THE BICYCLE IN THE TREATMENT OF NERVOUS DISEASES.

By GRÆME M. HAMMOND, M.D., New York.

THE value of systematic exercise in the treatment of many diseases is certainly not fully appreciated by the average physician, nor could it be fully expected to be otherwise, since it is notorious that physicians, as a class, take little or no active and regular exercise. Walking, and as little of that as will suffice in making his daily round of visits, is the only form of exercise which the busy physician imagines he can spare the time for; while such indoor exercise as is afforded by boxing, fencing, and the gymnasium, and out-of-door exercise, such as bicycle riding, horseback exercise and skating are practically unknown to him, and their therapeutic value is not grasped by his mind at all. Under such conditions it can be readily comprehended that the advice relating to exercise which the majority of physicians give to their patients is valueless. They are giving an opinion on a subject concerning which they are densely ignorant. Very recently a practitioner of this city, whose professional position is enviable, advised one of my patients, who was suffering from fatty degeneration of the heart, to spend most of her time lying down and to take as little exercise as possible. The advice was bad. Fatty degeneration of the heart like fatty degeneration of the biceps can be cured by appropriate exercise. Many physicians know this, but how many of them can conscientiously admit that they are competent to direct the physical training of a patient suffering from a feeble heart.

The subject of the therapeutics of exercise is so vast that it is practically impossible to cover the ground in a paper of ordinary length. I therefore propose to consider only one of the forms of exercise, namely, bicycling, and that only in its relation to the treatment of some forms of nervous disease.

Exercise when prescribed for nervous affections should preferably be taken out-of-doors. It must also be combined with pleasure, and should be prescribed not only with the view of strengthening the muscles, but also for its effect upon the mind. The effect upon the mind is often of greater importance than the effect upon the body. The feeding of the mind on self and the continual mental introspection which is so common in neurasthenia, hysteria and hypochondria should be combated by prescribing an exercise which necessitates the pleasurable concentration of the mind on what is being done, something which demands a certain amount of skill for its successful accomplishment, and which must therefore divert the thoughts from morbid channels, stimulate the mental faculties in a normal direction and engender a feeling of brain-rest and mental refreshment.

Such results can be obtained by the proper use of the bicycle. The facility with which almost any one can learn to use it, the exercise of skill required in guiding and controlling its course, the exhilaration which comes from rapid motion, the continual change of the panorama of the landscape, and the exercise of almost every muscle of the body make it an apparatus which not only develops the body, but is far more potent in stimulating a healthy cerebral activity and in arousing the mind from a lethargic condition than any medicinal remedy known to me.

Far different is the result obtained from the use of apparatus which physicians often advise patients to purchase and to use at home. After an individual reaches the age of twenty-five his exercise should be combined with pleasure. That factor of mental exhilaration must be present, or else the exercise simply consists of physical motions which soon become stupid and wearisome to the performer. The use of dumb-bells, Indian-clubs and home exercises of all forms soon becomes drudgery. The patient works at them faithfully for a few days with gradually increasing dislike. The exercise finally becomes repellent to him, and he ceases to perform it. This is the history of fully ninety per cent. of all the people, both well and sick, who with the most earnest intentions begin to exercise at home. The bicycle has

therefore two uses as a therapeutic agent, one as a developer of paretic muscles, the other as a mental stimulant. In the former case the paralyzed individual is willing and anxious to use it, because while he is exercising his muscles he is at the same time enjoying himself.

I have prescribed the systematic use of the bicycle in sixteen different instances. Three of these were cases of paralysis due to anterior polio-myelitis; one was a case of paralysis resulting from multiple-neuritis, and one was a case of hysterical paralysis with slight contracture. Six were cases of neurasthenia. The twelfth case was one of sexual perversion, and the thirteenth case was one of abnormally developed sexual appetite.

The cases of paralysis from anterior polio-myelitis can best be considered together. In this group the object was simply to obtain stimulation and development of muscles which had degenerated both from disease and from disuse. It may be argued that in such cases any form of exercise, the performance of which calls into play the affected muscles, would be equally as efficacious as the bicycle. This would perhaps be true if the patient would invariably exercise under the supervision of an instructor who would see that the exercise was faithfully carried out, because people *will not* voluntarily go through stupid and uninteresting muscular movements day after day unless they are compelled to. This, however, is not the case with the bicycle. Those who learn to ride it learn at the same time to like it. They exercise voluntarily and enjoy it. After the art of riding is mastered the patient can exercise by himself without any supervision. Horseback riding, while it is an excellent form of exercise, cannot be indulged in by any one whose limbs are paralyzed to any marked extent. In cases I. and II., only the right leg was affected; in case III., both legs were paralyzed. In all three cases the disease seemed only to have affected those cells supplying the extensor muscles of the foot and toes. The muscles of the thighs were much weaker than they should have been, were smaller than normal, and were soft and flabby. This condition I attributed solely to disuse, as the electrical reac-

