

Non-drug methods of correction of craniocervical myofascial pain

syndrome and deformity of the feet

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Manual therapy and individual foot orthotics for the correction of myofascial pain syndrome

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SUMMARY

This article is devoted to one of the urgent medical problems - the correction of myofascial pain syndrome caused by dysfunction of the foot. This topic is at the junction of several medical specialties and scientific areas. The article provides an overview of the literature on the history of the development of the issue, as well as modern ideas about the mechanisms of foot functioning, possible disorders and generally accepted options for correcting its dysfunctions. An original approach to the selection of the necessary corrective elements in the process of making individual orthoses, as well as to assessing the effectiveness of their functioning on the basis of tests used in applied kinesiology, is proposed.

Key words: manual therapy, individual orthotics, applied kinesiology, podology, osteopathy, myofascial pain syndrome, craniocervicalgia.

RESUME

This article is devoted to one of the most actual health problems - correction of the body myofascial signs of feet deformities. This topic lies at the intersection of several medical specialties and scientific fields, such as orthopedics, vertebroneurology, chiropractic, synosteology, posturology and others. The article is a comprehensive review of the literature related to the history of the issue, as well as contemporary ideas about the mechanisms of foot functioning, the possible violations and common correction variants of feet malfunction.

An original approach to selection of correction elements for individual orthoses, as well as evaluating of their effectiveness by means of applied kinesiology tests is proposed.

Viability and clinical efficacy of this method are demonstrated on the example of complex syndrome curation, including treatment of myofascial pain syndrome at the cranio-cervical level and feet dysfunction.

Keywords: individual orthotics, chiropractic, applied kinesiology, podiatry, osteopathy, myofascial pain syndrome.

Considering the high prevalence of muscle pain in all age groups, which, according to many researchers, reaches 65–75%, the interest of scientists and practical doctors in this problem at all times is understandable. Frorier in 1834 called painful cords in the muscles "callus". Virchow used the term "muscular rheumatism", and Lewellyn and Jones (1915) described the same phenomena as "fibrositis". In the literature, you can find the concept of "myogellosis zone" Schade, "myalgic points" Gatstein, Cornelius nodules, Mueller's nodes, reflected muscle pain of Kellgren [2].

The fundamental research on myofascial syndrome was the work of J. Travell & D. Simons, published in 1984 [6]. Since the publication of this work, the whole world began to use

uniform terminology. But, despite the huge number of works devoted to this topic, many problems related to the study of this pathology, for example, such an important issue as the influence of foot dysfunctions on the clinical picture of myofascial pain syndrome remains still not fully understood.

It is known that foot deformities are one of the most common pathologies of the musculoskeletal system. It has a destabilizing effect on the human postural system. As a result, this pathology can cause disturbances in any part of this system, affect the function of muscle chains and cause muscle-tonic disturbances [2, 5]. All of the above makes an individual approach to orthopedic treatment of foot dysfunction relevant.

The gold standard of orthopedic correction in the manufacture of individual orthopedic insoles is the dominant paradigm of orthosis by Merton Root for several decades [8]. This orthotics concept and its various modern interpretations are based on placing the foot in a neutral subtalar joint position and are purely mechanistic. However, the accumulated literature data on posturology, applied kinesiology, osteopathy, as well as numerous clinical observations show the connection between foot dysfunctions and impaired reflex regulation of various motor acts, in particular the walking pattern [3, 4, 9].

A walking pattern in applied kinesiology is understood as the natural strengthening of some muscles and inhibition of other muscles when testing them while the patient is in a position that imitates a step. For example, if a person takes a step with his right leg and locks himself in this position, then the flexor muscles of the right shoulder should normally show weakness, and the flexor muscles of the left shoulder should show strength, because Normally, when stepping with the right foot, the homolateral arm should be pulled back, and the heterolateral arm should move forward. In this case, the flexor muscles of the neck from the homolateral side (from the side of the leg extended forward) should show strength, and from the heterolateral side - weakness. Violation of these motor patterns indicates neurological disorganization (maladjustment) and due to the dissociation of the work of various muscle groups [3,

