THE

THERAPEUTIC APPLICATION

OF

MEDICAL GYMNASTICS

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History of Physical Education
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THE THERAPEUTIC APPLICATION OF MEDICAL GYMNASTICS.

BARON NILS POSSE.

THE word *gymnastics* is generally understood as meaning systematic exercise of the muscles, for the restoration of health, and for the development and preservation of the physical powers. Hence gymnastics must be considered, not only as an educational and hygienic agent, but as a curative means as well. It naturally follows that the character of the exercises must vary according to the purposes for which they are used.

Though exercise of one kind or another has been used since time immemorial for curative purposes, we owe it to the Swede P. H. Ling and his followers that each branch of gymnastics has been given a more distinctive character, and that a new impetus has been given to the medical part of this science. Ling divided gymnastics into two main branches, medical and educational, the names denoting their aims. The medical branch has been commonly known as "Swedish Movement Cure," "Movement Treatment," etc. I prefer to use the name "medical gymnastics" in this last sense, as these words have a wider significance than the word "massage," which usually is understood as denoting one of the procedures of friction, kneading, and percussion. Each one of these manipulations

might, however, be regarded as passive exercise of the muscles and as such to belong among the procedures of medical gymnastics.

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Medico-gymnastic movements are *active* when executed by the patient himself, as for instance the voluntary motion of the forearm as in flexion ; if the operator makes resistance against this movement, it becomes *resistive ;* if he helps the patient in performing it, it becomes *assistive ;* and if he is doing the movement without any voluntary effort whatsoever from the patient, the movement is called *passive.* The passive and resistive movements are the ones most used in the application of this treatment ; the assistive substituting the resistive where the voluntary nerve-impulse is deficient, and the active ones serving for home exer-

cise where this is desirable. All these movements may now be given the usual names of flexion, extension, abduction, adduction, etc., etc., and some of them can be applied by machinery, such as vibration and circumduction. As for "mechanical massage" I quite agree with Zabludowzky and other authorities, that nothing done by machinery can ever be worthy of the name of *massage.*

"The effect of a movement is the result of its *action*, and the *reaction* of our organism;" the effect may be physical, physiological, and psychological, and movements have also both a general and local effect. Usually the local effect decides the use of a movement, although its general effects should never be left entirely out of consideration. The local effects of active movements in general are stronger innervation or increased

cerebral influence upon the nerves, and increased afflux of arterial blood into the active parts. This afflux in some parts lessens the amount of blood supplied to other parts; and thus in the active movements we have a regulator for the hydrostatic pressure of the blood,—a means of preventing and relieving active hyperæmia. It also follows that we are able to overcome the atrophy of some parts by increasing the local nutritive activity, and to counteract hypertropy by lessening the arterial supply, *i. e.*, by leading it into channels where it is more needed. The local effects of active movements are highly increased by making the movements resistive, whereas they are lessened if the movements take the assistive form.

The effects of passive movements differ somewhat from those produced by the active ones. For, whereas

the active movements harden the fibrous tissues and lessen the adipose ones, the passive movements make lamellous texture predominant and cause a greater amount of fat to accumulate between the muscles and under the skin.

As a rule, the "prescription" for each particular case treated by medical gymnastics should contain both passive and active (resistive or assistive) movements, selected according to the above principles. The number of different movements given in one application should be reduced to its *minimum;* usually it is not less than six and not more than twelve, occupying from thirty to sixty minutes. These movements must follow each other in such a manner that the effect of one does not neutralize the effect of the one just given, or *vice versa.* The movements, at first given

gently and tentatively, should grow in power and duration in even pace with the strength of the patient; and it has been found advantageous to begin and end each application by some gentle exercises chosen for their general effects, and to put the more specific movements in the middle of the prescription. It is customary to allow a brief interval of "rest" after every two movements: it should be understood, however, that the patient does *not* lie down, but moves around if his strength allows it; for this pause is made so that the reaction may set in — "the movement may be 'assimilated'" — and this occurs sooner if the patient does not lie down, as gravitation has less influence on the circulation when we walk than when we lie down. It should be left to the physician, or in his absence, to the operator, to

decide the duration and frequency of each movement, for, as a rule, a patient is no more competent to prescribe what movement and how much of it he ought to take, than he is to prescribe his own medicine.

