

FEATURES OF METHOD OF MEDICAL PHYSICAL CULTURE AT INSUFFICIENCY OF AORTIC VALVE

Kalmykov S.A.

Kharkiv State Academy of Physical Culture

Annotation. The basic approaches are considered to application of facilities of medical physical education at aortic insufficiency on the stages of physical rehabilitation. An analysis is conducted more than 20 literary sources. The mechanisms of medical action of physical exercises are specified - restorative influence, forming of temporal indemnifications, trophic action, normalization of the broken functions. It is set that task, forms, facilities, the methods of medical physical culture depend on the degree of weight of disease, degree of cardio-vascular insufficiency and stage of physical rehabilitation. Engaged in a medical physical culture conducted in form morning hygienical gymnastics, medical gymnastics, independent employments, dosed walks, walking on steps, mobile and sporting games. It is marked that sparing training and training the motive modes are instrumental in the gradual training of the cardio-vascular system. Recommended the dosed walking to lead to a to 5-8 km on the sparing training and to 8-12 km on training modes.

Keywords: physical, rehabilitation, aortic, valve.

Introduction.

Pathology of aortic valve meets in 30-35% of sick with vices valves of heart, and on frequency of defeat a rheumatic process an aortic valve occupies the second place after mitral. Life-span of patients, even at the expressed aortic insufficiency from the moment of establishment of diagnosis is usually more than 5 years, and in halves - even more than 10. A prognosis gets worse with joining of cardiovascular insufficiency. Medicamental therapy in these cases is usually ineffective. Life-span of patients after appearance of heart failure - about 2 years [1, 4, 7].

Treatment of patients with aortic insufficiency is complex and includes conservative therapy (treatment of chronic heart failure), surgical treatment, physical therapy treatment, exercise therapy (ET), work therapy, massotherapy, climotherapy [3, 8, 12, 19-22]. The contents of different aspects of rehabilitation at aortic insufficiency, and also aim and task of practical realization of rehabilitation events are base on general organizational principles: early beginning of approaches, staggered functions sent to renewal; continuity of process of rehabilitation; complex character of rehabilitation events; individual going near determination of the program of restoration treatment depending on the initial level of bodily condition, features of flow of illness, personality of patient, profession etc. [5, 6]. But existent methodologies of ET at this pathology do not take into account the degree of cardiovascular insufficiency, that accompanies the flow of disease, and degree of weight of aortic insufficiency.

The work is done according to SRW of Kharkiv state academy of physical culture.

Aim, task, material and methods.

Aim of work – to consider main approaches to usage of means of ET at aortic insufficiency on stages of restorative treatment.

Results.

At insufficiency aortic valve is used the three stage system of rehabilitation: hospital, sanatorium (local rehabilitation center), polyclinic. For the stage-by-stage chart of rehabilitation it is characterised continuity and succession phase-to-phase rehabilitation [6, 9].

Exercise therapy, as a method of treatment, has a row of features, the main of which consists in that for a fight against violations of hemodynamics for insufficiency of aortic valve of heart is used the basic function of organism - function of motion. ET is not only pathogenetic method of therapy, but also functional, assisting prevention of development of heart failure at aortic insufficiency and proceeding in the staggered function of myocardium.

By the basic mechanisms of action of physical exercises at aortic insufficiency is neuroreflectory and neurohumoral. From these positions it is possible to distinguish four basic directions of curative action of physical exercises at aortic insufficiency: restorative, trophic action, forming of temporal indemnifications, normalization of the broken functions [10, 12].

Restorative action of physical exercises shows up activation of motor-visceral reflexes. Under the influences of physical exercise it is decrease, and sometimes psychogenic cortical inhibition take place. In these cases cortex is partly confined streams of natural irritations that goes from the receptors of working muscles and joints that affects on its functional state.

In the reactions of organism patient on physical exercises it is necessary to take into account participation of psychical sphere. Positive emotions that arise up at employments of ET stimulate physiological processes in the organism of patient, at the same time distract it from the sickly experiencing.

Under the act of physical exercises the tone of cortex of cerebral hemispheres is rises up, mobility of nervous process is accelerated, equalization of inhibition and excitation correlation take place, that is weak or break through pathological impulsing. Gradually promoting the dosage of physical exercises, it is succeeded to perfect broken illness and

hypokinesia co-ordination in process of cardiovascular, respiratory and other systems of organism. The reactions of the cardiovascular system on muscular work become adequate to loading.