In our opinion, an interesting test for assessing the influence of foot pathology on craniocervical dysfunction is the jugular compression test, which can be performed and evaluated in different positions of the patient's body (standing, sitting, lying), thereby preliminarily determining the zone of localization of dysfunction. This test examines the response of the indicator muscle to slight compression of the jugular veins. Normally, the indicator muscle should not respond with a decreased reflex. A positive test indicates the presence of signs of intracranial hypertension resulting from impaired venous outflow from the head. This is confirmed by the data of rheoencephalography and transcranial Doppler ultrasound [7]. In the event that this test is positive only in the standing position of the patient, we can talk about the upward effect of the foot on the tone of the neck muscles, and, most likely,

Taking into account that the standard methods of correction of MFBS, especially at the cervical level [1], are not always effective, this study was carried out.

Purpose of the study
Install expediency complex application manual therapy and
individual orthotics for muscle tonic syndrome at patients With
craniocervicalgias, and also to show the effectiveness of using the gait pattern test and the jugular compression test in the process of making orthoses and in assessing the results of treatment of this pathology.

Research objectives

1. To establish a relationship between the clinical picture of myofascial pain syndrome in craniocervicalgia and pathology of the feet.
2. To determine the effect of dysfunctions of the foot on the indices of tests of the gait pattern and jugular

compression.

3. To determine the effect of dysfunctions of the feet on the obstruction of venous outflow from the head according to jugular veins and reveal the sensitivity of the jugular compression test to these disorders.

4. To reveal the effectiveness of the use of gait pattern and jugular compression tests for selection of corrective elements in the process of making individual insoles.

5. Determine the sustainability of clinical results of combined use of manual therapy and individual orthotics according to the follow-up study.

Research methods

1. Clinical-neurological and vertebrological examination with volume determination active and passive movements in the cervical spine, as well as palpation determination of the tone of the muscles concerned and myofascial trigger points in them.

2. Manual muscle testing of the muscles of the neck, shoulder girdle.

3. Manual muscle testing of the muscles of the flexors and extensors of the shoulder, as well as the sternum the clavicular-mastoid muscle in a patient in a step imitation position (gait pattern study).

4. Test of ischemic compression of the jugular veins on both sides with the patient standing and sitting.

5. Psychological testing. The frequency and severity of psychoemotional disorders were determined by tests of "well-being-activity-mood" (SAN), as well as the test for the study of anxiety (Spielberger questionnaire).

6. Doppler ultrasonography for detecting disorders of venous outflow from the brain.

7. The severity of degenerative processes in the cervical spine was assessed by X-ray results in 2 projections, as well as in some cases according to CT and MRI data.

8. Statistical method. The results were processed using the package statistical software "Statgraphics" developed by BISK J.

The content of the work

We observed 60 patients aged 25 to 60 years with pain syndromes in the head and neck region in combination with myofascial dysfunctions at the same level; of them women - 39 (65%), men - 21 (28.6%). It should be noted that at the time of the visit, 20 patients participating in our study already had individual insoles, which were made without taking into account their effect on the indicators of the gait pattern test and jugular compression. The duration of the disease ranged from 6 months. up to 10 years and more, on average - 2-3 years. The duration of the last exacerbation averaged 1–2.5 months. Manual diagnostics and manual muscle testing revealed the presence of static-dynamic disorders in all patients in the form of limitation of active and passive movements in the cervical spine, signs of non-optimal statics, in some cases, a violation of the motor pattern - "abduction" of the shoulder, the presence of trigger points and a decrease in the stretch reflex in the muscles concerned. The intensity of the pain syndrome according to the VAS scale was 62.5 ± 2.5 points, where 0 was taken as a state in which pain was completely absent, and 100 points characterized the most pronounced pain reaction.

