Painful muscle syndromes in somatic patients

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Relevance

It is well known that pathological changes in the nervous system are often diagnosed in somatic patients. And the most common of them are muscle pain syndromes [1]. Therefore, patients with somatic diseases come to see not only neurologists, but also doctors of various specialties. However, there are still no signs of differential diagnosis of muscle pain syndromes of viscerogenic origin from muscle pain syndromes of vertebrogenic, myogenic genesis, etc. This is extremely important not so much for diagnosis as for determining treatment tactics and early detection of visceral pathology. And in patients living in large cities, early diagnosis of visceral pathology is extremely important due to the fact that

Nevertheless, muscle pain syndromes are the most undeveloped direction in neurology in terms of diagnostics. And the questions that arise before a practical neuropathologist every day still have no answer.

The main ones are the following:

1. What is the reason for the localization of muscle pain syndrome separately? taken muscle? Such syndromes as the syndrome of the pectoralis minor, piriformis, scalene muscles are widely described [1; 2]. If it is a static or dynamic load, why is only a single muscle overloaded? If this is a manifestation of nerve compression, then why is there only one muscle of all those innervated?

2. What causes the localization of muscle pain syndromes in different muscle groups that have neither common innervation nor single areas of blood supply?

3. Why are muscle pain syndromes not confined to a specific zone, but often migrate through the patient's body, localizing either in the cervical or in the lumbar spine? In this case, not only pain migrates, but also shortening or muscle spasm. In these cases, the neuropathologist is forced to chase pain through the patient's body with a blockade needle, and the chiropractor does not have time to stretch the shortened muscles even in 20 manual therapy sessions, dulling the sensation of pain, but not eliminating it drastically.

4. Equally important is the question of provoking factors, Why do muscle pain syndromes occur in static conditions or are they provoked by walking? Can these conditions be provocative for the spine and muscles for which they are intended? Movement is the main therapeutic factor, these words will be confirmed by any physiotherapy doctor. The aging factor is untenable, so

exactly how children make up the main group of patients with muscle pain syndromes. The factor of hypodynamia does not stand up to criticism, since despite the huge army of sports doctors there is not a single practical doctor who would not turn to athletes for help. In one of the schools of the Olympic reserve, we carried out a statistical study: traumatogenic and non-traumatogenic sports did not differ in the frequency of referral [3].

5. Why muscle pain syndromes can be provoked by such unusual factors, such as eating, experiencing emotional stress, or occurring at certain times of the day?

6. Why does muscle pain disappear completely, then reappears? What laws underlie its relapse, migration, chronicity? The lack of answers to these questions explains the widespread popularity of pain medications. So, if the doctor does not understand what the patient's body is telling him with its pain, and does not know what mechanisms cause it, then the only way to get rid of the pain is to stun the body with a discharge of pain medications.

Our twenty years of experience in observing patients suffering from muscle pain syndromes of viscerogenic genesis, allowed us to propose an original hypothesis of the formation of this suffering, allowing us to make an attempt to answer the above questions.

The proposed hypothesis is based on the results of experimental studies of domestic neurophysiologists and biomechanics, who have done so much to develop the theory of viscero-motor reflexes. Historically, the stages of development of the idea of muscle pain syndromes of somatic genesis can be represented as follows.

1st stage.

The issues of tonic-force imbalance of muscles are most widely studied at the Institute of Clinical Biomechanics N.A. Bernstein [4; 5]. In his works, the author reported on the presence of two phases of isometric contraction: phasic (regulation at the level of suprasegmental structures) and tonic (regulation at the level of the thalamopallidal system) components of muscle contraction - and described the occurrence in the muscle during isometric contraction of a large-amplitude pallidary tremor.

Stages of phasic and tonic contraction, highlighted by prof. ON. Bernstein, can be represented as follows.

Phase contraction:

- designed to perform quick short-term voluntary movements while performing concentric and eccentric muscle contractions;
- regulation is carried out at the level of the central nervous system;
- an arbitrary change in the force of contraction is possible;
- when an afferent signal appears, the first is included in maintaining tone;
- the transmission of information is an electrical impulse;
- when tested, it is estimated as resistance to pressure in the 1st phase of isometric contraction;

- characterized by rapid fatigue and therefore without the existence of the 2nd phase is diagnosed as functional muscle weakness.

