

Application of medical physical culture at extensive deep burns

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Purpose: describe the role of medical physical culture at extensive deep combustions for prophylaxis of development of congestive pneumonia, contractures and a muscular atrophy, and also for restoration of adaptation of an organism to household and labor loads after an dermoplastika.

Material & Methods: analysis and generalization of scientific and methodical literature.

Results: the main agent of physical aftertreatment – medical physical culture is considered; its application at treatment of patients with extensive deep combustions is proved; techniques of medical physical culture during the periods of a septicotoxemia and reconvalescence are described in detail.

Conclusions: it is established that functional treatment will promote restoration of function of a locomotorium, the cardiovascular and respiratory systems.

Keywords: dermoplastika, deep burns, medical physical culture, septicotoxemia, reconvalescence.

Introduction

The relevance of a problem of a burning injury is defined by the considerable frequency of defeat, both adults, and children, complexity and duration of treatment, long disability and rather high lethality of victims [5; 12; 13].

According to the data of WHO, thermal damages make 6% of number of injuries of a peace time. The tendency to the increase in quantity of these injuries is noted around the world. Annually from 1,8 till 3 million people got burns in the USA. From 20 till 22 thousand of people are hospitalized with heavy burns within a year in France. This type of damages makes from 5 till 10% of all types of injuries in the countries of CIS. And the frequency of thermal damages doesn't decrease, and has an obvious tendency to the growth in the certain countries [8].

Deep burns even on a limited site can often lead to cicatricial deformations, defects of tissues, trophic ulcers and to cause various violations of internals, bones and the central nervous system. Therefore rehabilitation therapy is appointed in early terms after a trauma; its contents constantly changes depending on the course of the wound process and the carried-out surgeries. It is carried out for the purpose of prevention of infection of a burning injury, acceleration of its clarification from necrotic masses, stimulation of growth of granulations and epithelization in the initial stage; further – for the prevention of contractures and keloid cicatrix [1; 10].

Analysis of the last researches and publications

Burns of the III(B) and the IV degrees are deep. The necrosis of skin extends to all its depth; bubbles with hemorrhagic contents are observed at the III(B) degree. If the burn scab (crust) is formed, then it has yellow, gray or brown color. The

necrosis of all layers of skin and the deep-lying tissues comes at the IV degree. Burn scabs are formed brown or black various thickness and density. A surgical treatment is applied to close a burn surface – autoplasty, when skin from a healthy part of the body is replaced to the burned place, or alloplasty, when skin from other person is replaced to the burned place. A treatment usually continues 3–6 months [7; 9].

A burn proceeds mainly as local suffering at superficial burns affecting up to 10–12% of a surface of a body (at deep – to 5–6% of a surface of a body). Various violations of activity of bodies and systems which set can be considered as a burn disease are observed at more extensive defeats [8; 11; 13].

Four periods are distinguished during a burn disease. The 1st period – is a burn shock. It arises in the presence of deep burns on the area more than 15-20% of a surface of a body. Period duration – is till 2 days. The 2nd period – is a sharp burn toxemia. Period duration – is 2–14 days. The 3rd period – is a burn septicotoxemia. It develops at deep defeats or at an operation failure (a rag hasn't got accustomed). It is followed by the development of inflammation and suppuration in a burning injury, loss of a significant amount of protein. Period duration – from 1,5 months till 1 year. Intensive conservative and expeditious treatment is applied. General condition of patients is heavy: they are sluggish, grow thin, they have no appetite. Pneumonia often occurs, and also the inflammatory centers in various bodies and tissues. The compelled immobilized position of a patient is followed by developing of decubitus, development of contractures of large joints, atrophy of muscles, and formation of the pulling together hems. The development of burn exhaustion can be heavy complication of this period – cachexia. The 4th period – is the recovery period. It begins with the moment of healing of deep burning injuries at successful expeditious restoration of an integument and it proceeds 2–4 months. Plastic surgeries are applied further at

formation of the pulling together hems on skin. It should be noted that quite often under the influence of timely effective treatment the period of recovery comes, passing a stage of a burn septicotoxemia [6; 8; 10].

