

MEDICAL GYMNASTICS IN EARLY MYOCARDIAL INCOMPETENCE WITHOUT VALVULAR DISEASE.**BY ROBERT H. BABCOCK, M.D.,**FORMERLY PROFESSOR OF DISEASES OF THE CHEST AND OF CLINICAL MEDICINE IN THE
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THERE is a large and important group of cardiopathies which is encountered among business men, and which furnishes such a great contingent to the increasing number of deaths from heart disease as to call for preventive and therapeutic measures. The cases referred to are found especially among men of affairs who, in response to the demands of modern commercial methods, lead very strenuous lives. The high tension under which professional and business men work nowadays is, of course, not the only, nor perhaps the chief, factor in producing myocardial incompetence, but it contributes powerfully to this end, no doubt. We may never be able to discover the cause or causes in more than a general way, as at present, and, moreover, we must not ignore the role played by acute and chronic infections in the etiology of cardiovascular degenerations, but in studying the class of cases that form the subject of this paper, with a view to therapy as well as etiology, it will be well to bear in mind the teachings of pathology.

The cardiopaths now considered are generally men of large physique, who, in addition to an occupation necessitating many hours daily at the office desk or in the counting room, are generous livers and often heavy smokers. Accordingly they take on weight, and very commonly display an abdominal girth out of proportion to their chest measurements. In a proportion of the cases these men, endowed with a magnificent physique, have been athletes in college, but on entering professional or commercial life have neglected physical exercise because of the ardor with which they devote their energies to their chosen careers. In the majority of instances these individuals possess indomitable energy and almost tireless activity, and display a systolic blood pressure that is well up toward, if not actually above, normal limits. Such, in the main, are the physical makeup and business conditions of these men who, in the late fifties or early sixties, consult us for symptoms which betoken long-endured and at length injurious cardiac strain.

Regarding the pathology of these cases, it need only be pointed out that the whole cardiovascular system is a sufferer, though not uniformly. The kidneys, too, participate in this degenerative process, but in the cases especially referred to in this paper, renal inadequacy is not marked and is overshadowed by that of the heart. The coronaries do not escape, but only occasionally are so involved as to occasion the symptoms of angina pectoris. The heart muscle

is the portion of the circulatory apparatus which first forces its functional disturbance upon the notice of the individual. Yet it has not been the first to feel the injurious effects of those various factors that are bound, in time, to bring disaster, for, as Hasenfeld and others have shown, the degenerative process begins in the intra-abdominal vessels, which are under the immediate control of the splanchnic nerves. There is persistent increase of blood pressure within this area, and, secondarily, throughout the entire vascular system. Strain on the myocardium results, and this enormous peripheral resistance, augmented by the strenuous and luxurious conditions of modern city life, wear out the heart prematurely.

Whatever may be all the factors or the precise *modus operandi*, I was impressed years ago by the clinical observation pointed out by Fraentsel in his classic description of what he termed idiopathic enlargement of the heart, namely, the frequency of myocardial incompetence in men of impressive abdominal girth and large physique, who spend their business hours in their office chairs and take altogether too little exercise in proportion to their consumption of food.

Therefore, in reflecting upon these various considerations, pathological and etiological, I came to the very natural conclusion that if the heart were to be strengthened, it would have to be relieved of some of its load, and not merely whipped on by digitalis. In other words, the peripheral resistance existing in the sluggish circulation within the mesenteric vessels should be lessened. That is, since these individuals sit too long, and their hearts are deprived of the aid that comes from muscular exercise and deepened respiration, they should endeavor to counteract this injurious tendency.

The foregoing reflections led me to the relief several years ago that in the early stage of myocardial incompetence the rational therapy lay in such means as was most likely to counteract the primary circulatory condition conceived to underlie the cardiac hypertrophy. Accordingly I began to send men of the type described to a medical gymnast, to whom was explained the end to be attained. He comprehended my purpose, and, being familiar with the investigations of Levin, subjected the patients to a course of gymnastics of the kind studied by Levin. This investigator showed, by a record of 600 pulse readings, that if certain simple exercises were given properly, they were capable of *slowing* and *strengthening* the pulse, instead of accelerating it, a *very vital principle* in the class of cases here considered.

The medical gymnastics consist of both active and passive movements, according to the degree of myocardial incompetence present. The former comprise certain rolling and bending movements of the trunk executed by the gymnast, who, standing behind the individual seated on a wooden horse, with his feet held firmly by toe-straps,

grasps the shoulders and firmly yet not too vigorously bends the body forward and then rolls it around to the opposite side in a backward direction, in such a manner that, flexed in the beginning, the trunk becomes extended when the movement is half completed, and ends again in a position of strong flexion. To these may be added passive flexion and extension of the extremities, and alternate expansion and compression of the chest, very much after the manner of performing artificial respiration.

The active exercises, which in all cases are gentle at first, and performed by the help of the gymnast, and only by degrees increase in vigor, consist in deep breathing, in bending, pulling, lifting, etc., on a horizontal bar or ladder, or such other movements as in the judgment of the gymnast will promote respiration and venous flow and reduce the girth of the abdomen.

But whatever be the kind of exercises, one essential principle underlies them all, namely, *the patient must not be allowed to hold his breath, but must breathe regularly and deeply in rhythm with the movements*, so as to inspire or expire according as the exercises expand or contract the chest, and depress or raise the diaphragm. It is this rhythmical breathing which the gymnast must watch carefully, for it is found that so soon as the individual holds his breath his face becomes congested and his pulse accelerated; whereas, if respiration is carried on regularly, the opposite effect is produced. Lastly, the gymnast keeps close watch of the pulse, and whenever it is observed to show acceleration and diminished volume the individual is made to rest or to breathe deeply in such a manner as will improve pulse rate and volume.