Tonic contraction:

- designed for long-term maintenance of a constant muscle length;
- regulation is carried out at the level of the thalamopallidary system;
- responds to an impulse 3 seconds after the occurrence isometric reduction;
- the impulse is transmitted using a mediator transmission system;
- when tested, it is estimated as an increase in the resistance force during 2nd isometric contraction phase;
- fatigue comes on slowly;
- arbitrary change in the force of contraction is impossible (affects peripheral afferentation: from the vertebral motor segment, visceral organ, trigger zones, etc.). It reacts to a decrease in afferentation (organ dysfunction, etc.) by a decrease in the contraction force in the 3rd phase, in response to muscle stretching (provocation, activation of the stretch reflex) - by its strengthening.

Especially important is the factor that the 2nd phase of muscle contraction is influenced by afferentation emanating from the body's receptor apparatus. And the determining factor in this afferentation is interoreception from internal organs. Deficiency or dysafferentation contributed to the fact that there was a distortion of the 2nd component of muscle tone and formed its functional weakness. This assumption is also confirmed by the research of M.R. Mogendovich [6; 7].

2nd stage.

During experiments on dogs, prof. M.R. Mogendovich traced this relationship more clearly. By irritating electrodes implanted into internal organs, he recorded the electromyographic response of skeletal muscles. Visceromotor reflexes [6; 7] were expressed as shifts in motor chronaxia. In chronic experiments on fistula dogs, the influence of irritation of the interoceptors of not only the gastrointestinal tract, but also the cardiovascular system, the bladder on the muscles of the extremities was established during temperature, mechanical, chemical stimulation of various parts of the digestive tract. In addition, after studies on patients with gastric fistula, results were obtained that confirm the data of experiments on animals. At the same time, it was found that between the hunger contractions of the stomach (registered kymographically) and the tone of the muscles of the hands, there are certain dynamic relationships [8]. The data obtained by him indicated the presence of interrelations between the function of internal organs and the tone of skeletal muscles in the form of visceromotor reflexes. It is also known that an attack of angina pectoris causes severe muscle weakness in general, and especially in the left arm [9].

Regulation of internal organs [6; 7] in the event of various life situations, it is provided by the integral activity of exteroreceptive afferent systems. The presence in the central nervous system of associative connections between somatic and autonomic formations

is the basis for the transition of excitation from one system to another [8].

Thus, in an experiment, when the central segment of the vagus nerve is irritated when the bladder is stretched, intereceptive impulses act depressingly on the reflex activity of the spinal cord and, in particular, cause a decrease in skeletal muscle tone [9].

At the same time, it has been reliably established that irritation of certain organs is accompanied by a decrease in the tone of specific skeletal muscles.

But for many years their teachings were not in demand by clinical medicine. Perhaps this is due to the fact that it was not known how to clinically diagnose muscles with a violation of the 2nd phase of muscle contraction with preserved strength, but with a reduced tone and what role they played in the clinic of muscle pain syndromes. In addition, during that period, the infectious therapy of myositis was adopted, in which the hypotonic muscles did not fit.

3rd stage.

It is associated with the emergence of data on viscerodermal connections (Zakharyin-Ged zone), on visceroemotional, on visceromeridian connections. In the light of these views, the data obtained by prof. Levit [10], about functional chains between various mutually distant structures and systems (vertebrae, muscles, fascia, joints of the extremities). In conditions of normal functioning of the body, they are inactive, and when the function of one of their components is disturbed, the activation of structures associated with it occurs.

It is possible to draw an analogy between these functional chains with the activity of congenital (primitive) reflexes, which are active in a newborn (sucking, palmar-oral), lose their activity in healthy adults and are manifested in the pathology of the central nervous system. These data have received only partial use in practice. At that time, the works of Ya.Yu. Popelyansky and his schools, revolutionary at that period of development, about the reflex mechanism of the onset of muscle pain syndromes as a reaction of peripheral nerve trunks to their irritation [11]. It was during this period that motovisceral reflexes were actively demanded by physiotherapy exercises, which were the scientific basis for the benefits of movement for the normal functioning of internal organs; visceromotor - were practically not used.