tions, though diminished quantitatively, were qualitatively normal. Case I. was a girl of twelve years of age, whose right leg had been paralyzed for five years; case II. was a lad fourteen years of age who also suffered from paralysis of the right leg which dated from his seventh year; case III. was a lady who is now about thirty years old. Both legs had been paralyzed since she was six months old. In the latter case the tendons of both gastrocnemii had to be cut to overcome a well marked talipes equinus of several years' duration. In all of these cases walking was performed with great difficulty owing to the atrophy and paralysis of the thigh muscles. Mounting the stairs was impossible in one case and accomplished with great effort in the other two cases for the same reasons. None of them could support the weight of the body in a standing position if the knees were ever so slightly bent. In the first and second cases the muscles of the left leg were undeveloped and much weaker than they should have been, though the muscles were not affected by disease. I prescribed the use of the bicycle in these cases three times a week, only allowing them to ride for a few minutes at a time. When muscular tissue is degenerated either from disease or disuse its cultivation must be carefully conducted at first. Over-use of a degenerated muscle only advances the process of degeneration, both of the muscular tissue itself and of the spinal motor cells which supply the muscles used; while on the other hand, intelligent use of the muscles is conducive to healthy stimulation and subsequent development. The development of muscular tissue is a slow process even in a healthy person. It is particularly slow where the muscles are degenerated. As the strength of the limbs gradually increased, I permitted the patient to ride for a longer time.

CASES I. and II. have now been riding for over a year. For the past six months they have ridden daily out-of-doors when the weather was not too inclement. The effect on the muscles of the legs is well marked. The thigh muscles which were simply paralyzed from disuse and were formerly soft and flabby are now firm, fairly hard, and are fully as

strong as those of the average person. Both the patients can mount the stairs easily, can support their weight with the knees bent, and can walk very much better than they formerly could. In regard to the paralyzed muscles the improvement is not so marked. Electricity has frequently been used on these muscles, hence what improvement has been obtained in them cannot be said to be due entirely to the bicycle, though, unquestionably, it has been of material aid. The muscles are stronger, and there is more mental control over them than there was a year ago. I am confident that one or two more years of cultivation will show even more decided improvement.

CASE III. was only able to continue her bicycle instruction for a few months, but even in that time her limbs were perceptibly strengthened. When she takes it up again I feel confident, judging from the other cases, that the development of her muscles will be proportionate to the time she devotes to the use of her bicycle.

CASE IV. *Multiple neuritis.*—The patient, a man thirty-two years of age, was first seen by me in December, 1890. He was a typical example of the disease, which was undoubtedly of alcoholic origin. Both legs and both arms were almost completely paralyzed; the flexors of the fingers and toes were capable of some slight motion; the muscles of both arms and legs were atrophied; the nerves were hard and tender; and there was a great deal of spontaneous pain in both legs. There was a loss of tactile sense and pain sense, the patient not feeling the prick of a pin or a cut with a knife; but severe pains were experienced if passive movements of the extremities were made. The electrical reaction of degeneration were well marked. Under appropriate treatment the neuritis gradually subsided, leaving the muscles greatly weakened and atrophied. Soon after the power of standing and walking was regained and a fair amount of strength had returned to the arms, I sent him to Bidwell's Bicycle School. For the first few days he rode three times for periods of five minutes each, with five minutes' rest between each ride. At first he had not sufficient strength to propel the bicycle and could only move it with

the teacher's assistance; but the improvement in the muscular strength was rapid, and as the strength increased the time devoted to riding was lengthened and the period of rests reduced, so that in twelve days he could ride for half an hour uninterruptedly. From this time on his improvement was even more rapid, and in ten days more his strength seemed to have reached its normal condition.

Exercise in any form should not be prescribed in cases of neuritis until all evidence of inflammation of the nerves has subsided and the period of regeneration has set in. Electrization of the muscles is, in my opinion, greatly inferior to bicycle riding as a muscular stimulant and developer. In one case the growth of the muscular fibre is produced artificially, and is therefore slow and imperfect; in the other, the development follows the laws of nature and the muscles are exercised through the will power, the motor impulses being transmitted through the nerves as fast as their regeneration makes transmission possible.