The results of psychological testing showed a significant ($p < 0.05$) decrease in all SAN indicators in comparison with the control measurements. So, the indicator "well-being" averaged 3.6 ± 0.3 , "activity" - 3.2 ± 0.4 , "mood" - 3.7 ± 0.4 points. Indicators in the control group were at the level of $4.7-5.0 \pm 0.4$ points. The Spielberger test in all patients revealed a high or very high degree of anxiety, which indicates the presence of initial signs of a psychosomatic syndrome.

All patients underwent manual therapy in the amount of 7-10 procedures, 2 times a week. In this case, osteopathic, structural, craniosacral, visceral techniques were used with the obligatory use of soft myofascial, not direct functional, and, in some cases, trust techniques on the foot and lower leg. According to the indications, drug therapy was prescribed, mainly NSAIDs.

In accordance with the tasks set, all patients were divided into 3 groups of 20 people each. The control group consisted of 10 healthy volunteers.

Patients of the 1st group immediately before the first procedure were made individual insoles according to the technology proposed by the research and production center Sursil-Orto. The choice of the metatarsal ridge, as well as the calcaneus and the longitudinal arch corrector, necessary for the correction of transverse flat feet and the elimination of subluxation of the metatarsal bones, was carried out taking into account the indicators of the gait pattern test. For the manufacture of insoles, we used that roller and that form of instep support, which restored the correctness of the "on" and "off" of the tested muscles (flexors and extensors of the shoulder, as well as the sternocleidomastoid muscles), while the person was in the position of imitating a step ... In addition, before and after the manufacture of orthoses, we performed a jugular compression test while standing and sitting. Group 2 patients received only manual therapy. Group 3 (comparison) consisted of 20 patients with orthopedic insoles already available. The limitation period for the manufacture of insoles did not exceed 6 months.

Results and its discussion

Analyzing the data of clinical efficacy in groups, we observed the following picture: a significant improvement (regression of subjective and objective symptoms) and improvement (regression of subjective manifestations) were observed in group 1 in 19 (95%) people, in group 2 in 16 (80%), in the third - in 18 (90%) people (Table 1).

Positive dynamics of neurological symptomatology was observed in all groups, however, differences in the time of its onset were revealed. Thus, the regression of static-dynamic disorders in patients of the 1st group was observed already by the 2nd or 3rd procedure, and in patients of the 2nd and 3rd groups by the fifth and fourth procedures, respectively. Group differences were also revealed in the dynamics of pain syndrome, assessed by the VAS scale. In patients of the 1st group, the analgesic effect was noted already by the 2nd procedure (p <0.05), reaching its maximum by the fourth. In patients of the 2nd and 3rd groups, the analgesic effect was noted somewhat later - by the 3-4th procedure with the maximum analgesic effect after the 6th procedure.

Table 1

Evaluation of the clinical effectiveness of the studied treatment methods

Groups	Significant improvement		Improvement		Minor improvement		No effect		Deterioration	
	Abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
I (n = 20)	eighteen	90%	one	5 %	-	-	-	-	-	-
II (n = 20)	14	70%	2	10 %	2	10 %	2	10%	-	-
III (n = 20)	15	75%	3	15 %	2	10 %	-	-	-	-

Note: n is the number of observations

We conducted gait pattern studies before and after each manual therapy session. At the initial examination, the walking pattern was disrupted in all patients. The exception was 4 patients from group 3. During the imitation of the step, the flexors and extensors of the arms gave the correct reaction. However, one of them showed a decrease in the reflex of the sternocleidomastoid muscle on the homolateral (with respect to the step) side, and in the other two, bilateral weakness of this muscle was tested. After the first session, we observed restoration of the walking pattern in all patients. It should be noted that when testing the walking pattern before the next sessions, abnormalities were found again in patients of the 2nd and most patients of the 3rd group, while in the patients of the 1st group, testing of all muscles gave the correct response.

We observed a similar picture when analyzing the jugular compression test. This test was also necessarily performed before and after each manual therapy session in the standing and sitting position of the patient. In the first procedure, the standing test was positive in all patients. After a session of manual therapy using osteopathic, cranial and visceral techniques, as well as correction of foot dysfunction using manual therapy, this test became negative. However, after provocation with a step load, in some patients (group 2 - 7 patients, group 3 - 5 patients) immediately, and in the rest of patients from groups 2 and 3, the jugular compression test again

turned out to be positive. These observations did not apply to the 1st group of patients. After foot correction and wearing custom-made insoles, the jugular vein compression test in these patients in the standing and sitting positions was negative.