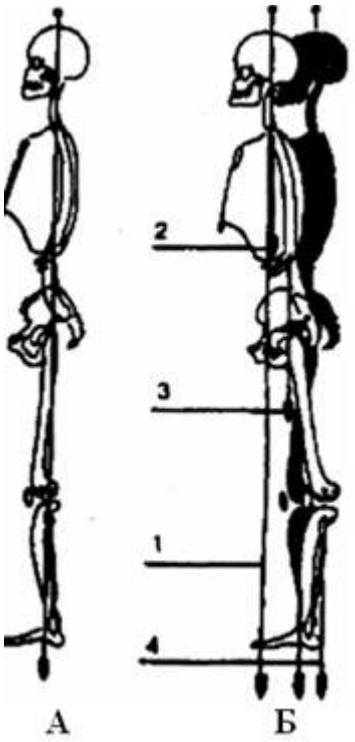


Fig. 1. Visual criteria for optimality of statics:
A-optimal statics,
B - suboptimal statics.
The numbers indicate regions with a displacement of the regional center of gravity.

3rd stage bound withworks V. Yandy [12]. Based Electromyographic data developed ideas about the possibility of non-optimal statics due to the combination of relaxed and shortened muscles, which form crossed and layered syndromes, depending on the combination of shortened and relaxed muscles. The concepts of visual diagnostics of non-optimal statics and dynamics are introduced (Fig. 1, 2).

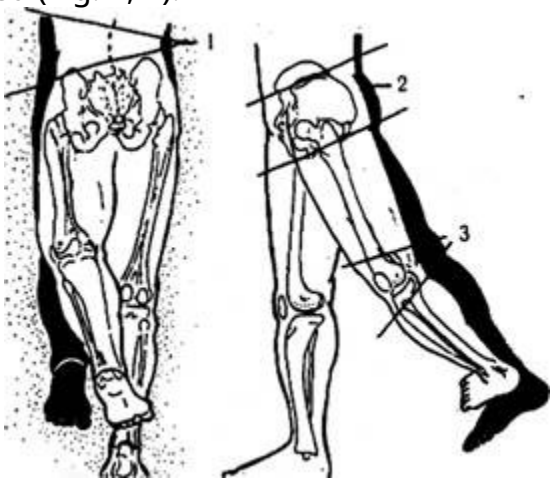


Fig. 2. Visual criteria for the atypical motor pattern "Extension hips "in a patient with reproductive dysfunction.

Regional boundaries: 1 - lumbar; 2 - femoral; 3 - knee

During this period, the data of prof. V.P. Veselovsky about the leading role of relaxed muscles in the genesis of muscle pain syndromes.

The syndromes described by him are called vicarious and postural. On the basis of electrophysiological studies, the author found that pain is localized in the muscles, which are shortened again, compensating for the static and dynamic failure of the relaxed muscles. However, the lack of data explaining why such a huge number of relaxed muscles appear, not connected by zones of innervation and blood supply, did not contribute to the widespread dissemination of its results.

4th stage.

It is related to the research of the founder of Applied Kinesiology, Dr. Goodhard [13]. His merit lies in the fact that he developed a method for diagnosing a functionally relaxed muscle.

The goal is to assess the functional state of the tone of the muscle under study. This requires:

1. Create conditions under which muscle tone normally increases:
- perform isometric contraction;
- perform a movement in which the muscle under study is an agonist.

2. Eliminate the influence of other muscles (Fig. 3). It is important for this to be correct perform the initial position in which the muscle fibers are located along the line of contraction, which allows it to be performed with little effort (limiting the inclusion of synergists).

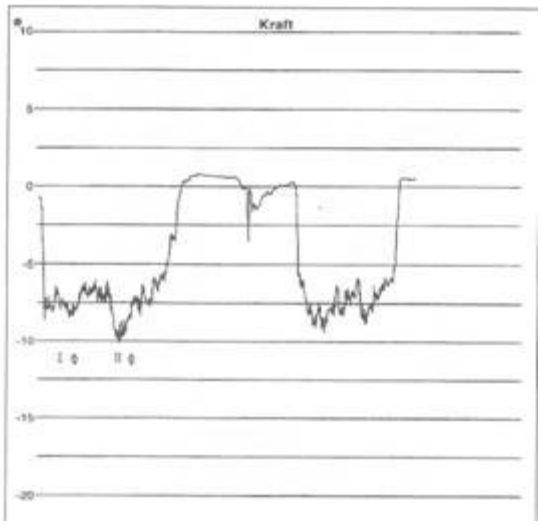
3. Correctly assess muscle tone in the form of an increase in the force of contraction 2-3 seconds after the onset of isometric muscle contraction and after activation of the stretch reflex (in the form of adaptation to increased load during stretching).