CASE V. *Hysterical paralysis with slight contraction.*— The patient, a young lady fifteen years of age, with a decidedly neurotic family history, was suddenly taken with complete paralysis of the right leg while at school. The physician who attended her at the time informed me there were no disorders of sensibility. When I first saw her, about three weeks after the onset of the paralysis, the limb was motionless, and slight contracture of the flexors of the leg was perceptible. There were no disorders of sensibility, nor was there any evidence of an organic lesion. I prescribed the use of the bicycle daily for half an hour at a time. At first it was necessary to strap the foot of the paralyzed leg to the pedal of the bicycle in order to keep it in position. She was encouraged by the teacher, under my instruction, to continually make every mental effort to use the paralyzed limb, the sound leg being strong enough, with slight assistance from the teacher, to propel the machine. Thus she was receiving passive exercise of the paralyzed leg, together with alternating stretching and relaxation of the contracted muscles, and at the same time was being urged to make volitional muscular efforts. The treat-

ment was successful. Muscular movements were made slowly at first and seemingly with great difficulty, but gradually the mind regained control of the muscles and a cure was established. I have recommended the steady use of the bicycle in this case with the idea that systematic out-of-door exercise will, by physical development, eradicate any tendency to a recurrence of the attack.

CASES VI. to XI. inclusive, were cases of neurasthenia. Five of them were men, one was a woman. The usual symptoms which are so familiar to the neurologist, such as insomnia, vertigo, depression of spirits, fulness or pressure in the head, dyspepsia, constipation, irritability of temper, loss of energy, and the host of other minor symptoms which, when taken collectively, tend to make life a burden to their possessor, were present in these cases. In the majority of instances, anxiety, worry or trouble of some kind was responsible for their condition.

In an individual with a strong and vigorous body, and who is accustomed to take a great deal of out-door physical exercise, small annoyances, and even troubles and griefs of considerable magnitude, are borne with a mental courage and fortitude which ordinarily can be but feebly reproduced in those who are physically undeveloped. There is a buoyancy of spirit in the strong and healthly which rises superior to the onslaught of troubles, while the individual of sedentary habits, or who never has felt the courage which goes hand-in-glove with health and strength succumbs sooner to the troubles which fall to the lot of nearly every man and woman. The development of the symptoms of nervous exhaustion follows as a matter of course. The plan of treatment for the relief of such cases is to strengthen the mind and the physical system at the same time. The direct cause of the disease cannot always be removed. Worry and trouble are things which cannot be relieved by a physician's prescription. But the intelligent physician aims to so strengthen the mental vigor of his patient that his brain will regain the power to assert itself and perform its functions in a natural manner. This can undoubtedly be accomplished by appropriate medic-

inal treatment. But this is not all. Physical development leads to a certain form of mental development. With increasing strength comes greater courage, perseverance and tenacity of purpose, and when physical exercise can be combined with a pursuit which is not only pleasant, but which must necessarily engross the mind and thereby lead it away from morbid thoughts, and from that introspection which is usually so prominent a feature of neurasthenia, we have a remedy which as an adjunct to appropriate medicinal treatment is an ally which is worthy of a great deal of consideration. In the bicycle we obtain a combination of physical and mental exercise which meets the requirements of the case more thoroughly than any other form of treatment. The six cases referred to in this paper always speak euthusiastically of the benefit they received from the bicycle. They returned from their rides physically tired, but mentally refreshed. Comparing these cases with other similar cases who did not use the bicycle, I am forced to admit that the recovery of the latter might have been materially accelerated if the bicycle had been prescribed. Neurasthenics should begin to ride out of doors as soon as they have learned to manage their wheel well enough to retain their equilibrium without assistance. They should be encouraged to ride for as long a time as they can without experiencing great fatigue. Beginning with a moderate ride of a mile or two, the distance should be rapidly increased till from ten to twenty miles are covered in a morning or afternoon's ride. If the companionship of other riders can be obtained, so much the better, provided they are not neurasthenics. The longer the ride and the more unfamiliar the scenery, the more the patient's mind is diverted from self and the thought directed into more varied and healthful channels. Patients with neurasthenia should therefore be instructed to take long rides at a moderate speed, and to vary the direction of their travels as much as possible.

