

FEATURES OF THE REHABILITATION MASSAGE FOR DYSFUNCTIONS OF THE FOREARM MUSCLES

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Purpose: to find the possibility of rehabilitation massage, forearms in the presence of pain in their muscles.

Material and methods: the study was conducted in two stages. The first stage of observation was carried out by the current method. It was attended by 14 respondents. The reaction of the muscles of the inner surface of the forearms to one procedure of classical massage, which was performed with talcum powder on the corresponding tendons, was checked. Research methods were used: dynamometry, myotonometry. The second stage of the observation was attended by 7 respondents, musicians with hypertension and muscle pain of the inner surface of the forearm, which arose for various reasons. When visiting a doctor, they were advised to stay calm for up to one month, which did not suit them due to the hard work associated with executive activity. Therefore, all its participants also formed one observation group. The following research methods were used: Quadruple Visual Analogue Scale (VAS), myotonometry.

Results: the results of the first observation showed that after one procedure of muscle tendon massage, the difference between the tone of rest and the tone of tension of healthy muscles - contraction, increased by an average of 11,7%. And the average dynamometry of the same brush increased by 4%. The result of the second stage of the observation, conducted on the hands with complaints of muscle pain in

the forearm, after ten procedures of massage of the tendons, revealed a reduction in pain almost twice and a decrease in muscle hypertension by an average of 11,3%.

Conclusions: massage of tendons of pathological muscles gave reason to believe that the massage technique developed by us has an analgesic effect and significantly reduces the hypertonicity of muscle tissues. The obtained indicators of the tone of rest and the level of muscle pain confirm the positive effect of our proposed massage technique on the pathological condition of the forearm muscles and the possibility of their early rehabilitation.

Keywords: pathological muscles, rehabilitation massage, myotonometry, hand dynamometry, massage techniques.

Introduction

The professional activity of a modern person is associated with certain movements. Monotonous short movements, the number of which in a working day is tens of thousands, cause occupational diseases of the musculoskeletal system, which eventually lead to disability. Such a person is forced to slow down the production pace, and sometimes take a break for treatment and restoration of his professional ability to work.

Among the occupational diseases of the human musculoskeletal system, diseases of the upper extremities occur most often, the cause of which is constant overstrain. This side of occupational pathology includes a large number of certain painful forms that affect various tissues of the upper limb: muscles, bones, peripheral nerves. The most common pathology is focal hand dystonia. It mainly covers people who carry out highly coordinated brush movements with a significant excess of the number of stereotyped movements per working day. One of its forms, this is neural, which manifests itself during exercise in the form of sudden pain in the muscles, progressing on the forearm or shoulder [7, 9].

Among the professions that this pathology constantly covers, musicians are often found, especially those who play keyboards or string instruments. A musician must skillfully use the capabilities of the musculoskeletal and nervous systems of his

body. Playing a musical instrument requires controlled repetitive movements and often involves working in an unnatural posture during long hours of rehearsals and performances. Such loads on the body can lead to specific disorders of the musculoskeletal system. In addition, harsh working conditions: increased noise levels, extended periods of non-stop playing, and strenuous preparation for a new repertoire or instrument can affect the health of musicians of all ages and skill levels. [1, 7, 8].

All this in most cases leads to a state that musicians call "overplayed hands". In these cases, they begin to carry out certain rehabilitation measures. Massage is one of the common and effective measures of physical therapy in such situations. However, the presence of pain does not always allow this procedure to be carried out directly on such muscles and it is temporarily considered contraindicated.

According to experts in physical therapy, when carrying out rehabilitation massage in this direction, certain systems and methods of this procedure are used. So the classical system in most cases of the presence of pain syndrome of muscle tissues provides for a drainage massage above the localization of the inflammatory process, while maintaining a certain time after the onset of an exacerbation. And only after its decay, the pathological tissues are massaged directly [3, 10].