When compared with the research of prof. ON. Bernstein, we came to the conclusion that in this case we are talking about two phases of isometric contraction. The 1st phase of isometric contraction allows, under conditions of constant length, to lead to an increase in tone, it was its increase that was normally recorded in the 2nd phase; a decrease in the strength of isometric contraction in the 1st phase indicates a decrease in muscle tone or the appearance of functional relaxation. Computer dynamometry (Fig. 4), carried out in the clinic of biomechanics, confirmed the presence of two phases of contraction and their changes in the presence of functional muscle weakness [14].

The 4th stage is associated with the name of J.P. Barral [15; 16] and his research on the possibility of diagnosing the mobility of internal organs, shortening their ligaments and the technique of visceral therapy, which allows to stretch the ligamentous apparatus of internal organs, contributing to the restoration of internal mobility of the organ (Fig. 5).

Fig. 3. Manual muscle testing of the pectoralis major muscle (brisket portion) associated with the liver (according to Walther D., 1988)

Computed tomography by means of repeated cross sections after 3-5 seconds confirmed the presence of the internal rhythm of various organs, their limitations in pathology and the possibility of their recovery after visceral therapy.



Rice. 4. Comparative computer dynamometry of the strength of two phases of isometric contraction: muscles in a healthy subject (a) and muscles, having functional weakness (b)

Rice. 5. Topographic visceromotor connections of the lungs and cervical chest passage

1 - lig. Vertebropleurale, 2 - lig. Costopleurale; 3 - lig. Costopleurovertebrale; 4 - lig. tracheopleurale; 5 - lig. oesophagopleurale; 6 - lig. vasopleural; 7 - fascia scaleni; 8 - scalene muscles; 9 - the smallest scalene muscle; 10 - lung; 11 - vertebra; 12 - the esophagus; 13 - trachea; 14 - large vessels

At radiological [17] and ultrasound violations of the position of the organ and its recovery after visceral therapy were recorded (Fig. 6, 7).

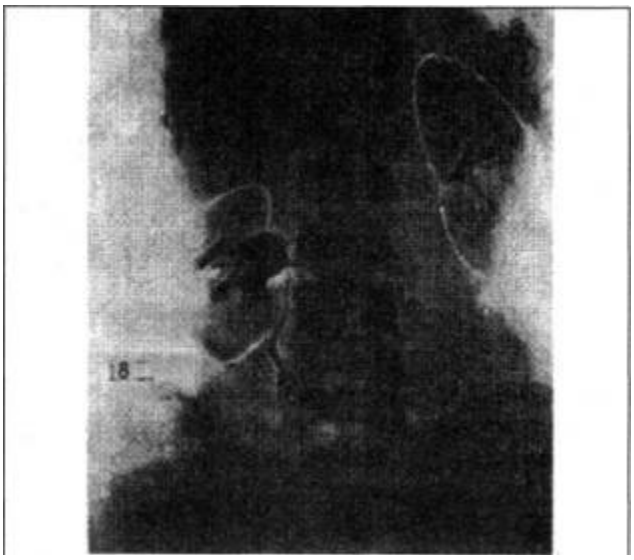


Fig. 6. Intravenous urography in a standing position before treatment. The lower pole of the right kidney is defined at the LV level

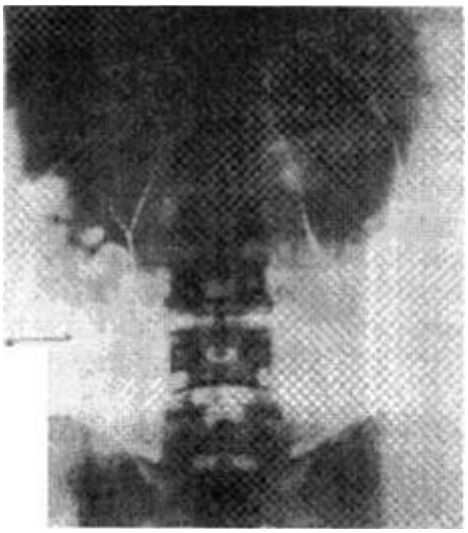


Fig. 7. Intravenous urography in a standing position after treatment.
The lower pole of the right kidney is defined at level LIII

5th stage.