One of the important components of modern complex treatment of thermal injuries is medical physical culture. It is considered as the necessary means promoting return of victims of burns to socially useful work on condition of timely and systematic application. Regular trainings by medical physical culture promote not only to the restoration of functionality of a patient and the increase of degree of re-adaptation to physical activities; treatment terms are reduced under their influence that has a great social value. Physical exercises exert the toning, trophic, normalizing impact on all systems of an organism. Physical exercises promote the formation of the compensatory and replaceable skills facilitating the patient's adaptation to life and work in cases of profound morphological changes in the fabrics struck as a result of a burn when normalization of functions is impossible [13].

Medical physical culture is shown to almost all patients at any localization of a burn, irrespective of degree and the area of defeat of tissues. The variety of clinical displays of a burn disease doesn't allow defining in advance all states at which medical physical culture is temporarily contraindicated [11].

The purpose of the research

To characterize a role of medical physical culture at extensive deep burns for the prevention of development of stagnant pneumonia, contractures and muscular atrophy, and also for the restoration of adaptation of an organism to household and labor loadings after thermoplastics.

Research tasks:

1. To study special literature on a problem of rehabilitation of patients with deep burns and a burn disease.
2. To consider a technique of medical physical culture at treatment of patients with extensive deep burns and at development in them of the III–IV periods of a burn disease.

Material and Methods of the research

Material and methods of the research: analysis and generalization of scientific and methodical literature.

Results of the research and their discussion

The main method of treatment of burns of the third and fourth degrees is free skin transplantation which quite often should be made repeatedly combustiology. Repeated landmark reconstructive plastic surgeries with the use of free skin plasticity, local plasticity (various triangular cuts and mutual movement of the formed rags), the Italian plasticity, plasticity Filatov-Gillies tubed pedicle flap, etc. are made for the elimination of the created contractures and other cosmetic and functional defects. If in the gravity of defeat it is necessary to resort to amputations, wounds of a stump whenever possible close free skin rags. Preparation of the sites of skin which are subject to change and the subsequent stimulation of healing of a wound and restoration of normal mobility of those segments of body, from which rags for plasticity are taken, has essential value at

all autoplasmic operations. And after and before it, it is necessary to reduce to operation, whenever possible, terms of stay of a patient in a bed. If the general condition of a patient and localization of burns allows, it is necessary that he sit more and walking. Plasticity by large rags demands the big area of donor places. It creates difficulties in selection of physical exercises in the postoperative period, but at the same time does them especially necessary as from movements are switched off not only the burned segments, but also parts of a body from which rags are taken. The contractures breaking functions of these segments and parts of the body can be created in the postoperative period [4].

Healing of a burning injury takes place certain stages which duration and character depends on many reasons, mainly on depth of a burn, its area and degree of intensity of a burning injury by microbes. N. I. Krause in 1942 allocated 2 options of healing of wounds [12]. There is its resorption on the periphery at the I option in the process of maturing of granulations and contraction of a wound owing to the formation of a hem at the same time. Epithelization comes after the rapprochement of edges of a wound to 1–1,5 sm. At such healing there is a narrow soft mobile hem, and wound defect is closed by shift on it the uninjured surrounding skin. At the II option maturing of granulations isn't followed by a resorption of the formed hem. At a number of patients the hem becomes pathological, gaining keloid or hypertrophic character [12].

The most important feature of a technique of classes of medical physical culture at a burn disease is need of repeated performance during the day of the special exercises which are directed to the prevention or elimination of malfunction of the musculoskeletal device. The large role in the increase of activity of a patient is played by the accounting of efficiency of classes [13].

Problems of the decrease in an adverse effect of a long bed rest, the increase of the general tone of the patient are solved; the prevention of malfunction of not struck segments of the musculoskeletal device is carried out in the third period. Loading on classes depends on the degree of exhaustion of a patient. It isn't necessary to cancel classes of medical physical culture, it is only possible to reduce loading even at the progressing exhaustion [9].