Specialists of the segmental-reflex massage system, using special techniques, influence the zones of hyperalgesia and hyperesthesia of muscle tissues by massaging the paravertebral zones of the spinal segments innervating pathological tissues. A well-known effect is also achieved by massaging symmetrical, healthy areas of the body. For example, limbs or torso [3, 5].

Specialists of local massage systems offer various point presses on certain areas of the human body. So, the founder of the Su-Jok therapy system Pak Gde Wu claims that local manual or instrumental massage of special zones of correspondence eliminates pain in various pathological conditions of tissues of the human somatovegetative systems. They make up the zones of projection on the hands and feet in the form of the systems "main", "insects" and "mini" [2]. In the presence of pain syndrome of muscle tissues, analgesic and relaxing effects are achieved by

performing acupressure, that is, acupressure of certain biologically active points, and prestating trigger zones [11, 14].

Among the hardware methods, vibration massage partially or completely eliminates pain in the muscles after physical overload and injuries. It is carried out with a manual vibration massager, which produces mechanical vibrations of a certain frequency. But during an exacerbation, it is also a contraindication to carrying out such a procedure [6, 10].

Studying literary sources, we drew attention to the statement of specialists, rubbing of connective tissues, namely muscle tendons, has a positive effect on the trophic processes of the muscles to which they are attached [13, 15]. According to our previous observations, during the massage of the Achilles tendon, a response was observed in the form of a decrease in skin temperature in the area of the gastrocnemius muscle and an improvement in its rest tone and tension [4].

In our case, we considered the possibility of obtaining a relaxing effect within a fairly short period of time, lasting up to 1 - 2 hours after the massage procedure. And therefore, all the recommendations presented do not solve this problem, due to the fact that their action is designed for a longer time.

Purpose of our study was to find the possibility of carrying out a rehabilitation massage of the forearms, in the presence of pain syndrome of their muscles.

Material and Methods of research

The first stage of observation was carried out by the current method in academic classes in the discipline "Massage" with 4th year undergraduate students, specialization 017 "Physical culture and sports", while studying the topic "Restorative massage in short breaks". The study involved 14 people, including 4 men and 10 women, who had no complaints about the pathological condition of the muscle tissue of the forearms. We tested the reaction of the muscles of the inner surface of the forearms on the corresponding tendons to one procedure of classic massage.

For clarity, we used the following research methods:

- dynamometry using a wrist dynamometer;

- myotonometry - with a mechanical myotonometer by analogy with the measurement of the "Sirmai" myotonometer, made on the basis of the ICh-1 dial indicator. Unlike the analogue, the double platform of this device allows, during repeated measurement, to apply it to the registration site with the same force and in any position in space. The probe with an area of 42 mm, depending on the density of the investigated tissues, under the action of an internal spring, was immersed into the soft tissues of the body to a certain depth. The full range of motion of the probe was 10 mm, taken as 100%. The depth of its immersion in superficial tissues is calculated as a percentage in relation to the full range of motion.

In the second stage of observation, 7 respondents took part - musicians with tissue hypertonicity and muscle pains of the inner surface of the forearm. The cause of the pain syndrome was professional activity. Four of them were guitarists, two were violinists and one pianist, members of musical groups, colleges and amateurs who voluntarily expressed a desire to take part in this study. When visiting a doctor, they were advised to leave their limbs alone for up to one month, they were not satisfied with the hard work associated with performing activities. At this stage, we used the following research methods:

- visual analogue scale of pain (Quadruple Visual Analogue Scale (VAS)).
- When assessing the intensity of pain according to the VAS, the respondents subjectively determined the intensity of their pain, pointing to a certain mark, which is located on a straight line 10 centimeters long. The beginning of the line on the left corresponds to the absence of pain, the end of the segment on the right side corresponds to unbearable pain;
- myotonometry.