The purpose of these exercises is not the development of the skeletal muscles, but the restoration of the functional integrity of the myocardium, and this they accomplish more or less effectively, not only by increasing venous flow on the one side, and by dilating the intermuscular arterioles on the other, but also by improving cardiac metabolism. This last is the result of several factors. In the first place, the circulation within the coronary vessels is improved, for with more efficient systoles the coronary veins are more fully emptied and the heart muscle receives a greater supply of arterial blood. This direct effect upon coronary circulation is enhanced by the improved flow in the pulmonary vessels, and consequently a better oxygenation of the blood supplied to the myocardium, while the correction of a tendency to stasis within the right auricle removes any impediment to outflow from the coronary veins and lymphatics into the auricle occasioned by overfilling of its cavity. From whatever standpoint, therefore, we contemplate the effect of these gymnastics, we see they must be theoretically, if not practically, beneficial.

This brings us to the query: Do the results bear out the theory, and how great and how lasting is the improvement? It is not

practical to report cases in response to this query, and hence it must suffice if the subjective and objective effects are stated.

Of course, the degree and permanence of the improvement must depend largely upon the state of the heart muscle. If this is extensively degenerated, no amount or kind of treatment can be expected to achieve much, and such improvement as is gained cannot last long. In such cases, therefore, if dilatation and inadequacy are pronounced, the so-called resistance exercises are preferable, although to these may be added with advantage such deep breathing movements as, with the aid of a trained attendant, can be performed without danger of strain to the heart wall.

As might be expected, the most pronounced benefit has been observed in cases of early or moderate myocardial incompetence, shown by breathlessness or palpitation upon slight cause, and upon examination by increased cardiac dullness, feebleness of the first tone at the apex, accentuation of the pulmonic second sound, and sometimes a faint systolic whiff in the mitral area. In most, but not all, cases the blood pressure is elevated above the normal. In such cases the first indication of improvement is shown by greater ease of respiration and a general sense of ease or lightness. Energy is increased and fatigue comes less easily, while a better action of the bowels and a diminution of waist measure are quite generally observed. These subjective indications of improvement have been especially and repeatedly marked in a man, aged fifty-nine years, with stiff arteries, a systolic blood pressure of 225 (broad arm band), and a greatly hypertrophied, habitually accelerated heart. After a month's treatment he is generally quite ready to cease the exercises, because satisfied with the improvement. Indeed, one of the difficulties met with has been the convincing of the patients of the wisdom of a continuance of the treatment with a view to preventing the return of the symptoms.

Objectively, it is noted at the time of the exercises that the pulse slows and its quality improves, provided the movements are properly directed by the assistant, and the breathing is carried on regularly, as already stated. Consequently it is of the utmost importance that these exercises be controlled by a trained assistant, and that the individual be forbidden the performance of so-called self-resisting exercises at his home.

The effect is thus seen to be quite different from that of ordinary physical exertion, which, when the myocardium is damaged, causes acceleration of the heart's action without subsequent rise of blood pressure as the heart resumes its wonted rate. This lack of recovery (Graupner's *Erholung*) is a sign of cardiac weakness, and in the class of cases here considered it is not desirable to have the myocardium subjected to such a degree of strain. Accordingly, it is important that these medical gymnastics be given by an assistant who understands the kind of exercises which slow and strengthen the

pulse, and will maintain a careful watch over the pulse and color of the skin, in order to detect the earliest signs of cardiac strain.

To make matters doubly sure, it is my wont to examine the patients directly after the first one or two sittings, and thereafter once a week.

If the myocardium is susceptible of improvement, this is shown by decrease in the area of dulness, especially on the right, added strength and clearness of the heart tones, and often by the disappearance of the systolic whiff of muscular mitral incompetence previously heard at the apex. Almost without exception the results observed have been gratifying, and have justified the recommendation of this plan of therapy.

In some cases there has been a small amount of medication, either in way of preparation for this gymnastic treatment, or to assist in more speedily and surely restoring cardiac efficiency. The medicinal therapy has consisted in occasional cathartics, a vasodilator, as nitrite of sodium, strophanthin, digitalin, etc., but in all truth it may be said that the medical gymnastics have been the main agent in the accomplishment of the results noted. Indeed, so much pleased have I been that I seldom nowadays prescribe the so-called resistance exercises of Schott, because, even when the heart may be too feeble to endure anything more than deep breathing in the manner described, this seems to me fully as efficient, in conjunction with other measures, as are the Schott movements.

In conclusion, my experience with medical gymnastics in cases showing early incompetence of the myocardium warrants me in recommending them, if properly controlled, and in asserting the belief that, if these and allied physical exercises were used more extensively and systematically by men of the build and habits to develop chronic myocardial and arterial disease, they would delay, if not prevent, the onset of cardiac inadequacy.

THE VALUE OF THE INUNCTION METHOD OF ADMINISTERING DRUGS TO CHILDREN.

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IN 1894¹ and in 1901² I published papers on the value of inunctions of guaiacol in the treatment of tuberculosis in infants and children. Since my first publication on this subject, fourteen years

¹ Ohio Med. Jour., May, 1894.

² Archives of Pediatrics, May, 1901.