The positive operating of physical exercises on *trophic processes* is explained by their stimulant influence on circulation of blood and exchange processes. As a result of muscular activity coronal arteries are broaden, circulation of blood increases, the amount of functioning capillaries increases in myocardium. Physical exercises that are long-run used, assist to development of microcirculation, activate the oxidation-reduction processes in myocardium, reduce maintenance of cholesterol in blood, liquidate the consequences of ischemic and hypoxias of myocardium, stimulate gradual strengthening and improvement of retractive ability of myocardium. In addition, improvement of metabolism in organism on the whole, and in a heart in particular, as a result of stimulation of oxidizing processes results in proceeding in the endocardium damaged as a result of inflammatory process (infectious endocarditis).

There are development and perfection of *compensatory processes* that improve circulation of blood due to extracardiac factors during employments in ET. Physical exercises assist the acceleration of forming of compensatory mechanisms and promote their full value, help to develop vicarian adaptations. Applying physical exercises at insufficiency aortic valve, it is succeeded lasted to save retractive ability of myocardium, compensate work of heart in the changed terms of circulation of blood.

Under the act of exercises elasticity of arteries rises, the large number of reserve capillaries opens up, that provides the acceleration of current of blood and improvement of blood supply of fabrics. Under the act of physical exercises in muscles accumulates power substratum (ATP, glycogen) and their expense diminishes, tone of veins rises and venous circulation of blood is accelerated. The rhythmic change of reductions and weakening of skeletal muscles ("muscular pump") assists moving of blood toward a heart. The improvement of circulation of blood is helped by breathing. Intrathoracic pressure goes down at inhalation, a stick action of chest increases, the greater complete of filling of cavities of heart by blood during a diastole take place. It provides the greater systole volume of blood. Abdominal pressure rises at inhalation, that, from one side, strengthens the current of blood towards a heart, on the other hand - increases the amount of circulatory blood due to her "squeezing-out" from a liver and spleen. At exhalation blood in great numbers comes in an abdominal region from lower limbs. Motions in joints also accelerate the current of blood on veins. All these extracardiac factors of circulation of blood compensate weakening of function of myocardium aught.

Usage of physical exercises in the stage of recovery provides *normalization of functions* of the cardiovascular system and rehabilitation of patient, that is achieved by the gradual and careful training that strengthens myocardium and improves it retractive ability, proceeds in vascular reactions on muscular work and change of body position. Physical exercises improve the function of regulative organs, their ability to coordinate work of cardiovascular, respiratory and other systems of organism during physical activities. Thus, ability to execute the large volume of work rises. The special respiratory exercises with lengthening of exhalation and reduction of breathing frequency reduce frequency of heart beats. Exercises in weakening of muscles and for shallow muscular groups reduce tone of arteriole and reduce peripheral resistance to the current of blood [10, 13, 16].

Medical exercises at insufficiency aortic valve is used with the aim of stimulation auxiliary factors of circulation of blood, tissue breathing, training of vehicle of the external breathing, development of indemnification of cardiovascular insufficiency and promotes: general training of all organism, adaptation to physical activity, increase of tone and capacity of patients; making of arbitrary management breathing at peace and during muscular work at patients, arbitrary weakening of muscles, co-ordination of motions [15].

Methodology of employments of ET at insufficiency aortic valve depends on the degree of insufficiency of circulation of blood. Exercises in ET at insufficiency aortic valve conducted in form of morning hygienical gymnastics, medical exercises, independent exercises, dosed walks, walking on steps, movable and sport games taking into account the motive mode, where a patient is, degree of insufficiency of circulation of blood.

On the hospital stage of rehabilitation of patients with insufficiency aortic valve is used four motive periods: strict bed rest; ambulation; free rest. At a outpatient department – sparing, sparing-training and training regime [6, 12].

At *insufficiency of circulation of blood of III of degree (strict bet motive rest)* activity of patient limits sharply, auxiliary motions, acceptances of meal, rest room come true by means of medical personnel; ET is used only during stabilizing of insufficiency of circulation of blood and in a period intensive treatment at the improvement of the state sick. Medical exercises are sent to warning of possible complications; stimulation of indemnifications; improvement of the psychoemotional state of patient.