Results of the research

The research was carried out in the following sequence. The position of the massaged person: sitting on a chair, forearms on the table with the back of the hand up. A point on the skin in the abdominal area of the muscle of the superficial flexor of the fingers was marked with a marker. At this point, the resting tone was measured. Then, at the moment of measuring the strength of the hand with a

dynamometer, the tension tone was recorded. An indicator of certain functional capabilities of the examined muscles was the difference between the resting tone and the tension tone - contraction. The larger it is, the higher the contractile ability of the muscles. All data were entered into the study protocol.

Then, the distal half of the inner surface of the forearm was massaged. Started by alternately stroking the entire surface. Then, slowly, without jerking, the tendons were rubbed from the wrist joint to the places of their attachment to the muscles. After that, the palmar surface of the entire hand was rubbed. An important condition during the rubbing technique was the maximum increase in skin mobility in the area of the massaged area. Stroking was repeated periodically and at the end of the procedure. The duration of the massage was the same for all participants - 4 minutes of the forearm and 2 minutes of the palmar surface of the hand. Immediately after this procedure, a second examination was carried out. Indicators of measurement results are presented in table 1.

Table 1

Results of the first stage of observation (n=14)

Respondent	Initial indicators before massage				Final indicators after the massage			
	Tone at rest %	Tone in tension %	Contract ion %	Brush strength kg	Tone at rest %	Tone in tension %	Contract ion %	Brush strength kg
Respondent 1 w	15,0%	24,0%	9,0%	19	12,1%	57,0%	44,9%	25
Respondent 2 w	16,0%	62,0%	46,0%	26	12,0%	66,8%	54,8%	28
Respondent 3 w	21,0%	42,0%	21,0%	21	15,0%	45,0%	30,0%	24
Respondent 4 w	17,0%	39,0%	22,0%	20	15,5%	47,4%	31,9%	24
Respondent 5 w	20,0%	57,5%	37,5%	21	19,0%	58,9%	39,9%	24
Respondent 6 w	15,7%	41,0%	25,3%	19	14,0%	50,1%	36,1%	23
Respondent 7 w	14,8%	39,0%	24,2%	19	13,5%	49,6%	36,1%	24
Respondent 8 w	18,0%	35,2%	17,2%	21	15,8%	47,8%	32,0%	25
Respondent 9 w	16,7%	33,6%	16,9%	20	15,0%	40,0%	25,0%	24
Respondent 10 w	19,0%	37,4%	18,4%	18	16,6%	40,0%	23,4%	23
Respondent 11 m	31,0%	69,3%	38,3%	42	27,5%	78,0%	50,5%	45
Respondent 12 m	26,0%	79,0%	53,0%	40	19,0%	80,0%	61,0%	43
Respondent 13 m	25,3%	70,2%	44,9%	42	20,0%	79,0%	59,0%	44
Respondent 14 m	25,2%	67,8%	42,6%	43	23,2%	78,8%	55,6%	45

At the first stage of observation, we obtained indicators that massage is aimed at connective tissues, namely, rubbing the muscle tendons of the inner surface of the

forearm, has a positive reflex effect on muscle tone both at rest and in a state of tension. At the same time, we did not take into account the possibility of performing other massage techniques, with a pathological condition of the muscles, namely hypertonicity and pain, are contraindicated before they are performed. [3, 5, 6].

Table 1 shows that after the massage according to the proposed method, the rest tone decreased by an average of 3%, and the state of tension increased by an average of 8.7%. The difference in the "Contraction" indicator indicates that the functional state of the examined muscles improved by an average of 11,7%.

Dynamometry indicators were confirmation that contraction positively affects the state of muscle performance by an average of 4 kg (table 1).

The second stage of observation, due to the impossibility of massaging the muscle tissue directly, was also performed in one group. Here, the main indicators of the condition of the muscle tissue were the intensity of pain and tone of rest.