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If we turn to the more immediate subject of this paper, or how to apply the movements, we are naturally led first to consider the disorders of the *circulatory system*, as the effects produced by movements are most noticeable in the changes caused in the circulation.

As it is well known how bodily movements increase the activity of even the healthy heart, it has been questioned whether it would be safe to apply movements when the heart is diseased and consequently still more sensitive. The question is, whether it is possible to give any

movements that could help and regulate the circulation without increasing the activity of the heart. Various movements have been applied to persons suffering from heart-disease, and their effects have been investigated by observing the heart's action at the beginning and end of each movement; and it has been found that there are both active and passive movements which will quiet and regulate the heart's action. How massage acts in these cases has been neatly illustrated by Dr. Douglas Graham, when he describes "the contracting hands of the manipulator" as "two more propelling hearts at the peripheral ends of the circulation, co-operating with the one at the centre," etc. But that is not all: if they are done in easy, restful positions, active movements can also be performed. When the force of the

movement is carefully graded according to the severity of the case, the pulse becomes fuller and more even, but not more rapid. The aim of the movements will be to diminish the irritability of the parts in the immediate neighborhood of the heart, which is done by passive expansion of the chest-cavity; and to prevent the too rapid afflux of the blood to the heart by increasing the circulation in peripheral parts. Whether the disease takes the form of hypertrophy, dilatation, fatty degeneration, or valvular deficiency, the character of the movements used will be very much the same, the chief object being to regulate the circulation of the blood and lymph. Among movements that have the best effects are the so-called "respiratory" movements. These consist in passive expansion of the patient's chest by the

operator, while the patient is breathing, as follows : the patient sits on a chair (without a back) ; the operator, standing or sitting behind, grasps the patient under the arms, which are hanging loosely down ; now the operator lifts the patient's shoulders upward and backward, while the patient inhales, and lets them gently sink, while he exhales. In this way the respiration becomes very deep, without any increased nerve-impulse from the patient, and the heart's action is by no means accelerated. The negative pressure produced during inhalation in the organs in the chest-cavity outside the lungs can in this way be made from five to six times greater than what it is during ordinary inhalation (which, according to Dr. Wundt, corresponds to the pressure of a 7.5 mm. quicksilver cylinder) ; and the circulation in the adjacent

veins is accelerated in proportion. The closing of the semi-lunar valves during the diastole of the ventricles and the resistance of the arterial walls prevent any marked retardation of the arterial currents. The effect can be still more increased if the operator lifts the patient's arms to a horizontal position during the inhalation, and again lowers them during the exhalation. Here the elevation of the arms not only expands the chest, thus aiding the respiratory act, but it also straightens the curve of the axillary artery, which lessens the resistance to the arterial current toward the arm, that is, the pressure in direction of the heart is lessened. These movements can be varied in many ways.

Prof. Lovén, of Stockholm, has said that "at the greater number of the articulations, but especially

around the hip and shoulder-joints, as well as at the lower part of the neck, the superficial part of the walls of the veins is usually fastened on aponeuroses and fasciæ, which by certain movements are extended so that the veins are expanded. This causes in these veins a suction which powerfully accelerates the return current. By the alternate motions of the joints the veins may thus be alternately extended and contracted, filled with blood and again emptied. This is true not only of the extremities, but also and especially of the largest of all the veins, the inferior vena cava, which is so located along the front of the spine that it must follow the movements of the latter. If the thorax be bent forward, this vein becomes highly contracted, again to expand when the trunk is straightened. Experiments have proved that

the capacity of the vessel largely increases at such extension. It is easy to understand how at every extension, and still more at backward flexion of the trunk, a suction is caused in all those veins which supply the inferior vena cava, especially in those of the lower extremities. A similar condition takes place in the veins of the arms when these are extended sideways and somewhat backward, with the hands closed. Finally, as regards the jugular veins, these are the most extended when the head is bent backward with upturned face."