Correctly neat exercises do not bother, but, vice versa, facilitate work of heart, because they activate the extracardiac factors of circulation of blood. To such exercises belong active motions for shallow and middle muscular groups. Motions in the large joints of extremities are executed with incomplete amplitude, with the shortened lever, sometimes by means of ET's instructor or passively. Exercises for the muscles of trunk are used only as turns on a right side and small tricking into of pelvis. Static respiratory exercises are executed without deepening of breathing. Exercises are executed in a slow rate, from initial position, lying on a back (with heaved up the head of a bed). Amount of repetition: for large joints - 3-4 times, for shallow - 4-6 times. Exercises combine with easy massage of shins. Methodical pointing: exercises for hip and knee joints can be executed with the small help of instructor. Feet can not be torn away from a bed. Motions in hip and humeral joints are executed in turn by every extremity. Initial position for all exercises – lying on a back, with the brought head of a bed, hands along a trunk. At this degree of insufficiency of circulation of blood is used the severe bed motive mode.

At *insufficiency of blood circulation of II degree* ET exercises direct on warning of possible complications; improvement of peripheral circulation of blood; liquidation of the stagnant phenomena; improvement of metabolic process in myocardium and endocardium; a grant of the easy general tonic operating on an organism that promotes the functions of all his systems (including central nervous and endocrine).

On exercises are used curative gymnastics (CG), morning hygienical gymnastics (MHG) and private lessons.

ET exercises are conducted in position, lying with highly heaved up head of bed. Exercises are used for the small and middle muscular groups of extremities with large muscular effort, executable in a middle rate, with a limit amplitude; dosage – 8-10 times. Respiratory exercises of pectoral type are used with the prolonged exhalation.

At *insufficiency of blood circulation of II B degree (lying mode)* the tasks of ET are providing of more prudent function of myocardium due to the improvement of peripheral circulation of blood and utilization of oxygen fabrics; decrease of high pressure in the small circle of blood circulation; activation of function of extracardiac mechanisms of blood circulation; development of indemnification of blood circulation; making of the correct breathing of pectoral type with the prolonged exhalation.

The lying mode is characterized active behavior of patient in a bed, independent taking food and self-reliant getting sit then stand. Methodology of ET, mainly, reminds methodology at the heart failure of III degree - the amount of reiterations of motions increases only in shallow joints (to 8-10 times); respiratory exercises are executed with lengthening small strengthening of exhalation that in a greater degree improves a venous outflow and improves peripheral circulation of blood.

Exercises begin to be used for the muscles of trunk that is executed with incomplete amplitude, amount of reiterations - 3-4 times. Initial positions - lying and sitting. For the improvement of motion of the ORP processes in employment the pauses of rest join at the complete weakening of muscles. Duration of exercises - 10-15 min; closeness of exercises - 40-45% of general time.

ET exercises at *insufficiency of blood circulation of II A degree (ambulant motive regimen)* there is an adaptation of the cardiovascular system to the changed terms of blood circulation; improvement of ventilation of lungs and utilization of oxygen by fabrics; strengthening of myocardium and increase of him retractive ability. It is recommended private CG and MHG lessons. ET exercises are conducted in initial position, lying, with highly heaved up head of bed, sitting and standing (limit). Simple for co-ordinations exercises are used for overhead and lower extremities, with moderate muscular effort, executable in a slow and middle rate, with complete amplitude; amount of reiterations - 8-10 times. Elementary exercises are used also for the muscles of trunk without the expressed muscular effort, executable in a slow rate, amplitude of motions of trunk grows gradually (but it remains incomplete); dosage – 2-6 times. The dosed walking (1-5 min) is included in a middle basic part of exercise. Respiratory exercises of pectoral and mixed type are used with the prolonged exhalation, with the pauses of rest at complete weakening of muscles. Duration of exercises – 15-20 min; closeness of exercise – 50-60 % of general time.

All motions are executed in a concordance with breathing. Special respiratory static and dynamic exercises are executed with strengthening and prolonged to exhalation. Motions in large joints are executed in a slow rate, amount of reiterations - 4-6 times; in shallow joints - in a middle rate, amount of reiterations - 8-12 times. Initial positions – lying, sitting and standing. At the improvement of the state sick a task gradually used to adapt him to physical activities that increase gradually. Physical exercises become complicated, amplitude and rate of motions increase. The amount of repetitions of exercises for large muscular groups increases to 10-12 times.