Connection of the presented data into a single functional system.A.

Decreased mobility of an internal organ leads to a decrease(distortion) of afferentation entering the thalamopallidal system through the spinothalamic pathways. A decrease in afferentation leads to a decrease in the efferentation of a specific skeletal muscle in the form of a decrease in its tone (confirmation by experiments on dogs by M.R. Mogendovich and EMG associated4 muscles - irritation of the electrode implanted into the internal organs of the dog - decrease in the tone of the associated muscles). The reverse effect of the reflex was traced in patients. Successful visceral therapy led to the elimination of functional weakness. Confirmation - data from records of computer dynamometry EMG studies before and after visceral therapy [18].

B. Decreased muscle tone, leading to its postural and dynamicinsolvency. Confirmation - data of computer topography in statics and dynamics of patients with functional muscle weakness and after its elimination [19; twenty]. Electromyographic studies of the sequence of muscle involvement in muscle movement during its functional relaxation and after its elimination

B. Hypotension of one muscle leads to secondary compensatory hypertonicity of its antagonist (in statics) or hyperexcitability of a synergist, neutralizer, fixator (in dynamics) [21]. Confirmation - elimination of hypertonicity and hyperexcitability of muscles after restoring the tone of functionally relaxed muscles.

The research carried out makes it possible to answer the questions posed at the beginning of the article.

1. Question: What is the reason for the localization of muscle pain in a single muscle?

Answer: Muscles associated with organs are usually isolated

agonists of specific movements. Their hypotension leads to compensatory hypertonicity of synergists or antagonists, which form pain syndrome. For example, liver dysfunction is accompanied by functional weakness of the pectoralis major muscle, which leads to compensatory overload of the pectoralis minor and the formation of a reflex compression syndrome.

The restoration of the functional mobility of the liver is accompanied by the restoration of the tone of the pectoralis major muscle and leads to spontaneous elimination of the pectoralis minor syndrome.

2. Question: What is the reason for the localization of muscle pain syndromes in different muscle groups that have neither common innervation nor uniform areas of blood supply?

Answer: Painful muscular syndromes arise v muscles, compensating static or dynamic insolvency functionally relaxed muscles, and are united by a single functional task - to keep the body from falling or to make a movement instead of an agonist. When the tone of functionally relaxed muscles is restored, compensatory shortening and, at the same time, clinical manifestation disappear spontaneously.

3. Question: Why are muscle pain syndromes not confined to a specific area, and often migrate through the patient's body, localizing either in the cervical or in the lumbar spine? In this case, not only pain migrates, but also shortening or muscle spasm.

Answer: Relaxed muscles are confined to a specific zone, and shortening(and pain syndrome) depends on the level of compensation formation in the body: compensation by shortening of muscles located in the same region with the localization of relaxed muscles or in a neighboring one.

4. Question: Why do muscle pain syndromes occur in static or are provoked by walking, is this natural movement for patients?

Answer: Because the statics and dynamics of the patient due to muscle imbalancebecome suboptimal. Therefore, for the implementation of the task, the body activates various muscle groups, forming their static and dynamic overload.

5. Question: Why can muscle pain syndromes be provoked? unusual factors such as eating, experiencing emotional stress, or occurring at certain times of the day?

Answer: The listed factors provoke dysfunction of internalorgans (or meridians associated with them), leading to the activation of visceromotor reflexes. Muscles associated with organs become hypotonic and hypoexcitable, causing compensatory overload (and clinical manifestation) of other muscles.

6. Question: Why does muscle pain disappear completely, then again arises? What laws underlie its relapse, migration, chronicity?

Answer: Activation of various functional connections (visceromotor, vertebromotor, emotional-vertebral reflexes, etc.) leads to a decrease in the tone of the associated muscles.

7. Question: How to identify that muscle pain syndromes have

somatogenic genesis?

Answer: Several stages are required.