The flow of the lymph is accelerated in proportion with that of the blood, the negative pressure, as described above, causing a suction also in the thoracic duct, and the increased pressure of the blood, produced by suitable movements, accelerating the flow also in peripheral

lymph-vessels. An average "prescription" for heart-diseases would have the following appearance :—

1. Passive foot circumduction ; reclining position.

2. Forearm flexion and extension with gentle resistance ; reclining position.

3. Passive hip circumduction ; reclining position.

4. Resistive foot-flexion and extention ; standing position.

5. Percussion on cardiac region of chest (specific in heart-diseases).

6. Passive trunk circumduction ; patient sitting astride a chair.

7. Resistive leg extension, one leg at a time ; reclining position.

8. Passive arm circumduction.

After each movement a passive respiratory movement.

In three cases of heart disease which came under my care, two of

dilatation, one of fatty degeneration, the movements used were substantially the same as the above; and although, of course, no *cure* was effected, there was a decided improvement of the symptoms. This is about all that can be expected, as an organic disorder of the heart but seldom changes into health. To alleviate the suffering and prevent any changes for the worse, is at least something gained; and no other means will prove so effective in this respect as medical gymnastics; but to secure any permanent results the movement treatment must be continued for long periods; or, as Dr. Zander, of Stockholm, has put it: "In heart-disease, movement treatment is an uninterrupted necessity, at least during the winter."

The same may be said of aneurism, which disease has sometimes been

treated by medical gymnastics, the movements being similar to those used for heart-diseases, and their object being the same: to promote the circulation of the blood. In one case of aneurism of aorta descendens, sent to me by a physician, some of the symptoms (numbness of the lower extremities and incontinentia urinæ) yielded readily to the treatment, but returned shortly after the patient had ceased to take treatment.

Of other diseases of the circulatory organs only varicose veins are amenable to this form of treatment. Dr. Hartelius, of Stockholm, states that this disorder cannot be cured by medical gymnastics. I have had more good fortune than he, for I have at least one cure to report: —

Mr. J. L., aged twenty-six, had very pronounced varix of the left internal

saphenous vein. His business compelled him to stand for ten or more hours a day, and this had caused passive hyperæmia of the whole pelvic region, producing constipation, enlargement of the prostate, cystitis, and finally this varix. The treatment given was : —

1. Resistive arm flexion and extension upward, to increase the arterial current in the upper thorax and arms, as well as to increase the chest capacity.

2. Passive hip circumduction (as described before).

3. Passive trunk circumduction (as before).

4. Brief percussion along the varicose veins so as to stimulate the vasomotor nerves and cause the vessels to contract. During this procedure the patient was lying on his back with his legs higher than the

rest of his body, so that the posture might aid the venous current.

5. Resistive trunk rotation to bring into play those muscles that perform the expulsory act and thus to relieve the constipation.

6. Pressure over the pubic crest, patient reclining, with relaxed abdomen. This movement is a specific against cystitis, acting on the nerves of the bladder.

7. Same as No. 4, followed by a brief kneading to prevent any soreness of surrounding tissues.

8. Percussion on the sacrum with closed fist, so as to stimulate the plexus that supplies the nerves to the pelvic viscera.

After a few weeks some stronger resistive movements of the legs were added to the above, and after three months and a half of daily treatment (counting out Sundays and a few

other days), the varicose veins were no more visible; the other symptoms had also disappeared except the cystitis, which, however, had lessened considerably, the desire to urinate being much less frequent.

Some diseases of the *respiratory organs* can be advantageously treated by medical gymnastics alone, especially disorders of the lungs; and that this should be the case is easily understood, when we remember that "deficient exercise is one of the causes which favor those nutritional alterations in the lung which we class as tuberculous" (Dr. C. A. Parkes). Consumption has ceased to be an incurable disease, for, if taken hold of in time, it will yield to medico-gymnastic treatment. The movements are here directed so as to aid the action of the heart, increase the chest capacity, and

improve the general nutrition. Swedish physicians have some glorious results to show, which space forbids me to mention here.

Of bronchitis I have a case to report: —

Miss N. P. S., aged twenty-two, contracted a severe cold which developed into chronic bronchitis; when she came to me (January, 1887) she had tried everything else and had finally been advised to go South. The general object of my treatment was here to increase the skin-evaporation by accelerating the cutaneous circulation (general massage), to keep the bowels active (resistive trunk-rotation), and to promote the reabsorption of the bronchial mucus. The last-named end was achieved by passive vibrations of the thorax and chest-percussion with the ulnar borders of the hands. A few respiratory

movements were added to the specific ones. My treatment cured her in the remarkably short time of five days, with one application a day.