The results of the questionnaire for VAS showed the presence of pain at the level of $5,42 \pm 0,29$ points with a maximum value of 10 points. Thus, the present pain syndrome found in musicians is a dysfunction of the forearm muscles and a significant cause of discomfort..

All of the above respondents received 10 daily classical massage procedures using a similar methodology for the first stage of observation. According to the main guidelines for classical massage, this procedure must be carried out gradually penetrating into the required depth of the massaged tissues, namely those that are the ultimate goal of the massage procedure. In our observation, the tissues to be influenced were anatomically superficial. Therefore, we used two main massage techniques: stroking and rubbing. Each of them had a specific functional purpose. Stroking by its mechanical action was directed at the skin. Its main action, in this case, was calculated on the adaptation of the tissues of the massaged surface to the hands by massaging and reflex pain relief due to friction of the hands on its surface.

The action of rubbing, in this case, was directed to connective tissues - tendons and their connections with the flexor muscles of the hand and fingers and attachment to the bones of the hand and fingers. When rubbing them, the intensity of the intake

was determined by the avoidance of significant pain sensations. Other massage techniques involve a greater intensity of movement performed by the massage therapist. Indeed, with a given state of muscle tissues, this will cause pain and, as a protective reaction, an increase in their hypertonicity..

On re-examination, all participants noted a decrease in pain intensity. Their pain score according to the VAS was $2,57 \pm 0,29$ points, that is, it decreased 2,1 times ($p < 0.05$). It should be noted that 57% of individuals rated pain at 2 points. Indicators of muscle tissue rest tone, which were used for observation, also decreased by an average of 11,3%. At the same time, five of them experienced a significant reduction in pain after 5-6 procedures, it was already a prerequisite for the continuation of their creative and professional activities (Table 2).

Table 2

Results of detecting the state of inflamed muscles before and after 10 procedures of massage of their tendons (n=7)

Respondent	Initial indicators before massage		Final indicators after the massage	
	Pain intensity according to the VAS scale, points	Tone at rest %	Pain intensity according to the VAS scale, points	Tone at rest %
Respondent 1	6	36,7 %	4	28,0 %
Respondent 2	6	38,3 %	3	25,5 %
Respondent 3	6	29,9 %	2	18,1 %
Respondent 4	5	29,8 %	2	17,6 %
Respondent 5	5	30,2 %	2	18,2 %
Respondent 6	4	28,3 %	2	17,0 %
Respondent 7	6	37,9 %	3	27,5 %

Conclusions / Discussion

A study of the state of hypertonicity of the muscles of the forearms in representatives of professions associated with constant overstrain, confirmed the impossibility of early rehabilitation, namely massage, of inflamed painful tissues. However, given that connective tissues and, in particular, tendons are involved in the work of the muscular apparatus, we proposed to transfer massage manipulations to these tissues, which practically do not experience pain. At the first stage, we studied the reaction of healthy muscles of the inner surface of the forearms to a one-time massage of their tendons. This observation has shown that tendon massage has a

positive effect on the condition of muscle tissue, a decrease in resting tone indices - relaxation and an increase in tension tone - with maximum static stress. And the growing difference between these indicators - contraction, indicates an improvement in their functional state, which is confirmed by an increase in the indicator of hand dynamometry.

The second stage of the research, we carried out with the participation of musicians with "overplayed hands". Massage of the tendons of pathological muscles gave grounds to assert that the massage technique developed by us has an analgesic effect and significantly reduces muscle tissue hypertonicity. Indicators of resting tone and level of muscle soreness noted the positive effect of the proposed massage technique and the possibility of early rehabilitation.

Prospects for further research in this direction are in the development, verification and implementation of methods for professional dysfunctions of the muscles of the forearms based on various methods of massage and self-massage.

Conflict of interests. The authors declare that no conflict of interest.

Financing sources. This article didn't get the financial support from the state, public or commercial organization.

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Received: 26.03.2021.

Published: 26.04.2021.

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