Exercises with the local and dosed muscular tension selectively influence the tissues and segments affected with a burn allow switching off from movements these or those segments (in connection with the made change applied by the tire or a plaster bandage), promote replacement of the died tissues with functionally adapted cicatricial tissue, reduce expressiveness of secondary changes in the tissues which are switched off from movements in connection with painful contractures or immobilization, cause the shift of sinews on all their length and interfere with education or promote elimination of their soldering with the tendinous vaginas and tissues having cicatricial changes [4].

The active movements in a zone of a burn are carried out with amplitude causing only small morbidity. The extension exercises, with a resistance and with special shells and devices (sponges, balls, pieces of rubber of various elasticity, expanders, etc.) belong to the active movements. The last are applied at later stages of a burn disease, at the increasing resistance of the formed hems when there is insufficient impact

only of the active movements. If weight of a burn, nature of surgery, immobilization doesn't allow to carry out the active movements, the static stress of muscles is shown [11].

The passive movements are applied when the active movements are impossible (damage at a burn of the muscles, sinews and nerves participating in the movement) or when they make insufficient impact on the formed cicatricial tissue. They shouldn't be sharp and causing pain. Force of the stretching influence has to increase slowly, gradually. Passive exercises should be combined with a parcel of impulses to tension of muscles at complication of burns by paresis. It is necessary to pay much attention to active power exercises for groups of the muscles at contractures which are constantly in the stretched situation and to relaxation exercises for contracture muscles.

It is necessary to do restoration of the coordination of movements broken in the connection with a burn except mobility in joints and forces of muscles. This requirement is especially essential at burns of the lower extremities [4; 9–11].

It is recommended to stop medical physical culture temporarily at emergence of heavy complications [3]. But at the same time the early application of means of medical physical culture – is the best prevention of complications. The complex of breathing exercises needs to be carried out already next day after the operation as the arising hypoxia can lead to the development of cardiovascular insufficiency, hypostasis of lungs, and thrombosis of vessels [1; 9].

V. E. Vasilyeva uses the stretching exercises in treatment of a burn disease at the formation of the deforming hems, and after full formation of hems – mechanotherapy. She recommends also in the third period of treatment application of elements of sports, and also broad application of work therapy [2].

The preoperative and postoperative periods are allocated at surgeries on skin transplantation in a technique of medical physical culture at deep burns.

Problems of medical physical culture in the preoperative period: removal of an emotional pressure at a patient before the operation; improvement of a functional condition of cardiovascular and respiratory systems; improvement of blood circulation in the struck and donor segments of a body; training in chest type of breath – in need of the compelled position of a body, lying on a stomach, after operation [1; 10].

Preparation of a patient for new conditions of breath or situation after the operation is carried out in need of the preoperative period. Teaching in belly breath in the preoperative period will facilitate a condition of a patient after change of a transplant in a neck and a breast. Strengthening of muscles of a back in the preoperative period will allow a patient easier to transfer the compelled situation, lying on a stomach [11].

During preparation for plastic surgeries appoint the all-strengthening exercises and exercises on preparation of tissues for the forthcoming operation (the active movements in adjacent segments and careful static tension in the struck segment) [3].

Problems of medical physical culture in the postoperative period: prevention of postoperative complications (pneumonia, thrombophlebitis, intestines atony); improvement of activ-

ity of cardiovascular and respiratory systems; activation of a blood-groove in a donor segment of a body and in the place of change of tissues – for the purpose of healing acceleration; prevention of rigidity in joints and atrophy of muscles [10].