CASES XII. and XIII. both suffered from abnormal sexual appetites. Case XII. a young man, twenty-four years of age, had observed for the past year a gradually increasing desire for members of his own sex. He had been able to

control his appetite so far, but was fearful lest it should finally overcome him and lead him to perpetrate acts which were naturally abhorrent to him. Case XIII. was a man, thirty years of age, whose naturally vigorous sexual appetite had been fed by indulgence, till it seemed as if the gratification of his desires was his only object in life.

I have observed during my twenty years experience among athletes, that physical fatigue is antagonistic to the sexual appetite, and that men who devote their lives to the cultivation of their physical strength are seldom, if ever, immoderate sexually, and during the periods of active training are often abstemious simply from lack of desire. Energy, which, in others might be expended sexually, is in them consumed by hard physical work. It has, therefore, been my custom in those cases, in whom I have considered it advisable to diminish or to abolish the sexual appetite, to prescribe severe and fatiguing exercise in conjunction with suitable medicinal treatment. I have found nothing more serviceable than the bicycle to accomplish this object. It should be used daily, preferably in the afternoon, and the patient should be directed to ride long distances at a rapid rate of speed, not carrying it to such an extent as to produce exhaustion, yet sufficiently so to induce well-marked fatigue.

Both of these patients have repeatedly told me that a hard ride would invariably abolish all sexual desire, even if the appetite was at its strongest just before the ride was taken. Of course, medicinal treatment was administered in both instances; but there can be no doubt that their recovery was hastened and facilitated by the hard physical labor they were subjected to by the use of the bicycle. These thirteen cases cited are not by any means the only ones in which the bicycle has been advantageously employed, but they represent three different classes of disease, all of which were benefited by the bicycle, and yet in each class the manner of using it was different. What would have been considered the immoderate and injudicious use of a remedy in one class of cases, was only attended by good results in another. For the guidance of those who

may consider it expedient to use the bicycle as a remedy, the following suggestions may be useful:

It is best, in most cases, to have the patient taught privately. Indeed, this is essential in cases of hysteria and neurasthenia, particularly when the subject happens to be a woman. The nervousness, agitation and fright, which pervade all nervous women and most nervous men at the bare possibility of taking their initial lessons before an audience, is in itself sufficient to neutralize any benefit which might be derived from the exercise; while on the other hand, if the lessons are taken with only the patient and the teacher in the room, the feeling of trepidation soon vanishes, and gives place to those of enjoyment and exhilaration. In such cases I would not even permit the intrusion of intimate friends or relatives; of course, if the case is one of simple paralysis these restrictions do not apply. The teacher should be a man of discrimination, who understands, that he is not only giving a bicycle lesson, but is also dealing with a case of sickness. Most of my patients were taught by a special teacher at Bidwell's School, who, acting under my instructions, exercised both tact and patience with his teaching, and materially aided me by his encouragement of fretful or despondent patients. It seems to me that all physicians who desire their neurasthenic or hysterical patients to take bicycle lessons, should carefully instruct the teacher in regard to his management of the case. Impatience and irritability on the teacher's part, often discourage patients who might have been greatly benefited by judicious management.

As comfort is essential to pleasure and contentment, a bicycle should be selected which combines fine workmanship and smoothly running parts, with the least amount of vibration, while traversing rough or uneven roads. A bicycle which works stiffly, or which "squeaks," or where the saddle is uncomfortable are often matters, which though trivial to the healthy individual, are of the greatest annoyance to the sick. One of my patients, a hysterical man, was one day so annoyed by the continual "squeak, squeak," of his pedal every time it revolved, that he finally burst into

tears, dismounted, left his bicycle in the road and returned home in the cars, in a highly hysterical condition.

At the present time the pneumatic tired machine is the most comfortable. Rough roads can be traversed on it with very little jar or vibration. It is particularly to be desired for women. The American, or Thomas tire, as it is called, is superior and more enduring than any tire that is imported. The weight of the bicycle is a matter of importance, and should be carefully determined by the weight of the individual who intends riding it. A heavy person is liable to break a wheel which is too light for him; on the other hand, it is not advisable for a person, especially if he is not strong, burdening himself with more weight than is necessary. The selection of the weight of the wheel had best be left to Bidwell.

In riding, the body should not be inclined forward, at least, only to a very slight degree. In racing, undoubtedly greater speed can be attained when the body is bent almost at right angles with the legs; but with the invalid in search of health the case is different. The attainment of great speed is not the point to be gained. He should sit in a natural and easy position, with the chest out, and the head well up, so that respiration can be carried on to the best advantage.

If physicians would study the bicycle as a remedy and prescribe it intelligently, they would often find it exerting a beneficial influence far in excess of their expectations.