At *chronic insufficiency of blood circulation of I degree and during the period of recovery without breach of blood circulation* is appointed *the free motive mode*. The basic task of ET is adaptation of the cardiovascular system and all organism of patient to domestic and productive physical activities; training of the cardiovascular system and all organism with the aim of proceeding in a physical capacity, strengthening of myocardium, activation of peripheral circulation of blood; making of the correct breathing is at walking, getting up and lowering on a stair. It is recommended CG, MHG, dosed walks. Engaging in a curative gymnastics exercises include exercises for middle and large muscular groups, exercises with objects (by gymnastic flails, balls), with small burdens (by dumb-bells, by the printed balls weighing 1-1,5 kg) and with resistance; not mobile games, playing tasks; different walking, of short duration at run in a slow rate.

Motions difficult for co-ordinations are executed with complete amplitude. These exercises alternate with exercises for the shallow muscular groups of extremities and with respiratory exercises. All substantive initial provisions are used: standing, sitting and lying. Simple for co-ordinations exercises are used for all muscular groups with moderate muscular effort, executable with complete amplitude; dosage - 12-16 times. Respiratory exercises of static and dynamic character of moderate depth are used with the prolonged exhalation; the pauses of rest are included at the complete weakening of muscles. Training in walking on steps (getting up and lowering) in a middle of basic part of exercise. Duration of exercise - 20-35 min; closeness of exercise - 50-70 % of general time [12, 16].

At *the compensated state* tasks of ET there is training of the cardiovascular system and organism on the whole due to gradually growing physical activities.

The sparing motive mode is appointed to patient with the polyclinic and sanatory stage of physical rehabilitation. By the nature executable physical exercises no so differ from those that are used at the free mode of permanent establishment. On the sparing mode is used the dosed walking, distance of which to the end of course of treatment increases to 2-3 km. Movable games of moderate intensity are used.

Training motive regime is appointed to patients in the stage of indemnification of disease on the polyclinic and sanatory stages of rehabilitation.

Sparing-training and training motive modes assist the gradual training of the cardiovascular system. Intensity of implementation of physical exercises rises. The dosed walking is about 5-8 km on sparing-training and 8-12 km on training modes. Some sport games, elements of sport (rowing, skiing, etc.), near tourism are used.

At application to the patients with insufficiency aortic valve ET it is necessary to build so that the physical loading did not exceed their functional possibilities. It is impossible to overload a sick heart even during proof indemnification, but needed to want a method the dosed physical training to develop and perfect the conformable mechanisms of the system of circulation of blood on the whole [6, 10].

Conclusion.

Treatment of patients with aortic insufficiency is complex and includes conservative therapy (treatment of chronic heart failure), surgical treatment, physical therapy treatment, curative physical culture, work therapy, massotherapy, climotherapy.

ET exercises at insufficiency aortic valve conducted in form of morning hygienical gymnastics, curative gymnastics, independent exercises, dosed walks, walking on steps, movable and sport games and others taking into account the motive mode, where patient is, and degree of insufficiency of blood circulation.

Perspective is further research of methodologies of curative physical education at the combined defects of heart.

References:

- 1 Biakin S.P. *Khirurgicheskoe lechenie priobretennykh porokov serdca* [Surgical treatment of the purchased heart-diseases], Moscow, Science, 2006, 131 p.
- 2 Voronkov L.G. *Ukrainskij kardiologicheskij zhurnal* [Ukrainian cardiologic journal], 1996, vol.3, pp. 13-17.
- 3 Voronkov L.G. *Khronicheskaja serdechnaja nedostatochnost'* [Chronic cardiac insufficiency], Kiev, Health, 2002, 136 p.
- 4 Knyshov G.V. *Serdce i sosudy* [Heart and vessels], 2003, vol.1, pp. 8-15.
- 5 Kovalenko V.N., Il'ias M.G., Nesukaj E.G. *Vrachebnaia praktika* [Medical practice], 2000, vol.4, pp. 4-9.
- 6 Popov S.N. *Lechebnaia fizicheskaia kul'tura* [Medical physical culture], Moscow, Academy, 2008, pp. 40-45.
- 7 Maeva M.V. *Diagnostika boleznej serdechnosudistoj sistemy* [Diagnostics of illnesses of the cardio-vascular system], Moscow, GOU VUNMU MZRF, 2004, 240 p.
- 8 Makolkin V.I., Ovcharenko S.I. *Vnutrennie bolezni* [Internal illnesses], Moscow, Medicine, 1999, 592 p.
- 9 Makolkin V.I. *Priobretennye poroki serdca* [Purchased heart-diseases], Moscow, Medicine, 1986, pp. 118-144.
- 10 Epifanov V.A. *Medicinskaia reabilitaciia* [Medical rehabilitation], Moscow, Medpress inform, 2005, pp. 16-19.
- 11 Moshkov V.N. *Lechebnaia fizicheskaia kul'tura v klinike vnutrennikh boleznej* [A medical physical culture in the clinic of internal illnesses], Moscow, Medicine, 1977, pp. 52-123.
- 12 Nazar P.S., Shakhlina L.N. *Zagal'nij ta special'nij dogliad za khvorimi z elementami fizichnoyi reabilitaciyi* [A general and special care of patients with the elements of physical rehabilitation], Kiev, Olympic Literature, 2006, 240 p.
- 13 Pieshkova O.V. *Fizichna reabilitaciia pri zakhvoriuvanniakh vnutrishnikh organiv* [A physical rehabilitation at the diseases of internals], Kharkiv, Brovin O.V., 2011, pp. 80-84.
- 14 Porada A.M., Solodovnik O.V., Prokopchuk N.Ie. *Osnovi fizichnoyi reabilitaciyi* [Bases of physical rehabilitation], Kiev, Medicine, 2006, 246 p.
- 15 Sokolovskij V.S., Romanova N.O., Iushkov's'ka O.G. *Likuval'na fizichna kul'tura* [Medical physical culture], Odesa, OSMU, 2005, 234 p.
- 16 Stepashko M.V., Sukhostat L.V. *Masazh i likuval'na fizichna kul'tura v medicini* [A massage and medical physical culture in medicine], Kiev, Medicine, 2006, 288 p.
- 17 Popov S.N. *Fizicheskaia reabilitaciia* [Physical rehabilitation], Rostov on Don, Phoenix, 2005, pp. 230-285.
- 18 Khvorostinka V.M., Malaia L.T. *Terapiia* [Therapy], Kharkov, Folio, 2005, 1135 p.
- 19 Asbach S., Siegenthaler M.P., Beyersdorf F., Bode C., Geibel A. Aortic valve rupture after blunt chest trauma. *Clinical Research in Cardiology*. 2006, vol.95(12), pp. 675-679. doi:10.1007/s00392-006-0441-4
- 20 Patrick O. Myers, Cecile Tissot, Jan T. Christenson, Mustafa Cikirikcioglu, Yacine Aggoun, Afksendiyos Kalangos. Aortic valve repair by cusp extension for rheumatic aortic insufficiency in children: Long-term results and impact of extension material. *The Journal of Thoracic and Cardiovascular Surgery*, 2010, vol. 140(4), pp. 836-844.
- 21 Pochis W. T., Cinquegrani M. P., McManus R. P., Almassi G. H. Periaortic hematoma formation leading to aortic valve failure. A complication of homograft placement for second valve surgery. *CHEST*. 1992, vol.102(4), pp. 1299-1301. doi:10.1378/chest.102.4.1299
- 22 Weidong Li, Yiming Ni, Xin chen, Liang Ma. Aortic valve tear with severe aortic regurgitation following blunt chest trauma. *Journal of Cardiothoracic Surgery*. 2011, vol.6, pp. 84-87. doi:10.1186/1749-8090-6-84

Information about the author:

Kalmykov S.A.: srgkalmykov@gmail.com; Kharkov State Academy of Physical Culture; Klochkovskaya str. 99, Kharkov, 61022, Ukraine.

Cite this article as: Kalmykov S.A. Features of method of medical physical culture at insufficiency of aortic valve. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2013, vol.1, pp. 25-29. doi:10.6084/m9.figshare.106932

The electronic version of this article is the complete one and can be found online at: <http://www.sportpedagogy.org.ua/html/arhive-e.html>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited (<http://creativecommons.org/licenses/by/3.0/deed.en>).

Received: 17.12.2012

Published: 31.01.2013