime factor in these "miracles" has been the enthusiasm for work aroused in the child. In most of them very little local treatment was used, and it was mainly limited to massage. The form of massage

employed consisted generally of upward and downward strokes, the effect of which was to stimulate the nerve endings and draw the blood temporarily to the surface. Such massage, which is conspicuous for its flagrant disregard of all the principles of scientific massage, has little effect on the muscles themselves. Its reflex mental effect on the patient, however, is tremendous. It is practically the fetish which creates the enthusiasm. It is the carrier of the hypnotic impulses that arouse the will power to concentrate to the utmost during the muscular contractions, and which leads to the building-up of the mental and motor brain-cells.

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