According to the ultrasound scan performed before treatment, obstruction of venous outflow through the cervical veins was detected in 92.7% of cases. After the course of therapy, 95% of patients of the 1st group showed a significant ($p < 0.05$) improvement in extracranial venous blood flow in the form of a decrease in LBFV in the internal jugular veins, while in patients of the 2nd and 3rd groups this improvement was verified in 65 % and 75% of patients, respectively.

Psychological research according to the SAN method reflected the positive dynamics of the studied parameters, and they acquired the character of statistical reliability only in the 1st group.

According to the results of the Spielberger test, positive dynamics of the psychological state was observed in 93.3% of patients in group 1, in 70% of patients in group 2 and in 83% of patients in group 3.

To identify the stability of the results obtained, we examined the treated patients 5–6 months after the end of the course. It was found that a persistent antinociceptive effect was observed in patients of the 1st group, the rate of pain in them averaged 12.8% (the rate immediately after treatment was 10%). In group 2 patients, the pain rate was 31.2% (immediately after treatment - 20%). In the 3rd group of patients, the severity of pain syndrome was 23.8% (immediately after treatment - 15%).

Violations of the walking pattern in the 2nd and 3rd groups of patients were detected in 100% of cases. In the first group of patients, the walking pattern was disturbed in 4 patients (20%). The normalization of function occurred after the necessary changes were made to the individual orthoses.

A similar picture was observed in the analysis of the jugular compression test, which correlates with the data of ultrasound diagnostics. In patients of the 2nd and 3rd groups, this test in the standing position was positive in 75% (15 patients) and 65% (13 patients) cases, respectively; while in patients of the first group, it was positive in 2 (10%) patients and returned to normal after adjusting the orthoses.

table 2

Dynamics of indicators of the test "well-being-activity-mood" by groups as a result of treatment

Groups	Wellbeing		Activity		Mood	
	Before	After	Before	After	Before	After
I (n = 20)	3.2 ± 0.4	4.5 ± 0.2 *	3.5 ± 0.4	4.3 ± 0.3 *	3.6 ± 0.6	4.8 ± 0.2 *
II (n = 20)	3.3 ± 0.3	3.9 ± 0.5	3.4 ± 0.5	4.0 ± 0.5	3.6 ± 0.5	3.9 ± 0.5
III (n = 20)	3.3 ± 0.4	4.0 ± 0.3	3.5 ± 0.4	4.0 ± 0.3	3.5 ± 0.5 *	3.8 ± 0.5

Note: * - $p > 0.05$ - significant difference in differences.

Conclusions:

1. The stability of the clinical manifestations of myofascial pain syndrome on the craniocervical level may be due to the presence of a connection between dysfunctions of the musculo-ligamentous-articular apparatus of the foot and the muscles of the neck.

2. Using the indicators of the gait pattern test when choosing the necessary the manufacture of orthopedic insoles, rollers, braids, etc. leads to the highest clinical effect of the orthosis, because in addition to mechanical correction of flat feet, this test allows to take into account the upward influence of foot dysfunctions on the implementation of posturological reactions and motor acts.

3. Dysfunctions of the foot can contribute to the formation of intracranial hypertension, which is confirmed by USDG data. Therefore, to control the effectiveness of the treatment, it is advisable to use the jugular compression test, since it is an indicator of latent disorders of venous outflow through the jugular veins.

4. The use of individual orthopedic insoles is advisable if myofascial pain syndrome at the craniocervical level, since their use in conjunction with manual therapy leads to the most pronounced and rapid regression of pain, muscle-tonic and neurovascular manifestations.

5. Sustainability of the therapeutic effect of manual therapy in combination with wearing Orthoses individually made according to this technique confirms the high efficiency of their use in this category of patients.

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