Visual diagnostics reveal suboptimal statics and dynamics [19; twenty].

Muscle testing evaluates the presence of functional weakness of agonists, performed movements, or postural muscles [13].

By the method of visceral diagnostics, mechanical provocation of an organ that has functional connections with a given muscle is carried out, and the change in the tone of the muscles under study is assessed [15; 16].

8. Question: Who is visceral manual therapy indicated for?

Answer: Those patients who have an organ displacement in a specific direction leads to the elimination of functional muscle weakness. If such a direction is not found, visceral therapy is contraindicated [17].

CONCLUSION

The proposed original hypothesis protected 15 copyright evidence obtained by the author of the article and her colleagues and students is based on a neurophysiological basis, verified by 20 years of clinical experience. The data obtained are widely used in teaching the course of neurology and traditional medicine, organized at the base of the Department of Neurology.

LITERATURE

1. Zaslavsky E.S. Painful muscle-tonic and muscle-dystrophic syndromes: Abstract of the thesis. dis. Dr. med. sciences. - M., 1980 .-- 34p.

2. Mikhailov A.M. A method of treating muscle pain syndromes. Priority No. 99009452 dated 15 September 1999

3. Vasilyeva L.F. Rehabilitation of pediatric athletes // Materials of the I International Congress of Vertebroneurology. - Kazan, 1991 .-- P. 116.

4. Bernstein ON Essays on Physiology of Movement and Physiological activity. - M .: Biomedgiz, 1966 .-- 422p.

5. Bernshtein N.A., Vereshchagin N.K. To the method of measuring tone striated muscles in humans // Proceedings of the 3rd All-Union Congress of Physiologists. - M., - T. 1. - S. 137-167

6. Mogendovich M.R. Sensitivity of internal organs (interoception) and chronaxia of skeletal muscles. - L., 1941.

7. He's the same. Reflex interactions of the locomotor and visceral systems. - M .: Medgiz, 1957. - S. 13-18.

eight. He's the same. On the relationship of motor-visceral and visceromotor reflexes // Motor-visceral and visceromotor reflexes. - Perm, 1963 .-- S. 7-9.

nine. Ivanichev G.A. Neurophysiological mechanisms of occurrence vertebrovisceral pain // Vertebroneurology. - 1994. - No. 1. - S. 9-12.

10. Vasilieva LF, Levit K. Diagnosis of muscle dysfunction in examination // Rehabilitation of the spine. - Williams & Willkins, 1995 .-- P. 113-142.

11. Popelyansky A.Ya. Lateral chest wall syndrome // MaterialsI International Congress of Vertebroneurology. - Kazan, 1991 .-- P. 116.

12. Janda V. Manuelle Muskulfunktinaldiagnostik. - Berlin: Veb Verlag, 1994.- 301 s.

13. Shafer JP Applied Kinesiology and gastroenteropathology, Medicine Approach. - Baltimore, Hong Hong, London, Munchen, Sydney, Tokyo: Williams & Willkins, 1996 .-- 309 p.

14. Vasilieva L.F, Kogan O.G. Method for diagnosing dynamic disturbances in patients with chronic muscle pain syndromes. AS No. 96111363.

15. Barral J.P. Visceral manipulation II, 1995.

16. Barral J.P. Pierre Mercier - Manipulation visceralis. - Berlin: Veb Verlag, 1977. - 300 s.

17. Vasilieva L.F., Mikhailov. Manual diagnostics and therapy dysfunction of internal organs. - Novokuznetsk, 2002.

18. Vasilieva L.F., Dupin V.A. Electromyographic diagnostic method violations of the coordination of muscle efforts. 1996, AC No. 96111363.

19. Vasilieva L.F., Schmidt I.R. Method for diagnosing static violations in patients with chronic muscle pain syndromes. 1996, AC No. 96109392.

twenty. Vasilyeva L.F., Kogan O.G. Diagnostic method for dynamic disorders in patients with chronic muscle pain syndromes 1996, AC No. 96109160.

21. Vasilieva L.F. Mikhailov V.P. A method for assessing a motor stereotype using optical topography. 1996, AC 96120550.

Vasilieva, L.F. Muscular pain syndromes in somatic patients / L.F. Vasilyeva // Traditional medicine. - 2004. - No. 1 (2). - pp. 14-20.

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