Asthma and emphysema can be treated by movements with equal success, although these two diseases may be considered as the opposites of each other. In asthma the nervous contraction of the respiratory muscles prevents the chest from expanding and the air from entering until the accumulation of carbon in the blood finally relaxes the muscles, whereas in emphysema the air-cells are enlarged, refuse to contract and to expel the air; the patient strains all his muscles to widen his chest, the thorax becomes arched and permanently dilated. Percussion on the chest is the specific movement in both cases; in asthma it is continued for a long period at a time,

as this will cause a relaxation of the respiratory muscles; the percussion must be alternated by kneading, or the muscles will be sore; other movements can also be given to prevent stasis. In emphysema the percussion is used only for short periods at a time, as its object here is to cause the intercostals to contract; and, whereas in asthma it is applied principally around the base of the lungs, in emphysema the upper part of the chest is the region to be subjected to this procedure. In asthma the passive respiratory movements play an important role, whereas in emphysema we give a movement to contract the chest as follows: the patient sits in a stooping position with arms extended sideways, and moves his arms horizontally forward, while the operator resists the motion. In this way the excessive con-

traction of the upper portion of the pectorals compresses the upper portion of the chest, and the air is forcibly expelled.

In disorders of the *digestive organs* a great deal can be done by massage, and still more by Swedish movements. The general object of the treatment would be to improve the general assimilation, to regulate the hepatic circulation and the peristaltic action of the stomach and intestines. Suitable movements are passive vibration, applied on the relaxed abdomen by the operator's hand, and rapid, passive trunk-rotation in a stooping, sitting position, both of which lessen the peristalsis, and deep kneading of the colon, which has the opposite effect.

Of fifteen cases of dyspepsia (this word used in its pathological sense), I have accomplished eight cures,

four were improved, and three unchanged; the average time of treatment has been seven to nine weeks.

Of neuralgia I will mention the following cases: —

Mr. H. W. G., aged forty, had for some time suffered from neuralgia of the left shoulder and arm, the pain extending from the neck to the thumb, which latter was quite numb. He was given local massage and resistive movements of the arm and hand, ten applications in as many days, and the result was a permanent cure.

Mrs. T. J. F., aged thirty-five, had an acute attack of neuralgia in the right shoulder and upper arm, so that she could not use this arm for any sort of work. Had two applications. Result: permanent cure.

Miss F. C., aged thirty-six, had suffered for some time from inter-

costal neuralgia of the left side. Cured by two applications.

Miss H. L. G., aged twenty-eight, had suffered from neuralgia of the trigeminus for six months, finally was not able to lie down, and had not slept for several nights when she came under my care (June, 1888). She had tried everything but massage. After the fourth application the pain had entirely disappeared, leaving only a "consciousness" of the trouble; four more applications cured her, and she has had no return since that time.

In diseases of the *organs of locomotion* much has been done by medical gymnastics where next to nothing could be accomplished by massage, properly so-called. This refers especially to deformities; and it might be added that medical gymnastics usually will do more, and do

it in a shorter time, than the orthopædic treatment. Eulenburg's words (in 1853) that "Ling's method is the only truly rational therapeutic means for the cure of chronic disturbances of motivity," and that "spinal curvatures, resulting from faulty carriage (in consequence of a preponderance of muscular force on one side of the body), are nowadays never treated by any good orthopædist by any other means than the Swedish system," seem reasonable, for although we may extend contracted parts by mechanical appliances, this does not develop any antagonistic forces that would counteract a return to the abnormal shape.

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In medical gymnastics there is a vast field for an exploring scientist, and there is an increasing demand from the medical profession in gen-

eral that the physicians should themselves take this matter in hand, and not leave it to be practised only by uneducated charlatans and by a few specialists who have had a medical education for this particular purpose. The physician would then prescribe this treatment where it is indicated, and if he had not the time nor the desire to apply it himself, he might be able to assist the *masseurs* by his greater and more extensive knowledge of general pathology, which a specialist will always more or less lack.