V. P. Pravosudov recommends a complex of breathing exercises and active movements by healthy extremities to carry out in 2–4 hours after the operation. Besides, patients are recommended to carry out 5–10 deep not forced respiratory movements in each hour, using individually picked up plastic tubes. The special attention should be paid to breathing exercises at skin transplantation on area of a breast, stomach and back. Application of medical physical culture after operation can be temporarily postponed in the connection with deterioration in the general condition of a patient, violation of activity of cardiovascular and respiratory systems, emergence of bleedings in the field of the replaced skin rags during performance of exercises. The development of hypostatic pneumonia isn't contraindication for performance of breathing exercises [11].

Static and dynamic breathing exercises and the simple all-developing exercises for distal departments of extremities in classes are included after operation. Physical exercises begin to carry out in the uninjured joints, with gradual involvement of joints which integuments are burned. However it is necessary to begin the movement in the operated area not earlier than for the 6–7th day after the surgical intervention not to cause tension of muscles and not to displace the replaced skin autografts. The movements are carried out only passive or active and passive, with a small amplitude and effort in the beginning in an operation zone after the 6–7th day. The active movements are joined in classes in the process of replantation of transplants [1; 7; 10].

V. K. Dobrovolsky recommends to begin at an autoplasmic not earlier than 6–8 in the afternoon, at homoplasmic – 8–10 days, at the plasticity which is carried out with a considerable tension replaced and the hemmed rags – the 12–15th day small on amplitude, slowly carried out active movements causing a tension of tissues in surgery sites. It is important to carry out exercises and at the plaster bandages applied after operation, steaks, and the immobilizing tires. At plasticity “marks” (when the skin rag is cut on pieces) between them form the hems reducing mobility as in the joints which are under burn surfaces and in nearby segments. The functional result at the same time is, as a rule, worse, than at plasticity continuous rags. Timely application of physical exercises helps to keep mobility at the expense of stretching of tissues in a zone of change and assistance to formation of elastic hems, smaller by the sizes, between “marks” [4].

The successful resorption of skin autografts defines the beginning of the next period of a burn disease – the recovery period. Problems of medical physical culture in the period of convalescence: formation of compensations of the irreversible violations caused by a burn disease; adaptation of an organism to household and labor loadings [10; 12].

The general duration of classes in this period reaches till 40 min. and more. Physical exercises in treatment of burns should be repeated, applied repeatedly systematically and it is long (sometimes for many years) [3].

Functional treatment promotes restoration of function of the

musculoskeletal device, cardiovascular and respiratory systems. Classes of medical physical culture are given in the form of morning hygienic exercises, remedial gymnastics, independent classes, and gymnastics in water. Also work therapy, sport elements, outdoor games are applied mechanical and work therapy. Performance of exercises in a heat bath (36–38°C) allows using the small force of atrophied muscles and that to promote prevention of different types of contractures [1; 7].

The absolute recovery or irreversible disability can be an outcome of a burn disease. It is necessary to apply widely the applied movements (grab of various objects, clothing of clothes, the letter, combing, sewing etc.) and sports exercises (walking, climbing, elements of sports, walking on skis), especially in the conditions of out-patient and sanatorium stages of treatment. Sometimes patients come to clinic repeatedly within 2–3 years for reconstructive operations. If throughout all this time not to care for a condition of the musculoskeletal device, in particular for preservation of mobility in joints, laying hopes only for surgery can sharply increase rigidity in joints and other violations of functions which don't manage to be eliminated with any subsequent reconstructive operations.

It is important that a patient didn't interrupt studies medical physical culture all this time and was under control of experts in this area [4; 9; 13].

Conclusions

1. The offered techniques of medical physical culture at treatment of patients with extensive deep burns after an autoplasmic or alloplasty promote the restoration of function of the musculoskeletal device, cardiovascular and respiratory systems.
2. Various localization of a burn, unequal depth and the area of defeat, variety of individual clinical displays of a burn disease don't allow using any standard complexes of remedial gymnastics in clinic. Even selection of special exercises at identical localization of a burn has to be strictly individual, considering concrete violations of functions at this patient.

Prospects of further researches

Studying and justification of application of medical massage in physical rehabilitation of patients with deep burns is perspective.

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